TECHNICAL SPECIFICATIONS

FOR

Avalon North and Latitude Water and Sewer Service Extension
and
Pope John Paul II Blvd Water Main Extension

POTABLE WATER AND SANITARY SEWER CONSTRUCTION

PREPARED FOR:

Ave Maria Utility Company
5078 Pope John Paul II Blvd, Suite 202
Ave Maria, FL 34142

PREPARED BY:

Peninsula Engineering
2600 Golden Gate Parkway
Naples, Florida 34105

July 2025

FOR BIDDING PURPOSES ONLY

Conner J. Jones, P.E.
License #99495
Florida Certificate of Authorization #28275

TABLE OF CONTENTS

DIVISION 33 – UTILITIES

All water and sewer facilities shall be constructed in accordance with UTILITY standards and specifications / standards manual and FDEP regulations (latest editions), unless otherwise indicated.

SECTION 33 41 00	SUBDRAINAGE
SECTION 33 42 00	STORMWATER CONVEYANCE

DIVISION 41 – MATERIAL PROCESSING AND HANDLING EQUIPMENT

SECTION 41 00 00	MATERIAL PROCESSING AND HANDLING EQUIPMENT

SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop Drawing submittal procedures.

1.02 PROCEDURES

A. Deliver one electronic copy of Submittals to OWNER or DESIGNER at address listed on cover sheet of Specifications.

B. Transmit each item under OWNER Accepted Form. Identify Project, CONTRACTOR, Sub-CONTRACTOR, and major supplier. Identify pertinent Drawing Sheet and Specification Section number as appropriate. Identify deviations from Contract Documents. Approve all Submittals prior to forwarding to OWNER by stamping and signing approval stamp. Provide space for CONTRACTOR, DESIGNER, and OWNER review stamps.

C. After OWNER review of Submittal, revise and resubmit as required, identifying changes made since previous Submittal.

D. Distribute copies of reviewed Submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

PART 2 PRODUCTS

2.01 SHOP DRAWING SUBMITTAL

A. Items required by the Drawings and/or Specifications:

1. Drainage structures.
2. Sanitary Sewer structures
3. Full Pump Station design

PART 3 EXECUTION (Not Used)

END OF SECTION 01 33 23

SECTION 01 42 13
ABBREVIATIONS AND ACRONYMS

PART 1 GENERAL

1.01 DEFINITION

Abbreviations and Names: Trade association names, titles of general standards, and names and titles of government agencies are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in ebook format and most libraries.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABMA	American Bearing Manufacturers Association (fka Anti-Friction Bearing Manufacturers Association)
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ACPA	American Concrete Pipe Association
ADC	Air Duct Council (fka Air Diffusion Council)
AFPA	American Forest and Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects
AIA	American Insurance Association
AIHA	American Industrial Hygiene Association
AISC	American Institute of Steel Construction

AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALI	Associated Laboratories, Inc.
ALSC	American Lumber Standards Committee
AMCA	Air Movement and Control Association International
AMPP	Association for Materials Protection and Performance
ANSI	American National Standards Institute
AOAC	Association of Official Analytical Chemists International
AOSA	Association of Official Seed Analysts
APA	Engineered Wood Association
API	American Petroleum Institute
AREMA	American Railway Engineering and Maintenance-of-Way Association
ARHI	Air Conditioning, Heating and Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASA	Acoustical Society of America
ASA	American Standards Association
ASC	Adhesive and Sealant Council
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
ATIS	Alliance of Telecommunication Industry Solutions
AWG	American Wire Gage
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association (fka American Wood Preservers Association)
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association

BIFMA	Business and Institutional Furniture Manufacturers Association
CAGI	Compressed Air & Gas Institute
CAUS	Color Association of the United States
CBMA	Certified Ballast Manufacturers Association
CCC	Carpet Cushion Council
CDA	Copper Development Association
COE	Corps of Engineers (also listed as USACOE or ACOE)
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CISCA	Ceiling and Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CMHA	Concrete Masonry & Hardscapes Association
CPSC	Consumer Product Safety Commission
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard of NIST (U.S. Dept. of Commerce)
CTIOA	Ceramic Tile Institute of America
DCA	Department of Community Affairs
DEP	Department of Environmental Protection
DHA	Decorative Hardwoods Asociation
DHI	Door and Hardware Institute
DOC	U.S. Department of Commerce
DOT	Department of Transportation
DRI	Development of Regional Impact
ECIA	Electronic Components Industry Association
EIFS	Exterior Insulation and Finish Systems
EIMA	EIFS Industry members Association
EJMA	Expansion Joint Manufacturers Association
EPA	U.S. Environmental Protection Agency
ERP	Environmental Resource Permit
FAA	Federal Aviation Administration

FCC	Federal Communications Commission
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FDOTSPEC	FDOT Standard Specifications for Road and Bridge Construction
FGIA	Fenestration & Glazing Industry Alliance
FGMA	Flat Glass Marketing Association
FHA	Federal Housing Administration
FM	Factory Mutual Research Organization
FS	Federal Specifications
FSC	Forest Stewardship Council
FTI	Facing Tile Institute
GA	Gypsum Association
GSA	General Services Administration
HEI	Heat Exchange Institute
HI	Hydronics Institute
H.I.	Hydraulic Institute
HMA	Hardwood Manufacturers Association
ICEA	Insulated Cable Engineers Association, Inc.
IEEE	Institute of Electrical and Electronic Engineers, Inc.
IESNA	Illuminating Engineering Society of North American
IGCC	Insulating Glass Certification Council
IIDA	International Interior Design Association
ILI	Indiana Limestone Institute of America
IMSA	International Municipal Signal Association
IRI	Industrial Risk Insurers
ISA	International Society of Automation
ITE	Institute of Transportation Engineers
LEED™	Leadership in Energy and Environmental Design
LIA	Lead Industries Association, Inc.
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturer's Association

MCAA	Mechanical Contractors Association of America
MFMA	Maple Flooring Manufacturers Association
MIA	Masonry Institute of America
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
MUTCD	Manual on Uniform Traffic Control Devices
NAAMM	National Association of Architectural Metal Manufacturers
NAIMA	North American Insulation Manufacturers Association
NALP	National Association of Landscape Professionals
NAPA	National Asphalt Pavement Association
NCRP	National Council on Radiation Protection and Measurements
NCSPA	National Corrugated Steel Pipe Association
NEC	National Electrical Code (Published by NFPA)
NECA	National Electrical Contractors Association
NEII	National Elevator Industry, Inc.
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFPA	National Fire Protection Association
NHLA	National Hardwood Lumber Association
NIST	National Institute of Standards and Technology
NLGA	National Lumber Grades Authority
NPA	National Particleboard Association
NPCA	National Paint and Coatings Association
NRCA	National Roofing Contractors Association
NSI	Natural Stone Institute
NWFA	National Wood Flooring Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PDA	Preliminary Development Agreement
PDI	Plumbing and Drainage Institute
PE	Professional Engineer

PLIB	Pacific Lumber Inspection Bureau
PSM	Licensed Professional Surveyor and Mapper
REA	Rural Electrification Administration
RFCI	Resilient Floor Covering Institute
SDI	Steel Deck Institute
SDP	Site Development Permit
SFIA	Steel Framing Industry Association
SFPA	Southern Forest Products Association
SFWMD	South Florida Water Management District
SGCC	Safety Glazing Certification Council
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPIB	Southern Pine Inspection Bureau
SPRI	Single Ply Roofing Institute
SRA	Stewardship Receiving Area
SSA	Stewardship Sending Area
SSPMA	Sump and Sewage Pump Manufacturers Association
SWI	Steel Window Institute
SWPA	Submersible Wastewater Pump Association
TCNA	Tile Council of North America
TIMSA	Thermal Insulation Manufacturers and Suppliers Association
TPI	Truss Plate Institute
UL	UL Solutions (fka Underwriters Laboratory, Inc.)
USDA	U. S. Department of Agriculture
USGBC	U. S. Green Building Council
USPS	U. S. Postal Service
USTMA	U.S. Tire Manufacturers Association
WA	Wallcoverings Association
WCC	Wall & Ceiling Conference
WCMA	Window Covering Manufacturers Association
WDMA	Window & Door Manufacturers Association

WRI	Wire Reinforcement Institute
WSC	Water Systems Council
W.W.P.A.	Woven Wire Products Association
WWPI	Western Wood Preservers Institute

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION 01 42 13

SECTION 01 42 16
DEFINITIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Supplementary Conditions and other Division 1 Specifications apply to this Section.

1.02 DEFINITION

A. Approved: The term approved, when used in conjunction with the Owner's Representative's action on the CONTRACTOR'S submittals, applications, and requests, is limited to the Owner's Representative's duties and responsibilities as stated in the Conditions of the Contract. A stamp reading "No Exceptions Taken" shall have the same intent as "Approved".

B. CONTRACTOR: shall indicate the company solicited for bid and/or the company who has entered into a contractual agreement for construction services with the OWNER.

C. DESIGNER: shall indicate the Licensed Professional whose valid signature and seal appear on the approved plan set and is responsible for issuing project completion and certification(s) at the end of construction.

D. Furnish: The term furnish means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

E. Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

F. Install: The term install describes operations at the Project site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

G. Installer: An Installer is the CONTRACTOR or another entity engaged by the CONTRACTOR, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in operations they are engaged to perform.

H. OWNER: shall indicate the property owner, the project developer, or their agent/representative of the subject project.

I. Project Site: The space available to the CONTRACTOR for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

J. Provide: The term provide means to furnish and install, complete and ready for the intended use.

K. Regulations: The term regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

L. Trades: Using terms such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.

M. UTILITY: shall indicate the utility jurisdictional and/or permitting agency, or dry utility company, where the subject project is located. Any UTILITY standards and specifications, standards manuals, etc. shall be the latest adopted version in effect at the time of permit approvals.

1.03 INDUSTRY STANDARDS

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.

C. Conflicting Requirements: Where compliance with two or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer to the OWNER for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION 01 42 16

SECTION 01 42 19
REFERENCE STANDARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Supplementary Conditions and other Division 1 Specifications apply to this Section.

1.02 REFERENCE STANDARDS

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with the standards in effect as of the date of the Approved Permits and/or commencement of construction, whichever is more restrictive.

C. Conflicting Requirements: Where compliance with two or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer to the OWNER for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION 01 42 19

SECTION 01 45 23
TESTING AND INSPECTING SERVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Responsibilities of the CONTRACTOR, DESIGNER, and Testing Laboratory regarding specified tests.

B. Report Specifications.

1.02 SELECTION AND PAYMENT

A. Unless otherwise stated in the Contract Documents, the OWNER will select and pay for the services of an independent testing laboratory to perform tests required by the technical specifications.

B. Cost of retest due to failures shall be paid for by the CONTRACTOR in the form of a deduction from the contract amount.

C. Utilization of a testing laboratory shall in no way relieve the CONTRACTOR of any obligation to perform work in accordance with the requirements of the Contract Documents.

1.03 SCHEDULING TESTS

A. The OWNER will furnish the name of the testing laboratory to the CONTRACTOR at the Preconstruction Conference.

B. The CONTRACTOR shall be responsible for scheduling each test by notifying the designated laboratory 24 hours prior to the time the test is to be taken.

C. The specific requirements including the type and amount of testing shall be in accordance with the technical specifications or as otherwise stated in the Contract Documents.

D. Ample time shall be allowed for the testing process by the CONTRACTOR, since an extension of time will not be allowed for testing delays or retest due to failures.

1.04 QUALITY ASSURANCE

A. All tests shall be performed by qualified personnel under the direction and control of the professional DESIGNER registered in the State of Florida and specializing in Geotechnical or Material analysis as applicable.

B. In addition to the tests required by the Contract Documents, the OWNER may direct the testing laboratory to take any other tests or material inspections that he feels necessary to achieve the quality of construction that is specified in the Contract Documents.

1.05 LABORATORY RESPONSIBILITIES

A. Perform inspection, sampling, and testing in accordance with the Contract Documents.

B. Provide qualified personnel to perform all phases of required services and cooperate with OWNER and CONTRACTOR in the performance of those services.

C. Ascertain compliance of materials and related procedures with requirements of the Contract Documents.

D. Promptly notify the CONTRACTOR and the OWNER of any irregularities or non-conformance of work, materials, or product.

E. Perform additional inspections or tests requested by the OWNER.

F. Attend pre-construction conferences and progress meetings.

1.06 LABORATORY REPORTS

A. After each inspection or test, promptly submit a laboratory report to the OWNER and the CONTRACTOR.

B. The report shall include the following:

1. Date of report.

2. Project title and number.

3. Date, time, and location of each sample extraction or inspection.

4. Identification of material and method of test.

5. Results of tests.

6. Evaluation of conformance to Contract specifications.

7. Notification of retest requirement due to test failure.

1.07 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke or alter the requirements of the Contract Documents.

B. Laboratory may not approve or accept any portion of the work.

C. Laboratory may not assume any duties of the CONTRACTOR.

D. Laboratory has no authority to stop the work.

1.08 CONTRACTOR RESPONSIBILITIES

A. Submit proposed mix designs and samples of proposed materials to the designated laboratory as required by the Contract Documents or as requested by the OWNER.

B. Provide access to the site for any tests or inspections.

C. Provide labor and facilities to obtain, handle, store, and cure test samples and to facilitate material inspection.

D. Cooperate with laboratory personnel to maximize the efficiency of the testing procedure by periodically updating the construction schedule and adhering to the 24-hour advance notice requirement for tests.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 BASIS OF PAYMENT

A. In accordance with Article 1.02 SELECTION AND PAYMENT of this Section.

END OF SECTION 01 45 23

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 REQUIREMENTS

A. Furnish, install, maintain and remove temporary utilities required for construction. See other sections for additional utilities coordination.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with National Electrical Code (NEC).

B. Comply with Federal, State, and local codes and regulations and with UTILITY requirements.

C. Comply with Health Department Regulations of authority having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Materials may be new or used but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

A. Arrange with UTILITY and OWNER to provide service required for power and lighting and pay all costs for service and for power used in the construction, testing and trial operation prior to final acceptance of the work by the OWNER as stipulated by the DESIGNER.

B. Install circuit and branch wiring, with area distribution boxes located so that power and lighting are available throughout the construction by the use of construction type power cords.

C. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work, and for areas accessible to the public.

2.03 TEMPORARY HEAT AND VENTILATION

A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage due to temperature or humidity.

B. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors or gases.

C. Portable heaters shall be standard approved units complete with controls.

D. Pay all costs of installation, maintenance, operation and removal, and for fuel consumed.

E. Provide connections to existing facilities, extend and supplement with temporary units as required to comply with requirements. Pay all costs of installation, maintenance, operation and removal.

2.04 TEMPORARY TELEPHONE SERVICE

A. Arrange with local telephone service company.

B. Pay all costs for installation, maintenance and removal, and service charges.

2.05 TEMPORARY WATER

A. Provide and pay for all required water for construction and consumptive purposes.

B. CONTRACTOR may utilize existing on-site water supply system for water needed for construction purposes. However, all water used shall be coordinated with the utility company.

2.06 TEMPORARY SANITARY FACILITIES

A. Provide sanitary facilities in compliance with laws and regulations.

B. Service, clean and maintain facilities and enclosures.

2.07 EROSION AND PROPERTY CONTROL

A. Flow of drains and sewers maintained: Adequate provisions shall be made for the flow of sewers, drains and water courses encountered during construction, and the lines and structures which may have been disturbed shall be immediately restored to their original condition at the expense of the CONTRACTOR.

B. Property Protection: Trees, grass, fences, signboards, poles and all other property shall be protected unless their removal is authorized; and any property damage shall be satisfactorily restored by the CONTRACTOR and at the expense of the CONTRACTOR.

C. Provide all means necessary for prevention, control and abatement of erosion, siltation and water pollution resulting from construction until final acceptance by OWNER. Provide for mulching, sodding, sandbagging, berms, slope drains, sedimentation structures, or other devices necessary to meet local, State and Federal regulation.

2.08 CLEANING DURING CONSTRUCTION

A. Control accumulation of waste materials and rubbish; periodically dispose of off-site.

B. Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

2.09 CHEMICALS, HAZARDOUS WASTES, AND PETROLEUM PRODUCTS

A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with manufacturer's instructions or government regulations as applicable. The CONTRACTOR shall legally dispose of and clean the project site of all chemicals, hazardous wastes, and petroleum products placed or used on the site by the CONTRACTOR.

PART 3 EXECUTION

3.01. REMOVAL

A. Completely remove temporary materials and equipment when their use is no longer required as determined by the DESIGNER.

B. Clean and repair damage caused by temporary installations or use of temporary facilities.

C. Restore permanent facilities used for temporary services to a specified condition.

END OF SECTION 01 50 00

SECTION 01 55 26
TRAFFIC CONTROL

PART I GENERAL

1.01 SCOPE

A. Work specified in this Section consists of maintaining traffic within limits of the project for the duration of the construction period, including any temporary suspensions of the work. It shall include construction and maintenance of any detour facilities, providing of necessary facilities for access to residences, businesses, etc., along the project, furnishing, installing and maintaining of traffic control and safety devices during construction, control of dust, and any other special requirements for safe and expeditious movement of traffic as may be called for on the Plans. The term, Maintenance of Traffic, as used herein, shall include all such facilities, devices and operations as required for the safety and convenience of the public, as well as for minimizing public nuisance; all as specified in this Section.

B. Sections Not Requiring Traffic Maintenance: In general, CONTRACTOR will not be required to maintain traffic over those portions of the project where no work is to be accomplished, or where construction operations will not affect existing roads. CONTRACTOR, however, shall not obstruct nor create a hazard to any traffic during construction, and shall be responsible for repair of any damage to existing pavement or facilities caused by his operations.

C. Beginning Date of CONTRACTOR's Responsibility: The CONTRACTOR's responsibility for maintenance of traffic shall begin on the day he starts work on the project or on the first day contract time is charged, whichever is earlier.

1.02 SPECIFICATIONS AND STANDARDS

A. The Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD), Part VI is the minimum standards for Traffic Control for Highway Construction Maintenance, and Utility Operations. It sets forth the basic principles and prescribes minimum standards to be followed in the design, application, installation, maintenance and removal of all traffic control devices and all warning devices and barriers which are necessary to protect the public and workers from hazards within the project limits. The standards established in the aforementioned manual constitute the minimum requirements for normal conditions, and additional traffic control devices, warning devices, barriers or other safety devices will be required where unusual, complex or particularly hazardous conditions exist.

B. In addition to the MUTCD stated above, more specific criteria are established in the latest edition of the Florida Department of Transportation booklet "Standard Plans for Road Construction". The 102 series of indexes under "Maintenance of Traffic" in this booklet shall govern all "Traffic Control Plans" or safety procedures for this project.

C. All references to "FDOTSPEC" shall mean the latest edition of the "Florida Department of Transportation Standard Specifications for Road and Bridge Construction".

PART 2 PRODUCTS

2.01 MATERIALS

A. Traffic Control devices shall meet the requirements of the applicable Sections of FDOTSPEC.

PART 3 EXECUTION

3.01 REQUIREMENTS

A. Maintenance of Roadway Surfaces: All lanes used for maintenance of traffic, including those on detours and temporary facilities, shall be adequately maintained, with a substantial surface under all weather conditions. Lanes shall be kept reasonably free of dust and, when necessary to accomplish this, sprinkled with water or other approved dust palliative applied. Lanes on which traffic is to be maintained shall be constructed of materials compatible to local conditions and provided with drainage facilities necessary to maintain an adequately substantial, relatively smooth riding surface under all weather conditions.

B. Number of Traffic Lanes:

Except as otherwise specified in the Contract Documents, the CONTRACTOR shall maintain one lane of traffic in each direction. Two lanes of traffic in each direction shall be maintained at existing four (or more) lane crossroads, where necessary to avoid undue traffic congestion. Unless otherwise specified, the width of each lane used for maintenance of traffic shall be at least as wide as the traffic lanes existing in the area prior to commencement of construction. Traffic control and warning devices shall not encroach on lanes used for maintenance of traffic.

The CONTRACTOR may be allowed to restrict traffic to one-way operation for short periods of time provided that adequate means of traffic control are affected, and traffic is not unreasonably delayed. When a construction activity requires restricting traffic to one travel way, the CONTRACTOR shall provide two flagpersons for each restricted location and for the entire duration of the restriction. The flagpersons should have visual contact with each other. When visual contact is not possible, the CONTRACTOR shall equip flaggers with two-way radios, use flag-carrying, official or pilot vehicle(s), or use traffic signals.

C. Crossings and Intersections:

Adequate accommodations for intersecting and crossing traffic shall be provided and maintained and, except where specified permission is given, no road or street crossing the project shall be blocked or unduly restricted.

D. Access for Property Owners:

The CONTRACTOR shall not isolate property owners from their property. Access shall be provided to all properties whenever construction interferes with the existing means of access.

The materials used to provide and maintain these accesses shall be limerock, shell or other approved base material. This material may be purchased from a commercial source or acquired from on-site excavation, such as an existing roadbed that is to be removed provided the use of such existing materials is approved by the OWNER in advance of its use.

E. Protection of the Work from Damage by Traffic: Where traffic would be injurious to a base, surface course or structure, constructed as a part of the work, all traffic shall be maintained outside the limits of such areas until the potential for damage no longer exists.

3.02 TRAFFIC CONTROL

A. Traffic Control Plan:

When the project includes a Traffic Control Plan, the CONTRACTOR shall conform to all requirements of that Plan; or they may submit to the governing government agency an alternative plan or modification to the plan at the Preconstruction Conference.

The CONTRACTOR shall submit to the governing government agency a plan in accordance with the standards specified in Article 1.02 (in this Section) required by the applicable government agency prior to working within a public Right-Of-Way.

In no case may the CONTRACTOR begin work using a Traffic Control Plan until such plan has been approved in writing by the applicable governmental agency. Modifications to the Traffic Control Plan that become necessary shall also be approved in writing before implementation.

The Traffic Control Plan shall indicate conditions and setups for each phase of the CONTRACTOR's activities in written form along with a plan view to illustrate the phases of activities and other pertinent details. The plan shall include the type and location of all signs, lights, barricades, striping, and other applicable warning devices to be used for the safe passage of pedestrians and vehicular traffic through the project and for the protection of the workers.

The CONTRACTOR shall be responsible for performing daily inspections of the equipment and installations on the project. The inspections shall continue through weekends and holidays, and a periodic inspection of lights and reflective panels shall be performed during the night hours. All equipment and devices not conforming with the approved standards shall be replaced during the inspection period.

Regardless of the Traffic Control Plan utilized, it shall be the CONTRACTOR's responsibility to notify the applicable governmental agency of any condition in the work zone which may require modification of the Traffic Control Plan.

