c. Provide periodic inspection of traffic areas to enforce requirements.

C. Schedule periodic collections and disposal of debris as specified in Section 01710 - Cleaning.

a. Provide additional collections and disposal of debris whenever the periodic schedule is to prevent accumulation.

1.9 POLLUTION CONTROL

A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.

B. Provide equipment and personnel, perform emergency measures required to contain any spillage, and to remove contaminated soils or liquids.

a. Excavate and dispose of any contaminated earth off-site and replace with suitable compacted fill and topsoil.

C. Take special measures to prevent harmful substances from entering public waters.

a. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams or in sanitary or storm sewers.

D. Provide systems for control of atmospheric pollutants.

a. Prevent toxic concentrations of chemicals.

b. Prevent harmful dispersal of pollutants into the atmosphere.

1.10 EROSION CONTROL

A. Plan and execute construction and earthwork, by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas to prevent erosion and sedimentation.

a. Hold the areas of bare soil exposed at one time to a minimum

b. Provide temporary control measures such as berms, dikes and drains.

c. Provide silt screens as required preventing surface water contamination.

B. Construct fills and waste areas by selective placement to eliminate surface silts or clays, which will erode.

C. Periodically inspect earthwork to detect any evidence of the start of erosion, apply corrective measures as required to control erosion.

D. All erosion control procedures must comply with the National Pollutant

Discharge Elimination System (NPDES).

**PART 2 PRODUCTS (Not Applicable)**

**PART 3 EXECUTION**

3.1 MEASUREMENT AND PAYMENT

A. There shall be no special measurement or payment for the work under this section; it shall be included in the price of all other work.

**END OF SECTION**

# SECTION 01570 – TRAFFIC REGULATIONS

## PART 1 GENERAL

### 1.1 REQUIREMENTS INCLUDED

A. Provide, operate and maintain equipment, services and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow to provide safe and expeditious movement of traffic through and on haul routes, at site entrances, in construction zones, on-site access roads, and parking areas including driving and/or walking public.

B. Remove temporary equipment and facilities when no longer required, restore grounds to original, or specified conditions.

C. The requirements specified herein are in addition to the plan for Maintenance of Traffic as specified in Section 01500.

### 1.2 RELATED REQUIREMENTS

A. All applicable sections of the Specifications.

B. Conditions of the Contract.

### 1.3 TRAFFIC SIGNALS AND SIGNS

A. Provide and operate traffic control and directional signals or signs required to direct and maintain an orderly flow of traffic in all areas under CONTRACTOR's control, or affected by CONTRACTOR's operations.

### 1.4 FLAGPERSON

A. Provide qualified and suitably equipped flag-person when construction operations encroach on traffic lanes, as required for regulation of traffic.

### 1.5 FLARES AND LIGHTS

A. Provide flares and lights during periods of low visibility:

a. To clearly delineate traffic lanes and to guide traffic.

b. For use of flag-person in directing traffic.

B. Provide illumination of critical traffic and parking areas.

a. Maintain free vehicular access to and through parking areas.

b. Prohibit parking on or adjacent to access roads, or in non-designated areas.

### 1.6 HAUL ROUTES

A. Consult with OWNER and governing authorities, establish public thoroughfares which will be used as haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to expedite traffic flow, to minimize interference with normal public traffic.

1.7 EMERGENCY ACCESS

A. In order to provide protection to the workers and residents, the Contractor shall maintain emergency access to all adjacent properties at all times during construction. If a road is required to be closed to vehicular traffic and the distance of the closure exceeds 150 feet between stabilized surfaces or prevents access to properties for a distance that exceeds 150 feet, the Contractor shall provide a 10 foot wide stabilized access way on one side of the trench capable of supporting a Fire Truck. Contractor shall also provide stabilized access ways across the trench or un-stabilized area a minimum of 6 feet in width at a spacing not to exceed 100 feet capable of supporting foot traffic. These access ways shall be protected and delineated with lighted barricades or other such devices as approved by the regulatory agency. Both ends of the emergency access way shall be blocked in accordance with the MOT permit approved by the City of Fort Lauderdale and FDOT with signage indicating that this access way is to be used by emergency vehicles only.

No trenches or holes shall be left open after working hours. In the event a trench must be left open after hours, it shall be done so only with the express written permission from the Engineer, and it shall be the Contractor's responsibility to provide proper protection of the open trench or hole as required by the regulatory agency. In addition the Contractor shall provide a security guard at the site whenever the Contractor's personnel are not present, 24 hours per day/ 7 days per week. It shall be the Security Guard's responsibility to protect the open trench or hole from trespassers and to direct emergency personnel on site. The Security Guard shall not have any other responsibilities such as operation pumps or equipment but shall be dedicated to protecting the trench or open hole. The Security Guard shall be equipped with a wireless telephone capable of calling 911 to report an emergency and shall keep that telephone on their person at all times. In addition to this provision the contractor shall maintain trench safety and comply with current OSHA regulations and the Trench Safety Act. The contractor shall maintain and keep all safety barricades, signage, flashers, and detours, in operation condition. A copy of the approved MOT plans, and details, shall be on site at all times.

B. Measurement and payment for security guard services shall be included in the utility pipe installation unit price. Measurement for temporary emergency access ways will be paid for under the specified line item at the unit price described in the bid schedule.

**PART 2 PRODUCTS (Not Applicable)**

**PART 3 EXECUTION**

3.1 MEASUREMENT AND PAYMENT

A. There shall be no special measurement and payment for work under the section; it shall be included in the lump sum price bid for Maintenance of Traffic.

**END OF SECTION**

# SECTION 01590 – PROJECT SIGN

## PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Contractor shall furnish a **4' x 8'** sign, **below is a sample, not specific to the project**.

B. **Sign shall be made to be weather resistant and on display for entire length of contract.**

C. **Shop drawings must be submitted prior to sign construction.**

D. **The exact style and design of the sign will be provided during the preconstruction meeting.**


B. See Page 2, "Construction Sign Request Form", for information on the sign for this Project.

**END OF SECTION**

# Construction Sign Request Form P11870D

Title (Bold):

Title (Not Bold):

What's Happening?

Benefits:

Number of Neighbors Benefitted:

Cost:

Month and Year of Expected Completion:

Contractor:

Phone: 954-828-8000

We're Working On:

Project Manager Signature Date

| | |
|---|---|
| | |
| Senior Project Manager Signature | Date |
| | |

# SECTION 01600 – MATERIAL AND EQUIPMENT

## PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Material and equipment incorporated into the work:

a. Conform to applicable specifications and standards.

b. Comply with size, make, type and quality specified, or as specifically approved in writing by the OWNER's Representative.

c. Manufactured and fabricated products:

i. Design, fabricate and assemble in accord with the best engineering and shop practices.

ii. Manufacture like parts of duplicate units to standard sizes and gauges to be interchangeable.

iii. Two or more items of the same kind shall be identical, by the same manufacturer.

iv. Products shall be suitable for service conditions.

v. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

d. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.2 RELATED REQUIREMENTS

A. All applicable sections of the Specifications.

B. Conditions of the Contract.

1.3 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to OWNER's Representative. Maintain one set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements.

a. Should job conditions or specified requirements conflict with manufacturer's

instructions, consult with OWNER's Representative for further instructions.

b. Do not proceed with work without clear instructions.

C. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.4 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site. Products shall be delivered to the job site on an "as needed" basis.

a. Deliver products in undamaged condition, in manufacturers' original containers or packaging, with identifying labels intact with legible markings.

b. Immediately upon delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

c. Pipe and materials shall not be strung out along installation routes for longer than two (2) weeks prior to installation.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

C. Coordinate deliveries to avoid conflict with Work and conditions at site:

a. Work of other contractors, or OWNER.

b. Limitations of storage space.

c. Availability of equipment and personnel for handling products.

d. OWNER's use of premises.

D. Deliver products in undamaged condition in original containers or packaging, with identifying labels intact and legible.

E. Partial deliveries of component parts of equipment shall be clearly marked to identify the equipment, to permit easy accumulation of parts and to facilitate assembly.

F. Immediately on delivery, inspect shipment to assure:

a. Product complies with requirements of Contract Documents and reviewed submittals.

b. Quantities are correct.

c. Containers and packages are intact, labels are legible.

d. Products are properly protected and undamaged.

G. Provide equipment and personnel necessary to handle products, including those provided by OWNER, by methods to prevent soiling or damage to products or packaging.

H. Provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.

I. Handle products by methods to prevent bending or overstressing.

J. Lift heavy components only at designated lifting points.

1.5 STORAGE

A. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.

a. Store products subject to damage by the elements in weather-tight enclosures.

b. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

c. Store unpacked products on shelves, in bins or in neat piles, accessible for inspection.

B. Exterior Storage

a. Provide substantial platforms, blocking or skids to support fabricating products above ground, prevent soiling or staining.

i. Cover products, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.

b. Store loose granular materials on solid surface such as paved areas, or provide plywood or sheet materials to prevent mixing with foreign matter.

i. Provide surface drainage to prevent flow or ponding of rainwater.

ii. Prevent mixing of refuse or chemically injurious materials or liquids.

1.6 MAINTENANCE OF STORAGE

A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:

a. State of storage facilities is adequate to provide required conditions.

b. Required environmental conditions are maintained on continuing basis.

c. Surfaces of products exposed to elements are not adversely affected.

i. Any weathering of products, coatings and finishes is not acceptable under requirements of Contract Documents.

B. Mechanical and electrical equipment which requires servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package.

1.7 PROTECTION AFTER INSTALLATION

A. Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, prior to completion of work.

B. Control traffic to prevent damage to equipment and surfaces.

C. Provide coverings to protect finished surfaces from damage.

a. Cover projections, wall corners, and jambs, sills and soffits of openings, in areas used for traffic and for passage of products in subsequent work.

b. Protect finished floors and stairs from dirt and damage.

i. In areas subject to foot traffic, secure heavy paper, sheet goods, or other materials in place.

ii. For movement of heavy products, lay planking or similar materials in place.

iii. Cover wall and floor surfaces in the vicinity of construction personnel activities and all finished surfaces used by construction personnel.

