



Florida's Warmest Welcome

City of Pompano Beach

**TECHNICAL SPECIFICATIONS
For**

**Alsdorf Park
Phase 2 - Parking
Improvements**

November 2015



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SECTION 02 41 00 - DEMOLITION CIVIL

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 site demolition work, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS."

1.03 RELATED WORK

- A. All applicable Sections under Divisions 1, 2, 31, 32 and 33.

1.04 QUALITY ASSURANCE

- A. Demolition contractor qualifications: Minimum of five (5) 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.

1.05 SUBMITTALS

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

1.06 JOB CONDITIONS

- 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 over night.
 - 3. Structural demolition, excavation, backfill and compaction as indicated in drawings.

- B. Protection:
 - 1. Erect barriers, fences, guard rails, 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.
- D. Dust Control:
 - 1. Use all means necessary for preventing dust from demolition operations from being a nuisance to adjacent property owners. Methods used for dust control are subject to approval by the ENGINEER prior to use.
- E. Burning:
 - 1. Burning will not be permitted.
- F. No explosives will be permitted.

1.07 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.

1.08 PRE-DEMOLITION MEETING

- A. A meeting shall be held with the OWNER or his representative at the jobsite to describe intended demolition and cleaning procedures and schedules. This shall include identifying access routes for bringing necessary equipment in, removing debris from site, and designation of any trees, drives or other items to remain.

1.09 EXISTING CONDITIONS

- A. The CONTRACTOR shall become thoroughly familiar with the site, and of existing utilities and their connections, and note all conditions which may influence the work.
- B. By submitting a bid, the CONTRACTOR affirms that CONTRACTOR has carefully examined the site and all conditions affecting work. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.
- C. The removal of A.C. pipe shall be done in strict compliance with local, state, and federal regulations. The OWNER shall be notified immediately by the CONTRACTOR should any hazardous materials be discovered during demolition.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that structures to be demolished are discontinued in use and ready for removal.
- B. Do not commence work until all conditions and requirements of all applicable public agencies are complied with.

3.02 PREPARATION

- A. Arrange for, and verify termination of utility services to include removing meters and capping lines.
- B. Notification:
 - 1. Notify the OWNER at least three (3) full working days prior to commencing the work of this Section.

3.03 CLARIFICATION

- A. The drawings do not purport to show all objects existing on the site.
- B. Before commencing the work of this Section, verify with the OWNER all objects to be removed and all objects to be preserved.

3.04 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.

3.05 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. 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.

3.06 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. Utility Services: Maintain existing off-site utilities, keep in service, and protect against damage during demolition operations.
- B. 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.
- C. 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.
- D. 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.
- E. Ensure safe passage of persons around areas of demolition.

3.07 MAINTAINING TRAFFIC

- A. Do not interfere with use of adjacent buildings and facilities. Maintain free and safe passage to and from. Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed travel ways if required by governing authorities.

3.08 POLLUTION CONTROLS

- A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.
- B. Clean adjacent 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.

3.09 INSPECTION AND PREPARATION

- A. Verify that structures to be demolished are discontinued in use and ready for removal.
- B. Do not commence work until all conditions and requirements of all applicable public agencies are complied with.
- C. Arrange for, and verify termination of utility services to include removing meters and capping lines.
- D. The drawings do not purport to show all objects existing on the site; at the pre-demolition meeting before commencement of the work, verify with the OWNER all objects to be removed and all objects to be preserved.

3.10 DEMOLITION

- A. Pull out any existing utility lines designated for abandonment, irrigation, electrical lines, pull boxes and splice boxes, manholes and catch basins to be removed and all other objects designated to be removed or interfering with the work. Contact the utility company or agency involved for their requirements for performing this work. No equipment and materials shall be allowed to remain in the work area after the day it was removed.
- B. Remove all debris from the site and leave the site in a neat, orderly condition to the full acceptance of the ENGINEER, or the OWNER. No debris shall be left on the site over night.
- C. Clear and Grub and dispose of all trees, shrubs and other organic matter not otherwise addressed on tree removal and relocation plans and specifications.

3.11 DEMOLITION OF SITE STRUCTURES

- A. Demolish all site structure items designated to be removed or which are required to be removed to perform the work. This item does not include buildings.

3.12 REMOVAL OF DEBRIS AND DISPOSAL OF MATERIAL

- A. 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.

- B. Remove from site contaminated, vermin infested, or dangerous materials encountered and dispose of by safe means so as not to endanger health of workers and public.
- C. Burning of removed materials from demolished structures will not be permitted.

3.13 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 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.

END OF SECTION

SECTION 31 00 00 - EARTHWORK

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 Earthwork, as indicated on the drawings, as specified herein or both.
- B. Including, but not necessarily limited to the following:
 - 1. Excavation, including demucking.
 - 2. Backfilling.
 - 3. Filling.
 - 4. Grading, general site and building pads.
 - 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 purpose 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 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 31 10 00 Site Preparation.
- B. All applicable sections of Division 1, 2, and 3.

1.04 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

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

B. Commercial Standards, latest edition:

ASTM D 422	Method for Particle-Size Analysis of Soils, latest revision.
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lbs. (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 Method 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

- A. There is no representations of any type made as to subsurface conditions.

1.06 SITE INSPECTION

- A. The CONTRACTOR shall visit the site to become acquainted with all existing conditions and make any subsurface investigation to felt necessary to be satisfied as to site and subsurface conditions. 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

- A. 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

- A. Unsuitable material encountered during the course of construction shall be left undisturbed under green areas and under pavements to receive geogrid reinforcement.

1.09 BENCH MARKS AND MONUMENTS

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

1.10 UTILITIES

- A. Locate all existing active utility lines traversing the site and determine the requirements for their protection. Preserve in operating conditions all active utilities adjacent to or traversing the site and/or designated to remain.
- B. 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.

If 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, latest edition 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 CONTRACTOR only, and no limitations, 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 Material: 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.
- 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 ½-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:

<u>Sieve Size</u>	<u>Percentage Passing</u>
2-inch	100
1-1/2-inch	90-100
1-inch	20-55
¾-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 ¾-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 ½-inch Max.</u>	<u>¾-inch Max.</u>
2-inch	100	-
1-1/2 inch	90-100	-
1-inch	-	100
¾-inch	50-85	90-100
No. 4	25-45	35-55
No. 30	10-25	10-30
No. 200	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 grades and shall meet the following gradation requirements.

<u>Sieve Size</u>	<u>Percentage Passing</u>
1-inch	100
¾-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 (°F)	135-175	165-200	70-120
Coverage (gal/sq. yd.)	0.50	0.50	0.50

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 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 sub-base): Crushed rock aggregate sub-base material that can be compacted readily by watering and rolling to form a firm stable base. The sand equivalent value shall not be 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 classified as unsuitable material.

2.03 USE OF FILL, BACKFILL, AND EMBANKMENT MATERIAL TREES

- 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.
- 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 1 backfill material of 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 on the Drawings.
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 thickness shown or specified. Where specified or shown, aggregate sub-base 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 materials.
 - b. Under concrete hydraulic structures or other water retaining structures without underdrain systems, Types G or H materials shall be used.
 - 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 the 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 fill 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 sub-grade 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 their cost, organic content test results for approval by the ENGINEER.

PART 3 - EXECUTION

3.01 JOB CONDITIONS

- A. 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 and 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), latest edition.
- 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 fill shall be over-excavated. The sub-grade areas beneath embankments shall be excavated to remove not less than the top [6 inches] of native material and where such sub-grade is sloped; the native material shall be benched. 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 area to be paved shall extend to the bottom of the aggregate based or sub-base, 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 shall be scarified, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density. The finished sub-grade 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 sub-grade.
- 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. 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.

- B. 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.
- C. Open Trench: The maximum amount of open trench permitted in any one location shall be 100 feet, unless permitted by the ENGINEER. 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.
- D. 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.
- E. Over-Excavation: When ordered by the ENGINEER, whether indicated on the Drawing 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.
- F. 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 tip of the pipe before the trench is excavated.

3.05 OVER-EXCAVATION NOT ORDERED, SPECIFIED, OR SHOWN

- A. 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 its own expense.

3.06 EXCAVATION IN LAWN AREAS

- A. 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

- A. Except where trees are shown to be removed, trees shall be protected from injury during construction operations. No tree root 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 and blasting.
- 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 WORK, an appropriate adjustment of the contract price will be made under a separate bid item if such bid 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

- A. The CONTRACTOR shall remove and dispose of all excess excavated material at a site selected by the CONTRACTOR and reviewed by the ENGINEER.

3.10 DISPOSAL OF UNSUITABLE EXCAVATED MATERIAL

- A. The CONTRACTOR shall remove and dispose of all unsuitable 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. Building 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 32 12 16 Asphaltic Concrete Paving and 32 12 17 Portland Cement Concrete Paving for compaction requirements in the affected areas.
 - 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, AND EMBANKMENT MATERIALS

- A. Each layer of Types A, B, C, G, H, I, and K backfill materials as defined herein, where 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 sub-grade.
- C. Type L material requires mechanical spreading and placement to fill voids but does not require mechanical compaction or vibration.
- D. Flooding, pounding, 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.
- 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 ASSHTO 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>
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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..... 98

Final backfill, not beneath paved areas or structures..... 95

Trench zone backfill, not beneath paved areas or structures, including trench plugs 95

Embankments 98

Embankment, beneath paved areas or structures..... 98

Backfill beneath structures, hydraulic structures..... 98

Backfill around structures..... 98

Topsoil (Type K material)..... 80

Aggregate base or sub base(Type G or M material)..... 100

- J. Trench Backfill Requirements: the pipe has been structurally designed based upon the trench configuration specified herein.
- K. The CONTRACTOR shall maintain the indicated trench cross-section up to a horizontal plane lying 6 inches above the top of pipe.
- L. If, at any location under said horizontal plane, 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 increase 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.
- M. If the allowable deflection specified for the pipe is exceeded, the CONTRACTOR shall expose and re-round 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.