B. Traffic Control Devices, Warning Devices and Barriers:

Installation and Maintenance: The responsibility for installation and maintenance of adequate traffic control devices, warning devices and barriers for the protection of the traveling public and workers as well as to safeguard the work area in general shall rest with the CONTRACTOR. The required traffic control devices, warning devices and barriers shall be erected by the CONTRACTOR prior to creation of any hazardous condition and in conjunction with any necessary re-routing of traffic. The CONTRACTOR shall immediately remove, turn or cover any devices or barriers which do not apply to existing conditions. The CONTRACTOR shall make the applicable governmental agency aware of any scheduled operation which will affect traffic patterns or safety, sufficiently in advance of commencing such operation to permit their review of the plan for installation of traffic control devices, warning devices or barriers proposed by the CONTRACTOR. The CONTRACTOR shall assign one of their employees the responsibility of maintaining the position and condition of all traffic control devices, warning devices and barriers throughout the duration of the contract. The CONTRACTOR shall supply the applicable governmental agency with the phone number and name of their assigned employee or employees that is available on a 24-hour basis. Traffic control devices, warning devices, and barriers shall be kept in the correct position, properly directed, clearly visible and clean, at all times. Damaged, defaced or dirty devices or barriers shall immediately be repaired, replaced or cleaned as applicable by the CONTRACTOR.

Flagger: The CONTRACTOR shall provide trained flaggers to direct traffic where one-way operation in a single lane is in effect and in other situations as may be required by the standards established in Article 1.02 (this Section).

Existing Pavement Markings: Where a detour changes the lane use or where normal vehicle paths are altered during construction, all existing pavement markings that will be in conflict with the adjusted vehicle paths shall be removed. Over-painting will not be allowed. The removal may be accomplished by any method that will not materially damage the surface texture of the pavement and which will eliminate the previous marking pattern regardless of weather and light conditions. All pavement markings that will conflict with "next phase of operations" vehicle paths shall be removed as described above, prior to opening to traffic.

No Waiver of Liability: The CONTRACTOR shall conduct their operations in such a manner that no undue hazard will result due to the requirements of this Section, and the procedures and policies described therein shall in no way act as a waiver of any of the terms of the liability of the CONTRACTOR of their surety.

C. Work Zone Pavement Markings:

This work shall consist of furnishing and installing work zone pavement markings for maintenance of traffic in construction areas in accordance with these specifications and in reasonably close conformity with the lines and details shown on the plans or established by the standards in Article 1.02 (this Section).

Centerlines, lane lines, edge lines, stop bars and turn arrows in work zones will be required in accordance with Part 6 of the MUTCD with the following additions:

1. Edge lines are required when a paved shoulder four feet or greater in width exists along the edge of a lane.

2. Edge lines will also be required on all detours, where vehicle paths are altered from normal operations and where a lane is narrowed from its normal width for any reason.

3. Work zone pavement markings, including arrows and messages, shall be in place prior to the end of the day when the road is open to traffic.

4. Work zone pavement markings will be designated in the plans or by the OWNER or governmental agency as removable or non-removable.

Removable work zone pavement markings shall consist of materials which can be taken up by hand without the use of additional equipment such as burners, sand blasting, etc. An example of this category of markings is reinforced plastic film (Tape). Non-removable work zone pavement markings shall consist of any markings that are not classified as removable. Use of Removable or Non-Removable work zone Pavement Markings shall be as follows:

<u>Finished Pavement</u>

1. All stripes representing final pavement markings shall be Non-Removable.

2. All stripes in an area where the traffic pattern will be altered prior to project acceptance shall be Removable.

3. All striping representing final markings shall be in the final location unless accepted in writing by the OWNER.

<u>Intermediate Pavement Course</u>

1. All stripes in areas of pavement which will be covered with a subsequent course of pavement prior to altering of the traffic pattern within such area shall be non-removable.

2. All stripes in an area where the traffic pattern will be altered prior to placing of the subsequent paving course within such area shall be Removable.

<u>Existing Pavement</u>

1. All stripes in areas of pavement which will be removed or overlayed with new pavement prior to altering of the traffic pattern within such area shall be non-removable.

2. All stripes in areas of pavement where the traffic pattern will be altered prior to removal or overlaying of such area shall be Removable.

D. Materials:

Paint shall meet requirements of the applicable Sections of FDOTSPEC. Glass beads shall meet requirements of the applicable Sections of FDOTSPEC, except that the percent of rounds shall be at least 75 percent.

Construction Methods

1. Non-Removable Pavement Markings (Paint or Preformed Pavement Marking Film) placed on the finished pavement surface shall be aligned to assure coverage by the permanent traffic stripes.

2. Removable Pavement Markings (Reinforced Plastic Film) placed on the finished pavement surface may vary from the alignment of permanent traffic stripes.

3. All work zone pavement markings shall be installed in accordance with the manufacturer's recommendations, except that paint shall be applied in accordance with the applicable Sections of FDOTSPEC. The pavement surface shall be dry at the time of work zone pavement marking application. All dirt, debris, loose particles and heavy oil residues shall be removed from the road surface application areas immediately prior to the installation of pavement markings.

4. Removable and non-Removable pavement marking film shall be applied with a mechanical applicator to provide pavement lines which are neat, accurate and uniform. The mechanical applicator shall be equipped with a film cut-off device and with measuring devices which automatically and accumulatively measures the length of each line actually placed within an accuracy tolerance of ± 2 percent. Pavement marking films (tape) shall be rolled or tamped to facilitate adhesion to the road surface. Tape may be placed by hand on short sections 500 feet or less provided it is done in a neat accurate manner.

5. When removable pavement markings are no longer required, they shall be removed just ahead of the permanent pavement markings.

3.03 DETOURS

A. Where Required: CONTRACTOR shall construct and maintain detour facilities wherever it becomes necessary to divert traffic from any existing roadway or bridge, or wherever construction operations block the flow of traffic. The location of all detours will require prior approval of the OWNER.

B. Standards of Construction: Detours are to be constructed and maintained in such a manner so they will be capable of carrying traffic required in all conditions of weather. CONTRACTOR shall provide the detour with all facilities necessary to meet this requirement.

C. Furnishing of Materials: CONTRACTOR shall provide all materials for the construction and maintenance of all detours, except that where the plans show a surplus of excavated material, the CONTRACTOR may obtain material from the limits of construction to the extent that the material obtained does not exceed the net surplus amount. No separate payment will be made for materials obtained from on-site or off-site to construct detours.

D. Construction Methods: In general, requirements of the Specifications pertaining to construction and material details shall not apply to detour construction. CONTRACTOR shall select and use construction methods and materials that will provide a stable and safe detour facility. Supplemented by maintenance, detour facility shall have durability to remain in good condition for the entire period the detour is required.

E. Removal of Detours: Unless otherwise indicated in the plans, temporary detours are to be removed when no longer needed and before the contract is completed. All materials from the detour will become the property of the CONTRACTOR and are to be disposed of by them, except for materials which might be loaned to the CONTRACTOR by the OWNER with the stipulation they be returned. CONTRACTOR is responsible for restoration of all disturbed areas upon completion of the detour's use.

3.04 BASIS OF PAYMENT

A. Maintenance of Traffic:

Where no separate pay item for Maintenance of Traffic is established in the Contract Documents, the cost of all such work specified in this Section shall be included in the prices for the other pay items which are included in the contract and no additional compensation will be allowed.

When an item of Maintenance of Traffic is included in the Contract Documents, the lump sum price and payment for such item shall be full compensation for all work and costs specified in this Section except as may be specifically covered for payment under other items.

B. Special Detours:

Where no separate pay item for a Detour(s) is established in the Contract Documents, the cost of constructing, maintaining, and removing detour facilities as required or specified shall be included in the Maintenance of Traffic pay item (if established) or included in the prices for other pay items which are included in the contract and no additional compensation will be allowed.

When a detour facility is specifically detailed in the plans or is otherwise described or detailed as a special item, and an item for separate payment is included in the proposal, the work of constructing, maintaining and subsequently removing such detour facilities will be paid for separately. The contract lump sum price for each such detour shall be full compensation for providing all detour facilities shown on the plans and all costs incurred in carrying out all requirements of this Section for general maintenance of traffic within the limits of the detour, as shown on the plans. When the plans show more than one detour, each detour shall be paid for separately, at the contract lump sum price for each.

C. Driveway and Business Access:

Unless otherwise specified in the Contract Documents, the cost of labor, materials, and equipment required to provide and maintain temporary access to property owners shall be included in the Maintenance of Traffic pay item (if established) or included in the prices for the other pay items which are included in the Contract Documents and no separate payment will be allowed.

D. Dust Control:

Unless otherwise specified in the Contract Documents, the cost of labor, materials, and equipment required to keep travel lanes reasonable free of dust shall be included in the item of Maintenance of Traffic, Detour, or otherwise shall be incidental to the Contract and no separate payment will be allowed.

END OF SECTION 01 55 26

SECTION 02 01 00
MAINTENANCE OF EXISTING CONDITIONS

PART 1 GENERAL

1.01. SCOPE

A. The work specified in this Section consists of restoring existing surfaces or any improvements such as but not limited to pavement, curb and gutter, sidewalk, structures, signs, or landscaping damaged during construction.

1.02. SPECIFICATIONS AND STANDARDS REFERENCE

A. Any reference to a supplementary specification or standard such as ASTM, AWWA, AASHTO, is intended to be a reference to the latest edition of that specification or standard.

B. All references to "FDOTSPEC" shall mean the latest edition of the "Florida Department of Transportation Standard Specifications for Road and Bridge Construction".

C. Technical Specifications Sections: All, where applicable.

PART 2 PRODUCTS

2.01. MATERIALS

A. Flexible Pavement: Comply with requirements of the applicable Sections of FDOTSPEC.

B. Concrete Pavement, Driveway, Sidewalk, Curb & Gutter: Comply with requirements of the applicable Sections of FDOTSPEC.

C. Grassing: Comply with requirements of the applicable Sections of FDOTSPEC.

PART 3 EXECUTION

3.01. GENERAL

A. Existing property damaged during construction shall be restored to a condition at least equal to the original condition of the property, unless otherwise specified in the Contract Documents.

B. Existing roadway or drainage improvements damaged within a roadway or drainage Right-Of-Way, or easement shall be restored in accordance with the requirements of the State and local agencies having jurisdiction thereof.

3.02. UNDERGROUND FACILITIES

A. Existing underground utilities and drainage systems damaged during construction shall be immediately repaired to the specifications of the owner of the damaged system. Where the utility owner elects to make said repairs under their direction, the CONTRACTOR shall pay for such repair costs directly.

B. Where damage to existing, underground utilities is anticipated due to unavoidable conflicts, the CONTRACTOR shall construct their work so as to cause the least amount of interruption of service as possible.

3.03. TRENCHING AND BACKFILLING

A. Any trenching and backfilling required to satisfy the requirements of this section shall be in accordance with Specification Section – 31 23 33 - TRENCHING AND BACKFILLING.

3.04. PAVEMENT CUTS

A. On dead end streets, collector streets, and high traffic streets, trenching and pipe laying shall be performed in such a manner that at least one-way traffic is always maintained.

B. All trench lines across existing pavements, driveways, sidewalks, curbs, etc. shall be saw cut in straight parallel lines prior to trench excavation.

C. CONTRACTOR shall exercise care to minimize amount of pavement, sidewalk, driveways, and curbing to be removed.

3.05. CONCRETE PAVEMENT, CURB & GUTTER, ETC.

A. Concrete pavement, driveway, sidewalk, and curb & gutter damaged during construction shall be restored to the same dimensions as that removed or as specified in the Contract Documents. All such restoration shall be in accordance with the applicable Sections of FDOTSPEC.

B. Prior to placing concrete, the subgrade shall be compacted to at least 98% of the maximum density determined by the "Modified Proctor Density" (ASTM D1557 latest revision).

3.06. FLEXIBLE PAVEMENT

A. Stabilized subgrade damaged during construction shall be restored in accordance with applicable Sections of FDOTSPEC. The restored stabilized subgrade shall have a minimum bearing value of LBR-40 and be compacted to at least 98% of the maximum density determined by the "Modified Proctor Density" (ASTM D1557 latest revision).

B. Limerock or shell base damaged during construction shall be restored in accordance with applicable Sections of FDOTSPEC. The minimum density of the restored base shall be 98% of the maximum density determined by the "Modified Proctor Density" (ASTM D1557 latest revision). After completion of the base course, a bituminous prime coat shall be applied in accordance with applicable Sections of FDOTSPEC when applicable prior to placement of asphalt surface course.

C. Asphalt Surfaces damaged during construction shall be replaced with a similar surface in accordance with applicable Sections of FDOTSPEC. The material used shall be the same type and the thickness of that damaged, except that the minimum thickness shall be one inch. In the case of multiple layers, each layer or course of the damaged asphalt surface shall be reconstructed to duplicate the original.

3.07. LANDSCAPING AND MISCELLANEOUS

A. Trees and bushes damaged during construction shall be removed and replaced with equal size and type by the CONTRACTOR at their expense unless otherwise specified in the Contract Documents.

B. Grassed areas damaged during construction shall be repaired with the same type of sod unless otherwise specified in the Contract Documents.

C. Sodding and grassing and mulching operations shall begin within a maximum of three weeks after utility installation, except in cases of front and back slopes which shall be done immediately following installation completion. Any yards or part of right-of-way in front of private property, that has a grass mat, shall be re-sodded with like sod. CONTRACTOR shall maintain disturbed areas until acceptable vegetation is re-established.

D. Areas without established grass mats in front of vacant lands shall be restored by seeding and mulching. The grass mat shall be restored to the required design or finished grade to permit proper drainage.

E. Unimproved areas such as an open field or lot having its surface disturbed during construction shall be graded to duplicate the existing conditions and seeded and mulched unless otherwise specified in the Contract Documents.

F. Any damage to an existing irrigation system caused by the construction operations shall be repaired by the CONTRACTOR prior to the installation of sod, seed, or other landscaping unless otherwise specified in the Contract Documents.

G. Mailboxes, railroad ties, or any other miscellaneous items damaged during construction shall be repaired to the satisfaction of the OWNER unless otherwise specified in the Contract Documents.

3.08. DENSITY TESTS

A. Density tests shall be performed in accordance with Specification Section – 01 45 23 – TESTING AND INSPECTING SERVICES of the technical specifications except that the CONTRACTOR shall pay for all tests related to restoration work.

B. Field density tests shall be required for each layer of fill, stabilized subgrade, limerock base, and asphalt surface in accordance with the frequency listed below unless otherwise authorized by the OWNER.

* Transverse Trench Crossing - one/location/layer
* Longitudinal Trench - one/300 LF/layer
* Pavement Repair - one/1,000 SY/layer

C. Concrete shall be tested for slump, air content, and compressive strength every 50 cubic yards for continuous pours. For smaller volume work, the same tests shall be taken for each separate pour. A minimum of 4 sample cylinders shall be made when testing for compressive strength.

3.09. GENERAL REQUIREMENTS

A. Maintenance of Service - CONTRACTOR shall provide facilities and be responsible for protection of all structures, buildings and utilities, underground, on the surface, or above ground, against trenching, dewatering or any other activity connected with Work covered by the modifications of existing utilities, CONTRACTOR shall provide for maintaining continuous water, electric, telephone, gas, sewage and other utilities, to all present customers of such utilities unless approval is obtained in writing from the UTILITY or OWNER for the interruption of such services.

B. Existing Facilities - Underground structures shown on the Plans are according to the best available information, but it shall be the responsibility of the CONTRACTOR to acquaint themselves with the exact location and to avoid conflict with all existing facilities. Where underground structures are damaged, they shall be immediately repaired to the specifications of the UTILITY. If the UTILITY elects to make such repairs with their own forces, CONTRACTOR shall make arrangements as to protect the OWNER from all damages. Where such conflicts are unavoidable, every effort shall be made to construct the work to cause as little interference as possible with services rendered by the structure disturbed.

C. Utility Installation Permits - CONTRACTOR shall obtain necessary permits for construction across public and private property, streets, railroads, telephone lines, power lines, etc. CONTRACTOR shall abide by all rules, regulations and requirements of the OWNER of such property regarding construction under this Contract, including giving of notices, provisions for inspection and employment of such methods of construction as may be required. Costs of any permits shall be incidental to construction and reflected in unit prices bid.

D. Work in State Rights-of-Way - Construction in State rights-of-way shall comply with both the State of Florida Department of Transportation (FDOT) Utility Accommodation Manual and Utility Procedures Manual, latest editions.

E. Work in County/City Rights-of-Way - Construction in County/City rights-of-way shall comply with the applicable codes for the agency having jurisdiction.

F. Clearing of Excavation Corridor - Only items necessary to provide adequate workspace including space for hubs, batter boards, and equipment shall be removed within the right-of-way, easement, or designated construction corridor. Trees, shrubbery, poles, mailboxes, and other items not to be removed shall be protected from damage during construction. When necessary to cut tree roots and branches, such cutting shall be performed with saws in a neat and workmanlike manner.

3.10 BASIS OF PAYMENT

A. There shall be no separate payment for any work defined in this section. The cost of any such restoration work shall be included in the various work items that necessitate the restoration unless otherwise specified in the Contract Documents. Any reference to unit price payment in the FDOTSPEC shall not be applicable.

END OF SECTION 02 01 00

SECTION 03 00 00
CONCRETE

PART 1 GENERAL

1.01 SCOPE

A. This section shall cover materials and methods for performing the construction and placing of all reinforcing steel, concrete, joints and all other items pertinent to the Structural Concrete and necessary to complete the project in full accordance with the Plans and Specifications.

1.02 GENERAL

A. OWNER shall be given 24 hours advance notice of all pours. No concrete shall be placed prior to inspection and approval of OWNER or DESIGNER.

B. CONTRACTOR shall provide all items, articles, materials, forms, operations, or methods listed, mentioned or scheduled on the Plans or herein, including all labor, materials, equipment and incidentals necessary and required for completion of all concrete work, both cast-in-place and pre-cast.

1.03 SPECIFICATION AND STANDARDS REFERENCE

A. Where supplementary specifications or standards such as ASTM, AWWA, AASHTO, etc., are referenced, such references shall be latest edition.

PART 2 PRODUCTS

2.01 AGGREGATES

A. All aggregates shall meet the requirements of ASTM C33 and C88 concerning deleterious materials and soundness.

B. Coarse aggregates shall be hard, clean washed gravel or crushed stone. Maximum size shall not be larger than one-fifth the narrowest dimension between forms of the member for which the concrete is used nor larger than three-fourths of the minimum clear spacing between reinforcing bars, nor larger than one inch.

C. Fine aggregates shall be clean, sharp sand. Sand with less than 2.1 fineness modulus, more than 250-ppm tannic acid or organic content exceeding Organic Plate No. 3 (ASTM C40) shall not be used.

2.02 CEMENT

A. Cement shall be Type I or II, domestic Portland cement, meeting the requirements of ASTM C150.

2.03 WATER

A. Water shall be clean, fresh, free from injurious amounts of mineral, organic substances, acids or alkalize.

2.04 EXPANSION JOINT MATERIAL

A. Pre-molded expansion joint filter strips shall be thickness indicated of pre-molded, resilient, compressible re-expanding, non-extruding, bituminous and fiber material.

2.05 REINFORCING STEEL

A. Intermediate grade, new billet-steel, deformed bars, free of loose rust, scale, dirt or oil, meeting the requirements of ASTM A615. Minimum yield of 40,000 psi, Grade 40, unless otherwise designated. Welded wire mesh shall be of the size and gage shown on the plans and shall meet the requirements of ASTM A185 or A1064.

2.06 ACCESSORIES

A. Metal accessories shall include all spacers, chairs, ties, and other devices necessary for properly piecing, spacing, supporting and fastening reinforcement in place and shall be in accordance with the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" ACI 315.

2.07 CURING COMPOUND

A. All exposed concrete compressive shall be thoroughly coated with an approved, non-staining curing compound meeting the requirements of ASTM C309. Application shall be made immediately after initial set at removal of forms.

2.08 CONCRETE CLASSES

A. All 28-day concrete strengths shall conform to the following unless noted otherwise on the Plans:

1. Prestressed and Structural 5000 PSI: Included are all prestressed members, and certain structures subjected to heavy vibratory loads or severe earth and/or hydrostatic pressures.

2. Structural 4000 PSI: Structural members included are beams, columns, floor slabs (column or pile supported), shear walls, bridges, underground structures deeper than 10 feet, precast concrete piling, topping of prestressed members.

3. Structural and Non-Structural 3000 PSI: Included are sheet pile walls, including caps, slabs on grade, bridge approach slabs, curbs, shallow inlets or manholes (Less than 10-foot depth) and all other concrete members not included in paragraph 2.08 or designated on the Plans.

4. Non-Structural 2500 PSI: Included are retaining wall anchor blocks, thrust blocks and concrete backfill.

2.09 CONCRETE MIX DESIGNS

A. All concrete mixes shall be designed by an Independent Testing Laboratory selected by the OWNER and paid by the CONTRACTOR. Mixes shall be proportioned in accordance with ACI 318 and the requirements set forth herein.

1. Slump (ASTM C143): 4+ 1%

2. Air Content (ASTM C231 or C173): 4+ 1%

3. 28 Day Strength: As required by structure type.

2.010 TESTS ON CONCRETE

A. The Testing Laboratory selected by the OWNER and paid by the CONTRACTOR shall make, cure, transport, and test a minimum of four compression test cylinders for each 50 cubic yards of concrete or fraction thereof per day. Slump tests and air content check, using a Chase Air Kit, will be conducted on concrete sampled for test cylinders and the results shall be reported. Concrete tests shall be conducted in accordance with applicable

specifications listed below and shall be conducted on the exact mix proportions to be placed in the forms:

Specifications:
1. ASTM C31
2. ASTM C39
3. ASTM C172
4. ASTM C173 or C231 or Air Chase Kit
5. ASTM C143

B. The selected Testing Laboratory shall be considered as a representative of the OWNER and shall have the full cooperation of the CONTRACTOR, including incidental labor as required to properly sample materials in the field.

C. Two copies of all test reports shall be sent directly to the OWNER and one copy to the CONTRACTOR by the Laboratory.

D. CONTRACTOR is fully responsible for all concrete and concrete work and finishes and shall reject all delivered concrete and finishes not meeting these specifications. CONTRACTOR shall be responsible for securing laboratory representative when such data is taken for the OWNER or by other independent tests. In case of discrepancies in data secured, the OWNER's data is considered conclusive. The Testing Laboratories' representatives shall immediately notify the OWNER of any variation from specified properties of delivered concrete. In the event the OWNER is not available to render judgment on acceptability of concrete not meeting the specifications, the testing laboratory representative may inform the CONTRACTOR of such non-compliance and the concrete shall be considered rejected and shall be removed permanently from the job. Concrete so rejected shall not be returned to the job under any conditions.