D. Waterproofed surfaces

a. Prohibit use of surfaces for traffic of any kind, and for storage of any products.

b. When some activity must take place in order to carry out the Contract, obtain recommendations of installer for protection of surface.

i. Install recommended protection; remove on completion of that activity.

ii. Restrict use of adjacent unprotected areas.

E. Lawns and landscaping

a. Prohibit traffic of any kind across planted lawn and landscaped areas.

F. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

1.8 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Limitations on substitutions.

a. During bidding period, Instructions to Bidders govern times for submitting requests for substitutions under requirements specified in this section.

b. Substitutions will not be considered when indicated on shop drawings or product data submittals without separate formal request, when requested directly by Subcontractor or supplier, or when acceptance will require substantial revision of Contract Documents.

c. Substitute products shall not be ordered or installed without written acceptance.

d. Only one (1) request for substitution for each product will be considered. When substitution is not accepted, provide specified product.

B. Products List

a. Within 15 days after Contract Date submit to ENGINEER a complete list of major products proposed to be used, with the name of the manufacturer and the installing Subcontractor.

C. Contractors Options

a. For products specified only by reference standard, select any product meeting that standard.

b. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named or approved equal, which complies with the Specifications.

c. For products specified by naming one or more products or manufacturers and "or approved equal," CONTRACTOR must submit a request as for substitutions for any product or manufacturer not specifically named.

D. Substitutions

a. For a period of 15 days after Contract Date, ENGINEER will consider written request from CONTRACTOR for substitution of products.

b. Identify product by specification Section and Article Numbers. Provide manufacturer's name and address, trade name of product, and model of catalog number. List fabricators and suppliers as appropriate.

c. List similar projects using product, dates of installation, and names of ENGINEER and OWNER.

d. List availability of maintenance services and replacement materials.

e. Submit a separate request for each product, supported with complete data, with drawings and samples as appropriate, including:

i. Comparison of the qualities and performance of the proposed substitution with that specified.

ii. Changes required in other elements of the work because of the substitution.

iii. Effect on the construction schedule.

iv. Cost data comparing the proposed substitution with the product specified.

v. Any required license fees or royalties.

vi. Availability of maintenance services, and source of replacement materials.

f. The burden of proof as to the type, function, and quality of any such substitute material or equipment shall be upon the CONTRACTOR.

g. The ENGINEER will be the sole judge as to the type, function, and quality of any such substitute material or equipment and the ENGINEER's decision shall be final.

h. The ENGINEER may require the CONTRACTOR to furnish at the CONTRACTOR's expense additional data about the proposed substitute.

i. The OWNER may require the CONTRACTOR to furnish at the CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.

j. Acceptance by the ENGINEER of a substitute item proposed by the CONTRACTOR shall not relieve the CONTRACTOR of the responsibility for full compliance with the Contract Documents and for adequacy of the substitute item.

k. The CONTRACTOR shall be responsible for resultant changes and all additional costs which the accepted substitution requires in the CONTRACTOR work, the work of its Subcontractors and of other Contractors, and shall effect such changes without cost to the OWNER.

E. Contractors Representation:

a. A request for a substitution constitutes a representation that

CONTRACTOR:

i. Has investigated the proposed product and determined that it is equal to or superior in all respects to that specified.

ii. Will provide the same guarantees or bonds for the substitution as for the product specified.

iii. Will coordinate the installation of an accepted substitution into the work, and make such other changes as may be required to make the work complete in all respects.

iv. Waives all claims for additional costs, under CONTRACTOR'S responsibility, which may subsequently become apparent.

F. Submittal Procedures

a. Submit three (3) copies of request for substitution.

b. ENGINEER will review requests for substitutions with reasonable promptness, and notify CONTRACTOR, in writing, of the decision to accept or reject the requested substitution.

c. During the bidding period, ENGINEER will record acceptable substitutions in Addenda.

d. After award of Contract, ENGINEER will notify CONTRACTOR, in writing, of decision to accept or reject requested substitutions in Addenda.

**PART 2 PRODUCTS (Not Applicable)**

**PART 3 EXECUTION (Not Applicable)**

**END OF SECTION**

# SECTION 01710 – CLEANING

## PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Execute cleaning, during progress of the Work, and at completion of the Work, as required by the General Conditions.

1.2 RELATED REQUIREMENTS

A. All applicable sections of the Specifications.

B. Conditions of the Contract.

1.3 DISPOSAL REQUIREMENTS

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

## PART 2 PRODUCTS

2.1 MATERIALS

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by cleaning material manufacturer.

## PART 3 EXECUTION

3.1 DURING CONSTRUCTION

A. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulation of waste material, rubbish and windblown debris, resulting from Construction Work.

B. Provide on-site containers for the collection of waste materials, debris and rubbish.

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

C. The OWNER's Representative reserves the right to direct the CONTRACTOR to remove waste materials

D. Mechanical Sweeping. CONTRACTOR shall maintain on site a mechanical sweeping device for removing debris from existing, temporary and permanent pavement.

3.2 DUST CONTROL

A. Perform operations so that dust and other contaminants resulting from Construction Work operations will not cause any damages or maintenance problems to adjacent properties.

B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.

3.3 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.

C. Polish glossy surfaces to a clear shine.

D. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

E. Prior to final completion, or OWNER occupancy, CONTRACTOR shall conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify the entire work is clean.

F. All storage and staging areas shall be cleaned and returned to prior conditions or better as per requirements of this section.

3.4 MEASUREMENT AND PAYMENT

A. There shall be no special measurement or payment for the work under this section; it shall be included in the price of all other work.

**END OF SECTION**

# SECTION 01720 – PROJECT RECORD DOCUMENTS

## PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

a. Record Drawings.

b. Record Specifications.

c. Record Product Data.

1.3 SUBMITTALS

A. Record Drawings. Comply with the following:

a. Number of Copies. Submit one set of marked-up Record Prints.

B. Record Specifications. Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data. Submit one copy of each Product Data submittal.

a. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

## PART 2 PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints. Maintain one set of black-line white prints of the Contract Drawings and Shop Drawings.

a. Preparation. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

i. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

ii. Accurately record information in an understandable drawing technique.

iii. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

a. Document with photographs.

b. Content. Types of items requiring marking include, but are not limited to, the following:

i. Dimensional changes to Drawings.

ii. Revisions to details shown on Drawings.

iii. Depths of foundations.

iv. Locations and depths of underground utilities.

v. Revisions to routing of piping and conduits.

vi. Revisions to electrical circuitry.

vii. Actual equipment locations.

viii. Changes made by Change Order or Work Change Directive.

ix. Changes made following Engineer's written orders.

x. Details not on the original Contract Drawings.

xi. Field records for variable and concealed conditions.

xii. Record information on the Work that is shown only schematically.

c. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

d. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

e. Mark important additional information that was either shown schematically or omitted from original Drawings.

f. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

g. Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Engineer. Make corrections where

required.

B. Format. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

a. Record Prints. Organize Record Prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

b. Identification. As follows:

i. Project number.

ii. Project name.

iii. Date.

iv. Designation "PROJECT RECORD DRAWINGS."

v. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation. Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

b. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

c. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

d. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.

e. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation. Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

a. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.

b. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

**PART 3 EXECUTION**

3.1 RECORDING AND MAINTENANCE

A. Recording. Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples. Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer's reference during normal working hours.

C. Record Documents of water, sewer and drainage must be provided for the General Contractor by a Professional Land Surveyor and must be satisfactory for approval by the OWNER and shall comply with the latest approved version of the CADD City Standards.

D. Final pay request will not be processed until Record Documents have been completed and submitted to the City.

**END OF SECTION**

# SECTION 01780 CONTRACT CLOSEOUT

## PART 1 GENERAL

1.1 SUBMITTALS

A. Informational Submittals:

a. Submit prior to application for final payment.

i. Record Documents.

ii. As-built drawings (signed and sealed hardcopies and electronic format – PDF and CAD files)

iii. Special Bonds, Special Guarantees, and Service Agreements.

iv. Consent of Surety to Final Payment.

v. Releases or Waivers of Liens and Claims.

vi. Releases from Agreements.

vii. Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01025, Measurement and Payment.

viii. Spare Parts, Special Tools and Extra Materials: As required by individual Specification sections.

A. Subcontractor Identification Form:

a. Submit form with final pay request.

b. Submit a separate form for each subcontractor used.

c. For Capital Improvement Projects, submit form along with final pay request to the PCM.

d. Form is attached as a Supplement to this Section.

1.2 RECORD DOCUMENTS

A. Quality Assurance:

a. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.

b. Accuracy of Records:

i. Coordinate changes within record documents, making legible and accurate entries on each sheet of Drawings and other documents

where such entry is required to show change.

ii. Purpose of Project record documents is to document factual information regarding aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination.

c. Make entries within 24 hours after receipt of information that a change in the Work has occurred.

d. Prior to submitting each request for progress payment, request PCM's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by PCM to recommend whole or any part of Contractor's Application for Payment, either partial or final.

1.3 RELEASES FROM AGREEMENTS

A. Furnish Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's construction right-of-way.

B. In the Event Contractor is Unable to Secure Written Releases:

a. Inform PCM of the reasons.

b. Owner or its representatives will examine the site, and Owner will direct Contractor to complete the Work that may be necessary to satisfy terms of the side agreement or special easement.

c. Should Contractor refuse to perform this Work, Owner reserves right to have it done by separate contract and deduct cost of same from Contract Price, or require Contractor to furnish a satisfactory Bond in a sum to cover legal claims for damages.

d. When Owner is satisfied that the Work has been completed in agreement with Contract Documents and terms of side agreement or special easement, right is reserved to waive requirement for written release if:

i. Contractor's failure to obtain such statement is due to grantor's refusal to sign, and this refusal is not based upon any legitimate claims that Contractor has failed to fulfill terms of side agreement or special easement, or

ii. Contractor is unable to contact or has had undue hardship in contacting grantor.

