

SECTION 30 - GENERAL REQUIREMENTS

30.1 GRADES, SURVEY LINES, AND PROTECTION OF MONUMENTS

30.1.1 GRADE

All WORK shall be constructed in accordance with the lines and grades shown on the PLANS. The full responsibility for keeping alignment and grade shall rest upon CONTRACTOR.

Bench marks and base line controlling points shall be established prior to beginning work. Reference marks for lines and grades as the work progresses will be located to cause as little inconvenience to the prosecution of the work as possible. CONTRACTOR shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. CONTRACTOR shall remove any obstructions placed contrary to this provision.

30.1.2 SURVEYS

CONTRACTOR shall furnish and maintain, at his own expense, stakes and other such materials and give such assistance, including qualified helpers, for setting reference marks to the satisfaction of COUNTY and ENGINEER. CONTRACTOR shall check such reference marks by such means as he/she may deem necessary and, before using this, shall call the COUNTY'S attention to any inaccuracies. CONTRACTOR shall, at his own expense, establish all working or construction lines and grades as required from the reference marks and shall be solely responsible for the accuracy thereof. CONTRACTOR shall, however, be subject to the check and review of COUNTY.

30.1.3 MONUMENT PRESERVATION

Property corners and survey monuments shall be preserved using care not to disturb or destroy them. If a property corner or survey monument is disturbed or destroyed during construction, whether by accident, careless work, or required to be disturbed or destroyed by the construction work, said property corner or survey monument shall be restored by a land surveyor registered in the State of Florida. All costs for this work shall be paid for by CONTRACTOR.

30.2 UTILITY COORDINATION

30.2.1 LOCATION OF UTILITIES

Prior to proceeding with trench excavation, CONTRACTOR shall contact all utility companies in the area to aid in locating their underground services. It shall be CONTRACTOR'S responsibility to contact utility companies at least three (3) normal working days before starting construction. CONTRACTOR shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground utilities may be determined.

CONTRACTOR shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main, gas main, sewer or underground cable, CONTRACTOR shall immediately notify the responsible official of the organization operating the interrupted utility. CONTRACTOR shall lend all possible assistance in restoring services and shall assume all cost, charges, or claims connected with the interruption and repair of such services.

30.2.2 DEVIATIONS OCCASIONED BY STRUCTURES OR UTILITIES

Wherever obstructions are encountered during the progress of the WORK and interfere to such an extent that an alteration in the PLANS is required, COUNTY shall have the authority to order a deviation from the line and grade or arrange with the owners of the structures for the removal, relocation or reconstruction of the obstructions. Where gas, water, telephone, electrical, hot water, steam or other existing utilities are an impediment to the vertical or horizontal alignment of the proposed pipe line, COUNTY shall order a change in grade or alignment or shall direct



*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

CONTRACTOR to arrange with the owners of the utilities for their removal. If a change in line or grade of a gravity sewer is necessary, COUNTY will require the addition of any manholes needed to maintain the integrity of the sewer system.

30.2.3 TEST PITS

Test pits for the purpose of locating underground pipeline, utilities, or structures in advance of the construction shall be excavated and backfilled by CONTRACTOR. Test pits shall be backfilled immediately after their purpose has been satisfied and maintained in a manner satisfactory to COUNTY. The costs for such test pits shall be borne by CONTRACTOR.

30.3 MAINTENANCE OF TRAFFIC AND CLOSING OF STREETS

CONTRACTOR shall carry on the WORK in a manner which will cause a minimum of interruption to traffic. Where traffic must cross open trenches, CONTRACTOR shall provide suitable bridges at street intersections and driveways. CONTRACTOR shall post suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic. Prior to closing of any streets, CONTRACTOR shall notify and obtain the approval of responsible authorities and COUNTY.

Unless permission to close a street is received in writing from the proper authority (COUNTY, CITY, FDOT, etc.), all excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If CONTRACTOR's operations cause traffic hazards, he/she shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to COUNTY.

Detours around construction will be subject to the approval of the authority having jurisdiction and COUNTY. Where detours are permitted, CONTRACTOR shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured, CONTRACTOR shall expedite construction operations. Periods when traffic is being detoured will be strictly controlled by COUNTY.

It shall be the sole responsibility of CONTRACTOR to take precautions to prevent injury to the public due to open trenches. Night watchmen may be required where special hazards exist, or police protection provided for traffic while work is in progress. CONTRACTOR shall be fully responsible for damage or injuries whether or not police protection has been provided.

30.4 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

30.4.1 BARRICADES, GUARDS AND SAFETY PROVISIONS

CONTRACTOR shall be solely responsible for adhering to the rules and regulations of OSHA and appropriate authorities regarding safety provisions. To protect persons from injury and to avoid property damage, adequate barricades, construction signs, lights and guards as required shall be placed and maintained by CONTRACTOR at his expense during the progress of the WORK and until it is safe for traffic to use the roads and streets. All material piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences or barricades and shall be protected by proper lights when the visibility is poor.

All signs and barricades shall be in accordance with the MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES and the TRAFFIC CONTROL AND SAFE PRACTICES MANUAL.

30.4.2 PROTECTION OF UTILITY STRUCTURES

Temporary support, adequate protection and maintenance of all underground and surface utility structures, including drains, sewers, manholes, hydrants, valves, valve covers, power poles and other miscellaneous utility structures encountered in the progress of the WORK shall be furnished by CONTRACTOR at his expense. Any such structures which may have been disturbed shall be restored upon completion of the WORK.

30.4.3 OPEN EXCAVATION

All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. CONTRACTOR shall, at his own expense, provide suitable and safe bridges with handrails and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. The length of open trench will be controlled by the particular surrounding conditions, but shall be limited to 300 feet unless otherwise approved by COUNTY. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, COUNTY may require special construction procedures, such as limiting the length of open trench, fencing, prohibiting excavated material in the street and requiring that the trench shall not remain open overnight. CONTRACTOR shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment or other obstacles which could be dangerous to the public shall be well lighted at night.

30.4.4 PROTECTION OF TREES AND SHRUBS

All trees and shrubs not shown to be removed on the PLANS shall be protected by CONTRACTOR at his expense. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of CONTRACTOR or his employees shall be replaced by him with new stock of similar size and age at the sole expense of CONTRACTOR.

30.4.5 PROTECTION OF LAWN AREAS

Lawn areas shall be left in as good or better condition as before starting of the WORK. Where sod is to be removed, it shall be carefully restored with new sod of the same type.

30.4.6 RESTORATION OF FENCES

Any fence, or part thereof, that is damaged or removed during the course of the WORK shall be replaced or repaired by CONTRACTOR and shall be left in as good a condition as before the starting of the WORK. The manner in which the fence is repaired or replaced and the materials used shall be subject to the approval of COUNTY.

30.4.7 PROTECTION AGAINST SILTATION AND BANK EROSION

CONTRACTOR shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses and drainage ditches. CONTRACTOR, at his own expense, shall remove any siltation deposits and restore to original grade.

30.4.8 HAZARDOUS MATERIALS

CONTRACTOR is to notify in writing the POLK COUNTY Fire Department of any combustible materials such as fuels, chemicals or other substances (i.e., herbicides, pesticides, etc.) being stored on-site which may pose a threat to public safety or emergency response personnel.

30.5 ACCESS TO THE PUBLIC SERVICES

Neither the materials excavated nor the materials or equipment used in the construction of the WORK shall be so placed as to prevent free access to public services. All excavated material shall be piled in a manner that will not endanger the WORK and that will avoid obstructing streets, sidewalks and driveways. Excavated material suitable for backfilling shall be stockpiled separately on the site. No material shall be placed closer than three feet from the edge of an excavation. Fire hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, or other utility controls shall be left unobstructed and accessible until the WORK is completed. Gutters shall be kept clear or other satisfactory provisions made for street drainage. Natural water courses shall not be obstructed or polluted. Surplus material and excavated material unsuitable for backfilling shall be transported and disposed of off the site in disposal areas obtained by CONTRACTOR.

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

30.6 PUBLIC NUISANCE

CONTRACTOR shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, or excessive noise or dust. CONTRACTOR shall eliminate noise to as great an extent as practicable at all times.

30.7 CONSTRUCTION SCHEDULE AND WORK HOURS

CONTRACTOR shall furnish to ENGINEER and COUNTY written and/or drawn time line for progression of WORK delineating milestone events such as completion of construction of each UTILITY SYSTEM, connection of new UTILITY SYSTEMS to existing UTILITY SYSTEMS, etc. The time line shall be furnished during the preconstruction meeting.

No WORK shall be done between the hours of 6:00 p.m. and 7:00 a.m., or on Saturdays or Sundays or legal holidays unless COUNTY grants approval and proper and efficient prosecution of the WORK requires operations during the night or weekend. Written notification for doing the WORK shall be provided to COUNTY a minimum 72 hours before starting such items of the WORK.

30.8 CONSTRUCTION IN EASEMENTS AND RIGHT-OF-WAYS

30.8.1 CONSTRUCTION IN EASEMENTS

In easements across private property, CONTRACTOR shall confine all operations within the easement area and shall be responsible and liable for all damage outside of the easement area. Trees, fences, shrubbery or other type of surface improvements located in easements will require protection during construction. Precautions shall be taken by adequate sheeting or other approved method to prevent any cave-in or subsidence beyond the easement limits or damage to improvements within the easement. In general, the easement area is intended to provide reasonable access and working area for efficient operation by CONTRACTOR. Where easement space for efficient operation is not provided, CONTRACTOR shall be responsible for organizing his operations to perform within the restrictions shown on the PLANS.

30.8.2 CONSTRUCTION IN FLORIDA DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY

CONTRACTOR shall strictly adhere to the requirements of the Florida Department of Transportation where construction work is in a right-of-way under the jurisdiction of the State of Florida and shall take care to avoid any unreasonable traffic conflicts due to the WORK in road right-of-way.

30.8.3 CONSTRUCTION IN POLK COUNTY RIGHT-OF-WAY

WORK shall be governed by the Polk County Right-of-Way Use Regulations as currently enforced.

30.9 SUSPENSION OF WORK DUE TO WEATHER

During inclement weather, all WORK which might be damaged or rendered inferior by such weather conditions shall be suspended. During suspension of the WORK from any cause, the WORK shall be suitably covered and protected so as to preserve it from injury by the weather or otherwise.

30.10 USE OF CHEMICALS

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 United States Environmental Protection Agency or United States Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict conformance with label instructions.

30.11 COOPERATION WITH OTHER CONTRACTORS AND FORCES

During construction progress, it may be necessary for other contractors and persons employed by

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

COUNTY to work in or about the site. COUNTY reserves the right to put such other contractors to work and to afford such access to the construction site and at such times as COUNTY deems proper. CONTRACTOR shall not impede or interfere with the work of such other contractors and shall cooperate with the other CONTRACTOR(s) for proper execution of the work.

30.12 SUBSURFACE EXPLORATION

CONTRACTOR shall make such subsurface explorations as he/she believes necessary to perform the WORK.