2.011 SUBSTANDARD TESTS

A. If the strength of any cylinder for any portion of the structure falls below compressive strengths called for on the Plans, OWNER shall have the right to order a change in the proportions or the water content of the remaining portion of the structure, require conditions of temperature and moisture necessary to secure the required strength or also may require tests in accordance with "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete" (ASTM C 42), or order load tests to be made on the portions of the structure so affected. Under strength concrete rejected by OWNER shall be promptly demolished and removed from the project and replaced with new concrete meeting specification requirements at no additional cost to the OWNER.

2.012 READY-MIXED CONCRETE

A. Ready-mixed concrete shall meet the requirements of ASTM C94. Maximum mixing time from charging to discharging shall be 1 1/2 hour.

B. Additional water up to one gallon per cubic yard may be added to the mixer at the job site to adjust slump if necessary and additional air-entraining agent may be added to increase air a maximum of 1% without rejection.

PART 3 EXECUTION

3.01 FORMS

A. Forms shall be constructed to conform to the shape, form, line, and grade required, and shall be maintained sufficiently rigid to prevent deformation under load.

B. Joints shall be tight and leakproof and arranged vertically or horizontally to conform to the pattern of design. Where forms are placed in successive units for continuous surfaces, they shall be fitted to accurate alignment so that the completed surface shall be smooth and free from irregularities. In long spans, where intermediate supports are not possible, the

anticipated deflection in the forms due to weight of the fresh concrete shall be accurately figured and considered in the design of the forms, so the finished concrete members will have true surfaces conforming accurately to the desired lines, planes and elevations. Lumber used in forms shall have nails withdrawn, and surfaces exposed to concrete carefully cleaned before reuse. All forms shall be constructed to be removed readily without hammering or prying against the concrete. Temporary openings shall be provided as necessary in the bottom of wall and pier forms to facilitate cleaning and inspection. Openings in sides of column forms shall be used to limit the free fall of concrete to that specified in this section of the specifications if tremies are not used. Forms shall be constructed so that the sides may be removed with the bottom remaining in place.

C. Forms shall be coated with oil, applied before the reinforcement is placed. Form oil on reinforcement will not be permitted.

D. Load supporting form stripping shall require concrete tests to insure sufficient strength.

3.02 REINFORCING STEEL

A. Reinforcing steel, fabricated to shapes and dimensions shown, shall be placed as indicated on the drawings in accordance with "Manual of Standard Practice", as published by CRSI, Concrete Reinforcing Steel Institute.

B. In all points where bars lap or splice, a wire tied, minimum lap of 24 bar diameters shall be provided, unless otherwise shown. Splices in piers (columns) shall be lapped 24 bar diameters of smaller bars to transfer the full stress by bond.

C. Except as otherwise shown on the Plans or specified, construction shall conform to the following requirements:

Minimum Concrete Covering Over Steel Reinforcement

1.	Beams & Girders:	Two Inches Primary Steel
2.	Slabs:	Three-fourths Inch
3.	Walls:	Two and One-half Inches
4.	Foundations & Salt Water Structures:	Three Inches

D. Shop detail and placing drawings for all reinforcing steel and accessories shall be furnished for approval by OWNER. No fabrication shall be done except from approved Shop Drawings.

3.03 EXPANSION JOINTS

A. Expansion joint materials shall be installed as indicated on Plans and subject to approval of OWNER. In no case shall the reinforcement or other fixed metal items bonded into the concrete be run continuous through an expansion joint.

3.04 CONSTRUCTION JOINTS

A. Joints not shown or specified shall be located as to least impair the strength and appearance of the work. Placement of concrete shall be carried on at such a rate that the surfaces of concrete which have not been carried to joint levels will not have attained initial set before additional concrete is placed thereon. Beams and slabs shall be placed in one operation. Special provisions shall be made for jointing successive pours as required by the DESIGNER. Keyed cold joints shall be used in slabs on grade.

3.05 PLACING CONCRETE

A. Concrete shall be handled from the mixer or transport vehicle to the place of final deposit in a continuous manner, and as rapidly as practicable until the given unit of operation, approved by the OWNER or DESIGNER, is completed. Concrete that has attained its initial set or has contained its water content for more than 1 1/2 hours shall not be deposited in the work. Concrete shall be deposited in the forms as nearly as practicable in its final position to avoid rehandling. Immediately after depositing, concrete shall be compacted with a vibrator to force out all air pockets and work the mixture into corners, around reinforcement and

inserts, and prevent the formation of honey-comb. Concrete shall not be placed on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. Concrete shall not be allowed to drop freely more than eight feet. Where greater drops are required, a tremie, or other method approved by the OWNER shall be employed. The discharge of the tremie shall be controlled so concrete may be effectively compacted into horizontal layers not exceeding 12 inches in thickness with a minimum of lateral movement.

3.06 PROTECTION AND CURING

A. Concrete shall be protected from the loss of surface moisture for seven days. The method of application of curing agents shall comply with all recommendations of the manufacturer.

3.07 FINISHES OF CONCRETE OTHER THAN FLOORS AND SLABS

A. Any slight honeycomb and minor defects shall be patched in all concrete, using cement mortar.

B. Smooth finish shall be given to all surfaces exposed to view. Smooth finish shall be obtained by use of plywood or form linings or as otherwise indicated herein or on the plans. Joint marks shall be smoothed off and all blemishes removed, leaving finished surfaces smooth and unmarred, subject to approval by the OWNER or DESIGNER.

3.08 CONCRETE SLAB FINISHES

A. In preparing base slabs for various finishes, slabs shall be struck off true at the required level below the elevation or grade of the finished floors, as shown on the Plans. Floors shall be level within a tolerance of 1/8 inch in 10 feet, except where floors pitch to drains.

B. Floor slabs to receive mortar setting beds or integral floor finish shall be screeded level and suitably roughened to receive the applied finish. Sidewalks shall receive a fine broom finish.

C. Floors in all spaces scheduled to have "monolithic" carpet or vinyl tile finish shall have a smooth steel troweled finish.

3.09 BASIS OF PAYMENT

A. Payment for all items referenced by this Section will be on either a lump sum basis per structure or parts thereof, or based on cubic yards of concrete and pounds of reinforcing steel as delineated in the Proposal.

END OF SECTION 03 00 00

SECTION 31 11 00
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SCOPE

A. Work under this Section includes removal and disposal of all trees, brush, stumps, grass, roots, and other such protruding objects. Also included is the removal and disposal of buildings, structures, existing pavement, other existing facilities, and debris not required to remain or to be salvaged that is necessary to prepare the area for the proposed construction. CONTRACTOR shall notify all UTILITY companies (both public and private) of their intent to perform such work and shall coordinate field location of utility lines prior to commencement of construction.

B. Other miscellaneous work considered necessary for the complete preparation of the overall project site is also included under this Section. Work includes, but is not limited to, the following:

1. Plugging of wells encountered within the project limits, which are to be abandoned.

2. Leveling and restoration of terrain outside the limits of construction for purposes of facilitating maintenance and other post-construction operations.

3. Trimming of certain trees and shrubs within project limits for utilization in subsequent landscaping of the project.

4. Removal and disposal of culvert pipes or other structures to be abandoned.

5. Abandonment of existing agricultural ditches.

6. Other items as required by the plans or this Section.

1.02 SPECIFICATION AND STANDARDS REFERENCE

A. Where supplementary specifications or standards such as ASTM, AWWA, AASHTO, etc. are referenced, such references shall be latest edition.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

A. Clearing and Grubbing shall consist of complete removal and disposal of all items stated in Article 1.01, which are not specified for removal under other items of the contract.

B. Unless otherwise shown in the Plans or Contract Documents, Standard Clearing and Grubbing shall be done within the following areas:

1. All areas where any type of embankment will be constructed.

2. All areas where any type of structure, including pipe culverts or pipelines, will be installed or constructed.

3. All areas where any type of pavement will be constructed.

4. Other areas designated in the Plans or by the Specifications.

C. Depths of Removal

1. In areas listed below all roots and other debris shall be removed to a depth of at least one foot below ground surface. The surface shall then be plowed to a depth of at least six inches and all roots exposed shall be removed to a depth of at least one foot. All stumps including subsurface roots shall be completely removed to the satisfaction of the OWNER. Trees shall be removed so roots are pulled out rather than broken or sawed off. Areas requiring the removal methods stated in this paragraph are as follows:

   a. Excavation areas where the excavated material is to be used in embankment construction under permanent structures such as but not limited to pavement and buildings.

   b. Embankment areas under permanent structures such as but not limited to pavement, buildings, sewage treatment facilities, bridges, etc.

   c. Excavation areas where roots or similar vegetation in the top one foot would interfere with disking, harrowing, or finish grading operations prior to seeding or landscaping.

   d. Lots and building areas.

2. In all other excavation areas not listed above where Clearing and Grubbing is to be done, all roots, stumps, and debris protruding through or appearing on the surface of the completed excavation shall be removed or cut off below the excavated surface.

3. In all other embankment areas not listed above where Clearing and Grubbing is to be done, all roots, stumps, and debris protruding through or appearing on the surface shall be removed to a depth of at least one foot below the surface, but no plowing or harrowing will be required in these areas.

D. Trees to Remain: As an exception to the above provisions, where so directed by the OWNER, desirable trees within the clearing limits shall be protected, left standing, and trimmed to prevent damage to limbs during construction. No equipment shall stand, stop, or travel across or inside the drip line of any trees or vegetation designated to be saved or protected.

E. Boulders: Any boulders laying on the top of the existing surface or otherwise encountered during the Clearing and Grubbing shall be removed and disposed of by the CONTRACTOR in areas provided by the CONTRACTOR. As an alternate to off-site disposal, and at the CONTRACTOR's expense, they may elect to utilize these boulders in embankments provided the conditions of Specification Section – 31 23 16.26 – ROCK REMOVAL is satisfied. Any breaking or splitting of boulders that may be necessary to comply with size requirements for embankment shall be incidental to the cost of Clearing and Grubbing. No boulders or rock shall be left or placed in building pads, lots, or building embankment areas.

3.02 SELECTIVE CLEARING AND GRUBBING

A. Selective Clearing and Grubbing shall consist of removing and disposing of all vegetation, obstructions, etc, as provided above except that in non-structural areas where the CONTRACTOR so elects, roots may be cut off flush with the ground surface. Stumps shall be completely removed. Undergrowth shall be completely removed except in areas designated by the OWNER for aesthetic purposes.

B. Desirable trees that are designated by the OWNER to remain shall be protected and trimmed in such a way to avoid damage to limbs during construction.

3.03 SPECIAL CLEARING AND GRUBBING

A. In certain areas that are inaccessible by machines or are considered environmentally sensitive, OWNER or DESIGNER may specify Special Clearing and Grubbing. Where listed as a separate pay item, Special Clearing and Grubbing shall consist of removal and disposal of all trees, brush stumps, roots, debris or other objects protruding through the surface by cutting off flush with the ground surface. The use of any machinery that would disturb the original ground surface condition will not be permitted.

3.04 ERADICATION OF EXOTIC VEGETATION

A. Eradication of Exotic Vegetation shall consist of removal and disposal of Australian Pine, Melaleuca, Brazilian Pepper, and other species specifically stated on the Plans or specified herein. Also included shall be the removal of the subsurface root system for each exotic.

B. In areas where removal is modified to permit cutting off flush within the ground surface, stump and root system shall be treated with an agency approved chemical herbicide that will ensure the eradication of the root system.

3.05 REMOVAL OF EXISTING PAVEMENT

A. Work specified in this Article consists of the removing and disposing of existing pavement surfaces such as, but not limited to, pavement, sidewalk, curb, and gutter where shown in the plans, or required to be removed during construction operations, or as required by the OWNER or DESIGNER.

3.06 REMOVAL OF EXISTING STRUCTURES

A. Work specified in this Article shall include removal and disposal of existing buildings, bridges, pipes, and structures of whatever type as specifically shown in the plans to be removed or as otherwise specified for removal in the Contract Documents. Also included are structures of whatever type or portions thereof which are encountered during construction operations. Where partial removal of a structure is approved by the OWNER or DESIGNER, the portion of the existing structure shall be backfilled, plugged, or filled in such a way that will prevent the settlement, movement, erosion or collapse of the adjacent soils.

3.07 BURNING ON-SITE

A. Unless otherwise stated in the Contract Documents, burning will be permitted within the project limits provided the burning operation complies with all applicable laws, ordinances, and other regulatory agencies. All permits required shall be obtained prior to the start of burning and all permit regulations strictly adhered to. All burning shall be done at locations approved by OWNER and where trees and shrubs adjacent to the cleared area will not be harmed.

3.08 DISPOSAL OF MATERIALS

A. Timber, stumps, roots, brush, boulders, rubbish, and other objectionable material resulting from work specified in this Section shall be disposed of off-site in locations provided by the CONTRACTOR.

3.09 OWNERSHIP OF MATERIALS

A. Except as may be otherwise stated in the Contract Documents, all buildings, structures, appurtenances and other materials removed by the CONTRACTOR shall become the property of the CONTRACTOR, to be disposed of in areas provided by them.

3.10 BASIS FOR PAYMENT

A. Paid at the Contract Lump Sum price. Partial payments will be calculated by the amount of work completed based on the approved schedule of values and applications for payment.

END OF SECTION 31 11 00

SECTION 31 23 00
EXCAVATION AND FILL

PART 1 GENERAL

1.01 SCOPE

A. Work specified in this Section consists of excavation and embankment required for roadways, lakes, ditches, swales, berms, canals, parking areas, site fill, building pads, retention areas, structure excavation, and other similar work described herein or shown on the Plans. This Section includes preparation of subgrades, construction of embankments, utilization or disposal of materials excavated, and compaction and finish grading of excavated area, embankments, and structural surcharge fills. All work shall conform to the proposed alignment, elevations, slopes, and cross-sections shown on the Plans.

1.02 SPECIFICATION AND STANDARDS REFERENCE

A. Where supplementary specifications or standards such as ASTM, AWWA, AASHTO, etc. are referenced, such references shall be latest edition.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 CLASSIFICATION OF EXCAVATION

A. General

1. Included in the excavation under this Section are materials of whatever nature encountered within the required limits of excavation (except material removed during clearing and grubbing). Determination of sub-surface conditions and its effect on construction costs are the sole responsibility of the CONTRACTOR. Subsurface conditions between soil borings that may be provided can vary greatly from those conditions found at the location where the sample was extracted.

2. Locating existing underground utilities shall be the responsibility of the CONTRACTOR. In the event of any utility conflict, the CONTRACTOR shall immediately inform the utility company and the OWNER of the conflict. CONTRACTOR shall be responsible for the immediate repair of any utility lines damaged during construction. CONTRACTOR shall notify all UTILITY companies or utility owners, both public or private, of their intent to perform such work and coordinate field location of all utility lines prior to commencement of construction.

3. All excavation shall be included under the item of Regular Excavation. If the item of Regular Excavation is not listed in the proposal, all costs included in the excavation of roadway, swales, subsoil, rock, lakes, structures (including utilization or disposal of materials) shall be incidental to the general cost of the project and no additional compensation will be allowed.

B. Regular Excavation shall consist of excavation of materials necessary for construction of roadways, ditches, sidewalks, building pads, retention ponds, and other surfaces as shown in the plans. Excavated material suitable for embankment shall be utilized in areas requiring fill with all excess material spread or stockpiled on site where shown on the plans or as directed by the OWNER. Included in regular excavation shall be:

1. Swale Excavation

   a. Swale Excavation shall consist of excavation of swales and ditches as indicated on the Plans and shall include the utilization of suitable excavated materials in areas requiring fill with all excess material spread or stockpiled on site where shown on the plans or as directed by the OWNER or DESIGNER.

2. Subsoil Excavation

   a. Subsoil Excavation shall consist of the excavation and off-site disposal of muck, clay, roots, or any other material that is determined to be unsuitable by the Geotechnical Engineer in its original position and that is excavated below the finished grading template. If provided in the plans or Contract Documents unsuitable material shall be stockpiled in areas on site designated by the OWNER or DESIGNER.

3. Rock Excavation

   a. Rock Excavation shall consist of excavation of rock and boulders necessary for construction of roadways, ditches, lakes, and other cut Sections shown on the plans. It shall also include utilization and disposal of excavated rock and boulders according to Articles 3.02, 3.03, and 3.04 in this Section.

   b. For the purpose of classifying rock excavation as a pay item, the rock strata encountered shall be of such thickness and hardness as to preclude removal by using a modern 3/4-yard hydraulic backhoe maintained in excellent operating condition.

4. Rock Blasting

   a. All blasting conducted under this contract shall strictly comply with the provisions of all governing laws and ordinances. All required blasting permits shall be the responsibility of the CONTRACTOR. The pattern of drilling shall be determined by the CONTRACTOR (unless otherwise specified) in order to meet the requirements of Article 3.02 in this Section.

5. Rock Crushing

   a. If Rock Crushing is listed as a pay item in the Proposal, rock shall be crushed so that at least 97 percent (by weight) of the material shall pass a 3 1/2-inch sieve and the material shall be graded uniformly down to dust. The crushed rock shall have an average limerock bearing ratio (LBR) value of not less than 100.

6. Lake Excavation

   a. All materials excavated shall be considered as "unclassified". Lake Excavation (Unclassified) shall consist of excavation of all material necessary for construction of lakes according to the depths, dimensions, side slopes, and in the locations shown in the plans. It shall also include the utilization of excavated materials and the disposal of unsuitable materials in accordance with Articles 3.02 and 3.03 in this Section. CONTRACTOR shall be responsible for any investigation of subsurface conditions and subsequent determination of the amount of rock, roots, and other materials to be incorporated into their price.

   b. CONTRACTOR shall construct the lake banks in strict accordance with the ordinances or laws governing the excavation. All slopes must be equal to the specified slopes or flatter. The bottom of the lake shall not be excavated

below the specified depth without prior written approval of the OWNER or DESIGNER and the governing agency.

7. Structure Excavation

a. Work specified in this Sub-article consists of excavating for bridge foundations, box culverts, pipe culverts, sewers, pipelines, retaining walls, pump stations, manholes, inlets, catch basins, sewage and water treatment plants and other similar type facilities shown on the plans. It shall also include (1) the construction and removal of cofferdams, sheeting, bracing, etc.; (2) dewatering; (3) disposal of structures (of whatever type) encountered during excavation; (4) disposal of unsuitable materials; (5) bedding materials; (6) backfilling and the compacting thereof; (7) utilization of excess suitable materials according to Article 3.02 this Section.

b. Material excavated (of whatever nature) shall be classified for utilization or disposal according to Articles 3.02 and 3.03. The excavation shall be of such size and depth as to facilitate the construction and/or installation of each structure according to the location and elevations shown in the plans. Rock blasting, rock excavation, demolition of structures or foundations, or any unusual or undefined work that may be to complete the excavation for a structure shall be considered as work included in Structure Excavation.

c. If the excavation requires the use of cofferdams, dewatering, sheeting, or bracing, all such work will be done in strict compliance with all permit requirements and any laws or ordinances that may apply to the work being performed. It shall be the responsibility of the CONTRACTOR to familiarize themselves with any regulations applicable and to satisfy said regulations at their own expense.

d. The structure shall be constructed or laid in dry dewatered excavation unless otherwise approved by the OWNER or DESIGNER. In such cases where the excavation is unstable or has water in sufficient quantities that make uniform bedding impossible, the bottom of the excavation shall be stabilized as required. If crushed stone is used, it shall be a uniformly graded angular material which conforms to ASTM C33 and according to the sieve analysis listed below.

100% passing 1"
90-100% passing 3/4"
20-55% passing 3/8"
0-10% passing #4
0-5% passing #8

e. After the structure is complete, backfilling shall be performed in a careful manner so as not to disturb or damage the completed structure. The backfill material shall conform to the requirements of Sub-article 3.04C., except that the size of rock shall not exceed 3-1/2 inches in diameter. The backfill material shall be compacted to the same or greater density as the adjacent existing earth.

8. Rock Burial

a. Work specified in this Sub-article consists of excavating and stockpiling of overburden, hauling and placing rock into the excavated area, covering the rock with overburden from the stockpile and utilizing all excess overburden. The proposed rock burial areas shall be as shown in the plans and/or as designated by the OWNER or DESIGNER on-site.

b. After completion of the clearing and cross-sectioning of the proposed rock burial areas, CONTRACTOR shall excavate the overburden material down to the top of cap rock or as shown in the plans or as directed by the OWNER

or DESIGNER. The excavated overburden shall be stockpiled nearby for use in the covering process. The excavation area shall then be cross-sectioned by the OWNER or DESIGNER.

c. After cross-sectioning, rock and boulders from previous excavation shall be loaded, hauled, and placed into these areas. During the placement of rock enough fine material from the overburden stockpile shall be deposited and compacted between individual rocks or boulders so as to completely fill any voids that may occur during placement of such rocks. The top of the deposited rock shall be a minimum of 3 feet below the proposed finished grade or as otherwise specified in the plans.

d. After the rock placement is complete, the stockpiled overburden shall be placed over the rock to a minimum depth of 3 feet to the specified elevation and in accordance with the requirement of Article 3.04 of this Section.

e. After the finish grading is complete, all excess stockpiled overburden shall be utilized in other embankment areas according to the provisions of Article 3.04.

3.02 UTILIZATION OF EXCAVATION MATERIALS

A. General

1. All excavated materials suitable for embankment shall be utilized in the embankment areas shown in the plans or as otherwise specified in the Contract Documents. After the requirements for embankment have been satisfied, the surplus suitable excavated material shall be deposited in areas on-site as directed by the OWNER or DESIGNER, unless otherwise specified in the Contract Documents.

2. On projects where excavation does not provide enough material to satisfy embankment requirements, excavated materials shall first be utilized in the roadway or other permanent structure embankment, then into other embankment areas shown in the plans.

B. Classification of Materials

1. Material shall be classified as "suitable" if it meets all the requirements of Sub-article 3.04C. of this Section. A rock stratum that can be blasted, split or screened to meet the requirements of Sub-article 3.04C. shall be considered as "suitable" for embankment.

2. Material such as muck, or any other material containing excessive amounts of organic, silt, clay, or other deleterious materials shall be classified as "unsuitable" for embankment unless otherwise specified or classified by the OWNER or DESIGNER.

3. The term "unclassified" simply refers to material that has not been defined as suitable or unsuitable.

4. If a dispute arises over the classification of materials, the OWNER or DESIGNER shall make the final determination.

C. Rock and Boulders

1. Rock and boulders shall be utilized on site as embankment unless otherwise specified. If it cannot be utilized in its natural state, it shall be blasted in such a manner that the excavated rock will meet the requirements of Sub-article 3.04C. of this Section. If that is not practical, it may be disposed of off-site and replaced with an acceptable material. In all cases, the alteration or replacement of

excavated material shall be at the CONTRACTOR's expense unless otherwise provided in the plans or Contract Documents.