3.14 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 sub-grade, 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 sub-grade 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 sub-grade 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 sub-grade soils are classified as suitable fill and backfill materials per Paragraph 2.01.
 - 4. The trench sub-grade 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. 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 grade, or if the trench is under pavement, 18 inches below the roadway sub-grade. If flooding, ponding, or jetting is used the pipe shall be filled with water to prevent flotation.
- E. 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 sub-grade.

3.15 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 moistening, 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 recompactd as the embankment fill is brought up in layers. Material thus cut shall be recompactd 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.

3.16 CORRECTION OF GRADE

- A. Bring to required grade level areas where settlement, erosion or other grade changes occur.

3.17 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. CONTRACTOR shall repair at their 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.

3.18 AS-BUILT SURVEY

- 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.

END OF SECTION 02200

31 21 10 - CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 SCOPE

The work to be performed under this item shall consist of either the clearing of or the clearing and grubbing of the area along the alignment of construction as designated on the drawings.

- A. Clearing - Where clearing only is required it shall consist of the cutting and removal of all trees, stumps, bush, logs, hedges, and the removal of all fences and other loose or projecting material from the designated area. The grubbing of stumps and roots will be required.
- B. Clearing and Grubbing - Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which, in the opinion of ENGINEER, is unsuitable, including grubbing of stumps, roots, matter roots, foundations and disposal from the project of all spoil materials resulting from clearing and grubbing by burning or otherwise.

1.02 REFERENCES

- A. Florida Department of Transportation Standard Specifications for Road and Bridge construction (F.D.O.T.) latest edition.

PART 2 - MATERIALS

2.01 MATERIALS FOR REPLACEMENT

- A. All materials required to be brought on to the site for filling of holes caused by grubbing or otherwise shall be consistent with materials of the surrounding area.

PART 3 - EXECUTION

3.01 SCHEDULE

- A. CONTRACTOR shall schedule the clearing or clearing and grubbing work at a satisfactory distance in advance of the pipe laying operations.

3.02 SPOIL MATERIALS REMOVAL

- A. All materials to be disposed of by removal from the site shall be disposed of by CONTRACTOR at the Contractor's expense. In no case shall any discarded materials be left in piles adjacent to or within the project limits. The manner and location of disposal of

materials shall be subject to review by ENGINEER and shall not create an unsightly or objectionable view.

3.03 CLEARING

- A. Clear the area of all objectionable materials. Trees unavoidably falling outside the specified limits must be cut up, removed, and disposed of in a satisfactory manner. Preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut to a height of not more than 12-inches above the ground. The grubbing of stumps and roots will be required.
- B. Fences shall be removed and disposed of when directed by ENGINEER. Fence wire shall be neatly rolled and the wire and posts stored on the project if they are to be used again, or stored at a designated location if the fence is to remain the property of OWNER.

3.04 CLEARING AND GRUBBING

- A. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass and other unsatisfactory materials shall be removed.
- B. All holes remaining after the grubbing operation in embankment areas shall have the sides broken down to flatten out the slopes, and shall be filled with acceptable material, moistened and properly compacted in layers to the density required. The same construction procedure shall be applied to all holes remaining after grubbing in excavation areas where the depth of holes exceeds the depth of the proposed excavation.

END OF SECTION

SECTION 31 23 23 - STRUCTURAL EXCAVATION, BACKFILL & COMPACTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Section includes, except as elsewhere provided, excavation, filling and grading under and around structures to the subgrades and grades indicated on the Drawings.
- B. Supplemental Foundation and Site Preparation Notes may be indicated on the Structural Drawings.

1.02 RELATED WORK

- A. General Conditions
- B. Section 31 10 00: Site Preparation

1.03 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Testing and Inspection Service: The Contractor will engage soil testing and inspection service for quality control testing during earthwork operations.

1.04 JOB CONDITIONS

- A. The Contractor shall examine the site and review the available test borings or undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work. The Owner and Engineer will not assume responsibility for variations of subsoil quality or conditions at locations other than places shown and at the time the investigation was made.
- B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Engineer and the Owner of such piping or utility immediately for directions.
 - 2. Cooperate with the Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - 3. Demolish and completely remove from site existing underground utilities indicated on the Drawings to be removed.
- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

1.05 PROTECTION

A. Sheeting and Bracing in Excavations:

1. In connection with the construction of below grade structures, the Contractor shall construct, brace, and maintain cofferdams consisting of sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, existing piping and foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.
2. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction of other structures, utilities, existing piping, or property. Unless otherwise approved or indicated on the Drawings or in the Specifications, all sheeting and bracing shall be removed after completion of substructure, care being taken not to disturb or otherwise injure the finished structures. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as may be directed.
3. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.
4. The Contractor shall construct the cofferdams and sheeting outside the neat lines of the foundations unless indicated otherwise to the extent, he deems it desirable for his method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing and cofferdams shall be adequate to withstand all pressures to which the structure will be subjected. Pumping, bracing, and other work within the cofferdams shall be done in a manner to avoid disturbing any construction of the masonry enclosed. Any movement or bulging which may expense so as to provide the necessary clearances and dimensions.
5. Drawings of the cofferdams and design computations shall be submitted to the Engineer for approval, and construction shall not be started until such drawings are approved. However, approval of these drawings shall not relieve the Contractor of the responsibility for the cofferdam. The drawings and computations shall be prepared and stamped by a Registered Professional Engineer in the State of Florida and shall be in sufficient detail to disclose the method of operation for each of the various stages of construction, if required, for the completion of the substructures.

B. Dewatering, Drainage and Floatation:

1. The Contractor shall construct and place all concrete work, structural fill, bedding rock, and limerock base course, in-the-dry unless authorized by the Engineer or Owner to place in the wet. When dewatering, the Contractor shall make the final 24-inches of excavation for this work in-the-dry and not until the water level is a minimum of 12-inches below proposed bottom of excavation.

2. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavations and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill and structure to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.
3. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
4. Wellpoints may be required for predrainage of the soils prior to final excavation for some of the deeper in-ground structures, and for maintaining the lowered groundwater level until construction has been completed to such an extent that the structure or fill will not be floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from wellpoints shall be continuous and standby pumps shall be provided.
5. The Contractor shall furnish all materials and equipment and perform all work required to install and maintain the drainage systems he proposes for handling groundwater and surface water encountered during construction of structures and compacted fills.
6. If requested by the Engineer, the Contractor's proposed method of dewatering shall include a groundwater observation well at each structure to be used to determine the water level during construction of the structure. Locations of the observation wells shall be at structures as approved by the Engineer prior to their installation. The observation wells shall be extended to 6-inches above finished grade, capped with screw-on caps protected by 24" x 24" wide concrete base, and left in place at the completion of this Project.
7. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the Engineer for approval. However, such approval shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The contractor shall be responsible for correcting any disturbance or natural bearing soils or damage to structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.
8. As part of his request for approval of a dewatering system, the Contractor may be requested to demonstrate the adequacy of the proposed system and wellpoint filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one-quart sample.
9. During backfilling and construction, water levels shall be measured in observation wells located as directed by the Engineer.
10. Continuous pumping will be required as long as water levels are required to be below natural levels.

1.06 SUBMITTALS

- A. The Contractor shall furnish the Engineer, for approval, a representative sample of fill material obtained from on-site sources at least 10-calendar days prior to the date of anticipated use of such material.
- B. For each material obtained from other than on-site sources, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample at least 10-calendar days prior to the date of anticipated use of such material.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General:

1. Materials for use as base, fill and backfill shall be as described below.
 - a. Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M-145, soil classification Groups A-1, A-2-4, A-2-5 and A-3.
 - b. Unsatisfactory soil materials are those defined in AASHTO M-145 soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6 and A-7 along with peat and other highly organic soils.
2. Materials shall be furnished as required from off site sources and hauled to the site.

B. Structural Fill:

1. Structural fill material shall be satisfactory soil material consisting of a minimum of 60 percent clean medium to fine grain sized quartz sand, free of organic, deleterious and compressible material. Rock in excess of 2-1/2-inches in diameter shall not be used in the fill material. Structural fill shall not contain hardpan, stones, rocks, cobbles or other similar materials.

C. Crusher-Run Gravel:

1. The impervious aggregate base, crusher-on gravel, subbase or shoulder course material shall be uniform quality throughout. The material retained on the No. 10 sieve shall be composed of aggregate meeting the requirements for Class A or B coarse aggregate, except the percent of soft fragments allowed shall be as shown in the requirements below. To be used only if requested by Contractor and approved by Engineer.
2. The impervious aggregate may be produced from an approved quarry source, or bank or pit deposit, which will yield a satisfactory mixture conforming to all requirements of these specifications after it has been crushed or processed as a part of the mining operations, or the material may be furnished in two sizes of such gradation that when combined in the central mix plant the resultant mixture shall conform to the required specifications. Impervious aggregate base, subbase or shoulder material shall conform to the following requirements:
 - a. Gradation, Percent by Weight Passing Each Sieve.

12-Inch Sieve	100
3/4-Inch Sieve	60-100
No. 10 Sieve	30-55
No. 60 Sieve	8-35
No. 200 Sieve	5-20

Test on Material Passing No. 10 Sieve Volume Change, Percent 0-18.

Test on Material Retained on 3/8 Sieve Soft Fragments, Percent 0-30.

