

DIVISION 2

**SITE WORK**

**SECTION 02010**  
**SUBSURFACE INVESTIGATION**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

All applicable provisions of the bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this section.

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the subsurface investigation WORK, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".
- B. The subsurface investigation for conditions of the project site is the sole responsibility of the CONTRACTOR. In preparing the Bid, the CONTRACTOR shall make all subsurface or surface investigations necessary to provide proper background and knowledge to determine the nature and extent of WORK required.
- C. All the available subsurface information, as attached Exhibit A makes no warranties or guarantees concerning the nature of materials to be encountered on the site.

1.03 RELATED WORK

- A. Section 02110 - Clearing.
- B. Section 02200 - Earthwork.
- C. All applicable sections under Divisions 1, 2, 3, and 4.

1.04 MEASUREMENT AND PAYMENT

There shall be no special measurement or payment for the WORK under this section, it shall be included in the lump sum price bid for item 1 - mobilization.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 02010

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this Section.

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the clearing WORK, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".
- B. Under this section, the CONTRACTOR shall do all clearing, grubbing, root-raking, and necessary clean-up operations in connection with the construction of the WORK and its related sitework.
- C. The WORK shall consist of the removal and disposal of trees, stumps, roots, limbs, brush, fences, asphalt, etc. from all project areas as designated on the drawings as specified herein, and as directed by the ENGINEER on the site.
- D. The CONTRACTOR shall remove all refuse, asphalt pavement, concrete pavement, glass, metal, stone, plaster, lumber, paper materials, and any and all trash found in clearing and adjacent areas as directed by the ENGINEER.
- E. The CONTRACTOR shall furnish all services, labor, transportation, materials, and equipment necessary for the performance of these operations. All clearing and cleanup operations shall be accomplished to the complete satisfaction of the ENGINEER.
- F. The CONTRACTOR shall strip all existing topsoil and stockpile it on-site in locations approved by the OWNER's Representative. All topsoil material shall be stockpiled within a haul distance of 3,000 feet.

1.03 RELATED WORK

- A. Section 02010 - Subsurface Investigation
- B. Section 02200 - Earthwork.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 TREE REMOVAL AND TREE PRESERVATION

- A. All trees shall be removed unless noted in the plan to remain or be relocated.

3.02 MEASUREMENT AND PAYMENT

**SECTION 02110  
CLEARING**

There shall be no special payment for the WORK under this section, it shall be included in the lump sum price bid.

END OF SECTION 02110

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this Section.

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the Earthwork, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".
- B. Including but not necessarily limited to the following:
  - 1. Excavation, including demucking.
  - 2. Backfilling.
  - 3. Filling.
  - 4. Grading, general site.
  - 5. Compaction.
- C. There shall be no classification of excavation for measurement of payment regardless of materials encountered.
- D. The WORK of this Section includes all earthwork required for construction of the WORK. Such earthwork shall include, but not be limited to, the loosening, removing, loading, transporting, depositing, and compacting in its final location of all materials wet and dry, as required for the purposes of completing the WORK specified in the Contract Documents, which shall include, but not be limited to, the furnishing, placing, and removing of sheeting and bracing necessary to safely support the sides of all excavation; all pumping, ditching, draining, and other required measures for the removal or exclusion of water from the excavation; the supporting of structures above and below the ground; all backfilling around structures and all backfilling of trenches and pits; the disposal of excess excavated materials; borrow of materials to makeup deficiencies for fills; and all other incidental earthwork, all in accordance with the requirement of the Contract Documents.

1.03 RELATED WORK

- A. Section 02210 - Site Grading.
- B. All applicable sections of Division 1, 2, 3, and 4.

1.04 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

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A. **Codes:** All codes, as referenced herein, are specified in Section 01090, "Reference Standards".

B. **Commercial Standards:**

ASTM D 422	Method for Particle-Size Analysis of Soils.
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in (304.8-mm) Drop.
ASTM D 1556	Test Method for Density of Soil in Place by the Sand Cone Method.
ASTM D 1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in (457-mm) Drop.
ASTM D 1633	Test Method for Compressive Strength of Molded Soil-Cement Cylinders.
ASTM D 2419	Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
ASTM D 2487	Classification of Soils for Engineering Purposes.
ASTM D 2901	Test Method for Cement Content of Freshly-Mixed Soil-Cement.
ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
ASTM D 4253	Test Methods for Maximum Index Density of Soils Using a Vibratory Table.
ASTM D 4254	Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.

1.05 SUBSOIL INFORMATION

There are no representations of any type made as to subsurface conditions.

1.06 SITE INSPECTION

The CONTRACTOR shall visit the site and acquaint himself with all existing conditions. Make his own subsurface investigation to satisfy himself as to site and subsurface conditions, but such subsurface investigations shall be performed only under time schedules and arrangements approved in advance by the OWNER's Representative and ENGINEER.

1.07 TOPOGRAPHIC INFORMATION

The existing grades shown on the drawings are approximate only and no representation is made as to their accuracy or consistency. The CONTRACTOR shall verify all existing grades to the extent necessary to insure completion of the job to the proposed grades indicated on the drawings.

1.08 DISPOSAL OF SURPLUS OR UNSUITABLE MATERIAL

Unsuitable material encountered during the course of construction shall be removed from the construction site at the expense of the CONTRACTOR. Unsuitable material shall not be stockpiled

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on-site. All suitable material shall be stockpiled on-site at areas designated by the ENGINEER. CONTRACTOR to comply with City ordinances.

1.09 BENCH MARKS AND MONUMENTS

CONTRACTOR shall employ a registered surveyor to lay out lines and grades as indicated. Bench marks shall be established by a surveyor registered in the State of Florida. Bench marks shall be permanent and easily accessible and maintained and replaced if disturbed or destroyed. All benchmarks shall be NGVD.

1.10 UTILITIES

- A. Before starting site operations, disconnect or arrange for the disconnection of all utility services designated to be removed.
- B. Locate all existing active utility lines traversing the site and determine the requirements for their protection. Preserve in operating condition all active utilities adjacent to or traversing the site and/or designated to remain.
- C. Observe rules and regulations governing respective utilities in working under requirements of this section. Adequately protect utilities from damage, remove or replace as indicated, specified or required. Remove, plug or cap inactive or abandoned utilities encountered in excavation. Record location of all utilities.

1.11 QUALITY ASSURANCE

- A. The soil ENGINEER may be retained by the OWNER to observe performance of WORK in connection with excavating, filling, grading, and compaction. The CONTRACTOR shall re-adjust all WORK performed that does not meet technical or design requirements but make no deviations from the Contract documents without specific and written acceptance of the ENGINEER.
- B. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with ASTM D 1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D 4253 and D 4254. Field density in-place tests will be performed in accordance with ASTM D 1556, ASTM D 2922, or by such other means acceptable to the ENGINEER.
- C. In case the tests of the fill or backfill show non-compliance with the required density, the CONTRACTOR shall accomplish such remedy as may be required to insure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the OWNER and shall be at the CONTRACTOR's expense.
- D. Particle size analysis of soils and aggregates will be performed using ASTM D 422.
- E. Determination of sand equivalent value will be performed using ASTM D 2419.
- F. **Unified Soil Classification System:** References in these specifications to soil classification types and standards set forth in ASTM D 2487 shall have the meanings and definitions indicated in the chart illustrated at the end of this Section. The chart is reproduced herein for the convenience of the

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CONTRACTOR only, and no limitation, amendment, or modification is intended thereby. The CONTRACTOR shall be bound by all applicable provisions of said ASTM D 2487 in the interpretation of soil classifications.

- G. Requirements of all applicable building codes and other public agencies having jurisdiction upon the WORK.

PART 2 - PRODUCTS

2.01 SUITABLE FILL AND BACKFILL MATERIAL REQUIREMENTS

- A. **General:** Fill, backfill, and embankment materials shall be suitable selected or processed clean, fine earth, rock, or sand, free from grass, roots, brush, or other vegetation.
- B. Fill and backfill materials to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.
- C. **Suitable Materials:** Soils not classified as unsuitable as defined in Paragraph entitled, "Unsuitable Material" herein, are defined as suitable materials and may be used in fills, backfilling, and embankment construction subject to the specified limitations. In addition, when acceptable to the ENGINEER, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.
- D. Suitable materials may be obtained from on-site excavations, may be processed on-site materials, or may be imported. If imported materials are required to meet the requirements of this Section or to meet the quantity requirements of the project the CONTRACTOR shall provide the imported materials at no additional expense to the OWNER, unless a unit price item is included for imported materials in the bidding schedule.
- E. The following types of suitable materials are designated and defined as follows:
  - 1. Type A (one inch minus granular backfill): Crushed rock, gravel, or sand with 100 percent passing a 1-inch sieve and a sand equivalent value not less than 50.
  - 2. Type B (one half inch minus granular backfill): Crushed rock, gravel, or sand with 100 percent passing a 1/2-inch sieve and a sand equivalent value not less than 50.
  - 3. Type C (sand backfill): Sand with 100 percent passing a 3/8-inch sieve, at least 90 percent passing a number 4 sieve, and a sand equivalent value not less than 30.
  - 4. Type D (coarse rock backfill): Crushed rock or gravel with 100 percent passing a 1-inch sieve and not more than 10 percent passing a Number 4 sieve.
  - 5. Type E (pea gravel backfill): Crushed rock or gravel with 100 percent passing a 1/2-inch sieve and not more than 10 percent passing a Number 4 sieve.
  - 6. Type F (coarse drainrock): Crushed rock or gravel meeting the following gradation requirements:



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<u>Sieve Size</u>	<u>Percentage Passing</u>
2-inch	100
1-1/2-inch	90-100
1-inch	20-55
3/4-inch	0-15
No. 200	0-3

7. Type G (aggregate base): Crushed rock aggregate base material of such nature that it can be compacted readily by watering and rolling to form a firm, stable base for pavements. At the option of the CONTRACTOR, the grading for either the 1-1/2-inch maximum size or 3/4-inch maximum size shall be used. The sand equivalent value shall be not less than 22, and the material shall meet the following gradation requirements.

<u>Sieve Size</u>	<u>Percentage Passing</u>	
	<u>1-1/2 inch Max.</u>	<u>3/4-inch Max.</u>
2-inch	100	-
1-1/2 inch	90-100	-
1-inch	-	100
3/4-inch	50-85	90-100
No. 4	25-45	35-55
No. 30	10-25	10-30
No. 200	2-9	2-9

8. Type H (graded drainrock): Drainrock shall be crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The material shall be uniformly graded and shall meet the following gradation requirements.

<u>Sieve Size</u>	<u>Percentage Passing</u>
1-inch	100
3/4-inch	90-100
3/8-inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

The drainrock shall have a sand equivalent value not less than 75. The finish graded surface of the drainrock immediately beneath hydraulic structures shall be stabilized to provide a firm, smooth surface upon which to construct reinforced concrete floor slabs. The CONTRACTOR shall use, at its option, one of the asphalt types listed below:

	<u>Type 1</u>	<u>Type 2</u>	<u>Type 3</u>
Designation	SC-70	SC-250	RS-1
Spray Temperature (EF)	135-175	165-200	70-120

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Coverage (gal/ sq. yd)	0.50	0.50	0.50
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If the surface remains tacky, sufficient sand shall be applied to absorb the excess asphalt.

9. Type I: Any other suitable material as defined herein.
10. Type J (cement-treated backfill): Material which consists of Type H material, or any mixture of Types B, C, G and H materials which has been cement-treated so that the cement content of the material is not less than 5 percent by weight when tested in accordance with ASTM D 2901. The ultimate compressive strength at 28 days shall be not less than 400 psi when tested in accordance with ASTM D 1633.
11. Type K (topsoil): Stockpiled topsoil materials which has been obtained at the site by removing soil to a depth not exceeding 2 feet. Removal of the topsoil shall be done after the area has been stripped of vegetation and debris as specified.
12. Type L (Class I crushed stone): Manufactured angular, granular crushed stone, rock, or slag, with 100 percent passing a 1-inch sieve and less than 5 percent passing a Number 4 sieve.
13. Type M (aggregate subbase): Crushed rock aggregate subbase material that can be compacted readily by watering and rolling to form a firm stable base. The sand equivalent value shall be not less than 18 and shall meet the following gradation requirements.

<u>Sieve Size</u>	<u>Percentage Passing</u>
3-inch	100
2-1/2 inch	87-100
No. 4	35-95
No. 200	0-29

14. Type N (trench plug): Low permeable fill material, a nondispersible clay material having a minimum plasticity index of 10.

**2.02 UNSUITABLE MATERIAL**

- A. Unsuitable soils for fill material shall include soils which, when classified under ASTM D 2487, fall in the classifications of Pt, OH, CH, MH or OL.
- B. In addition, any soil which cannot be compacted sufficiently to achieve the percentage of maximum density specified for the intended use, shall be classed as unsuitable material.

**2.03 USE OF FILL, BACKFILL, AND EMBANKMENT MATERIAL TYPES**

- A. The CONTRACTOR shall use the types of materials as designated herein for all required fill, backfill, and embankment construction hereunder.
- B. Where these Specifications conflict with the requirements of any local agency having jurisdiction, or with the requirements of a material manufacture, the ENGINEER shall be immediately notified. In case of conflict therewith, the CONTRACTOR shall use the most stringent requirement, as determined by the ENGINEER.

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- C. Fill and backfill types shall be used in accordance with the following provisions:
1. Embankment fills shall be constructed of Type I material, as defined herein, or any mixture of Type I and Type A through Type H materials.
  2. Pipe zone backfill, as defined under "Pipe and Utility Trench Backfill" herein, shall consist of the following materials for each pipe material listed below. Where pipelines are installed on grades exceeding 4 percent, and where backfill materials are graded such that there is less than 10 percent passing a Number 4 sieve, trench plugs of Type J or N material shall be provided at maximum intervals of 200 feet or as shown on the Drawings.
    - a. Mortar coated pipe, concrete pipe, and uncoated ductile iron pipe shall be provided Type A, B, C, D, E, or L pipe zone backfill material.
    - b. Coal tar enamel coated pipe, polyethylene encased pipe, tape wrapped pipe, and other non-mortar coated pipe shall be backfilled with Type C pipe zone backfill material.
    - c. Plastic pipe and vitrified clay pipe shall be backfilled with Type L pipe zone backfill material.
  3. Trench zone backfill for pipelines as defined under "Pipe and Utility Trench Backfill" shall be Type I backfill material or any of Types A through H backfill materials or any mixture thereof, except that Type K material may be used for trench zone backfill in agricultural areas unless otherwise shown or specified.
  4. Final backfill material for pipelines under paved area, as defined under "Pipe and Utility Trench Backfill" shall be Type G backfill material. Final backfill under areas not paved shall be the same material as that used for trench backfill, except that Type K material shall be used for final backfill in agricultural areas unless otherwise shown or specified.
  5. Trench backfill and final backfill for pipelines under structures shall be the same material as used in the pipe zone, except where concrete encasement is required by the Contract Documents.
  6. Aggregate base materials under pavements shall be Type G material constructed to the thicknesses shown or specified. Where specified or shown, aggregate subbase shall be Type M Material.
  7. Backfill around structures shall be Type I material, or Types A through Type H materials, or any mixture thereof.
  8. Backfill materials beneath structures shall be as follows:
    - a. Drainrock materials under hydraulic structures or other water retaining structure with underdrain systems shall be Type H material.
    - b. Under concrete hydraulic structures or other water retaining structures without underdrain systems, Types G or H materials shall be used.

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- c. Under structures where groundwater must be removed to allow placement of concrete, Type F material shall be used.
  - d. Under all other structures, Type D, E, G, or H material shall be used.
9. Backfill used to replace pipeline trench over-excavation shall be a layer of Type F material with a 6-inch top filter layer of Type E material or filter fabric to prevent migration of fines for wet trench conditions or the same material as used for the pipe zone backfill if the trench conditions are not wet. Filter fabric shall be **Mirafi 140 N, Mirafi 700X, or equal**.
10. The top 6 inches of fill on reservoir roofs, embankment fills around hydraulic structures, and all other embankment fills shall consist of Type K material, topsoil.

2.04 EMBANKMENT

- A. The maximum sizes of rock which will be permitted in the completed fill areas are as follows:

<u>Depth Below Finish Grade</u>	<u>Maximum Allowable Diameter</u>
Top 4 inches	1 inch
4 inches to 12 inches	3-1/2 inches
12 inches to 2 feet	6 inches
2 feet to 4 feet	12 inches
4 feet to 8 feet	24 inches
Below 8 feet	36 inches

- B. Embankments shall be constructed of material containing no muck, stumps, roots, brush, vegetable matter, rubbish or other material that will not compact into a suitable and enduring roadbed, and material designated as undesirable shall be removed from the site. Where embankments are constructed adjacent to bridge end bents or abutments, rock larger than 3-1/2 inches in diameter shall not be placed within three feet of the location of any abutment.
- C. Fill material containing debris, sod, biodegradable materials shall not be used as fill in construction areas.
- D. Fill material required for the building pads and for pavement subgrade shall be granular fill, free of organic material.
- E. Fill material required for pervious and sodded areas shall have a maximum organic component of 10%. CONTRACTOR shall provide, at his cost, organic content test results for approval by the ENGINEER.

PART 3 - EXECUTION

3.01 JOB CONDITIONS

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Protection: Use all means necessary to protect existing objects and vegetation. In the event of damage, immediately make all repairs, and replacements necessary to the acceptance of the OWNER's Representative and ENGINEER at no cost to the OWNER.

3.02 BACKFILL, FILLING & GRADING

A. Grades:

1. Cut, backfill, fill and grade to proper grade levels indicated. The proposed grades shown on the drawings are for establishing a finished grade over the site.

B. Filling:

1. Fill material shall be placed in horizontal layers and spread to obtain a uniform thickness.
2. After compaction, layers of fill are not to exceed twelve (12) inches for cohesive soils or eight (8) inches for noncohesive soils.

3.03 STRUCTURE, ROADWAY, AND EMBANKMENT EXCAVATION

A. **General:** Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the WORK. The removal of said materials shall conform to the lines and grades shown or ordered. Unless otherwise provided, the entire construction site shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. The CONTRACTOR shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other measure for the removal or exclusion of water, including taking care of storm water, groundwater, and wastewater reaching the site of the WORK from any source so as to prevent damage to the WORK or adjoining property. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable State safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).

B. **Excavation Beneath Structures and Embankments:** Except where otherwise specified for a particular structure or ordered by the ENGINEER, excavation shall be carried to the grade of the bottom of the footing or slab. Where shown or ordered, areas beneath structures or fills shall be over-excavated. The subgrade areas beneath embankments shall be excavated to remove not less than the top [6 inches] of native material and where such subgrade is sloped, the native material shall be benched. When such over excavation is shown, both over-excavation and subsequent backfill to the required grade shall be performed by the CONTRACTOR. When such over-excavation is not shown but is ordered by the ENGINEER, such over-excavation and any resulting backfill will be paid for under a separate unit price bid item if such bid item has been established; otherwise payment will be made in accordance with a negotiated price. After the required excavation or over-excavation has been completed, the exposed surface shall be scarified to a depth of 6 inches, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density.

C. **Excavation Beneath Paved Areas:** Excavation under areas to be paved shall extend to the bottom of the aggregate base or subbase, if such base is called for; otherwise it shall extend to the paving thickness. After the required excavation has been completed, the top 12 inches of exposed surface

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shall be scarified, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density. The finished subgrade shall be even, self-draining, and in conformance with the slope of the finished pavement. Areas that could accumulate standing water shall be regraded to provide a self-draining subgrade.

- D. **Notification of ENGINEER:** The CONTRACTOR shall notify the ENGINEER at least 3 days in advance of completion of any structure excavation and shall allow the ENGINEER a review period of at least one day before the exposed foundation is scarified and compacted or is covered with backfill or with any construction materials.

3.04 PIPELINE AND UTILITY TRENCH EXCAVATION

- A. **Trench Act:** All construction to be in compliance with the Florida Trench Safety Act, Section 553.60, et. seq.
- B. **General:** Unless otherwise shown or ordered, excavation for pipelines and utilities shall be open-cut trenches. Trench widths shall be kept as narrow as is practical for the method of pipe zone densification selected by the CONTRACTOR, but shall have a minimum width at the bottom of the trench equal to the outside diameter of the pipe plus 24 inches for mechanical compaction methods and 18 inches for water consolidation methods. The maximum width at the top of the pipe shall be equal to the outside diameter of the pipe plus 36 inches for pipe diameters 18 inches and larger and to the outside diameter of the pipe plus 24 inches for pipe diameters less than 18 inches, or as shown on the Drawings.
- C. **Trench Bottom:** Except when pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe. The trench bottom shall be given a final trim, using a string line for establishing grade, such that each pipe section when first laid will be continually in contact with the ground along the extreme bottom of the pipe. Rounding out the trench to form a cradle for the pipe will not be required. Excavations for pipe bells and welding shall be made as required.
- D. **Open Trench:** The maximum amount of open trench permitted in any one location shall be 300 feet, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. The above requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 100 feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights meeting OSHA requirements shall be provided and maintained.
- E. **Trench Over-Excavation:** Where the Drawings indicate that trenches shall be over-excavated, they shall be excavated to the depth shown, and then backfilled to the grade of the bottom of the pipe.
- F. **Over-Excavation:** When ordered by the ENGINEER, whether indicated on the Drawings or not, trenches shall be over-excavated beyond the depth shown. Such over-excavation shall be to the depth ordered. The trench shall then be backfilled to the grade of the bottom of the pipe. All WORK specified in this Section shall be performed by the CONTRACTOR when the over-excavation ordered by the ENGINEER is less than 6 inches below the limits shown. When the over-excavation ordered by the ENGINEER is 6 inches or greater below the limits shown, additional payment will be made to the CONTRACTOR for that portion of the WORK which is located below said 6-inch distance. Said

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additional payment will be made under separate unit price bid items for over-excavation and bedding if such bid items have been established; otherwise payment will be made in accordance with a negotiated price.