1.4 AS-BUILT DRAWINGS

A. Quality Assurance

a. As-built drawings must meet all minimum City of Fort Lauderdale CAD standards and be submitted in the latest version of AutoCAD available at the time the contract is signed.

b. As-built drawings will be submitted in both electronic and hard copy forms as follow:

i. 3 hard copy sets of as-builts will be submitted on 24x36 paper signed, sealed, and dated by a Florida Professional Licensed Surveyor (PLS).

ii. 1 CD or jump drive which will include both DWG files for the package and a PDF document including the surveyors signature and seal.

c. As-built drawings will include the following:

i. PLS name, business name, license numbers, address, and telephone number

ii. The following statement must be included:

"I hereby certify that the as-built location information of the potable water, reclaimed water, wastewater and drainage facilities shown on these drawings conforms to the minimum technical standards for land surveying in the State of Florida, Chapter 5J-17.050(10)(i) (Florida Administrative Code), as adopted by the Department of Agriculture and Consumer Services, Board of Professional Surveyors and Mappers, and that said as-builts are true and correct to the best of our knowledge and belief."

iii. As-built drawings will contain the information on the design drawings (plan and profile views) plus document changes between the design and construction including correcting all information that is incorrect due to changes during construction. Incorrect or no longer relevant information will be erased or struck through. All location changes constructed materially different (one-tenth foot horizontal, one tenth vertical) than the design location will have their design location struck through and will be redrafted at the constructed location. Design drawing dimensioning will be corrected as necessary.

iv. Drawing will be a complete set including cover sheet, index, and any other sheets included in the approved design set. Standard detail sheets are not necessary.

B. Minimum As-Built Drawing Requirements (Not applicable for this project)

a. Show the location of easements used by the water and wastewater facilities.

b. Indicate pipe joint locations where water and wastewater or reclaimed water

piping crosses.

c. Indicated the length of gravity wastewater piping and actual slope between manhole centers.

d. Show all abandoned in place facilities including the extent and method of abandonment.

e. Show elevations to the nearest tenth of a foot for top of pipe for water mains, force mains, and reclaimed water mains at vertical deflection points, all bends, valves and fittings and every 200 feet along straight runs and where they cross all other facilities.

f. Show elevations to the nearest one hundredth of a foot for manhole rims, gravity main inverts at the manhole, force main connections to manholes, lift station top of slab, bottom of wet well, influent pipe invert and control set points.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

3.1 MAINTENANCE OF RECORD DOCUMENTS

A. General:

a. Promptly following commencement of Contract Times, secure from Engineer, at no cost to Contractor, one complete set of Contract Documents. Drawings will be full size.

b. Delete Engineer title block and seal from all documents.

c. Label or stamp each record document with title, “RECORD DOCUMENTS,” in neat large printed letters.

d. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded. Contractor is responsible for maintaining up-to-date “red-lined” markups, on site, of all changes including revised locations of buried features and provides access to the City for review at any time.

e. All piping inserts, fittings, and valve locations shall be located by a Florida Licensed Surveyor in accordance with City of Fort Lauderdale surveying standards and per NAVD 88. Contractor shall provide adequate notice to the surveyor to ensure that all locations are accessible, prior to backfill.

B. Preservation:

a. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

b. Make documents and Samples available at all times for observation by PCM or Engineer.

C. Making Entries on Drawings:

a. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.

i. Color Coding:

a. Green when showing information deleted from Drawings.

b. Red when showing information added to Drawings.

c. Blue and circled in blue to show notes.

b. Date entries.

c. Call attention to entry by “cloud” drawn around area or areas affected.

d. Legibly mark to record actual changes made during construction, including, but not limited to:

i. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.

ii. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.

iii. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.

iv. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.

v. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and Engineer's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.

e. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.

i. Clearly identify the item by accurate notes such as “cast iron drain,” “galv. water,” and the like.

ii. Show, by symbol or note, vertical location of item (“under slab,” “in ceiling plenum,” “exposed,” and the like).

iii. Make identification so descriptive that it may be related reliably to Specifications.

D. Coordination with Florida Licensed surveyor:

a. Contractor shall not cover any bends, valves, or fittings installed until they have been located by the survey crews for the purpose of preparing as-built and/or Record Drawings.

b. If the above conditions are not met, for any reason, Contractor shall bear the cost of potholing the constructed installation to allow for the locations.

3.2 FINAL CLEANING

A. At completion of the Work or of a part thereof and immediately prior to Contractor's request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to Contractor's notice of completion, clean entire site or parts thereof, as applicable.

a. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to Owner and PCM.

b. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.

c. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.

d. Clean all windows.

e. Clean and wax wood, vinyl, or painted floors.

f. Broom clean exterior paved driveways and parking areas.

g. Hose clean sidewalks, loading areas, and others contiguous with principal structures.

h. Rake clean all other surfaces.

i. Replace air-handling filters and clean ducts, blowers, and coils of ventilation units operated during construction.

j. Leave water courses, gutters, and ditches open and clean.

B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

C. Meet all requirements of Section 02575, Surface Restoration.

3.3 SUPPLEMENTS

*A.* The supplements listed below, following "END OF SECTION," are part of this Specification.

*a. Subcontractor Identification Form (See next page).*

**END OF SECTION**

## SUBCONTRACTOR IDENTIFICATION FORM

This form shall be completed by all City of Fort Lauderdale Prime Contractors who subcontracted out any portion of his/her City contract. The form shall be forwarded to the City of Fort Lauderdale's Public Services Department (Engineering and Architectural Services) with the prime contractor's final pay request. A separate form is to be completed and submitted for each subcontractor. Please telephone (954) 761-5057 or 761-5083, if you have any questions regarding this form.

1) CITY OF FORT LAUDERDALE PROJECT NO.

2) PROJECT DESCRIPTION _____

3) SUBContractor ___

_____
*Business Name*

_____
*Address*

_____
*Telephone & Fax Nos.*

_____
*Email Address/Company Wesbsite (if applicable)*

4) SUBCONTRACTOR'S PRINCIPAL OFFICER

5) CLASSIFICATION OF WORK SUBCONTRACTED OUT ___

6) COST OF WORK SUBCONTRACTED OUT ___

7) Please check the item(s) which properly identify the ownership status of the subcontractor's firm:

☐ Subcontractor firm is not a MBE or WBE

☐ Subcontractor firm is a MBE, as at least 51 percent is owned and operated by one or more socially and economically-disadvantaged individuals:

☐ American Indian ☐ Asian ☐ Black ☐ Hispanic ☐ White

☐ Subcontractor firm is a WBE, as at least 51 percent is owned and operated by one or more women.

☐ American Indian ☐ Asian ☐ Black ☐ Hispanic ☐ White

8) **PRIME Contractor** _____

_____

**NAME & TITLE OF PRIME CONTRACTOR'S REPRESENTATIVE COMPLETING THIS FORM** (*Please Print*)

*(Telephone No.)* *(Fax No.)* *(Email Address)*

**SIGNATURE** **DATE**

*Prime Contractor's Representative*

# SECTION 02050
# DEMOLITION

## 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. Section 02200 - Earthwork.

B. All applicable Sections under Divisions 1, 2, and 3.

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 overnight.

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 02200
# 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 02211 - Site Grading.

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 are 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 removed from the construction site at the expense of the CONTRACTOR. Unsuitable material shall not be stockpiled on-site. All suitable material shall be stockpiled on-site at areas designated by the ENGINEER, and shall be removed from construction site at the expense of contactor, as directed by owner.

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 ½-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:

| Sieve Size | Percentage Passing |
|---|---|
| 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.

| | Percentage Passing | |
|---|---|---|
| Sieve Size | 1 ½-inch Max. | ¾-inch Max. |
| 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 | 2-9 | |

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

| Sieve Size | Percentage Passing |
|---|---|
| 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:

| | Type 1 | Type 2 | Type 3 |
|---|---|---|---|
| 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:

| Sieve Size | Percentage Passing |
|---|---|
| 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 virtified 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:

| Depth Below Finish Grade | Maximum Allowable Diameter |
|---|---|
| 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 nor 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 compaction is complete, 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 02513 Asphaltic Concrete Paving and 02515 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.

| Location or Use of Fill | Percentage of Maximum Density |
|---|---|
| Pipe zone backfill portion above bedding for flexible pipe. | 95 |
| Pipe zone backfill bedding and over-excavated zones under bedding/pipe for flexible pipe, including trench plugs. | 95 |
| Pipe zone backfill portion above bedding for rigid pipe. | 95 |
| Pipe zone backfill bedding and over-excavated zones under bedding/pipe for rigid pipe. | 95 |
| Final backfill, beneath paved areas or structures | 100 |
| Final backfill, not beneath paved areas or structures | 95 |
| Trench zone backfill, not beneath paved areas or structures, including trench plugs | 95 |
| Embankments | 98 |
| Embankment, beneath paved areas or structures | 100 |
| Backfill beneath structures, hydraulic structures | 100 |
| 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 recompacted as the embankment fill is brought up in layers. Material thus cut shall be recompacted along with the new fill material at the CONTRACTOR'S expense. Hillside of fill slopes 4:1 or flatter shall be prepared in accordance with Paragraph A, above.

C. Where embankment or structure fills are constructed over pipelines, the first 4 feet of fill over the pipe shall be constructed using light placement and compaction equipment that does not damage the pipe. Heavy construction equipment shall maintain a minimum distance from the edge of the trench equal to the depth of the trench until at least 4 feet of fill over the pipe has been completed.

## 3.16 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**

# SECTION 02211
# SITE GRADING

## PART 1 - GENERAL

1.01 WORK INCLUDED

A. Remove topsoil and stockpile on site for later use.

B. Excavate sub-soil and reform to grades, contours and levels.

C. Excavate or fill for roadways, walks, curbs, gutters, parking areas, landscaped areas and as shown on the Drawings.

1.02 RELATED WORK

A. Section 02110: Clearing and Grubbing.

B. Section 02220: Trenching, Backfilling and Compacting.

C. Section 02260: Finish Grading.

D. Section 02513: Asphaltic Concrete Paving.

1.03 EXISTING CONDITIONS

A. Known underground, surface and aerial utility lines, and buried objects are based on best available data and indicated on the Drawings. Contractor shall verify all locations.

1.04 PROTECTION

A. Protect trees, shrubs and lawns and other features remaining as part of final landscaping.

B. Protect bench marks, and existing structures, fences, roads, sidewalks, paving and curbs against damage from equipment and vehicular traffic.