3. Method of tests shall be in accordance with the following:

Gradation	AASH O: T27
Volume Change	GHD: 6
Soft Fragments	AASHTO: T-189

D. Base Course:

1. Limerock shall not contain cherty or other extremely hard pieces, or lumps, or balls or pockets of sand material in sufficient quantity as to be detrimental to the proper bonding, finish or strength of the limerock base.
2. Gradation and Size Limits:
At least 97-percent (by weight of the material shall pass a 3-1/2-inch sieve and the material shall be graded uniformly down to dust. The fine material shall consist of dust of fracture. All crushing or breaking up which might be necessary in order to meet such size requirements shall be done before the material is in place.
3. Limerock shall originate from a Florida Dept. of Transportation (FDOT) certified pit.
4. Crushed or recycled concrete free from deleterious materials may be used as base material conforming to the gradation requirements of limerock.

E. Common Fill:

1. Common fill material shall be satisfactory soil material containing no more than 20-percent by weight finer than No. 200-mesh sieve. It shall be free from organic matter, muck, marl, and rock exceeding 2-1/2-inches in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar material.
2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.

F. Bedding Rock:

1. Bedding rock shall be 3/8" to 3/4-inch washed and graded limerock. This Rock shall be graded so that 99-percent will pass a 3/4-inch screen and 80-percent will be retained on a No. 8 screen.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which excavating, filling, and grading are to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Examine and accept existing grade of walks, pavements and steps prior to commencement of work and report to Engineer if elevations of existing subgrade substantially vary from elevations shown on the Drawings.

3.02 EXCAVATION

- A. Excavation consists of removal and disposal of material encountered when establishing required grade elevations.
- B. Excavation Classifications: The following classifications of excavation will be made when unanticipated rock excavation or unclassified excavation is encountered in the work. Do not perform such work until material to be excavated has been cross-sectioned and classified by Engineer or specialized geotechnical consultant.
 - 1. Authorized earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in soil boring data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.
 - 2. Unauthorized excavation consists of removal of material beyond the limits needed to establish required grade and subgrade elevations without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer shall be at the Contractor's expense.
 - a. Under footings and foundation bases, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation. Lean (unreinforced) concrete fill may be used to bring bottom elevations to proper position, when acceptable to Engineer. Reinforcement shall be placed as needed or directed by the Engineer.
 - b. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classifications, unless otherwise directed by Engineer.
- C. Additional Excavation: When excavation has reached required subgrade elevations, notify the Engineer who will reserve the right to contact a specialized geotechnical consultant and make an inspection of conditions.
 - 1. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Engineer.
 - 2. Removal of unsuitable material and its replacement as directed beyond the authorized limits will be paid on the basis of contract conditions relative to changes in work.
- D. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction or as shown on the Drawings. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
 - 1. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- E. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
 - 1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
 - 2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

- F. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area. Maintain groundwater table level a minimum of one-foot below excavation level.
1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, wellpoints, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 2. Convey water removed from excavations and rainwater to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
 3. While dewatering for new Construction in the vicinity of existing structures, depletion of the groundwater level underneath these existing structures may cause settlement. To avoid this settlement, the groundwater level under these structures shall be maintained by appropriate methods of construction as approved by the Engineer.
- G. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
1. Locate and retain soil materials away from edge of excavations.
 2. Dispose of excess soil material and waste materials as herein specified.
- H. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection, or as shown on the Drawings.
1. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavated by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.
 2. Do not excavate to the bearing levels designated on the drawings until surface compaction is completed.

3.03 BACKFILL AND FILL

- A. General: Place material in layers to required subgrade elevations, for each area classification listed below.
1. Structural fill shall be used below spread footing foundations, slab-on grade floors, and other structures and as backfill within three feet of the below grade portion of structures.
 2. Crusher-run gravel shall be used under and around drainage sumps. It can be used at the request of the Contractor and if approved by the Engineer as base material for areas approved by the Engineer.
 3. Limerock base course shall be used under roadways, parking areas, and walks and for riprap. Limerock base course may be used by the Contractor at other similar locations if approved by the Engineer or indicated on the Drawings.
 4. Common fill shall be used at all other locations.
 5. Bedding rock shall be used for pipe bedding, under and around manhole base and at other locations indicated on the Drawings or approved by the Engineer.

- B. Backfill excavations as promptly as work permits, but not until completion of the following:
1. Acceptance by Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 2. Inspection, testing, approval, and recording locations of underground utilities.
 3. Removal of concrete formwork.
 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
 5. Removal of trash and debris.
 6. Permanent or temporary horizontal bracing is in place on horizontally supported walls. Layout and location of bracing shall consider loads of the structure as well as the effects of the soil and groundwater.
- C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
1. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
- D. Fill Placement:
1. Material placed in fill areas under and around structures shall be deposited within the lines and to the grades shown on the Drawings or as directed by the Engineer, making due allowance for settlement of the material. Backfill shall be carried up evenly on all walls of an individual structure simultaneously with no more than a two-foot elevation variation allowed. Fill shall be placed only on properly prepared surfaces which have been inspected and approved by the Engineer.
 2. Fill material can be obtained from cut areas within the construction project site. If sufficient satisfactory soil material is not available from excavation on site, the Contractor shall provide fill material as may be required from off-site sources at no additional cost to the Owner.
 3. Fill shall be brought up in substantially level lifts throughout the site, starting in the deepest portion of the fill. The entire surface of the work shall be maintained free from ruts, and in such condition that construction equipment can readily travel over any section. Fill shall not be placed on surfaces that are muddy or against concrete structures until they have attained sufficient strength.
 4. Fill shall be dumped and spread in layers by a bulldozer or other approved method. During the process of dumping and spreading, all roots, debris, and stones greater in size than specified under Materials, shall be removed from the fill areas, and the Contractor shall assign a sufficient number of men to this work to insure satisfactory compliance with these requirements.
 5. If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layer, it shall be loosened by harrowing or by another approved method before the succeeding layer is placed.

6. All fill materials shall be placed and compacted “in-the-dry.” The Contractor shall dewater excavated areas as required to perform the work and in such manner as to preserve the undisturbed state of the natural inorganic soils.

3.04 COMPACTION

- A. General: Control soil compaction during construction providing minimum percentage of density specified on the drawings for each area classification. It shall be the Contractor’s responsibility to notify the Engineer in writing that penetration tests can be performed. Written notice from the Contractor shall precede completion of compaction operations by at least 2- working days.
- B. Percentage of Maximum Density Requirements:
 1. Compact soil to not less than the following percentages of maximum dry density in accordance with AASHTO T-180.
 - a. Underneath structures and 5-feet 0-inches around perimeter of foundation: Compact top 12-inches of subgrade and each layer of backfill or fill material at 98-percent maximum dry density.
 - b. Building Slabs and Footings: Compact top 12-inches of subgrade and each layer of backfill or fill material at 98-percent maximum dry density.
 - c. Lawn or Unpaved Areas: Compact top 6-inches of subgrade 95-percent maximum dry density.
 - d. Walkways: Compact top 6-inches of subgrade 95-percent maximum dry density.
 - e. Pavements and Steps: Compact top 12-inches of subgrade at 98-percent maximum dry density.
 2. Moisture content of soil shall be within 2-percent of the optimum.
- C. Moisture Control: Where subgrade or layer of soil material that is too wet to permit compaction to specified density.
 1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 2. Soil material that has been removed because it is too wet to permit compaction, but is otherwise satisfactory may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to satisfactory value.
- D. Structural fill shall be placed in layers not more than 9-inches loose depth for material compacted by heavy compaction equipment. Each layer shall be compacted by a minimum of six coverages with the equipment described below, to at least 98 percent of maximum dry density as determined by AASHTO-T-180. Incidental compaction due to traffic by construction equipment will not be credited toward the required minimum coverages.
- E. Common fill consisting of other than structural fill shall be placed and compacted in a manner similar to that described above for structural fill, with the following exception: layer thickness prior to compaction may be increased the 12-inches in open area; and common fill except dike fill, required below water level in peat excavation areas may

be placed as one lift, in-the-wet, to an elevation one foot above the water level at the time of filling.

- F. Compaction of the fill by such means shall be to the same degree of compaction as obtained by rubber-tired or vibratory roller equipment, and the Engineer may make the necessary tests to determine the amount compactive effort necessary to obtain equal compaction. Large compaction equipment shall not be used within-5 feet of structures. Compaction equipment is subject to approval by the Engineer.
- G. Place fill material in layers not more than 12-inches loose depth for material compacted by hand-operated tampers. Use manually operated sled-type vibratory compactors next to structures and confined areas not accessible to heavy mechanical compaction equipment.
- H. If the Engineer shall determine that added moisture is required, water shall be applied by sprinkler tanks or other sprinkler systems, which will insure uniform distribution of the water over the area to be treated, distribution of the water over the area to be treated, and give complete and accurate control of the amount of water to be used. If too much water is added, the area shall be permitted to dry before compaction is continued.
- I. The Contractor shall supply all hose, piping, valves, sprinklers, pumps, sprinkler tanks, hauling equipment, and all other materials and equipment necessary to place the water in the fill in the manner specified.

3.05 GRADING

- A. General: Uniformly grade-fill areas within limits of project including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such point and existing grades. No soft spots or uncompacted areas will be allowed in the work.
- B. Grading Outside Building Lines: Grade areas adjacent to Buildings as shown on the Drawings, to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:
- C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2-inch when tested with a 10-foot straightedge.
- D. Stones or rock fragments larger than 2-1/2-inches in their greatest dimension will not be permitted in the top 6-inches of the subgrade line of all dike, fills or embankments.
- E. All cut and fill slopes shall be uniformly dressed to the slope, cross section and alignment shown on the Drawings, or as directed by the Engineer to prevent ponding water on driveways, walkways or against structures.
- F. During grading, protect all buried valved extensions and covers, sprinklers and any other mechanical or structural object protruding from below grade.