- G. Where pipelines are to be installed in embankment or structure fills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated.

3.05 OVER-EXCAVATION NOT ORDERED, SPECIFIED, OR SHOWN

Any over-excavation carried below the grade ordered, specified, or shown, shall be backfilled to the required grade with the specified material and compaction. Such WORK shall be performed by the CONTRACTOR at their own expense.

3.06 EXCAVATION IN LAWN AREAS

Where excavation occurs in lawn areas, the sod shall be carefully removed, kept damp, and stockpiled to preserve it for replacement. Excavated material may be placed on the lawn; provided that a drop cloth or other suitable method is employed to protect the lawn from damage. The lawn shall not remain covered for more than 72 hours. Immediately after completion of backfilling and testing of the pipeline, the sod shall be replaced and lightly rolled in a manner so as to restore the lawn as near as possible to its original condition. CONTRACTOR shall provide new sod if stockpiled sod has not been replaced within 72 hours.

3.07 EXCAVATION IN VICINITY OF TREES

Except where trees are shown to be removed, trees shall be protected from injury during construction operations. No tree roots over 2 inches in diameter shall be cut without express permission of the ENGINEER. Trees shall be supported during excavation by any means previously reviewed by the ENGINEER.

3.08 ROCK EXCAVATION

- A. Rock excavation shall include removal and disposal of the following: (1) all boulders measuring 1/3 of a cubic yard or more in volume; (2) all rock material in ledges, bedding deposits, and unstratified masses which cannot be removed without systematic drilling and blasting; (3) concrete or masonry structures which have been abandoned; and (4) conglomerate deposits which are so firmly cemented that they possess the characteristics of solid rock and which cannot be removed without systematic drilling.
- B. Said rock excavation shall be performed by the CONTRACTOR; provided, that should the quantity of rock excavation be affected by any change in the scope of the work, an appropriate adjustment of the contract price will be made under a separate bid item if such bid item has been established; otherwise payment will be made in accordance with a negotiated price.
- C. Explosives and Blasting: Blasting will not be permitted.

3.09 DISPOSAL OF EXCESS EXCAVATED MATERIAL

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The CONTRACTOR shall remove and dispose of all excess excavated material at a site selected by the CONTRACTOR and reviewed by the ENGINEER. All waste disposal shall be in accordance with the City of Sunrise Ordinance(s) regarding waste handling and disposal.

3.10 DISPOSAL OF UNSUITABLE EXCAVATED MATERIAL

The CONTRACTOR shall remove and dispose of all unsuitable excavated material. This shall include muck, tree roots, rocks, garbage, debris, or any other material designated as unsuitable by Paragraph 2 of this Section. Disposal shall be at a site selected by the CONTRACTOR that is designated as an approved disposal site for the unsuitable material.

3.11 BACKFILL - GENERAL

- A. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.
- B. Except for drainrock materials being placed in over-excavated areas or trenches, backfill shall be placed after all water is removed from the excavation.

3.12 PLACING AND SPREADING OF BACKFILL MATERIALS

- A. Backfill materials shall be placed and spread evenly in layers. When compaction is achieved using mechanical equipment the layers shall be evenly spread so that when compacted each layer shall not exceed 6 inches in thickness.
- B. During spreading each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer. Pipe zone backfill materials shall be manually spread around the pipe so that when compacted the pipe zone backfill will provide uniform bearing and side support.
- C. Where the backfill material moisture content is below the optimum moisture content water shall be added before or during spreading until the proper moisture content is achieved.
- D. Where the backfill material moisture content is too high to permit the specified degree of compaction the material shall be dried until the moisture content is satisfactory.

3.13 COMPACTION - GENERAL

- A. Compact each layer of fill in designated areas with approved equipment to achieve a maximum density at optimum moisture, AASHTO T 180 - latest edition.
  - 1. Structural Pads: compaction shall be to 98% of maximum density, unless otherwise shown on the drawings or specifications. Building pads shall be within plus or minus one-tenth (0.1) of a foot of the elevations shown on the plans.
  - 2. Refer to Sections 02513 Asphaltic Concrete Paving and 02515 Portland Cement Concrete Paving for compaction requirements in the affected areas.



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3. Under landscaped area, compaction shall be to 85% of maximum density, unless otherwise shown on the drawings.
- B. No backfill shall be placed against any masonry or other exposed building surface until permission has been given by the OWNER's Representative, and in no case until the masonry has been in place seven days.
- C. Heavy construction equipment will not be permitted within ten (10) feet of any masonry or other exposed building surface.
- D. Compaction in limited areas shall be obtained by the use of mechanical tampers or approved hand tampers. When hand tampers are used, the materials shall be deposited in layers not more than four inches thick. The hand tampers used shall be suitable for this purpose and shall have a face area of not more than 100 square inches. Special precautions shall be taken to prevent any wedging action against masonry, or other exposed building surfaces.

3.14 COMPACTION OF FILL, BACKFILL MATERIALS

- A. Each layer of Types, A, B, C, G, H, I, and K backfill materials as defined herein, where the material is graded such that at least 10 percent passes a No. 4 sieve, shall be mechanically compacted to the specified percentage of maximum density. Equipment that is consistently capable of achieving the required degree of compaction shall be used and each layer shall be compacted over its entire area while the material is at the required moisture content.
- B. Each layer of Type D, E, F, and J backfill materials shall be compacted by means of at least 2 passes from a flat plate vibratory compactor. When such materials are used for pipe zone backfill, vibratory compaction shall be used at the top of the pipe zone or at vertical intervals of 24 inches, whichever is the least distance from the subgrade.
- C. Type L material requires mechanical spreading and placement to fill voids but does not require mechanical compaction or vibration.
- D. Flooding, ponding, or jetting shall not be used for fill on roofs, backfill around structures, backfill around reservoir walls, for final backfill materials, or aggregate base materials.
- E. Pipe zone backfill materials that are granular, may be compacted by a combination of flooding and vibration using concrete vibrators or by jetting, when acceptable to the ENGINEER.
- F. Pipeline trench zone backfill materials, containing 5 percent or less of material passing a No. 200 sieve, may be compacted using flooding and jetting or vibration if the CONTRACTOR uses effective procedures that yield the specified compaction test results. Flooding and jetting shall not be done in such a manner that the pipe or nearby utilities are damaged, in areas of poorly draining or expansive soils, or where the use of the procedure is prohibited by any agency having jurisdiction over the street or right-of-way. Approved jet pipes or immersible vibrators shall be used so that each backfill layer is saturated and consolidated to its full depth before the next layer is placed. Jet pipes shall be kept at least 6 inches away from the pipe where the backfills being consolidated and 2 feet away from other pipes or utilities.

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- G. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the fill at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.
- H. Compaction Requirements: The following compaction test requirements shall be in accordance with AASHTO T-99-C. Where agency or utility company requirements govern, the highest compaction standards shall apply.

<u>Location or Use of Fill</u>	<u>Percentage of Maximum Density</u>
Pipe zone backfill portion above bedding for flexible pipe.	95
Pipe zone backfill bedding and over-excavated zones under bedding/pipe for flexible pipe, including trench plugs.	95
Pipe zone backfill portion above bedding for rigid pipe.	95
Pipe zone backfill bedding and over-excavated zones under bedding/pipe for rigid pipe.	95
Final backfill, beneath paved areas or structures	100
Final backfill, not beneath paved areas or structures	95
Trench zone backfill, not beneath paved areas or structures, including trench plugs	95
Embankments	98
Embankments, beneath paved areas or structures	100
Backfill beneath structures, hydraulic structures	100
Backfill around structures	98
Topsoil (Type K material)	80
Aggregate base or subbase Type G or M material)	100

- I. Trench Backfill Requirements: the pipe has been structurally designed based upon the trench configuration specified herein.

- J. The CONTRACTOR shall maintain the indicated trench cross section up to a horizontal plane lying 6 inches above the top of the pipe.
- K. If, at any location under said horizontal plain, the CONTRACTOR slopes the trench walls or exceeds the maximum trench widths indicated in the Contract Documents, the pipe zone backfill shall be improved or the pipe class increased as specified herein, at no additional cost to the OWNER. Improved backfill shall mean sand-cement backfill or other equivalent materials acceptable to the ENGINEER.
- L. If the allowable deflection specified for the pipe is exceeded, the CONTRACTOR shall expose and reround or replace the pipe, repair all damaged lining and coating, and reinstall the pipe zone material and trench backfill as specified at no additional expense to the OWNER.

3.15 PIPE AND UTILITY TRENCH BACKFILL

- A. Pipe zone Backfill: The pipe zone is defined as that portion of the vertical trench cross-section lying between a plane 6 inches below the bottom surface of the pipe, i.e., the trench subgrade, and a plane at a point 6 inches above the top surface of the pipe. The bedding for flexible pipe is defined as that portion of pipe zone backfill material between the trench subgrade and the bottom of the pipe. The bedding for rigid pipe is defined as that portion of the pipe zone backfill material between the trench subgrade and a level line which varies from the bottom of the pipe to the springline as shown.
- B. Bedding shall be provided for all sewers, drainage pipelines, and other gravity flow pipelines. Unless otherwise specified or shown, for other pipelines the bedding may be omitted if all the following conditions exist.
  - 1. The pipe bears on firm, undisturbed native soil which contains only particles that will pass a one-inch sieve.
  - 2. The trench excavation is not through rock or stones.
  - 3. The trench subgrade soils are classified as suitable fill and backfill materials per Paragraph 2.01.
  - 4. The trench subgrade soils have, as a maximum, a moisture content that allows compaction.
- C. Where bedding is required, after compacting the bedding the CONTRACTOR shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe. Excavation for pipe bells and welding shall be made as required.
- D. The pipe zone shall be backfilled with the specified backfill material. The CONTRACTOR shall exercise care to prevent damage to the pipeline coating, cathodic bonds, or the pipe itself during the installation and backfill operations.
- E. Trench Zone Backfill: After the pipe zone backfill has been placed as specified above, and after all excess water has completely drained from the trench, backfilling of the trench zone may proceed. The trench zone is defined as that portion of the vertical trench cross-section lying between a plane 6 inches above the top surface of the pipe and a plane at a point 18 inches below the finished surface

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grade, or if the trench is under pavement, 18 inches below the roadway subgrade. If flooding, ponding, or jetting is used the pipe shall be filled with water to prevent flotation.

- F. Final Backfill: Final backfill is all backfill in the trench cross-sectional area within 18 inches of finished grade, or if the trench is under pavement, all backfill within 18 inches of the roadway subgrade.

3.16 EMBANKMENT CONSTRUCTION

- A. The area where an embankment is to be constructed shall be cleared of all vegetation, roots and foreign material. Following this, the surface shall be moistened, scarified to a depth of 6 inches, and rolled or otherwise mechanically compacted. Embankment fill material shall be placed and spread evenly in approximately horizontal layers. Each layer shall be moistened or aerated, as necessary. Unless otherwise approved by the ENGINEER, each layer shall not exceed 6 inches of compacted thickness. The embankment fill and the scarified layer of underlying ground shall be compacted to 95 percent of maximum density under structures and paved areas, and 90 percent of maximum density elsewhere.
- B. When an embankment fill is to be made and compacted against hillsides or fill slopes steeper than 4:1, the slopes of hillsides or fills shall be horizontally benched to key the embankment fill to the underlying ground. A minimum of 12 inches normal to the slope of the hillside or fill shall be removed and recompacted as the embankment fill is brought up in layers. Material thus cut shall be recompacted along with the new fill material at the CONTRACTOR's expense. Hillside of fill slopes 4:1 or flatter shall be prepared in accordance with Paragraph A, above.
- C. Where embankment or structure fills are constructed over pipelines, the first 4 feet of fill over the pipe shall be constructed using light placement and compaction equipment that does not damage the pipe. Heavy construction equipment shall maintain a minimum distance from the edge of the trench equal to the depth of the trench until at least 4 feet of fill over the pipe has been completed.

3.17 CORRECTION OF GRADE

Bring to required grade levels areas where settlement, erosion or other grade changes occur.

3.18 MAINTENANCE AND PROTECTION OF WORK

- A. While construction is in progress adequate drainage for the roadbed shall be maintained at all times.

The CONTRACTOR shall maintain all earthwork construction throughout the life of the contract, unless otherwise provided, and shall take all reasonable precautions to prevent loss of material from the roadway due to the action of wind or water. He/she shall repair at his expense, except as otherwise provided herein, any slides, washouts, settlement, subsidence, or other mishap which may occur prior to final acceptance of the WORK.

All channels excavated as a part of the contract WORK shall be maintained against natural shoaling or other encroachments to the lines, grades, and cross sections shown on the plans, until final acceptance of the project.

3.19 AS-BUILT SURVEY

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- A. At the completion of the WORK and prior to final inspection of the area, the CONTRACTOR shall provide the ENGINEER with an as-built topographic survey made by a registered Surveyor, of the State of Florida.
- B. The surveyor is to certify on the survey whether or not the as-built conditions conform to the elevations shown on the Drawings to within plus or minus one-tenth (.1) of a foot.

3.20 MEASUREMENT AND PAYMENT

There shall be no special measurement or payment for the WORK under this section, it shall be included in the lump sum price bid.

END OF SECTION 02200

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this section.

1.02 WORK INCLUDED

- A. The WORK covered by this section shall include all labor, equipment, services and materials necessary for bringing the entire site to elevations shown in the plans. The work included in this section shall include all necessary excavations for streets, ditches and swales. It shall include the construction of embankments and fills by the loading, movement, deposition and compaction of suitable fill materials resulting from above listed excavations. It shall include stockpiling of any excess material to an on-site location as specified by the OWNER.
- B. It shall include rough grading within the roadways and parking lots to the elevations or cross-section details shown on the drawings.
- C. It shall include the erection and maintenance of any barricades that are required for accident prevention and property protection.
- D. It shall include removal and disposal of muck, rock boulders or any foreign material interfering with construction.

1.03 RELATED WORK

- A. Section 02110 - Clearing
- B. Section 02200 - Earthwork

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 GENERAL

The CONTRACTOR shall acquaint himself with all WORK to be performed as specified and shown on the Drawings. He/she shall ascertain where all excavation will be required and shall be solely responsible for all excavating to complete the Contract.

3.02 PAYMENT

No extra payment will be allowed for type or classification of material in excavation.

3.03 MATCHING EXISTING GRADES

**SECTION 02210  
SITE GRADING**

Where existing roadbed surfaces are not at the elevation required prior to subgrade compaction, the CONTRACTOR shall perform any such excavation, filling, earthmoving and grading as may be necessary to attain the proper compacted subgrade elevation before proceeding with base course construction.

3.04 UNSUITABLE MATERIAL

All muck, large rocks and boulders encountered during the WORK under this Contract shall be removed and disposed of in a manner approved by the OWNER's Representative.

3.05 EXCAVATION

- A. All excavation shall be unclassified regardless of material encountered.
- B. The CONTRACTOR shall make probings or sounding for subsurface rock to ascertain its location and depth.
- C. It shall be the CONTRACTOR's responsibility to be familiar with soil conditions on the site. Borings, in addition to those provided by others, if any, shall be acquired by the CONTRACTOR, at the CONTRACTOR's expense.
- D. Any wet excavated materials shall be drained before hauling or moving.

3.06 EMBANKMENT (FILL)

- A. Embankment shall be constructed from suitable materials resulting from roadway or site excavation or approved materials furnished from off-site borrow areas.
- B. Embankments shall be placed in successive layers of not more than eight inches in thickness, measured loose, for the full width of the embankment.
- C. Each layer of the material used in the formation of roadbed embankments shall be compacted at optimum moisture content to a density of at least 98% of the Maximum Density as determined by Moisture-Density Tests AASHTO T180 test results.
- D. The existing material on the site may vary as to stability. The CONTRACTOR shall satisfy himself by site inspection borings, probings, etc., prior to bidding, as to the subsurface character of the material.
- E. All unstable soil shall be removed and shall be replaced by material approved by the ENGINEER.

3.07 GRADING

- A. The material excavated shall be transported and spread over the entire WORK site and shall be graded

**SECTION 02210  
SITE GRADING**

so that the finished grade shall be within  $\pm 0.1$  feet of the grades indicated by the grade stakes and control point elevations shown on the plans and by the cross-sections. Due to the minimal slope of the roadways, swale grades shall be within  $\pm 0.05$  feet of the grades indicated on the plans.

- B. The disposal of large rocks in excess of 8", within roadways and parking areas is prohibited. Where allowable, the disposal of large rocks by burial in areas designated by the ENGINEER shall have a minimum 30 inches of cover below finished grade elevation.

3.08 FINISH GRADING

Following completion of the paving WORK, all swales, etc., adjacent to the roadway shall be shaped and graded to the elevations and cross-sections shown on the drawings. The finished surface shall be maintained until seeding and mulching WORK is completed.

3.09 SURVEYS

- A. All initial surveys, including detail construction stakes, will be furnished by the CONTRACTOR.
- B. The CONTRACTOR will carefully maintain bench marks, monuments, stakes and other reference points, and if disturbed or destroyed, be replaced as directed at the CONTRACTOR's expense.

3.10 MEASUREMENT AND PAYMENT

There shall be no special measurement or payment for the WORK under this section; it shall be included in the lump sum price bid.

END OF SECTION 02210



PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this section.

1.02 SUMMARY

- A. This Section includes demolition and removal of the following:
  - 1. Site improvements.
- B. See Section 02110, Site Clearing, for site clearing and removal of above- and below-grade improvements not part of building demolition.

1.03 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the site demolition work, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".

1.04 RELATED WORK

- A. Section 02200 - Earthwork.
- B. Section 02110 - Site Clearing
- C. All applicable Sections under Divisions 1, 2, 3, and 4.

1.05 QUALITY ASSURANCE

- A. CONTRACTOR Qualifications: Minimum of five years experience in demolition of comparable nature.
- B. Requirements of All Applicable Regulatory Agencies:
  - 1. All applicable Building Codes and other Public Agencies having jurisdiction upon the work.

1.06 SUBMITTALS

- A. Permits and notices authorizing building demolition.
- B. Certificates of severance of utility services.
- C. Permit for transport and disposal of debris.
- D. Demolition procedures and operational sequence for review and acceptance by ENGINEER.

1.07 JOB CONDITIONS

**SECTION 02221  
DEMOLITION**

A. Existing Conditions:

1. The demolition work shall be done as indicated on the construction plans.
2. Remove all demolition debris from the site the same day the work is performed. Leave no deposits of demolished material on site overnight unless approved by the ENGINEER.
3. Structural demolition, excavation, backfill and compaction as indicated in drawings.

B. Protection:

1. Erect barriers, fences, guardrails, enclosures, and shoring to protect personnel, structures, and utilities remaining intact.
2. Protect designated trees and plants from damages.
3. Use all means necessary to protect existing objects and vegetation designated to remain, and, in the event of damage, immediately make all repairs, replacements and dressings to damaged plants necessary, to the approval of the ENGINEER at no additional cost to the OWNER.

C. Maintaining Traffic:

1. Ensure minimum interference with roads, streets, driveways, sidewalks, and adjacent facilities.
2. Do not close or obstruct streets and sidewalks without written approval from the ENGINEER.
3. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways.
4. The CONTRACTOR shall prepare, apply for and obtain an approved Maintenance of Traffic Plan from the applicable agencies, if necessary. Comply with Section 01555 Traffic Regulations.

D. Dust Control:

1. Use all means necessary for preventing dust from demolition operations from being a nuisance to adjacent property OWNER's. Methods used for dust control are subject to approval by the ENGINEER prior to use.

E. Burning:

1. Burning will not be permitted.

1.08 GENERAL ITEMS

- A. Scope of work shall comprise the following: Provide all labor, materials, necessary equipment and services to complete the demolition and clearing work, as indicated on the contract plans, and as specified herein.

- B. The CONTRACTOR shall provide references to the OWNER to demonstrate a minimum of five years experience in demolition of a comparable nature. Current occupational licenses held by CONTRACTOR shall be submitted to OWNER.
- C. The CONTRACTOR shall be responsible for adherence to all applicable codes of all regulatory agencies having jurisdiction upon the works.

1.09 REFERENCE STANDARDS

- A. Code of Federal Regulations
  - 1. 40 CRF 82
- B. National Fire Protection Association
  - 1. NFPA 241 - Standard for Safeguarding.

1.10 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or recycled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to the OWNER.
- C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or recycled.

1.11 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the OWNER that may be encountered during demolition shall remain on OWNER's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the OWNER.

1.12 SUBMITTALS (When required by OWNER or authorities having jurisdiction)

- A. Qualification Data for the following:
  - 1. Demolition Firm;
  - 2. Test Control Firm;
  - 3. Refrigerant Recovery Technician; and,
  - 4. Licensed Professional Providing Demolition Oversight.
- B. Pollution Control Measures
  - 1. The CONTRACTOR shall prepare and deliver approved pollution and dust control drawings to the OWNER with the bid package prior to the commencement of demolition

**SECTION 02221  
DEMOLITION**

work. The drawing shall outline proposed methods for dust control, noise control and maintaining the surrounding streets and buildings in a clean condition for both demolition operations and during debris removal. The drawing shall be subject to the review and approval by the OWNER and the OWNER's ENGINEER.

C. Demolition Schedule/Plan

1. The CONTRACTOR shall submit for review and approval a detailed schedule for all proposed work to the OWNER with the bid package. This submission shall include a calendarized schedule of the proposed work and a step-by-step description of all aspects pertaining to demolition and protection of existing structures and adjacent community, labor forces, demolition rubble management and disposal and other items of work required under this contract.

D. Utility Schedule

1. The CONTRACTOR shall submit to the OWNER and all affected utility/service companies, a proposed schedule of coordination for all necessary utility/service shut-offs, capping and continuation of utility services as required with the bid package. The CONTRACTOR shall provide the OWNER with written confirmation for all utility or service companies serving the site that service has been terminated prior to capping, abandoning or removal of any such utility and prior to commencement of building demolition.
2. The CONTRACTOR shall, during his work, accurately locate and mark on the contract drawing the location of all underground utility and services that have been capped and those that are to remain within the contract limit area.

