DIVISION II
DESIGN STANDARDS

SECTION 23

WATER MAINS

23. 1 GENERAL

23. 1. 1 APPROVAL

The CITY will approve PLANS for water supply mains and extensions only when such mains are designed and constructed in accordance with the criteria set forth in this MANUAL.

23. 1. 2 DESIGN PERIOD

Water mains should be designed for the estimated ultimate tributary population, as delineated in the approved City of Sanford Comprehensive Plan (latest edition). Water systems shall be designed to satisfy the domestic water demand and fire protection requirements for the area.

23. 1. 3 LOCATION

Water mains shall be located within dedicated rights-of-way, alleys, or established utility easements with sufficient width. Where this is not possible, a minimum of a twenty (20) foot wide CITY SERVICES EASEMENT shall be provided. If a water main is located outside and adjacent to an existing or at least a sixty (60) percent designed road right-of-way, a minimum of a fifteen (15) foot CITY SERVICES EASEMENT shall be provided. Additional easement widths shall be provided if the pipe size or depth of cover so dictates. In general, the additional width of the easement shall be calculated by adding fifteen (15) feet to the facility's greatest depth and rounding up to the nearest even whole foot.

No mains shall be placed under buildings, retention ponds, tennis courts, swimming pools, or other structures. Unless approved in writing by the DIRECTOR, mains shall not be located within side or rear lot lines. Placement of mains within side or rear lot line may be allowed on a case by case basis if such a configuration results in efficient placement and utilization of the system. This criteria shall also apply to placement of mains in retention pond berms. In general, air release valves and other valves shall not be placed on side or rear lot lines.

DIVISION II
DESIGN STANDARDS
23. 2 DESIGN BASIS

23. 2. 1 AVERAGE DAILY FLOW AND PEAK FLOWS

Average daily water flow shall be calculated by CITY approved methods. Maximum daily and peak hourly water flow rates shall be calculated by CITY approved peaking factors.

23. 2. 2 FIRE FLOW REQUIREMENTS

Fire flow requirements shall be a minimum of 600 gallons per minute for single family and duplex residential areas and 1250 gallons per minute for nonresidential and multiple family residential area. Where fire flow requirements exceed the anticipated available fire flow from the central water system, on-site fire protection system, or other Fire Department approved mitigation measures shall be utilized.

23. 2. 3 DESIGN CALCULATIONS

DEVELOPER's ENGINEER shall submit signed, sealed and dated design calculations with the PLANS for all water distribution projects. Calculation shall show the water mains will have sufficient hydraulic capacity to transport peak hourly flows and the combination of maximum daily flows and fire flows while meeting the requirements of Section 23.3.1. Head losses through meters and backflow devices shall also be included in calculations.

23. 3 DESIGN AND CONSTRUCTION

23. 2. 1 PRESSURE

All water mains shall be designed in accordance with Section 23.2.3 above. A minimum pressure of 20 psi at all points shall be maintained in the distribution system under all conditions of flow. Higher pressures may be required at commercial, industrial, and high density residential areas. The normal working pressure in the distribution system should be approximately 60 psi, but in no case less than 35 psi on the downstream side of a meter. For pressures greater than 90 psi, special provisions may be required. Design Friction Losses for water mains shall be as specified in Section 21.3.2.

23. 3. 2 DIAMETER

Four (4) inch water mains shall be permitted only in cul-de-sacs with a maximum length of 500 feet of pipe. In cul-de-sacs, the water main shall be looped to prevent dead ends.

As a minimum, six (6) inch looped systems shall be required in single family and duplex residential areas. Where the looping of mains back to existing CITY facilities is not practical, a minimum of an eight (8) inch main shall be required, unless detailed calculations are submitted to substantiate the sufficiency of the smaller main.

In nonresidential and multiple family residential areas, a minimum of an eight (8) inch looped main shall be required. Where the looping of mains back to existing CITY facilities is not practical, a minimum of a ten (10) inch main shall be required, unless detailed calculations are submitted to subtaintiate the sufficiency of the smaller main.

Larger size mains shall be required if necessary to allow the withdrawal of the required fire flow while maintaining the minimum residual pressure specified in Section 23.3.1.

23. 3. 3 FIRE HYDRANT LOCATION AND SPACING

The maximum actual travel distance between hydrants in single family and duplex residential areas shall be eight hundred (800) feet and the maximum actual travel distance between the principal building and a hydrant shall be four hundred (400) feet. The maximum actual travel distance between hydrants in nonresidential and multiple family residential areas shall be five hundred (500) feet and the maximum actual travel distance between the principal building and a hydrant shall be two hundred and fifty (250) feet. Hydrants to be maintained by the CITY shall be lime-yellow in color and red for those that are to remain under private ownership.

23. 3. 4 DEAD ENDS

In order to provide increased reliability of service and reduce head loss, dead ends shall be minimized by making appropriate tie-ins whenever practical, as determined by the CITY. Mains in cul-de-sacs shall be looped as detailed in the STANDARD DRAWINGS.

Where dead-end mains occur, they shall be provided with a fire hydrant or with an approved flushing hydrant or blow-off for flushing purposes. Flushing devices shall be sized to provide flows which will give a velocity of at least 2.5 feet per second in the water main being flushed. No flushing device shall be directly connected to any sanitary or storm sewer.

23. 3. 5 VALVES

Sufficient valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs. Valves shall be located at not more than 500 foot intervals in

nonresidential and multiple family residential areas and not more than 1000 foot intervals in all other areas. Appropriate valving shall also be provided at all areas where water mains intersect to ensure effective isolation of water lines for repair, maintenance or future extension. As a minimum, valves shall be placed
on at least two of the three legs of a tee or three of the four legs of a cross.