D. Existing Pavement

1. All existing asphalt pavement including the base course shall be utilized on-site as embankment unless otherwise specified. The pavement structure shall be scarified or similarly broken up to satisfy the requirements of Sub-article 3.04C. Care shall be taken to utilize the broken asphalt pavement and base course in areas that will not adversely affect future landscape plantings or building pad related work such as footings, rough plumbing, electrical, etc.

2. All existing concrete pavement, sidewalk, curb and gutter or similar surfaces shall be disposed of off-site unless otherwise specified or directed by the OWNER or DESIGNER. At the CONTRACTOR's option, and at their expense, they may break up the concrete and mix with enough fines for incorporation into embankment areas, provided he follows the same conditions required for the utilization of asphalt pavement.

E. Muck

1. Although muck or other material high in organic content will not generally be permitted in embankment areas, certain conditions may require or permit its utilization. Muck will not be permitted in embankment unless specifically stated on the plans or specified herein. When so specified the placement of muck or other similar material will only be permitted outside of an imaginary downward 2:1 slope starting from the outward edge of roadway structure or other permanent structure.

F. Topsoil

1. Where top of the existing surface is high in organic content, it may be necessary to strip the topsoil and reuse it or dispose of it. Topsoil shall be stripped and stockpiled on-site for later use as a layer under sod, grassing, or in landscaped areas. When an item of topsoil is not listed as a separate pay item in the Contract Documents, the placement of the stockpiled topsoil shall be included in the item of Clearing and Grubbing or Excavation. When topsoil is listed as a pay item, it shall be placed in locations shown in the plans to a specified thickness and to a finished elevation that will allow for the placement of sod, ground cover or other landscape related surface.

2. The material utilized as topsoil shall be suitable for plant growth and free from appreciable quantities of hard clods, stiff clay, hardpan, gravel, brush, large roots, refuse, or other deleterious materials. The organic content shall be at least 1.5 percent. The characteristics of the material shall be such that it can be adjusted to have a pH value between 5.0 and 8.0, or as approved by the OWNER or DESIGNER.

3.03 DISPOSAL OF EXCAVATED MATERIALS

A. Disposal of Surplus Materials

1. Ownership of all suitable excavated materials shall be retained by the OWNER unless otherwise stated in the plans or Contract Documents to be surplus material. When so specified the surplus material shall become the property of the CONTRACTOR to be disposed of outside the project limits. The cost of the disposal and furnishing the disposal area shall be included in the item requiring excavation and no additional compensation will be given.

B. Disposal of Unsuitable Materials

1. Unsuitable excavated material as defined in Sub-article 3.02B. shall become the property of the CONTRACTOR to be disposed of outside the project limits. The cost of the disposal and furnishing the disposal area shall be included in the item requiring excavation and no additional compensation will be given.

3.04 EMBANKMENT

A. General

1. Embankments shall be constructed true to lines and grades shown in the plans or ordered by the OWNER or DESIGNER. Material used in embankments shall be obtained from on-site excavation and/or from off-site borrow sources secured by the CONTRACTOR.

B. Site Preparation

1. Subsequent to clearing and prior to placement of embankment material, the existing earth surface shall be compacted 6 feet beyond the building and pavement structure limits and in other areas shown in the plans or stated in the Supplementary Conditions. The existing surface shall be compacted at a moisture content such that the specific density requirement can be attained. Soil one foot below the compacted surface shall attain a density of 95 percent of the maximum theoretical density as determined by the Modified Proctor Density (ASTM D1557). Field density tests shall be conducted in accordance with ASTM D1556, D2167, D2922, or D2937 (latest revisions) by a certified Engineering laboratory or Geotechnical Engineer approved by the OWNER or DESIGNER. The location and number of the tests shall be determined by the DESIGNER.

C. Requirements for Embankment Materials

1. 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 or similar foundation. Material designated as unsuitable in the soil borings or as classified as unsuitable by the DESIGNER shall be removed from the embankment and disposed of off-site. Utilization of material in embankment construction shall be in accordance with plan details or as directed by the DESIGNER.

2. The maximum size of rock which will be permitted in the completed embankment are as follows:

In top 12 inches	3 1/2 inches
12 inches to 2 feet	6 inches
In the 2 feet depth below	Not to exceed the compacted thickness of the layer being placed

3. When and where approved by the DESIGNER, the CONTRACTOR may place larger rocks outside the 2 to 1 slope of any structure embankment. Where such rock is utilized in any embankment, enough fine material shall be deposited and compacted between individual rocks so as to completely fill any voids that may occur during the placement of such material. No rock shall be utilized in any building pad embankment areas.

D. Borrow Material

1. The use of borrow material shall be resorted to only when sufficient quantities of suitable material are not available from the various types of excavation required on the drawings. When borrow is required the material shall conform to the requirements of Sub-article 3.04C. and shall be approved by the DESIGNER prior to placement. Borrow material shall be obtained from areas furnished by the CONTRACTOR at their expense. Borrow sources shall comply with all local requirements applicable for the excavation and sale of fill material.

E. Construction Requirements

1. Embankment material shall be placed in horizontal layers not to exceed 12 inches thickness measured loose. Each layer shall be leveled and compacted in accordance with Sub-article 3.04F. Where the material is deposited in water or on unstable ground that will not support the weight of hauling equipment, the fill shall be constructed by dumping successive loads in a uniform layer of a thickness not greater than necessary to support the hauling equipment while placing subsequent layers. These subsequent layers shall then conform to the thickness and compaction requirements stated above.

2. When embankments are constructed on a hill or slope, slope shall be "stepped" so as to permit the embankment to be placed in horizontal layers and compacted as stated above. Upon completion of the embankment steps on a slope, steps shall be dressed to conform to the specified slope.

3. For any embankments not covered above, construction methods shall be approved by the DESIGNER prior to placement.

F. Compaction Requirements

1. Materials shall be compacted at a moisture content such that the specific density can be attained. If necessary, water shall be added to the material, or the moisture content shall be lowered by manipulating the material or allowing it to dry, as is appropriate. Each layer of material shall be compacted by the use of a smooth drum vibratory roller or other method approved by the DESIGNER.

2. Field density tests shall be conducted in accordance with ASTM D1556, D2167, D2922, or D2937 (latest revisions) by a Certified Engineering Laboratory or Geotechnical Engineer approved by the OWNER or DESIGNER according to the Compaction Requirements stated below:

Embankment Area	**Density[1]**	**Frequency/Lift**
Building Pads[2]	95%	1 Ea/2000 SF
Pavement Areas[3]	95%	1 Ea/1000 SY
Retention Areas[4]	95%	1 Ea/1000 SY
Other Areas	N/A	N/A

[1] The percentage listed shall be the minimum acceptable amount of the maximum theoretical density as determined by the Modified Proctor Density (ASTM D1557).
[2] Includes future building pads and lots.
[3] Includes any permanent pavement structure such as curb and gutter, sidewalk, roadway, shoulder, driveway, or any other similar surface.
[4] Includes earth berms, water retention slopes, dikes, and other similar areas.

3. CONTRACTOR shall be responsible for scheduling of all soil testing. These soil testing costs shall be borne by the OWNER, except that in the event of a test failure all subsequent tests required to pass density shall be at the expense of the CONTRACTOR. The OWNER may deduct this expense from the CONTRACTOR's payment or request payment directly from CONTRACTOR.

3.05 FINISH GRADING

A. General

1. As a final grading operation, the surface of the earthwork shall be shaped to conform to the lines, grades, and contours shown on the plans. For cuts or fills where plant growth will be established, slopes shall be left in a roughened conditions as approved by the DESIGNER. Hand dressing will not be required except as necessary in confined areas where equipment operation is restricted.

2. CONTRACTOR shall take necessary precautions to prevent erosion of slopes before and after finish grading. Any erosion of whatever consequence shall be repaired at the expense of the CONTRACTOR until final acceptance of the project.

B. Tolerances

1. In final shaping of the surface of earthwork a tolerance of 0.1 foot above or below the plan elevations and contours will be allowed with the following exceptions:

   a. In areas where sod, ground cover or other finish landscape surface will be used, an allowance shall be made for the thickness of sod, etc. that will result in the finish landscape elevation to be within the above tolerance.

   b. Earthwork shall be shaped to match adjacent pavement, curb, sidewalk, structures, etc. with applicable allowance for sod, etc.

   c. Ditch bottoms may have a higher tolerance as approved by the DESIGNER provided that no water will be impounded.

3.06 METHOD OF MEASUREMENT

A. General

1. Volumetric - When payment is made on a volumetric basis, calculations shall be based on the method of average end areas or the grid cell method, unless the OWNER determines that another method will provide a more accurate result. The existing elevations shown on the plans or field survey provided by the OWNER or DESIGNER shall be incorporated into the volume calculations. Should any of these existing elevations appear to be in error, the CONTRACTOR shall notify the OWNER or DESIGNER in writing and resolve the dispute prior to disturbing the existing surface in question. Once the existing surface is disturbed by clearing, excavating, or any other construction, the CONTRACTOR's right to dispute the existing elevations shown by the OWNER will be nullified. After the excavation or embankment is completed, the finished surface shall be measured in place by field survey and these cross-sections shall be incorporated into the volume calculations.

2. Loose Volume - In special cases as shown in the Contract Documents, payment shall be made on a loose volume basis as measured in trucks or other hauling equipment. The volume capacity of each truck shall be measured and recorded by the OWNER or DESIGNER. Before unloading on-site, the OWNER shall compare the loaded truck to its recorded capacity and record the actual volume on the load ticket. Only load tickets that have been so recorded and collected by the OWNER at the point of dumping shall be included in the quantity for payment.

3. Lump Sum - The proposal may contain items of work that are to be paid for on a lump sum basis. Additionally, the Contract Documents may provide for a lump sum payment for the entire project. The lump sum payment for individual items or

for the entire project shall constitute full compensation for the completion of all work specified in the plans and specifications.

4. Plan Quantity - When cross Sectioning finished surfaces is not feasible, the OWNER may specify the final pay quantity of any item to be the original Plan quantity. When so specified in the Contract Documents, such quantity will be revised only in the event that it is determined to differ by more than 10 percent of the original plan quantity. Such revisions will be determined by calculation of quantities from the plan sheets as applicable. Field measurement will not be considered except to verify that the work was accomplished in substantial compliance with the plan dimensions.

B. Regular Excavation

1. Measurement of regular excavation shall include only the net volume of material excavated between the original ground surface and the surface of the completed earthwork. The pay quantity shall be the plan quantity in accordance with Sub-article 3.06A., unless otherwise stated in the Contract Documents.

C. Swale Excavation

1. Measurement of swale excavation shall include only materials excavated within the line and grades indicated in the Plans or as directed by the OWNER or DESIGNER. Measurement may be by volume or lineal as called for in the Contract Documents.

D. Subsoil Excavation

1. Measurement of subsoil excavation shall include only material excavated within the lines and grades indicated on the plans or as directed by the OWNER or DESIGNER. Where the limits of subsoil excavation are not shown or vary from the limits shown on the Plans, the pay quantity shall be determined by cross Sectioning measurements in accordance with the volumetric method described in Sub-article 3.06A. When the final pay quantity is more or less than the original Plan quantity, an appropriate adjustment shall be made to the applicable pay quantity for imported fill so that the loss or increase is compensated provided that the unsuitable material is to be disposed off-site. A lower than Plan volume will require less fill replacement and a higher than plan volume will require more fill replacement than originally calculated. However, if the subsoil excavation is displaced by on-site excavation, a quantity adjustment will not be made. Where no separate pay item is included in the contract, all such work involving the excavation and disposal of unsuitable material shall be considered incidental to the cost of the applicable excavation item.

E. Rock Excavation

1. When rock excavation is listed as a separate pay item in the Contract Documents, measurement of rock excavation shall be by cross-sectioning method prior to and after the rock layer is excavated. CONTRACTOR shall allow enough time between operations to facilitate this field survey work.

2. If Rock Excavation is not listed as a separate pay item in the Contract Document, the cost of all such work, including blasting, shall be included in the unit price for Regular Excavation, Swale Excavation, Subsoil Excavation, Lake Excavation (Unclassified), or other items which may require the excavation of rock or boulders.

F. Rock Blasting

1. When listed as a pay item in the Contract Documents, Rock Blasting shall be paid by the square yard, acre, cubic yard, or lump sum for the actual quantity of rock blasted that meets the requirements of Article 3.02 and Sub-article 3.04C.

2. When Rock Blasting is not listed as a pay item, any blasting or splitting of rock necessary to facilitate the excavation of rock shall be included in the item of Rock Excavation. If Rock Excavation is not listed as a pay item, any such blasting or splitting shall be included in the cost of whatever work that may require rock excavation and no additional compensation will be provided.

G. Rock Crushing

1. When listed as a separate pay item in the Contract Documents, Rock Crushing shall be paid by the cubic yard on a volumetric basis. Prior to crushing, the existing surface of the proposed stockpile area shall be cross-sectioned by the OWNER or DESIGNER. After crushing has been completed and with the crushed material in a stockpile, the stockpile shall be cross-sectioned by the OWNER or DESIGNER. The volume of the stockpile shall then be calculated by either a grid cell or average end area method. This volume shall be used for paying purposes without consideration of shrinkage or expansion. The CONTRACTOR shall be responsible for scheduling the OWNER or DESIGNER for cross-sectioning and shall allow sufficient time in their schedule for the completion of such work.

2. The utilization of crushed rock shall be included in the cost of the excavation item requiring rock excavation according to the provisions of this Section.

H. Lake Excavation (Unclassified)

1. All materials excavate shall be considered as "unclassified". Measurement of Lake Excavation (Unclassified) shall include only the net volume of material excavated between the ground surface after clearing and the finish slopes and bottom of the lake using the volumetric method as described in the first paragraph of Sub-article 3.06A. The CONTRACTOR shall be responsible for scheduling the OWNER or DESIGNER to cross-section the existing surface of the proposed lake after the clearing has been completed and prior to commencement of blasting or lake excavation. The CONTRACTOR shall allow sufficient time for the OWNER or DESIGNER to complete such cross-sectioning work. Any unauthorized overdigging or excavation below the plan bottom elevation will not be included in the measurement for payment.

2. If the initial expense of the lake Sections is to be paid for by the OWNER, the CONTRACTOR shall not request said Section until he has notified the OWNER or DESIGNER that they have shaped the bank slopes per the permitted design slopes and depths.

3. If the Sections indicate that the depths or bank slopes do not conform to the permitted design slopes or indicate that they are steeper, the CONTRACTOR shall correct the deficiency. Further, the CONTRACTOR shall pay for the expense of re-Sectioning the lakes to document that said correction has been accomplished.

4. OWNER shall have the option of deducting the re-Sectioning costs from the CONTRACTOR's payment, or the OWNER may request separate payment directly from the CONTRACTOR.

I. Structure Excavation

1. Unless otherwise specified, there shall be no measurement for structure excavation. The cost of structure excavation shall be incidental to the cost of the applicable structure and no separate pay item will be established.

J. Rock Burial

1. Measurement of Rock Burial shall be on a volumetric basis unless otherwise specified in the Contract Documents. Payment shall be made for the neat volume of material excavated below the existing elevation after clearing. The

CONTRACTOR shall be responsible for scheduling the OWNER or DESIGNER to cross-section the existing surface after clearing and to cross-section the burial area after excavation, and sufficient time shall be allowed for this purpose.

2. Payment shall be by the cubic yard at the unit price established in the Contract Documents. Such unit price shall be full compensation for all excavation, stockpiling, loading, hauling and placing rock, overburden replacement over rock, and utilization of all excess overburden.

K. Pavement Removal

1. Measurement for pavement removal shall be by the square yard as measured in place prior to removal unless otherwise specified in the Contract Documents. When no separate pay item is included, the cost of such work shall be incidental to the item of clearing and grubbing or excavation as applicable.

L. Topsoil

1. Measurement for topsoil shall be by the square yard as measured in place in locations shown in the Plans or as directed by the OWNER or DESIGNER. Placement of topsoil shall be to the thickness specified in the Plans or Contract Documents, and it shall include the cost of furnishing the material as specified in Sub-article 3.02F. If enough excavated material is not available to satisfy the topsoil requirements, suitable topsoil shall be imported and the cost of furnishing and hauling this imported material shall be included in the unit price of the topsoil item.

M. Embankment

1. When there is not enough suitable excavated material to satisfy the requirements of embankment, a separate item called Embankment or Borrow may be established in the Contract Documents to facilitate completion. Payment will be made only for material required to complete the embankment to the plan dimensions and elevations. Material placed beyond the limits shown on the Plans will not be measured for payment.

2. For Embankment, the pay quantity shall be the Plan quantity unless otherwise stated in the Plans or Contract Documents. The measurement for embankment shall be the in-place volume of material placed above the original surface elevation within the dimensions and elevations indicated on the Plans less the neat volume of excavation. No allowance will be made for subsidence or shrinkage.

3. For Borrow, the pay quantity shall be made on a loose volume basis unless otherwise specified in the Plans or Contract Documents. The method of measurement shall be in accordance with the second paragraph of Sub-article 3.06A., Loose Volume.

N. Berm Construction

1. Measurement for Berm Construction shall include only materials excavated within the lines and grades indicated in the plans or as directed by the OWNER or DESIGNER. Measurement may be by volume or lineal as defined in the Contract Documents.

O. Finish Grading

1. Measurement for Finish Grading shall only include areas that require a change in elevation to meet the new design grade. Placement of sod to an existing elevation would require finish grading to facilitate placement of sod. If there is no pay item for finish grading, the cost of all such work shall be incidental to the applicable item of excavation or embankment.

3.07 BASIS OF PAYMENT

A. Paid at the Contract Lump Sum price. Partial payments will be calculated by the amount of work completed based on the approved schedule of values and applications for payment.

3.08 PAY ITEMS

A. For all work specified in this Section, Payment shall be made in accordance with the list of pay items established or as otherwise defined in the Contract Documents. The description of a pay item in the proposal Section may vary from the descriptions stated in this Section.

END OF SECTION 31 23 00

SECTION 31 23 16.26
ROCK REMOVAL

PART 1 GENERAL

1.01 SCOPE

A. The work specified in this Section consists of the excavation and disposal of rock and boulders encountered during the construction of water main, sanitary or storm sewer, pressure pipeline, or other underground utilities including structures shown on the plans.

1.02 REFERENCES

A. Specification Sections:

Section – 31 23 00 - EXCAVATION AND FILL
Section – 31 23 33 - TRENCHING AND BACKFILLING

1.03 GENERAL SUBSURFACE DESCRIPTION

A. When the results of soil survey are provided, such data is not to be construed as a guarantee of the depth, extent or character of material present.

It is the sole responsibility of the CONTRACTOR to make such examination at the site of the work as may be necessary to inform themselves of the conditions under which the work is to be performed.

B. Refer to Instruction to Bidders (Examination of Contract Documents and Site) and to Supplementary or Special Conditions.

1.04 REGULATORY REQUIREMENTS

A. The CONTRACTOR shall comply with any governmental agency blasting ordinance applicable at the time of construction.

B. The CONTRACTOR shall obtain all permits required before the removal of overburden material, drilling, or delivery of explosives.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 EXCAVATION OF ROCK

A. All rock and boulders shall be excavated to the width and depth that permit the construction and installation of the specified work. Unless otherwise specified in the Contract Documents, governmental codes or ordinances, and permit requirements, the method used to remove rock and boulders shall be determined by the CONTRACTOR.

3.02 BLASTING

A. Blasting or splitting of rock to facilitate rock excavation shall be the option of the CONTRACTOR unless otherwise specified. Any blasting or splitting shall comply with the provisions of the Contract Documents, governmental codes or ordinances, and the blasting permit.

3.03 UTILIZATION OF ROCK

A. Excavated rock may be utilized on-site if authorized by the OWNER in writing and provided the material complies with the size requirements for backfill material in Specification Section – 31 23 33 - TRENCHING AND BACKFILLING or for embankment material in Section – 31 23 00 - EXCAVATION AND FILL.

B. If the excavated rock does not meet the size requirements referred to above, the CONTRACTOR may split, crush, or screen the material to conform to those size requirements.

3.04 DISPOSAL OF EXCAVATED ROCK

A. All excavated rock that is not utilized on-site shall be disposed of by the CONTRACTOR at a location outside the project limits.

B. All such material disposed of outside the project limits shall become the property of the CONTRACTOR and they shall therefore be responsible for any liability resulting from the ownership, hauling, or disposing of such excavated material.

3.05 METHOD OF MEASUREMENT

A. Not applicable for this Section.

3.06 BASIS OF PAYMENT

A. The cost of rock excavation including blasting shall be included in the prices for work items requiring rock removal.

B. Where the disposal of rock or boulders creates a deficiency of backfill or embankment material the cost of furnishing replacement material shall be included in the work item requiring rock removal with no additional payment allowed.

END OF SECTION 31 23 16.26

SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SCOPE

A. The work specified in this Section consists of the excavation, bedding, and backfilling of trenches for water main, storm sewer, sanitary sewer, force main, irrigation lines, and utility lines, where not otherwise dictated by the UTILITY standards and specifications of a municipality or dry utility provider. Also included is the excavation and backfilling of pertinent structures, such as manholes, inlets, pump stations, etc.

B. Improvements being constructed in areas under a specific jurisdiction shall be constructed in accordance with the requirements of said jurisdiction's UTILITY standards and specifications manual, ordinance, etc.

1.02 REFERENCES

A. Referenced standards or specifications such as ASTM, AASHTO, or AWWA, shall be the latest edition.

B. Specification Sections:
Section – 01 55 26 – TRAFFIC CONTROL
Section – 31 11 00 – CLEARING AND GRUBBING
Section – 31 23 16.26 – ROCK REMOVAL

1.03 SUPPLEMENTAL REQUIREMENTS

A. The requirements in this Section are the minimum for this project. Any additional requirements stated in the Contract Documents or otherwise specified by the manufacturer or any governmental agency in a permit, code, or ordinance shall take precedence over the requirements of this Section.

1.04 SUBSURFACE CONDITIONS

A. The CONTRACTOR shall be responsible for determining the subsurface conditions in areas where excavation can be anticipated. The type of soil, depth and thickness of rock, ground water table, and other factors that affect cost shall be evaluated prior to submitting a bid.

B. The method used to determine subsurface conditions shall be the responsibility of the CONTRACTOR. Soil borings (if provided) only supply information in the exact location of each boring; therefore, on-site exploration of the subsurface is the CONTRACTOR's responsibility. All on-site exploration shall be scheduled with the OWNER or DESIGNER and coordinated with jurisdictional agencies and their UTILITY company.