E. Permits

1. Prior to submission of bid package, the CONTRACTOR shall investigate all permit requirements and include any cost for these requirements in the bid. Prior to the commencement of work, the CONTRACTOR shall obtain all necessary permits and certificates associated with utility disconnections, storage tank removals and building demolition work from any and all Federal, State or regulatory authorities having jurisdiction over this project. The CONTRACTOR shall incur all fees and other requirements associated with obtaining the required permits and certificates. Copies of all permits executed and certificates obtained shall be sent to the OWNER. Costs associated with permit and certificate procurements, including drawing and permit preparation, revisions, filing fees, etc., shall be borne by the CONTRACTOR.
2. Including but not limited to, the following permits and certificates may be applicable and shall be obtained by the CONTRACTOR prior to applying for and obtaining general demolition permits.
  - a. Plumbing permit for water shut-off;
  - b. Plumbing permit for sewer seal;
  - c. Water shut-off certificate (original);

- d. Building and/or Fire Department permit for underground storage tank removal;
- e. Letters from Electric and Gas Utility companies and gas meter shut-offs;
- f. Letters from Cable TV companies for cable disconnections and removals.
- g. Certificate from Tax Office (taxes paid);
- h. Letter to adjacent Owners of proposed demolition with proof of receipt;
- i. Exterminator Certificate;
- j. Board of Health approval;
- k. Soil Erosion and Sediment Control Permit;
- l. Asbestos Abatement Permit;
- m. Asbestos Abatement Completion; and,
- n. Demolition Contractor's License.

1.13 QUALITY ASSURANCE

A. Pre-Demolition Conference

- 1. The CONTRACTOR along with all designated subcontractors shall schedule a pre-demolition meeting to be attended by the OWNER and other necessary attendees prior to commencement of work.

B. Progress Conference

- 1. Once the demolition work has begun, the CONTRACTOR shall schedule, administer and attend meetings with the OWNER as deemed necessary by the OWNER to maintain optimum degree of communications between interested parties. The CONTRACTOR shall include selected subcontractors at such times as their interests may be involved.

1.14 PROJECT CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of Work; and,

B. The CONTRACTOR shall maintain access to existing walkways, exits, and other adjacent occupied or used facilities. The CONTRACTOR shall not close or obstruct walkways, exits, or other occupied or used facilities without written permission from authorities having jurisdiction.

C. OWNER assumes no responsibility for structures to be demolished.

- 1. Conditions existing at time of inspection for bidding purpose will be maintained by OWNER as far as practical.

- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work, unless otherwise identified in the Contract Documents.
  - 1. If materials suspected of containing hazardous materials are encountered, other than those identified in the Contract Documents, do not disturb; immediately notify OWNER.

1.15 COORDINATION

- A. Arrange demolition schedule so as not to interfere with OWNER's or other existing on-site operations.

PART 2 - PRODUCTS

- 2.01 The CONTRACTOR shall supply all materials as required.

PART 3 - EXECUTION

3.01 CLARIFICATION

- A. The drawings do not purport to show all objects existing on the site; at the pre-demolition or preconstruction meeting before commencement of the work, verify with the OWNER all objects to be removed and all objects to be preserved.
- B. Before commencing the work of this Section, verify with the OWNER all objects to be removed and all objects to be preserved. If project is adjacent to private property, notify residents and businesses two weeks in advance of items to be removed from ROW and private property.

3.02 SCHEDULING

- A. Schedule all work in a careful manner with all necessary consideration for the public and the OWNER.
- B. Avoid interference with the use of, and passage to and from, adjacent facilities.

3.03 EXAMINATION

- A. Survey existing conditions and correlate with requirements indicated to determine extent of building demolition required.
- B. Review project record documents of existing construction. OWNER does not guarantee that existing conditions are same as those indicated in project record documents.
- C. Inventory and record the condition of items to be removed and salvaged.
- D. Do not commence work until all conditions and requirements of all applicable public agencies are complied with.

3.04 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, roadways, and other existing facilities during demolition operations.

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- B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by OWNER items may be removed to a suitable, protected storage location during demolition and reinstalled in their original locations after demolition operations are complete.
- C. Existing Utilities: Maintain utility services indicated to remain and protect them against damage during demolition operations.
  - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by OWNER and authorities having jurisdiction; and,
  - 2. Provide temporary services during interruptions to existing utilities, as acceptable to OWNER and to authorities having jurisdiction.
    - a. Provide at least 72 hours notice to OWNER if shutdown of service is required during changeover.
- D. Temporary Protection: Erect temporary protection, such as walks, and fences, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 1 Section 01560 Temporary Controls.
  - 1. Protect existing site improvements, appurtenances, and landscaping to remain;
  - 2. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent facilities to remain;
  - 3. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures; and,

3.05 DISCONNECTION OF UTILITIES

- A. Before starting site operations, disconnect or arrange for the disconnection of all effected utility service:
  - 1. Arrange and pay for disconnecting, removing, capping, and plugging utility services and meters. Disconnect and stub off. Notify affected utility company in advance and obtain approval before starting this work.
  - 2. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction.
  - 3. Place markers to indicate location of disconnected services.
  - 4. On-site drainage structures and drain fields shall be removed in their entirety by methods approved by the OWNER's representative, and replaced as directed by the Engineer of Record if necessary.

3.06 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. Existing utilities have been shown on the drawings insofar as information is reasonably available; however, it will be the CONTRACTOR's responsibility to preserve all existing utilities whether

**SECTION 02221  
DEMOLITION**

shown on the plans or not. If utility conflicts are encountered by the CONTRACTOR during construction, the CONTRACTOR shall give sufficient notice to the respective utility owners so that they may make necessary adjustments. Damages to any utilities shall be promptly repaired at the CONTRACTOR's expense and at no additional cost to the CITY. At the sole discretion of the CITY, such repairs shall be performed by the CONTRACTOR's forces or by another contractor retained by the prime CONTRACTOR. Any delays ensuing from this damage will be considered inexcusable and the CITY will have the right to hire a CONTRACTOR and charge the bidder if the work is not done in a timely manner.

- B. Utility Services: Maintain existing utilities, keep in service, and protect against damage during demolition operations.
- C. Prevent movement or settlement of adjacent structures. Provide and place bracing or shoring and be responsible for safety and support of structures. Assume liability for such movement, settlement, damage, or injury.
- D. Cease operations and notify OWNER immediately if safety of adjacent structures appears to be endangered. Take precautions to properly support structures. Do not resume operations until safety is restored.
- E. Prevent movement, settlement, damage, or collapse of adjacent services, sidewalks, driveways and trees. Assume liability for such movement, settlement, or collapse. Promptly repair damage at no cost to the OWNER.
- F. Ensure safe passage of persons around areas of demolition.

3.07 POLLUTION CONTROLS

- A. Clean structures and improvements of dust, dirt, and debris caused by demolition operations as directed by the OWNER or his representative or governing authorities. Return adjacent areas to condition existing prior to start of work.

3.08 DEMOLITION

- A. General: Demolish as indicated on drawings as specifically identified on construction drawings existing structures, and site improvements completely.
- B. Site Access and Temporary Controls: Conduct site improvement demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from OWNER and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction; and,
  - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as flooding, and pollution.



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- C. Pull out any existing utility lines designated for abandonment, irrigation, electrical lines, pull boxes and splice boxes, maintenance access structures and catch basins to be removed and all other objects designated to be removed or interfering with the work in advance of mobilization. Contact the utility company or agency involved for their requirements for performing this work in advance of construction. All removed equipment and materials shall be removed from the work area the same day as removed.
- D. Clear and Grub and dispose of all trees, shrubs and other organic matter not otherwise addressed on tree removal and relocation plans and specifications. There shall be no special measurement and payment for this work. It shall be included in Clearing.

3.09 EXPLOSIVE DEMOLITION

- A. Explosives: Use of explosives is not allowed for any reason.

3.10 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Division 2 Section 02300, Earthwork.
- C. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.11 REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by site improvement demolition operations.
- B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
- C. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.12 DISPOSAL OF DEMOLISHED MATERIALS

- A. General
  - 1. The CONTRACTOR shall remove from the site all debris, rubbish and other materials resulting from demolition and shall safely and legally dispose of all these items in accordance with applicable Federal, State and regulatory authority having jurisdiction codes and regulations. All recycling must be done in accordance with all currently applicable State waste flow regulations, and regulatory authority having jurisdiction requirements. Burning of any demolished materials on-site shall not be permitted. Any recycling of demolition debris shall be approved by the OWNER.

**SECTION 02221  
DEMOLITION**

2. Material resulting from demolition and not scheduled for salvaging shall become the property of the CONTRACTOR and shall be removed from site and legally disposed of off-site. Disposal shall be timely, performed as promptly as possible and not left until the final cleanup. Material shall not be left on the job site for more than 60 days.
3. Remove from site contaminated, vermin infested, or dangerous materials encountered and disposed of by safe means so as not to endanger health of workers and public.
4. Burning of removed materials from demolished structures will not be permitted on-site.

**B. Submittals**

1. Verification of permission shall be obtained by the CONTRACTOR for any off site location used to dump demolition materials.
2. Hazardous Materials: The CONTRACTOR shall provide manifests or disposal tickets for each truck that exits and enters the site with demolition and construction material to the OWNER's ENGINEER and the OWNER. These manifests shall indicate the following:
  - a. Date and time of departure from the demolition site;
  - b. Type of material carted off-site or type of material brought on-site;
  - c. Amount of material brought on-site;
  - d. Amount of material (in tons);
  - e. Truck ID number;
  - f. Final destination of the excess material;
  - g. Date and time of entry to the demolition material;
  - h. Date and time of entry to the demolition site;
  - i. Amount of material; and,
  - j. Source of material brought on-site.

**3.13 CLEANING**

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before further demolition operations continue.

**3.14 COMPLETION OF WORK**

- A. Leave the site in a neat, orderly condition to the full acceptance of the OWNER.
- B. Dirt remaining after demolition shall be graded level and compacted, in preparation for filling

**SECTION 02221  
DEMOLITION**

operations to follow demolition. Trenches shall be filled in layers of 12" maximum thickness and compacted in accordance with the technical specifications applicable to backfilling of trenches.

3.15 MEASUREMENT AND PAYMENT

- A. There shall be no special measurement or payment for the work under this section; it shall be included in the price bid for items associated with the demolition.

END OF SECTION 02221

**SECTION 02225**  
**EXCAVATION AND BACKFILLING FOR UTILITIES**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this section.

**1.02 WORK INCLUDED**

The work shall consist of furnishing all materials, labor and equipment for excavation, trenching and backfilling for utilities. "Utilities" shall include storm water drains, culverts, water mains, gravity sewers, sewage force mains and appurtenant structures.

**1.03 RELATED WORK**

- A. 02200 - Earthwork
- B. 02210 - Site Grading

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION**

**3.01 EXCAVATION**

- A. General: This WORK shall consist of the excavation of whatever substances shall be encountered to the depths as shown on the plans. Excavated materials not required for fill or backfill shall be removed from the WORK site as directed by the ENGINEER and shall be considered to be a part of the bid price of the utility pipe for which excavation and backfill is required.
- B. Excavation for structures and other accessories shall have a minimum clearance of twelve inches and a maximum clearance of twenty-four inches on all sides.
- C. Excavation shall not be carried below the required depths as indicated by the plans. Excess excavation below the required level shall be backfilled at the CONTRACTOR's expense with sharp sand, gravel or other suitable material thoroughly compacted and approved by the ENGINEER.
- D. Any unstable soil shall be removed and shall be replaced by material acceptable to the ENGINEER. The removal and replacement of such unstable soil shall be considered to be part of the bid price of the pipe for which excavation and backfill is required.
- E. Water shall not be permitted to accumulate in the excavated area. It shall be removed by pumping or other means as approved by the ENGINEER. The removal of water shall be considered to be a part of the bid price of the pipe for which excavation and backfill is required.

Well points, pumps or other approved means shall be used to keep the ground water sufficiently low in the opinion of the ENGINEER to permit the placing of concrete, masonry or pipe in first class

**SECTION 02225**  
**EXCAVATION AND BACKFILLING FOR UTILITIES**

condition, and sufficiently long thereafter to protect the concrete, masonry or joints against washing or damage.

The CONTRACTOR shall also use such other means as may be necessary to keep the excavation in satisfactory condition for the construction of the WORK, and the use of well points, or other approved method, will not relieve the CONTRACTOR of his responsibility to make structures water tight.

- F. Banks and trenches shall be vertical unless shown otherwise on plans. The width of the trench shall be no less than 8" and no more than twelve inches, or as approved by the ENGINEER, on each side of the pipe bell for pipe up to 16" diameter. Bell holes shall be accurately excavated by hand.
- G. If the bottom of the trench is rock, the excavation shall be carried eight inches below the invert of the pipe and backfilled with thoroughly compacted sharp sand, gravel or other suitable material approved by the ENGINEER.
- H. Rock excavation shall include any rock encountered which cannot be removed with a 3/4 yard backhoe under normal operating conditions. Rock excavation shall be incidental to construction of all piping systems and no separate payment will be made.
- I. Whenever it is necessary, in the interest of safety, to brace or shore the sides of the trench, such bracing or shoring shall be considered to be part of the bid price of the pipe for which excavation and backfill is required.

The CONTRACTOR shall furnish, put in place and maintain such sheeting, bracing, as may be required to support the side of the excavation, and to prevent any movement which can in any way damage the WORK or endanger adjacent structures. If the ENGINEER is of the opinion that supports are insufficient, he/she may order additional supports. The compliance with such order shall not release the CONTRACTOR from his responsibility for the sufficiency of the sheeting.

The CONTRACTOR shall leave all sheeting in place. The ENGINEER may require sheeting to be cut off at any specified elevation, but in no case will any sheeting be left closer than two (2) feet below the natural surface, nor cut off below the elevation of the top of the pipe.

**3.02 BACKFILLING**

- A. After pipes, structures and other appurtenances have been installed, the trench or opening shall be backfilled with material free from large stones or clods of a quality acceptable to the ENGINEER.
- B. Backfill around the pipe and to a point twelve inches above the top of the pipe shall be placed in six inch layers compacted with 20 pound hand tampers or mechanical tampers suitable for this purpose. Backfilling shall follow pipe-laying closely, and shall not be more than one hundred (100) feet behind completed pipe-laying. Backfill over pipe shall be carefully placed by experienced labor and thoroughly consolidated without shock to the pipe, and carried up uniformly on both sides of the pipe. No backfilling with bulldozers will be permitted adjacent to pipe line.
- C. Within roadway right-of-ways, or within areas where pavements are to be constructed over the pipe, the remainder of the trench shall be placed in six-inch layers (compacted thickness) and shall be compacted to 100% of maximum density as determined by AASHTO T-99. CONTRACTOR will be responsible for correcting settlement in all backfilled areas whether under the pavement or otherwise.

**SECTION 02225**  
**EXCAVATION AND BACKFILLING FOR UTILITIES**

- D. In areas where no pavement is to be constructed, the backfill above the twelve inch line above the pipe shall be compacted to a firmness approximately equal to that of the soil adjacent to the pipe trench or 95% of maximum density as determined by AASHTO T-99 in public rights of way. Backfill below the 12-inch line shall be compacted in 6-inch layers (compacted thickness) and shall be compacted to 100% of maximum density as determined by AASHTO T-99.

3.03 EXPLOSIVES

The use of explosives will not be permitted.

3.04 PAYMENT

No separate payment is provided for WORK covered by this Section. All costs in connection with Excavation and Backfilling, including testing, shall be included in the bid price of any item for which excavation and backfilling is required.

END OF SECTION 02221

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this Section.

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the WORK, as indicated on the drawings, as specified herein or both.
- B. Including but not necessarily limited to the following:
  - 1. Topsoil Stripping.
  - 2. Topsoil Mixing and Spreading.
- C. There shall be no classification of excavation for measurement of payment regardless of materials encountered.

1.03 RELATED WORK

- A. Section 02110 - Clearing.
- B. Section 02200 - Earthwork.
- C. Section 02210 - Site Grading.

PART 2 - PRODUCTS

2.01 TOPSOIL

- A. Topsoil shall be obtained from any previously established stockpile on site, to the extent that suitable material is available.
- B. Additional topsoil, if required, shall be obtained by mixing existing on-site sandy fill with imported muck or compost.
- C. Topsoil, whether obtained from stockpile, or mixed as described in "B" above, shall be sandy loam, and shall have the following characteristics:
  - 1. 95% of topsoil shall pass a 2 mm. sieve.
  - 2. Topsoil shall be free of stones 1" in longest dimensions, earth clods, plant parts, and debris.
  - 3. Organic matter content shall be 4% to 12% of total dry weight.

**SECTION 02284  
TOPSOIL**

4. pH and nutrient content shall be adjusted as necessary to conform with recommendations made by testing laboratory.
- D. Samples shall be submitted to OWNER for testing. Test shall indicate compliance with the specifications and recommendations as to the type and quantity of soil additives required to bring the nutrient content and pH to satisfactory levels for planting specified plant material. Tests shall be required at a rate of one per 500 cubic yards of material placed, for the first 5,000 cubic yards of material, and may be reduced at the ENGINEER discretion thereafter. Sampling shall be done in the presence of the ENGINEER. The CONTRACTOR shall be responsible for the cost of testing.

**PART 3 - EXECUTION**

**3.01 JOB CONDITIONS**

Protection: Use all means necessary to protect existing objects and vegetation. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the ENGINEER.

**3.02 FILLING AND GRADING:**

Topsoil shall be spread in a uniform 2" layer after compaction, over all sodded and pervious areas, and finished to grades shown on the plans, making allowance, where necessary, for sod. Grades shown include 0.2' for thickness of sod in all sodded areas.

**END OF SECTION 02284**



PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this section.

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the erosion control installation, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".

1.03 RELATED WORK

- A. Section 02200 - Earthwork
- B. Section 02910 - Sodding.

1.04 INTENT

- A. The main concern associated with erosion on a construction site is the movement of soil off the site and its impact on water quality. It is the OWNER's intent that the CONTRACTOR install and maintain sufficient erosion control practices to retain sediment within the boundaries of the site in addition to complying with regulatory authorities having jurisdiction and local erosion and sedimentation control laws and ordinances. All erosion control methods and devices used shall conform to the latest requirements imposed by federal, state and local authorities. The CONTRACTOR shall be responsible for repair of any damage caused and shall be financially responsible for any penalties imposed.
- B. If an erosion control drawing has been included in the drawings prepared by the ENGINEER, it shall be the CONTRACTOR's responsibility to review the drawing prior to implementation. If an erosion control drawing is not included in the project documents, the CONTRACTOR shall submit, for approval, a proposed sequence of operations and a compatible method of preventing erosion.
- C. The CONTRACTOR shall prepare, submit, and implement a Storm Water Pollution Prevention Plan (SWPPP) in accordance with FDEP document 62-621.300(4)(a).

1.05 SUMMARY

- A. Work under this section shall include but not be limited to, installation and maintenance of both temporary and permanent soil erosion control measures, slope protection and stabilization measures, protection of all surface water and property both on and off site. This work shall include all labor, materials, and equipment necessary to meet all applicable requirements and as specified in the contract documents.

**SECTION 02370**  
**EROSION CONTROL AND SLOPE PROTECTION**

1.06 REFERENCE STANDARDS

- A. All applicable standards and requirements of all regulatory authorities having jurisdiction, including local FDEP and soil conservation agencies.

1.07 QUALITY ASSURANCE

- A. Soil erosion and sediment control measures shall be implemented in accordance with the requirements and procedures outlined in this specification, contract drawings and documents, the state standards or guidelines for soil erosion and sediment control, and all regulatory authorities having jurisdiction. Where conflicts between requirements exist, the more restrictive rules shall govern.
- B. The CONTRACTOR shall provide all temporary control measures shown on the drawings, or as directed by the OWNER, owner's representative, or soil conservation district for the duration of the contract. Erosion control drawings are intended to be a guide to address the stages of work shown. Additional erosion control measures not specified on the drawings may be necessary and shall be implemented to address intermediary stages of work and any conditions that may develop during construction at no cost to the OWNER.
- C. Temporary control provisions shall be coordinated with permanent erosion control features to the extent practical to assure economical, effective and continuous erosion control throughout the construction and post-construction period.
- D. Soil erosion and sediment control measures shall at all times be satisfactory to the owner's representative. Owner's representative will inform the CONTRACTOR of unsatisfactory construction procedures and operations if observed. If the unsatisfactory construction procedures and operations are not responded to and corrected within 48 hours, the owner's representative may suspend the performance of any or all other construction until the unsatisfactory condition has been corrected. Such suspension shall not be the basis of any claim by the CONTRACTOR for additional compensation nor for an extension of time to complete the work. Any complaints, fines, etc. relating to ineffective erosion control, shall be the sole responsibility of the CONTRACTOR.
- E. The CONTRACTOR shall inspect all soil erosion and sediment control measures at least at the beginning and end of each day to ascertain that all devices are functioning properly during construction. Maintenance of all soil erosion and sediment control measures on the project site shall be the responsibility of the CONTRACTOR until the project is 100% complete, and until the permanent soil erosion controls are established and in proper working condition.
- F. The CONTRACTOR shall protect adjacent properties and watercourses from soil erosion and sediment damage throughout construction.

1.08 SEQUENCE OF CONSTRUCTION

- A. The approved construction sequence, as permitted/approved shall be adhered to during the execution of work under this section. All soil erosion and sediment control measures shall be installed in accordance with the phasing sequence shown on the contract documents.

