

RESOLUTION NUMBER 2019-033R

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ST. CLOUD, FLORIDA AMENDING AND READOPTING RESOLUTION NO. 2012-079R, "CONSTRUCTION AND DESIGN STANDARDS FOR PAVEMENT AND DRAINAGE SYSTEMS" FOR ARTICLE VI AND "UTILITIES" FOR ARTICLE VII AS PROVIDED FOR IN ORDINANCE NO. 2014-26 PROVIDING FOR SEVERABILITY, CONFLICT, AND AN EFFECTIVE DATE.

WHEREAS, the City wishes to amend and readopt the Standard Details associated with Article VI, Construction and Design Standards for Pavement and Drainage Systems and Article VII, Utilities, as more particularly described herein, and provided for in Ordinance 2014-26,

WHEREAS, the City Council of the City of St. Cloud, Florida has determined that the amendment is in the best interest of the City of St. Cloud, and

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ST CLOUD, FLORIDA, as follows:

SECTION I. The City Council of the City of St. Cloud readopts the Standard Details associated with Article VI and VII as more particularly described in "Attachment A", attached hereto and incorporated by reference.

SECTION II. Copies of this resolution shall be kept on file in the City Manager's and the Public Services Department, respectively.

SECTION III. The City Engineer shall update the standard detail sheets from time to time as provided herein.

SECTION IV: Article VI, Construction and Design Standards for Pavement and Drainage Systems, and Article VII, Utilities, as provided for in Ordinance 2014-26, is hereby repealed and replaced in its entirety.

DIVISION 1 GENERAL REQUIREMENTS

6.1.1 GENERAL

The procedures, specifications, and standards set forth herein are to assure uniformity and quality in the construction of pavement and drainage systems, which meet one or more of the following criteria:

- a. facilities to be constructed within the corporate limits of the City of St. Cloud; and/or,
- b. facilities to be dedicated to the City for ownership.

All lands included within the development shall be suitable for the various purposes proposed in the request for development approval and shall not be subject to flooding, poor drainage, erosion or other conditions detrimental to the health, safety, and general

welfare of the public. Further, no development plan shall be approved unless the Planning Board and/or City Council finds, after full consideration of all pertinent data, that the development can be served adequately with such normal public facilities and services as are suitable in the circumstances of the particular case.

A professional engineer registered in the State of Florida and qualified by virtue of training and experience to practice the engineering disciplines involved will be employed to design all required improvements such as streets, drainage structures, bridges, and bulkheads, and to provide such professional services during construction as is generally considered to be part of a complete engineering service. All plans for improvements shall be prepared by such engineer and approved by all appropriate regulatory agencies including, but not limited to, the Development Review Committee (D.R.C.), City Manager, and, if applicable, the City Council, prior to commencement of construction. Refer to Article VII for the Design and Construction Standards and Specifications for Water, Wastewater, and Reclaimed Water Systems.

6.1.2 ADOPTION OF SPECIFIC CONSTRUCTION AND DESIGN STANDARDS AND CONFORMANCE WITH CITY POLICY

a. The City Council shall by duly adopted resolution implement specific construction and design standards that shall be applicable and govern development within the City. To the extent of conflict between this resolution as may be amended and any resolution adopted pursuant to this section, the terms and conditions of this resolution shall control.

b. In addition to the foregoing, the subdividing and/or development of any areas subject to this Article shall conform to the adopted general goals and objectives of the City with respect to the physical development of the City as set forth in various elements of the Comprehensive Plan of St. Cloud and other requirements including, but not limited to:

1. the most current Orlando Urbanized Area Transportation Study, (O.U.A.T.S.) or other such plan as may be determined applicable by St. Cloud;
2. City policies on services and facilities as enunciated by the adopted Comprehensive Plan and capital improvements programs;
3. the Zoning Regulations.

6.1.3 PAVE TO NEAREST PAVED PUBLIC ROAD

A development shall abut, or have as its primary access, a street paved to City standards. This street shall be paved by the developer from the entrance of the development to the nearest public paved road of proper functional classification. Abutting rights-of-way shall be paved as hereinafter specified. Unless there exists a governmentally maintained street, as shown by the "St. Cloud Governmentally Maintained Street Map," which provides such access, a minimum of one (1) paved access on public rights-of-way shall be provided to connect to the existing network of governmentally maintained streets. Improvements of existing streets to meet the engineering and construction requirements of this article may be required for this access. At the option of the City Engineer, more than one (1) paved access may be required.