C. Protect aerial, surface, or underground utility lines or appurtenances which are to remain.

D. Repair any damage, at no cost to Owner.

## PART 2 - PRODUCTS

2.01 MATERIALS

A. Excavated fill material: Soil free from roots, rocks larger than 3-inches, and building debris.

B. Additional fill material: Shall be approved by the Engineer.

## PART 3 - EXECUTION

3.01 PREPARATION

A. Establish and identify required lines, levels, contours and datum.

B. Maintain bench marks, monuments, and other reference points. Re-establish if disturbed or destroyed, at no cost to Owner.

C. Before start of grading, establish the location and extent of utilities in the work areas. Notify utilities to remove and relocate lines which are in the way of construction.

D. Maintain, protect, reroute or extend as required existing utilities to remain which pass through the work area.

3.02 REMOVAL OF TOPSOIL

A. Topsoil of horticultural value shall be stripped from areas of construction under this contract and stockpiled in area designated by Engineer. Said material shall be stockpiled separately from fill material.

B. Do not permit topsoil to be mixed with subsoil

C. Do not strip topsoil when wet.

D. Do not drive heavy equipment over stockpiled topsoil.

3.03 ROUGH GRADING

A. Rough grade site to required levels, profiles, contours and elevations ready for finish grading and surface treatment. Maintain the following:
   1. Sodded areas - 4 1/2-inches below finished grade elevation. (See Specification 02212 for Athletic Field Site Grading)
   2. Seeded areas - 6-inches below finished grade.
   3. Paved areas - 18-inches below finished grade elevations.
   4. Shrub beds - 24-inches below finished grade elevations.
   5. Flower beds - 18-inches below finished grade elevations.
   6. Concrete sidewalks - 8-inches below finished grade elevations.

B. Prior to placing fill material over undisturbed subsoil, scarify surface to depth of 6-inches.

3.04 SURPLUS MATERIAL

A. Remove surplus materials from site.

B. Dispose of surplus material at no cost to Owner.

**END OF SECTION**

# SECTION 02220
# TRENCHING, BACKFILLING AND COMPACTING

## PART 1 - GENERAL

1.01 WORK INCLUDED

A. Excavate for all underground piping.

B. Place and compact granular beds and fills over pipelines to rough grade elevations.

C. Dewater excavations as required.

1.02 RELATED WORK

A. Section 02661: Water Mains.

B. Section 02720: Storm Drainage System.

C. Section 02730: Sanitary Sewer Pipe.

1.03 SITE COMPACTION TESTING

A. Testing of compacted fill materials will be performed in accordance with F.D.O.T. and A.A.S.H.T.O. specifications.

B. If, during progress of Work, tests indicate that compacted materials do not meet specified requirements, remove defective work, replace and retest as directed by ENGINEER.

C. Ensure compacted fills are tested before proceeding with placement of surface materials.

1.04 PROTECTION

A. Protect trees, shrubs, lawn, areas to receive planting, rock outcropping and other features remaining as part of final landscaping.

B. Protect bench marks and existing structures, roads, sidewalks, paving and curbs against damage from vehicular or foot traffic. Install and maintain proper bridging, planking and cants to provide access to buildings.

C. Protect excavations by shoring, bracing, sheet piling underpinning, or by other methods, as required to prevent cave-ins or loose dirt from falling into excavations in accordance with Trench Safety Act.
D. Underpin or otherwise support adjacent structure(s) which may be damaged by excavation work. This includes other utility lines and pipe runs.
E. Notify ENGINEER of any unexpected sub-surface conditions. Discontinue work in the area until ENGINEER provides notification to resume work.

## PART 2 - PRODUCTS

2.01 PRODUCTS

A. Bedding Materials: Pipe shall be placed on dry, undisturbed earth.

B. Selected Backfill: After pipe joints have been inspected and given preliminary approval, and sufficient time has elapsed for setting of joints if necessary, backfilling shall be performed, together with tamping until fill has progressed to an elevation at least one foot above the top of the pipe bell. During this initial stage of backfilling, approved granular materials or loose soil free from lumps, clods, or stones shall be deposited in layers approximately 6-inches thick and compacted by manually operated machine tampers actuated by compressed air, or other suitable means. Tampers and machines shall be suitable for the work, and subject to approval by ENGINEER.

C. Backfill Material: Excavated material, free from roots, rocks larger than 3½ inches in size and building debris.

D. Fill under landscaped areas: Free from alkali, salt, and petroleum products. Use sub-soil excavated from site only if conforming to specified requirements.

## PART 3 - EXECUTION

3.01 PREPARATION AND LAYOUT

A. Establish extent of excavation by area and elevation. Designate and identify datum elevation.

B. Set required lines and levels.

C. Maintain bench marks, monuments and other reference points.

3.02 UTILITIES

A. Before starting excavation, establish the location and extent of underground utilities occurring in the work area.
B. Notify ENGINEER if utility lines which are in the way of excavation are uncovered.
C. Protect active utility services uncovered by excavation.
D. Remove abandoned utility service lines from areas of excavation. Cap, plug or seal such lines and identify at grade.
E. Accurately locate and record abandoned and active utility lines re-routed or extended on Project Record Documents.

3.03 TRENCHING

A. Ensure trenching does not interfere with normal 45 degree bearing angle of any foundation.

B. Excavate in accordance with lines and grades.

C. Cut trenches sufficiently wide to enable proper installation of pipe and to allow for inspection. Trim and shape trench bottom and leave free of irregularities, lumps and projections.

D. Do not disturb soil within branch spread of existing trees or shrubs that are to remain. If it is necessary to excavate through roots, perform work by hand and cut roots with a sharp axe.

E. When complete, request ENGINEER to inspect excavations. Correct unauthorized excavation as directed, at no cost to OWNER.

F. Remove excess or unsuitable excavated sub-soil from site.

3.04 DEWATERING

A. Keep trenches dry. Provide necessary equipment including pumps, piping and temporary drains.

B. Do not discharge drainage water into municipal sewers without municipal approval. Ensure water discharge does not contain silt held in suspension.

C. Direct surface drainage away from excavated areas.

D. Control the grading in and adjacent to excavations to prevent water running into excavated areas or onto adjacent properties or public thoroughfares.

E. Furnish and operate suitable pumps on a 24 hour basis to keep excavations free of water until piping has been placed and backfilling has been completed.

F. No water shall be allowed to rise over masonry or mortar until the concrete or mortar has set at least 24 hours.

3.05 BACKFILLING

A. Do not start backfilling until piping has been inspected.

B. Ensure trenches are free of building debris, wood, rocks over 3½ inches in diameter and water.

C. Backfill systematically and as early as possible to allow maximum time for natural settlement and compaction.

D. After backfill has reached a point one foot above the top of the pipe, a variation in the procedure as to manner of placing and amount of compaction to fill will be allowed, depending upon the location of the work and danger from subsequent settlement, as follows:

1. For backfilling in unimproved areas (along utility easements and in parkway strip beyond the edge of driveways and graveled parking areas), from an elevation of one foot above top of pipe to the surface of the ground, backfill may be deposited by equipment. Depositing in layers or tamping will not be required. Sufficient surplus excavated material shall be neatly rounded over the trench, to compensate for settlement. All surplus excavated materials beyond that indicated above shall be disposed of by Contractor.
2. For backfilling beneath driveways and parking areas, alleys, and streets where non-rigid type surfacing is to be replaced. This shall also include dirt, gravel or asphalt driveways and alleys.
    a. The backfill material shall be carefully deposited in uniform layers not to exceed 12-inches in thickness and each layer shall be compacted to 98% of maximum density in accordance with AASHTO T-180 with manually operated machine tampers.
    b. In lieu of the foregoing compaction method, the backfill material and procedure used may be that as specified under Method 3, below.
3. For backfilling across and beneath driveways, sidewalks, parking areas or streets where a rigid type paving is to be replaced (concrete and asphaltic concrete and brick surfaces).
    a. All backfill material shall be approved granular material of high weight and density. The material shall be carefully deposited in

uniform layers not to exceed 12-inches thick (loose measure), and each layer shall be compacted by ramming or tamping with tools approved by ENGINEER in a manner that does not disturb the pipe. Where necessary, granular base material of the type and thickness specified shall be used for the last layer prior to surfacing.

END OF SECTION

# SECTION 02260
# FINISH GRADING

## PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Contractor shall, under this Section, supply, place, and compact and roll finish grade materials prior to landscaping work.

B. Finish grade sub-soil.

C. Cut out areas to receive stabilizing base course materials for paving and sidewalks.

D. Place, finish grade and compact topsoil.

1.02 RELATED WORK

A. Section 02211: Site Grading.

B. Section 02220: Trenching, Backfilling and Compacting.

C. Section 02920: Sodding.

D. Section 02950: Trees, Plants and Ground Cover.

1.03 PROTECTION

The Contractor shall prevent damage to existing fencing, trees, landscaping, natural features, bench marks, pavement, utility lines, and sprinkler system. Correct damage at no cost to the Owner.

## PART 2 - PRODUCTS

2.01 MATERIALS

Topsoil shall be friable loam free from subsoil, roots, grass, excessive amount of weeds, stones and foreign matter; acidity range (ph) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. (Use topsoil stockpiled on site if conforming to these requirements, or as directed by the Engineer.)

## PART 3 - EXECUTION

3.01 SUB-SOIL PREPARATION

A. Rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, etc., in excess of 2 inches in size. Remove sub-soil which has been contaminated with petroleum products.

B. Cut out areas, to sub-grade elevation, which are to receive stabilizing base for paving and sidewalks.

C. Bring sub-soil to required levels, profiles and contours. Make changes in grade gradual. Blend slopes in to level areas.

D. Slope grade away from building minimum 4 inches in 10 feet (unless indicated otherwise on Drawings).

3.02 PLACING TOPSOIL

A. Place topsoil in area where seeding, sodding and planting is to be performed. Place to the following minimum depths, up to finished grade elevations:

1. 6-inches for seeded areas.
2. 4 1/2-inches for sodded areas.
3. 24-inches for shrub beds.
4. 18-inches for flower beds.