PART 2 - PRODUCTS

**SECTION 02370**  
**EROSION CONTROL AND SLOPE PROTECTION**

2.01 MATERIALS

- A. CONTRACTOR shall provide all materials necessary to perform the work.
- B. Hold/gro as manufactured by Gulf States Paper, Tuscaloosa, Alabama or approved equal.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Review the soil erosion and sediment control drawings as they apply to current site conditions. Any deviation from the drawings must be submitted for approval to the ENGINEER in writing at least 72 hours prior to commencing that work.
- B. Notify county or municipal soil conservation district, in writing least 72 hours prior to initial land disturbance.
- C. All soil sediment and erosion control devices shall be in place prior to any earthwork construction, in their proper sequence, and maintained until permanent protection is established.
- D. The limit of the area of any earthwork operations in progress shall be commensurate with the CONTRACTOR's capability and progress in keeping the finished grading, mulching, seeding and other such permanent control measures current and in accordance with the accepted schedule for construction phasing. Should seasonal limitations make such coordination unrealistic, as determined by the owner's representative, temporary erosion control measures shall be provided immediately by the CONTRACTOR at no expense to the OWNER.
- E. Temporary erosion control measures shall be used to correct conditions which develop during construction that are needed prior to installation of permanent control features, or that are temporarily needed to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.
- F. The CONTRACTOR shall incorporate all permanent erosion control features into the project at the earliest practical time to minimize the need for temporary controls.
- G. A temporary construction entrance pad shall be installed and maintained at any point where construction vehicles enter a public right-of-way, street or parking area. The pad shall be used to eliminate mud from the construction area onto public right-of-way. The pad shall be constructed as shown on the drawings. Any mud or debris tracked on streets shall be cleaned up immediately.
- H. Any disturbed or stockpiled areas that will be left exposed more than 30 days, and not subject to construction traffic, shall immediately receive a temporary seeding. Mulch/straw shall be used if the season prevents the establishment of a temporary cover.
- I. Permanent vegetation shall be established as specified on all exposed areas within 10 days after final grading, unless otherwise directed by the OWNER and permitted by appropriate regulations. Mulch as necessary for seed protection and establishment. Lime and fertilize seedbed prior to permanent seeding.

**SECTION 02370**  
**EROSION CONTROL AND SLOPE PROTECTION**

- J. Cut slopes shall be permanently seeded and mulched as the excavation proceeds to the extent considered desirable and practical. Slopes that erode easily shall be temporarily seeded and mulched.
- K. All storm drainage outlets must be stabilized, as specified, before the discharge points become operational. Equip all inlets with inlet protection immediately upon construction.
- L. Discharge from de-watering operations for the excavated areas shall not be directed to surface waters without first properly removing the suspended sediment through filtration and/or settlement. The CONTRACTOR shall obtain any required permits associated with dewatering activities.
- M. The quantity of silt fence to be installed will be affected by the actual conditions that occur during the construction of the project. Silt fence shall be installed at locations shown on the drawings and any additional locations necessary for proper erosion control. The CONTRACTOR shall maintain the silt fence until the project is accepted and shall remove and dispose of the silt fence and silt accumulations.
- N. Soil erosion and sediment control shall include but not be limited to the approved measures. The CONTRACTOR shall be responsible for providing all additional measures that may be necessary to accomplish the intent of the drawings.
- O. Comply with all other requirements of authorities having jurisdiction.

3.01 SLOPE PROTECTION

- A. The soil and dunes, if applicable, shall be graded as called for on the drawings prior to installation. Seed and fertilizer shall be applied immediately before laying fabric.
- B. The hold/gro fabric shall be installed vertically to the slope starting from the top and running the length of the slope to the bottom. The fabric shall be overlapped a minimum of four (4) inches at all joints. The staples shall be located nine (9) inches apart along the edge and three (3) feet apart down the center. The staples shall be installed as the fabric is rolled out. Use heavy gauge staples. The fabric shall be draped over the dune, if applicable. Stretching over voids shall be avoided.
- C. When used for slope protection of sand dunes, the fabric shall be installed several days before the dune planting takes place. When planting cut an "x"-shaped opening in the fabric and insert the plant.
- D. The installer shall have a representative of the factory on site to inspect the installation.

3.02 MEASUREMENT AND PAYMENT

- A. There shall be no special measurement and payment for the work under this section; it shall be included in the lump sum price bid for item 'Mobilization'.

END OF SECTION 02370

**SECTION 02510  
CONCRETE SIDEWALK**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this section.

**1.02 WORK INCLUDED**

The WORK specified in this Section consists of the construction of concrete sidewalk in accordance with these Specifications and in conformity with the lines, grades, dimensions and notes shown on the plans.

**1.03 RELATED WORK**

- A. Section 02200 - Earthwork
- B. Section 02110 - Clearing
- C. Section 02751 - Portland Cement Concrete Paving

**PART 2 - PRODUCTS**

**2.01 CONCRETE**

Concrete shall be Class I Concrete, with a minimum compressive strength of 3,000 psi in accordance with Section 345, Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

**2.02 FORMS**

Forms for this WORK shall be made of either wood or metal and shall have a depth equal to the plan dimensions for the depth of concrete being deposited against them. They shall be straight, free from warp or bends, and of sufficient strength when staked, to resist the lateral pressure of the concrete without displacement from lines and grade. Forms shall be cleaned each time they are used and shall be oiled prior to placing the concrete.

**2.03 SUBGRADE AND GRADING**

Excavation shall be made to the required depth, and the foundation material upon which the sidewalk is to be set shall be compacted to a firm, even surface, true to grade and cross-section, and shall be moist at the time that the concrete is placed.

**2.04 JOINTS**

- A. Expansion joints between the sidewalk and the curb, and at all other locations indicated on the plans, shall be 1/4-inch wide, formed with a preformed joint filler. Preformed joint filler shall meet the requirements of AASHTO M153 or AASHTO M213.
- B. Contraction joints may be of the open type or may be sawed. Open type contraction joints shall be

**SECTION 02510  
CONCRETE SIDEWALK**

formed by staking a metal bulkhead in place and depositing the concrete on both sides. After the concrete has set sufficiently to preserve the width and shape of the joint, the bulkhead shall be removed. After the sidewalk has been finished over the joint, the slot shall be edged with a tool having a 1/2-inch radius.

If the CONTRACTOR elects to saw the contraction joints, a slot approximately 1/8 inch wide and not less than 1-1/2 inches deep shall be cut with a concrete saw after the concrete has set, and within the following periods of time:

Contraction joints shall be constructed at not more than 20-foot intervals, and shall be in place within 12 hours after finishing.

**PART 3 - EXECUTION**

**3.01 PLACING**

The concrete shall be placed in the forms to the required depth and shall be vibrated and spaded until mortar entirely covers its surface.

**3.02 FINISHING**

- A. Screeding: The concrete shall be struck-off by means of a wood or metal screed, used perpendicular to the forms, and floated in order to obtain the required grade and remove surplus water and laitance.
- B. Surface requirements: The concrete shall be given a broom finish. The surface variations shall not be more than 1/4 inch under a ten-foot straightedge, nor more than 1/8 inch on a five-foot transverse section. The exposed edge of the slab shall be carefully finished with an edging tool having a radius of 1-1/2 inch.

**3.03 CURING**

- A. The concrete shall be continuously cured for a period of at least 72 hours. Curing shall be commenced after finishing has been completed and as soon as the concrete has hardened sufficiently, to permit application of the curing material without marring the surface.
- B. Wet burlap, white-pigmented curing compound, waterproof paper or polyethylene sheets may be used for the curing.
- C. CONTRACTOR shall protect against graffiti and other damages to the finish, prior to curing and acceptance.

**END OF SECTION 02510**

**SECTION 02513**  
**ASPHALTIC CONCRETE PAVING - GENERAL**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

All applicable provisions of the bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this section.

1.02 WORK INCLUDED

- A. This section of the specifications covers the control and general conduct of asphalt paving construction for roads, parking, walks and court areas.
- B. All WORK within the right-of-way shall be constructed using materials and methods in accordance with the drawings, Broward County and Florida Department of Transportation Standard Specifications for Road and Bridge Construction.
- C. Provide all labor, materials, necessary equipment and services to complete the Asphaltic Concrete Paving WORK, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".
- D. Including, but not necessarily limited to the following:
  - 1. Preparation of subgrade.
  - 2. Installation and compaction of base course.
  - 3. Spreading of asphalt surface course.

1.03 RELATED WORK

- A. Section 02200 - Earthwork

1.04 TRAFFIC CONTROL

The CONTRACTOR shall provide and maintain access to and from all properties along the line of his WORK. The CONTRACTOR shall also provide temporary by-passes and maintain them in a safe and usable condition whenever detouring of traffic to parallel routes cannot be done without hardship or excessive increases in travel by the public.

1.05 SPECIAL SUBGRADE CONDITIONS

When special subgrade conditions are encountered for which these "Asphaltic Concrete Paving Specifications" are not applicable, portions of these specifications shall be deleted or revised to provide a properly finished paved surface. A requested revision or deletion of the specifications shall be accompanied with reports and laboratory tests on existing field conditions. Any change from these "Asphaltic Concrete Paving Specifications" shall be approved by the ENGINEER and shall be in effect only for a specified area or paving project.

**SECTION 02513**  
**ASPHALTIC CONCRETE PAVING - GENERAL**

1.06 QUALITY ASSURANCE

A. D.O.T. Standard Specifications.

1. WORK and materials shall conform to all applicable requirements of Florida Department of Transportation "Standard Specifications for Road and Bridge Construction - 1991" (referred to herein as D.O.T.).

B. American Society for Testing and Materials.

1. ASTM 3515-80 "Standard Specification for Hot-Mixed, Job Laid, Bituminous Paving mixtures."

1.07 SUBMITTALS

Provide copies of materials, notarized certificates of compliance signed by material producer and CONTRACTOR, certifying that each material item complies with, or exceeds, specified requirements.

1.08 JOB CONDITIONS

- A. Apply prime and tack coats when ambient temperature is above 50 degrees, and when temperature has not been below 35 degrees for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.
- B. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees, and when base is dry. Base course may be placed when air temperature is above 30 degrees, and rising.

1.09 LOCATIONS, LAYOUT AND GRADES

- A. Locate and layout paved areas and right-of-ways with reference to bench marks, property lines or buildings according to the drawings and as accepted by the ENGINEER.
- B. Determine locations of paved edges and right-of-way line from surveyor's permanent reference monuments and information on the drawings.
- C. Where permanent reference monuments are not available, obtain proper line locations from authorities having jurisdiction.
- D. Establish and maintain required lines and elevations.

PART 2 - PRODUCTS

2.01 FILL

- A. All fill shall be clean rock and sand (maximum rock size = 1 inch).
- B. Fill shall be compacted thoroughly as per Section 02200 - Earthwork.



**SECTION 02513**  
**ASPHALTIC CONCRETE PAVING - GENERAL**

2.02 LIMEROCK

- A. Limerock shall be obtained from pits for which all overburden has been removed previous to blasting and shall show no tendency to air slake and must meet the following chemical requirements.
1. Carbonates of Calcium and Magnesium - Min. 70.0 percent (Miami Limerock). 95.0 percent (Ocala Limerock)
  2. Oxides of Iron and Aluminum - Max. 2.0 percent
  3. Organic Matter - Max. 0.5 percent
  4. Any constituents of other than the above shall be silica or inert material.
  5. The material shall be crushed to such size that not less than 97% shall pass a 3-1/2" sieve and it shall be graded uniformly down to dust. All fine material shall consist entirely of dust of fracture.
  6. Limerock from on-site may be used if the material meets the requirements of this section of the specifications.
- B. All limerock shall comply with requirements set forth under F.D.O.T. Section 911.
- C. Equipment: The equipment for constructing the rock base shall be in first class working condition and shall include:
1. Three wheel roller weighing not less than ten tons.
  2. Self-propelled blade grader weighing not less than three tons. The wheel base shall be not less than fifteen feet and blade length not less than ten feet.
  3. Scarifiers shall have teeth space not to exceed 4-1/2 inches.
  4. Provision for furnishing water at the construction site by tank or hose at a rate not less than 50 gallons per minute.

2.03 PRIME COAT

- A. Prime coat shall be Grade RC-70, cut-back asphalt, D.O.T. Section 916-2.
- B. Prime coat shall have full compatibility with surface treatment asphalt.

**SECTION 02513**  
**ASPHALTIC CONCRETE PAVING - GENERAL**

- C. The bituminous material shall conform to the requirements of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Section 300-2.
- D. The sand for cover shall be clean dry sand.

2.04 TACK COAT

The bituminous material to be used for the tack coat shall conform to the requirements of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Section 300-2.

2.05 ASPHALT

- A. 1. The asphaltic concrete surface course shall be in accordance with Broward County, Florida Department of Transportation Standard Specifications for Type S-1 and Type S-3 Asphaltic Concrete Surface Course.
- 2. Pavement within public road right-of-way which has been disturbed by this construction shall be replaced with the same type and thickness to match the existing pavement section.
- B. General composition of mixtures:
  - 1. The aggregate in the asphaltic concrete shall be crushed stone and manufactured sand screening of natural sand or combination of both when necessary to meet requirements of composition of mix. All aggregate shall have a Los Angeles abrasion loss of less than 40%.
  - 2. The mineral aggregate shall be so graded, and the prescribed constituents, prepared as hereinafter set out, shall be combined in such proportions as to produce a mixture conforming to the following general composition limits by weight:

<u>Constituent</u>	<u>Passing Sieve</u>	S-1 Percent <u>by Weight</u>	S-3 Percent <u>by Weight</u>
Course Aggregate	3/4"	100	100
	1/2"	80-100	100
	3/8"	75-93	88-100
	No. 4	47-75	60-90
Total Course Aggregate	No. 10	31-53	40-70
Fine Aggregate	No. 40	19-35	20-45
	No. 80	7-21	10-30
Filler	No. 200	2-6	2-6
Total Fine Aggregate and Filler	No. 10	100	100

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**ASPHALTIC CONCRETE PAVING - GENERAL**

Total Mineral Aggregate	100	100
Total Mix	100	100

<u>Constituent</u>	<u>Percent by Weight</u>
Total Mineral Aggregate	91-95
Asphalt Cement	5-9*
(Bitumen) Total Mix	100

\*For highly absorptive aggregates the upper limit may be raised.

**2.06 SEAL COATING**

- A. Homogeneous mixture of emulsified coal tar pitch, sand and other inert fillers. It shall be easily remixed if settlement occurs in storage (except in the case of freezing). It shall be capable of application and complete coverage by rubber squeegee, brush, or approved mechanical method, to the surface of bituminous pavements at the spreading rate of point two (.2) to point three (.3) gallons per square yard in two (2) coats.
- B. Approved product: "TARFEX" manufactured by Bitucote Products Co. or approved equal.

**PART 3 - EXECUTION**

**3.01 BARRICADES**

- A. Provide substantial temporary barricades around all areas of operation and maintain until WORK under this section is completed and approved.
- B. Install temporary traffic markers, signals, and signs as per Broward County Engineering Division Standard Specification to:
  - 1. Eliminate potentially hazardous conditions.
  - 2. Maintain adequate traffic patterns free of conflict with WORK under this Contract.

**3.02 PREPARATION OF SUBGRADE**

- A. This WORK consists of bringing the bottom of excavations and top of embankments of the roadway between the outer limits of the shoulders or base course to a surface conforming to the grades, lines, and cross sections shown on the plans. The subgrade shall be of uniform density ready to receive the rock base of the paving course.
- B. All soft and yielding material and other portions of the subgrade which will not compact readily shall be removed and replaced with suitable material and the entire subgrade brought to line and grade to provide a foundation of uniform compaction and supporting power.

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- C. Stumps, roots, and other deleterious organic matter encountered in the preparation of the subgrade shall be removed.
- D. Where fills are required on areas covered or partly covered by existing paving, the entire area of such existing paving shall be scarified to a depth of at least six inches, and the scarified material spread evenly over the area to be filled to a width not less than that of the proposed paving.
- E. Material for fills shall consist of sand or other suitable material approved by the ENGINEER free from stumps, roots, brushes, and other deleterious organic matter.
- F. Where fill is more than one foot (1') in depth, the backfill material above the ground water table shall be compacted on one (8") depth lifts. Each individual layer of fill under the rock base shall have a density of 98% of the maximum density as determined by the AASHTO T-180 unless shown otherwise on the plans. Each individual layer of fill under the shoulder area shall have a density of 98% of the maximum density as determined by AASHTO T-180, unless shown otherwise on the plans.
- G. The bottom of all excavated areas and the top of all fills where rock base is to be constructed shall be thoroughly compacted by rolling. Water shall be used to insure thorough compaction. The stability of the top 12 inch thickness of the subgrade immediately under the base, for the full base width plus one foot (1') on each side, shall be at least 50 PSI as determined by the Florida Bearing Value Method.
- H. Bring subgrade which has been properly filled and shaped to a firm unyielding surface, by rolling an entire area with an approved power roller weighing a minimum of 10 tons.
  - 1. Thoroughly compact area inaccessible to the roller with approved hand tamper.
  - 2. Apply water sufficiently to compact the subgrade where the subgrade is of a dry, sandy nature and cannot be rolled.
- I. The subgrade shall be maintained free from ruts, depressions or other irregularities until rock base material is spread.
- J. For all roads and streets other than State Highway, the stabilized subgrade shall have a minimum Limerock Bearing Ratio (LBR) of 40, unless otherwise noted on the plans.
- K. Where the bearing value of the existing subgrade is adequate without addition of stabilizing material, the subgrade shall be scarified and disked, harrowed, bladed or tilled for removal of boulders, roots, etc. to assure uniformity and thorough mixing of material to the full width and depth of required stabilization. The compacted subgrade shall conform to the lines, grades and cross-section shown on the plans.
- L. Test subgrade for crown and elevation after preparation and immediately before base of paving course is laid.
  - 1. Remove or add material and compact to bring to a correct elevation and uniform bearing if the subgrade is found not to be at the specified elevation at all points.

**SECTION 02513**  
**ASPHALTIC CONCRETE PAVING - GENERAL**

2. Adjust the manhole rims, catch basin frames and valve boxes where necessary to match proposed finish grade.

**3.03 CONSTRUCTION OF BASE COURSE**

- A. This WORK consists of construction of lime rock base course for the asphaltic concrete wearing surface. The base course shall be constructed on the prepared subgrade in a 8" thick limerock bases constructed in two four inch lifts as shown on the drawings. Twelve (12) inch thick limerock bases shall be constructed in two six-inch lifts. The limerock base shall be a minimum LBR of 100.
- B. Spreading Rock: The rock shall be transported to the points where it is to be used over rock previously placed, and dumped on the end of the preceding spread. It shall then be spread uniformly with hand tools, or mechanical equipment. In no case shall rock be dumped directly on the subgrade. No hauling shall be done over the subgrade.
- C. Compacting Rock
  1. Following spreading, the rock shall be rolled with a three wheel roller weighing not less than ten tons, water being added as required, until the entire depth of base is compacted into a dense unyielding mass.
  2. No greater area of rock base shall be placed during any one day than that which can be rolled and compacted on the same day.
- D. Finishing Base
  1. After watering and rolling, the entire surface shall be thoroughly scarified to a depth not less than four inches (4") and shaped to exact crown and cross section, re-watered and again thoroughly rolled. Rolling shall continue until the entire depth of base is bonded and compacted into a dense, unyielding mass, true to grade and cross section.
    - a. Any irregularities which may develop in the surface during such finishing shall be corrected by the removal or addition of rock as the case may be.
    - b. If at any time the subgrade material becomes churned up and mixed with the base rock, the CONTRACTOR shall dig out and remove the mixture, reshape and compact the subgrade and replace the materials removed with clean rock which shall be watered and rolled until satisfactorily compacted.
    - c. Where cracks or checks appear in the base either before or after priming, which in the opinion of the ENGINEER would impair the structural efficiency of the base course, the CONTRACTOR shall remove such cracks or checks by re-scarifying, reshaping, watering, rolling and adding rock where necessary.
    - d. During final compacting operations, if grading of any areas is necessary to obtain the true grade and cross section, the compacting operations for such areas shall be completed prior to making the density tests on the finished base.

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**ASPHALTIC CONCRETE PAVING - GENERAL**

- E. Inferior Rock: If in the opinion of the ENGINEER at any time during the progress of the WORK, rock of inferior quality is being delivered to the construction site, a laboratory analysis of the rock shall be made. Should the results of such tests indicate that the rock does not conform to specifications, the CONTRACTOR shall, at his own expense, remove such inferior material from the area indicated and deliver and spread satisfactory rock on said area.
- F. Testing Surface: The finished surface of the rock base shall be true to the required cross section. Any irregularities in the grade greater than 1/4", as determined by placing a ten foot straight edge parallel with the centerline, shall be corrected by scarifying to a depth of three inches (3"), removing or adding rock as may be required and again watering, rolling, and compacting the scarified area. In testing the surface for irregularities, the measurements under the straight edge shall not be taken in small holes caused by individual pieces of rock having been pulled out by the road grader.
- G. Thickness Determination: Thickness of the base shall be measured by intervals as required by the ENGINEER. Measurements shall be taken at various points on the cross section. The measurements shall be taken in holes through the base of not less than three inches (3") in diameter. Where the base is more than 1/2" less than the required compacted thickness, the CONTRACTOR shall correct such areas by scarifying and adding rock. The affected areas shall then be watered, rolled and brought to a satisfactory state of completion, and of required thickness and cross section.
- H. Density: Density determinations shall be made by the CONTRACTOR or at intervals required by the ENGINEER. An average required density shall be 98% of maximum density obtainable under AASHTO Method T-180. No section of base shall be accepted when more than 10% of tests fall below 98% of maximum density and in no case shall a density of less than 96% of maximum be accepted.
- I. Testing: The CONTRACTOR shall coordinate with ENGINEER for all testing. One test shall be made in accordance with AASHTO, T-180 for each class of material in the subgrade and base.
  - 1. In place density tests in accordance with AASHTO T-147 shall be made in the locations shown on the plans. Two copies of the test reports will be sent directly to the ENGINEER for evaluation.
  - 2. Any material which fails to meet these specifications shall be removed, replaced, and retested, all at the CONTRACTOR's expense.
  - 3. Tests shall be taken at least every 1,000 square yards and taken at locations and lifts as directed by the ENGINEER.