1.05 PROTECTION

A. All excavated areas or trenches shall be backfilled immediately after work is completed. Where a hole or trench is left open at the end of a production day or because of some other construction requirement, the entire perimeter of the open hole or trench shall be protected from the workers and the general public by barricades, fence, signs, lights or other devices required by the Contract Documents and/or local agency installation codes.

B. Pavement, sidewalk, driveway, curb and gutter, and other structures shall be protected from damage during excavation wherever possible and as directed in the Contract Documents.

PART 2 PRODUCTS

2.01 BEDDING MATERIALS

A. Crushed stone bedding material: Crushed, washed, and graded in accordance with ASTM C33, gradation 67.

B. Sand bedding: Clean sand, free of clay, silt, debris, roots, vegetation, or rock larger than one-half inch in diameter.

2.02 BACKFILLING MATERIALS

A. Select fill: Materials excavated from the limits of construction or imported that conform to AASHTO Standard M 145, Groups A-1 and A-3 and free of rocks or gravel larger than one-half inch in diameter.

B. Common fill: Material that conforms to AASHTO Standard M 145, Groups A-1, A-2, or A-3, free of rocks or gravel larger than six inches.

PART 3 EXECUTION

3.01 PREPARATION

A. Investigate existing conditions and identify line and grade stakes as applicable. Arrange for placement of materials required to minimize the duration of open trenches or excavated areas.

B. Install well points or other approved methods of dewatering as required so that the discharged water complies with all pertinent ordinances, codes, permits, or requirements of the Contract Documents.

C. Implement traffic control and protective devices, as may be applicable, in accordance with Specification Section – 01 55 26 – TRAFFIC CONTROL.

D. For pipelines placed above the natural ground, embankment shall be placed and compacted to an elevation of at least two feet above the top of the pipe and to a width equal to four pipe diameters prior to trench excavation. The minimum side slopes shall be six (6) feet (horizontal) to one (1) foot (vertical).

3.02 CLEARING AND GRUBBING

A. Prior to trench excavation, the existing surface that will be disturbed by the excavation operation shall be cleared and grubbed in accordance with Specification Section – 31 11 00 -CLEARING AND GRUBBING.

B. The limits of clearing and grubbing for this Section shall be as shown on the plans or as otherwise specified in the Contract Documents. Where the clearing limits are not shown or stated, the limits of clearing and grubbing shall be the smallest area that will facilitate the construction of work specified.

3.03 TRENCH WIDTH

A. Trenches for pipe construction shall be excavated to a width that will provide enough working space next to the pipe and facilitate proper compaction of backfill material around the haunches of the pipe. All such trench excavation shall comply with the manufacturer's recommendations for the type of pipe used.

B. Excavation for structures such as manholes, inlets, pump stations, etc. shall be large enough to provide adequate working room. A minimum distance of two feet shall be provided between the outside edge of the structures and the side or wall of the excavation to allow for proper backfilling and compaction.

3.04 EXCAVATION

A. All trenches shall be excavated by open cut unless otherwise indicated in the Contract Documents.

B. The length of the open cut trench that is excavated ahead of the pipe laying operation shall not exceed half of the normal daily production length. The excavation and pipe laying operation shall be coordinated so that all pipes laid in one day is fully backfilled except for the last length of pipe in an unfinished run between structures.

3.05 ROCK EXCAVATION

A. Where rock is encountered during the performance of work specified in this Section, the rock shall be excavated in accordance with Specifications Section – 31 23 16.26 - ROCK REMOVAL.

3.06 UNSUITABLE MATERIALS

A. Where materials unsuitable for backfilling are encountered during trench excavation, these materials shall be separated from the suitable materials and disposed of off-site or utilized on-site in embankment areas as authorized by the OWNER or DESIGNER.

3.07 REPLACEMENT MATERIAL

A. Where unsuitable material including rock larger than 6 inches is excavated and hauled off-site, replacement material shall be acquired from on-site excavation as provided by the Contract Documents or as authorized by the OWNER or DESIGNER. Where replacement material is not available from the site, the CONTRACTOR shall furnish fill material from an off-site borrow source. Only materials that conform to Article 2.02 of this Section may be used for backfilling operations unless otherwise specified in the Contract Documents or authorized in writing by the OWNER or DESIGNER.

3.08 PREPARATION OF TRENCH BOTTOM

A. Where rock is encountered at the bottom of the trench, the trench shall be undercut to a depth of at least 6 inches below the bottom of the pipe to allow for a bedding cushion above the rock.

B. Where muck, roots or other organic materials are encountered at the bottom of the trench, the trench shall be undercut to remove the unsuitable material to the satisfaction of the OWNER or DESIGNER.

C. The CONTRACTOR shall dewater the excavation operation as required, and in accordance with the approved dewatering permit, to provide a dry trench bottom.

3.09 BEDDING

A. Where the exposed material at the bottom of the trench meets the requirements of Article 2.01 this Section, the existing material may be used as bedding, provided it is compacted.

B. Where the bottom of the trench has been undercut to remove rock or unsuitable material, the bottom shall be brought up to grade by placing and compacting bedding materials conforming to the requirements of Article 2.01 this Section.

C. In exceptionally wet conditions, the CONTRACTOR may request permission from the OWNER or DESIGNER to lay the pipe in water. If that request is authorized, the CONTRACTOR shall undercut the existing bottom a minimum of 6 inches and replace with "crushed stone bedding material" conforming to Article 2.01A this Section. This bedding material shall be tamped and consolidated to provide a solid and unyielding base for the pipe. During this operation, the CONTRACTOR shall continue the dewatering process to facilitate adequate installation of the pipe or structure and to permit observation of the

process by the OWNER or DESIGNER. The additional undercut excavation, crushed stone bedding, and other associated costs shall be at the CONTRACTOR's expense and no extra compensation will be allowed.

3.10 BACKFILLING

A. Backfilling of pipe trenches shall be done in three stages as follows:

1. First Stage: Material above the bedding and beneath the haunches compacted in 6-inch layers.

2. Second Stage: Material along the sides of the pipe up to at least 1 foot above the top of the pipe compacted in 6-inch layers.

3. Third Stage: Material above the second stage up to the bottom of the subgrade or the finished surface as applicable compacted in 12-inch layers.

B. Backfilling of structures shall be done in 12-inch compacted layers up to the top of the completed or partially completed structure.

C. Materials used for backfilling shall comply with the requirements of Article 2.02 this Section or as otherwise authorized in writing by the OWNER or DESIGNER. For backfilling of pipe "Select Fill" shall be used for the First and Second Stages. "Common Fill" shall be used for the Third Stage of pipe backfill and for backfilling structures.

3.11 COMPACTION

A. The compaction requirements for backfilling pipe trenches and around structures are listed below under the following two categories.

1. Under pavement: In a cross-section view this is the area under the pavement and within a 2:1 slope downward from the outside edge of the shoulder or back of curb as applicable.

2. Not under pavement: Any area outside the 2:1 slope referred to above.

	Under Pavement	Not Under Pavement
Bedding	90%	90%
First Stage	90%	90%
Second Stage	98%	Equal to 90% adjacent soil
Third Stage	98%	Equal to 90% adjacent soil

The above are the minimum percentages of the maximum density determined by the "Modified Proctor Density" (ASTM D1557).

B. The CONTRACTOR shall add water or dry out the material used for backfilling until the moisture content is within two percent of the optimum moisture required to achieve the maximum compaction.

C. A density test shall be taken for each 300-foot section of trench or part thereof for each layer. Each layer shall pass the compaction requirements before the next layer is placed unless otherwise authorized by the OWNER or DESIGNER in writing.

D. A density test shall be taken for every other layer for each structure. Each test shall pass the minimum compaction requirements before the next layer is placed unless otherwise authorized by the OWNER or DESIGNER in writing.

3.12 DEWATERING

A. Dewatering. All piping shall be laid in a dry trench excavation, unless otherwise approved by the UTILITY. Dewatering systems shall lower the ground water level in advance of the excavation to keep the trench bottom and sides firm and dry. The sewer system under construction shall not be used as a conduit to remove groundwater from the pipe trench. Water pumped or drained from the work shall be handled in accordance with the approved dewatering permit and/or current South Florida Water Management District rules, regulations, procedures and at a minimum in a suitable manner without damage to adjacent property, to work under construction or to street pavements, parks or private property. Water shall not be discharged onto streets without adequate protection of the surface at the point of discharge. No water shall be discharged into a wastewater system. No water containing settleable solids shall be discharged into storm sewers. Any and all damage caused by dewatering shall be promptly repaired by CONTRACTOR at their expense. All permits required for dewatering operations shall be obtained by the OWNER or CONTRACTOR and a copy filed with the governing municipality and UTILITY company.

3.13 BASIS OF PAYMENT

A. There shall be no separate payment for any work defined in this Section except as otherwise specified in the Contract Documents. The cost of rock excavation including blasting shall be included in the contract unit price for pipe or structures unless rock excavation is specifically established as a separate pay item in the Contract documents. When rock excavation is paid for separately, payment shall be made at the contract unit price in accordance with Specification Section – 31 23 16.26 - ROCK REMOVAL.

END OF SECTION 31 23 33

SECTION 32 10 00
BASES, BALLASTS, AND PAVING

PART 1 GENERAL

1.01 SCOPE

A. The work specified in this Section consists of restoring existing surfaces or any improvements such as but not limited to pavement, curb and gutter, sidewalk, structures, signs, or landscaping damaged during construction.

1.02 SPECIFICATIONS AND STANDARDS REFERENCE

A. Any reference to a supplementary specification or standard such as ASTM, AWWA, AASHTO, is intended to be a reference to the latest edition of that specification or standard.

B. All references to "FDOTSPEC" shall mean the latest edition of the "Florida Department of Transportation Standard Specifications for Road and Bridge Construction".

C. Specifications Sections:

Section – 31 23 33 - TRENCHING AND BACKFILLING
Section – 01 45 23 – TESTING AND INSPECTING SERVICES

PART 2 PRODUCTS

2.01 MATERIALS

A. Flexible Pavement: Comply with requirements of the applicable Sections within the FDOTSPEC.

B. Concrete Pavement, Driveway, Sidewalk, Curb & Gutter: Comply with requirements of the applicable Sections within the FDOTSPEC.

C. Grassing: Comply with requirements of the applicable Sections within the FDOTSPEC.

PART 3 EXECUTION

3.01 GENERAL

A. Existing property damaged during construction shall be restored to a condition at least equal to the original condition of the property, unless otherwise specified in the Contract Documents.

B. Existing roadway or drainage improvements damaged within a roadway or drainage Right-Of-Way, or easement shall be restored in accordance with the requirements of the State and local agencies having jurisdiction thereof.

3.02 UNDERGROUND FACILITIES

A. Existing underground utilities and drainage systems damaged during construction shall be immediately repaired to the specifications of the owner of the damaged system. Where the utility owner elects to make said repairs under their direction, the CONTRACTOR shall pay for such repair costs directly.

B. Where damage to existing, underground utilities is anticipated due to unavoidable conflicts, the CONTRACTOR shall construct their work to cause the least amount of interruption of service as possible.

3.03 TRENCHING AND BACKFILLING

A. Any trenching and backfilling required to satisfy the requirements of this section shall be in accordance with Specification Section – 31 23 33 - TRENCHING AND BACKFILLING.

3.04 PAVEMENT CUTS

A. On dead end streets, collector streets, and high traffic streets, trenching and pipe laying shall be performed in such a manner that at least one-way traffic is always maintained.

B. All trench lines across existing pavements, driveways, sidewalks, curbs, etc. shall be saw cut in straight parallel lines prior to trench excavation.

C. CONTRACTOR shall exercise care to minimize amount of pavement, sidewalk, driveways, and curbing to be removed.

3.05 CONCRETE PAVEMENT, CURB & GUTTER, ETC.

A. Concrete pavement, driveway, sidewalk, and curb & gutter damaged during construction shall be restored to the same dimensions as that removed or as specified in the Contract Documents. All such restoration shall be in accordance with the applicable Sections of FDOTSPEC.

B. Prior to placing concrete, the subgrade shall be compacted to at least 98% of the maximum density determined by the "Modified Proctor Density" (ASTM D1557 latest revision).

3.06 FLEXIBLE PAVEMENT

A. Stabilized subgrade damaged during construction shall be restored in accordance with the applicable Sections of FDOTSPEC. The restored stabilized subgrade shall have a minimum bearing value of LBR-40 and be compacted to at least 98% of the maximum density determined by the "Modified Proctor Density" (ASTM D1557 latest revision).

B. Limerock or shell base damaged during construction shall be restored in accordance with the applicable Sections of FDOTSPEC. The minimum density of the restored base shall be 98% of the maximum density determined by the "Modified Proctor Density" (ASTM D1557 latest revision). After completion of the base course, a bituminous prime coat shall be applied in accordance with the applicable Sections of FDOTSPEC when applicable prior to placement of asphalt surface course.

C. Asphalt Surfaces damaged during construction shall be replaced with a similar surface in accordance with the applicable Sections of FDOTSPEC. The material used shall be the same type and the thickness of that damaged, except that the minimum thickness shall be one inch. In the case of multiple layers, each layer or course of the damaged asphalt surface shall be reconstructed to duplicate the original.

3.07 LANDSCAPING & MISCELLANEOUS

A. Trees and bushes damaged during construction shall be removed and replaced with equal size and type by the CONTRACTOR at their expense unless otherwise specified in the Contract Documents.

B. Grassed areas damaged during construction shall be repaired with the same type of sod unless otherwise specified in the Contract Documents.

C. Sodding and grassing and mulching operations shall begin within a maximum of three weeks after utility installation, except in cases of front and back slopes which shall be done immediately following installation completion. Any yards or part of right-of-way in front of

private property, that has a grass mat, shall be re-sodded with like sod. CONTRACTOR shall maintain disturbed areas until acceptable vegetation is re-established.

D. Areas without established grass mats in front of vacant lands shall be restored by seeding and mulching. The grass mat shall be restored to the required design or finished grade to permit proper drainage.

E. Unimproved areas such as an open field or lot having its surface disturbed during construction shall be graded to duplicate the existing conditions and seeded and mulched unless otherwise specified in the Contract Documents.

F. Any damage to an existing irrigation system caused by the construction operations shall be repaired by the CONTRACTOR prior to the installation of sod, seed, or other landscaping unless otherwise specified in the Contract Documents.

G. Mailboxes, railroad ties, or any other miscellaneous items damaged during construction shall be repaired to the satisfaction of the OWNER unless otherwise specified in the Contract Documents.

3.08 DENSITY TESTS

A. Density tests shall be performed in accordance with Specification Section – 01 45 23 – TESTING SERVICES of the technical specifications except that the CONTRACTOR shall pay for all tests related to restoration work.

B. Field density tests shall be required for each layer of fill, stabilized subgrade, limerock base, and asphalt surface in accordance with the frequency listed below unless otherwise authorized by the OWNER.

* Transverse Trench Crossing - one/location/layer
* Longitudinal Trench - one/300 LF/layer
* Pavement Repair - one/1,000 SY/layer

C. Concrete shall be tested for slump, air content, and compressive strength every 50 cubic yards for continuous pours. For smaller volume work, the same tests shall be taken for each separate pour. A minimum of four (4) sample cylinders shall be made when testing for compressive strength.

3.09 GENERAL REQUIREMENTS

A. Maintenance of Service - CONTRACTOR shall provide facilities and be responsible for protection of all structures, buildings and utilities, underground, on the surface, or above ground, against trenching, dewatering or any other activity connected with Work covered by this modifications of existing utilities, CONTRACTOR shall provide for maintaining continuous water electric, telephone, gas, sewage and other utilities, to all present customers of such utilities unless approval is obtained in writing from the utility company or OWNER for the interruption of such services.

B. Existing Facilities - Underground structures shown on the Plans are according to the best available information, but it shall be the responsibility of the CONTRACTOR to acquaint himself with the exact location and to avoid conflict with all existing facilities. Where underground structures are damaged, they shall be immediately repaired to the specifications of the owner of the utility. If the owner of the utility elects to make such repairs with their own forces, CONTRACTOR shall make arrangements as to protect the OWNER from all damages. Where such conflicts are unavoidable, every effort shall be made to construct the work so as to cause as little interference as possible with services rendered by the structure disturbed.

C. UTILITY Permits - CONTRACTOR shall obtain necessary permits for construction across public and private property, streets, railroads, telephone lines, power lines, etc. CONTRACTOR shall abide by all rules, regulations and requirements of the OWNER of

such property regarding construction under this Contract, including giving of notices, provisions for inspection and employment of such methods of construction as may be required. Costs of any permits shall be incidental to construction and reflected in unit prices bid.

D. Work in State Rights-of-Way - Construction in State rights-of-way shall comply with the State of Florida Department of Transportation (FDOT) Utility Accommodation Manual.

E. Work in Jurisdictional Rights-of-Way - Construction in jurisdictional rights-of-way shall comply with the utility accommodation manual for the agency having jurisdiction.

F. Clearing of Excavation Corridor - Only items necessary to provide adequate workspace including space for hubs, batter boards, and equipment shall be removed within the right-of-way, easement, or designated construction corridor. Trees, shrubbery, poles, mailboxes, and other items not to be removed shall be protected from damage during construction. When necessary to cut tree roots and branches, such cutting shall be performed with saws in a neat and workmanlike manner.

3.10 BASIS OF PAYMENT

A. There shall be no separate payment for any work defined in this section. The cost of any such restoration work shall be included in the various work items that necessitate the restoration unless otherwise specified in the Contract Documents. Any reference to unit price payment in the FDOTSPEC shall not be applicable.

END OF SECTION 32 10 00

SECTION 32 11 00
BASE COURSES

PART 1 GENERAL

1.01 SCOPE

A. The scope of this Section consists of furnishing materials and methods for construction of a crushed limerock base course and stabilized subgrade in accordance with the Plans and Specifications.

1.02 SPECIFICATION AND STANDARDS REFERENCE

A. Where supplementary specifications or standards such as ASTM, AWWA, AASHTO, etc. are referenced, such references shall be latest edition.

B. The Florida Department of Transportation Standard Specifications for Road and Bridge Construction, hereinafter referenced as FDOTSPEC.

PART 2 PRODUCTS

2.01 LIMEROCK BASE

A. Material for limerock base shall meet the requirements of the applicable Sections within the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, hereinafter referenced as FDOTSPEC.

B. CONTRACTOR shall pay for and furnish samples of materials to the approved testing laboratory for physical and chemical analysis, together with optimum moisture and density relationships of the base material. Test reports and samples shall be required of every limerock supplier furnishing material for the work. The source or sources of materials proposed for use shall be designated and shall not change without written consent of the OWNER. During construction, OWNER or DESIGNER may require additional tests if any visible variation occurs.

C. Limerock shall be obtained from pits from which all overburden has been removed, prior to blasting. It shall show no tendency to air slake or undergo chemical change under exposure to weather, Limerock-Miami (or Ocala) formations shall be tested to meet the following requirements:

	LIMEROCK BASE GRADE #1	LIMEROCK STABILIZED BASE GRADE #2
Minimum Limerock Bearing Ratio (LBR)	40	40
Minimum Carbonates (Calcium and Magnesium)	70	70
Maximum Liquid Limit	35	35
Maximum Plasticity Index	non-plastic	10/less
Maximum Percent Clay	3/less	3/less

D. Grade #1 Limerock as placed shall be well graded, crushed material from either Miami or Ocala formations with at least 97 percent (by weight) of the material passing a 3-1/2-inch sieve and shall be graded uniformly down to dust with the fines consisting entirely of dust of fracture. Grade #2 Limerock will conform to the above except that 97 percent shall pass a 1-1/2-inch sieve.

2.02 SUBGRADE STABILIZATION

A. General: Materials to be used for stabilizing shall be commercial limerock, limerock overburden, crushed or local shell meeting the requirements of the applicable Sections of FDOTSPEC.

B. Limerock and Limerock Overburden: For limerock and limerock overburden, the percentage of carbonates of calcium and magnesium shall be at least 70 percent and the plasticity index shall not exceed 10 percent. The gradation of both commercial limerock and limerock overburden shall be such that at least 95 percent (by weight) of the material will pass a 3-1/2-inch sieve and not less than 10 percent (by weight) of the material will pass a No. 200 sieve and the material shall be graded uniformly down to dust.

C. Crushed Shell: Crushed shell shall be mollusk shell (i.e., oysters, mussels, clams, cemented coquina, etc.). Steamed shell will not be permitted. Shell shall meet the following requirements:

1. At least 95 percent (by weight) of the material shall pass a 3-1/2-inch sieve and at least 50 percent (by weight) of the total material shall be retained on the No. 4 sieve.

2. Not more than 15 percent (by weight) of the total material shall pass the No. 200 sieve. The determination of the percentage passing the No. 200 sieve shall be made by washing the material over the sieve.

3. In the event shell meets the above requirements without crushing, crushing will not be required.

D. Local Shell: Local shell shall consist of a naturally occurring deposit which is essentially broken mollusk shell. The gradation of the shell shall be such that at least 95 percent (by weight) of the material will pass a 3-1/2-inch sieve and not more than 20 percent (by weight) of the material will pass a No. 200 sieve by washing. The portion of material passing the No. 40 sieve shall have a liquid limit not greater than 30 percent and a plasticity index not greater than 10 percent.

2.03 PRIME COAT MATERIALS

A. Material used for prime coat shall meet the requirements of the applicable Sections of FDOTSPEC. CONTRACTOR may select any of the specified bituminous materials for use, unless the Plans or Specifications indicate use of a specific material. Types and grades of bituminous material other than those specified above may be allowed if it can be shown the alternate material will properly perform the function of prime coat material.

2.04 COVER MATERIAL FOR PRIME COAT

A. If an emulsified asphalt is used for prime coats, the cover material shall consist of a sand-bituminous hot mix or screenings. Sand-bituminous hot mix shall contain from 2 to 4 percent Asphalt-Cement, viscosity Grade AC-20, and fine aggregate consisting of a clean sand or screenings. Sand shall contain no more than 10 percent (by weight) of material passing the No. 200 sieve. The gradation of screenings used along shall be such that 100 percent will pass the 3/8-inch sieve, and not more than 10 percent will pass the No. 200 sieve.

B. If material other than emulsified asphalt is used for the prime coat, cover material shall be either sand (bare or hot-asphalt coated) or screenings, at the CONTRACTOR's option. Sand shall be non-plastic and free from any appreciable amount of silt, clay balls and root particles, and from any noticeable sticks, trash, vegetation or other organic matter. Screenings shall be Miami Oolite rock screenings.

2.05 TACK COAT

A. Unless a specific type or grade of material is called for on the Plans or Specifications, material used for tack coat shall meet the requirements of the applicable Sections of FDOTSPEC.