B. Use topsoil in relatively dry state. Place during dry weather.

C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles and contours of sub-grades.

D. Remove stones, roots, grass, weeds, debris and other foreign material while spreading.

E. Manually spread topsoil around trees, plants, buildings and other structures to prevent damage which may be caused by grading equipment.

F. Lightly compact placed topsoil.

3.03 SURPLUS MATERIAL

A. Remove surplus sub-soil and topsoil from site.

B. Leave stockpile areas and entire job site clean and raked, ready to receive landscaping.

END OF SECTION

# SECTION 02511
# CONCRETE SIDEWALKS

## PART 1 - GENERAL

1.01 SCOPE

A. The work specified in this section consists of the construction of concrete sidewalks, in accordance with these specifications, and in conformity with the lines, grades, dimensions and notes shown on the plans.

1.02 REFERENCES

A. City of Fort Lauderdale Standards

B. FDOT 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.

1. Compressive strength: 3,000 psi at 28 days - tested according to ASTM designation C31 (AASHTO T23)
2. 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.

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 pressure of the concrete without deviation from line and grade. Forms shall be cleaned each time they are used and shall be oiled or saturated with water prior to placing the concrete.

## PART 3 - EXECUTION

3.01 SUB-GRADE

A. Excavation shall be made to the required depth and the sub-grade or base upon which the sidewalk is to be set shall be compacted to a firm, even surface, true to grade and cross-section, by means of watering, rolling or tamping. The sub-grade for sidewalk to be used as driveway pavement shall be compacted as called for on the plans. The sub-grade shall be moist at the time the concrete is placed.

3.02 JOINTS

A. Expansion Joints between the sidewalk and the curb or driveway or at fixed objects and sidewalk intersections shall be 1/2 inch joints, formed with preformed joint filler.

B. Preformed Filler shall meet the requirements of AASHTO M-153 or M-213, or cellulose fiber types meeting all the requirements of AASHTO M-213 except the asphalt content are acceptable provided they contain minimums of 0.2 percent copper pentachlorophenate as a preservative and 1.0 percent waterproofing wax. For AASHTO M-153, unless a particular type is specified; either type I, type II, or type III may be used

C. Contraction Joints may be of the open type, or may be sawed.

1. 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 1/2" radius.
2. If the Contractor elects to saw the contraction joints, a slot approximately 3/16" wide and not less than 1-1/2" deep shall be cut with a concrete saw after the concrete has set and within the following periods of time: Joints at not more than 30' intervals - 12 hrs after finishing, and remaining joints - within 96 hrs after finishing.

3.03 PLACING

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

3.04 FINISHING

A. SCREEDING: All surplus water, laitance and inert material shall be worked off the surface of the concrete with a ten (10) foot straight edge, or by some other method equally as satisfactory and so approved by the Engineer.

B. FLOATING; SURFACE REQUIREMENTS: The concrete shall be given a wooden float finish. The surface variations shall not be more than three-sixteenths (3/16) inch under a ten (10) foot straight edge, nor more than one-eighth (1/8) inch on a five (5) foot transverse section. The edge of the sidewalk shall be carefully finished with an edging tool having a radius of one-half (1/2) inch.

3.06 THICKNESS

Concrete sidewalks shall be four (4) inches thick or as detailed on the plans.

END OF SECTION

# SECTION 02513
# ASPHALTIC CONCRETE PAVING

## PART 1 - GENERAL

1.01 WORK INCLUDED

A. Prepare sub-grade to receive base course.

B. Place stabilizing base courses work and compact.

C. Prime base course, place asphalt pavement.

1.02 RELATED WORK

A. Section 01410: Testing Laboratory Services.

B. Section 02211: Site Grading.

C. Section 02580: Pavement Markings and Post Signs.

1.03 REFERENCE STANDARDS

A. ASTM D1557 - Tests for Moisture - Density Relationship of Soils using 10 lb. rammer in 18 inch Drop.

B. AASHTO M-81 - Penetration Graded Asphalt Cement.

C. AASHTO M-140 - Emulsified Asphalt.

D. FDOT Road & Bridge Construction - Section 200 - Limerock Base

E. FDOT Road and Bridge Construction - Section 250 - Shell Base.

F. FDOT Road and Bridge Construction - Section 250 - Shell Stabilized Base.

G. FDOT Road and Bridge Construction - Section 330 - Hot Bituminous Mixtures General Construction Requirements.

H. FDOT Road and Bridge Construction - Section 916-1 - Asphalt Cement.

1.04 TESTING AND INSPECTION

A. Testing and inspection of asphalt pavement mixes and testing of placed stabilizing base course and asphalt pavement will be performed by an independent testing laboratory, in accordance with Section 01410-Testing Lab Services. Testing and inspection will be performed so as to minimize disruption to work.

B. Allow testing laboratory access to the mixing plant for verification of weights or proportions, character of materials used and determination of temperatures used in the preparation of asphalt concrete mix.

C. When and if required, the testing laboratory will perform laboratory tests on proposed asphalt pavement mixes to determine conformity with requirements.

D. The testing laboratory will perform one series of compaction tests for stabilizing base course and for asphalt pavement. The contractor shall pay for costs of additional testing as required due to improper performance of work.

E. When stabilizing base course or portion thereof has been placed and compacted in accordance with requirements, notify the testing laboratory to perform density and bearing value tests. Do not place asphalt pavement until results have been verified and base course installation approved.

F. If compaction tests indicate that stabilizing base course or asphalt paving do not meet specified requirements, remove defective work, replace and retest at Contractor's expense.

**PART 2 - MATERIALS**

2.01 LIMEROCK

A. Composition - The minimum percentage of carbonates of calcium and magnesium in the limerock material shall be 70. The maximum percentage of water-sensitive clay mineral shall be 3 percent. Limerock material shall not contain cherty or other extremely hard pieces, or lumps, balls or pockets of sand or clay size material in sufficient quantity as to be detrimental to the proper bonding, finishing, or strength of the limerock base.

B. Gradation and Size Requirements - At least 97 percent (by weight of the material shall pass a 3½ inch sieve and the material shall be graded uniformly down to dust. The fine material shall consist entirely 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 placed on the road.

C. Limerock Bearing Requirements - Limerock material used in construction of limerock base shall have an average LBR value of not less than 100. The average LBR value of material produced at a particular source shall be determined in accordance with an approved quality control procedure.

2.02 PRIME COAT

A. Prime coat shall be one of the following:

1. Cutback Asphalt, Grade RC-70 or RC-250 shall meet the requirements of AASHTO Specification M-81.
2. Emulsified Asphalt Grade SS-1 or SS1H shall meet the requirements of ASSHTO Specifications M-140 and/or M-280.

2.03 TACK COAT

A. Tack coat shall be one of the following:

1. Asphalt Cement, Penetration Grade 85-100 shall meet the requirements of AASHTO Specification M-20.
2. Emulsified Asphalt, Grade RS-2 shall meet the requirements of AASHTO Specification M-140.

2.04 ASPHALTIC CONCRETE

A. Asphaltic concrete surface course - Type S-III asphaltic concrete wearing surface, 1½ inches in compacted thickness or as indicated on the Drawings, in accordance with Sections 330-10 Compacting Mixture and 331 Type S-III Asphaltic Concrete of aforesaid DOT Standard Specification.

**PART 3 - EXECUTION**

3.01 PREPARATION

A. Subgrade shall be stabilized per Section 160 - Stabilizing, of the FDOT Standard Specifications.

B. Bearing Value Requirements for subgrade stabilization

1. Limerock Bearing Ratio - Minimum LBR 40 under paved and curbed areas, and minimum LBR 30 in shoulder and swale areas.

2. Florida Bearing Value - Minimum FBV 75 pounds per square inch (psi) under paved and curbed areas, and minimum FBV 50 psi in shoulder and swale areas.

3.02 TRANSPORTING BASE COURSES

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. Hauling over the subgrade and dumping on the subgrade will be permitted when these operations will not be detrimental to the base as determined by the Engineer.

3.03 EQUIPMENT

A. Base Course - The rock shall be spread by mechanical rock spreaders, equipped with a device which strikes off the rock uniformly to laying thickness, and capable of producing an even distribution of the rock.

B. Pressure Distributor - The pressure distributor shall be equipped with pneumatic tires having a sufficient width of rubber in contact with the road surface to avoid breaking the bond or forming a rut in the surface. The distance between the centers of openings of the outside nozzles of the spray bar shall be equal to the width of the application required, within an allowable variation of two (2) inches.

3.04 SPREADING BASE COURSE

A. Method of Spreading - The limerock shall be spread uniformly with equipment as specified in 3.02 above. All segregated areas of fine or coarse rock shall be removed and replaced with properly graded rock.

B. Number of Courses - When the specified compacted thickness of the base is greater than six inches, the base shall be constructed in two courses. The thickness of the first course shall be approximately one-half the total thickness of the finished base, or enough additional to bear the weight of the construction equipment without disturbing the subgrade.

3.05 COMPACTING AND FINISHING BASE

A. Single-Course Base - For single-course base, after the spreading is completed the entire surface shall be scarified and then shaped so as to produce the required grade and cross section after compaction.

B. Moisture Content - When the material does not have the proper moisture content to insure the required density, wetting or drying will be required. When water is added it shall be uniformly mixed-in by disking to the full depth of the course which is being compacted. Wetting or drying operations shall involve manipulation, as a unit, of the entire width and depth of the course which is being compacted.

C. Density Requirements - As soon as proper conditions of moisture are attained the material shall be compacted to a density of not less than 98 percent of maximum density as determined by AASHTO T-180.

D. Density Test - At least three density determinations shall be made on each day's final compaction operations on each course, and the density determinations shall be made at more frequent intervals if deemed necessary by the Engineer. During final compacting operations, if blading of any areas is necessary to obtain the true grade and cross section, the compacting operations for such areas shall be completed prior to making the density tests on the finished base.

E. Correction of Defects:

1. Contamination of Base Material - If, at any time, the subgrade material should become mixed with the base course material, the Contractor shall, without additional compensation, dig out and remove the mixture, reshape and compact the subgrade and replace the materials removed with clean base material, which shall be shaped and compacted as specified above.
2. Cracks and Checks - If cracks or checks appear in the base, either before or after priming, which, in the opinion of the Engineer, would impair the structural efficiency of the base, the Contractor shall remove the cracks or checks by rescarifying, reshaping, adding base material where necessary, and recompacting.