3.04 PRIME COAT FOR BASE COURSE

- A. Cleaning the prepared base:
  - 1. Before any bituminous material is applied, all loose material: dust, dirt, caked clay and foreign matter which might prevent proper bond with the existing surface shall be moved to the shoulders, to the full width of the treatment, by means of revolving brooms or approved mechanical sweepers and by mechanical blowers, of approved types, supplemented by hand sweeping. Dust and other loose materials not removed by mechanical means shall be

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**ASPHALTIC CONCRETE PAVING - GENERAL**

removed with hand brooms. Particular care shall be taken to clean the outer edges of the strip to be treated in order to insure that the prime coat will adhere. Sweeping and blowing shall be continued until all the loose dust and dirt is removed from the surfaces.

2. Application of bituminous material shall be made during the same day surface has been swept and as soon as practical thereafter.

**B. Application for prime coat:**

1. The bituminous material shall be applied to the clean dry surface of the rock base at such temperature as will insure uniform distribution. The amount applied will be at the rate of approximately 0.10 to 0.20 gallons per square yard of base area. The application shall be made by means of self-propelled pressure distributor operating under a pressure not less than 20 pounds per square inch. Application of bituminous material shall be made on only one-half of the width of base at one time.
2. The primed base shall then be covered with a uniform layer of clean sand, and kept thoroughly and uniformly covered by additional sand or sweeping until it shows no signs of picking up under traffic. For a period of one week after priming, the CONTRACTOR shall again broom any area where insufficient cover sand or excess of bituminous material causes "bleeding" and, if necessary, spread additional sand on such area.

- C. Prime coat finish:** After prime has cured or sat and been sanded, the shoulder shall be shaped to conform to all grade lines and cross sections and the entire area shall be rolled and compacted with a rubber tired roller or a power roller before asphalt surface is laid on the finished base.

**3.05 BITUMINOUS TACK COAT**

- A.** Before applying any bituminous material, all loose material: dust, dirt and foreign material, which might prevent proper bond with the existing surface, shall be removed for the full width of the application.

**B. Application for tack coat:**

1. The surface to receive the tack coat shall be clean and dry. The tack coat shall be clean and dry. The tack coat shall be applied with a pressure distributor except that on small jobs, if approved by the ENGINEER, the application may be made by other approved mechanical methods or by hand methods. The pressure distributor shall operate at a pressure not less than 20 pounds per square inch and at a consistency such that it can be properly pumped and sprayed uniformly over the surface.
2. The bituminous material shall be applied in a thin uniform layer. The rate of application shall be between 0.02 and 0.10 gallon per square yard. The tack coat shall be applied sufficiently in advance of the laying of the wearing surface to permit drying, but shall not be applied so far in advance that it might lose adhesiveness as a result of being covered with dust or other foreign material. The tack coat surface shall be kept free from traffic until the wearing surface is laid.

**3.06 ASPHALTIC CONCRETE WEARING SURFACE COURSE**

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**ASPHALTIC CONCRETE PAVING - GENERAL**

- A. Cleaning and preparing base:
1. Prior to the laying of the asphaltic concrete, the base of pavement to be covered shall be cleaned of all loose deleterious material by the use of power brooms or blowers. A tack coat shall be applied on all pavement. The tack coat shall not be applied so far in advance of laying operations as to allow shifting and sand or weather conditions to nullify its effectiveness.
  2. After the surface has been thoroughly cleaned, all holes shall be filled with asphaltic concrete, if necessary, and thoroughly compacted to conform to the existing surface and to form a smooth surface.
- B. Placing asphaltic concrete: The asphaltic concrete surface course shall be applied after the tack coat may be permitted a reasonable time for drying but not to an extent that the tack coat is allowed to lose its adhesiveness.
1. Machine spreading: Upon arrival the mixture shall be dumped into the approved mechanical spreader and immediately spread and struck off to the full width required and to such appropriate loose depth for each successive course that when the WORK is completed the required weight of the mixture per square yard or the specified thickness will be secured. An excessive amount of mixture shall be carried ahead of the screen at all times. Hand raking shall be done behind the machine as required.
  2. Hand spreading: In limited areas, where, on account of irregularities or unavoidable obstacles, the use of mechanical spreading and finishing equipment is impractical, the mixture may be spread by hand, when so authorized by the ENGINEER.
  3. The mixture shall be laid only when the surface to be covered is dry and only when weather conditions are suitable.
  4. All structures which will be in actual contact with asphaltic mixture, including the face or surface of curbs or gutters and their vertical faces of existing pavements, shall be painted with a uniform coating of asphalt material to provide a closely bonded, watertight joint.
  5. Where necessary, due to the traffic requirements, the mixture shall be laid in strips in such manner as to provide for the passage of traffic.
  6. Any mixtures caught in transit by a sudden rain may be laid at the CONTRACTOR's risk. In no case shall the mixture be laid while rain is falling or when there is water on the surface to be covered.
  7. The depth of the layer being spread shall be gauged as directed, and where the thickness fails to average the specified thickness, immediate steps shall be taken to correct the depth.
  8. Before any rolling is started, the course surface shall be checked, any inequalities adjusted, and all drippings, fat sand accumulations from the screed and fat spots from any source shall be removed and replaced with satisfactory material.



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**ASPHALTIC CONCRETE PAVING - GENERAL**

9. Straight-edging and back-patching shall be done after initial completion has been obtained and while the material is still hot. Any irregularity greater than 1/4" either longitudinally or transversely shall be corrected at this time.
  10. No skin patching shall be done. When a depression is to be corrected while the mixture is hot, the surface shall be well scarified before the addition of fresh mixture. If irregularities occur and are not corrected while the mixture is still hot, the irregularities shall be cut out the full depth of the layer and replaced with fresh mixture.
- C. Compacting mixture: After the spreading, the mixture shall be rolled when it has set sufficiently or come to the proper condition to be rolled, and when the rolling does not cause undue displacement or shoving.
1. The motion of the roller shall at all times be slow enough to avoid displacement and shall at once be corrected by the use of rakes and fresh mixture where required. The rolling shall include all transverse, longitudinal, and diagonal rolling, as may be necessary to obtain the maximum density.
  2. The seal rolling with tandem steel rollers weighing from five to eight tons shall follow as close behind the spreader as is possible without picking up, or displacing or blistering the material.
  3. Rolling with the self-propelled pneumatic-tired rollers shall follow as soon as possible and as close behind the seal rolling as the heat of the mixture will permit. The rolling shall be done while pavement temperature is between 175° and 240°F, and to such an extent that the self-propelled traffic roller shall cover every area of the surface with at least ten passes. Final rolling with tandem steel rollers shall be done after the rolling with self-propelled pneumatic tired rollers is completed. This final rolling shall be done before the pavement temperature is lower than 175°F, and shall be continued until all roller marks or tire marks are eliminated.
  4. Self-propelled pneumatic rollers shall be used for the rolling of patching and leveling courses. At the option of the CONTRACTOR, a steel-wheeled roller may be used to supplement the self-propelled pneumatic-tired rollers but not more than one steel-wheeled roller may be used in conjunction with the necessary number of self-propelled pneumatic-tired rollers. After final completion, the finished pavement shall at no point have a density less than 95% of the laboratory compacted density.
  5. Rolling with the self-propelled pneumatic-tired roller shall proceed at a speed from six to twelve miles per hour and the rate of rolling shall not exceed 3,000 square yards per hour per roller. A sufficient number of self-propelled pneumatic-tired rollers shall be used so that the rolling of the surface for the required number of 10 passes within this maximum rolling rate shall not delay any other phase of the placing operation and not result in excessive cooling of the mixture before the rolling is complete. In the event that the rolling is not properly maintained to schedule as outlined above, the laying operation shall be discontinued until the rolling operations are sufficiently caught up.
  6. In all places inaccessible to a roller, such as adjacent to curbs, headers, gutters, bridges, manholes, etc., the required compaction shall be secured with tamps. Depressions which may

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develop before the completion of the rolling shall be remedied by loosening the mixture laid and adding new material to bring such depressions to a true surface.

7. Should any depressions remain after final compaction has been obtained, the mixture shall be removed sufficiently and new material added to form a true and even surface. All high spots, high joints and honeycombs shall be adjusted as directed by the ENGINEER.
  8. The mixture, after compaction, shall be of the thickness shown on the plans. The surface, after compactions, at no place shall show an excess of asphalt and any area showing such excess or other defect, shall be cut out and replaced with fresh mixture and immediately compacted to conform with the surrounding area. Any mixture which becomes loose or broken, mixed with dirt in the wearing course shall be removed and replaced with fresh mixture which shall be immediately compacted to conform with surrounding areas.
  9. Gasoline or oil from rollers shall not be allowed to deposit on the pavement and any pavement damaged by such deposits shall be removed and replaced as directed by the ENGINEER.
  10. Any mixture remaining unbonded after rolling shall be removed and replaced.
- D. Protection of pavement: After the completion of the pavement, no vehicular traffic of any kind shall be permitted on the pavement until it has set sufficiently as approved by the ENGINEER.

**3.07 ABUTTING EXISTING PAVING**

Meet elevation of existing paving and structures, facilities and utilities where applicable by feathering the thickness of the new surface course for not more than one (1) foot in the periphery of the structure, facility or utility. Do not cover access covers, manhole tops, water meters or other similar devices.

**3.08 PAVEMENT EDGES**

Make edges of paved area conform to details and sections as shown on drawings.

**3.09 SEAL COATING**

- A. Preparation of surface: Pavement to be sealed must be sound and free of loose dust, dirt, stones, or other foreign matter:
1. Repair any breaks or holes.
  2. Scrape off accumulations of oil or fuel drippings and scrub with detergent and water. Remove all traces of detergent.
  3. Soft or damaged spots must be repaired.
  4. Flush entire area with clean water.
  5. Pavement should be damp (no puddles or excess water) when seal coating is applied.

**SECTION 02513**  
**ASPHALTIC CONCRETE PAVING - GENERAL**

- B. **MIXING:** Stir seal coating to a uniform consistency, use no solvents for thinning. Dilute seal coating with ten (10) percent to twenty (20) percent clean water, stirring to uniform consistency.
- C. **Application:**
1. Seal coat may be applied to dampened surface with a rubber squeegee, soft bristled push broom, or approved mechanized equipment.
  2. Seal coating may be poured directly onto pavement in a ribbon or windrow. Squeegee is placed on pavement at a slight angle to edge line of pavement and pulled in a window along pavement in parallel lines, always working excess material toward bottom edge of squeegee.
  3. Seal coating should be applied in two (2) thin coats. After first coat is completely dry to touch, a second coat may be applied at right angles to the first. Rate of application will depend on porosity of surface.
  4. Allow to cure for twenty-four (24) hours before opening to traffic.
  5. Do not apply seal coating when temperature is below fifty (50) degrees Fahrenheit, or falling, before sealer is dry, or rain appears imminent or forecast.
  6. Apply in strict accord with manufacturers published instructions.

3.10 FIELD QUALITY CONTROL

- A. Test in place asphalt concrete course for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by OWNER's Representative and ENGINEER.
1. In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:
    - a. Base Course: Not greater than 1/2" of specified thickness.
    - b. Surface Course: Not greater than 1/4" of specified thickness.
  2. Test finished surface of each asphalt concrete course for smoothness, using 10' straight edge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.
    - a. Base Course Surface: 1/4".
    - b. Wearing Course Surface: 1/8".
- B. Check surface area at intervals as directed by the ENGINEER.
- C. Finish grade shall be within  $\pm 0.05$  feet of the grades indicated on the plans.

3.11 CLEAN UP

**SECTION 02513**  
**ASPHALTIC CONCRETE PAVING - GENERAL**

- A. Remove all debris and excess material immediately from project site.
- B. Take down all barricades and temporary traffic markers, signals and signs only after all WORK included in this section is finished and inspected, and only after so directed by the ENGINEER.
- C. Leave project area clean, orderly and free of any hazardous conditions.

3.12 CONSTRUCTION OF SWALES

- A. This WORK consists of regrading existing swales and construction of new swales adequate for conveying storm water along the edge of roadways to catch basins. The swale shall be shaped according to the cross section shown on the plan. In areas adjacent to existing roadways all swales shall be regraded to match their existing condition prior to construction, unless otherwise noted.
- B. Requirements: All soft and yielding material and other portions of the swale which will not compact readily shall be removed and replaced with suitable material and the entire swale area brought to the proper grade. Stumps, roots, and other deleterious organic matter encountered during the shaping for the swale shall be removed.
- C. The bottom of all excavated areas and the top of all fills of swale areas shall be thoroughly compacted by rolling. Water shall be used as necessary to insure thorough compaction. The stability of the top 12" thickness of swale area shall be at least 50 PSI as determined by the Florida Bearing Value Method. Sufficient stabilizing material shall be added to swale area soil as required to provide the specified stability.
- D. The CONTRACTOR shall place sod over existing areas damaged by construction. The sod shall match the existing sod type in the affected areas.

END OF SECTION 02513

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this Section.

**1.02 WORK INCLUDED**

- A. This section covers the work necessary for service connections, laying service pipe, casing pipe, making connections to the new water main and to the existing service pipe, testing and flushing, and all incidental work necessary to accomplish the construction.
- B. The work includes trench excavation, backfill and compaction, furnishing and installing service clamps, corporation stops or valves, meter yokes or connections, service connection piping, fittings, and appurtenances within the designated limits, testing, flushing, and other incidental work as required for a complete installation. Included are the installation and transfers of 5/8-inch, one (1) inch, 1½ inch, and two (2)-inch meter connections within the limits shown on the plans.
- C. The approximate location of service connections to be installed or transferred will be determined by the CONTRACTOR, upon review and approval by the ENGINEER and COUNTY.

**1.03 RELATED WORK**

- A. Division 2 as applicable
- B. Section 02200 - Earthwork.
- C. Section 02225 - Excavation and Backfilling for Utilities.

**PART 2 - PRODUCTS**

**2.01 EXCAVATION**

- A. Excavation shall conform to the requirements of Section 02305, Excavation and Backfilling for Utilities.

**2.02 BACKFILL**

- A. Acceptable material excavated from the trench shall be used for trench backfill. Select backfill material for use in the pipe zone, when required by the ENGINEER, shall contain no material larger than one (1) inch in diameter.

**2.03 SERVICE CONNECTION SIZE**

- A. The location and size of service connection to be transferred or installed will be as determined in the field by CONTRACTOR. The meter and meter box will be installed by CONTRACTOR if required. Minimum tap size shall be one (1) inch.

**SECTION 02515**  
**WATER SERVICE CONNECTIONS AND TRANSFERS**

2.04 SERVICE SADDLES

- A. Service saddles shall be malleable or ductile iron double-strap saddles with iron pipe tap, or equal. Saddle shall be of the size required by the pipe and shall be provided with a neoprene O-ring seal and appropriately sized IP tap. Straps shall be corrosion resistant with Type 304 stainless steel bands and hardware.
- B. Service Saddle Manufacturers or Equal:
  - 1. JCM
  - 2. Rockwell International
  - 3. Mueller

2.05 TAPPING MATERIALS

- A. The CONTRACTOR shall provide the necessary tapping machines for making the connections, and shall furnish the miscellaneous materials required for making the taps, such as cutting oil and similar materials.

2.06 CORPORATION STOPS

- A. Corporation stops for one (1) inch services shall have AWWA thread inlet and a compressive connection outlet suitable for service pipe. Corporation stops for two (2) inch services shall be ball valves and have outside iron thread inlet and a compression connection outlet suitable for service pipe. Corporation stops shall meet AWWA C800, latest revision.
- B. Corporation Stop Manufacturers or Equal:
  - 1. Mueller
  - 2. Ford
  - 3. Hays Manufacturing Company

2.07 COUPLINGS

- A. Couplings shall be hose clamp type coupling, outside IP thread to plastic for connecting polyethylene pipe to corporation stop and meter yoke. Clamp pipe with two stainless steel clamps at each connection.
- B. Coupling Manufacturers or Equal:
  - 1. Mueller
  - 2. Ford
  - 3. Hays Manufacturing Company

2.08 FLEXIBLE COUPLINGS

**SECTION 02515**  
**WATER SERVICE CONNECTIONS AND TRANSFERS**

- A. Flexible couplings shall be straight cast couplings and shall be Rockwell International No. 431, or equal.

2.09 UNION

- A. Copper-to-copper union.
- B. Union Manufacturers or equal:
  - 1. Mueller H-15400
  - 2. Hays Manufacturing Company 5615

2.10 MISCELLANEOUS FITTINGS

- A. Miscellaneous fittings, includes reducers and adapters.
- B. Miscellaneous Fittings Manufacturers or equal:
  - 1. Mueller Company
  - 2. Ford
  - 3. Hays Manufacturing Company

2.11 CURB STOPS

- A. Curb stops shall meet AWWA C800, latest revision and shall be Mueller or equal.

2.12 CURB BOXES

- A. Curb boxes shall be two (2) feet long, extension type, arch pattern base, Mueller or equal, and furnished with lids and plugs.

2.13 METER STOP

- A. Meter stops shall be Mueller, Ford, Hays Manufacturing Company, or equal.

2.14 METERS, BOXES, AND COVERS

- A. Meters are provided by the CONTRACTOR. Boxes and Covers are to be furnished by the CONTRACTOR. CONTRACTOR will install Meters, Boxes and Covers.

2.15 METER YOKES

- A. The meter yokes shall be Ford, Hays, or equal.

2.16 ANGLE VALVES

**SECTION 02515**  
**WATER SERVICE CONNECTIONS AND TRANSFERS**

- A. Angle valves for the one (1) inch and two (2) inch meter installations shall be Ford, Crane, or equal.

2.17 COPPER TUBING

- A. Copper tubing used for one (1) inch service connections shall be Type K, soft, seamless, conforming to ASTM B88, with commercially pure wrought copper solder joint fittings. Make joints with 95-5 coreless wire solder, ASTM B32, Grade 95 TA.

2.18 POLYETHYLENE PLASTIC TUBING

- A. Polyethylene plastic tubing shall be manufactured from ultra-high molecular weight, high-density polyethylene in accordance with AWWA C901, latest revision, ASTM D3350, PE 355434C. The tubing shall have a working pressure of 200 psi and a standard dimension ratio of nine (9).
- B. Polyethylene Plastic Tubing Manufacturers or equal: Driscopipe.

2.19 CASING PIPE

- A. Casing pipe shall be galvanized or black iron, or equal, as determined by Engineer.

PART 3 - EXECUTION

3.01 TRENCH EXCAVATION AND BACKFILL

- A. Conform to the requirements of Section 02305, Excavation and Backfilling for Utilities. Place only select backfill material in the trench within six (6) inches of the service connection pipe or line. Cover around pipe shall be 8 inches or as indicated on the plans. Backfill and compact remainder of trench with excavated material as specified in the referenced section.

3.02 CONNECTION TO MAIN

- A. Clean exterior of main of dirt or other foreign matter that may impair the quality of the completed connection. Then place service clamp at the desired location and clamp tight by tightening alternate nuts progressively. Do not place service clamp within one (1) foot of pipe joint or other clamp.
- B. Taps shall be made in the pipe by experienced workmen using tools in good repair with the proper adapters for the size main being tapped.

3.03 PREPARATION OF TRENCH

- A. Grade the bottom of the trench by hand to the line and grade to which the pipe is to be laid, with proper allowance for special bedding. All other conditions and operations as specified in Section 02305, EXCAVATION AND BACKFILLING FOR UTILITIES, must be adhered to. The trench bottom shall form a continuous and uniform bearing support for the pipe. A six (6) inch layer of imported earth or other specified material will be required over and under pipe in areas where suitable trench side material is not available.

3.04 UNDERCROSSING OF ASPHALT-SURFACED ROADS



**SECTION 02515**  
**WATER SERVICE CONNECTIONS AND TRANSFERS**

- A. Service connection piping under asphalt-surfaced roads shall be bored or jacked. Open cutting of asphalt-surfaced roads is not permitted except at the direction of the ENGINEER. The service connection pipe shall be installed so that it has a minimum cover of two (2) feet with a slight grade sloping away from the water main.

3.05 COPPER TUBING

- A. The copper tubing shall be cut with square ends, reamed, and flared with the proper size flaring tool, cleaned, and made up tightly. Care shall be taken to prevent the tubing from kinking or buckling on short-radius bends. Kinked or buckled sections of copper tubing shall be cut out and the tubing spliced with the proper brass fitting at the CONTRACTOR's sole expense.

3.06 POLYETHYLENE PLASTIC TUBING

- A. Install polyethylene plastic tubing in accordance with the manufacturer's recommendations.

3.07 INSTALLATION OF METER BOXES AND METERS

- A. Meters and meter boxes or vaults shall be installed by the CONTRACTOR as shown on the plans. Finish grade of completed meter enclosure shall be flush with existing ground or as shown otherwise. Meter boxes or vaults shall be set or constructed plumb with the top set to conform to the slope of the finish grade. Lightly compacted earth backfill shall be placed inside of the meter boxes to depth indicated. Grade adjustment of the meter boxes or vaults shall be by using standard extension sections for the box or vault specified. Install meter in a horizontal position with the meter dial or dials at a depth below the cover as shown on the plans. Backfill around meter vaults as specified for adjoining pipe.
- B. Water meters shall be reinstalled by the CONTRACTOR. Corporation stops shall be in the open position and angle stops shall be closed, prior to reinstallation of the meter.
- C. Withhold reinstalling meters until the new water system is ready for operation. The remainder of the service connection, excluding the meter, may be installed at any time during or after construction of the main.
- D. Where existing meters are designated for relocation, contractor shall read, record, and submit existing meter readings on the form supplied by the county prior to removal of meters, and after completion of relocation work. Contractor shall furnish ENGINEER and county with copies of all meter readings on a monthly basis or as requested by the ENGINEER.

3.08 HYDROSTATIC TEST AND LEAKAGE

- A. Test service connections and service connection tubing by either testing in conjunction with the main at the test pressure required for the main, or by testing at the normal hydrostatic main pressure after the main has been completely installed and tested. Inspect visually for leaks and repair any leaks before backfilling. Duration of the test shall be at least fifteen (15) minutes.