30.13 CLEANING

30.13.1 DURING CONSTRUCTION

During construction, CONTRACTOR shall, at all times, keep the construction site and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of COUNTY, such material, debris, or rubbish constitutes a nuisance or is objectionable.

30.13.2 FINAL CLEANING

At the conclusion of WORK, all tools, temporary structures and materials belonging to CONTRACTOR shall be promptly taken away. CONTRACTOR shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

30.14 SALVAGE

Any existing COUNTY-owned equipment or material including but not limited to valves, pipes, meters, fittings, couplings, etc., which is removed or replaced as a result of construction may be designated as salvage by COUNTY and, if so, shall be carefully excavated if necessary and delivered to COUNTY at a location within COUNTY.

30.15 SHOP DRAWINGS AND SAMPLES

This section is intended to outline the requirements and procedures for preparing, reviewing, and submitting shop drawings to ENGINEER for review and approval. No work requiring a shop drawing or sample submittal may commence until the submittal has been approved by ENGINEER. A copy of each approved shop drawing and each approved sample shall be kept in good order by CONTRACTOR at the site and shall be available to COUNTY.

CONTRACTOR shall submit to ENGINEER for review and processing with such promptness as to cause no delay in work, all samples required by the contract documents. All samples will have been checked by and stamped with the approval of CONTRACTOR, and identified clearly as to material, manufacturer, any pertinent numbers and the use for which intended.

30.15.1 SCHEDULE

Within 30 days after the contract award, CONTRACTOR shall submit a complete schedule of shop drawing submittals for review by ENGINEER.

30.15.2 CONTRACTOR'S REVIEW

CONTRACTOR shall submit without delay, for ENGINEER's review and processing, certified shop drawings for all equipment and materials as called for under the contract documents in accord with provisions of the contract documents and completely coordinated with work of all other trades. Items submitted without CONTRACTOR's review stamp will be returned, without action, for resubmission. Items not submitted in accord with provisions of this section will be returned, without action, for resubmission. Submissions on items not approved for use by contract documents or addenda will be returned without action, rejected.

30.15.3 QUANTITY

After checking and verifying all field measurements, CONTRACTOR shall submit to ENGINEER for review and processing in accordance with the accepted schedule of shop drawing submissions six (6) copies of all shop drawings, which shall have been thoroughly reviewed and checked by and stamped with the approval of CONTRACTOR as indication of his checking and verification of dimensions and coordination with interrelated items, and identified as the Owner/County may require. Data shown on shop drawings will be complete with respect to dimensions, design criteria, materials of construction, wiring diagrams, and the like to enable ENGINEER to review the information as required.

30.15.4 DEVIATIONS

At the time of each submission, CONTRACTOR will in writing, call the ENGINEER's attention to any deviations that the shop drawing or sample may have from the requirements of the contract documents.

30.15.5 ENGINEER REVIEW

ENGINEER will review and process with reasonable promptness shop drawings and samples, but its review and approval shall be only for conformance with the design concept of the project and for compliance with the information given in the contract documents. The approval of a separate item as such will not indicate approval for the assembly in which the item functions. CONTRACTOR will make any corrections required by ENGINEER and will return the required number of corrected copies of shop drawings and resubmit new samples until approved. CONTRACTOR's stamp of approval on any shop drawing or sample shall constitute a representation to ENGINEER that CONTRACTOR has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data or he/she assumes full responsibility for doing so, and that he/she has reviewed or coordinated each shop drawing or sample with the requirements of the work and the contract documents.

30.15.6 CONTRACTOR'S RESPONSIBILITY

ENGINEER's approval of shop drawings or samples shall not relieve CONTRACTOR from his responsibility for any deviations from the requirements of the contract documents unless CONTRACTOR has in writing called the ENGINEER's and COUNTY's attention to such deviation at the time of submission and ENGINEER and COUNTY have given written approval to the specific deviation, nor shall any approval by ENGINEER relieve CONTRACTOR from responsibility for errors or omissions in the shop drawings. Reviewed shop drawings or samples submitted constitute criterion for judging completed work. Finished work or items not equal to submittals will be rejected.

30.15.7 SUBMITTAL NUMBERING

To facilitate review, CONTRACTOR shall consecutively number each submittal. This numbering system should be in order of submittal. Any re-submittal required shall have the same number as the original submittal, followed by letter suffix signifying that it is a second (or third, etc.) submittal, e.g. No. 14A (2nd Submittal of No. 14). In addition, all submittals shall have a completed shop drawing Submittal sheet placed on them by CONTRACTOR, and review of particular submittal will be undertaken only if such information is provided. A copy of the Shop Drawing Submittal Form is included at the end of this Section.

30.16 PROJECT MEETINGS

Project meetings will be held prior to and during construction of the project. Meetings, scheduling, attendance and agenda will be as indicated in this section. Two types of meetings will be held in conjunction with this project. One is the preconstruction meeting and the other is project progress meetings.

30.16.1 PRECONSTRUCTION MEETING

ENGINEER will have the responsibility of scheduling the preconstruction meeting with

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

CONTRACTOR. The preconstruction meeting will be scheduled as soon as possible after both parties have completely executed the contract. At the preconstruction meeting, the "Notice to Proceed" will be issued to CONTRACTOR. The location of the preconstruction meeting will be determined by ENGINEER. Agenda items are as follows:

- A. List of subcontractors, list of products and suppliers, schedule of values, and pay request schedule;
- B. Projected construction schedule;
- C. Critical work sequencing;
- D. Major equipment deliveries and priorities;
- E. Project coordination and designation of responsible personnel from each party;
- F. Procedures and processing of:
 - 1. Field decisions;
 - 2. Proposal requests;
 - 3. Submittals;
 - 4. Change Orders;
 - 5. Applications for payment;
 - 6. Schedule of Values;
- G. Procedures for maintaining up-to-date field record documents;
- H. Miscellaneous items:
 - 1. Use of premises by OWNER, CONTRACTOR, and ENGINEER;
 - 2. Security;
 - 3. Safety;
 - 4. Construction facilities provided by OWNER and CONTRACTOR;
 - 5. First-aid;
- I. Inspections by OWNER and ENGINEER
- J. Substantial completion;
- K. Final completion and project close-out.

30.16.2 PROJECT PROGRESS MEETING

ENGINEER shall schedule regular weekly project progress meetings with CONTRACTOR and shall hold called meetings as required by the progress of the work. These meetings shall be held at the field office of CONTRACTOR or a mutually agreed upon alternate location if a field office is not applicable to project scope.

- A. Attendees:
 - 1. ENGINEER;
 - 2. OWNER's on-site project inspector;
 - 3. CONTRACTOR's Superintendent;
 - 4. Subcontractors;
 - 5. Major equipment suppliers;
 - 6. Others as required by OWNER and/or CONTRACTOR;
 - 7. COUNTY (UTILITIES DIVISION and INSPECTION SERVICES).

B. Agenda:

1. Review and approval of minutes of previous meeting;
2. Review of work progress since previous meeting;
3. Field observations, problems, and/or conflicts;
4. Review of construction schedule and any revisions to the schedule;
5. Plan progress, schedule, during succeeding work period;
6. Review submittal schedules and status; expedite as required;
7. Estimates for periodic payment request;
8. Identification of problems that impede progress;
9. Maintenance of quality and work standards;
10. Other relative business.

30.17 OPERATION AND MAINTENANCE DATA MANUALS

This section is intended to outline the requirements and procedures for preparing, reviewing, and submitting operation and maintenance data manuals. Prior to final acceptance, CONTRACTOR must compile and bind product data and related information appropriately for COUNTY's use in performing operation and maintenance activities of products furnished under this contract. The operation and maintenance manuals shall be prepared as specified in this section and as referenced in other pertinent sections of the contract documents.

30.17.1 SUBMITTALS

Prepare data in the form of an information and instructional manual for use by COUNTY personnel in accordance with the following format:

- A. Size: 8-1/2" x 11";
- B. Paper: 20# minimum, white, for typed pages;
- C. Text: Manufacturer's printed data, or neatly typed pages;
- D. Drawings:
 1. Provide reinforced punched binder tab and bind in with text;
 2. Reduce larger drawings and fold to size of text pages but not larger than 14" x 17"
- E. Provide fly-leaf for each separate product, or each piece of operating equipment:
 1. Provide typed description of product or each piece of component parts of equipment;
 2. Provide indexed tabs
- F. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE DATA AND INSTRUCTIONS" and the following information:
 1. Title of project;
 2. Identify volume number and total number of volumes (e.g., Volume 1 of 3), if applicable;
 3. Provide index;
 4. Identity of separate structure as applicable;
 5. Identity of general subject matter covered in the manual.

30.17.2 BINDERS

- A. Commercial quality 3-post binders with durable and cleanable matching plastic covers;
- B. Maximum post width to be 2";
- C. When multiple binders are used, correlate the data into related consistent groupings.

30.17.3 SCHEDULE

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

- A. Submit 2 copies of preliminary draft of proposed formats and outlines of contents of operation and maintenance manuals within 90 days after the issuance of the "Notice To Proceed";
- B. ENGINEER will review the preliminary draft and return 1 copy with comments;
- C. Submit 2 copies of completed data in final form no later than 30 days following the Engineer's review of the last required shop drawing and/or other submittal;
- D. 1 copy will be returned with comments to be incorporated into final copies;
- E. Submit 5 copies of approved manual in final form to the of ENGINEER within 30 days of product shipment to the project site and preferably within 30 days after the reviewed copy is received;
- F. Append 6 copies of addenda to the operation and maintenance manuals as applicable and certificates as specified within 30 days after final inspection and project startup test.

30.17.4 QUALITY ASSURANCE

Preparation of the operation and maintenance manuals shall be done by personnel who are trained and experienced in maintenance and operation of products; familiar with requirements of this section; skilled as technical writer to the extend required to communicate essential data; skilled as draftsman competent to prepare required drawings.