H. Surface Testing - The finished surface of the base course shall be checked with a template cut to the required crown and with a 15 foot straightedge laid parallel to the center line of the road. All irregularities greater than ¼ inch shall be corrected by scarifying and removing or adding base course material as required, after which the entire area shall be recompacted.

## 3.06 PRIMING

A. Preparation - The prime coat shall be applied only when the base meets the specified density requirements and the moisture content in the top half of the base does not exceed 90 percent of the optimum moisture of the base material. At the time of priming, the base shall be firm, unyielding and in such condition that no undue distortion will occur.

Before any bituminous material is applied, all loose material, dust, dirt, caked clay and other foreign material which might prevent proper bond with the existing surface shall be removed for the full width of the application. Particular care shall be taken in cleaning the outer edges of the strip to be treated, to insure that the prime or tack coat will adhere.

When the prime or tack coat is applied adjacent to curb and gutter, valley gutter or any other concrete surfaces, such concrete surfaces (except where they are to be covered with a bituminous wearing course) shall be covered with heavy paper, or otherwise protected while the prime or tack coat is being applied. Any bituminous material deposited on such concrete surfaces shall be removed.

The temperature of the prime material shall be between 100 degrees Fahrenheit and 150 degrees Fahrenheit. The actual temperature shall be that which will insure uniform distribution. The material shall be applied by means of a pressure distributor. The amount to be applied will be dependent on the character of the surface and shall be sufficient to coat the surface thoroughly and uniformly, with no excess.

B. Rate of Application - The rate of application shall be not less than 0.10 gallon per square yard, unless a lower rate is approved by the Engineer.

C. Sprinkling - If so required by the Engineer the base shall be lightly sprinkled with water and rolled with a traffic roller, in advance of the application of the prime.

D. Sanding - The primed base shall be covered by a light uniform application of cover material. If considered necessary for proper distribution of spread, the cover material shall be lightly dragged with a drag broom, after which it shall be rolled with a traffic roller.

E. Sampling Device on Transport Tanks - All transport tanks delivering bituminous materials for use on the project shall be equipped with an approved spigot-type sampling device.

F. Temperature Sensing Device on Transport Tanks - All transport tanks delivering bituminous materials shall be equipped with an approved dial type thermometer. The thermometer shall have a temperature range from 50 degrees Fahrenheit to 500 degrees Fahrenheit in 25 degrees Fahrenheit increments with a minimum dial diameter of two inches.

## 3.07 QUALITY CONTROL

A. Testing Surface - The finished surface of the base course shall be checked with a template cut to the required crown and with a 15-foot straightedge laid parallel to the centerline of the road. All irregularities greater than ¼ inch shall be corrected by

scarifying and removing or adding rock as required, after which the entire area shall be recompacted as specified hereinbefore. In the testing of the surface, the measurements will not be taken in small holes caused by individual pieces of rock having been pulled out by the grader.

B. Thickness Requirements:

1. Measurements - Thickness of base shall be measured at intervals of not more than 200 feet. Measurements shall be taken at various points on the cross section, through holes not less than three inches in diameter.
2. Areas Requiring Correction - Where the compacted base is deficient by more than ½ inch from the thickness called for in the plans, the Contractor shall correct such areas by scarifying and adding rock. The base shall be scarified and rock added for a distance of 100 feet in each direction from the edge of the deficient area. The affected areas shall then be brought to the required state of compaction and to the required thickness and cross section.
3. Deficient Areas Left in Place - As an exception to the requirement for correcting areas of base which show a thickness deficiency exceeding the allowable ½ inch, the deficiency might be considered as not sufficient to seriously impair the required strength of the base and may be left in place. No payment, however, will be made for such deficient areas left in place and not corrected.

## 3.08 MAINTENANCE

The Contractor will be responsible for assuring that the true crown and template are maintained, with no rutting or other distortion, and that the base meets all the requirements, at the time the surface course is applied.

## 3.09 PROTECTING ADJACENT WORK

Provide adequate protection for all adjacent construction, whatever it may be, against bituminous spraying. Spraying of bituminous material on work, other than base course, will not be accepted.

## 3.10 TRANSPORTATION OF THE ASPHALT

The surface course shall be transported in tight vehicles previously cleaned of all foreign material. The inside surface of the truck bodies shall be only thinly coated with soapy water or an approved emulsion containing not over 5 percent oil. Kerosene, gasoline or similar products shall not be used. After coating and before loading, the truck bodies shall be raised and drained of all excess liquids.

## 3.11 INSTALLATION OF FINAL ASPHALTIC CONCRETE SURFACE COURSE

The Contractor shall install asphaltic concrete surface course over the entire surface as per the plans.

Mechanical spreading and screeding equipment shall be of an approved type that is self-propelled and can be steered. It shall be equipped with a receiving and disbursing hopper and a mechanical screed or strike-off member capable of adjustment to regulate the depth of material being spread. Tandem Type 5 to 12 ton steel- wheeled rollers shall be used for sealing. Self-propelled, pneumatic-tired traffic rollers equipped with at least 7b smooth tread, low pressure tires, having a total weight of 6 to 10 tons shall be used for final rolling.

## 3.12 FIELD QUALITY CONTROL

The final surface course of all pavements will be required to be checked by a rolling straightedge. The finished surface shall not vary more than 3/16 inch from the straightedge applied parallel to the centerline of the pavement. The straightedge shall have an effective length of 15 feet.

END OF SECTION

# SECTION 02515
# PORTLAND CEMENT CONCRETE PAVING

## 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 Portland Cement Concrete Paving work, as indicated on the drawings, as specified herein or both.

B. Including, but not necessarily limited to the following:

1. Fill, sub-grade, and limerock base.

2. Concrete form work.

3. Concrete reinforcement.

4. Expansion and contraction joints.

5. Concrete paving.

### 1.03 RELATED WORK

A. Section 02200 - Earthwork

B. Section 02513 - Asphaltic Concrete Paving - General

### 1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Perform work in accordance with local building and other applicable codes.

B. Installation: Performed only by skilled workmen with satisfactory record of performance on completed projects of comparable size and quality.

C. Inspection and Testing: Performed in accordance with Section 01410, Testing Laboratory Services, unless otherwise specified.

1. Test cylinders - as per ASTM C-39.

a. Minimum of three (3) concrete test cylinders shall be taken for every 75 or less cubic yards of concrete placed.

b. Minimum of one (1) additional test cylinder shall be taken during any cold weather concreting, and be cured on job site under same conditions as the concrete it represents.

2. Slump test - as per ASTM C-143:

a. Minimum of one (1) slump test shall be taken for each set of test cylinders taken.

1.05 SUBMITTALS

A. Test Reports: Reports of concrete compression, yield, air content, and slump tests.

B. Certificates:

1. Manufacturer's certification that materials meet specification requirements.

2. Material content per cubic yard of each class of concrete furnished.

a. Dry weights of cement.

b. Saturated surface-dried weights of fine and coarse aggregate.

c. Quantities, type and name of admixtures.

d. Weight of water.

3. Ready-mix delivery tickets, ASTM C-94.

C. Shop Drawings:

1. Show sizes and dimensions for fabrication and placing of reinforcing steel and bar supports.

2. Indicate bar schedules, stirrup spacing, and diagrams of bend bars.

3. Detail items of form systems affecting appearance of Architectural concrete surfaces such as joints, tie holes liners, patterns and textures. Show items in relation to entire form system.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.

B. Handle and store materials to prevent contamination.

1.07 JOB CONDITIONS

A. Allowable concrete temperatures:

1. Hot weather: Maximum 90° F as per ASTM C-94.

B. Do not place concrete during rain, unless protection is provided.

PART 2 - PRODUCTS

2.01 FILL

A. As specified in Section 02513 - Asphaltic Concrete Paving.

2.02 SUBGRADE

A. As specified in Section 02513 - Asphaltic Concrete Paving

2.03 LIMEROCK BASE

A. As specified in Section 02513 - Asphaltic Concrete Paving.

2.04 READY-MIXED CONCRETE

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

B. Admixtures:

1. Air entraining: ASTM C-260.

2. Chemical: Type (as required) ASTM C-494.

3. Fly ash and pozzolans: ASTM C-618.

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

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

E. Air content: 5% + 1%.

F. Mix Proportioning:

1. 28-day compressive strength of cured laboratory samples 3,000 psi.

2. Minimum cement content 5 sacks/cubic yard.

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

H. Mixes:

1. ASTM C-94.

2. Mix concrete only in quantities for immediate use.

3. Do not retemper or use set concrete.

2.05 REINFORCEMENT

A. Reinforcing Steel Bars: 60 psi yield strength; deformed billet steel bars; ASTM A-615, plain finish.

B. Welded Steel Wire Fabric: Plain type, ASTM A-185, hot dip galvanized, plain finish.

C. Tie Wire: FS QQ-W-461-G, annealed steel, black, 16 ga. minimum.

D. Bar Supports: Conform to "Bar Support Specifications," CRSI Manual of Standard Practice.

2.06 FORMWORK AND ACCESSORIES

A. Formwork: Matched, tight fitting and adequately stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of concrete, conform with ACU 347, Chapter 3, Material and Form Work.

B. Lumber:

1. Softwood framing lumber: Kiln dried, PS-20.

2. Boards less than 1-1/2 inch thick and 2 inches wide, used for basic forms and form liners: Kiln dried.

3. Grade marked by grading rules agency approved by American Lumber Standards Committee.

4. Light framing or studs for board or plywood forms, 2 inches to 4 inches width and thickness, construction standard grade.

5. Boards for basic forms, construction standard grade.

6. Board surface: Smooth.

C. Plywood:

1. Exterior type softwood plywood, PS 1-66.

2. Each panel stamped or branded indicating veneer grades, species, type and identification.

3. Wood faced plywood for Architectural concrete surfaces.

a. Panel veneer grades: B-C.

b. Mill-oiled sides and mill-sealed edges of panels.