PART 3 EXECUTION

3.01 CONSTRUCTION OF STABILIZED SUBGRADE

A. Stabilized subgrade shall be constructed of roadbed soil and subgrade stabilization materials in conformance with the lines, grades, and cross-section shown on the Plans. Prior to beginning of stabilizing operations, the area to be stabilized shall have been completed to the lines shown on the Plans and to a grade parallel to finished elevation of the stabilized subgrade. Before stabilizing material is added, the elevation of the roadbed shall be such that subgrade shall conform to requirements of the typical cross-section when the work is completed.

B. Stabilized Subgrade Minimum Bearing Value - Completed stabilized subgrade shall have minimum limerock bearing ratio value of 40 (LBR40) unless otherwise stated on the Plans or amended in the Specifications.

C. Incorporation of Stabilizing Material and Mix-in

1. Spreading and Mixing: Stabilizing material shall be placed on areas to be stabilized and spread uniformly. Stabilizing material shall be thoroughly mixed with the soil with rotary tillers or other approved equipment which can achieve a satisfactory blend. Mixing shall be done as soon as practical, but not later than one week after stabilizing material is placed on the road. The area to be stabilized shall be thoroughly mixed throughout the entire depth and width of the stabilized subgrade.

2. Maximum Particle Size of Mixed Materials: At the completion of mixing, all particles of materials within the limits of the stabilized sub-base shall pass a 3-1/2-inch ring. Any particles not meeting this requirement shall be removed or shall be broken down as to meet this requirement.

3. Plant Mixing: Mixing of the soil may be accomplished by the central plant-mix method in lieu of mixing in place, provided that a uniform mixture containing the proper amount of water is achieved.

4. Depth of Mixing Stabilizing Materials: Stabilizing material shall be mixed to the nominal depth of Stabilized Subgrade shown on the Plans. The following tolerances over or under the specified depth will be allowed:

Plan Depth	Tolerance
8” or less	1"
Over 8"	2"

In the event the measured depth of mixing is less than the minimum specified above, CONTRACTOR shall remix the stabilized subgrade until stabilizing material is distributed throughout the subgrade course to the required depth. OWNER or DESIGNER may waive the above requirements for remixing or addition of stabilizing material and remixing for Stabilized Subgrade which serves solely as a working platform for concrete paving equipment, if the subgrade as originally mixed is firm and substantially unyielding.

5. Compacting

   a. After mixing operations have been completed and requirements for uniformity, mixing depth and maximum particle size have been satisfied, sub-base shall be shaped and compacted. Minimum density acceptable at any location within the entire limits of width and depth of the sub-base will be 98 percent of the maximum density as determined by AASHTO T-180.

   b. In the event CONTRACTOR elects to shape and compact the subgrade that will be underlying curb and gutter separate from the rest of the subgrade, additional density testing along those curb and gutter lines will be required at a minimum frequency of 1 test per 500 lineal feet.

   c. OWNER or DESIGNER may waive the above density requirement for Stabilized Subgrade which serves solely as a working platform for concrete paving equipment, if the subgrade as compacted is firm, substantially unyielding, and no areas of excessive moisture are evident.

6. Finish Grading: Completed stabilized subgrade shall be shaped to conform with finished lines, grades and cross-sections indicated on the Plans. Sub-base shall be checked using elevation stakes, or other means approved by the OWNER or DESIGNER.

7. Requirements for Condition of Stabilized Subgrade: After stabilizing and compacting operations have been completed, subgrade shall be firm and substantially unyielding to the extent it will support construction equipment. All soft and yielding material, and any other portions of the subgrade which will not compact readily, shall be removed and replaced with suitable material and the whole subgrade brought to line and grade, with proper allowance for subsequent compaction.

8. Maintenance of completed Stabilized Subgrade: After stabilized subgrade has been completed as specified, CONTRACTOR shall maintain it free from ruts, depressions and any damage resulting from the hauling or handling of materials, equipment, tools, etc.

9. Preparation of Subgrade

   a. Embankment Subgrade Soil: If the subgrade consists of embankment soil, CONTRACTOR before undertaking this work, shall shape and compact the subgrade to conform with the grade lines and cross-sections required for the completed work. Unless otherwise shown on the Plans, subgrade limits shall extend through the pavement area to one foot beyond the curb line or 6 feet beyond pavement edge where curbs are not employed. Unless otherwise shown on the plans, subgrade thickness shall be 12 inches.

   b. Undisturbed Subgrade Soil: In-place soil under Group Classification A-4 through A-7, according to AASHTO's Soil Classification System, shall be removed and replaced unless OWNER directs it remain in place. Any replacement soil must be acceptable to the OWNER.

3.02 CONSTRUCTION OF LIMEROCK BASE

A. Limerock (also referred to as "rock") base shall be constructed on the prepared subgrade in accordance with the Specifications and with lines, grades, and cross-sections shown on the Plans. Construction shall meet requirements of the applicable Sections of FDOTSPEC.

B. Transporting Limerock: Limerock shall be transported to the point where it is to be used, over rock previously placed if practical, and dumped on the end of the preceding spread. Hauling over the subgrade and dumping on the subgrade will be permitted when, in the OWNER or DESIGNER's opinion, these operations will not be detrimental to the base.

C. Spreading Limerock

1. Method of Spreading: Limerock shall be spread uniformly. All segregated areas of fine or coarse rock shall be removed and replaced with properly graded rock.

2. Number of Courses: When the specified compacted thickness of the base is greater than 6 inches, 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.

D. Compacting and Finishing Base

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

2. Double-Course Base: For double-course base, the first course shall be cleaned of foreign material, bladed and brought to a surface cross-section approximately parallel to that of the finished base. Prior to the spreading of any material for the upper course, density tests for the lower course shall be completed and DESIGNER will determine that required compaction has been obtained. After spreading of the material for the second course is completed, its surface shall be finished and shaped to produce the required grade and cross-section after compaction, free of scabs and laminations.

3. Moisture Content: When material does not have proper moisture content to ensure the required density, wetting or drying will be required. When water is added, it shall be uniformly mixed 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.

4. Density Requirements: As soon as proper conditions of moisture are attained, material shall be compacted to a density of not less than 98 percent of maximum density as determined by AASHTO T-180. Minimum density which will be acceptable at any location outside the traveled roadway (such as crossovers) shall be 95 percent of such maximum.

E. Testing Frequency: At least three density determinations shall be made on each day's final compaction operation on each course, and a frequency of one test per 1000 square yards or fraction thereof of surface roadway with a minimum of three tests on each course or roadway section requiring a break in the rolling pattern. Additional tests or greater frequency may be deemed necessary by the OWNER and/or DESIGNER.

F. Checking: Prior to application of any bituminous materials, base shall be checked for grade, cross-section and thickness. Where excessive deviations occur, base shall be reworked by scarifying, adding additional materials, blading, rolling and re-bonding until such unsatisfactory condition is corrected. In general, deficiency in thickness shall be interpreted as anything in excess of 1/4-inch for the entire work or of 1/2-inch in isolated or limited areas. Deviations from straight edge laid parallel with the centerline, or from cross-section template, shall not be more than 1/16-inch per foot from point to point of contact. Deviations from grade shall not exceed 0.05 (five one hundredths) foot and in no case shall such deviation vary from one extreme to the other within less than 100 feet from low to high.

3.03 PRIMING

A. Prime coat shall be applied only when the base meets 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 time of priming, base shall be firm, unyielding and in such condition that no undue distortion will occur.

3.04 MAINTAINING

A. CONTRACTOR shall assure the true crown and template are maintained, with no rutting or other distortion, and the base meets all requirements at the time the surface course is applied.

3.05 CLEANING BASE AND PROTECTION OF ADJACENT WORK

A. Before any bituminous material is applied, all loose material, dust, dirt, cakes clay and other foreign material which might prevent proper bonding 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 the prime or tack coat will adhere.

B. 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 as approved by OWNER and/or DESIGNER. Any bituminous material deposited on such concrete surfaces shall be removed.

3.06 WEATHER LIMITATION

A. Prime and tack coats shall be applied when the air temperature, in the shade, is above 40º F and when all other weather conditions and the condition of the surface are suitable.

3.07 APPLICATION OF PRIME COAT

A. Rate of Application for Limerock, Limerock Stabilized, and Local Rock Bases: For these bases, rate of application shall be not less than 0.10 gallon per square yard, unless a lower rate is directed by OWNER or DESIGNER.

B. Sprinkling: If required by OWNER or DESIGNER, base shall be lightly sprinkled with water and rolled with a traffic roller in advance of the application of the prime.

C. Partial Width of Application: If warranted by traffic conditions, OWNER or DESIGNER may request that the application be made on only one-half the width of the base at one time, in which case positive means shall be used to secure the correct amount of bituminous material at the joint.

3.08 APPLICATION OF TACK COAT

A. General: Where a bituminous surface is to be laid and a tack coat is required, tack coat shall be applied as specified herein below.

B. Where Required: In general, a tack coat will not be required on primed bases except in areas that have become excessively dirty and cannot be cleaned, or in areas where the prime has cured to the extent that it has lost all bonding effect. Generally, a tack coat will be required on hot bituminous base courses before placing the surface course.

C. Method of Application: Tack coat shall be applied with a pressure distributor except that, on small jobs, if approved by OWNER and/or DESIGNER, application may be by other mechanical devices or by hand methods. The bituminous material shall be heated to a suitable temperature as designated by the OWNER or DESIGNER and shall be applied in a thin, uniform layer.

D. Rate of Application: Rate of application shall be between 0.02 and 0.08 gallon per square yard. For tack coat applied on concrete pavement, which is to be surfaced, the rate of application may exceed the upper limit, if directed by DESIGNER.

E. Curing and time of Application: Tack coat shall be applied sufficiently in advance of the laying of the bituminous mix to permit drying but shall not be applied so far in advance that it might lose its adhesiveness as a result of being covered with dust or other foreign material.

F. Protection: Tack coat surface shall be kept free from traffic until the subsequent layer of bituminous hot mix has been laid.

3.09 QUALITY CONTROL

A. OWNER shall select and pay the Testing Laboratory for required testing in work performed under this Section. Should retesting be required because of failure to pass, CONTRACTOR shall pay for additional testing required until specification requirements are attained. CONTRACTOR shall either promptly reimburse the OWNER for said costs or shall have the amount deducted from the next month's pay request and all subsequent pay requests. In such case the OWNER shall promptly pay the Testing Laboratory for all testing costs. CONTRACTOR is herein required to schedule and make test arrangements with the Testing Laboratory for making the required tests. Test patterns and frequency will be at the direction of the OWNER and/or DESIGNER. Frequency of tests shown below shall be considered a minimum.

1. Subgrade - Bearing: One Limerock Bearing Value (LBR) test for each 0-5000 square yards of subgrade plus one test for each additional 5000 square yards or fraction thereof, plus one LBR for each change of material. One subgrade in place density for each 0-1000 square yards of base and one test for each additional 1000 square yards or fraction thereof.

2. Base Course: One Limerock Base Course in place density for each 0-1000 square yards of base plus one test for each additional 1000 square yards or fraction thereof (AASHTO T-180).

3.10 METHOD OF MEASUREMENT

A. The Work required under this Section will not be measured for payment.

3.11 BASIS OF PAYMENT

A. Paid at the Contract Lump Sum price. Partial payments will be calculated by the amount of work completed based on the approved schedule of values and applications for payment.

END OF SECTION 32 11 00

SECTION 32 12 16
ASPHALT PAVING

PART 1 GENERAL

1.01 SCOPE

A. The work specified in this Section consists of the construction of asphalt base courses, asphaltic concrete surfaces, asphaltic concrete friction courses, the application of prime and tack coats and the preparation of hot bituminous mixtures used in base and surface courses.

1.02 SPECIFICATION AND STANDARDS REFERENCE

A. Where supplementary specifications or standards such as ASTM, AWWA, AASHTO, etc., are referenced, such references shall be the latest edition.

B. All references to “FDOTSPEC” shall mean the latest edition of the “Florida Department of Transportation Standard Specifications for Road and Bridge Construction”.

PART 2 PRODUCTS

2.01 CERTIFICATION OF MATERIALS

A. Prior to award of the Contract, CONTRACTOR shall submit proof from a State Certified Testing Laboratory that the materials and mixes meet FDOTSPEC. DESIGNER may require additional tests from time to time and CONTRACTOR shall furnish said tests. Costs of said tests shall be incidental to construction and borne by the CONTRACTOR.

2.02 ASPHALT BASE COURSES

A. Asphalt Base Courses shall meet the requirements of the applicable Sections within FDOTSPEC, except as modified.

2.03 PRIME AND TACK COATS

A. Prime and Tack Coats shall meet the requirements of the applicable Sections within FDOTSPEC, except as modified.

2.04 ASPHALTIC CONCRETE

A. Type S-I, S-II, and S-III Asphaltic Concrete shall meet the requirements of the applicable Section within FDOTSPEC, except as modified.

B. SuperPave (SP) Asphaltic Concrete shall meet the requirements of the applicable Section within FDOTSPEC, except as modified.

2.05 ASPHALTIC CONCRETE FRICTION COURSES

A. Asphaltic Concrete Friction Courses (FC) shall meet the requirements of the applicable Section within FDOTPSEC, except as modified.

PART 3 EXECUTION

3.01 ASPHALT PLANT

A. The plant and methods of operation for preparing all plant-mixed hot bituminous mixtures for base and surface courses shall meet the requirements of the applicable Sections of FDOTSPEC.

3.02 CONSTRUCTION EQUIPMENT

A. The equipment to be used in the construction of the asphalt pavements and bases shall meet the requirements of the applicable Sections within FDOTSPEC.

3.03 GENERAL CONSTRUCTION REQUIREMENTS

A. The general construction procedures for plant-mixed hot bituminous pavements and bases shall meet the requirements of the applicable Sections within FDOTSPEC.

B. The construction of asphalt base courses shall meet the requirements of the applicable Sections within FDOTSPEC.

3.04 PAYMENT

A. Paid at the Contract Lump Sum price. Partial payments will be calculated by the amount of work completed based on the approved schedule of values and applications for payment.

END OF SECTION 32 12 16

SECTION 32 13 00
RIGID PAVING

PART 1 GENERAL

1.01 SCOPE

A. Rigid pavement consists of constructing a specified Portland Cement Concrete roadway on a prepared subgrade. Work shall include furnishing of all labor, materials, equipment and incidentals necessary for the proposed rigid pavement construction in accordance with the approved Plans and Specifications.

1.02 SPECIFICATION AND STANDARDS REFERENCE

A. Where supplementary specifications or standards such as ASTM, AWWA, AASHTO, etc., are referenced, such references shall be the latest edition.

B. All referenced to “FDOTSPEC” shall mean the latest edition of the “Florida Department of Transportation Standard Specifications for Road and Bridge Construction”.

PART 2 PRODUCTS

2.01 MATERIALS FOR RIGID PAVEMENT

A. Proportioning

1. Actual proportions of cement, fine aggregate, coarse aggregate, water and admixtures to be used for various mixes shall be determined by an approved testing laboratory, or a registered professional engineer, in accordance with the American Concrete Institute (ACI) Standard 318-77, Section 4.2 through 4.8 (excluding Section 4.6), or other approved methods so as to produce a workable concrete having the properties of strength, slump and air content set out elsewhere in the specifications. Materials or mixes not currently approved (cement, coarse aggregate, fine aggregate, etc.) shall be submitted by the CONTRACTOR to the testing laboratory at least 45 days prior to usage in quantities suitable for testing.

B. Materials

1. Cement – Shall meet the requirements of ASTM C150. Cement supplier shall submit a certification of the cement used to the OWNER or DESIGNER that conforms to applicable specifications with complete mil analysis for every 200 tons used.

2. Aggregate – Shall meet the requirements of ASTM C-33.

3. Admixtures - Air entraining admixtures shall meet the requirements of ASTM C260. Type A water reducing admixtures (normal setting) shall meet the requirements of ASTM C494. Type D water reducing admixtures (retarders) shall meet the requirements of ASTM C494. Type E water reducing admixtures (accelerating) shall meet the requirements of ASTM C494. Fly ash shall meet the requirements of ASTM C618 Type F with the following restrictions: Sulfur trioxide shall not exceed 5.0 percent, and loss of ignition shall not exceed 5.0 percent.

4. Materials for Curing Concrete – Shall be the pigmented type meeting the requirements of AASHTO M 148 and ASTM C309. Membrane curing compounds for concrete may be transparent with a fugitive dye.

5. Joint Sealing Compound - Where the Plans call for joints to be sealed, sealing material shall be hot poured rubber asphalt joint sealing compound meeting the requirements of AASHTO M 173 or Federal Specifications SS-S-1401C(1).

6. Water - If water is of questionable quality, it shall be tested in accordance with FDOT Standard Specification Section 923, "Water For Concrete."

C. Flexural Strength

1. All pavement concrete shall have a minimum flexural strength at 28 days as called for on the plans. Conformance to flexural strength requirements shall be determined by ASTM C78 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading). Flexural strength shall be expressed as MOR (Modulus of Rupture).

D. Compressive Strength

1. Minimum 28-day compressive strength of the concrete shall be 3400 psi and water to cement weight ratio shall not exceed 0.49. Fly ash may be used to replace up to 20 percent by weight of the cement content if the resulting concrete mix design meets all strength requirements except that no Fly ash substitution will be allowed for Type I-S or I-P cement.

2. The following table lists various flexural strengths that may be called for on the Plans.

MODULUS OF RUPTURE (MOR) PSI - ASTM C78

398 PSI
430 PSI
490 PSI

E. Air Content

1. Air content of the plastic concrete shall be 5.5 percent plus or minus 1.5 percent.

F. Slump

1. Mixture shall contain no more water than is necessary to produce concrete which is workable and plastic. The minimum slump necessary to place the concrete satisfactorily shall be used. Slumps should be maintained so as not to exceed 2 to 3 1/2 inches for non-vibrated placement and 1-3 inches for vibrated placement.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION FOR RIGID PAVEMENT

A. General

1. The bottom of the excavation for the roadway or top of the earth fill will be known as the pavement subgrade and shall conform to lines, grade, and cross-sections shown on the Plans. If necessary, material shall be removed or added as required to bring all portions of the subgrade to the correct elevations.

B. Excavation

1. Where required, all earth and other material shall be excavated to the depth and width of the cross- sections as shown on the Plans. In addition, sufficient material shall be excavated to provide for the setting of forms or slipform paving equipment, all work shall be done to the line and grade as established on the Plans and in

accordance with the grade stakes set. Topsoil shall be stockpiled for use in backfilling behind curbs or as otherwise directed in the special conditions.

C. Embankment and Borrow

1. Where required, embankment shall be formed of materials capable of being compacted per Section 3.01D of this Section, and shall be free of all muck, roots, organic or other deleterious material. In the event sufficient acceptable material is not obtainable within the limits of this contract to provide all the fill required, CONTRACTOR shall furnish such additional approved filling material to complete the designated work. All additional fill material shall meet the minimum Limerock Bearing Ratio specified on the Plans. If off-site fill is required, it shall be paid for in accordance with the unit price in the proposal based on truck measured quantities. Payment shall include the cost of all materials, equipment, and labor costs necessary to furnish, place and compact the fill.

D. Compaction

1. Subgrade materials shall be placed and compacted in maximum 12-inch lifts to 95% of maximum density as determined by AASHTO T-180.

E. Checking

1. Prior to placing the concrete, subgrade shall be tested for conformity with the cross-sections shown on the Plans. Concrete shall not be placed on any portion of the subgrade which has not been tested for correct elevation. Subgrade shall be cleared of all loose material. At any time that trucks, construction equipment or slip forming machines cause rutting or displacement of the subgrade material, the subgrade shall be reshaped and compacted. Subgrade shall be in a moist condition at the time the concrete is placed.

F. Utility Trench Backfilling

1. All utility trenches shall be backfilled and finished to grade with soil similar to that adjacent to the trench, if suitable, or with approved granular backfill. Backfill under the pavement shall be compacted to 95% of maximum density as determined by AASHTO T 99.

3.02 TESTING AND INSPECTION

A. OWNER shall select and pay an Engineering Testing Laboratory for required testing in work performed under this Section. Should retesting be required because of failure-to-pass, CONTRACTOR shall pay for additional testing required until specification requirements are attained. CONTRACTOR is herein required to schedule in advance and make test arrangements with the Testing Laboratory for making the required tests. Test requirements shall conform to the applicable Sections of FDOTSPEC.

3.03 EQUIPMENT

A. All equipment necessary for proper preparation of the subgrade, placing, finishing, and curing of the concrete pavement shall be on the project in good working condition before CONTRACTOR will be permitted to begin placing concrete. Throughout construction of the project, CONTRACTOR shall maintain equipment in good working condition to assure proper prosecution of the work.

B. Forms

1. Unless special provision is made for use of wood, all side forms for this work shall be of metal of a depth at least equal to the edge thickness of the pavement, except that it is permissible to increase the depth of forms by fastening boards under the forms. Sections shall have a length of at least ten feet, except on curves of less

than 150-foot radius, where other materials may be used as provided in Article 3.03.C of this Section. Forms with a height of eight or more inches shall have a base width of at least eight inches. Other forms shall have a minimum base width of six inches. When set to grade and staked in place, the maximum deviation of the top surface of any section from a straight line shall not exceed 1/8 inch.

2. Method of connection between sections shall be such that joint formed shall be free from play or movement in any direction. Bracing and support must be ample to prevent deflection of the forms under pressure of the concrete or weight or thrust of the machinery operating on the forms.

C. Flexible Forms - Flexible steel or wood forms may be used only when specifically provided on the Plans or in Specifications with the exception their use is herein approved for all curves having a radius of less than 150 feet. Wood forms shall be equal in depth to the edge thickness of the pavement. Forms shall be held by stakes and securely braced at the pavement. Forms shall be held by stakes and securely braced at any point where necessary so that no movement will result from pressure of the concrete or weight or thrust of machinery operating on the forms.

D. Ready Mixed Plants - Plant shall be in accordance with the applicable Sections of FDOTSPEC.

E. On Site Central Mix Plants - Plant shall be certified to the satisfaction of the responsible testing agency and shall conform to the current standards of the Concrete Plant Manufacturers Bureau or the plant shall be in accordance with the applicable Sections of FDOTSPEC. Trucks used to transport the concrete shall meet the approval of the OWNER or DESIGNER.

F. Batching Plant and Equipment.

1. General - Batching plant shall include bins, weighing hoppers, and scales for the fine aggregate and for each size of coarse aggregate. If bulk cement is used, a bin, hopper, and separate scale for cement shall be included. The weighing hoppers shall be properly sealed and vented to preclude dusting during operation.