30.17.5 CONTENT OF MANUAL

Contents shall be neatly typewritten, complete table of contents for each volume, arranged in systematic order, and containing the following information:

- A. CONTRACTOR, name of responsible principal, address and telephone number;
- B. A list of each product required to be included, indexed to content of the volume;
- C. With each product, list name, address and telephone number of:
 - 1. Subcontractor(s) or installer(s) involved and area/item of responsibility of each;
 - 2. Local source of supply for parts and replacement;
- D. Identify each product by product name and other identifying symbols as set forth in contract documents;
- E. Product Data: Include only those sheets which are pertinent to the specific product. Annotate each sheet to:
 - 1. Clearly identify specific product or part installed;
 - 2. Clearly identify data applicable to installation;
 - 3. Delete all inapplicable references and information;
- F. Drawings: Supplement product data with drawings as necessary to clearly illustrate:
 - 1. Relations of components parts of equipment and systems;
 - 2. Control and flow diagrams;
 - 3. Coordinate drawings with information in project record documents to assure correct illustration of completed installation;
 - 4. Do not use project record documents as maintenance drawings;
- G. Written text as required to supplement product data for the particular installation;
- H. Organize in consistent format under separate headings for different procedures;
- I. Provide logical sequence of instructions of each procedure;
- J. Text is to be typed;
- K. Warranty, Bond and Service Contracts: Copy of each warranty, bond and service contract issued and provide information sheet for COUNTY personnel explaining conditions that may invalidate warranties or bonds and course of action to be taken in the event of a failure;
- L. Proper procedures in event of failure;
- M. Instances which might affect validity of warranties or bonds;

30.17.6 MATERIALS AND FINISHES

- A. Content for architectural products, applied materials, and finished:
 - 1. Manufacturer's data, giving full information on products:



- a. Catalog number, size, composition;
- b. Color and texture designations;
- c. Information required for reordering special manufactured products;
2. Instructions for care and maintenance:
 - a. Manufacturer's recommendation for types of cleaning agents and methods;
 - b. Cautions against cleaning agents and methods which are detrimental to product;
3. Recommended schedule for cleaning and maintenance;
- B. Contents for moisture protection and weather-exposed products:
 1. Manufacturer's data, giving full information on products;
 2. Applicable standards;
 3. Chemical composition;
 4. Details of installation;
 5. Instructions for inspection, maintenance and repair;
 6. Additional Requirements for Maintenance Data: Respective sections of these specifications.

30.17.7 EQUIPMENT AND SYSTEMS

- A. Contents for each unit of equipment and system, as appropriate;
- B. Description of unit and component parts:
 1. Function, normal operating characteristics, and limiting conditions;
 2. Performance curves, engineering data and tests;
 3. Complete nomenclature and commercial number listing of replaceable parts;
- C. Operating Procedures:
 1. Startup, break-in , routine and normal operating instructions;
 2. Regulation, control, stopping, shutdown and emergency instructions;
 3. Summer and winter operating instructions;
 4. Special operating instructions;
- D. Maintenance Procedures:
 1. Routine operations;
 2. Guide to "troubleshooting";
 3. Disassemble, repair and reassemble;
 4. Alignment, adjusting and checking;
- E. Servicing and lubrication required;
- F. Manufacturer's printed operating and maintenance instructions;
- G. Description of sequence of operation by control manufacturer;
- H. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance:
 1. Predicted life of parts subject to wear;
 2. Items recommended to be stocked as spare parts;
- I. As installed control diagrams by control manufacturer;
- J. Each CONTRACTOR's coordination drawings;
- K. As installed color coded piping diagrams;

- L. Charts of valve tag numbers, with location and function of each valve;
- M. Charts of equipment tag numbers, with location and name of each piece of equipment;
- N. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage;
- O. Other data as required under pertinent sections of specifications;
- P. Content, for each electric and electronic system, as appropriate:
 - 1. Description of system and component parts:
 - a. Function, normal operating characteristics, and limiting conditions;
 - b. Performance curves, engineering data and tests;
 - c. Complete nomenclature and commercial number of replaceable parts;
 - 2. Circuit directories of panel/electrical equipment:
 - a. Electrical service;
 - b. Controls;
 - c. Communication;
 - 3. As installed color-coded wiring diagrams;
 - 4. Operating procedures:
 - a. Routine and normal operating instructions;
 - b. Sequences required;
 - c. Special operating instructions;
 - 5. Maintenance procedures:
 - a. Routine operations;
 - b. Guide to "troubleshooting";
 - c. Disassembly, repair and reassemble;
 - d. Adjustment and checking;
- Q. Manufacturer's printed operating and maintenance instructions;
- R. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage;
- S. Other data as required under pertinent sections of specifications;
- T. Prepare and include additional data when the need for such data becomes apparent during instruction of the OWNER's personnel.

30.18 PROJECT RECORD DOCUMENTS

This section is intended to outline the requirements for preparing and maintaining record documents throughout the duration of the project.

30.18.1 ON-SITE RECORD DOCUMENTS

CONTRACTOR shall maintain at the site for OWNER one record copy of the following:

- A. Drawings;
- B. Specifications;
- C. Addenda;
- D. Change orders and other modifications to the contract;

- E. ENGINEER field orders or written instructions;
- F. Approved shop drawings, product data and samples;
- G. Field test records;
- H. Record drawings;
- I. Materials Safety Data Sheets;

30.18.2 STORAGE AND MAINTENANCE OF RECORD DOCUMENTS

CONTRACTOR shall store record documents, record drawings, and samples apart from documents used for construction; provide files and racks for storage of documents; provide locked cabinet or secure storage space for storage of samples.

Documents shall be maintained in a clean, dry, legible condition and in good order. Do not use Record Drawings documents for construction purposes. Documents and samples shall be available at all times for inspection by ENGINEER.

30.18.3 GATHERING AND RECORDING OF INFORMATION

Record Drawing information shall be maintained continuously by CONTRACTOR as construction progresses. CONTRACTOR retains full responsibility to ensure the record information is gathered and recorded as outlined in the contract documents.

- A. Each document shall be labeled "RECORD DRAWINGS" in large printed letters, and shall include CONTRACTOR's name and the person's name responsible for maintenance of current data on the record drawings.
- B. Record drawing information shall be kept current with construction progress.
- C. CONTRACTOR shall keep an accurate record of the location, size, and material for all piping, pipe casings and changes in equipment dimensions and other variations between the work actually provided and that shown on the contract drawings. The representation of such variations shall conform to standard drafting practices and shall include such supplementary notes, legends, and details as may be necessary for legibility and clear portrayal of the construction.
- D. Final alignment, elevations, invert elevations and locations are to be supplied by CONTRACTOR. Final location of buried facilities shall be identified by reference to at least two permanent above-grade structures/reference points.
- E. No work shall be concealed or buried until the required information is gathered and recorded.
- F. Sketches showing record drawing information shall be made available to ENGINEER for review with the applications for payment. Record drawing information shall be reviewed with ENGINEER monthly as part of the application for payment review process.
- G. Upon completion, CONTRACTOR shall have record drawings prepared to scale and records certified as to their completeness and correctness by CONTRACTOR's Superintendent for incorporation in the record drawings.

30.18.4 FINAL RECORD DOCUMENTS

The CONTRACTOR's Superintendent and a registered SURVEYOR shall certify the record



*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

drawings by signing and dating one complete set of reproducible drawings containing a certification statement stating that he/she responsibly and accurately collected and recorded the record drawing data for this project and guarantees said information for perpetuity. Four complete blueprint sets of record drawings shall be signed, sealed, and dated by the CONTRACTOR's Superintendent and a registered SURVEYOR and shall be provided to ENGINEER at contract close-out. CONTRACTOR shall deliver four complete blueprint sets and one complete reproducible set of record drawing documents to ENGINEER. A letter of transmittal shall accompany the record drawing and record document submittals. The letter shall include the date, project title and number, CONTRACTOR's name and address, title and number of each record drawing document, certification that each document as submitted is complete and accurate, and signature of CONTRACTOR or his authorized representative.

30.19 CONTRACT CLOSE-OUT

The close-out of this contract shall include the following five parts: substantial completion, final inspection, CONTRACTOR's close-out submittals to ENGINEER, final adjustment of account, and final application for payment. This section is intended to define and discuss each of these parts and their respective order of occurrence.

30.19.1 SUBSTANTIAL COMPLETION

When CONTRACTOR considers the work to be substantially complete, CONTRACTOR shall submit to ENGINEER a written notice that the work is substantially complete and a list of items that are not completed and items that must be corrected. Within a reasonable time after receipt of such notice, ENGINEER will make an inspection to determine the status of completion. If, in the opinion of ENGINEER, the work is not substantially complete, ENGINEER will promptly notify CONTRACTOR in writing stating reason(s) for the work not being substantially complete. This sequence of events shall be repeated until such time both parties agree the project is substantially complete.

30.19.2 FINAL INSPECTION

After substantial completion, and when CONTRACTOR considers the work to be totally complete, he/she shall submit to ENGINEER a written certification stating:

- A. Contract documents have been thoroughly and completely reviewed by him;
- B. Work has been inspected for compliance with the contract documents by him;
- C. Work has been completed in accordance with the contract documents and changes sanctioned by OWNER;
- D. Work has been tested as required by the contract documents and in the presence of the OWNER's representative and is operational;
- E. Work is completed and ready for final inspection.

ENGINEER will make an inspection to verify the status of completion with reasonable promptness and receipt of such certification. Should ENGINEER consider the work to be incomplete or defective, he/she shall promptly notify CONTRACTOR in writing, listing the incomplete and/or defective work.

This sequence of events shall be repeated until such time both parties agree the project is complete. When ENGINEER finds the work is acceptable under the contract documents, he/she shall request CONTRACTOR to make close-out submittals.

30.19.3 CONTRACTOR'S CLOSE-OUT SUBMITTALS TO ENGINEER



*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

Upon receipt of ENGINEER's request for close-out submittals, CONTRACTOR shall submit to ENGINEER:

- A. Evidence of compliance with requirements of governing authorities and permits;
- B. Final record drawings and record documents;
- C. Evidence of payment and release of liens in accordance with requirements of the Supplementary Conditions and General Conditions;
- D. Final statement of accounting.

Upon receipt of CONTRACTOR's close-out submittal, ENGINEER shall review the documents and determine whether all required information is provided. ENGINEER shall respond to CONTRACTOR with their findings.

30.19.4 FINAL ADJUSTMENT OF ACCOUNT

When making the close-out submittal to ENGINEER, CONTRACTOR shall also submit a final statement of accounting to ENGINEER. The statement shall reflect all adjustments to the contract sum, to include:

- A. The original contract sum;
- B. Additions and deductions resulting from:
 - 1. Previous change orders;
 - 2. Allowances;
 - 3. Unit prices;
 - 4. Deductions for uncorrected work;
 - 5. Other adjustments;
- C. Total adjusted contract sum;
- D. Previous payments;
- E. Sum remaining and due to CONTRACTOR;

ENGINEER will prepare a final change order reflecting approved adjustments to the contract sum that were not previously made by change order(s).

30.19.5 FINAL APPLICATION FOR PAYMENT

CONTRACTOR shall submit the final application for payment in accordance with the General Conditions and Supplementary Conditions.

30.20 CONSTRUCTION WATER SUPPLY

CONTRACTOR is required to establish construction meter account with POLK COUNTY UTILITIES DIVISION (administration) for construction water supply. Costs are subject to change without notice and CONTRACTOR is advised to call POLK COUNTY UTILITIES DIVISION, CUSTOMER SERVICE SECTION for verification of costs.

A jumper assembly is required for water supply. See DRAWINGS for assembly requirements.

30.21 OTHER UTILITY SERVICES

CONTRACTOR shall be responsible for coordination and all costs associated with other utility companies, such as power and telephone companies for holding power and telephone poles/wires, guy wires, or



*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

relocating same.

CONTRACTOR shall be responsible for procuring electrical permit and service and telephone service for work embraced as part of this project. CONTRACTOR shall be responsible for all costs and coordination for installation of service(s) and required materials, conduits, cables, junction boxes, etc.