3.06 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.
- B. If in the opinion of the Engineer, based on testing service reports and inspection, subgrade or fills, which have been placed, are below specified density, provide additional compaction and testing at no additional expense.

3.07 MAINTENANCE

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
 - 1. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

3.08 DISPOSAL OF SURPLUS AND WASTE MATERIAL

- A. All surplus and unsuitable excavated material shall be disposed of by the Contractor in the following ways.
 - 1. Transport to an appropriate soil storage area and stockpile or spread as needed.
 - 2. Transport and legally dispose of. Any permit required for the hauling and disposing of this material shall be obtained prior to commencing hauling operations.
- B. Suitable excavated material may be used for fill if it meets that specifications for satisfactory material and is approved by the Engineer. Excavated material so approved may be neatly stockpiled at the site where designated by the Engineer provided there is an area available where it will not interfere with the operator of the facility nor inconvenience traffic or adjoining property owners.
- C. Excavated rock may be used in open fill areas only with the approval of the Engineer.

END OF SECTION

SECTION 32 01 00 - SURFACE RESTORATION

PART 1 - GENERAL

1.01 SCOPE

- A. The work to be performed under this item shall include completing of surface restoration as specified herein. This work does include pavement paver restoration, concrete curb and/or sidewalk restoration and landscaping. Surface restoration shall follow completion of backfilling within 7 calendar days. Where work is on private property the Contractor shall photograph the area of work before construction and not proceed with the work until clearance has been received through the City. Where work is in FDOT or County right-of-way, restoration shall conform to the conditions of the permit and/or FDOT or County standards.

1.02 REFERENCES

- A. Work and materials shall conform to the applicable requirements from the Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", most current edition at time of bid.
- B. American Association of State Highway and Transportation Officials (AASHTO).
 - 1. AASHTO T-180 - Test for Moisture-Density Relations of Soils Using a 10 lb. Rammer and an 18-Inch Drop Modified Protector Test.

PART 2 - PRODUCTS

2.01 SUBGRADE

- A. Subgrade shall be compacted in accordance with the plans and specifications.

2.02 BASE COURSE

- A. The base course shall consist of Grade No. 2 limerock conforming to Section 911-3 of FDOT "Standard Specifications for Road and Bridge Construction".

2.03 PRIMER

- A. Primer shall be hot bituminous material in accordance with Section 300-2 of FDOT Standard Specifications, most current edition at time of bid. Alternate primers shall be acceptable only with prior approval of the Engineer.

2.04 TACK COAT

- A. Tack coat shall be in accordance with Section 300-2.3 of FDOT Standard Specifications, most current edition at time of bid.

2.05 SURFACE COURSE

- A. If required, the temporary surface course shall be SP 9.5 (1") asphaltic concrete in

accordance with all applicable requirements of FDOT "Standard Specifications for Road and Bridge Construction," most current edition at time of bid.

2.06 GRASS, SHRUBBERY, TREES, ETC.

- A. All planted vegetation which is removed, damaged or destroyed by project construction shall be replaced by like kind and in the same manner.

2.07 CONCRETE

- A. The concrete used shall be Class I (3,000 psi in 28 days) in accordance with FDOT Standard Specification Section 345. Concrete in right-of-way shall be 3,000 psi in 28 days

2.08 PAVERS

- A. Pavers shall be replaced in kind and shall match style and pattern of existing pavers.

PART 3 - EXECUTION

3.01 NON STATE-OWNED PUBLIC PAVEMENT

- A. Base Course: The base course shall be constructed to the details shown on the Plans and at the Engineer's direction. Any variance from the Plan details shall not be allowed without the prior written consent of the Engineer.
- B. The limerock shall be transported to the point where it is to be used, over rock previously placed, if practicable, and dumped on the end of the preceding spread.
- C. In no case shall rock be dumped directly on the subgrade.
- D. The limerock shall be spread uniformly with equipment approved by the Engineer.
- E. All segregated areas of fine or coarse rock shall be removed and replaced with well graded rock.
- F. The equipment to be used shall include a self-propelled blade grader weighing not less than 3 tons, with wheel base not less than 15 feet and blade length not less than 10 feet; scarifiers shall have teeth spaced not to exceed 4-1/2 inches apart; at least one three-wheel roller weighing not less than 10 tons; provision for furnishing water at the site of work by tank truck or hose at a rate not less than 50 gallons per minute.
- G. Alternate equipment approved by the Engineer may be used where narrow widths preclude use of larger equipment.
- H. After spreading is completed, the entire surface shall be scarified and shaped so as to produce the exact grade and cross section after compaction.

- I. The full depth of base shall be compacted to an average density of 98% of maximum density as determined by AASHTO T-180 (Modified Proctor). The minimum density acceptable at any location shall be 98%.
- J. The finished surface of rock base shall be true to the required cross section throughout. Any irregularities in the surface greater than 1/4-inch, as determined by placing a 10 foot straightedge parallel or perpendicular with the centerline, shall be corrected by scarifying to a depth of 3-inches, removing or adding rock as may be required and again watering, rolling and compacting the scarified area.
- K. Priming: Before any bituminous material is applied, all loose material, dust, dirt and other foreign material which might prevent proper bond shall be removed from the base for the full width of application.
- L. The surface to be primed shall have the glazed finish removed by "hard-planing" prior to the application.
- M. The bituminous material to be used shall be RC-70 or other material approved by the Engineer. The temperature of the material shall be between 100 degrees F and 150 degrees F, the exact temperature being such as will insure uniform distribution.
- N. The surface to be primed shall be clean and dry. No bituminous material shall be applied when the temperature of the air is less than 60 degrees F in the shade, or when, in the opinion of the Engineer, the weather conditions or the condition of the existing surface is unsuitable.
- O. The rate of application shall not be less than 0.10 gal. per square yard, and shall be sufficient to coat the surface thoroughly and uniformly without having any excess to puddle or flow off the base.
- P. Application shall be by self-propelled pressure distributor, operating under a pressure not less than 20 lbs. per square inch.
- Q. The prime shall be allowed to stand, without sanding, for a period of at least 4 hours. A uniform application of clean sand shall be applied prior to opening the primed base to traffic, in which case the sand shall be rolled with a traffic roller in conjunction with traffic to cure the prime coat.
- R. The sand to be used shall be free of silt, rock, particles, sticks, trash, vegetation, or other deleterious material.
- S. Asphaltic Surface Course: Saw cut and square edges of existing asphalt. After the prime coat has had adequate time to cure, and prior to the installation of a temporary surface course, the Contractor shall clean the prepared base of all loose sand and other deleterious materials.
- T. If, in the opinion of the Engineer, the prepared surface is unsuitable to receive the temporary surface course without tacking, a tack coat shall be applied in accordance with FDOT Section 300-7.

- U. Once the surface has been properly prepared, the Contractor shall install SP 9.5 (1") Asphaltic Concrete in accordance with the details shown on the Plans as a temporary surface course. Said Asphaltic Concrete shall conform to all of the applicable requirements of the Florida Department of Transportation "Standard Specifications for Road and Bridge Construction," current edition at time of bid, except that "Job Mix Formula" will not be required.
- V. The temporary surface course may be spread with a spreader box in lieu of a self-propelled mechanical spreader.

3.02 STATE OR COUNTY OWNED PUBLIC PAVEMENT

- A. Restoration within all State or County owned and maintained rights-of-way shall be made in strict compliance with the construction permit.
- B. All work shall be subject to final inspection and approval of the Florida Department of Transportation or the County and shall be completed as expeditiously as possible.

3.03 DRIVEWAYS, PARKING LOTS AND MISCELLANEOUS PAVEMENT

- A. Driveways, parking lots and miscellaneous pavement shall be replaced in kind and restored to a condition equal to or better than that which existed previously.
- B. The Contractor is to repair all improvements at no extra cost whether shown or not shown by the Plans.

3.04 UNIMPROVED STREETS

- A. Unimproved streets shall be restored to a condition equal to that which existed prior to this construction.

3.05 PAVER RESTORATION

- A. The work to be performed under this item shall include delivering and the installation of pavers to replace pavers which have been removed and/or damaged during the course of construction of the work performed under this contract.
- B. All pavers shall be replaced in kind and shall be installed in accordance with manufacturer's specifications.
- C. No separate pay item for pavement restoration. Cost of pavement restoration to be included in price of item such as pipe, sidewalk, pavers, etc.

3.06 CONCRETE SIDEWALK AND/OR CURB RESTORATION

- A. The work to be performed under this item shall include the selling and delivering and the installing of concrete sidewalk which have been removed and/or damaged during the course of construction of the work performed under this Contract. The sidewalk shall be replaced to the same width as the original sidewalk.

- B. Work shall conform to Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction, Section 520 and 522 "Concrete, Gutter, Curb Elements and Traffic Separator" and "Concrete Sidewalk".
- C. All material, labor, forms, tools and equipment for restoration of the sidewalk shall be supplied by the Contractor. All disturbed sidewalk shall be replaced with 4-inch thick (6-inches thick at driveways) to the widths required. The sidewalk finish shall match as near as possible the original finish. Broken or cracked sidewalk shall be removed and disposed of as directed by the Engineer. Subgrade shall be fully compacted, scored joints shall be placed at a maximum of 5 foot intervals, 3/4" expansion joints shall be placed at changes in direction and at maximum 20 foot intervals.