2. Bins and Hoppers - Bins with adequate separate compartments for fine aggregate and for each required size of coarse aggregate shall be provided in the batching plant. Each compartment shall discharge efficiently and freely into the weighing hopper. Means of control shall be provided so as the quantity desired in the weighing hopper is approached, material may be added slowly and shut off with precision. A port or other opening for removing an overload of any one of the several materials from the hopper shall be provided. Weighing hoppers shall be constructed to eliminate accumulations of tare materials and to discharge fully.

3. Scales - Scales for weighing aggregates and cement shall be of either the beam or the springless dial type. They shall be accurate within 0.5% throughout their range of use. When beam-type scales are used, provision, such as "tell-take" dial, shall be made for indicating to the operator that the required load in the weighing hopper is being approached. A device on the weighing beams shall clearly indicate critical position. Poises shall be designed to be locked in any position and to prevent unauthorized change. The weight beam and "tell-tale" device shall be in full view of the operator while charging the hopper, and he shall have convenient access to all controls. Scales shall be inspected and sealed as often as the DESIGNER may deem necessary to assure their continued accuracy. CONTRACTOR shall have on hand not less than ten 50-pound weights for frequent testing of all scales.

G. Mixers

1. General - Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. Each mixer shall have attached in a prominent place a manufacturer's plan showing capacity of the drum in terms of volume of

mixed concrete and speed of rotation of the mixing drum or blades. A device, accurate within 3% and satisfactory to the DESIGNER, shall be provided at the mixer for determining the amount of air-entraining agent to be added to each batch requiring such admixture. Mixers shall be examined daily for the accumulation of hard concrete or mortar and the wear of blades.

2. Mixers at Construction Sites - Mixing shall be in an approved mixer capable of combining the aggregates, cement, and water into a thoroughly mixed and uniform mass within the specified mixing period, and of discharging and distributing the mixture without segregation on the prepared grade. Mixer shall be equipped with an approved timing device which will automatically lock the discharge lever when the drum has been charged and release it at the end of the mixing period. The device shall be equipped with a bell or other suitable warning device adjusted to give a clearly audible signal each time the lock is released. In case of failure of the timing device, mixer may be used for the balance of the day while it is being repaired, providing that each batch is mixed 90 seconds. Mixers shall be cleaned at suitable intervals. The pickup and throw-over blades in the drum(s) shall be repaired or replaced when they are worn down 3/4 inch or more. CONTRACTOR shall have available at the job site a copy of the manufacturer's design, showing dimensions and arrangements of blades in reference to original height and depth, or provide permanent marks on blades to show points of 3/4 inch wear from new conditions. Drilled holes of 1/4 inch diameter near each end and at the midpoint of each blade are recommended.

3. Central Plant Mixers - Mixers for central plant mixing (plant mixer, revolving drum type mixer, single opening revolving truncated drum mixer, and a revolving drum charging at one end and discharging at the other end) shall have attached thereto, in a prominent place by the manufacturer, a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the nominal capacity (in cubic feet) of the drum or container in terms of the volume of mixed concrete, and the speed of rotation of the mixing drum or blades. Central plant mixers shall be equipped with an acceptable timing device that will not permit the batch to be discharged until the specified mixing time has elapsed. The water system for a central mixer shall be either a calibrated measuring tank or a meter and shall not necessarily be an integral part of the mixer. Mixers shall be cleaned at suitable intervals. They shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or to wear of blades. The pick-up and throw-over blades shall be replaced when they have worn down 3/4 inch or more. CONTRACTOR shall provide DESIGNER with a copy of the manufacturer's design showing dimensions and arrangement of blades in reference to original height and depth.

4. Truck Mixers and Truck Agitators - Truck mixers used for mixing and hauling concrete, and truck agitators used for hauling central-mixed concrete, shall conform to the requirements of AASHTO M 157.

5. Non-agitator Trucks – Non-agitating hauling equipment shall meet the requirements of AASHTO M 157.

H. Finishing Equipment

1. Finishing Machine - Finishing machine shall be equipped with at least two oscillating type transverse screeds.

2. Vibrators - Vibrators, for full width vibration of concrete paving slabs, may be either the surface pan type or the internal type with either immersed tube or multiple spuds. They may be attached to the spreader or the finishing machine, or they may be mounted on a separate carriage. They shall not come in contact with the joint, load transfer devices, subgrade, or side forms. The frequency of the surface vibrators shall be not less than 3,500 impulses per minute and the frequency of the internal type shall be not less than 5,000 impulses per minute for tube vibrators and not less than 7,000 impulses per minute for spud vibrators. When spud type internal vibrators are used adjacent to forms, they shall have a frequency of not less than 3500 impulses per minute.

I. Concrete Saw - When sawing of joints is elected or specified, CONTRACTOR shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions and at the required rate. CONTRACTOR shall provide at least one standby saw in good working order. An ample supply of saw blades shall be maintained at the site of the work at all times during sawing operations. CONTRACTOR shall provide adequate artificial lighting facilities for night sawing. All of this equipment shall be on the job both before and at all times during concrete placement.

J. Joint Sealing Equipment - Sealing equipment shall be capable of installing the sealant in joints in accordance with the manufacturer's recommendations.

K. Membrane Sprayer - A pressure sprayer capable of applying a continuous uniform film will be required.

L. Other Equipment - CONTRACTOR shall furnish all other equipment, small tools, and supplies which are necessary to proper prosecution of the work.

3.04 MIXING AND PLACING

A. General - Concrete pavement shall be constructed on the prepared subgrade in accordance with these Specifications and in reasonably close conformity with lines, grades, thickness, and typical cross-sections shown on the Plans.

B. Mixing Concrete - Concrete mixed in truck mixers shall be at the speed designated as mixing speed by the manufacturer for a total of 75-100 revolutions of the drum unless additional water is added in conformance with Section 3.04C. Time of mixing in a central mix plant shall be a minimum of 60 seconds.

C. Transporting Concrete - Concrete may be transported any distance providing it is discharged on the grade with the slump within the required slump range and meets time requirements of Section 2.02F. If additional water is required to maintain the specified slump of concrete transported in truck mixers, it may be added with the permission of the DESIGNER. In this case, a minimum of 20 additional revolutions of the mixer drum at mixing speed shall be required before discharging of the concrete.

D. Concrete Time Limit - Length of time that the concrete can be held in the truck shall conform to the following:

1. Air temperature 45°F to 80°F - 90 minutes maximum.

2. Air temperature over 80°F with a retarder added to the mix - 90 minutes maximum.

3. Air temperature over 80°F without a retarder added to the mix - 60 minutes maximum.

E. Placing Concrete - Concrete shall be deposited on grade in such a manner as to require as little re-handling as possible. It shall be deposited in successive batches in a continuous operation. Concrete shall be consolidated by suitable means so as to preclude the formation of voids or honeycomb pockets.

F. Placing in Cold Weather - CONTRACTOR shall be responsible for protecting concrete placed in cold weather. Any concrete damaged by frost action shall be removed and replaced at their expense.

G. Placing on Frozen Subgrade - No concrete shall be placed on a frozen subgrade.

3.05 FINISHING

A. General - Concrete shall be struck-off, consolidated, and finished with mechanical equipment in such a manner that after final finishing, it shall conform to the pavement cross-section shown on the Plans. Hand finishing will be permitted in narrow widths, areas of irregular dimensions, and in the event of breakdown of the mechanical equipment, to finish the concrete already deposited on the grade.

B. Final Surface Finish - The final surface of the pavement shall have a uniform, skid-resistant texture. The method of texturing shall be approved by DESIGNER, and he may require changes in the final finishing procedure as required to produce the desired final surface texture. A burlap drag finish is recommended for residential, collector and minor arterial streets. Major arterial and rural roads may require an overlapping stiff bristled broom or steel comb finish at the DESIGNER's option.

C. Pavement Exposed to Rain During Construction

1. CONTRACTOR shall always have materials available to protect the surface of the plastic concrete against rain. Areas of the pavement surface where the texture has been damaged by the protective cover shall be retextured and cured unless the concrete has hardened. Areas of pavement surface that exhibit a smooth sandy appearance after the rain ceases shall be textured and cured. An attempt shall be made to impart the specified texture to these areas before applying the membrane curing material. Areas that have suffered some surface erosion and have coarse aggregate exposed shall be reworked by hand methods or with the finishing machine when the form paving method is used. Fresh concrete containing the same materials and properties as the pavement concrete shall be added to maintain an adequate supply in front of the screeds or machine to assure replacement of the concrete eroded from the surface. Surface shall then be textured and cured as specified.

2. If pavement edges have been severely eroded and concrete has not set, edges shall be repaired by setting side forms and replacing eroded concrete. After side forms are set, fresh concrete shall be placed and finished prior to texturing and curing. After pavement has hardened, remedial work shall not be permitted.

3.06 CURING

A. General - After finishing operations have been completed, and immediately after the free water has left the surface, the surface of the slab and, for slip formed pavements, sides of the slab shall be coated and sealed with a uniform layer of membrane curing compound applied at the rate of not less than one gallon per 200 square feet of surface. When forms are removed, curing compound shall be applied to the sides of the slab. Areas in which the curing membrane is damaged within a period of three days shall be resprayed with curing compound. Curing compound may be omitted when, in conjunction with protection of the pavement from inclement weather, a polyethylene film or other acceptable material is applied over the pavement and maintained intact for three days.

B. Cracks - Concrete rigid pavement will not be accepted with uncontrolled cracks. CONTRACTOR shall avoid shrinkage cracks which occur when evaporation exceeds the rate at which bleed water rises to the surface.

3.07 JOINTS

A. General - Transverse and longitudinal joints shall be constructed to the dimensions and at the spacing shown on the Plans. Transverse joints shall extend the entire width of the pavement and through the curbs. Joints may be formed in the plastic concrete or sawed, after the concrete has hardened. Sawing of joints shall begin as soon as the concrete has hardened sufficiently to permit sawing without excessive raveling and before uncontrolled cracking occurs.

B. Construction Joints - All longitudinal joints may be construction joints at the CONTRACTOR's option. Transverse construction joints shall be installed whenever the placing of concrete is suspended a sufficient length of time that the concrete may begin to harden.

C. Joint Sealing - Where called for on the Plans, joints shall be sealed before pavement is exposed to traffic. Prior to sealing, all foreign material shall be removed from the joints and the joints thoroughly dried.

D. Joint Construction

1. Construct expansion (isolation), contraction (weakened-plane) and construction joints true to line with face perpendicular to surface of the pavement. Joints shall be provided in both the longitudinal and transverse directions. Maximum spacing of longitudinal and transverse contraction joints shall be 15 feet. On radius sections maximum joint spacing shall be 12 feet as measured along the longest edge of the curve.

2. Contraction (Weakened-Plane Joints) - Provide contraction joints for a depth of 1/4 of the pavement thickness. Contraction joints must be continuous across the slab unless interrupted by a full depth joint filler and must extend completely through any integral curbs. Contraction joint alignment may be skewed or warped where necessary to reach points of stress concentration. Contraction joints are to be constructed at the CONTRACTOR's option as follows:

   a. Sawed Joints - Form contraction joints using saws equipped with shatterproof abrasive or diamond rimmed blades. Cut joints into concrete paving as soon as surface will not be raveled or otherwise damaged by cutting action.

   b. Hand-formed - Contraction joints may be installed in the concrete paving with the use of a mason's hand groover utilized while the concrete is in the plastic state. Hand groover must be sufficient depth to leave a finished joint of not less than "Depth"/4. Hand-formed joints must have a finished radius along the joint edge equal to 1/4 inch.

3. Construction Joints - Place full depth construction joints at the end of concrete pours and at locations where placement operations are stopped for a period of 30 minutes or more except where such pours terminate at expansion joints or where otherwise called for on the Plans.

4. Expansion (Isolation) Joints - Provide expansion joints to isolate fixed objects abutting or within the paved area. They must contain pre-molded joint filler for the full depth of the paving slab.

3.08 FINAL ACCEPTANCE

A. General - Before pavement will be considered for acceptance, all items shall be completed in substantial accordance with the Plans and specifications. Equipment, surplus materials, and construction debris shall be removed from the project.

B. Opening to Traffic - Pavement shall be closed to traffic after concrete is placed until it reaches a compressive strength of 2500 psi under ordinary field conditions. This does not include sawing and sealing equipment or other light miscellaneous equipment.

C. Tolerance in Pavement Thickness - Before final acceptance of the pavement, at the option of OWNER, its thickness may be determined by coring at random locations at various points on the cross-section in each poured strip so that a core represents an area not exceeding 2,500 sq. yds. and determining the depth of each core by average measurements of the core in accordance with AASHTO T 148. When the measurement of the core is not deficient by more than 5% from the Plan thickness, full payment for the unit will be made. Pavement deficient in thickness by more than 5% but not more than 10% from the specified thickness, shall be subject to an adjustment in the contract unit price in accordance with the schedule in Section 3.08D. No additional compensation will be allowed for pavement placed in excess of the specified thickness.

D. Cores - When the measurement of the core is deficient in thickness by more than 5%, but not more than 10% from the plan thickness, two additional cores will be taken at 25-foot intervals from the original core. If the core deficient in thickness is from a two-lane pour unit, each lane will be cored separately. If the average thickness of the three cores is not deficient more than 5% from the Plan thickness, full payment for the unit will be made. If the average thickness of the three cores is deficient more than 5% but not more than 10% from the Plan thickness, an adjusted unit price will be applied for the area represented by these cores as shown in the following table for thickness less than 6-1/2 inches. For thicker pavements, use AASHTO Guide Specifications.

Deficiency in Thickness as Determined by Cores	Proportional Part of Contract Price Allowed
0-5%	100%
5.1-6%	98%
6.1-7%	94%
7.1-8%	88%
8.1-9%	80%
9.1-10%	70%

1. Where the thickness of the pavement is deficient by more than 10%, and the judgment of the DESIGNER is the area of such deficiency should not be removed and replaced, payment will be 50% of Contract Price. Where the thickness of the pavement is deficient by more than 10% and the judgment of the DESIGNER is that area of such deficiency should be removed, no payment shall be made for said deficient work. The OWNER will pay for initial cores or tests. CONTRACTOR shall pay for extra or exploratory cores or tests to determine the extent of areas deficient in thickness.

3.09 MEASUREMENT AND PAYMENT

A. The Work required under this Section will not be measured for payment.

3.10 BASIS OF PAYMENT

A. Paid at the Contract Lump Sum price. Partial payments will be calculated by the amount of work completed based on the approved scheduled of values and applications for payment.

END OF SECTION 32 13 00

SECTION 32 17 23
PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SCOPE

A. This Section specifies pavement traffic painting, marking, striping, and signing shown on the Plans or called for in the Specifications. In general, all pavement traffic painting, marking, striping, and signing shall comply with the latest edition of Florida Department of Transportation Standard Specifications for Road and Bridge Construction, hereafter referenced "FDOTSPEC" and the latest edition, as amended, Manual on Uniform Traffic Control Devices, U.S. Department of Transportation, Federal Highway Administration, hereafter referenced as "MUTCD".

1.02 SPECIFICATION AND STANDARDS REFERENCE

A. Where supplementary specifications or standards such as FDOTSPEC, MUTCD, etc., are referenced, such references shall be the latest edition.

PART 2 PRODUCTS

2.01 SIGN PANELS AND POSTS

A. Sign panels shall be aluminum. All signposts shall be frangible aluminum and have a standard extruded aluminum sign bracket clamped to the post 12 inches below grade. Bracket size shall match post diameter.

2.02 SIGN BLANKS AND FACES

A. Regulatory and Warning signs as defined in the MUTCD shall be "High Intensity" reflectorized grade.

B. Street Name and guide signs as defined in the MUTCD shall be "Standard reflectorized grade".

C. CONTRACTOR shall submit documentation from the sign suppliers which identifies the reflector grade of each sign. All materials shall meet the requirements of FDOTSPEC.

2.03 SIGN HARDWARE

A. Signs shall be attached to posts with vandal resistant nuts and carriage bolts with washers. Nuts and bolts shall be manufactured from high strength aluminum. Button head bolts shall not be used.

2.04 PAVEMENT STRIPING AND PAINTING

A. Thermoplastic Striping and Marking - Thermoplastic pavement striping shall be reflective and meet the requirements of the applicable Sections of FDOTSPEC.

B. Painted Striping and Marking - Painted striping shall be reflectorized and meet the requirements of the applicable Sections of FDOTSPEC.

2.05 REFLECTIVE PAVEMENT MARKERS

A. Reflective pavement markers and their installation shall meet the requirements of the applicable Sections of FDOTSPEC.

PART 3 EXECUTION

3.01 BASIS OF PAYMENT

A. Paid at the Contract Lump Sum price. Partial Payments will be calculated by the amount of work completed based on the approved schedule of values and applications for payment.

END OF SECTION 32 17 23

SECTION 32 92 00
TURF AND GRASSES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work specified in this Section consists of the required sodding or seeding and mulching operation within the right-of-way or designated project areas.

1.02 SPECIFICATION AND STANDARDS REFERENCE

A. Where supplementary specifications or standards such as ASTM, AWWA, AASHTO, etc., are referenced, such references shall be latest edition.

B. All references to “FDOTSPEC” shall mean the latest edition of the “Florida Department of Transportation Standard Specifications for Road and Bridge Construction”.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 SEEDING AND MULCHING

A. Furnish all labor, material and equipment to prepare shoulders and backslopes from edge of pavement or back of concrete gutter to the right-of-way lines or other designated areas. All work shall be accomplished in accordance with the applicable Sections of FDOTSPEC. Rates of application after shoulder surface is prepared is as specified.

B. Distribute 8-8-8 fertilizer at the rate of 900 lbs. per acre.

C. Sow a mixture of 50% - 50% Bahia and Bermuda seed at the rate of 50 lbs. per acre.

D. Spread live Bermuda sprig mulch at the rate of 2-inch loose thickness layer, cut in and rolled.

E. Water shall be evenly applied until growth is initiated or until sufficient local rainfall activity will insure growth.

3.02 SODDING

A. Areas designated for sodding shall be sodded in accordance with the applicable Sections of FDOTSPEC.

3.03 BASIS OF PAYMENT

A. Paid at the Contract Lump Sum price. Partial payments will be calculated by the amount of work completed based on the approved schedule of values and applications for payment.

END OF SECTION 32 92 00

SECTION 33 41 00
SUBDRAINAGE

PART 1 GENERAL

1.01 SCOPE

A. Work specified in this Section consists of furnishing and installing a storm drainage system with all the component parts specified in the Contract Documents. Included are storm sewers, pipe culverts, manholes, crossing boxes, inlets, catch basins, pipe end treatments, restoration, and other similar items defined in this Section.

1.02 SPECIFICATION AND STANDARDS REFERENCE

A. Where supplementary specifications or standards such as ASTM, AWWA, AASHTO, etc., are referenced, such references shall be the latest edition.

B. Specifications Sections:

Section 31 23 16.26	ROCK REMOVAL
Section 31 23 33	TRENCHING AND BACKFILLING
Section 32 10 00	BASES, BALLASTS, AND PAVING

C. All references to "FDOTSPEC" shall mean the latest edition of the "Florida Department of Transportation Standard Specifications for Road and Bridge Construction".

D. All references to "FDOT INDEX BOOK" shall mean the latest edition of the "FDOT Standard Plans for Road Construction".

PART 2 PRODUCTS

2.01 CORRUGATED ALUMINUM ALLOY CULVERTS

A. Aluminum alloy culvert pipe shall meet requirements of the applicable Sections of FDOTSPEC. Where bituminous coated aluminum pipe is specified, bituminous coating shall meet requirements of AASHTO M 190, for Type A, (Fully Bituminous Coated).

2.02 CORRUGATED STEEL PIPE AND PIPE ARCH

A. Corrugated steel pipe, including round culvert pipe, pipe arch and under-drain, and coupling bands for each type, shall conform to requirements of the applicable Sections of FDOTSPEC. Corrugated steel pipe shall be bituminous coated, both sides, in accordance with requirements of AASHTO M 190, Type A, (Fully Bituminous Coated).

2.03 REINFORCED CONCRETE PIPE

A. Reinforced concrete pipe materials shall conform to the applicable Sections of FDOTSPEC.

B. Reinforced Concrete Pipe (Round) - Unless otherwise specified, reinforced concrete pipe shall meet the requirements of ASTM Designation C 76, "Standard Specification for Reinforced Concrete Pipe", Class III, Wall Thickness B. Lifting holes will not be permitted in pipe. CONTRACTOR shall only use pipe joint lubricants supplied by or recommended by pipe manufacturer. Lubricant shall be water soluble, non-toxic, and inhibitor to bacterial growth, and shall be non-detrimental to the elastomeric seal and pipe. Mineral oil, petroleum jelly, hydrogenated vegetable fat (i.e. Crisco, cooking oil, grease, etc.) shall not be used. Joints for round reinforced concrete pipe shall be made by use of "O-Ring", round synthetic rubber gaskets meeting the requirements of the applicable Sections of FDOTSPEC.

C. Reinforced Concrete Pipe (Elliptical) - Elliptical concrete pipe shall meet the requirements of ASTM C 507, except exceptions and modifications to ASTM C 76, as specified in Section 449-4.4, FDOTSPEC shall apply also to elliptical pipe. Standard elliptical pipe shall meet requirements of Table I for Class HE-III and special elliptical pipe shall meet requirements of Table I for Class HE-IV. Lifting holes will not be permitted in pipe.

D. Joints for Elliptical and Arch Concrete Pipe - Field joints for elliptical and arch concrete pipe shall be made with a pre-formed plastic gasket material. Gasket material shall meet the requirements of the applicable Sections of FDOTSPEC. Material shall be "Ram Nek" as manufactured by K.T. Snyder Co. or approved equal.

2.04 CORRUGATED POLYETHYLENE AND POLYPROPYLENE PIPE

A. Corrugated polyethylene and polypropylene pipe shall meet the requirements of AASHTO M294 and M330 (as applicable) specifications except size range shall be expanded through 36" diameter. Minimum pipe values shall be as follows:

DIAMETER	INTERIOR	PIPE STIFFNESS (min.)	N FACTOR
12”	Smooth	45 psi	.012
15”	Smooth	42 psi	.012
18”	Smooth	40 psi	.012
24”	Smooth	34 psi	.012
30”	Smooth	28 psi	.012
36”	Smooth	22 psi	.012

2.05 MORTAR, BRICK, AND REINFORCING BARS

A. Mortar used for constructing and plastering manholes, catch basins, drop inlets and junction boxes shall meet the requirements of ASTM Specification Serial Designation C 270. CONTRACTOR shall use either a Portland cement-hydrated lime mixture cement or a Portland cement mixture with masonry cement added for improved workability. However, the same materials must be used throughout the project. Mortar materials shall be proportioned by volume and shall be as follows:

1. One (1) part Type I Portland Cement - ASTM C150
2. Three (3) parts Aggregate (sand) - ASTM C144
3. Addition of masonry cement, ASTM C91 will be permitted to improve workability of mortar.