30.22 SEPARATION OF WASTEWATER SYSTEMS AND POTABLE WATER SYSTEMS AND RECLAIMED WATER SYSTEMS

30.22.1 GENERAL

Construction of potable water, reclaimed water, and wastewater systems shall meet the following horizontal and vertical separation requirements.

30.22.2 HORIZONTAL SEPARATION

Reclaimed water mains shall be located at least 5 feet center-to-center or 3 feet edge of pipe-to-edge of pipe, measured horizontally, from any wastewater main, and at least 5 feet center-to-center or 3 feet edge of pipe-to-edge, measured horizontally, from any potable water main. The separation requirement providing the most separation between mains shall govern.

Potable water mains shall be located at least 10 feet edge of pipe-to-edge of pipe, measured horizontally, from any wastewater main (pressure or gravity), and at least 5 feet center-to-center or 3 feet edge of pipe-to-edge, measured horizontally, from any reclaimed water main. The separation requirement providing the most separation between mains shall govern.

30.22.3 SYSTEM CROSSINGS

Reclaimed water mains shall cross above wastewater mains. Potable water mains shall cross above reclaimed water mains and wastewater mains.

A vertical separation of at least 18 inches shall be maintained between mains when crossings occur.

Adequate structural support for mains shall be provided to prevent excessive deflection of joints and settling.

Reclaimed and potable water mains shall be constructed of PVC or DIP with minimum laying length of 18 feet. Wastewater mains shall be constructed of PVC with minimum laying length of 20 feet. At the point of crossing, joints shall be equidistant and as far as possible from the other main.

30.23 PERMITS

30.23.1 GENERAL

During the construction of the Work, the CONTRACTOR shall adhere to and follow all permit conditions issued by the various regulatory agencies.

30.23.2 PERMITS OBTAINED BY THE OWNER

The OWNER has, or will have by the time construction begins, obtained the following permits:

- A. Florida Department of Health, Public Water System Construction Permit

END OF SECTION



*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*



SHOP DRAWING SUBMITTAL FORM

TO: _____ SUBMITTAL NO: _____

FROM: _____ DATE: _____

PROJECT NAME: _____

OWNER'S PROJECT NO.: _____ CONTRACTOR'S PROJECT NO.: _____

SPECIFICATION PRAGRAPH _____ DRAWING NO.: _____

THE FOLLOWING IS HERBY SUBMITTED FOR REVIEW AND ACTION:

DESCRIPTION OF ITEM(S) SUBMITTED (Type, size, model, etc.)	CATALOF, DRAWING, BROCHURE NO.	NO. OF COPIES

DEVIATIONS: _____ (Yes, No) If so, list below:

NOTE: CONTRACTOR is required to advise COUNTY as soon as possible if there is any deficiency in the design drawings and specifications and/or equipment specified as delineated on/in the drawings and specifications.

I certify that the above submitted item has been reviewed in detail and is correct and in conformance with the design intent of the contract drawings and specifications, except as otherwise stated.

Printed Name of CONTRACTOR'S Reviewer: _____

Signature and Date of CONTRACTOR'S Reviewer: _____



SECTION 31 - SITE PREPARATION, SURFACE REMOVAL AND RESTORATION

31.1 GENERAL

This section covers clearing, grubbing, and stripping of the construction sites. CONTRACTOR shall clear and grub all of the area within the limits of construction as shown on the PLANS and approved by COUNTY prior to the beginning of any WORK. All site work shall conform to the applicable site clearing ordinance, and landscaping and tree ordinances of COUNTY.

31.2 CLEARING AND GRUBBING

31.2.1 CLEARING

The surface of the ground for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, trees and shrubs shall be preserved as specified in Section 30. Clearing operations shall be conducted so as to prevent damage to existing structures and installations and to those under construction, and so as to provide for the safety of employees and others.

31.2.2 GRUBBING

Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

31.2.3 STRIPPING

In areas so designated, top soil shall be stripped and stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. Any topsoil remaining after all WORK is in place shall be disposed of by CONTRACTOR.

31.2.4 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

CONTRACTOR shall at his expense dispose of all material and debris from the clearing and grubbing operation in accordance with all applicable ordinances.

31.3 DUST CONTROL

CONTRACTOR shall control dust resulting from clearing and grubbing operations to prevent nuisance to adjacent property owners and the general public. CONTRACTOR shall use dust control methods and materials approved by COUNTY.

31.4 SURFACE REMOVAL

Along the proposed pipe lines as indicated on the PLANS, CONTRACTOR shall remove the surface materials only to such widths as will permit a trench to be excavated which will afford sufficient room for proper efficiency and proper construction. All applicable COUNTY and FDOT regulations shall be followed. Where sidewalks, driveways, pavements and curb and gutter are encountered, care shall be taken to protect against fracture or disturbance beyond reasonable working limits. All fractured, broken or disturbed surfaces shall be restored to their original condition prior to completion of the WORK.

31.5 RESTORATION

Restoration of all surfaces including road sub-base, soil cement, limerock base, asphaltic concrete surface, portland cement concrete pavement and driveways, sidewalks and concrete curbs shall be in strict accordance with FDOT ROAD CONSTRUCTION SPECIFICATIONS. All grassing and mulching shall be done as specified in the FDOT ROAD CONSTRUCTION SPECIFICATIONS. Solid sodding shall be placed on all slopes greater than 4:1, within 10 feet of all proposed structures and where existing sod

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

is removed or disturbed by the WORK. In addition, CONTRACTOR shall restore all storm drains, culverts, inlets and storm manholes to equal or better condition in accordance with the FDOT ROAD CONSTRUCTION SPECIFICATIONS.

END OF SECTION



SECTION 32 - EXCAVATION, BACKFILL, COMPACTION AND GRADING

32.1 GENERAL

This Section covers excavation, backfill, fill and grading associated with utility trench and structural construction. All such WORK shall be performed by CONTRACTOR concurrently with the WORK specified in Divisions II, III, and IV of these specifications. CONTRACTOR shall furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, fill, compaction, grading and slope protection required to complete the WORK shown on the DRAWINGS and specified herein. The WORK shall include, but not necessarily be limited to: pump stations, manholes, vaults, conduit, pipe, roadways and paving; all backfilling, fill and required borrow; grading; disposal of surplus and unsuitable materials; and all related WORK such as sheeting, bracing and water handling.

32.2 SOIL BORINGS AND SUBSURFACE INVESTIGATIONS

CONTRACTOR shall examine the site and undertake subsurface investigations, including soil borings, before commencing the WORK. COUNTY will not be responsible for presumed or existing soil conditions in the WORK area.

32.3 EXISTING UTILITIES

CONTRACTOR shall locate existing utilities in the areas of WORK. If utilities are to remain in place, CONTRACTOR shall provide adequate means of protection during earthwork operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, CONTRACTOR shall consult OWNER of such piping or utility immediately for directions. Payment for damage and repair to such piping or utilities is CONTRACTOR'S responsibility. Refer to Section 30.2 for utility coordination requirements.

COUNTY shall not be responsible for uncharted or incorrectly charted water and wastewater mains or other utilities. It is CONTRACTOR'S responsibility to ensure that such facilities exist at the presumed point prior to commencing construction.

32.4 MATERIALS

32.4.1 GENERAL

Materials for use as bedding and backfill, whether insitu or borrow, shall be as described under this section. CONTRACTOR shall employ a state-certified laboratory for all geotechnical sampling and testing required and present copies of all sampling and testing results to COUNTY or its designated representative.

32.4.2 STRUCTURAL FILL

Materials for structural fill shall be bedding rock or select common fill as specified herein or other suitable material as approved by COUNTY.

32.4.3 COMMON FILL

Common fill shall consist of mineral soil, substantially free of clay, organic material, loam, wood, trash and other objectionable material which may be compressible or which cannot be compacted properly. Common fill shall not contain stones larger than 6 inch in any dimension, asphalt, broken concrete, masonry, rubble, or other similar materials. It shall have physical properties such that it can be readily spread and compacted during filling. Additionally, common fill shall be no more than 12 percent by weight finer than the No. 200 mesh sieve unless finer material is approved for use in a specific location by COUNTY.

Material falling within the above specifications, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of COUNTY, is not suitable for reuse, shall be spoiled as specified herein for disposal of unsuitable materials.

32.4.4 SELECT COMMON FILL

Select common fill shall be as specified above from common fill, except that the material shall contain no stones larger than 1-1/2 inches in largest dimension, and shall be no more than 5 percent by weight finer than the No. 200 mesh sieve.

32.4.5 BEDDING ROCK

Bedding rock shall be 3/16 inch to 3/4 inch washed and graded stone (FDOT #67). This stone shall be graded so that 90 to 100 percent will pass a 3/4 inch screen and 95 to 100 percent will be retained on a No. 8 screen. No stones larger than 1 inch in any dimension shall be accepted.

32.5 SHEETING AND BRACING IN EXCAVATIONS

32.5.1 GENERAL

If required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction and to protect adjacent structures, existing piping and/or foundation material from disturbance, undermining or other damage, CONTRACTOR shall construct, brace and maintain cofferdams consisting of sheeting and bracing. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

32.5.2 MISCELLANEOUS REQUIREMENTS

For trench sheeting for pipes, no sheeting is to be withdrawn if driven below mid-diameter of any pipe and no wood sheeting shall be cut off at a level lower than one foot above the top of any pipe unless otherwise directed by COUNTY. If, during the progress of the WORK, COUNTY decides that additional wood sheeting should be left in place, CONTRACTOR shall do so. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given by COUNTY for an alternate method of removal. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction of other structures, utilities, existing piping or property. Unless otherwise approved or indicated on the Drawings or in the Specifications, all sheeting and bracing shall be removed after completion of the substructure. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools specially adapted to that purpose, by watering or otherwise as may be directed.

The right of COUNTY to order sheeting and bracing left in place shall not be construed as creating any obligation on its part to issue such orders, and its failure to exercise its right to do so shall not relieve CONTRACTOR from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of CONTRACTOR to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

CONTRACTOR shall construct the cofferdams and sheeting outside the neat lines of the foundation unless indicated otherwise to the extent he/she deems it desirable for his method of operation. sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing and cofferdams shall be adequate to withstand all pressures to which the structure will be subjected. Pumping, bracing and other work within the cofferdam shall be done in a manner to avoid disturbing any construction already performed. Any movement or bulging which may occur shall be corrected by CONTRACTOR at his own expense so as to provide the necessary clearances and dimensions.

32.6 DEWATERING, DRAINAGE, AND FLOTATION

32.6.1 GENERAL

CONTRACTOR shall excavate, construct and place all pipelines, concrete work, fill, and bedding

rock, in-the-dry. In addition, CONTRACTOR shall not make the final 24 inches of excavation until the water level is a minimum of one foot below proposed bottom of excavation. For purposes of these specifications, "in-the-dry" is defined to be within 2% of the optimum moisture content of the soil. COUNTY reserves the right to ask CONTRACTOR to demonstrate that the water level is a minimum of one foot below proposed bottom of excavation before allowing the construction to proceed.