D. Ties:

1. Material: Steel

2. Type: Snap ties

3. Depth of breakback: 1 in.

4. Maximum diameter, 1/4 in.

E. Form Coatings:

1. Non-staining type.

2. Agent: Pine oil derivative.

2.07 EXPANSION AND CONTRACTION JOINTS

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

2.08 OTHER

A. Water: Clean and potable.

## PART 3 - EXECUTION

### 3.01 BARRICADES

A. Provide substantial temporary barricades around all areas of operation and maintain until work under this Section is completed and approved.

B. Install temporary traffic, markers, signals, and signs as per D.O.T. Standard Specifications to:

1. Eliminate potentially hazardous conditions.

2. Maintain adequate traffic patterns free of conflict with work under this Contract.

### 3.02 PREPARATION OF SUBGRADE

A. Ensure rough grading has brought subgrade to required elevations.

B. Fill soft spots and hollows with additional fill, without organics.

C. Level and compact subgrade, to receive limerock base for concrete walks, curbs and gutters, to 98% compaction as per AASHTO T-180.

### 3.03 FORMWORK

A. CONTRACTOR is responsible for the design, construction, removal and complete safety of formwork and shoring.

B. Form construction shall be provided to shape, lines dimensions of members shown: substantial, tight enough to prevent leakage, and properly braced or tied to maintain position and size, form sides and bottoms of members unless specifically excepted.

C. Fill voids of plywood joints with sealant and tool smooth.

D. Form vertical surfaces to full depth and securely position to required lines and levels. Ensure form ties are not placed so as to pass through concrete.

E. Arrange and assemble formwork to permit easy dismantling and stripping, and to prevent damage to concrete during formwork removal.

### 3.04 REINFORCING

A. Reinforce concrete curbs and gutters. Allow for minimum 1-1/2 inch concrete cover.

B. Do not extend reinforcing through expansion and contraction of joints. Provide doweled joints through expansion and contraction joints, with one end of dowels fitted with capping sleeve to allow free movement.

3.05 FORMING EXPANSION AND CONTRACTION JOINTS

A. Place expansion and contraction joints at 20 foot intervals or as indicated on drawings. Where possible, make joints of curbs coincide with joints in paving slabs. When sidewalks abut building, provide continuous joint filled.

B. Fill joints with filler of required profiles, set perpendicular to longitudinal axis of walks, curbs and gutters. Recess 1/2 inch below finished concrete surface.

3.06 INSPECTION

A. Assure that excavation and form work are completed, and excess water is removed.

B. Check that reinforcement is secured in place.

C. Verify that expansion joint material, anchors, and other embedded items are secured in position.

3.07 PREPARATION FOR PLACEMENT

A. Notify the ENGINEER and other inspectors at least 96 hours prior to inspection.

B. Equipment forms, and reinforcing shall be clean and wet down, reinforcing firmly secured in place, runways set up and not resting on or displacing reinforcing.

3.08 PLACING CONCRETE

A. Place concrete, screed and wood float surfaces to a smooth and uniform finish, free of open texturing and exposed aggregate.

B. Avoid working mortar to surface.

C. Round all edges, including edges of expansion and contraction joints, with 1/2 inch of radius edging tool.

D. Where concrete curbs are adjacent to pavement slabs, make concrete curbs and gutters integral with slabs. Make expansion and contraction joints of curbs coincide with slab joints.

E. Ensure finished surfaces do not vary from true lines, levels or grade by more than 1/8 inch in 10 feet when measured with straightedge.

F. Apply curing compound on finished surfaces immediately after finishing. Apply in accordance with manufacturer's recommendations.

3.09 PROTECTION OF COMPLETED WORK

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

3.10 CLEAN UP

A. Remove all debris and excess material immediately from project site.

B. Take down all barricades and temporary traffic markers, signals and signs only after all work included in this section is finished and inspected, and only after so directed by OWNER's Representative.

C. Leave project area neat, orderly and free of any hazardous conditions.

END OF SECTION

# SECTION 02520
# 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 02580
# PAVEMENT MARKING AND POST SIGNS

## PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Pavement marking.
2. Protection of painted markings.
3. Aluminum or steel sign panels and posts.
4. Exterior signage indicated on the drawings and specified in this section.

B. Related Sections:

1. Asphaltic Concrete Pavement - Section 02513.
2. Cast-In Place Concrete - Section 03300.

1.03 SUBMITTALS

A. Submit properly identified manufactures product data and technical data prior to starting work for review and acceptance of all components to be used.

B. Submit shop drawings for review, indicating construction details, sizes, elevations, installation requirements, gages, thickness of materials, color and other information necessary to show compliance with the requirements of this section.

C. Submit paint tests, as specified in Section 971 of FDOT Specifications and as applicable to hereinafter specified material.

1.04 QUALITY ASSURANCE

A. All signage must comply with the latest edition of the Florida Building Code and all referenced standards included therein as well as all other applicable code ordinances.

B. Work shall be performed in accordance with the Contract Documents in a neat and accurate manner.

C. All equipment shall be of type and design that will readily obtain the required uniformity of application of the pavement markings both as to thickness of coating and as to alignment.

D. Applicable Publications: The following publications of the issue listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

1. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction. (Latest Edition)

2. Manual on Uniform Traffic Control Devices for Streets and Highways published by the U.S. Department of Transportation, Federal Highway Administration, (Latest Edition)

3. Broward County Administrative Code "Minimum Standards". (Latest Edition)

1.05 REFERENCES

A. Applicable Publications: The following publications of issues listed below referred to elsewhere by basic designation only, form a part of this specification to the extent indicated by references thereto:

1. Manual on Uniform Traffic Control Devices, U.S. Department of Transportation, Federal Highway Administration, (Latest Edition)
2. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction, (Latest Edition)
3. Broward County Administrative Code "Minimum Standards". (Latest Edition)

B. When reference is made herein to the FDOT Specifications delete therefrom the basis of payment and other pay measurement requirements. Payment for the work specified in this section will be included as part of the lump sum bid for the entire project in accordance with the contract documents. When the word "ENGINEER" occurs therein, substitute the words "Architect-Engineer".

**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 and Broward County Standards.

C. Reflectors: In accord with Broward 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 or Broward County Administrative Code "Minimum Standards"
2. Size, shape and color as indicated on the drawings or as directed by Architect-Engineer

E. Sign Support Posts (Unless noted otherwise on Drawings):

1. Aluminum or Galvanized Steel in accordance with the applicable requirements of Section 700 "Highway Signing" of the FDOT Specifications or Standard Road Details and Specifications (DCPWD).
2. Size, shape and color of posts and mountings as indicated on drawings or as directed by Architect-Engineer.

## PART 3 - EXECUTION

3.01 INSPECTION

Do not proceed with the work in this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 SIGN PANELS AND SUPPORT INSTALLATION

A. Secure breakaway sign post assembly to concrete substrate and sign panel to aluminum posts according to FDOT and Broward County recommendations

1. Section 700 "Highway Signing" of FDOT Specifications
2. Manual on Uniform Traffic Control Devices
3. Broward County Administrative Code "Minimum Standards"

B. Approved shop drawings and as indicated on drawings

3.03 PAVEMENT MARKINGS

A. Sweep dust and loose material from the sealed surface.

B. Apply paint striping as indicated on the drawings, with suitable mechanical equipment to produce uniform straight edges.

1. Apply in not less than (2) two coats as per manufacturer's recommended rates of applications.

C. Protect pavement markings until completely dry in accordance with manufacturer's recommendations.

D. Time of Application: Painting shall be done only during daylight hours and, as far as practical, shall be terminated in time to permit sufficient drying by sunset.

E. Weather Limitations: No paint shall be applied when any moisture is present on the surface to be painted or when the air temperature is below 40 degrees F. Painting shall not be done when winds are sufficient to cause spray dust.

F. Preparation of Surface to be painted: 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 soil shall be removed from the pavement before striping is begun.

G. Mixing Paint: 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 the machine shall be thoroughly cleaned with paint thinner or other suitable cleaner.

H. Paint Application: The traffic markings shall be of the specified dimensions with clean, true edges and without sharp breaks in the alignment. A uniform coating of paint shall be obtained and the finished markings shall contain no light spots or paint skips. Any stripes that do not have a uniform, satisfactory appearance, both day and night, shall be corrected.

I. Rate of Paint Application: The minimum rate of application for paint shall be as follows:

1. Six inch solid parking stalls stripes: 18.5 gallons per mile.
2. Any other width stripe or marking: A direct proportion of the above.

J. Required Film Thickness: The minimum wet film thickness for all painted areas shall be 15 mils.

K. Alignment of Stripes: Where a stripe deviates from the correct alignment, as indicated by the string line, by more than one inch in any 20 foot length, it shall be obliterated and the stripe corrected hereinafter as specified in paragraph "Corrective Measures".

## 3.04 PROTECTION OF PAINTED MARKINGS

A. Protection of Stripes: All newly painted stripes, or other markings, shall be protected until the paint is sufficiently dry to permit vehicles to cross the marking without damage from the tires.

B. Repair of Damaged Areas: Any portions of the stripes damaged by passing traffic or from any other cause shall be repainted at the Contractor's expense.

3.05 DIMENSION AND ALIGNMENT TOLERANCE

A. Dimensions: No marking shall be less than the specified width. No markings shall exceed the specified width by more than 1/2 inch. Alignment tolerances shall be as specified herein.

B. Correction Rates: Any corrections of variation in the width of the alignment of stripes shall not be made abruptly but the stripes shall be returned to the design width at the rate of at least 10 feet for each 1/2 inch of correction.

3.06 CORRECTIVE MEASURES:

A. All painted markings which fail to meet the specifications, including the permissible tolerances and the appearance requirements, or are marred or damaged shall be corrected at the Contractor's expense.

1. All drip and spattered paint shall be removed. When it is necessary to remove paint, it shall be done by means that will not damage the underlying surface of the pavement. When necessary to correct a deviation that exceeds the permissible tolerance in alignment, that portion of the stripe affected shall be removed and repainted in accordance with these specifications.