3.07 SWALE RESTORATION

- A. Where the Contractor is to construct a new watermain/storm sewer pipe in the swale area, the swale shall be excavated and replaced in conformance to the City's Swale Restoration Standards, as shown on the plans detail sheet. No separate payment shall be made for landscape or swale construction/restoration, it is part of the unit bid price for new watermain/storm sewer pipe.

3.08 RIGHT-OF-WAYS AND/OR EASEMENTS IN GRASS AND SHRUBBERY PLOTS

- A. Rights-of-way and/or easements in grass and shrubbery plots shall be restored to the condition existing prior to making the excavation. All shrubbery, ornamental trees and others plantings shall be fully protected. If it is found necessary to remove any grass, shrubbery or plants to accomplish the work, they shall be satisfactorily replaced before the work will be accepted or paid for. Grass shall be replaced with sod.

3.09 CLEANUP

- A. Cleanup is an essential part of the project and this portion of the work will not be considered complete and no payment made until the cleanup is complete to the satisfaction of the Engineer.

END OF SECTION

SECTION 32 12 16 - CONCRETE SIDEWALK

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. 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 31 10 00 – Site Preparation
- B. Section(s) of the Contract related to Cast-in-Place Concrete

PART 2 - PRODUCTS

2.01 CONCRETE

- A. 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

- A. 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

- A. 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, point of curvature, point of tangency and at all other locations indicated on the plans, shall be 1/2-inch wide, formed with a preformed joint filler and the joint shall be edged with a tool having a 1/4-inch radius. Preformed joint filler shall meet the requirements of AASHTO M153 or AASHTO M213.

- B. Contraction joints shall be 1/8-inch wide x 3/4-inch deep and may be of the open type or may be sawed. Open type contraction joints shall be 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 1/8-inch radius.

If the CONTRACTOR elects to saw the contraction joints, shall be cut with a concrete saw after the concrete has set.

Contraction joints shall be constructed at not more than five (5) foot intervals, and shall be in place within twelve (12) hours after finishing.

PART 3 - EXECUTION

3.01 PLACING

- A. 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.

END OF SECTION

SECTION 32 12 16 - ASPHALTIC CONCRETE PAVING

PART - 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and place asphaltic concrete pavement in accordance with the grades and typical sections shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Section 33 01 00: Trenching, Bedding & Backfill for Pipe
- B. Section 32 17 23: Pavement Marking & Signing

1.03 SUBMITTALS

- A. Submit shop drawings as specified in the Contract.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. The limerock base shall consist of crushed limerock as specified by the Florida Department of Transportation with minimum LBR of 100 or a crushed, or recycled concrete meeting the same requirements as LR base.
- B. The material used for the prime coat shall conform to the Florida Department of Transportation Specifications for primer to be used on Miami Oolite limerock base.
- C. Bituminous material for tack coat shall meet the standard specifications of the Florida Department of Transportation for the grade used and may be any suitable grade of RC.
- D. The materials of the asphaltic concrete surface shall conform with applicable sections of the Florida Department of Transportation Standard Specification. Asphaltic mix designs shall be as specified in the plans. A tack coat shall be used between paving courses.
- E. The paint used for parking and traffic stripes shall be yellow or white traffic paint which shall be of a type approved by the Florida Department of Transportation under their Specifications for Traffic paint (Sec. 971-12.3), Code T-2.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The sub-grade preparation shall comply with the requirements of Section 160 of the Florida Department of Transportation Specifications. All soft and yielding material and other portions of the sub-grade which will not compact readily shall be removed and replaced with suitable material and the whole sub-grade brought to line and grade and to a foundation of uniform

compaction and supporting power. The cost of removing and replacing unsuitable material shall be included in the bid for the paving.

- B. The top 12-inches of the sub-grade, in both cut and fill sections, shall be compacted to a density of not less than 98-percent of the maximum density as determined by the AASHTO Method T-180. If shown on the Drawings, compact sub-grade to a Limerock Bearing Value of 40 psi. Unless the sub-grade material at the time of compacting contains sufficient moisture to permit proper compaction it shall be moistened as necessary and then compacted. Sub-grade material containing excess moisture shall be permitted to dry to the proper consistency before being compacted. The sub-grade shall be shaped prior to making the density tests. The required density shall be maintained until the base or pavement has been laid or until the aggregate materials for the base or pavement course have been spread in place.
- C. The minimum compacted thickness of the limerock base shall be 8- inches applied in three layers of equal depth unless otherwise shown on the Drawings. The width of the limerock base shall be 3-feet wider than the pavement, 1-1/2-ft. on each side.
- D. Before the prime coat is applied, all loose material, dust, dirt or other foreign material which might prevent bond with existing surface shall be moved to the shoulders to the full width of the base by means of revolving brooms, mechanical sweepers, blowers, supplemented by hand sweeping or other approved methods. The glazed finish shall have been removed from the base. The prime coat shall be applied by a pressure distributor so that approximately 0.1 gallons per square yard is applied uniformly and thoroughly to a clean surface.
- E. Prior to the application of the surface course, all loose material, dust, dirt and all foreign material which might prevent proper bond with the existing surface shall be removed to the full width of the repair by means of approved mechanical sweepers and supplemented by hand sweeping if required.
- F. Submit as-builts of the finished limerock and curbing to the Engineer of Record for review and approval prior to paving.
- G. Apply bituminous tack coat at a rate between 0.02 and 0.10 gallons per square yard. Bituminous material shall be heated as per manufacturer's recommendations.
- H. The asphaltic concrete shall be placed at an average thickness of 2-inches unless otherwise shown on the drawings.
- I. All manhole castings, valve boxes or other utility castings within the area to be surfaced shall be adjusted to the proposed surface elevation by the Contractor. The work shall be accomplished in such a manner as to leave the casting fixed permanently in its correct position.

3.02 PAVEMENT REPAIR

- A. All damage to pavement as a result of the work (construction or maintenance) under this contract shall be repaired according to the plans and specifications at the Contractors cost. Pavement shall be repaired to match the original surface material and original grade; however,

the asphalt concrete thickness shall not be less than 1-inch. The repair shall include the preparation of the sub-grade, the placing and compacting of the limerock base, the preparation and priming of the base, the placing and maintaining of the surface treatment, all as specified herein and as shown on the Drawings.

- B. The width of all repairs shall extend at least 12-inches beyond the limit of the damage or as shown on the Drawings. The edge of the pavement to be left in place shall be saw cut to a true edge and should provide a clean edge to abut the repair. The line of the repair shall be reasonably uniform with no unnecessary irregularities.

3.03 TESTING

- A. Should any test indicate that any portion of the materials or workmanship does not comply with these Specifications; that portion of the work shall be removed and replaced or reworked at no additional cost to the Owner until satisfactory compliance is attained.

3.04 PARKING AND TRAFFIC STRIPES

- A. The Contractor shall paint the stripes indicated on the Drawings. The paint shall be applied in strict accordance with printed specifications of the manufacturers of the paint being applied, and the latest Florida Department of Transportation Standard Specifications. Unless otherwise indicated the width of stripes shall be 6-inches.

END OF SECTION

SECTION 32 16 13 - CONCRETE CURBS AND HEADERS

PART 1 - GENERAL

1.01 SCOPE

The work covered by this section of the specifications consists of furnishing all plant, labor, equipment, appliances and materials and performing all operations in connection with the construction of concrete curbs and headers, complete and in place, in strict accordance with these specifications and the applicable drawings and subject to the terms and conditions of this contract.

1.02 REFERENCES

Florida Department of Transportation Standard Specifications for Road and Bridge Construction, (latest edition)

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The concrete mix shall produce standard weight concrete with the following properties to be verified by the use of the appropriate listed test methods.
- *Compressive strength:* 3,000 psi at 28 days - tested according to ASTM designation C31 (AASHTO T23)
 - *Slump Range:* 2-4 inches - tested according to ASTM designation C143 (AASHTO T119)
- B. Joint materials shall be in accordance with FDOT Specification Section 932

PART 3 - EXECUTION

3.01 CONSTRUCTION METHODS

Concrete curbs and headers shall be constructed of the type and in the locations as shown on the plans.

- A. **FORMS:** Forms for this work shall be made of either wood or metal. They shall be straight, free from warp or bends, and of sufficient strength, when staked, to resist the pressure of the concrete without springing. If made of wood, they shall be of two (2) inch surfaced plank; if made of metal, they shall be of approved section and shall have a flat surface on top.
- B. **CONSTRUCTION:** Excavation shall be made to the required depth; and the sub-grade or base upon which the curb or header is placed shall be compacted to 98% AASHTO T-180.

The concrete shall be placed in the forms to the depth specified, and tamped and spaded to prevent honeycomb and until the top of the structure can be floated smooth and the edges rounded to the radius shown on the plans.

Contraction joints shall be placed at intervals of ten feet except where a lesser interval is required for closure, but no section shall be less than four feet in length.

Contraction joints shall be created while the concrete is still plastic by using a grooving tool or by inserting a premolded filler strip, or a groove may be saw cut into the concrete soon after it has hardened. Curb with irregular cracks due to late contraction joint construction will not be accepted.

Expansion joints shall be constructed at all radius points and at other locations indicated on the plans. They shall be located at intervals of 500 feet between other expansion joints, or ends of a run. The joint shall be 1/2 inch in width.

The forms shall be removed within twenty-four (24) hours after the concrete has been placed, and minor defects then filled with mortar composed of one (1) part Portland Cement and two (2) parts fine aggregate. Plastering shall not be permitted on the face of the curb; and all rejected curb, or header shall be removed and replaced without additional compensation. The curb top, face and/or header top shall be given a surface finish while the concrete is still green. A brush finish will be required unless noted otherwise; however, additional finishing may be required in areas considered too rough or with minor defects.