Discharge water shall be clear, with no visible soil particles. Discharge from dewatering shall be disposed of in such a manner to not interfere with the normal drainage of the area in which the WORK is being performed, create a public nuisance, or form ponding. The operations shall not cause injury to any portion of the WORK completed, or in progress, or to the surface of streets, or to private property. The dewatering operation shall comply with the requirements of appropriate regulatory agencies. Additionally, where private property will be involved, advance permission shall be obtained by CONTRACTOR.

32.6.2 ADDITIONAL REQUIREMENTS

CONTRACTOR shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavations and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.

Dewatering shall, at all times, be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

It is expected that wellpoints will be required for predrainage of the soils prior to final excavation for some of the deeper in-ground structures, or piping and for maintaining the lowered groundwater level until construction has been completed to such an extent that the structure, pipeline or fill will not be floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and negligible fines shall be removed by pumping.

CONTRACTOR shall furnish all materials and equipment and perform all work required to install and maintain the drainage systems for handling groundwater and surface water encountered during construction of structures, pipelines and compacted fills.

During backfilling and construction, water levels shall be measured in observation wells located as directed by COUNTY, installed by CONTRACTOR at CONTRACTOR'S expense.

Continuous pumping will be required as long as water levels are required to be below natural levels.

32.7 EXCAVATION

32.7.1 GENERAL

Excavation consists of removal, storage and disposal of material encountered when establishing required grade elevations and in accordance with the notes shown in the DRAWINGS.

Authorized earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, and other materials encountered that are not classified as rock excavation or unauthorized excavation. Unauthorized excavation consists of removal of material beyond the limits needed to establish required grade and subgrade elevations without specific direction of COUNTY. Unauthorized excavation, as well as remedial work directed by COUNTY shall be at CONTRACTOR'S expense. Such remedial work shall be performed as directed by COUNTY.

If requested by COUNTY, when excavation has reached required subgrade elevations, a GEOTECHNICAL/SOILS ENGINEER shall make an inspection of conditions. If the subgrade is unsuitable, CONTRACTOR shall carry excavation deeper and replace excavated material with select common fill or bedding rock, as directed by COUNTY.

If CONTRACTOR excavates below grade through error or for his own convenience or through failure to properly dewater the excavation or disturbs the subgrade before dewatering is sufficiently complete, CONTRACTOR shall excavate below grade and refill the excavation using select common fill or bedding rock.

Slope sides of excavations shall comply with local codes and ordinances, and with OSHA requirements. CONTRACTOR shall shore and brace where sloping is not possible due to space restrictions or stability of the material excavated. Sides and slopes shall be maintained in a safe condition until completion of backfilling.

CONTRACTOR shall stockpile satisfactory excavated materials at a location approved by COUNTY until required for backfill and fill. When needed in the WORK, material shall be located and graded at the direction of a GEOTECHNICAL/SOILS ENGINEER.

Stockpiles shall be placed and graded for proper drainage. All soil materials shall be located away from the edge of excavations. All surplus and/or unsuitable excavated material shall be legally disposed of by CONTRACTOR. Any permits required for the hauling and disposing of this material shall be obtained by CONTRACTOR prior to commencing hauling operations.

32.7.2 EXCAVATION FOR STRUCTURES

All such excavations shall conform to the elevations and dimensions shown on drawing within a tolerance of plus or minus 0.10 feet and extending a sufficient distance from footings and foundations to permit placing and removing formwork, installation of services and other construction, inspection or as shown on the DRAWINGS. In excavating for footings and foundations, care shall be exercised not to disturb the bottom of the excavation. Bottoms shall be trimmed to required lines and grades to leave a solid base to receive concrete.

32.7.3 TRENCH EXCAVATION

Excavation for all trenches required for the installation of utility pipes shall be made to the depths indicated on the DRAWINGS and in such manner and to such widths as will give suitable room for laying the pipe within the trenches, for bracing and supporting and for pumping and drainage facilities.

The bottom of the excavations shall be firm and dry and in all respects acceptable to COUNTY.

Excavation shall not exceed normal trench width as specified in the DRAWINGS. Any excavation which exceeds the normal trench width, shall require special backfill requirements as determined by COUNTY.

Where pipes are to be laid in bedding rock, select common fill or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

Where the pipes are to be laid directly on the trench bottom, the lower part of the trenches shall not be excavated to grade by machinery. The last of the material being excavated shall be done manually in such a manner that will give a shaped bottom, true to grade, so that pipe can be evenly supported on undisturbed material, as specified in the DRAWINGS. Bell holes shall be made as required.

32.8 BEDDING AND BACKFILL

32.8.1 GENERAL

Material placed in fill areas under and around structures and pipelines shall be deposited within the lines and to the grades shown on the DRAWINGS or as directed by COUNTY, making due allowance for settlement of the material. Fill shall be placed only on properly prepared surfaces which have been inspected and approved by COUNTY. If sufficient select common or common fill material is not available from excavation on site, CONTRACTOR shall provide fill as may be required.

Fill shall be brought up in substantially level lifts starting in the deepest portion of the fill. The entire surface of the WORK shall be maintained free from ruts and in such condition that construction equipment can readily travel over any section.

Fill shall be placed and spread in layers by a backhoe or other approved method, unless otherwise specified. Prior to the process of placing and spreading, all materials not meeting those specified under Section 32.4 shall be removed from the fill areas. CONTRACTOR shall assign a sufficient number of men to this WORK to ensure satisfactory compliance with these requirements.

If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layer, it shall be loosened by harrowing or by another approved method before the succeeding layer is placed.

All fill materials shall be placed and compacted "in-the-dry". CONTRACTOR shall dewater excavated areas as required to perform the work and in such a manner as to preserve the undisturbed state of the natural inorganic soils.

Prior to filling, the ground surface shall be prepared by removing vegetation, debris, unsatisfactory soil materials, obstructions and deleterious materials. CONTRACTOR shall plow strip or break up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with the existing surface. When existing ground surface has a density less than that specified under Section 32.9 for the particular area classification, CONTRACTOR shall break up the ground surface, pulverize, moisture-condition to the optimum moisture content and compact to required depth and percentage of maximum density.

Before compaction, material shall be moistened or aerated as necessary to provide the optimum moisture content. Material which is too wet shall be spread on the fill area and permitted to dry, assisted by harrowing if necessary, until the moisture content is reduced to allowable limits. If added moisture is required, water shall be applied by sprinkler tanks or other sprinkler systems, which will ensure uniform distribution of the water over the area to be treated and give complete and accurate control of the amount of water to be used. If too much water is added, the area shall be permitted to dry before compaction is continued. CONTRACTOR shall supply all hose, piping, valves, sprinklers, pumps, sprinkler tanks, hauling equipment and all other materials and equipment necessary to place water in the fill in the manner specified. CONTRACTOR shall compact each layer to required percentage of maximum dry density or relative dry density in accordance with Section 32.9. Backfill or fill material shall not be placed on surfaces that are muddy, frozen or contain frost or ice.

32.8.2 BEDDING AND BACKFILL FOR STRUCTURES

Bedding rock shall be used for bedding under all structures as indicated on the DRAWINGS. CONTRACTOR shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed. Structural fill shall be used as

backfill against the exterior walls of the structures. Fill shall be compacted sufficiently in accordance with Section 32.9.2 of these specifications. If compaction is by rolling or ramming, material shall be wet down as required.

Backfilling shall be carried up evenly on all walls of an individual structure. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength.

In locations where pipes pass through building walls, CONTRACTOR shall take precautions to consolidate the fill up to an elevation of at least one (1) foot above the bottom of the pipes. Structural fill in such areas shall be placed for a distance of not less than three feet either side of the center line of the pipe in level layers not exceeding eight inches in depth.

The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the DRAWINGS. No soft spots or uncompacted areas will be allowed in the WORK.

Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

32.8.3 BEDDING AND BACKFILL FOR PIPES

Bedding for pipe shall be as shown on the PLANS and detailed on the DRAWINGS. CONTRACTOR shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.

Backfilling over and around pipes shall begin as soon as practicable after the pipe has been laid, jointed and inspected. All backfilling shall be prosecuted expeditiously and as detailed on the DRAWINGS.

Any space remaining between the pipe and sides of the trench shall be carefully backfilled and spread by hand or approved mechanical device and thoroughly compacted with a tamper as fast as placed, up to a level of one foot above the top of the pipe. The filling shall be carried up evenly on both sides. Compaction shall be in accordance with the DRAWINGS and Section 32.9.

The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted in uniform layers. Compaction shall be in accordance with the DRAWINGS and Section 32.9.

32.9 COMPACTION

32.9.1 GENERAL

CONTRACTOR shall control soil compaction during construction to provide the percentage of maximum density specified. CONTRACTOR shall provide COUNTY copies of all soils test reports, prepared by a GEOTECHNICAL/SOILS ENGINEER, demonstrating compliance with these SPECIFICATIONS.

When existing trench bottom has a density less than that specified under Section 32, CONTRACTOR shall break up the trench bottom surface, pulverize, moisture-condition to the optimum moisture content and compact to required depth and percentage of maximum density.

32.9.2 PERCENTAGE OF MAXIMUM DENSITY REQUIREMENTS

Fill or undisturbed soil from the bottom of the pipe trench to one foot above the pipe shall be densified to a minimum density of 95% of the maximum dry density as determined by AASHTO T-

180.

Backfill from one foot above utility pipes to grade shall be densified to a minimum density of 95% of the maximum dry density as determined by AASHTO T-180.

Fill under and around structures, and to the extent of the excavation shall be densified to a minimum density of 95% of the maximum dry density as determined by AASHTO T-180.

32.9.3 COMPACTION TESTS

At a minimum, one compaction test location shall be required for each 300 linear feet of pipe in improved areas and for each 400 linear feet of pipe in unimproved areas and for every 100 square feet of backfill around structures. The locations of compaction tests within the trench shall be in conformance with the following schedule:

- A. One test at the spring line of the pipe.
- B. At least one test for each 12" layer of backfill within the pipe bedding zone for pipes 24 inches and larger.
- C. One test at an elevation of one foot above the top of the pipe.
- D. One test for each two feet of backfill placed from one foot above the top of the pipe to finished grade elevation.

If based on GEOTECHNICAL/SOILS ENGINEER testing reports and inspection, fill which has been placed is below specified density, CONTRACTOR shall provide additional compaction and testing prior to commencing further construction at CONTRACTOR'S expense.

32.10 GRADING

All areas within the limits of construction, including transition areas, shall be uniformly graded to produce a smooth uniform surface. Areas adjacent to structures or paved surfaces shall be graded to drain away from structures and pavement. Ponding shall be prevented. After grading, the area shall be compacted to the specified depth and percentage of maximum density.

No grading shall be done in areas where there are existing pipelines that may be uncovered or damaged until such lines have been relocated.