3.09 DISINFECTION

- A. Service connection transfers shall be disinfected as follows:
  - 1. Make connection to the main pipeline which shall have been previously hydrostatically

**SECTION 02515**  
**WATER SERVICE CONNECTIONS AND TRANSFERS**

tested and disinfected.

2. Prior to connecting new copper or plastic tubing to existing copper tubing or meter stop, flush new copper or plastic tubing by fully opening corporation stop and allowing water to run for 2 minutes.
3. Close corporation stop and meter stop, connect new copper or plastic tubing to existing copper tubing or to meter stop, as applicable. Open corporation stop and allow to stand for a minimum of 30 minutes retention period. Open meter stop.

END OF SECTION 02515

**SECTION 02751  
PORTLAND CEMENT CONCRETE PAVING**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this Section.

1.02 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the Portland Cement Concrete Paving WORK, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".
- B. Including, but not necessarily limited to the following:
  - 1. Fill, subgrade, and limerock base.
  - 2. Concrete form work.
  - 3. Concrete reinforcement.
  - 4. Expansion and contraction joints.
  - 5. Concrete paving.

1.03 RELATED WORK

- A. Section 02200 - Earthwork
- B. Section 02513 - Asphaltic Concrete Paving - General

1.04 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Perform WORK in accordance with local building and other applicable codes.
- B. Installation: Performed only by skilled workmen with satisfactory record of performance on completed projects of comparable size and quality.
- C. Inspection and Testing: Performed in accordance with Section 01410 unless otherwise specified.
  - 1. Test cylinders - as per ASTM C-39.
    - a. Minimum of three (3) concrete test cylinders shall be taken for every 75 or less cubic yards of concrete placed.
    - b. Minimum of one (1) additional test cylinder shall be taken during any cold weather concreting, and be cured on job site under same conditions as the concrete it represents.

**SECTION 02751  
PORTLAND CEMENT CONCRETE PAVING**

2. Slump test - as per ASTM C-143:
  - a. Minimum of one (1) slump test shall be taken for each set of test cylinders taken.

1.05 SUBMITTALS

- A. Test Reports: Reports of concrete compression, yield, air content, and slump tests.
- B. Certificates:
  1. Manufacturer's certification that materials meet specification requirements.
  2. Material content per cubic yard of each class of concrete furnished.
    - a. Dry weights of cement.
    - b. Saturated surface-dried weights of fine and coarse aggregate.
    - c. Quantities, type and name of admixtures.
    - d. Weight of water.
  3. Ready-mix delivery tickets, ASTM C-94.
- C. Shop Drawings:
  1. Show sizes and dimensions for fabrication and placing of reinforcing steel and bar supports.
  2. Indicate bar schedules, stirrup spacing, and diagrams of bend bars.
  3. Detail items of form systems affecting appearance of Architectural concrete surfaces such as joints, tie holes liners, patterns and textures. Show items in relation to entire form system.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.
- B. Handle and store materials to prevent contamination.

1.07 JOB CONDITIONS

- A. Allowable concrete temperatures:
  1. Hot weather: Maximum 90 degrees F as per ASTM C-94.
- B. Do not place concrete during rain, unless protection is provided.

**SECTION 02751  
PORTLAND CEMENT CONCRETE PAVING**

**PART 2 - PRODUCTS**

**2.01 FILL**

As specified in Section 02513 - Asphaltic Concrete Paving - General

**2.02 SUBGRADE**

As specified in Section 02513 - Asphaltic Concrete Paving - General

**2.03 LIMEROCK BASE**

As specified in Section 02513 - Asphaltic Concrete Paving - General

**2.04 READY-MIXED CONCRETE**

A. Cement: ASTM C-150, normal Type 1.

B. Admixtures:

1. Air entraining: ASTM C-260.
2. Chemical: Type (as required) ASTM C-494.
3. Fly ash and pozzolans: ASTM C-618.

C. Coarse aggregate: Not less than 50% clean, hard, crushed stone conforming to requirements of Table 2, size number 467 ASTM C-33.

D. Slump Range: 2-4 inches - tested according to ASTM designation C143 (AASHTO T119).

E. Air content: 5% + 1%.

F. Mix proportioning:

1. 28 day compressive strength of cured laboratory samples 3,000 psi.
2. Minimum cement content 5 sacks/cubic yard.

G. Curing Material: Liquid membrane, ASTM C-309, Type 1.

H. Mixes:

1. ASTM C-94.
2. Mix concrete only in quantities for immediate use.
3. Do not retemper or use set concrete.

**SECTION 02751  
PORTLAND CEMENT CONCRETE PAVING**

2.05 REINFORCEMENT

- A. Reinforcing Steel Bars: 60 psi yield strength; deformed billet steel bars; ASTM A-615, plain finish.
- B. Welded Steel Wire Fabric: Plain type, ASTM A-185, hot dip galvanized, plain finish.
- C. Tie Wire: FS QQ-W-461-G, annealed steel, black, 16 ga. minimum.
- D. Bar Supports: Conform to "Bar Support Specifications," CRSI Manual of Standard Practice.

2.06 FORMWORK AND ACCESSORIES

- A. Formwork: Matched, tight fitting and adequately stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of concrete, conform with ACU 347, Chapter 3, Material and Form Work.
- B. Lumber:
  - 1. Softwood framing lumber: Kiln dried, PS-20.
  - 2. Boards less than 1-1/2 inch thick and 2 inches wide, used for basic forms and form liners: Kiln dried.
  - 3. Grade marked by grading rules agency approved by American Lumber Standards Committee.
  - 4. Light framing or studs for board or plywood forms, 2 inches to 4 inches width and thickness, construction standard grade.
  - 5. Boards for basic forms, construction standard grade.
  - 6. Board surface: Smooth.
- C. Plywood:
  - 1. Exterior type softwood plywood, PS 1-66.
  - 2. Each panel stamped or branded indicating veneer grades, species, type and identification.
  - 3. Wood faced plywood for Architectural concrete surfaces.
    - a. Panel veneer grades: B-C.
    - b. Mill-oiled sides and mill-sealed edges of panels.
- D. Ties:
  - 1. Material: Steel
  - 2. Type: Snap ties

**SECTION 02751  
PORTLAND CEMENT CONCRETE PAVING**

3. Depth of breakback: 1 in.
4. Maximum diameter, 1/4 in.

E. Form coatings:

1. Non-staining type.
2. Agent: Pine oil derivative.

2.07 EXPANSION AND CONTRACTION JOINTS

Minimum 3/4 inch thick asphaltic impregnated fiberboard as per ASTM D-1751.

2.08 OTHER

Water: Clean and potable.

PART 3 - EXECUTION

3.01 BARRICADES

- A. Provide substantial temporary barricades around all areas of operation and maintain until WORK under this section is completed and approved.
- B. Install temporary traffic, markers, signals, and signs as per D.O.T. Standard Specifications to:
  1. Eliminate potentially hazardous conditions.
  2. Maintain adequate traffic patterns free of conflict with WORK under this Contract.

3.02 PREPARATION OF SUBGRADE

- A. Ensure rough grading has brought subgrade to required elevations.
- B. Fill soft spots and hollows with additional fill.
- C. Level and compact subgrade, to receive limerock base for concrete walks, curbs and gutters, to 98% compaction as per AASHTO T-180.

3.03 FORMWORK

- A. CONTRACTOR is responsible for the design, construction, removal and complete safety of formwork and shoring.
- B. Form construction shall be provided to shape, lines dimensions of members shown: substantial, tight enough to prevent leakage, and properly braced or tied to maintain position and size, form sides and bottoms of members unless specifically excepted.

**SECTION 02751  
PORTLAND CEMENT CONCRETE PAVING**

- C. Fill voids of plywood joints with sealant and tool smooth.
- D. Form vertical surfaces to full depth and securely position to required lines and levels. Ensure form ties are not placed so as to pass through concrete.
- E. Arrange and assemble formwork to permit easy dismantling and stripping, and to prevent damage to concrete during formwork removal.

**3.04 REINFORCING**

- A. Reinforce concrete curbs and gutters. Allow for minimum 1-1/2 inch concrete cover.
- B. Do not extend reinforcing through expansion and contraction of joints. Provide dowelled joints through expansion and contraction joints, with one end of dowels fitted with capping sleeve to allow free movement.

**3.05 FORMING EXPANSION AND CONTRACTION JOINTS**

- A. Place expansion and contraction joints at 20 foot intervals or as indicated on drawings. Where possible, make joints of curbs coincide with joints in paving slabs. When sidewalks abut building, provide continuous joint filled.
- B. Fill joints with filler of required profiles, set perpendicular to longitudinal axis of walks, curbs and gutters. Recess 1/2 inch below finished concrete surface.

**3.06 INSPECTION**

- A. Assure that excavation and formwork are completed, and excess water is removed.
- B. Check that reinforcement is secured in place.
- C. Verify that expansion joint material, anchors, and other embedded items are secured in position.

**3.07 PREPARATION FOR PLACEMENT**

- A. Notify the ENGINEER and other inspectors at least 36 hours prior to inspection.
- B. Equipment forms, and reinforcing shall be clean and wet down, reinforcing firmly secured in place, runways set up and not resting on or displacing reinforcing.

**3.08 PLACING CONCRETE**

- A. Place concrete, screed and wood float surfaces to a smooth and uniform finish, free of open texturing and exposed aggregate.
- B. Avoid working mortar to surface.



**SECTION 02751  
PORTLAND CEMENT CONCRETE PAVING**

- C. Round all edges, including edges of expansion and contraction joints, with 1/2 inch of radius edging tool.
- D. Where concrete curbs are adjacent to pavement slabs, make concrete curbs and gutters integral with slabs. Make expansion and contraction joints of curbs coincide with slab joints.
- E. Ensure finished surfaces do not vary from true lines, levels or grade by more than 1/8 inch in 10 feet when measured with straightedge.
- F. Apply curing compound on finished surfaces immediately after finishing. Apply in accordance with manufacturer's recommendations.

3.09 PROTECTION OF COMPLETED WORK

During curing period, protect concrete from damaging mechanical disturbances, water flow, loading, shock, and vibration.

3.10 CLEAN UP

- A. Remove all debris and excess material immediately from project site.
- B. Take down all barricades and temporary traffic markers, signals and signs only after all WORK included in this section is finished and inspected, and only after so directed by OWNER's Representative.
- C. Leave project area neat, orderly and free of any hazardous conditions.

END OF SECTION 02751

**SECTION 02768**  
**DECORATIVE CEMENT CONCRETE PAVEMENT**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:

1. Embossed integrally colored concrete pavement.

- B. Related Sections include the following:

1. Division 2 Section 02200 "Earthwork"
2. Division 2 Section 02751 "Portland Cement Concrete Pavement"
3. Division 3 Section 03010 "Concrete"
4. Division 3 Section 03100 "Concrete Formwork"
5. Division 3 Section 03200 "Concrete Reinforcement"
6. Division 3 Section 03300 "Cast-in-Place Concrete"

1.03 REFERENCES

- A. American Concrete Institute (ACI):

1. ACI 301 "Specification for Structural Concrete for Buildings."
2. ACI 302 IR "Recommended Practice for Concrete Floor and Slab Construction."
3. ACI 303.1 "Standard Specification for Cast-in-Place Architectural Concrete."
4. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete"
5. ACI 305R "Recommended Practice for Hot Weather Concreting."
6. ACI 306R "Recommended Practice for Cold Weather Concreting."

- B. American Society for Testing and Materials (ASTM):

1. ASTM C309 "Liquid Membrane-Forming Compounds for Curing Concrete."
2. ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
3. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete."

**SECTION 02768**  
**DECORATIVE CEMENT CONCRETE PAVEMENT**

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. Colored admixture
  - 2. Releasing agent
  - 3. Curing compound
  - 4. Embossing skin
- B. Design Mixtures: For each decorative cement concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Qualification Data: For installer, including list of completed projects.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer of specified products.
- B. Comply with the requirements of ACI 301.
- C. Source Limitations: Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout project.
- D. Notification of manufacturer's authorized representative shall be given at least 1-week before start of work.
- E. Mockups: Cast mockups of sections approximately 3' by 3' of embossed integrally colored concrete pavement to demonstrate typical pattern, texture, surface finish, color, joints, and standard of workmanship.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Colored admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry conditions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. L.M. SCOFIELD COMPANY, Douglasville, Georgia (770)-920-6000 or the appropriate local contact: Steve Rissi (727)-521-4330

2.02 FORMS

- A. Formwork is as established in Division 3, Section 03100.

2.03 STEEL REINFORCEMENT

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**SECTION 02768**  
**DECORATIVE CEMENT CONCRETE PAVEMENT**

- A. Concrete reinforcement is as established in Division 3, Section 03200.

2.04 CONCRETE MATERIALS

- A. Colored Admixture for Integrally Colored Concrete: CHROMIX Admixtures for Color-Conditioned Concrete including CHORMIX P Admixtures, CHORMIX ML Admixtures or CHROMIX L Admixtures; L.M. SCOFIELD COMPANY.
1. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are limeproof and ultra-violet resistant.
  2. Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494
  3. Raw pigments are not an equivalent and may not be substituted.
- B. Curing Compound for Integrally Colored Concrete: Curing compound shall comply with ASTM C309 and be of same manufacturer as colored admixture, for use with integrally colored concrete.
1. Exterior Intergrally Colored Concrete: LITHOCHROME Colorwax; L.M. SCOFIELD COMPANY. Use to cure exterior flatwork that will be allowed to cure naturally with on-ly occasional maintenance.

2.05 COLOR MATERIALS

- A. Concrete Colors:
1. Cement, Sand, and Aggregate: shall be as specified in Sections 03100, 03200, 03300
  2. Colored Admixture: “C-15 Coachella Sand” as selected by Landscape Architect from Scofield Color Chart.
  3. Releasing Agent Color: “A-21 Deep Charcoal as selected by Landscape Architect from Scofield Color Chart.
  4. Curing Compound: Color to match integrally colored concrete.

2.06 IMPRINTING TOOLS

- A. Scofield Pavecrafter Embossing Skin: Semirigid polyurethane mats with projecting textured and ridged underside capable of imprinting texture and joint patterns on plastic concrete.
- B. Embossing Skin Texture: #935 Rustic River Stone
- C. Use Embossing Skin with colored releasing agent as specified by the manufacturer.
- D. Fern pattern is to be done by placing actual ferns on the colored concrete before it is textured with the embossing skin.

2.07 CURING AND SEALING MATERIALS

- A. Curing Compound and sealer used are as specified by manufacturer.

**SECTION 02768**  
**DECORATIVE CEMENT CONCRETE PAVEMENT**

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install concrete according to requirements of Division 3, section 03300
- B. Do not add water to concrete mix in field.
- C. Surfaces shall be finished with the following finishes:
  - 1. Fern Pattern: Applied concrete prior to embossing texture is applied. Layout pattern in a random fashion across concrete to match originally approved mockup.
  - 2. Embossing Skin: After fern pattern is laid in, apply embossing skin to concrete according to manufacturer's specifications along with the releasing agent.
- D. Proceed with decorative cement concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

**3.02 PREPARATION**

- A. Remove loose material from compacted subbase surface immediately before placing concrete.
- B. Protect adjacent construction from discoloration and spillage during application of color hardeners, release agents, stains, curing compounds, and sealers.

**3.03 STAMPING**

- A. Embossing Skin: While initially finished concrete is plastic, accurately align and place embossing skin in sequence. Uniformly load skins and press into concrete to produce required imprint pattern and depth of imprint on concrete surface. Remove embossing skins immediately. Hand stamp edges and surfaces unable to be imprinted by stamp mats.
  - 1. Remove unembedded release agent no fewer than three days after stamping concrete. High pressure wash surface and joint patterns, taking care not to damage stamped concrete. Control, collect, and legally dispose of runoff.

**3.04 CURING**

- A. Integrally Colored Concrete: Apply curing and sealing compound for integrally colored concrete according to manufacturer's instructions using manufacturer's recommended application techniques. Apply curing and sealing compound at consistent time for each pour to maintain close color consistency.
- B. Curing compound shall be same color as the colored concrete and supplied by same manufacturer of the colored admixture.
- C. Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 "Plastic Shrinkage Cracking" published by the National Ready Mixed Concrete Association.
- D. Do not cover concrete with plastic sheeting.

**SECTION 02768**  
**DECORATIVE CEMENT CONCRETE PAVEMENT**

3.05 TOLERANCES

- A. Minor variations in appearance of integrally colored concrete, which are similar to natural variations in color and appearance of uncolored concrete, are acceptable.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Compound: Apply curing compound immediately after final finishing. Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after application. Maintain continuity of coating and repair damage during curing period.
  - 1. Cure integrally colored concrete with a [pigmented] curing compound.
  - 2. Cure concrete finished with pigmented mineral dry-shake hardener with a [pigmented] curing compound.
- F. Curing and Sealing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
- G. Curing Paper: Cure with unwrinkled curing paper in pieces large enough to cover the entire width and edges of slab. Do not lap sheets. Fold curing paper down over pavement edges and secure with continuous banks of earth to prevent displacement or billowing due to wind. Immediately repair holes or tears in paper.

3.06 APPLICATORS

- A. For a list of qualified contractors, contact your local Scofield representative or the appropriate division office: (770)-920-6000.

END OF SECTION 02768

**SECTION 02810  
UNDERGROUND IRRIGATION**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. All applicable provisions of the Subcontractor Agreement shall govern the WORK under this section.

**1.02 SCOPE OF WORK**

- A. The bid is to include the furnishing of all labor, supplies, equipment and materials necessary to complete the installation of the pipe and fittings, valves and sprinkler heads, as shown on the Irrigation Plans as well as all other related responsibilities described in these Specifications and accompanying Plans. The scope to also include the installation of all sleeves and isolation valves.
- B. The system is a fully automatic system comprising numerous zones by one time clock controller.

**1.03 QUALITY ASSURANCE**

- A. Responsibility for Assuring Quality WORK:
  - 1. The CONTRACTOR's Superintendent shall be well versed in standard plumbing procedures, PVC assembly procedures, blueprint reading and coordination with other contracts or services in the project area.
  - 2. All employees shall be competent and highly skilled in their particular job in order to properly perform the WORK assigned to them. The CONTRACTOR shall be responsible for maintaining the quality of material on the job throughout the duration of his responsibility.

**1.04 PROTECTION OF PUBLIC AND PROPERTY**

The Irrigation CONTRACTOR shall protect all materials and WORK against injury from any cause and shall provide and maintain all necessary guards for the protection of the public. He/she shall be held responsible for any damage or injury to persons or property which may occur as a result of his negligence in the execution of the WORK.

**1.05 SUBMITTALS**

- A. Two copies of manufacturer's specifications and installation instructions for equipment and material required including data substantiating that proposed materials comply with specified requirements.
- B. Shop drawings for special conditions not covered in the details indicated on the Plans.

**1.06 SUBSTITUTIONS**

- A. All products to be supplied as indicated or an approved equal.
- B. Changes or substitutions of equipment or material types or sizes shall be done only when written approval has been obtained from the Owner or Owner's Representative.

**1.07 GUARANTEE**

**SECTION 02810  
UNDERGROUND IRRIGATION**

One calendar year: The irrigation system shall be guaranteed for one calendar year from date of final acceptance. Guarantee shall include all material and workmanship except for damages or theft resulting from others.

1.08 AS-BUILT DRAWINGS

- A. Prints of the plans will be supplied to the CONTRACTOR for recording "As-Built" information. In addition, the CONTRACTOR shall have a set of prints of the shop drawings prepared by the CONTRACTOR, Subcontractors, etc. for recording "As-Built" information.
- B. Immediately upon installation of any WORK which deviates from what is shown on the prints, the CONTRACTOR shall clearly indicate such changes in red pencil on the prints. Such changes shall include, but not be limited to, changes in (1) material, (2) sizes of material, (3) location, and (4) quantities. Dimensions shall be used where required such as, but not limited to, e.g. underground utilities.
- C. Upon completion of the WORK, the completed set of "As-Built" prints shall be delivered to the Owner or Owner's representative for review and approval.

1.09 LOCATION

Bidders shall personally examine the site and fully acquaint themselves with all of the existing conditions in order that no misunderstanding may afterwards arise as to the character or as to the extent of the WORK to be done; and, likewise, in order to advise and acquaint themselves with all precautions to be taken in order to avoid injury to persons or property of another. No additional compensation will be granted because of any unusual difficulties which may be encountered in the execution or maintenance of any portion of the WORK.

PART 2 - MATERIALS

- 2.00 All materials to be as specified below or approved equal.



**SECTION 02810  
UNDERGROUND IRRIGATION**

2.01 PIPE

- A. All PVC pipe shall be new and free from defects and shall be continuously marked indicating size, schedule, type and Department of Commerce Standard Reference. Pipe shall be furnished in standard length of twenty (20) feet.
- B. Main: Main line shall be Class 160 Bell and O-Ring (rubber gasket, push-on ends)
- C. Laterals: All lateral pipe shall be Polyvinyl Chloride (PVC) 1120-1120, Class 160. Threaded connections shall be schedule 80 unless noted otherwise on the Plans or Specifications.
- D. Galvanized Steel Pipe: All pressure mains which are exposed to possible damage, such as above ground, shall be threaded end, standard weight, Schedule 40 galvanized or coated steel.
- E. Sleeves: All sleeves to be Polyvinyl Chloride (PVC) Schedule 40 and sized as indicated in Plans.
- F. Chaseways: All chaseways shall be PVC Schedule 40 and sized as needed for present and future use.

2.02 PIPE FITTINGS AND JOINTS

- A. All PVC lateral pipe shall have PVC solvent weld Schedule 40 fittings and joints. The primer and solvent glue shall be compatible with the pipe and fittings. No male threaded PVC fittings are to be used, with the exception of street ells and riser adapters.
- B. Galvanized steel pipe shall have threaded standard, 150 pound galvanized malleable fittings. All sprinkler heads shall be connected to the supply line with flexible pipe and ells, (Rainbird flex pipe and barbed ells O.A.E.) or Schedule 80 swing joints as shown on the details.
- C. Main line pipe joints shall be "belled" solvent-weld type.