B. Brick used in construction of manholes, catch basins, drop inlets and junction boxes shall be Portland cement concrete meeting the requirements of ASTM Serial Designation C-55, Grade P II.

C. All bars shall be deformed Reinforcing Steel and shall meet the requirements of Specifications for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement (ASTM A615). All bars shall be lapped and placed in accordance with ACI Requirements and Specifications.

2.06 CONCRETE FOR STRUCTURES

A. Work specified in this Section shall consist of furnishing all concrete, reinforcing steel, ties, forms, labor, materials, and placing of all embedded pipe sleeves, fixtures, joist anchors, etc., necessary to complete the work shown on the Plans and specified herein, all in accordance with the Florida Building Code and the American Concrete Institute Building Code Requirements for Reinforced Concrete (ACI 318).

B. Transit or Ready-Mixed Concrete - Transit or ready-mixed concrete may be used provided it conforms to the strength and tests herein described and further provided that the central plant producing the concrete, equipment and transporting of it are, in the opinion of the DESIGNER, suitable for production and transportation of the specified concrete. All concrete

shall develop 3000 psi compressive strength in 28 days. Coarse aggregate shall be no smaller than one-half inch (1/2") diameter.

C. Admixtures - Admixtures for air-entrainment in concrete are permitted as long as specified strength and quality is obtained and unless the admixture seems to be giving abnormal field results as evidenced by erratic or excessive air content or low strength. No other admixtures, of any type, will be permitted without written approval of DESIGNER.

2.07 IRON CASTINGS

A. Castings shall meet the requirements of ASTM Specification A48 for Class 30 Grey Iron. They shall be cast in a closed mold with controlled sand and be true to pattern. Castings shall be free from blow holes and porosity, well-cleaned, with fine and sharp edges ground smooth. All circular frames and covers shall have machined (on lathe) bearing surfaces to prevent rattling under traffic. All covers shall have a concealed type of pick-hole (non-penetrating) and shall have the words "storm sewer" cast thereon. All square and rectangular frames, covers and grates shall be individually fitted as sets and installed as sets in the field. All castings shall be as manufactured by United States Foundry and Manufacturing Corporation, with drawing numbers as shown on the Plans, or approved equal. Upon request of OWNER or DESIGNER, manufacturer shall also furnish an independent testing laboratory's report of castings supplied. Frame and cover surfaces shall be machined and any tendency to rattle, as determined by tests before or after installation, will be sufficient cause for rejection of frame and cover.

2.08 CROSSING BOXES (CONFLICT BOXES)

A. Crossing boxes shall be constructed at the location and depth indicated on the Plans and in accordance with details shown. Crossing boxes shall have inverts with at least one foot clearance between conflicting pipe and bottom of structure or as shown on the Plans. They may be constructed of concrete or brick with top surface plastered.

PART 3 EXECUTION

3.01 GENERAL

A. Pipe and structures shall be constructed at the location and elevations specified on the plans and in accordance with the details specified in the Contract Documents.

3.02 TRENCHING AND BACKFILLING

A. Excavation, bedding, and backfilling of trenches during the construction of a storm drainage system shall comply with the requirements of Specification Section 31 23 33 - TRENCHING AND BACKFILLING.

3.03 MATERIAL HANDLING

A. Pipe and accessories shall be loaded and unloaded by lifting with hoists or skidding in a manner that will avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground. In distributing material at the site of the work, each piece shall be off-loaded near the place where it is to be laid in the trench.

3.04 PIPE LAYING

A. In general, corrugated metal pipe shall be installed in accordance with the Handbook for Steel Drainage and Highway Construction Products, published by the American Iron and Steel Institute. In general, concrete pipe shall be installed in accordance with the Concrete Pipe Installation Manual, published by the American Concrete Pipe Association.

B. Laying of pipe in finished trenches shall be commenced at the lowest point and shall progress up-grade. All pipes shall be carefully laid, true to the lines and grades given, with hubs upgrade and tongue end fully entered into the hub. When pipe with quadrant reinforcement, or circular pipe with elliptical reinforcement is used, pipe shall be installed in a position such that manufacturer's marks designating "top", and "bottom" of the pipe shall not be more than five degrees from the vertical plane through the longitudinal axis of the pipe. Any pipe that is not in true alignment or which shows any settlement after laying shall be taken up and re-laid without additional compensation. Pipe and joints shall be kept clean at all times.

3.05 SAND CEMENT RIP RAP

A. Where the Plans and specifications call for sand cement bag construction bags shall be made of burlap. Paper bags will not be permitted.

3.06 PIPE END TREATMENTS

A. Where storm drains connect to a lake, location of the headwall or end section shown on the Plans shall be adjusted to fit the slope of the lake bank. Length of pipe at each end treatment shall be adjusted accordingly, and the quantity of pipe paid for shall be the actual length installed. Headwall shall be constructed so top of the headwall will intersect the designed location and slope of the lake bank.

B. If mitered ends are called for on the plans, mitered end section shall be constructed so that the top of the pipe end will match and intersect the designed slope of the lake bank, and the concrete collar slope shall conform to the mitered end detail.

C. Storm drainage CONTRACTOR and lake excavation CONTRACTOR shall coordinate the location and installation of the headwall or mitered end section to be constructed at the lake bank. All "field adjustments" to end treatment location or elevation shall be approved by the DESIGNER prior to construction.

3.07 JOINING ELLIPTICAL CONCRETE PIPE

A. Joint Design - Pipe manufacturer shall furnish the DESIGNER with details regarding configuration of the joint and the amount of gasket material required to affect a satisfactory seal. Joint surfaces which are to be in contact with the gasket material shall not be brushed or wiped with a cement slurry. Minor voids may be filled with cement slurry provided that all excess cement slurry is removed from the joint surface at the point of manufacture.

B. Primer - Prior to application of gasket material, a primer of the type recommended by the manufacturer of the gasket material shall be applied to all joint surfaces which are to be in contact with the gasket material. The surface to be primed shall be thoroughly cleaned and dry when primer is applied.

C. Application of Gasket - Prior to placing a section of pipe in the trench, gasket material shall be applied to form a continuous gasket around the entire circumference of the leading edge of the tongue. The paper wrapper on the exterior surface of the gasket materials shall be left in place until immediately prior to joining of sections. The gasket material shall be checked to assure it is bonded to the joint surface, immediately prior to placing a joint in the trench. Plastic gasket material shall be applied only to surfaces which are dry. A hand heating device shall be kept at the job site to dry joint surfaces immediately before application of the plastic gasket material. When the atmospheric temperature is below 60°F, plastic joint seal gaskets shall either be stored in an area warmed to above 70°F, or artificially warmed to this temperature in a manner satisfactory to the DESIGNER.

D. Installation of Elliptical and arch Concrete Pipe - Handling of a section of pipe after the gasket material has been affixed shall be carefully controlled to avoid displacement of gaskets or contamination of gasket material with dirt or other foreign material. Any gasket displaced or contaminated in handling of the pipe shall be removed and repositioned or replaced as directed. Pipe shall be installed in a dry trench. The bottom of the trench shall be

carefully shaped so as to minimize the need for realignment of sections of pipe after they are placed in the trench. Care shall be taken to properly align each section of pipe to the gaskets coming into contact. Realignment of a joint after the gaskets come into contact tends to reduce the effectiveness of the seal and shall be held to a minimum. When pipes are joined, the entire joint shall be filled with gasket material and there shall be evidence of squeeze-out of gasket material for the entire internal and external circumference of the joint. Excess material on the interior of the pipe shall be trimmed to provide a smooth interior surface. After the pipe is in its final position, joint shall be carefully examined to determine the gasket material is satisfactorily adhering to all surfaces of the joint and the entire joint is filled with gasket material. If a joint is defective, the leading section of pipe shall be removed and the joint resealed.

E. In addition to the required gasket joint, a filter fabric jacket shall be included. The filter fabric jacket shall conform to requirements of the applicable Sections of FDOTSPEC.

3.08 INSTALLATION OF CORRUGATED POLYETHYLENE AND POLYPROPELENE PIPE

A. Pipe shall be joined per manufacturer specifications and exceeding AASHTO soil tightness requirements. Unless otherwise specified by the DESIGNER, a mastic type gasket shall be utilized.

B. Pipe and accessories shall be unloaded by using skidways, hoists or dropping on non-paved areas, in a manner that does not damage the pipe.

C. Pipe shall be installed in accordance with ASTM D2321 specifications.

3.09 PLACING OF CONCRETE FOR STRUCTURES

A. Concrete shall be deposited in clean wet form as nearly as practicable in its final position to avoid segregation. Concrete placing shall be carried on at such a rate that the concrete is, at all times, plastic and flows readily into the spaces between the bars. Concreting shall be a continuous operation until the panel or section is completed. Beams and slabs shall be poured monolithically unless shown otherwise on the Plans. All structural concrete shall be mechanically vibrated.

B. No concrete shall be allowed a free fall of more than 4 feet or allowed to strike against a vertical or inclined surface or reinforcement above point of deposit. Placing by means of pumping may be allowed, contingent upon the adequacy of the equipment for this particular work. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced.

C. Placing of concrete shall be so regulated the pressure caused by wet concrete shall not exceed that used in the design of the forms. After the concrete has taken its initial set, care shall be exercised to avoid jarring the forms or placing any strain on the ends of projecting reinforcement.

D. Joints between the junction box and manhole walls and incoming and out-going pipes shall be sealed with Portland Cement Mortar to form a watertight joint. All pipes in manholes or catch basins shall be sawed off flush with the inside face of the structure and sawed ends of these pipes shall be grouted with Portland Cement Mortar to a smooth uniform covering with no steel exposed.

3.10 CLEANING AND FLUSHING

A. Prior to other tests, storm sewer lines shall be cleaned and flushed with a sewer cleaning ball or high velocity jet.

3.11 INFILTRATION TEST

A. After completion, storm sewers shall be tested for accuracy in alignment and gradient as herein specified. Gravity sewers will also be tested or gauged to determine the amount

infiltration into, or exfiltration out of, the sewers, with a maximum limit of two hundred (200) gallons per inch of diameter, per day, per mile of pipe.

3.12 FINAL INSPECTION OF STORM WATER SYSTEM

A. Each sewer, upon completion, or at such time as the DESIGNER may direct, is to be cleaned, tested and inspected. All repairs or alterations shown necessary by these tests shall be made; all broken or cracked pipe removed; all excessive infiltration or exfiltration corrected; all deposits in pipe and manholes removed; and the sewer left clean, true to line and grade and ready for use. Each section of pipe from manhole to manhole is to show a full circle of light from either end. Each manhole shall be to the specified form and size, to the proper depth and watertight.

3.13 ADJUSTING EXISTING STRUCTURES

A. Existing manholes, catch basins, inlets, crossing boxes, monument boxes, etc., within the limits of the proposed work, that do not conform to the finished grade of the proposed pavement, or to the finished grade designated on the plans for such structures, shall be cut down or extended, and made to conform to the grade of the new pavement, or to the designated grade of the structure if outside of the proposed pavement area. The materials and construction methods for this work shall conform to the requirements specified above. Where manholes are to be raised, the adjustment may, at the CONTRACTOR's option, be made using adjustable extension rings of the type which do not require the removal of the existing manhole frame. The extension device shall provide positive locking action and shall permit adjustment in height as well as diameter. The particular type of device used shall meet the approval of the DESIGNER.

3.14 RESTORATION

A. Existing surfaces or property improvements damaged during the construction of work specified in this Section shall be repaired in accordance with the requirements of Specifications Section 32 10 00 - BASES, BALLASTS, AND PAVING.

3.15 METHOD OF MEASUREMENT

A. The Work required under this Section will not be measured for payment.

3.16 BASIS OF PAYMENT

A. Paid at the Contract Lump Sum price. Partial payments will be calculated by the amount of work completed based on the approved schedule of values and applications for payment.

END OF SECTION 33 41 00

SECTION 33 42 00
STORMWATER CONVEYANCE

PART 1 GENERAL

1.01 SCOPE

A. These Specifications refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, hereafter referenced as FDOTSPEC. Work covered in this Section consists of furnishing all plant, labor, equipment, materials and the performing of all operations necessary for construction of:

1. All storm water inlets including throat inlets, catch basins, and grated inlets.

2. Adjustment or installation of sanitary and storm manhole frames and covers, or grates, inlet grates, gate-valve boxes, and other similarly exposed utilities in paved areas.

1.02 SPECIFICATION AND STANDARDS REFERENCE

A. Where supplementary specifications or standards such as ASTM, AWWA, AASHTO, etc., are referenced, such references shall be the latest edition.

PART 2 PRODUCTS

2.01 CONCRETE CONSTRUCTION

A. All concrete and concrete work shall conform to the following specifications unless otherwise noted on the Plans. All concrete specified in this Section shall attain a minimum compressive strength of 3000 psi in 28 days.

B. Concrete Mix Materials

1. Coarse aggregate shall be hard, clean, washed gravel or crushed stone. Minimum aggregate size shall not be larger than one inch nor smaller than on-half inch equivalent diameter. Fine aggregate shall be clean, sharp sand. Water shall be clean, fresh, free from injurious amounts of minerals, organic substances, acids or alkalis. Cement shall be Type I, domestic Portland cement, meeting the requirements of ASTM C150.

C. Concrete Admixtures

1. Air-entrainment admixtures in concrete are permitted in accordance with manufacturer's specifications provided specified strength and quality are maintained and unless admixtures appear to be causing abnormal field results, and total entrained air content does not exceed 5.0%. No other admixture of any type will be permitted without written approval of the DESIGNER.

D. Reinforcement Steel

1. Reinforcing bars shall be intermediate grade, new billet-steel, deformed bars, free of loose rust, scale, dirt or oil, and shall conform to ASTM A615 "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement". Welded wire fabric for concrete reinforcement shall conform to ASTM A185, "Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete". All reinforcement steel shall be placed, spliced, lapped, etc. in accordance with the ACI Standard 318, Building Code Requirements for Structural Concrete.

E. Transit Or Ready-Mixed Concrete

1. Transit or ready-mixed concrete may be used provided it meets the requirements of ASTM C94, “Standard Specification for Ready-Mixed Concrete”, and provided the central plant producing the concrete, the batching, mixing and transportation equipment, in the opinion of the DESIGNER, is suitable for the production and transportation of the specified concrete.

PART 3 EXECUTION

3.01 CONSTRUCTION METHODS

A. Work shall be performed to lengths and cross-sections shown on the Plans. Forms shall be of sufficient strength to resist pressure of the concrete without springing. Bottom forms shall not be removed within twenty-four hours after concrete has been placed. Side or top forms shall not be removed within twelve hours after concrete has been placed. Upon removal of forms, minor defects shall be corrected with a rich mix of cement mortar. Curbs, gutters, walks or medians shall be finished until a smooth surface is attained. Final finish shall be a light broom finish. When completed, concrete shall be cured as specified.

3.02 PLACING OF CONCRETE

A. Concrete shall be deposited in clean wet forms and as nearly as practicable in its final position to avoid segregation. Concrete placing shall be carried on at such a rate the concrete is at all times plastic and flows readily into spaces between the bars. Concreting shall be a continuous operation until the panel or section is completed. All structural concrete shall be vibrated. No concrete shall be allowed a free fall of more than 4 feet or allowed to strike against a vertical or inclined surface or reinforcement above the point of deposit. Placing by means of pumping may be allowed, contingent upon the adequacy of the equipment for this work. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. Placing of concrete shall be so regulated pressure caused by wet concrete shall not exceed that used in the design of the forms. After concrete has taken its initial set, care shall be exercised to avoid jarring the forms or placing any strain on the ends of projecting reinforcement.

3.03 MACHINE-LAYING

A. Machine laying of work will be permitted, providing all quality conditions of conventional construction are met.

B. As a specific requirement for machine-laid curb and gutter, contraction joints shall be sawed unless an alternate method of constructing them is approved in writing by the DESIGNER. Joints shall be sawed as soon as the concrete has hardened to the degree that excessive raveling will not occur and before uncontrolled shrinkage cracking begins. Contraction joints shall be spaced at intervals of 10 feet except where a lesser interval is required for closure, but no section shall be less than 4 feet in length.

3.04 CURING

A. As soon as practicable after finishing, all concrete shall be covered with burlap and kept moist for a period of seven days or an approved membrane curing compound may be applied at the CONTRACTOR's option. Where membrane curing compound is used, no walking or other traffic will be allowed over the slab for 72 hours after application unless the surface is protected by burlap or heavy building paper. Curing shall meet the requirements of the applicable Sections of FDOTSPEC.

3.05 JOINTS

A. Construction Joints: Joints not shown or specified shall be located as to least impair the strength and appearance of the work. Placement of concrete shall be carried on at such a rate that the surfaces of concrete which have not been carried to joint levels will not have attained initial set before additional concrete is placed thereon.

B. Contraction Joints: Curbs, curb and gutters, and valley gutters shall be constructed with contractions joints at intervals of 10 feet except where shorter intervals are required for closures, but no joint shall be constructed at intervals of less than 4 feet. Sidewalks and concrete medians shall be constructed with contraction joints at intervals equal to the width of the walk or median respectively unless otherwise noted on the Plans. Contraction joints may be of the open type or sawed. Construction procedures of contraction joints shall meet the requirements of the applicable Sections of FDOTSPEC.

C. Expansion Joints: Curbs, curb and gutters, and valley gutters shall be constructed with expansion joints at all inlets, all radius points, all points where operations cease for any considerable time and at intervals of not more than 500 feet. Walks and concrete medians shall be constructed with expansion joints at points of walk or median termination against an unyielding surface and at intervals not to exceed 90 feet. Expansion joints shall be constructed with PVC slips encasing the reinforcing bars. Expansion joint material shall be one-half inch bituminous impregnated expansion joint material which meets the requirements of the applicable sections of FDOTSPEC. 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 a preformed joint filler meeting the requirements of the applicable Sections of FDOTSPEC.

3.06 CONTRACTORS RESPONSIBILITIES

A. CONTRACTOR is fully responsible for all concrete and concrete work and finishes and shall reject all delivered concrete and finishes not meeting these specifications. CONTRACTOR shall also be responsible for securing laboratory tests or reports if such tests or reports are requested by DESIGNER.

B. DESIGNER may, at their discretion, request that specified tests be conducted and reports furnished at the CONTRACTOR's expense. Normally, the DESIGNER will not require testing of more than one set of three compression test cylinders per 50 cubic yards, (or part thereof).

C. CONTRACTOR shall protect the finished work from damage until final acceptance. CONTRACTOR shall repair, replace, or clean all concrete damaged or discolored prior to final acceptance.

3.07 EXCAVATION AND BACKFILL

A. Excavation shall be to the required depth, and supporting earth, base, or subgrade shall be compacted. When the Plans call for a stabilized subgrade under the curb or gutter, subgrade shall be stabilized, and tested if required, as set forth elsewhere in these specifications and as indicated on the Plans. When the Plans call for a soil-cement base, subgrade supporting the curb or gutter shall be compacted by watering, rolling or tamping to 95% of maximum density as determined by AASHTO-T-180. Subgrades for walks and concrete medians shall be compacted to a firm, even surface, by means of rolling, watering and/or tamping.

B. After the concrete has set sufficiently, but not later than three days after placing, the spaces in front and back shall be backfilled with suitable material and compacted. When street bases are to be constructed adjacent to curbs, gutters, etc., the curbs, gutters, etc., shall be properly backfilled and shall cure for a period of not less than 3 days before any base material is placed against it.

3.08 STORM WATER INLETS

A. Construction of storm water inlets shall include all work and materials necessary for final construction by CONTRACTOR of throat inlets, catch basins, grated manholes, or other storm water inlets.

B. Construction of throat inlets shall be to the lines, elevations and dimensions shown on the Plans and include forming of the throat and construction of the top slab with frame and cover and supporting walls.

C. Construction of grated inlets, catch basins, manholes, etc. shall be to the elevations and dimensions shown on the Plans. Construction shall include any reasonable adjustment and realignment of the grate necessary (if grates are installed by the previous CONTRACTOR), or the installation of inlet grates. Frames shall be secured in mortar and the mortar struck smooth inside and out.

3.09 MANHOLE FRAMES AND COVERS

A. Manhole frames with covers or grates in paved areas shall be installed/adjusted (see Proposal) flush with the final paved surface. Frames and covers shall be milled to prevent rocking of the cover when passed over by a motor vehicle. Frames shall be secured in mortar or concrete and surfaces struck smooth inside and out. Gate valve boxes and other similarly exposed utilities shall be raised or lowered as required to insure a flush, even surface with the adjacent paved area.

3.10 BASIS OF PAYMENT

A. Paid at the Contract Lump Sum price. Partial payments will be calculated by the amount of work completed based on the approved schedule of values and applications for payment.

END OF SECTION 33 42 00

SECTION 41 00 00
MATERIAL PROCESSING AND HANDLING EQUIPMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Products.

B. Transportation and Handling.

C. Storage and Protection.

D. Product Options.

E. Substitutions.

F. Systems Demonstration.

1.02 PRODUCTS

A. Only new materials and equipment shall be incorporated in the work. All material and equipment furnished by CONTRACTOR shall be subject to inspection and approved by OWNER or DESIGNER.

B. Comply with Specifications and referenced standards as minimum requirements.

C. Components required to be supplied in quantity within a Specification section shall be the same and shall be interchangeable.

1.03 TRANSPORTATION AND HANDLING

A. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.

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

C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

1.04 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with weather-tight enclosure as recommended by manufacturer. Provide ventilation to avoid condensation.

C. Store loose granular materials on solid surfaces in a well-drained area. Prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged and are maintained under required conditions.

E. Materials which in the opinion of the OWNER or DESIGNER have become so damaged as to be unfit for the use intended or specified shall be removed from the site of the work. CONTRACTOR shall receive no compensation for the damaged material or its removal.

1.05 PRODUCT OPTIONS

A. Products specified by reference standards or by description only: Any product meeting those standards.

B. Products specified by naming one or more manufacturers with a provision for substitutions: Submit a request for substitution for any manufacturer not specifically named.

1.06 SUBSTITUTIONS

A. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

B. Request constitutes a representation that CONTRACTOR:

1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.

2. Will provide the same warranty for substitution as for specified product.

3. Will coordinate installation and make other changes which may be required for work to be complete in all respects.

4. Waives claims for additional costs which may subsequently become apparent.

C. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.

D. DESIGNER will determine acceptability of proposed substitution and will notify CONTRACTOR of acceptance or rejection in writing within a reasonable time.

1.07 SYSTEMS DEMONSTRATION

A. Prior to final inspection, demonstrate operation of each system to DESIGNER and OWNER.

B. Instruct OWNER or DESIGNER in the operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

END OF SECTION 41 00 00