32.11 MAINTENANCE

CONTRACTOR shall protect newly graded areas from traffic and erosion and keep them free of trash and debris. CONTRACTOR shall repair and reestablish grades in settled, eroded and rutted areas.

Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, CONTRACTOR shall scarify surface, and reshape and compact to required density prior to further construction.

32.12 INSPECTION AND QUALITY ASSURANCE

32.12.1 INSPECTION

CONTRACTOR shall examine the areas and conditions under which excavating, filling and grading are to be performed, and not proceed with the WORK until unsatisfactory conditions have been corrected.

CONTRACTOR shall examine existing grade prior to commencement of WORK and report to COUNTY if elevations of existing grade vary from elevations shown on DRAWINGS.

32.12.2 QUALITY ASSURANCE

All work shall be performed in compliance with applicable requirements of governing authorities having jurisdiction.

CONTRACTOR, at his expense, shall engage soil testing and inspection services for quality control testing during earthwork operations. The testing and inspection service shall be subject to the approval of COUNTY.

Quality control testing shall be performed during construction to ensure compliance with these Specifications. CONTRACTOR shall require the testing service to inspect and approve fill materials and fill layers before further construction is performed. CONTRACTOR shall give five copies of all test results in a report form to INSPECTOR to demonstrate compliance with compaction requirements stipulated in this MANUAL.

END OF SECTION

SECTION 33 - BORING AND JACKING

33.1 GENERAL

The installation of a casing pipe by the method of boring and jacking shall be in accordance with these specifications. The overall work scope shall include, but not limited to, boring and jacking pits and equipment, sheeting, steel casing pipe, skid, steel straps, coatings, location signs as required, miscellaneous appurtenances to complete the entire WORK as shown on the DRAWINGS, and restoration. Applicable provisions of other Divisions in this MANUAL shall apply concurrently with these specifications. Boring and jacking operations shall be performed within the right-of-way and/or easements shown on the DRAWINGS.

33.2 PIPE MATERIAL

33.2.1 STEEL CASING

Steel casings shall be new, unused, full lengths, and shall conform to the requirements of ASTM Designation A139 (straight seam pipe only) Grade "B" with a minimum yield strength of 35,000 psi. The casing pipes shall have the minimum nominal diameter and wall thickness as shown on the following table:

CARRIER NOMINAL DIAMETER	CASING DIAMETER	WALL THICKNESS FOR COUNTY & FDOT	WALL THICKNESS FOR CSX WITH COATING	WALL THICKNESS FOR CSX WITHOUT COATING
UP TO 1"	2	0.188	0.251	0.188
UP TO 2"	4	0.188	0.251	0.188
UP TO 3"	6	0.188	0.251	0.188
UP TO 4"	8	0.25	0.251	0.188
UP TO 4"	10	0.25	0.251	0.188
UP TO 6"	12	0.25	0.251	0.188
UP TO 6"	14	0.25	0.282	0.219
UP TO 8"	16	0.25	0.282	0.219
UP TO 8"	18	0.25	0.313	0.25
UP TO 10"	20	0.25	0.344	0.281
UP TO 12"	24	0.25	0.407	0.344
UP TO 16"	30	0.312	0.469	0.406
UP TO 20"	36	0.375	0.532	0.469
UP TO 24"	42	0.5	0.563	0.5
UP TO 30"	48	0.5	0.688	0.625
OVER 30" SHALL BE SPECIALLY DESIGNED BY ENGINEER.				

Field and shop welds of the casing pipes shall conform with the American Welding Society (AWS) standard specifications. Field welds shall be complete penetration, single-bevel groove type joints. Welds shall be airtight and continuous over the entire circumference of the pipe and shall not increase the outside pipe diameter by more than 3/4-inch.

33.2.2 CARRIER PIPE

Joints of the carrier pipe shall be mechanically restrained. Restrain joints, ductile iron pipe, and

polyvinyl chloride pipe shall comply with appropriate specifications outlined in Divisions II and III.

33.2.3 INSPECTION

All casing pipe to be installed may be inspected at the site of manufacture for compliance with these SPECIFICATIONS by an independent laboratory selected and paid for by COUNTY. The manufacturer's cooperation shall be required in these inspections.

All casing pipe shall be subjected to a careful inspection prior to being installed. If the pipe fails to meet the specifications it shall be removed and replaced with a satisfactory replacement at no additional expense to COUNTY.

33.3 PIPE HANDLING

Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe shall not be dropped at all from any height. All pipe shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe or coatings shall be repaired to the satisfaction of COUNTY.

33.4 CONSTRUCTION REQUIREMENTS

33.4.1 WORK COORDINATION

It shall be the CONTRACTOR'S responsibility to perform the boring and jacking work in strict conformance with the requirements of the agency in whose right of way or easement the work is being performed. Any special requirements of the agency such as insurance, flagmen, etc., shall be strictly adhered to during the performance of WORK. The special requirements shall be performed by CONTRACTOR at no additional cost to COUNTY.

33.4.3 DEWATERING

Dewatering through the casing during construction shall not be permitted. All dewatering methods shall be approved by COUNTY before construction work begins.

33.4.4 CARRIER PIPE SUPPORT

The carrier pipes shall be supported within the casing pipes so that the pipe bells do not rest directly on the casing. The load of the carrier pipes shall be distributed along the casing by casing spacers. Casing spacers may be ratchet-on type manufactured by RACI. Casing space may also be bolt on style split shells made of either T-304 stainless steel or fusion coated steel (a minimum 0.010" thick coating of PVC shall be provided over the entire band). The shell shall be lined with a PVC liner 0.090" thick with 85-90 Durometer. All nuts and bolts shall be high strength, low alloy meeting AWWA C111. Runners shall be made of a high molecular weight polymer with inherent high abrasion resistance and a low coefficient of friction. Wooden skids are prohibited from use.

33.4.5 JACKING PITS

Excavation adjacent to the roads shall be performed in a manner to adequately support the roads. Bracing, shoring, sheeting or other supports shall be installed as needed. CONTRACTOR shall install suitable reaction blocks for the jacks as required. Jacking operations shall be continuous and precautions shall be taken to avoid interruptions which might cause the casing to "freeze" in place. Upon completion of jacking operations, the reaction blocks, braces, and all other associated construction materials shall be completely removed from the site.

Upon commencement of boring and jacking, it shall be completed without stopping except for the addition and welding of casing sections. If boring and jacking is halted while under a roadway for any other reason, then the entire casing shall be abandoned and pressure grouted with 10:1 sand-cement mix.

33.4.6 CASINGS AND SEALS

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

Correct line and grade shall be carefully maintained. Earth within the casing shall not be removed too close to the cutting edge in order to prevent the formation of voids outside the casing. If voids are formed, they shall be satisfactorily filled with grout by pumping. Over-boring of the casing by the cutter head shall not exceed 3/4-inch outside the casing diameter.

The sections of steel casing shall be field welded in accordance with the applicable portions of AWWA C206 and AWS D7.0 for field welded pipe joints. CONTRACTOR shall wire brush the welded joints and paint with Inertol Quick-Drying Primer 626 by Koppers Company or approved equal. After completion of jacking, CONTRACTOR shall clean the interior of the casing of all excess material.

The annular space between the carrier pipe and casing shall be maintained cleaned and free of any dirt, dust, debris, etc. unless required in the Bore and Jack permit.

Masonry plugs are prohibited. An elastomeric end-seal boot shall be installed at each open end of the casing and fastened tightly to the casing and carrier via stainless bands. All equipment and hardware shall be suitable for restraining the earth load.

END OF SECTION



SECTION 34 – DIRECTIONAL BORES

34.1 GENERAL

Directional bores will be allowed for pipe diameters of 4 inch to 24 inch.

The installation of a casing pipe by method of directional boring shall be in accordance with these specifications. The overall work scope shall include, but not limited to, boring pits and equipment, sheeting, casing pipe, location signs as required. Miscellaneous appurtenances to complete the entire Work, and restoration. Applicable provisions of other Divisions in this MANUAL shall apply concurrently with these specifications. Boring operations shall be performed within the right-of-way/or easements. Erosion and siltation control shall meet the requirements of Polk County Ordinance 93-06, latest edition.

34.2 PIPE MATERIAL

34.2.1 POLYETHYLENE PIPE

All polyethylene pipe of nominal diameter, four inches (4”) through twenty-four inches (24”), shall be manufactured in accordance with AWWA Standard C906, latest edition. The minimum requirements are a pipe of high density polyethylene (HDPE) with a dimension ratio (DR) of 11, with a minimum working pressure rating of 160 psi. The pipe shall have the same outside diameter as PVC C900 or ductile iron pipe. Driscopipe, 4000 series, ductile pipe sizes, DR 11, is approved for use in installation of pipe of four inches (4”) through twenty-four inches (24”).

The minimum requirements are a pipe of high density polyethylene (HDPE) with a dimension ratio (DR) of 11, with a minimum working pressure rating of 160 psi. The pipe shall have the same outside diameter as PVC C900 or ductile iron pipe.

All polyethylene pipe shall be new and unused, of the best quality available as specified herein; free of cracks, holes, pitting; and true to shape, form and dimension.

Color coding of the pipe shall meet the specifications of the appropriate sections of the MANUAL for the material to be transported.

34.2.2 INSPECTION

All polyethylene pipe to be installed may be inspected at the site of manufacture for compliance with these Specifications by an independent laboratory selected and paid for by County. The manufacturer’s cooperation shall be required in these inspections.

All polyethylene pipe shall be subjected to a careful inspection prior to being installed. If the pipe fails to meet the specifications it shall be removed and replaced with a satisfactory replacement at no additional expense to County.

34.3 PIPE HANDLING

Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe shall not be dropped at all from any height. All pipe shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe or coatings shall be repaired to the satisfaction of County.

34.4 CONSTRUCTION REQUIREMENTS

34.4.1 WORK COORDINATION

It shall be the CONTRACTORS responsibility to perform the boring work in strict conformance with the requirements of the agency in whose right of way or easement the work is being performed. Any special requirements of the agency such as insurance, flagmen, etc., shall be strictly adhered to during the performance of WORK. The special requirements shall be

performed by CONTRACTOR at no additional cost to COUNTY.

34.4.2 BORING OPERATION

Excavation adjacent to the roads shall be performed in a manner to adequately support the roads. Bracing, shoring, sheeting or other supports shall be installed as needed. Boring operations shall be continuous and precautions shall be taken to avoid interruptions that might cause the casing to “freeze” in place. Upon completion of boring operations associated construction materials, including drilling fluids, shall be completely removed from the site and disposed of properly,

Upon commencement of boring, it shall be completed without stopping except for the addition and welding of casing sections. If boring is halted while under a roadway for any other reason, then the entire casing shall be abandoned and pressure grouted with 10:1 sand-cement mix.

After the completion of the boring, all ends shall be provided with a temporary cap.

Present testing of HDPE pipe used as casing or carrier pipe shall be pressure tested as recommended by the pipe manufacturer.