2.03 SPRINKLER HEADS

- A. All rotary pop-up heads shall be as specified on the irrigation plan.
- B. Pop-up spray sprinklers to be TORO 640 or TORO SUPER 600 as specified on the irrigation plan.
- C. Shrub spray leads to be TORO 570 Z with standard gallonage nozzles as specified on the irrigation plan set atop Schedule 80 threaded risers.

**SECTION 02810  
UNDERGROUND IRRIGATION**

2.04 IRRIGATION CONTROL WIRE

All irrigation control wire from the controller to the electric valve shall be UL approved PE irrigation control wire, single conductor insulated utilizing low density high molecular weight polyethylene insulation suitable for operating at 600 volts and conductor temperatures up to 60 degrees C. The conductor shall be soft drawn bare copper meeting the requirements of ASTM Specification B-3 or B-8. Temperature rating shall be from -55 degrees to +60 degrees C. Thickness of insulation for conductor size 14 AWG through 8 AWG solid shall be 3/64 inches. AWG size for wire shall be in accordance with the manufacturer's specifications based upon a relationship between the number of valves and their distance from the controller.

2.05 WIRE CONNECTORS

All splices in irrigation control wire shall be accomplished by using 3M Dry Direct Bury Splice Kit.

2.06 SLEEVING AND CONDUIT

Sleeving and conduit shall be PVC, Schedule 40 for pipe sizes through 3", and Class 160 for sizes 4" diameter or greater. Size as required by code or as shown on the Plan, whichever is larger in size. Electric conduit shall be grey PVC with Underwriters' Laboratories label.

2.07 RISERS

Risers to be Schedule 40 PVC riser threshold, height to be determined by use.

2.08 AUTOMATIC CONTROL VALVES

The automatic valves are to be as specified on the irrigation plan.

2.09 GATE VALVES & ISOLATION VALVES

- A. Gate valves 3 inches and smaller shall be Crane No. 438 (screwed end) with all bronze body, wedge disc and non-rising stem, or approved equal.
- B. Isolation valves shall be iron body resilient seat gate valves with modified wedge disc NRS type, with slip on joint ends installed with thrust blocks.

2.10 VALVE BOXES

Valve boxes shall be made of Superflexon 1203 as manufactured by Nelson Irrigation or Ametek or Equal. Boxes shall be 16 in. x 12 in. x 10 3/4 in. and Black with a Green cover.

2.11 PAINT FOR RISERS

All risers to be painted black.

2.12 CONTROLLER

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UNDERGROUND IRRIGATION**

None Required.

2.13 VACUUM BREAKER

None Required.

2.14 WELL

None Required.

2.15 PUMPS AND CONTROL EQUIPMENT

None Required.

2.16 PUMP ENCLOSURE

None Required.

2.17 POWER SOURCE

None Required.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Layout of Main and Laterals: The sprinkler main lines and all laterals shall be laid out by the CONTRACTOR and approved by the ENGINEER or Owner's Representative, prior to excavation. The sprinkler lines, as shown on the Plans are drawn for clarity and are schematic in nature. No sprinkler lines shall be under paved areas unless in sleeves or specifically noted on the Plans. Any adjustment or site modification shall be done prior to the excavation operation.
- B. Layout of Sprinkler Heads: All sprinkler heads locations shall be staked by the CONTRACTOR and approved by the Owner or Owner's Representative, prior to installation to insure uniformity and correctness to both pattern and coverage.
- C. Valve Locations: The location of all valves shall be in landscape areas. The location of all valves shall be staked by the CONTRACTOR and approved by the ENGINEER or Owner's Representative, prior to installation to insure ease of access for maintenance and to insure that they do not conflict with other elements on the project. Each valve shall be installed in a separate valve box. The valve locations shown on the plan are drawn for clarity and are schematic in nature.
- D. Irrigation Plans: The irrigation system indicated on the drawings is drawn for clarity and is essentially diagrammatic. Spacing of the heads shown on the Plans shall not be modified unless approved in writing by the Owner and Owner's Representative.

3.02 INSTALLATION

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**UNDERGROUND IRRIGATION**

- A. Ground Level Areas: The CONTRACTOR shall do all necessary excavating and backfilling required for the proper installation of the WORK. Minimum depth of cover over piping shall be 12 inches. Backfill material shall be clean fill. If existing material has been excess of rock, then clean sand must be used. In rocky areas, the trenching depth shall be two inches below normal trench depth to allow for a 2 inch bed of sand below the pipe. There shall be no rock in contact with PVC pipe. The CONTRACTOR shall use backfilling equipment that will tamp backfill to its original density. He shall barricade or light the excavation to prevent hazards to the public. Objectionable materials such as coral rock, asphalt, limerock and bricks that are encountered during working operations, shall be removed from the project by the CONTRACTOR.
- B. Pvc Pipe Assembly:
1. All PVC pipe shall be cut to the proper length prior to assembly. The cut shall be neat and square, 90 degrees to the axis of the pipe. Prior to assembly, the cut end shall be de-burred. The fitting and pipe end shall both be cleaned with a PVC High Etch Primer. This primer shall have a purple tint to aid in visual inspection.
  2. A thin even flow coat of slow drying, heavy duty PVC solvent/glue shall be applied to both the inside of the fitting and the pipe mating surface.
  3. The pipe shall be inserted into the fitting until it bottoms, then given a quarter turn to insure proper sealing. The pipe and fittings shall be out of service during the curing time as recommended by the manufacturer or 24 hours, whichever is longer. The finished joint shall be water-tight and shall have a strength equal to or greater than that of the pipe being joined. The direct tapping of PVC pipe or fittings shall not be permitted.
- C. Control Lines: All electric control lines shall be installed in the same trench with the pipe lines in a neat and orderly fashion. They shall be installed in the main and lateral trenching or in their own trenches, and where necessary, bundled together and taped every five feet.
- D. Connections: Any connections to existing piping systems shall be made after consultation and cooperation with authorities of the City.
- E. Modifications Due to Field Conditions: Conditions that occur on the site that cause the system to be modified, shall be presented as shop drawings by the Contractor and approved by the Owner or Owner's Representative, prior to construction.
- F. The existence and location of utilities (overhead, above ground and underground) shall be thoroughly investigated and verified by the CONTRACTOR before the WORK begins in the area of said utilities. The CONTRACTOR shall exercise care in digging and working so as not to damage utilities or endanger the safety and lives of people. Should overhead, above ground or underground obstructions be encountered which interfere with the WORK, the Owner or Owner's Representative shall be consulted in order for a decision to be made on the relocation of the WORK to clear such obstruction. The CONTRACTOR shall be responsible for the immediate repair of any damage to utilities caused by his WORK.
- G. At threaded joints between PVC and metal pipes, the metal shall contain the socket end and the PVC end shall contain the spigot. A metal spigot shall not, under any circumstances, be screwed into a PVC socket.

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UNDERGROUND IRRIGATION**

- H. Valves: Valves shall be carefully inspected during installation; they shall be opened wide and then tightly closed and the various nuts and bolts shall be tested for tightness. Special care shall be taken to prevent any foreign matter from becoming lodged in the valve seat. Valves shall be set plumb at the locations indicated and in accordance with the details shown on the drawings.
- I. Sprinkler Heads: All sprinkler heads shall be installed as shown on the Drawings. Backfill around the sprinkler shall be free of rocks, roots, or foreign debris. If finished grade has not been established, the line shall temporarily capped at the head and a stake marker placed. After the grade has been completed, the sprinkler head shall be set. The CONTRACTOR shall coordinate his operations with the various phases of the WORK.
- J. Flushing: All lines shall be flushed prior to any installation of automatic sprinkler valves or sprinklerheads to remove all sand and other foreign matter with velocity of the flushing water not less than four (4) feet per second. Flushing shall be terminated at the direction of the City Representatives. The CONTRACTOR shall dispose of the flushing water without causing a nuisance or property damage.
- K. Pressure and Leakage Testing:

General: All pumps, gauges, and measuring devices shall be furnished, installed and operated by the CONTRACTOR and all such equipment and devices and their installation shall be approved by the A/E.

Pressure Tests for Lines: Pressure piping installed under this contract shall be subjected to a pressure test after the pipe has been installed and partially backfilled for underground installations. Each pressure test shall be maintained for at least one hour at 150 psi during which time all joints shall be examined for leaks.

Before application of test pressure, all air shall be expelled from the pipe. If permanent air vents are not located at all high points, the CONTRACTOR shall install corporation cocks or fittings and valves at such points so the air can be expelled as the pipe system is slowly filled with water. After expulsion of air, the corporation cocks, or other blowoff devices shall be closed and the test pressure applied.

All exposed pipe, fittings, valves, and joints shall be carefully examined for leaks. All cracked, broken, or defective pipe, fittings, or valves discovered as a consequence of this pressure test shall be removed and replaced with sound material. All leaking, or defective joints shall be repaired, replaced, or corrected. After all necessary replacements and corrections, the test shall be repeated until satisfactory to the A/E.

Leakage Testing for Pressure Piping: After completion of satisfactory pressure tests of piping, the lines shall be subjected to leakage tests.

The duration of each leakage test shall be at least two hours and the pressures maintained during each leakage test shall be as specified above for the pressure tests.

Leakage is defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain the specified test pressure after the air in the pipeline has been

**SECTION 02810**  
**UNDERGROUND IRRIGATION**

expelled and the pipe has been filled with water. The allowable limits for leakage of underground piping shall be determined by the following formula.

Allowable Limits for Leakage of Pressure Piping: The hydrostatic pressure tests shall be performed as herein above specified and no installation, or section thereof, will be acceptable until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{SD P}{133200}$$

in which,

L = Allowable leakage, in gallons per hour

S = Length of pipe being tested in feet

D = Nominal pipe diameter; in inches

P = Average test pressure during the test, in psi gauge

Water shall be supplied to the line during the test period as required to maintain the test pressure as specified. The quantity used, which shall be compared to the above allowable quantity, shall be measured by pumping from the calibrated container.

Where leakage exceeds the allowable limit, as specified herein before, the defective pipe or joints shall be located and repaired. If the defective portions cannot be located, the CONTRACTOR shall remove and reconstruct as much of the WORK as is necessary in order to conform to the specified limits. No additional payment will be made for the correction of defective WORK, or to damage to other parts of the WORK resulting from such corrective WORK.

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- L. Balancing and Adjustment: The CONTRACTOR shall balance and adjust the various components of the sprinkler system so the overall operation of the system is most efficient. This includes a synchronization of the controllers, part circle sprinkler heads, and individual station adjustments on the controllers.
- 3.03 RESPONSIBILITY PRIOR TO FINAL ACCEPTANCE The CONTRACTOR shall be responsible for maintenance until the inspection for completion and final acceptance. The responsibilities include the following:
- A. Repair of all damage to installed material and equipment as needed.
  - B. Adjustment of all sprinkler heads with regard to proper height after landscape installation, arc coverage, radius and operation at least once a week.
  - C. Once a week clean, repair and adjust all valves and other controls. Also, check to insure that they are opening and closing properly.

END OF SECTION 02810

**PART 1 - GENERAL**

**1.01 REQUIREMENTS INCLUDED**

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this section.

**1.02 WORK INCLUDED**

- A. Provide all labor, materials, necessary equipment and services to complete the Site Furnishings work, as indicated on the drawings, as specified herein or both.
- B. Including but not necessarily limited to the following:
  - 1. Benches
  - 2. Trash Receptacle/ Recycling Bins
  - 3. Bike Racks
  - 4. Picnic Tables
  - 5. Water Fountains
  - 6. Wetlands Fencing
  - 7. Emergency Call Tower

**1.03 RELATED WORK**

- A. Section 02210 - Site Grading
- B. All required engineering, architectural and electrical work.

**1.04 SUBMITTALS**

- A. Manufacturer's Data:
  - 1. Descriptive data of installation, methods, procedures and maintenance for all items under this section.
- B. Complete shop drawings for all items of work under this section indicating all details of fabrication and installation, including sizes, shapes, finishes, colors, thicknesses, material quality and all other related work applicable to the items of this section.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. Deliver all materials with manufacturer's tags and labels intact.
- B. Store and handle so as to avoid damage.



PART 2 - PRODUCTS

2.01 BENCHES

- A. Manufacturer: Ultra Play Systems, 1675 Locust St., Red Bud, IL. 62278
- B. Type and Size: 1) 982SM-BRN6, Six Foot bench with back, hot dipped galvanized/ surface mount
- C. Color: Brown- Recycled Plastic
- D. Provide complete with all other required accessories, fasteners and mounting items necessary to provide a complete installation as required by the drawings. All exposed metal fasteners and anchoring devices to match the color requirements required above.
- E. Install per manufacturer's specifications.
- F. Local Representative: Mr. Roy May, Dominica Recreation Products, PO Box 520700, Longwood FL, 32752

2.02 TRASH RECEPTACLES/ RECYCLING BINS

- A. Manufacturer: EnviroDesign, 4165 Pruden Blvd.- Bldg 2, Suffolk, VA. 23434
- B. Type & Size: RL4200, 42 gallon trash/recycling combo (2x21gallons) receptacle comes with half moon rigid plastic liners and decals. Compartment 1- bottles and cans, Compartment 2- trash.
- C. Color: Lid- Forest Green, Recycled Plastic Lumber- Brown

2.03 BIKE RACKS

- A. Manufacturer: Ultra Play Systems, 1675 Locust St., Red Bud, IL. 62278
- B. Type and Size: 5805SM, 5 Loop- Surface Mount, holds 7 bikes.
- C. Color: Hot Dipped Galvanized
- D. Install per manufacturer's specifications
- E. Local Representative: Mr. Roy May, Dominica Recreation Products, PO Box 520700, Longwood FL, 32752

2.04 PICNIC TABLES

- A. Manufacturer: Ultra Play Systems, 1675 Locust St., Red Bud, IL. 62278
- B. Type and Size: 238SM-BRN8, 8 foot picnic table, hot dipped galvanized/ surface mount
- C. Color: Brown- Recycled plastic

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SITE FURNISHINGS**

- D. Local Representative: Mr. Roy May, Dominica Recreation Products, PO Box 520700, Longwood FL, 32752

2.05 WATER FOUNTAINS

- A. Manufacturer: Most Dependable Fountains, Inc., 5705 Commander Dr., Arlington, TN. 38002
- B. Types and Size: 410SM, 30" surface mount/ meets ADA accessibility
- C. Color: Black
- D. Provide complete with all other required accessories, fasteners and mounting items necessary to provide a complete installation as required by the drawings. All exposed metal fasteners and anchoring devices to match the color requirements required above.
- E. Install per manufacturer's specifications.
- F. Local Representative: Mr. Vince McGrory, 1.800.552.6331, 5705 Commander Dr., Arlington, TN. 38002

2.06 WETLANDS FENCING

- A. Manufacturer: General Contractor
- B. Type and Size: 6"x6" - 6' long pressure treated pine post, with 1" diameter, 3-strand nylon rope
- C. Color: Posts-natural wood color, Rope-black
- D. Provide complete with all other required accessories, fasteners and mounting items necessary to provide a complete installation as required by the drawings. All exposed metal fasteners and anchoring devices to match the color requirements stated in the drawings.
- E. Install per details on plans.

2.07 EMERGENCY CALL TOWER

- A. Manufacturer:
  - 1. Code Blue (Basis of Design)
  - 2. Or Landscape Architect/Owner Approved Equal.
- B. Type and Size: Code Blue CB 1-S, 108" tall, with 12.75" outside diameter.
- C. Color: Safety Blue with clear coat enclosure and faceplate
- D. Graphics Text: Emergency
- E. Graphics Color: Reflective White

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SITE FURNISHINGS**

- F. Speakerphone – IA4100 (1button) with Maine Bezel labeled “Emergency”(raised letters with Braille)
- G. Wireless GSM Digital Cellular
- H. Power:
  - 1. Line Power
  - 2. NightCharge
  - 3. Voltage – 120V AC
- I. This unit requires UL Certification on site.
- J. Provide complete with all other required accessories, fasteners and mounting items necessary to provide a complete installation as required by the manufacturer. All exposed metal fasteners and anchoring devices to match the color requirements stated in the drawings. Appropriate grounding per manufacturer installation requirements.

**PART 3 - EXECUTION**

**3.01 WORKMANSHIP AND INSTALLATION**

- A. Provide as indicated and detailed on the drawings, and as per manufacturer's standard printed specifications, instructions and recommendations.

**END OF SECTION 02870**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this Section.

1.02 WORK INCLUDED

- A. The WORK included in this section consists of furnishing all labor, supplies equipment and materials necessary to complete the installation of all landscaping as shown on the Plans as base bid including the installation of sod and seeding as shown, as well as all other related responsibilities as described in these Specifications and accompanying plans.
- B. Installation: All plant materials included shall be of the specific size and quality indicated on the plans and in these specifications and shall be installed in strict accordance with sound nursery practices and shall include maintenance and watering for all WORK outlined on the plans and specifications until final acceptance.
- C. Quantities and Locations: The ENGINEER reserves the right to adjust the number and locations of the designated types and species to be used at any of the locations shown in order to provide for any modifications which might become necessary.

1.03 RELATED WORK

- A. Section 02210 - Site Grading
- B. Section 02284 - Topsoil
- C. Section 02910 - Sodding

1.04 QUALITY ASSURANCE

- A. Responsibility for Assuring Quality WORK: The CONTRACTOR'S Superintendent shall be well versed in Florida plant material, planting operations, blue print reading, and coordination with other performing contracts or services in the job area.

All employees shall be competent and highly skilled in their particular job in order to properly perform the WORK assigned to them. The CONTRACTOR shall be responsible for maintaining the quality of the material on the job throughout the duration of his responsibility.

- B. Correct Grade of Plants: In the event that it becomes apparent that any nursery supplying plants for this WORK has knowingly and consistently represented the grade of plants as being higher than their

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LANDSCAPE WORK**

actual grades as determined under these provisions, all plants already delivered from such sources shall be removed from the job at the CONTRACTOR'S expense, and no further plants will be accepted from such nursery until written evidence is submitted and confirmed that all material for delivery has been inspected and approved by inspectors of the State Plant Board as being of the grade as represented.

- C. Authority for Nomenclature, Species, Etc.: All plant material shall conform to the names given in Hortus Third, 1976 edition. Names of varieties not included therein conform generally with names accepted in the nursery trade.
- D. Grade Standards: All plant materials shall be nursery grown except where specified as collected material, and shall comply with all required inspections, grading standards and plant regulations as set forth by the Florida Department of Agriculture's "Grades and Standards for Nursery Plants" revised 1998, or with any superseding specifications that may be called for on the Plans or in the Specifications. ALL PLANTS NOT LISTED IN THE GRADES AND STANDARDS FOR NURSERY PLANTS, shall conform to a Florida No. 1 as to: (1) Health and Vitality, (2) Condition of Foliage, (3) Root System, (4) Freedom from Pest or Mechanical Damage, (5) Heavily Branched and Densely Foliated according to the accepted normal shape of the species, or sport, (6) Form and branching habit.
- E. Balled and Burlapped (B&B) and Wire Balled and Burlapped (WB&B) Plants: These plants shall be properly protected until they are planted. The plant shall be handled only by the earth ball and not be the plant itself.

Any (B&B) or (WB&B) plant which shows evidence of having handled by a method other than the method outlined above, and resulting in a cracked or broken ball or of the roots being loosened within the ball shall be rejected.

For plants grown in soil of loose texture, which does not readily adhere to the root system, (especially in the case of large plant material), WB&B plants may be specified. For WB&B plants, before plant is removed from the hole, sound hog wire shall be placed around the burlapped ball and looped and tensioned until the burlapped ball is substantially packaged by the tightened wire netting, such as to prevent disturbing of the loose soil around the roots during handling. Any wire, synthetic material or chemically treated material will be removed from the rootball at planting time, all ties shall be removed from the rootball and around the trunk at planting.

- F. Container Grown Plants (CG): Any Container Grown (CG) plants, which have become "pot bound" or for which the top system is out of proportion (larger) to the size of the container, will not be acceptable.

With metal containers, unless the root-ball system slips easily and unbroken from the can, a nursery can-cutter shall be used to slit the can in such a way that the can may be opened fully.

CG plants shall not be removed from the can until immediately before planting, and with all due care to prevent damage to the root system.

- G. Submit to the ENGINEER the names and locations of nurseries proposed as sources of acceptable plant material. The ENGINEER reserves the right to visit the nursery to inspect and/or select the specified material.

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- H. The ENGINEER and a OWNERs representative will be included in the hand selecting of all Live Oaks for the project.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Inspection and Transporting: Movement of nursery stock shall comply with all Federal, State, and local laws and regulations. Therefore, required inspection certificates shall accompany each shipment, and shall be filed with the ENGINEER.

Wrap root balls with burlap. Wire wrap burlap if root ball is not sufficiently compacted. Palms will not require burlap wrapping if the following requirements are met:

1. Dug from marl or heavy soil that adheres to roots and retains shape without shattering.
2. Moistened material used to cover ball and roots not exposed to wind and sun.
3. Transport material on vehicles large enough to allow plants not to be crowded. Plants shall be covered to prevent wind damage during transit and shall be kept moist, fresh and protected at all times. Such protection shall encompass the entire period which the plants are in transit, being handled, or are in temporary storage.

- B. All plant material shall not remain on the WORK site longer than two (2) days prior to being installed.

1.06 SUBSTITUTIONS

- A. Substitutions of plant types or change in the size of plant material will only be permitted upon submission of documented proof that the particular plant type and size specified is not obtainable.
- B. Where B&B or WB&B plants are specified, CG plants of the same species, etc., will not be accepted. Where a B&B or WB&B is not specified on a particular plant material, B&B, WB&B or CG plants may be used provided they meet all specifications.