After the concrete has been rubbed smooth, it shall be rubbed again until a uniform color is produced, using a thin grout composed of one (1) part Portland Cement and one (1) part fine aggregate.

After concrete has set sufficiently, the spaces in front and back of the curb shall be refilled to the required elevation with suitable material, which shall be placed and thoroughly compacted in layers of not more than six (6) inches in thickness.

END OF SECTION

SECTION 32 17 23 - PAVEMENT MARKING AND SIGNING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment and incidentals required and place pavement markings and signing in accordance with the Drawings and Specifications as shown herein.

1.02 RELATED WORK

- A. Section 32 12 16 – Asphaltic Concrete Paving

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Paint: In accord with requirements as specified in Section 971 of the FDOT Specifications.
 - 1. Paint shall be factory mixed, quick drying and non-bleeding type.
 - 2. Color shall be as per D.O.T. requirements.
 - 3. Striping, arrows, lane markers and stop bars shall be provided with paint containing reflective additive.
- B. Thermoplastic paint: In accord with the applicable Technical Specifications (Section 711) of the Florida Department of Transportation.
- C. Reflectors: In accord with Palm Beach County Minimum Standards.
- D. Sign Panels:
 - 1. Aluminum or galvanized steel in accordance with the applicable requirements of Section 700 "Highway Signing" of the FDOT Standard Specifications.
 - 2. Size, shape and color as indicated on the drawings or as directed by the Engineer.
- E. Sign Support Posts:
 - 1. Aluminum or Galvanized Steel in accordance with the applicable requirements of Section 700 "Highway Signing" of the FDOT Specifications.
 - 2. Size, shape and color of posts and mountings as indicated on drawings or as directed by the Engineer.

2.02 EQUIPMENT

- A. All equipment shall be of a type and design which will readily obtain the required uniformity of application of the stripes, both as to thickness of coating and as to alignment.

- B. The traveling unit shall be capable of traveling at a uniform predetermined rate of speed, both uphill and downhill, in order to produce a uniform application of paint.
- C. The paint machine shall be of the spray type and shall be capable of spraying the paint to the required spread without thinning of the paint. The paint tank shall be equipped with a mechanical agitator. The nozzles shall have cut-off valves which will apply broken or skip lines automatically. The nozzles shall be quipped with a mechanical bead dispenser that will operate simultaneously with the spray nozzle and distribute the beads in a uniform pattern at the rate specified. Each nozzle shall also be provided with suitable line guides, either metallic shrouds or air blasts.
- D. Misalignment, defective surfaces, etc., shall be corrected by sand blasting or by any other type of mechanical device which, in the opinion of the Engineer, will effectively remove the paint without damage to the pavement surface.

PART 3 - EXECUTION

3.01 ALIGNMENT FOR STRIPES

- A. Tack points will be established at appropriate intervals for use in aligning stripes, and if found to be necessary to achieve accuracy a stringline will be set from such points.
- B. Tolerances:
 - 1. Dimensions
 - a. Longitudinal Lines: No stripe shall be less than the specified width. No stripe shall exceed the specified width by more than ½ inch.
 - b. Transverse markings, gore markings, arrows, and messages: When the specified width of the markings cannot be made with a single pass and multiple passes are required, the width of the line may be plus or minus one inch.
 - 2. Alignment: On tangents, and on curves up to one degree, the alignment of the painted stripe shall not deviate from the stringline by more than one inch. On curves exceeding one degree the maximum permissible deviation will be two inches. In addition, the outer edges of the edge stripe shall fall uniformly at not less than two nor more than four inches from the edge of the pavement, and shall have no noticeable breaks or deviations in alignment or width.
 - 3. Correction Rates: Any corrections or variations in the width or in the alignment of the stripes shall not be made abruptly but the stripes shall be returned to the design width at the rate of at least ten feet for each ½ inch of correction, and returned to the stringline at the rate of at least 25 lineal feet per inch of correction.
- C. Application of Paint and Spheres: Painting shall be done only during daylight hours and, as far as practicable, shall be terminated in time to permit sufficient drying by sunset.

Placing of permanent pavement markings on newly constructed Friction Course shall not be accomplished prior to 30 calendar days after placement of the friction course unless authorized by the

Owner. Temporary pavement striping will be required during the interim period if the road is open to traffic.

- D. No paint shall be applied when any moisture is present on the surface to be painted or when the air temperature is below 40° F. Painting shall not be done when winds are sufficient to cause spray dust.
- E. The surface which is to be painted shall be cleaned by compressed air or other effective means, immediately before the start of painting, and shall be clean and dry when the paint is applied. Any vegetation or loose solid shall be removed from the pavement before edge striping is done.
- F. The paint shall be thoroughly mixed before it is poured into the painting machine and no thinning of the paint in the machine will be allowed at any time. Before the start of each day's work the paint container, the connections, and the spray nozzles on machine shall be thoroughly cleaned with paint thinner or other suitable cleaner.
- G. The traffic stripe shall be of the specified width, with clean, true edges and without sharp breaks in the alignment. A uniform coating of paint shall be obtained and the finished stripe shall contain no light spots or paint skips. Any stripes which do not have a uniform satisfactory appearance, both day and night, shall be corrected.
- H. The minimum rate of application for paint shall be as follows: Six-inch solid traffic stripes: 16.5 gallons per mile, Six-inch skip traffic stripe: 4.12 gallons per gross mile.
- I. The minimum wet film thickness for all painted areas shall be 15 mils.
- J. Where a stripe deviates from the correct alignment, as indicated by the stringline, by more than one inch in any 50-foot length, it shall be obliterated and the stripe, corrected as specified in 710-3.4.

3.02 PROTECTION

- A. All newly painted stripes, including edge stripes, shall be protected until the paint is sufficiently dry to permit vehicles to cross the stripe without damage from the tires. While the center line stripes are being painted all traffic shall be routed to the right side of the painting operations and the newly painted stripe. When necessary, a pilot car shall be used to protect the painting operations from the traffic interference.
- B. Warning signs shall be set up before the beginning of each operation and extra signs shall be kept well ahead of the painting equipment. The painting equipment shall be so operated that traffic may pass on the right side safely. Warning signs are to be placed only where operations are in progress and are to be relocated as often as is necessary.
- C. The contractor shall erect adequate warning signs, provide sufficient number of flagman, and take all necessary precautions for the protection of the wet paint and the safety of the public. Cones, rubber "Z" guards or similar protective devices shall be placed along or similar protective devices shall be placed along the newly painted stripe to prevent traffic from crossing the wet paint. Any such devices used shall be of a type that will not cause damage to vehicular traffic in the event that these objects are accidentally passed over. All protective devices shall be removed not later than sunset to allow free movement of traffic at night.

If the Contractor elects to use fast dry traffic paint no protective devices will be required provided that the Contractor utilizes a trailing vehicle (behind striping machine) equipped with warning sign and flashing beacon and that he operates such vehicle in a manner consistent with the paint drying time.

- D. Any portion of the stripes damaged by passing traffic or from any other cause shall be repainted at the Contractor's expense.

3.03 CORRECTIVE MEASURE

- A. All painted stripes which fail to meet the specifications including the permissible tolerances and the appearance requirements, or are marred or damaged by traffic or from other causes, shall be corrected at the Contractor's expense. All drip and spattered paint shall be removed to the satisfaction of the Engineer. Whenever it is necessary to remove paint it shall be done by means, as approved by the Engineer, which will not damage the underlying surface of the pavement. When necessary to correct a deviation which exceeds the permissible tolerance in alignment, that portion of the stripe affected shall be removed and repainted in accordance with these specifications.

3.04 ACCEPTANCE OF THE WORK

- A. When the work under this Section has been completed to the satisfaction of the Engineer, including any corrections or repairs ordered by the Engineer, acceptance of the work of painting will be made, independently of the remaining work under the Contract, and the Contractor will be relieved of all maintenance of the painting except for damage due to his operations.

END OF SECTION

SECTION 33 01 00 - TRENCHING, BEDDING, AND BACKFILL FOR PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall furnish all labor, equipment, and incidentals necessary to perform all excavation, backfill, fill, grading and slope protection required to complete the sewer piping and utility work shown on the Drawings and specified herein. The work shall include, but not necessarily be limited to: sewer structures, duct work, conduit, pipe, paving, backfilling, fill, grading, disposal of surplus and unsuitable materials, and all related work such as sheeting, and bracing.

1.02 RELATED WORK

- A. Section 31 41 00: Shoring and Bracing of Excavations
- B. Section: 33 40 00: Storm Drainage Systems
- C. Section 33 30 00: Sanitary Sewers

1.03 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of Owner.

1.04 JOB CONDITIONS

- A. The Contractor shall examine the site and undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work. The Owner and Engineer will not assume responsibility for variations of sub-soil quality or conditions.
- B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Engineer and the owner of such piping or utility immediately for directions.
 - 2. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

1.05 SUBMITTALS

- A. For each material obtained from other than on-site sources, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample

weighing approximately 50-pounds, at least 10-calendar days prior to the date of anticipated use of such material.