23. 3. 6 SEPARATION OF WATER MAINS AND SEWERS

Refer to Section 51.3 of these specifications for applicable requirements. No water pipe shall pass through or come in contact with any part of a sanitary or storm sewer manhole.

Extreme caution should be exercised when locating water mains at or near certain sites such as sewage treatment plants or industrial complexes. Individual septic tanks must be located and avoided.

Separation standards set forth by the Florida Department of Environmental Protection shall be complied with.

23. 3. 7 SURFACE WATER CROSSINGS

The CITY shall be consulted before final PLANS are prepared. Requirements outlined in Sections 21.3.6 and 21.3.7 shall apply. All above ground pipe shall be painted as specified in Section 50.4.4 for water mains.

23. 3. 8 AIR RELIEF VALVES

At high points in water mains where air can accumulate, provisions shall be made to remove the air by means of hydrants or automatic air relief valves. Automatic air relief valves shall not be used in situations where flooding of the manhole or chamber may occur. See details in STANDARD DRAWINGS.

23. 3. 9 CHAMBER DRAINAGE

Chambers, pits, or manholes containing air relief valves, blow-offs, meters, or other appurtenances to a distribution system shall not be connected directly to any storm drain or sanitary sewer.

23. 4 WATER SERVICES AND CONNECTIONS

Water services and connections shall conform to the applicable provisions of Sections 50 and 51 and the STANDARD DRAWINGS. Services shall be minimum of one (1) inch in diameter. Where open cutting of a roadway or driveway is not necessary, water services and connections up to two (2) inches shall be made to an existing CITY system by the CITY after payment of all applicable fees and charges, unless the CITY instructs the CONTRACTOR to do so. Services and connections larger than two (2) inches to new and existing water systems, or those installations which require the open cutting of a roadway or driveway, shall be made by the CONTRACTOR and inspected by the CITY. The CONTRACTOR shall be responsible for all costs related to the installation and the restoration of all disturbed public and private improvements to CITY standards.

23. 5 WATER METERING

23. 5. 1 GENERAL

All water service connections shall be metered. In general, the method of metering will follow the guidelines listed below. However, the DEVELOPER's ENGINEER must obtain approval before finalizing the design of the metering system. All meters subject to vehicular traffic shall be installed in a traffic rated meter box. Unless approved by the DIRECTOR, meter boxes shall not be installed in sidewalks or driveways.

23. 5. 2 SINGLE FAMILY, DUPLEX, AND MULTI-FAMILY SUBDIVISIONS WITH PUBLIC RIGHTS OF WAY

Each unit shall be individually metered. Meters shall be installed at the property line within the right-of-way in individual single meter boxes as indicated by the STANDARD DRAWINGS.

23. 5. 3 SINGLE FAMILY AND DUPLEX SUBDIVISIONS WITH PRIVATE STREETS

Individual meters may be permitted in accordance with Section 23.5.2 if the private streets are designed to CITY standards and easements are dedicated over the entire private street common areas. In addition, sufficient area must be available outside of paved areas to locate water mains, services, and meters. If the above criteria cannot be met, the subdivision shall be metered pursuant to Section 23.5.5.

23. 5. 4 COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL PROJECTS WITHOUT PRIVATE FIRE LINES

Buildings shall be individually metered when adjacent to a public right-of-way. Meter(s) shall be located in the public rights-of-way at the property line. Developments with multiple buildings and/or units shall be master metered unless otherwise approved by the DIRECTOR.

23. 5. 5 COMMERCIAL, INDUSTRIAL, INSTITUTIONAL, MULTI-FAMILY WITH PRIVATE STREETS, APARTMENTS, AND CONDOMINIUM PROJECTS WITH PRIVATE FIRE LINES

In general, all such projects shall require installation of a fire line master meter. A combination meter with a fire flow bypass and double check valve assembly, as a minimum, shall be required as determined by the CITY. Where on-site fire systems contain less than 250 feet of main, a dual system (separate domestic and fire lines) may be considered.

23. 5. 6 SHOPPING CENTERS

In general, shopping centers and associated outparcels shall require installation of a fire line master meter to service the entire development. In extreme cases, individual meters to each unit may be considered on a case-by-case basis subject to the DEVELOPER executing a Meter Installation and Easement Agreement.

23. 5. 7 METER INSTALLATION

All meters will be installed by the DEVELOPER. Installation of meters two inches and smaller may be done by the CITY in extreme cases. All meters two inches or smaller in size will be installed underground in an approved meter box. Meters that are three inches and larger shall be installed above ground. In general, meters three inches or larger shall be located in an easement located adjacent to but outside of the public right of way.

The DEVELOPER'S ENGINEER shall coordinate the location of each water service line and meter so as to avoid conflicts or potentially dangerous situations with electrical transformers or street light installations. Electrical transformers shall not be located over water service lines.

23. 5. 8 METER SIZING

The size of all meters shall be recommended by the DEVELOPER'S ENGINEER and approved by the DIRECTOR. The DEVELOPER's ENGINEER shall provide sufficient information, when requested by the DIRECTOR, on estimated peak flows and low flows so that meter size can be verified. The DEVELOPER's ENGINEER shall include head losses through metering device when designing the water system.

23. 6 MATERIAL, INSTALLATION, AND TESTING

Applicable provisions of Division III, IV, and V shall apply.

23. 7 LOCATION AND IDENTIFICATION

All lettering shall be legible and colors correct for the intended use. See STANDARD DRAWINGS.