34.4.3 CASING AND SEALS

Correct line and grade shall be carefully maintained. Earth within the casing shall not be removed too close to the cutting edge in order to prevent the formation of voids outside the casing. If voids are formed, they shall be satisfactorily filled with grout by pumping.

The installation shall produce no upheaval, settlement, cracking, movement or destruction of the existing roadbed, ditches, railroad bed or other facilities in the vicinity of the bore location. Any damage caused by the boring operation shall be corrected by the CONTRACTOR, at no additional cost to the COUNTY. If the final grade of the finished bore is not satisfactory to the COUNTY or other jurisdictional entity, the casing shall be abandoned, pressure grouted full in place and an alternate installation made, at no additional cost the COUNTY.

A minimum cover of six feet (6”) shall be provided over the entire casing.

END OF SECTION

SECTION 35 - PRESSURE PIPE RESTRAINT

35.1 GENERAL

Pressure pipe fittings and other items requiring restraint shall be restrained using restraining assemblies all as specified in Section 34 herein. Use of thrust blocks, precast or cast-in-place is strictly prohibited.

For all pressure pipe and fittings, restraining shall follow the criteria established herein.

35.2 THRUST PROTECTION SYSTEM

All fittings shall be restrained by the use of mechanical joint restraining devices and a precast thrust block. The mechanical joint restraining device shall be as specified below.

35.3 RESTRAINED JOINT CONSTRUCTION

Sections of piping requiring restrained joints shall be constructed using pipe and fittings with restrained "locked-type" joints manufactured by the pipe and/or fitting manufacturer, and the joints shall be capable of holding against withdrawal for line pressures at least 50 percent above the normal working pressure. Any restrained joints that allow for elongation upon pressurization will not be allowed in those locations where pipe comes above ground. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1. Restrained pipe joints that achieve restraint by incorporating cut out sections in the wall of the pipe shall have a minimum wall thickness at the point of cut out that corresponds with the minimum specified wall thickness for the rest of the pipe.

The minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe shall be determined from the length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil.

The required lengths of restrained joint pipe shall be determined by calculations based on the method outlined in the publication entitled "Thrust Restraint Design for Ductile Iron Pipe", latest edition, published by Ductile Iron Pipe Research Association, Birmingham, AL 35244. This shall apply to PVC pipe.

Wherever two 45° bends are used in place of 90° bend and the minimum restrained joints required from one 45° bend extend beyond the other 45° bend, the two 45° bends will be considered as though a 90° bend were located midway between the two 45° bends.

MINIMUM PIPE LENGTH, IN FEET, TO BE RESTRAINED ON EACH SIDE OF THE FITTING					
PIPE SIZE	4"	6"	8"	10"	12"
90° BEND	40	54	70	85	100
45° BEND	20	23	29	35	40
22.5° BEND	8	11	14	17	20
11.25° BEND	4	6	7	9	10

35.4 MECHANICAL RESTRAINING DEVICES

35.4.1 GENERAL

Mechanical Restraining Devices as specified herein may be substituted for the restrained "locked-type" joints manufactured by the ductile iron pipe and fitting manufacturer.

35.4.2 JOINT RESTRAINT DEVICE

Two types of joint restraint devices are approved for use on PVC and DIP. One is the "Mega-Lug" device and the other is the "MJR" device. Restraining glands are approved for use on DIP

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

only.

Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple or continuous wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN.

For Mega-Lug restraints, dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI A21.11 and ANSI/AWWA C153/A21.53. Twist-off nuts shall be used to ensure proper actuating of the restraining devices.

The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1.

END OF SECTION

SECTION 36 - PRESSURE SYSTEM CONNECTIONS

36.1 GENERAL

Installations of pressure connections 4" and larger shall be made in accordance with this section.

36.2 TAPPING SLEEVES

36.2.1 GENERAL

Tapping sleeves shall be mechanical joint sleeves or fabricated steel sleeves as specified below. All pressure connections to asbestos cement pipe and all "size on size" taps shall utilize mechanical joint sleeves.

36.2.2 MECHANICAL JOINT SLEEVES

Sleeves shall be cast of gray-iron or ductile iron and have an outlet flange with the dimensions of the Class 125 flanges shown in ANSI B16.1 properly recessed for tapping valve. Glands shall be gray-iron or ductile iron. Gaskets shall be vulcanized natural or synthetic rubber. Bolts and nuts shall comply with ANSI/AWWA C111/A21.11. Sleeves shall be capable of withstanding a 200 psi working pressure or the pipe rated working pressure, whichever is greater.

36.2.3 STEEL TAPPING SLEEVES

Sleeves shall be fabricated of minimum 3/8" carbon steel meeting ASTM A285 Grade C. Outlet flange shall meet AWWA C-207, Class "D" ANSI 150 lb. drilling and be properly recessed for the tapping valve. Bolts and nuts shall be high strength low alloy steel to AWWA C111 (ANSI A21.11). Gasket shall be vulcanized natural or synthetic rubber. Sleeve shall have manufacturer applied fusion bonded epoxy coating, minimum 12 mil thickness.

36.2.4 TAPPING VALVES

Tapping valves shall meet the requirements of Section 52.2 except that units shall be flange by mechanical joint ends. Valves shall be compatible with tapping sleeves as specified above and specifically designed for pressure connection operations.

36.3 NOTIFICATION AND CONNECTION TO EXISTING MAINS

All connections, regardless of new or existing pipe size, to existing mains shall be made by CONTRACTOR only after the connection procedure and his work scheduling has been reviewed and approved by COUNTY. CONTRACTOR shall submit a written request to COUNTY a minimum of five working days prior to scheduling said connections. The request shall outline the following:

- A. Points of connection, fittings to be used, and method of flushing and disinfection if applicable.
- B. Estimated construction time for said connections.

COUNTY shall review the submittal within three working days after receiving it and inform CONTRACTOR regarding approval or denial of his request. If his request is rejected by COUNTY, CONTRACTOR shall resubmit his request modifying it in a manner acceptable to COUNTY.

All connections shall only be made on the agreed upon date and time. If CONTRACTOR does not initiate and complete the connection work in the agreed upon manner, CONTRACTOR shall be required to reschedule the said connection by following the procedure outlined above.

CONTRACTOR shall not operate any valves in or connected to an existing system.

36.4 INSTALLATION

36.4.1 EXCAVATION, BACKFILL, COMPACTION AND GRADING

Applicable provisions of this Division shall apply.

36.4.2 CONSTRUCTION DETAILS

Sufficient length of main shall be exposed to allow for installation of the tapping sleeve and valve and the operation of the tapping machinery. The main shall be supported on concrete pedestals or bedding rock at sufficient intervals to properly carry its own weight, plus the weight of the tapping sleeve valve and machinery. Any damage to the main due to improper or insufficient supports shall be repaired at the CONTRACTOR'S expense.

The inside of the tapping sleeve and valve, the outside of the main, and the tapping machine shall be cleaned and swabbed or sprayed with 10% liquid chlorine prior to beginning installation for water system pressure connections.

After the tapping sleeve has been mounted on the main, the tapping valve shall be bolted to the outlet flange, making a pressure tight connection. Prior to beginning the tapping operation, the sleeve and valve shall be pressure tested at 150 psi to ensure that no leakage will occur.

For pressure connections through 12" diameter or less the minimum diameter cut shall be 1/2" less than the nominal diameter of the pipe to be attached. For 14" through 20" installations the minimum diameter shall be 1-1/2" less; for larger taps the allowable minimum diameter shall be 2" to 3" less than the nominal diameter of the pipe being attached. After the tapping procedure is complete CONTRACTOR shall submit the coupon to COUNTY.

Adequate restrained joint fittings shall be provided to prevent movement of the installation when test pressure is applied. Provisions of this Division shall apply.

END OF SECTION

SECTION 37 - PRESSURE SYSTEM TESTING

37.1 GENERAL

All pressure systems shall be hydrostatically tested in accordance with this section to ensure system integrity.

37.2 HYDROSTATIC TESTS

37.2.1 GENERAL

Hydrostatic tests shall consist of pressure test and leakage test. Hydrostatic tests shall be conducted on all newly laid pressure pipes, joints and valves including all service lines to the curb stops. Air testing of pressure pipes will not be permitted under any circumstance. Tests may be made on sections not exceeding 2,000 feet. CONTRACTOR shall furnish all necessary equipment and material, make all taps, and furnish all closure pieces in the pipe as required. Equipment to be furnished by CONTRACTOR shall include graduated containers, pressure gauges, hydraulic force pumps, and suitable hoses and piping. COUNTY will monitor and approve a satisfactory test.

CONTRACTOR may conduct hydrostatic tests after the trench has been partially backfilled with the joints left exposed for inspection for his informational purposes only. The hydrostatic tests for acceptance shall only be conducted after the trenches have been completely backfilled and compacted as specified.

37.2.2 TESTING CRITERIA

All pipe sections to be pressure tested shall be subjected to a hydrostatic pressure of not less than 150 psi. The duration of each pressure test shall be for a period of not less than 2 hours. If during the test, the integrity of the tested line is in question, COUNTY may require a 6 hour pressure test. The basic provisions of AWWA C-600, latest revision shall be applicable.

37.2.3 PROCEDURE FOR PRESSURE TEST

Each section of pipe to be tested, as determined by COUNTY, shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, and appropriate valves installed to ensure bleeding of all air from the main. All such tapping and valving shall be indicated so on the record drawings. If defective pipes, fittings, valves, or hydrants are discovered in consequence of this pressure test, all such items shall be removed and replaced by CONTRACTOR with sound material and the test shall be repeated until satisfactory results are obtained. Provisions of AWWA C600, where applicable, shall apply.

37.2.4 PROCEDURE FOR LEAKAGE TEST

After completion of the pressure test, a leakage test shall be conducted to determine the quantity of water lost by leakage under the specified test pressure. Applicable provisions of AWWA C600 shall apply.

Allowable leakage in gallons per hour for pipeline shall not be greater than that determined by the formula listed below:

For ductile iron pipe the leakage shall not exceed the following:

$$L = \frac{SD (P)^{1/2}}{133,200}$$

Where: L = Allowable leakage in gallons per hour



*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

S = Length of the force main tested in feet
 D = The nominal diameter of the pipe in inches
 P = Average test pressure in psi gauge

For a 2-hour test at 150 psi, the equation above simplifies to:

$$L = SD \times 0.000184$$

For PVC pipe the leakage shall not exceed the following:

$$L = \frac{ND (P)^{1/2}}{7,400}$$

L = Maximum allowable leakage, gallons per hour;
 N = Number of joints in the tested line;
 D = Nominal diameter of the pipe, inches;
 P = Test gauge pressure, pounds per square inch.