1.06 TRENCH PROTECTION

- A. Contractor shall construct and maintain sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction; and to protect adjacent structures, existing piping and/or foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, and if voids are formed, they shall be immediately filled and rammed.
- B. For pipe trench sheeting, no sheeting is to be withdrawn if driven below mid-diameter of any pipe, and no wood sheeting shall be cut off at a level lower than 1 foot above the top of any pipe unless otherwise directed by the Engineer. If during the progress of the work the Engineer decides that additional wood sheeting should be left in place, he may direct the Contractor in writing. If steel sheeting is used for trench sheeting, removal shall be as specified above unless written approval is given by the Engineer for an alternate method of removal.
- C. All sheeting and bracing not specified to be left in place shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering, or otherwise as may be directed.
- D. The right of the Engineer to order sheeting and bracing to be left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property, occurring from or upon the work, occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Materials for use as base, fill and backfill shall be as described below:
 - a. Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M-145, soil classification Groups A-1, A-2-4, A-2-5, and A-3.
 - b. Unsatisfactory soil materials are those defined in ASSHTO M-145 soil classification Groups A-2-6, A-2-7, A-6, and A-7 along with peat and other highly organic soils.
- B. Structural Fill: Structural fill material shall be satisfactory soil material consisting of a minimum of 60-percent clean medium to fine grain sized quartz sand, free of organic, deleterious and/or compressible material. Rock in excess of 2-1/2- inches in diameter shall not be used in the fill material. Structural fill shall not contain hardpan, stones, rocks, cobbles or other similar materials.
- C. Common Fill:

1. Common fill material shall be satisfactory soil material containing no more than 20-percent by weight finer than No. 200-mesh sieve. The material shall be free from organic matter, much, marl, and rock exceeding 2-1/2- inches in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar materials.
 2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpile(s) for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.
- D. Rock bedding shall be 3/8-inch to 3/4-inch washed and graded limerock. This rock shall be graded so that 99 percent will pass a 3/4-inch screen and 80 percent will be retained on a No. 8 screen.

PART 3 - EXECUTION

3.01 GENERAL

- A. All excavation, backfill and grading necessary to complete the Work shall be made by the Contractor and the cost thereof shall be included in the contract price.
- B. Material may be obtained on-site with the approval of the Owner, or shall be furnished as required from off site sources and hauled to the site.
- C. The Contractor shall take all the necessary precautions to maintain the work area in a safe and workable condition.
- D. The Contractor shall protect his work at all times by flagging, marking, lighting and barricading. It shall also be the Contractor's responsibility to preserve and protect all above and underground structures, pipe lines, conduits, cables, drains or utilities which are existing at the time he encounters them. Failure of the Drawings to show the existence of these obstructions shall not relieve the Contractor from this responsibility. The cost of repair of any damage which occurs to these obstructions during or as a result of construction shall be borne by the Contractor without additional cost to the Owner.

3.02 TRENCH EXCAVATION

- A. Excavation for all trenches required for the installation of pipes and electrical ducts shall be made to the depths indicated on the Drawings. Excavate trench to provide a minimum of 36-inch clear cover over the pipe bell unless otherwise noted on the Drawings, and to sufficient depth to provide the bedding depth indicated on the Drawings. Excavate in such manner and to such widths as will give suitable room for laying the pipe. The trench width at the top of the pipe shall not exceed the allowable as determined by the depth of cut and these specifications.
- B. Rock shall be removed to provide a minimum clearance of 8-inches around the bottom and sides of all the pipe or ducts being laid.
- C. Where pipe or ducts are to specified be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade, provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

- D. Where the pipes or ducts are specified to be laid directly on the trench bottom, the lower parts of the trenches shall not be excavated to the trench bottom by machinery. The last of the material being excavated shall be done manually in such a manner that will give a flat bottom true to grade so that pipe or duct can be evenly and uniformly supported along its entire length on undisturbed material or bedding rock. Bell holes shall be made as required manually so that there is no bearing surface on the bells and pipes are supported along the barrel only.

3.03 DEWATERING

- A. Prevent surface water and subsurface or groundwater from flowing into excavations, and from flooding project site and surrounding area.
 - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting structure bases, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 - 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey stormwater runoff and water removed from excavations into collection areas or to direct stormwater runoff in the historical flow direction. Do not use trench excavations as temporary drainage ditches. Maintain proper erosion and sedimentation control measures to avoid siltation of existing stormwater management systems.

3.04 PIPE INTERFERENCE AND ENCASEMENT

- A. The Contractor shall abide by the following schedule of criteria concerning interference with other facilities.
 - 1. In no case shall there be less than 18-inches of vertical separation between any two pipe lines, or 4-inches of separation between pipe lines and structures.
 - 2. Where the above conditions cannot be met, or unless otherwise specified on the Drawings, the Contractor shall consult with the Engineer.
- B. The Engineer shall have full authority to direct the placement of the various pipes and structures in order to facilitate construction, expedite completion and to avoid conflicts.

3.05 BACKFILLING

- A. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed, and inspected, and the trench filled with suitable compacted material to the mid-diameter of the pipe.
- B. All backfilling shall be performed expeditiously and as detailed on the Drawings.
- C. Any space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth, free from stones having a diameter greater than 2-inches and thoroughly compacted with a tamper as fast as fill is placed, up to a level of one foot above the top of the pipe. Compact to 100-percent of maximum dry density as determined by AASHTO T-99 in layers not to exceed 6-inches in depth up to the centerline of the pipe from the trench bottom and in layers not to exceed 6-inches from the pipe centerline to 12-inches above the pipe.

- D. The backfill shall be carried up evenly on both sides with at least one person tamping for each person shoveling material into the trench.
- E. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted with common fill by rolling, ramming, or puddling, as the Engineer may direct. Where pavement is to be constructed over the pipe, compact common fill in 6-inch layers to 98-percent of maximum dry density as determined by AASHTO T-180. Where no pavement is to be constructed over the pipe, compact common fill in 6-inch layers to 95-percent of maximum dry density as determined by AASHTO T-180.
- F. The bedding rock shall consist of at least 6-inches of washed and graded limerock placed in the trench to the proposed elevation of the centerline of the pipe prior to laying the piping. The bedding shall not be used under any circumstances as a drain for groundwater. The Contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.
- G. In location where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the backfill up to an elevation of at least 1-foot above the bottom of the pipes:
 - 1. Place structural fill in such areas for a distance of not less than 3-feet on either side of the center line of the pipe in level layers not exceeding 6-inches in depth.
 - 2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.

3.06 GRADING

- A. Grading shall be performed at such places as are indicated on the Drawings, to the lines, grades, and elevations shown or as directed by the Engineer and shall be made in such a manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water, which may affect the performance or condition of the work.
- B. If at the time of excavation it is not possible to place all available material in its proper section of the permanent structure, the excess material shall be stockpiled in approved areas for later use. Stockpiling or double handling of excavation material shall not bear any additional cost to the Owner.
- C. The Owner, through his Engineer, reserves the right to make adjustments or revisions in lines or grades, if found necessary as the Work progresses, due to discrepancies on the Drawings, adverse field conditions, or in order to obtain satisfactory construction.
- D. Stones or rock fragments larger than 2-1/2-inches in their greatest dimensions will not be permitted in the top 6-inches below the subgrade line of all dikes, fills or embankments.
- E. All fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings, or as directed by the Engineer.
- F. In cuts, all loose or protruding rocks on the side slopes shall be barred loose or otherwise removed to

line or finished grade of slope. All cut slopes shall be uniformly graded to the slope, cross-section and alignment shown on the Drawings or as directed by the Engineers.

- G. No grading is to be done in areas where existing pipe lines that may be uncovered or damaged until such lines which must be maintained are projected or relocated; or, where lines are to be abandoned, all required valves are closed and drains plugged at manholes.
- H. The Contractor shall replace all pavement cut or otherwise damaged during the progress of the Work as specified elsewhere herein.

3.07 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

- A. All surplus and unsuitable excavated material shall be disposed of in one of the following ways as directed by the Engineer.
 - 1. Transport to designated soil storage area on Owner's property and stockpile or spread as directed by the Engineer.
 - 2. Transport from Owner's property and legally dispose of off-site. Any permit required for the hauling and disposing of this material beyond Owner's property shall be obtained prior to commencing hauling operations.
- B. Suitable excavated material may be used for fill if it meets the specifications for common fill and is approved by the Engineer. Excavated material so approved may be neatly stockpiled at the site where designated by the Owner/Engineer provided there is an area available where it will not interfere with the operation of the facility nor inconvenience traffic or adjoining property owners.

END OF SECTION

SECTION 33 40 00 - STORM DRAINAGE SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The work covered and described in this Section includes the furnishing and construction of culverts, storm sewers, inlets and other drainage structures as shown on the Drawings and specified herein.

1.02 RELATED WORK

- A. Section 33 01 00: Trenching Bedding & Backfill for Pipe.
- B. Section(s) of the Contract related to Metal Fabrications
- C. Section(s) of the Contract related to Precast Concrete Specialties
- D. Section 33 41 00: Reinforced Concrete Pipe

1.03 SUBMITTALS

- A. Shop Drawings: Shop drawings for the following items shall be submitted for Engineer's approval.
 - 1. Grates and Castings
 - 2. Precast structures
- B. Pipe certification of quality by producer shall be delivered to Engineer ten days prior to installation.

1.04 JOB CONDITIONS

- A. Existing Drainage System: Maintain operational, prevent siltation with the method as approved and as directed by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. A-2000 PVC Pipe: Polyvinyl Chloride (PVC) storm sewer/drain pipe and fittings shall be manufactured by Contech Construction Products, Inc. or approved equal and tested in accordance with ASTM F949. The structural design of thermoplastic pipes shall be in accordance with AASHTO Section 12 titled: "BURIED Structures and Tunnel Liners." To ensure long-term design strength properties, PVC pipe shall be manufactured from 12454 cell class material per ASTM D1784. Pipe and fittings shall have a minimum pipe stiffness of 46 lbs./in./in. when tested in accordance with ASTM D2412.
- B. Concrete Pipe: Concrete pipe shall be reinforced concrete culvert pipe conforming to ASTM Designation C 76, Class III, Wall B, except when otherwise indicated. Pipe joints shall be rubber gasket joints, and the pipe joint shall be manufactured to meet the requirements of the approved type of gasket to be used. Pipe joints and rubber gaskets shall conform to the requirements of Section 941

and 942 of the FDOT Standard Specifications.