1.07 GUARANTEE

All plant material shall be guaranteed for a minimum of one (1) calendar year from the time of final acceptance.

1.08 REPLACEMENT

- A. The guaranteeing of plant material shall be construed to mean the complete and immediate replacement of plant material if it is:
  1. Not in a healthy growing condition.
  2. There is a question to its survival ability at the end of the guarantee period.
  3. It is dead.

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1.09 SIZE, QUALITY AND GRADE OF REPLACEMENT

Replacement plant material shall be of the same species, quality and grade as that of the plant to be replaced. The size of the replacement shall not necessarily be the same size as the original specified plant at its initial planting but shall closely match specimens of the same species. Replacements shall be guaranteed for a period equal to the originally specified guarantee. This guarantee period shall begin at time of plant replacement.

1.10 GUARANTEE NULL AND VOID

The guarantee shall be null and void for plant material which is damaged or dies as a result of "Act of God" limited to hail, freeze, lightning, winds which exceed hurricane force, providing the plant was in a healthy growing condition prior to these "Acts of God".

PART 2 - MATERIALS

2.01 PLANT MATERIAL

- A. Florida No. 1: Except where another grade is specifically called for in the Plans, all plant material shall be no less than Florida No. 1 at the time of final inspection immediately prior to the acceptance by the OWNER.
- B. Habit of Growth: All plant material shall have a habit of growth that is normal for that species and shall be sound, healthy, vigorous and free from insects, plant diseases, injuries, and dead limbs.
- C. Branching, Leafing, Measurements and Ball Sizes:
  - 1. Trees and Shrubs: Requirements for the measurement, branching character, ball diameter, depth and other standards shall follow the Code of Standards recommended by the American Association of Nursery Stock, Bulletin Z-60.1-1973 and as revised.
  - 2. Palms: Requirements for the measurement of clear trunk, clear wood and graywood ball diameter and depth shall comply with requirements as set forth by the Florida department of Agriculture's "Grades and Standards for Nursery Plants, Part II for Palms and Trees".
- D. Die-Back and Leaf-Drop: Plant material showing signs of die-back or leaf-drop will not be accepted and must be removed from the job immediately if so directed by the ENGINEER. Therefore, any plant material with tendencies toward leaf-drop or die-back must be root pruned early enough to provide a sound network of hair roots prior to relocation to the job site.
- E. Mechanical Destruction of Foliage: Mechanical destruction of foliage resulting from root pruning shall not effect more than 10% of the total foliage prior to planting on the job site. Loss of foliage caused by seasonal change will be accepted.
- F. Spanish Moss: If Spanish Moss (*Tillandsia usneoides*) exists on plant material, it shall be completely removed prior to planting on the job site.
- G. Palms: Before transporting, see Delivery, Storage and Handling; for requirements related to wrapping of root balls.

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1. Remove a minimum of fronds from the crown of the palms to facilitate transporting and handling.
  2. Palms with burn marks, nail holes, and frond boots on trunk shall not be accepted.
  3. To reduce head volume, Palm fronds may be taper trimmed by not more than one-third (1/3).
  4. Palm trees showing cable or chain marks and equipment scars shall be rejected.
- H. Chlorosis: The allowable level of Chlorosis in foliage shall be as set forth in the Florida Department of Agriculture's "Grades and Standards for Nursery Plants".

2.02 PLANTING SOILS

- A. General Type: All plant material shall be planted with planting soil mixed with 50% original soil, if the soil is of good quality, as determined by the ENGINEER. The planting soils shall be sandy loam (50% sand, and 50% muck) typical of the locality. The soil must be taken from ground that has never been stripped, with a slight acid reaction (5.5 to 6.5 ph) and without an excess of calcium or carbonate. Soil shall be delivered in a loose friable condition.
- B. Special Type: Planting soil for palms shall be a good grade of salt free sand, which is free of all weeds.

2.03 WATER

Water shall be potable, from municipal water supplies or other sources which are approved by a public health department.

2.04 MULCH

Mulch shall be Eucalyptus mulch or other approved non native tree bark mulch. It must be uniformly shredded and be free from large pieces of bark, foreign matter, weed seeds and any other organic or inorganic material. Submit sample for approval. CONTRACTOR shall apply one application at initial installation and a second application prior to final acceptance.

2.05 FERTILIZER

- A. New Plant Material: Trees, palms and shrubs, fertilize with Agriform planting tablets, 20-20-5 formula, 21 gram.
- B. New Ground Covers: Fertilize with an approved fertilizer of fifty percent (50%) or greater organic 6-6-6 or 8-8-8 with minor elements including, but not limited to, iron zinc and manganese.
- C. Composition of Quality: All fertilizer shall be uniform in composition and dry. Granular fertilizer shall be free flowing and delivered in manufacturers standard container with name of material, weight and guaranteed analysis printed on container. Tabletized fertilizer shall be delivered in unopened



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containers or boxes. All bags, containers or boxes shall be fully labeled with the manufacturer's analysis. Submit labels to ENGINEER for approval prior to placement of fertilizer.

- D. All shall comply with the State of Florida fertilizer laws.

**2.06 VEGETATIVE ROOT INHIBITOR**

- A. A vegetative root inhibitor shall consist of a polypropylene fabric with root control time release modules of Trifluralin with an effective life of 100 years.
- B. Vegetative root inhibitor shall be Bio-Barrier as manufactured by Reemay, Inc. or approved equal.

**PART 3 - EXECUTION**

**3.01 INSPECTION**

Utilities: The location and existence of utilities (overhead and underground) shall be thoroughly investigated and verified by the CONTRACTOR before the WORK begins in the area of said utilities. The CONTRACTOR shall exercise care in digging and WORK so as not to damage existing utilities in said areas, such as underground pipes, cables, wires, etc. Should such overhead or underground obstructions be encountered which interfere with planting, the ENGINEER shall be consulted immediately in order for a decision to be made on the relocations of plant material to clear such obstruction. The CONTRACTOR shall be responsible for the immediate repair of any damage to utilities caused by his WORK.

**3.02 PREPARATION**

- A. Staking Plant Locations: Plant locations must be staked or marked prior to plant hole excavation or placing on deck, by scaling the plants from existing features found on-site and shown on the plans or by given dimensions if shown.
- B. Spacing of Shrubs: Shrub beds located next to another bed, walkway, structure, etc., shall have the plants along the perimeter spaced so that the plants can mature properly without growing into the other bed, walkway, structure, etc.
- C. Excavation of Plant Holes: Excavation of plant holes shall be roughly cylindrical in shape with the sides approximately vertical. The ENGINEER reserves the right to adjust the size and shape of the plant hole and the location of the plant in the hole to compensate for unanticipated structures or unanticipated factors. All plant holes shall be sufficiently deep to allow the rootball to set on existing soil and have root collar at grade level. Plants shall be centered in the holes with the tree trunk locations scaled from existing permanent structures as shown on the drawings. Plants shall be set straight or plumb in locations. All plant holes to accommodate plants with ball sizes less than 24" in diameter shall be at least 18" greater than the diameter of the ball. All plants holes to accommodate plants with ball sizes two feet (2') and larger in diameter shall be at least twice the diameter of the ball. The excavated material from the plant holes may not be used to back-fill around the plant material. Such material shall be disposed of either on the project site or off the site as directed by the ENGINEER. Plant holes for shrub material planted in mass shall meet all requirements listed above for plant holes. However, they shall not be individual holes but one continuous hole or excavation.

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Plant holes for hedge material shall also meet all requirements listed above for plant holes, however, a continuous trench shall be used in lieu of individual holes.

3.03 INSTALLATION

A. Setting of Plants:

1. When lowered into the hole the plant shall rest on the prepared hole bottom such that the roots after settlement are level, or slightly above the level of its previous growth condition and the final level of the ground around the plant shall conform to the surrounding grade. The plants shall be set straight or plumb or normal to the relationship of their growth prior to transplanting. The ENGINEER reserves the right to realign any plant material after it has been set.
2. Plant material of the shrub category and smaller must be handled by the ball only. Plant material too large for hand handling, if moved by winch or crane, must be thoroughly protected from chain, rope or cable marks, girdling, bark slippage, limb breakage and any other damage that might occur by improper handling or negligence.
3. All palm trees handled by the trunks must be wrapped with burlap and wood battens, held in place by banding strips as called for in the details.

B. Backfilling:

1. Use planting soils specified in Article 2.02, Planting Soil. Backfill to the bottom two thirds of the planting hole and firmly tamp and settle by watering as backfilling progresses. After having tamped and settled the bottom two thirds (2/3) of the hole, thoroughly puddle with water and fill remaining one third (1/3) of the hole with planting soil, tamping and watering to eliminate air pockets.

C. Application of Fertilizer:

1. Fertilize New Planting (Trees, Palms and Shrubs) as follows:

A. Specified Container Size	Application Rate
1 gallon container	1 tablet
3 gallon container	2 tablets
5 gallon container	3 tablets
7 gallon container	5 tablets

- B. Large tubs or boxes and B&B material shall receive one (1) tablet for each one-half (1/2) inch of trunk diameter (measured three (3) feet from ground). For large shrubs, one (1) tablet for each one (1) foot of height or spread.

- D. Mulch: Within 24 hours after planting, planting areas must be mulched as called for in these specifications. The mulch shall be uniformly applied to a depth of three (3) inches over all shrub, tree and groundcover areas and any areas indicated on the plans.

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LANDSCAPE WORK**

- E. Staking and Guying shall be installed within 24 hours; in accordance with details.
- F. Initial Watering: Initially, water the plant material to develop uniform coverage and deep water penetration of at least six inches (6"). Avoid erosion, puddling, and washing soil away from plant roots.
- G. Hand Watering: Provide hand watering of plant material as necessary subject to weather conditions, to maintain healthy growing conditions until final acceptance. This shall be in addition to water received from irrigation system, if any.
- H. Pruning:
  - 1. The amount of general pruning shall be limited to the minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of transplanting operations. Pruning shall be done in such a manner as not to change the natural habit of shape of a plant, and in accordance with ANSI A300 standards.
  - 2. All broken or damaged roots shall be cut off smoothly. The tops of all trees shall be pruned in a manner complying with standard horticultural practices.
- I. Weeding: In the event that weeds or undesirable vegetation becomes prevalent to such an extent that they threaten plant material, they shall be removed as directed by the ENGINEER. If necessary, the plant material and/or planting soil shall be replaced as needed to eliminate the weeds at the expense of the CONTRACTOR.

3.04 CLEANING AND PROTECTION

- A. Disposal of Trash: All debris and other objectionable material created through planting operations and landscape construction shall be removed completely on a daily basis from the job or as directed by the ENGINEER. Excess soil shall be disposed of as directed by the ENGINEER.
- B. Responsibility for Protection and Restoration of Property: The CONTRACTOR shall be responsible for all damage to property whether it is accidental or necessary for the completion of his contract.
- C. Protection Against mechanical Damage: The CONTRACTOR's responsibility for protection against mechanical damage shall include providing protection from vehicles and providing warning signs and barricades as might be necessary and he/she shall repair, restore and replace any planting areas which become damaged as a result of any negligence of the CONTRACTOR or his employees in complying with these requirements. Coordination shall be with the OWNER and the ENGINEER.
- D. Responsibility Prior to Final Acceptance:
  - 1. Maintenance shall begin immediately after each plant is planted and continue until final acceptance.
  - 2. Plants shall be watered by hose, soaking thoroughly each day for the first two weeks (14 calendar days) and every other day for the following two week period. Soaking then shall continue on a twice weekly basis for another period of three (3) weeks for material over five feet (5') height, amounting to a total of 28 days after installation of planting under five feet (5') and a total of 45 days for plants over five feet (5'). All watering is required without regard to an irrigation system.

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3. Plant maintenance shall include watering, pruning, weeding, cultivating, mulching, tightening and repairing of guys, stakes, braces, etc., replacement of sick or dead plants, resetting plants to proper grades or upright position and maintenance of the watering saucer, and all other care needed for proper growth of the plants. Plant material rejected during the course of the construction shall be removed within five (5) working days and replaced before the inspection for completion will be scheduled.
4. During the maintenance period and up to the issuance of Certificate of Final Acceptance, the CONTRACTOR shall do all seasonal spraying and/or dusting of all planting. The materials and methods shall be in accordance with the highest standard nursery practices and as recommended by the County Agent, or Horticultural ENGINEER and approved by the ENGINEER, prior to implementation.
5. Planting areas and plants shall be protected against trespassing and damage. If any plants become damaged or injured they shall be treated or replaced, as directed and in compliance with this specification. No WORK shall be done within or over planting areas or adjacent to plants without proper safeguards and protection.

END OF SECTION 02900

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the WORK under this Section.

1.02 WORK INCLUDED

The WORK included in this section consists of furnishing all labor, supplies, equipment and materials necessary to complete the installation of sod and associated materials herein after listed and as shown on the plans.

1.03 RELATED WORK

- A. Section 02200 - Earthwork
- B. Section 02210 - Site Grading.
- D. Section 02900 - Landscape Work.

1.04 QUALITY ASSURANCE

- A. Sodding WORK shall be performed by a firm specializing in sodding.
- B. Substitutions: Do not make substitutions. If specified sod is not obtainable, submit proof of non-availability to ENGINEER, together with proposal for use of equivalent material.
- C. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

1.05 SUBMITTALS

- A. Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Plant and Material Certifications:
  - 1. Certificate of inspection as required by governmental authorities.
  - 2. Manufacturer's or vendor's certified analysis for soil amendments or fertilizer materials.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.
- B. Sod: Time delivery so that sod will be placed within 24 hours after stripping. Protect sod against drying.

C. Transporting:

1. Sod transported to the project in open vehicles shall be covered with tarpaulin or other suitable covers securely fastened to the body of the vehicle to prevent injury to the sod material. Closed vehicles shall be adequately ventilated to prevent overheating of the sod. Evidence of inadequate protection against drying out in transit shall be cause for rejection.
2. Sod shall be kept moist, fresh and protected at all times. Such protection shall encompass the entire period during which the sod is in transit, being handled, or in temporary storage.
3. Upon arrival at the temporary storage location or the site of WORK, sod shall be inspected for proper shipping procedures. Should the roots be dried out, the ENGINEER will reject the sod. When sod has been rejected, the CONTRACTOR shall remove it at once from the area of the WORK and replace it.
4. Unless otherwise authorized by the ENGINEER, the CONTRACTOR shall notify the ENGINEER at least 48 hours in advance of the anticipated delivery date of sod material. A legible copy of the invoice, showing species and variety of sod included for each shipment shall be submitted to the ENGINEER. Certificate of Inspection must accompany each sod shipment.

1.07 JOB CONDITIONS

- A. Begin installation of sod after preceding related WORK is accepted.
- B. Environmental Requirements:
  1. Install sod during months acceptable to the ENGINEER.
  2. Do not install sod on saturated soil.
- C. Protection: Erect signs and barriers to control vehicular traffic.
- D. Utilities: Determine location of underground utilities and perform WORK in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

1.08 SEQUENCING AND SCHEDULING

- A. Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.
- B. Coordination with sodding: Plant trees, palms and shrubs after final grades are established and prior to planting of sod, unless otherwise acceptable to ENGINEER. If planting of trees, palms and shrubs occurs after sod WORK, protect sod areas and promptly repair damage to lawns resulting from planting operations.

1.09 SPECIAL PROJECT WARRANTY

**SECTION 02910  
SODDING**

Warranty sod through specified lawn maintenance period, and until final acceptance.

**PART 2 - PRODUCTS**

**2.01 PLANTING SOIL**

- A. Provide new planting soil that is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 1 inch in any dimension, and other extraneous or toxic matter harmful to plant growth.
- B. Obtain planting soil from local sources or from areas having similar soil characteristics to that found at project site.

**2.02 COMMERCIAL FERTILIZER**

For sod, provide fertilizer with percentage of nitrogen required to provide not less than 1 pound of actual nitrogen per 1,000 sq. ft. of lawn area and not less than 8 percent phosphoric acid and 8 percent potassium. Provide nitrogen in a form that will be available to sod during initial period of growth; at least 50 percent of nitrogen to be organic form.

**2.03 SOD**

- A. Provide strongly rooted sod, not less than 2 years old, free of weeds and undesirable native grasses, and machine cut to pad thickness of 1-1/2 inch (plus or minus 1/4 inch), excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted (viable, not dormant).
- B. Provide sod uniform pad sizes with maximum 5 percent deviation in either length or width. Broken pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically with a firm grasp on upper 10 percent of pad will be rejected.
- C. Provide sod as indicated on the plans and composed of the following:
  - 1. St. Augustine Floritam
- D. Sod shall be nursery grown on cultivated mineral agricultural soils. Sod shall have been mowed regularly and carefully maintained from planting to harvest.
- E. American Sod Producers Association (ASPA) Grade: Nursery Grown or Approved. Field grown sod is not acceptable.
- F. Furnished in pads:
  - 1. Size:
    - a. Length: 24 inches plus or minus 5%.
    - b. Width: 18 inches plus or minus 5%

**SECTION 02910  
SODDING**

- c. Thickness: 1-1/2 inches excluding top growth and thatch.
- 2. Not stretched, broken or torn.
- G. Uniformly mowed height when harvested: 2 inches.
- H. Thatch: Maximum 1/2 inch uncompressed.
- I. Inspected and found free of disease, nematodes, pests, and pest larvae, by entomologist of State Department of Agriculture.
- J. Weeds:
  - 1. Free of Bermuda grass, nut grass or other objectionable weeds.
- K. Uniform in color, leaf texture, and density.
- 2.04 WATER

Water shall be potable, from municipal water supplies or other sources which are approved by a public health department.
- 2.05 FERTILIZER
  - A. FS O-F-241c(1), Grade A or B.
  - B. The chemical designation shall be 8-8-8, with at least 50 percent of the nitrogen from a non-water-soluble organic source.
- 2.06 HERBICIDES

As recommended by the State Department of Agriculture.
- 2.07 STAKES

Softwood, 3/4 inch diameter, 8 inch length.



PART 3 - EXECUTION

3.01 PREPARATION OF GROUND SURFACE

- A. Before mixing, clean planting soil of roots, plants, sods, stones, clay lumps, and other extraneous material harmful or toxic to plant growth.
- B. Mix specified fertilizers with planting soil as necessary at rates specified. Delay mixing fertilizer if planting will not allow placing of planting soil within a few days.
- C. For sod, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

3.02 PREPARATION OF PLANTING BEDS

- A. Loosen subgrade of lawn areas to a minimum depth of 4 inches. Remove stones measuring over 1 1/2 inches in any dimension. Remove sticks, stones, rubbish, and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation.
- B. Spread planting soil to minimum depth of 2" or as required to meet lines, grades, and elevations shown, after light rolling and natural settlement. Add specified fertilizer and mix thoroughly into upper 4 inches of topsoil.
- C. Place approximately 1/2 of total amount of top soil required. WORK into top of loosened subgrade to create a transition layer and then place remainder of planting soil. Add specified soil amendments and mix thoroughly into upper 4 inches.
- D. Where sod is to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for lawn planting as follows: Till to a depth of not less than 6 inches. Apply fertilizers as specified. Remove high areas and fill in depressions. Till soil to a homogenous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter.
- E. Prior to preparation of unchanged areas, remove existing grass, vegetation and turf. Dispose of such material outside of OWNER's property. Do not turn existing vegetation over into soil being prepared for lawns.
- F. Allow for sod thickness in areas to be sodded.
- G. Apply specified commercial fertilizer at rates specified and thoroughly mix into upper 2 inches of topsoil. Delay application of fertilizer if lawn planting will not follow within a few days.
- H. Fine grade sod areas to smooth, even surface with loose, uniformly fine texture. Roll, rake, and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.
- I. Moisten prepared sod areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting lawns. Do not create a muddy soil condition.

**SECTION 02910**  
**SODDING**

- J. Restore sod areas to specified condition, if eroded or otherwise disturbed, after fine grading and prior to planting.

3.03 SODDING NEW LAWNS

- A. Lay sod within 24 hours from time of stripping.
- B. Lay sod to form solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. WORK from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade. WORK sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.
- C. Anchor sod on slopes with wood pegs to prevent slippage.
- D. Water sod thoroughly with a fine spray immediately after planting.

3.04 MAINTENANCE

- A. Begin maintenance immediately after planting.
- B. Maintain lawns for not less than a minimum of 30 days after substantial completion, until final acceptance.
- C. Maintain sod by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.
- E. Mowing:
  - 1. Whenever grass reaches a height of 3 inches, it shall be cut back to 2" with all clippings removed.
  - 2. After two mowings, CONTRACTOR shall topdress the sod with an application of fertilizer at the rate of 1 pound of actual nitrogen per 1,000 square feet.

3.05 CLEANUP AND PROTECTION

- A. During sodding WORK, keep pavements clean and WORK area in an orderly condition.
- B. Protect sodding WORK and materials from damage due to landscape operations, operations by other CONTRACTORS and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged sod WORK as directed.

3.06 INSPECTION AND ACCEPTANCE

- A. Sod areas will be accepted when in compliance with all the following conditions:
  - 1. The roots are thoroughly attached to the soil.
  - 2. Absence of visible joints.
  - 3. All areas show a uniform stand of specified grass in healthy condition.
  - 4. At least 60 days have elapsed since the completion of the WORK in this section.
- B. When inspected sod WORK does not comply with requirements, replace rejected WORK and continue specified maintenance until reinspected by ENGINEER and found to be acceptable. Remove rejected plants and materials promptly from project site.
- C. Procedure:
  - 1. The CONTRACTOR shall submit a request for acceptance in writing to the ENGINEER. Request must be received not less than 10 days before the anticipated date for final inspection.
  - 2. Upon completion of all repairs and/or renewals required by ENGINEER at the inspection, the ENGINEER will verify the completeness of the WORK and then notify the OWNER in writing that the WORK is accepted.
  - 3. Upon completeness, the OWNER will assume maintenance of all sod areas.

END OF SECTION 02910