B. Corrective Devices: Misalignment, defective surfaces, etc., shall be corrected by chemical agents, or by any other type of mechanical device which will effectively remove the paint without damage to the pavement surface, or prevent the reapplication of markings.

3.07 SPARE PAINT

A. Provide the Owner with a minimum of 5 gallons of Traffic Paint from the same batch used in application of pavement markings. Also provide paint specifications and the manufacturer's identification number of the paint used.

END OF SECTION

# SECTION 02720
# STORM DRAINAGE SYSTEM

## PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

The extent of the storm drainage system is shown on the drawings and/or specified.

1.02 RELATED WORK

A. Section 02110: Clearing and Grubbing

B. Section 02220: Trenching, Backfilling and Compacting

1.03 SUBMITTALS

A. Submit shop drawings for pipe, inlets, manholes, frames and covers.

## PART 2 - PRODUCTS

2.01 HIGH DENSITY POLYETHYLENE PIPE

A. High Density Polyethylene Pipe (HDPE) sizes twelve (12) – thirty-six (36) inches, shall be corrugated type, smooth interior, conforming to ASTM F405, ASTM F667, AASHTO M252 and AASHTO M294 as manufactured by Advanced Drainage Systems or approved equal.

B. Basic Material:

1. Extruded Pipe and Blow Molded Fittings: Pipe and fittings shall be made of virgin PE compounds which conform with the requirements for Type III, Category 4 or 5, Grade P33, Class C; or Grade P34, Class C, as defined and described in ASTM D 1248.

2. Rotational Molded Pipe and Fittings: Pipe and fittings shall be made of virgin PE compounds which conform with the requirements of Type III, Category 3, Grade P33, Class C; or Grade P34, Class C, as defined and described in ASTM D 1248.

C. Corrugated Polyethylene Pipe shall meet the requirements as describe in ASTM D 2412 for pipe stiffness.

D. Corrugated Polyethylene Pipe shall be in accordance for brittleness with ASTM D 2444.

E. Fitting Requirements:

1. The fittings shall not reduce or impair the overall integrity or function of the pipe line.

2. Couplings shall be corrugated to match the pipe corrugations and shall provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joints. Couplings shall be bell and spigot, split collar, or screw-on collar. Split collar couplings shall engage at least one full corrugation on each pipe section and screw on collars shall be in width at least one-half the nominal diameter of the pipe.

3. HDPE pipe joints shall be of a rubber or neoprene gasket designed to secure a soil tight joint.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. Piping and appurtenances for sewers shall be of the type and material specified in the applicable sections of the Detailed Specifications. All pipes, fittings, jointing materials, grates, manhole frames and covers, and other appurtenances shall be new material to be included in the work; and if not specifically described in these specifications, shall be of the best quality and entirely suitable for the service intended. All such material shall be approved by the engineer prior to installation.

B. Pipe shall be protected during storage and handling against impact shocks, or free fall. Pipe shall be kept clean at all times and no pipe shall be used that does not conform fully to standards or specifications hereinafter described.

C. Each pipe section shall be laid in strict conformance with the line and grade as shown on the construction plans. Three (3) batter boards and a top line shall be used when pipe is laid, unless another method of checking the inner grade is approved by the engineer. The laying of pipe in finished trenches shall commence at the lowest point with the bell end laid upgrade.

D. The contractor shall provide and maintain on the job site at all times, a gauge rod of sufficient length to reach from the invert of the pipe being laid to the top line secured on the batter boards. The gauge rod shall be graduated and numbered each foot of its entire length and shall be equipped with either a plumb line or two (2) spirit levels.

E. Construction using any of the several type laser beam devices is generally acceptable provided same is in good repair and calibration and a level and level rod is used to check for grade at catch basins, manholes and outfalls. Use of levels and/or transits alone is discouraged and generally will not be permitted.

F. Prior to installing the pipe, the rubber gasket shall be placed on the tongue of the pipe, in accordance with the manufacturer's recommendations, but not more than twenty-four (24) hours prior to installation of the pipe. The tongue end shall be protected at all times from the sun, blowing dust, or other deleterious agents. Gaskets shall be inspected before installation of the pipe and any loose or improperly affixed gaskets shall be removed and replaced to the satisfaction of the engineer.

G. Pipe shall be set firmly according to the lines and grade; and preparatory to making joints for concrete pipe, all surfaces of the portion of the pipe to be jointed shall be thoroughly cleaned. The pipe shall be laid with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint.

H. Immediately prior to installation, the entire interior of the groove of the pipe already installed, and the rubber gasket of the pipe to be installed shall be coated with an approved vegetable soap lubricant. The groove and spigot ends shall be cleaned prior to application of the lubricant. The pipe shall then be aligned with the previously installed pipe and the joint pulled together. The joint shall be pulled by the use of interior or exterior pull jacks or winches, anchored by suitable means. The choice of method and type of equipment will depend on trench conditions, type and size of pipe, and its ability to properly seat the gasket. If, while making the joint, the gasket becomes loose and can be seen through the exterior joint recess, when the joint is pulled up to within one (1) inch of closure, the pipe shall be removed and the joint remade to the satisfaction of the engineer.

## 3.02 EARTHWORK

Excavation of trenches, preparation of trench bottoms, backfilling and other earthwork in connection with installation of storm sewers shall be in accordance with the section: 02220 Trenching, Backfilling and Compacting for piping systems.

## 3.03 RESPONSIBILITY

The contractor shall be held strictly responsible for all parts of the work that bear the load of the backfill. If structural failures in the sewers or appurtenances develop within one (1) year from the date of final acceptance of the work, the contractor shall be required to replace all faulty material at his full expense. To this end, the contractor is advised to purchase material under a guarantee from the manufacturer, guaranteeing proper service under conditions which are established by the drawings, specifications and local conditions.

END OF SECTION

# SECTION 02730
# EXFILTRATION TRENCH

## PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

Construct exfiltration trenches, utilizing one of the authorized types of pipe, with coarse aggregate, or ballast rock when specified, and filter fabric.

## PART 2 - PRODUCTS

2.01 PIPE

A. Pipes furnished shall be:

1. Polyvinyl Chloride (PVC) Pipe

2.02 COARSE AGGREGATE

A. No. 4 stone.

2.03 SELECT FILL

A. Use select fill meeting the requirements shown in the Plans.

## PART 3 – EXECUTION

3.01 EXCAVATING TRENCH

A. Carefully excavate the trench to such depths as required to permit the filter fabric, coarse aggregate and the pipe to be placed in accordance with the details shown in the Plans.

3.02 LAYING PIPE

A. Lay all pipe conforming with the lines and grades specified in the Plans and in accordance with these Specifications. Unless otherwise specified in the Plans, set the pipe with a 36 inch minimum cover and a maximum cover of 66 inches.

3.03 PLACING COARSE AGGREGATE AND BACKFILLING

A. After placing the pipe and without disturbing the pipe, carefully place the coarse aggregate around the pipe to a depth shown in the Plans. Fold the filter fabric over the coarse aggregate. Backfill and compact as described below.

3.04 EXFILTRATION TRENCH UNDER PAVEMENT

A. Fill the area above the coarse aggregate with select fill material. Place and compact the select fill according to the requirements for pipe. Additional coarse aggregate is allowed over the top of the pipe instead of select fill material. In this case, the filter fabric shall be extended to wrap the additional course aggregate. The top of the coarse aggregate shall not be higher than the bottom of the base, unless shown in the Plans. No additional costs associated with substituting coarse aggregate for select fill will be paid.

3.05 EXILFTRATION TRENCH NOT UNDER PAVEMENT:

A. Fill and compact the area above the coarse aggregate according to the requirements for pipe, unless specific procedures are described in the Plans.

3.06 METHOD OF MEASUREMENT.

A. The quantity of exfiltration trenches to be paid for under this Section will be the length in feet, measured in place, completed and accepted as specified on Standard Plans.

3.06 BASIS OF PAYMENT

A. The quantities determined as provided above will be paid for at the Contract unit price per foot for exfiltration trenches. Such prices and payments will be full compensation for all the work specified in this Section and will include all materials and all excavation, and will also include sheeting or shoring, if required, the disposal of surplus material, pavement restoration, backfilling and tamping, but will not include payment for items paid for elsewhere in the specifications.

END OF SECTION

# SECTION 02950
# LANDSCAPE SPECIFICATIONS

## 1.01 SCOPE OF WORK

A. The work consists of: furnishing all labor, materials, equipment, tools, transportation, and any other appurtenances necessary for the completion of this project as shown on the drawings, as included in the plant list, and as herein specified.

B. Work shall include maintenance and watering of all contract planting areas until certification of acceptability by the owner.

## 1.02 PROTECTION OF EXISTING STRUCTURES

A. All existing buildings, walks, walls, paving, piping, other site construction items, and planting already completed or established shall be protected from damage by the contractor unless otherwise specified. All damage resulting from negligence shall be repaired or replaced to the satisfaction of the owner, at no cost to the owner.

## 1.03 PROTECTION OF EXISTING MATERIALS OUTSIDE LIMIT OF WORK

A. The contractor shall be responsible for all unauthorized cutting or damage to trees and shrubs existing or otherwise, caused by careless equipment operation, material stockpiling, etc. This shall include compaction by driving or parking inside the drip-line and spilling oil, gasoline, or other deleterious materials within the drip-line. No materials shall be burned where heat will damage any plant. Existing trees killed or damaged so that they are misshapen and/ or unsightly shall be replaced at the cost to the contractor of one hundred dollars ($100) per caliper inch on an escalating scale which adds an additional twenty (20) percent per inch over four (4) inches caliper as fixed and agreed liquidated damages. Caliper shall be measured six (6) inches above ground level for trees up to and including four (4) inches in caliper and twelve (12) inches above ground level for trees over four (4) inches in caliper.

## 1.04 MATERIALS

A. General materials listed below shall be submitted for approval. Upon submittals' approval, delivery of materials may commence.

| Material | submittal |
|---|---|
| Mulch | product data |
| Topsoil Mix | amendment mix/ product data/ test results |
| Plants | photographs of one (1) of each species (or tagged in nursery) client-requested tagging may substitute photos. Indicate sizes (height/width) and quality per spec. |
| Fertilizer | product data |
| Inoculant | product data |