- C. Corrugated aluminum pipe (C.A.P.) shall be helical type, conforming to ASTM B209 and AASHTO M196, as manufactured by Kaiser Aluminum, Inc., or approved equal. The corrugation pattern and gauge shall be as follows:

<u>DIA.</u>	<u>CORRUGATION</u>	<u>GAUGE</u>
12" TO 21"	2-2/3" X 1/2"	16
24" TO 27"	2-2/3" X 1/2"	16
30"	2-2/3" X 1-1/2"	14
36" TO 54"	3" X 1"	14
60" TO 78"	3" X 1"	12

Pipe couplings for C.A.P. shall be 12" wide (minimum), 24" for 60" diameter or larger, split bands of the same alloy as the pipe may be one gauge lighter than the pipe. Polyurethane or other manufacturer supplied sealant shall be used with the couplings.

- D. French Drain Pipe: Pipe for the French drains shall be one of the following types, unless otherwise specified on the drawings, that conform to the respective specification, except perforations and joints shall be as shown on the Drawings.
1. Concrete Pipe - ASTM Designation C14
 2. Perforated Concrete Pipe - AASHTO Designation MI 75
 3. Perforated and Nonperforated Clay Pipe - ASTM Designation C700, Standard Strength
 4. Bituminous Coated Corrugated Metal Pipe (Perforated) - AASHTO Designations Type III and MI 90, Type A.
 5. Corrugated Aluminum Perforated Pipe - AASHTO Designation MI 97.
 6. HDPE
 7. A2000 PVC
- E. Brick: Brick for drainage structures shall be dense, hard burned, shale or clay brick conforming to ASTM Designation C32, Grade MM or C 62, Grade MW, except that brick absorption shall be between five and twenty-five grams of water absorbed in one minute by dried brick, set flat face down, in 1/8-inch of water.
- F. Cement Mortar: Cement mortar for manhole construction shall be one part cement and two parts clean sharp sand to which may be added lime in the amount of not over twenty-five percent volume of cement. It shall be mixed dry and then wetted to proper consistency for use. No mortars that have stood for more than one hour shall be used.
- G. Concrete: Concrete shall conform to the requirements of Division 3 for Cast-in-Place Concrete.
- H. Precast Concrete Units: Precast concrete inlets shall conform to applicable requirements of Division 3.
- I. Castings: Castings for inlets and other items shall conform to the ASTM Designation A 48, Class 25. Castings shall be true to pattern in form and dimensions and free of pouring faults and other defects in positions which would impair their strength or otherwise make them unfit for the service intended. No plugging or filling will be allowed. Catch basin gratings shall be as specified on the drawings.

- J. The trench liner shall be Mirafi 700X filter fabric or approved equal.
- K. Ballast rock for French drains shall be limerock free from deleterious matter and 3/4-inch to 1 1/2-inches in size with not more than 10% passing the 1/2-inch sieve.
- L. Pea rock shall be graded so that 100% passes the 1-inch sieve and not more than 5% passes the 1/4-inch sieve.
- M. Roofing felt shall be 30 pound felt.
- N. Drainage Well Casing Pipe: Casing pipe shall be plain, standard weight, 3/8-inch minimum thickness, new black steel pipe conforming to ASTM A 53.

PART 3 EXECUTION

3.01 PREPARATION

- A. Pipe Trenches:
 - 1. Pipe trenches shall be of necessary widths for the proper laying of the pipe and the banks shall be as nearly vertical as practicable. In paved areas, the trench shall be vertical and sheeted, if required; the clearance between the pipe and trench wall or back of sheeting shall not exceed 18 inches. The bottom of the trenches shall be excavated to a depth of the outside bottom of the pipe barrel. Any over excavation shall be replaced with suitable compacted material. Excavation for inlets and other appurtenances shall be sufficient to provide a clearance between their outer vertical surfaces and the face of the excavation or sheeting, if used, of not less than 12- inches.
 - 2. Soft, spongy, or otherwise unsuitable material encountered below the established grade of the excavation which will not provide a firm foundation for subsequent work shall be removed and replaced as directed. Unless otherwise directed, all such unstable materials shall be removed for the full width of the excavation and replaced with approved fill material.
 - 3. Where sheeting and bracing are necessary to prevent caving of the trench sidewalls or sidewalls of excavation for other structures, and to safeguard the workmen, the trench or excavation for other structures shall be dug to such width that the proper allowance is made for the space occupied by the sheeting and bracing to provide clearance as specified above.

3.02 INSTALLATION

- A. Laying Concrete Pipe and A2000 PVC Pipe:
 - 1. All pipe shall be placed on a minimum of 4" stable granular material free of rock formation and other foreign formations, all pipe shall be carefully laid true to the line and grade shown on the Drawings. Any deviation from true alignment or grade which would result in a displacement from the normal position of the gasket of as much as 1/4-inch, or which would produce a gap exceeding 1/2-inch between sections of pipe for more than 1/3 of the circumference of the inside of the pipe, will not be acceptable and where such occurs, the pipe shall be relaid without additional compensation. No mortar, joint compound, or other filler which would tend to restrict the flexibility of the gasket joint shall be applied to the gap. Pipes having defects that have not caused their rejection are to be so laid that these defects

- will be in the upper half of the sewer.
2. Before installation of the pipe gasket and the surface of the pipe joint, including the gasket recess shall be clean and free from grit, dirt, or other foreign matter at the time the joints are made. In order to facilitate closure of the joint, application of an approved vegetable soap lubricant immediately prior to closing of the joint will be permitted.
 3. All pipes shall be laid with bells or grooves uphill. As the pipes are laid throughout the work, they must be thoroughly cleaned and protected from dirt and water. No length of pipe shall be laid until the two preceding lengths have been thoroughly embedded in place so as to prevent any movement or disturbance of the finished joint. No walking on or working over the pipes after they are laid, except as may be necessary in tamping earth and refilling, will be permitted until they are covered to a depth of one-foot. No pipe shall be laid except in the presence of an authorized inspector. Fill placed around the pipe shall be deposited on both sides simultaneously to approximately the same elevation and uniformly compacted. Whenever the pipe laying is discontinued, as at night, the unfinished end is to be securely protected from displacement due to caving of the banks or from other injury and a suitable stopper is to be inserted therein.
 4. A2000 Pipe Jointing System: Joints shall be an integral bell-gasketed joint. When the joint is assembled, it shall prevent misalignment of adjacent pipes and form either a soil tight joint (2 psi hydrostatic test per AASHTO Standard Specification for Highway Bridges, Section 26.4.2.4) or a watertight joint (10.8 psi test per ASTM D3212 TITLED: "Standard Specification for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals") as required. The PVC Pipe shall provide a Manning's "n" value of .009. Thermoplastic pipe and fittings shall be installed in strict accordance with ASTM D2321 or AASHTO Section 30.
- B. Laying Corrugated Pipe:
1. All corrugated pipe shall be carefully laid, true to the line and grade shown on the Drawings. Where a coupling is required, the pipe gasket and coupling band shall be centered over the joint with the coupling band bolts securely tightened without cutting the gasket.
 2. Fill placed around the pipe shall be deposited on both side simultaneously to approximately the same elevation and uniformly compacted. Whenever the pipe laying is discontinued, as at night, the unfinished end is to be securely protected from displacement due to caving of the banks or from other injury and a suitable stopper is to be inserted therein.
- C. French Drain Trenches:
1. French drain trenches shall be excavated to the lines and grade shown on the Drawings and backfilled with ballast rock to the bottom of the proposed pipe. The pipe shall be laid with open joints as shown on the Drawings. The remaining ballast rock shall be placed, and the line and grade of the pipe shall be maintained. Pea rock and 30 pound per square felt paper shall be placed over ballast rock as shown on the Drawings. The remaining trench shall be backfilled with suitable material and backfill material 12-inches and above the felt paper shall be compacted to not less than 98 percent of the maximum density as determined by AASHTO Designation T 180.
- D. Drainage Structures:
1. Concrete inlets or other structures shall be constructed in conformity with the Plan Details. Forms shall be designed and constructed so that they may be removed without injury to the concrete and shall be left in place for at least 24 hours after concrete is poured. Concrete shall

be thoroughly tamped and shall be cured for at least five days after removal of forms. Honeycomb places shall be thoroughly cleaned, saturated with water and pointed up with mortar.

2. Precast inlets or other structures may be used in lieu of cast-in-place structures. Grates are to be set in place in mortar to the proper line and grade.

E. Backfilling for Pipe Culverts and Drainage Structures:

1. After the pipe has been installed, approved selected material from excavation at a moisture content which will facilitate compaction shall be placed along side the pipe in layers not exceeding 6-inches loose measure in depth. Care shall be taken to insure thorough compaction of the fill under the haunches of the pipe. Each layer shall thoroughly compacted by rolling or tamping with mechanical rammers. This method of filling and compacting shall be continued until the fill is 12-inches above the pipe, then the remainder of the backfill shall be placed in lifts not exceeding 12-inches. The operation of heavy equipment shall be conducted so that no damage to the pipe will result. Backfill material 12-inches and above the top of the pipe shall be compacted to not less than 98 percent of maximum density as determined by AASHTO Designation T 180. Selected material for backfill shall not contain any stones or rock larger than 2 1/2-inches. Tests for density of compaction shall be made at the places designated by the Engineer, and deficiencies shall be corrected by the Contractor without additional cost to the Department.

END OF SECTION