For a 2-hour test at 150 psi, the equation above simplifies to:

$$L=ND \times 0.00331.$$

For HDPE pipe, test pressure shall not exceed 1.5 times the rated operating pressure of the pipe at the lowest point in the section under testing, or the lowest rated component in the system. The initial pressure test shall be applied and allowed to stand without make-up pressure for a minimum of 2 hours in order to allow for diametric expansion of the pipe. After this time, the final test pressure shall be held for a minimum of 1 hour. Under no circumstances shall the total test time exceed four (4) hours. Allowable amounts of make-up water for pipe expansion under the test pressure are as follows:

Nominal Pipe Size (in)	Gallons/100 ft. of Pipe		
	1 Hour Test	2 Hour Test	3 Hour Test
3	0.10	0.15	0.25
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.00	1.50
10	0.75	1.30	2.10
12	1.10	2.30	3.40
14	1.40	2.80	4.20
16	1.70	3.30	5.00

Leakage is defined as the quantity of water to be supplied in the newly laid system or any valved section under test, which is necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled. Should any test of system laid disclose leakage greater than that allowed, CONTRACTOR shall locate and replace or repair the defective joints, pipe or valve until the leakage from subsequent testing is within the specified allowance.

END OF SECTION

SECTION 38 - PRESSURE SYSTEM CLEANING

38.1 GENERAL

All pressure systems shall be cleaned in accordance with this section to ensure system performance integrity.

38.2 FINAL CLEANING

Prior to disinfection of potable systems, final inspection and acceptance of any system by COUNTY, CONTRACTOR shall clean all parts of the system. Cleaning and flushing shall remove all accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the system. The cleaning procedure shall be conducted in multiple "pigging" operations of the system. Between successive operations, the pig diameter shall increase and the pig material shall stiffen. The cleaning procedures shall conform to the poly pig manufacturer's recommendations and shall continue until clear water is realized from the cleaned system.

Clean water shall be used to propel the poly pig. Care shall be taken to protect fire hoses and other equipment used in the cleaning process. CONTRACTOR shall dispose of water discharged at the retrieval point to avoid flooding, washouts and other nuisance problems that may occur. This procedure will be repeated as often as necessary to thoroughly clean all sand and debris from the water main.

Upon COUNTY's final inspection of the pressure systems, if any foreign matter is still present in the system, CONTRACTOR shall clean the sections and portions of the system as required.

All taps, fittings, and appurtenances required for cleaning and flushing purposes, and for temporary or permanent release of air shall be provided for by CONTRACTOR as a part of the construction of systems and shall be so indicated on the record drawings. After cleaning all such taps, fittings, and appurtenances shall be sealed to the satisfaction of COUNTY.

38.2.1 PURPOSE

The purpose of the cleaning procedure is to provide a safe and effective means to remove from newly installed or constructed systems any foreign material, construction debris, hindrances to its performance, or threats to its sanitation, or other similar items which can be found in systems not properly and sufficiently cleaned.

Foreign material and construction debris can include such items as tools, fittings, lumber, stones, rock, sand, etc., which can be inadvertently, carelessly, or maliciously left or insert into a system during the many phases of its construction and in turn pose a realistic and serious threat to the proper functioning of the system if this material is allowed to remain in the system.

The threats to proper operation, safe sanitation, and performance of a system can and do include such diverse elements as oily rags, oxidized surfaces, contaminated fluids, garbage, welding scale, human refuse, mud, silt, gravel, small animals, insects, etc., which either find their way into a system or are not properly prevented from entering the system while it is being installed. These and other comparable items can negate the attempts of the installer to sanitize the system once it has been prepared for service and adversely impact system performance and operation. Therefore, it is required that a system be cleaned prior to its being put into service to remove potentially mechanically hazardous material and any real or potential threats to the effective sanitation of a system.

38.2.2 POLY PIGS

Pigs shall be blown elastomer polyurethane with open cell-type construction having a material density suitable for use within the system to be cleaned. Pigs shall have a parabolic nose, crisscross coated with a resilient peripheral surface that engages the inner cylindrical wall of the pipe to maintain a sliding seal.

When in use, the pig must be able to undergo a reduction to a minimum of sixty-five percent (65%) of the original cross-sectional area and return to shape while maintaining the sliding seal and ability to clean. Pigs shall be bi-directional and have the ability to negotiate fittings, valves, and other appurtenances. The pig cover material shall be such that it effectively scours and cleans the inside of the pipe without damage to the pipe liner or wall.

Poly pigs shall be as manufactured by Knapp Poly Pig, Houston, Texas, or equivalent.

38.2.3 POLY PIG ELECTRONIC DETECTOR

CONTRACTOR shall maintain on-site for the duration of the pigging operation ready and available an electronic poly pig detector with the appropriately sized cavity poly pig for use in the system being cleaned to provide a means of tracking the passage of the pig in the system to locate areas of potential or suspected blockage and to find lost valves and other disparities within the system.

38.2.4 LAUNCHING AND RETRIEVAL STATIONS

Launching and retrieval stations shall be fabricated, designed, and manufactured in accordance with ANSI standards and capable of withstanding working pressures to 150 psig. Launching and receiving tubes shall be fabricated of steel pipe sized one diameter larger than the system to which it will be attached with a minimum length of 2.5 times the diameter. For stations 12 inches or smaller in diameter, steel wall thickness shall be a minimum of 5/16". For stations larger than 12 inches, steel wall thickness shall be a minimum of 3/8".

38.2.5 METHOD

The cleaning of the piping system shall be accomplished by the controlled pressurized passage through the system of a series of hydraulic or pneumatic polyurethane plugs of varying dimensions, coatings, and densities — poly pigs.

- A. The dimensions, coatings, and densities of these poly pigs shall be determined by:
 - 1. characteristics of the system to be cleaned;
 - 2. recommendation of ENGINEER;
 - 3. recommendation of the poly pig manufacturer.
- B. A series of predetermined poly pigs shall be launched into the system at the beginning of the system. The launching station shall take the form of a size-on-size tee installed on the main.
- C. The poly pigs shall be launched into the system by the use of a pig launching station. This launching station shall allow the following:
 - 1. introduction of pigs into system providing means to induce flow from an external source, independent of the flows and pressure immediately available from the system, on the back of the pig to develop sufficient pressure to force the pig through the system;
 - 2. means to control and regulate this flow;
 - 3. means to monitor the flows and pressure introduced into the system;
 - 4. means to connect to and subsequently be disconnected from the system without any mechanical disruption of the operation ability of system.
- D. The poly pigs shall be discharged or retrieved from the end of the system. The retrieval station shall take the form of a size-on-size tee installed on the main.
- E. The retrieval station shall trap poly pigs but will allow for the passage or discharge of flow used for propelling the pig through the system. The retrieval station will allow for:
 - 1. discharge of poly pigs from system by providing means to control the flow at this

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

- point so the pig must enter the trap;
- 2. means to control and regulate flow;
- 3. means to monitor flows and pressures in the system at this point;
- 4. means to connect to and subsequently disconnect from the system without any mechanical disruption of the operational ability of the system.

F. CONTRACTOR shall maintain or provide during the entire pigging operation:

- 1. constant surveillance of system and immediately report to COUNTY any deviation from established pigging procedures, any in-line problems or malfunctions encountered or discovered by passage of pigs through the system;
- 2. record of pigs, pig sizes, pig styles, pig material, pig manufacturer, and other pertinent information about the pigging operation and system.

G. CONTRACTOR must demonstrate to the satisfaction of COUNTY that the work will be performed by an experienced and knowledgeable superintendent and personnel who have properly, safely, and effectively cleaned comparable systems in similar applications. The personnel shall be required to provide acceptable procedures, prior to initiation of work, that will clearly illustrate they are capable and have the means on hand to resolve potential or real problems that may occur in conjunction with pigging of the system. CONTRACTOR shall provide evidence of qualification by providing copies of his/her state license or certification to perform such work as described herein.

END OF SECTION



SECTION 39 - DISINFECTION OF WATER SYSTEMS

39.1 GENERAL

All potable water and reclaimed water systems shall be disinfected in accordance with this section to ensure water quality to end users.

39.2 DISINFECTION OF WATER SYSTEMS

39.2.1 GENERAL

Before being placed in service, all new water systems shall be chlorinated in accordance with the specifications below and the procedures outline in AWWA C-651, latest revision "Standard Procedure for Disinfecting Water Mains". Systems shall be cleaned prior to disinfection.

All taps, fittings, and appurtenances required for chlorination, cleaning, and flushing purposes, and for temporary or permanent release of air shall be provided for by CONTRACTOR as a part of the construction of water systems. After cleaning all such taps, fittings, and appurtenances shall be sealed so as not to cause contamination to the system and to the satisfaction of COUNTY. This shall be done prior to disinfection and bacteriological sampling of the system. After disinfection and satisfactory bacteriological test results have been received, all such taps used for sampling purposes shall be sealed so as not to cause contamination to the system and to the satisfaction of COUNTY.

39.2.2 DISINFECTION CRITERIA

Before being placed into service, all new systems and repaired portions of, or extensions to existing systems shall be chlorinated so that the initial chlorine residual is not less than 50 mg/l and that a chlorine residual of not less than 25 mg/l remains in the water after standing 24 hours in the pipe.

39.2.3 FORM OF APPLIED CHLORINE

Chlorine may be applied as a liquid chlorine (gas-water mixture), or a mixture of water and high-test calcium hypochlorite. CONTRACTOR shall assume responsibility for safe handling of chlorine and shall meet requirements of OSHA and other regulatory agencies for safe handling of chlorine.

39.2.4 POINT OF APPLICATION

The preferred point of application of the chlorinating agent is at the beginning of the water system extension or any valved section of it, and through a corporation stop inserted in the pipe. The water injector for delivering the chlorine-bearing water into the system shall be supplied from a the construction meter installed by COUNTY at CONTRACTOR'S expense.

39.2.5 OPERATION OF COUNTY VALVES

Valves on existing systems shall be operated by COUNTY personnel only.

39.2.6 RETENTION PERIOD

Treated water shall be retained in the pipe at least 24 hours. After this period, the chlorine residual at system extremities and at other representative points shall be at least 25 mg/l.

39.2.7 CHLORINATING VALVES AND HYDRANTS

In the process of chlorinating a newly constructed system, all valves or other appurtenances shall be operated while the system is filled with the chlorinating agent and under normal operating pressure.

39.2.8 FINAL FLUSHING AND TESTING

Following chlorination, all treated water shall be thoroughly flushed from the newly constructed

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

system at its extremity until the replacement water throughout its lengths shows upon test, a free chlorine residual not in excess of that normally carried in the system.

After flushing, water samples collected on 2 successive days from the treated system shall show acceptable bacteriological results. All bacteriological testing shall be performed at CONTRACTOR'S expense by a laboratory certified by the State of Florida.

Proper chain of custody procedures must be followed and samples shall only be collected by certified laboratory personnel in the presence of COUNTY personnel. Copies of testing results and all related correspondence with the FDEP shall be submitted to COUNTY.

39.2.9 REPETITION OF FLUSHING AND TESTING

Should the initial treatment result in an unsatisfactory bacterial test, the original chlorination procedure shall be repeated by CONTRACTOR until satisfactory results are obtained.

END OF SECTION