6.1.4 USE OF NATURAL FEATURES

The arrangement of structures, lots and blocks and the street system shall make the most advantageous use of existing topography and preserve mature trees and other natural features wherever possible.

6.1.5 CONSIDERATION OF SOIL AND FLOOD HAZARDS

All land intended for use in a development plan for building sites must be able to be used safely for building purposes without danger from flood or other inundation or from adverse soil or foundation conditions or from any other menace of health, safety or public welfare. In particular, lands which are within the 100-year flood prone areas, shall not be developed until proper provisions are made for protective flood control measures and water management facilities necessary for flood free development and flood free vehicular access to such sites. No filling or grade level change shall be permitted which shall reduce the flood storage volume available between the base flood elevation and the nominal ground water table to adversely affect any surrounding area. Requirements for development within the 100-year flood plain are contained in the St. Cloud Land Development Code. The Osceola County Soil Survey is to be used as a guideline in identifying soil properties and interpretations for various uses in terms of soil limitations and soil features adversely affecting a particular use. In addition, the Osceola County Soil Supplement is to be used in interpreting the basis properties of the soils in terms of their potential for a particular use. The following standards shall be followed:

- a. Soils with either very low potential or low potential for proposed uses, as identified in the Osceola County Soil Survey and its soil supplement, shall not be developed unless:
 1. Health and safety hazards are not created; and,
 2. A site-specific soils analysis, with an accompanying engineering report and site development plan, including the ability to provide for suitable public facilities, demonstrating the suitability for the proposed development, is submitted by a professional engineer licensed in the State of Florida. The engineer must provide evidence that he has geotechnical and subsurface drainage design experience.
- b. As determined by the City Engineer, a soil analysis may be required when the density or intensity of the development warrants special consideration of soil and drainage.

6.1.6 SPECIAL CONSIDERATIONS

Special considerations shall be given in the layout of streets, lots, blocks, buildings, and easements to the preservation of large and specimen individual trees. Special consideration shall also be given to preserving natural drainage methods and natural topography and landscape. Special consideration shall be given to providing special screening, buffers, or berms where development abuts incompatible land uses.

6.1.7 MONUMENTS

Permanent reference monuments and control points shall be placed as required by Chapter 177, Florida Statutes, as amended. A letter is required from a registered land surveyor certifying that all monuments, Permanent Control Points (P.C.P.'s) and Permanent Reference Monuments (P.R.M.'s), are in place as of the date of the certificate of completion.

6.1.8 PHASED DEVELOPMENT

Phased development may be approved provided that each phase of the development is capable of standing on its own in full compliance with Land Development Code requirements and approved in conformity with other provisions of this resolution.

6.1.9 SOLID WASTE COLLECTION AREAS

All commercial developments shall have adequate solid waste collection areas with adequate ingress and egress, independent of parking and loading facilities. If required, dumpster pads with screens and access drives shall be constructed meeting the requirements as set forth by the City.

6.1.10 STREET LIGHTING

Street lighting shall be required for all projects except for the development of simple subdivisions where, upon request, the City Engineer may determine that street lighting is unnecessary and/or impractical. All street lighting shall be installed in accordance with the requirements of the electric utility providing service to the property and utilizing dark night principals. All wiring to street lights shall be installed underground.

6.1.11 PRECONSTRUCTION CONFERENCES

A preconstruction conference shall be required and shall be held at least two (2) working days prior to commencement of construction. The developer shall be responsible for arranging this conference with the City Engineer. The preconstruction conference requirement shall be primarily directed toward projects that shall include public improvements. Those projects not constructing public improvements may be exempt from the preconstruction conference requirement. Said exemption shall be determined on a case-by-case basis and, if approved, a preconstruction conference waiver shall be issued by the City Engineer. No development shall occur until a Notice to Proceed is issued.

6.1.12 PERMIT REQUIREMENTS

- a. Any and all permit fees required by the City of St. Cloud shall be due and payable IN FULL prior to the issuance of a Notice to Proceed.
- b. It shall be unlawful for any person, firm, or corporation to construct, install, alter, repair, dig, open-cut, jack and bore or perform any type of work within any right-of-way or utility easement in the City of St. Cloud without first obtaining a permit from the Public Works Department, and upon payment of such reasonable fees as may be set from time to time by resolution of the City Council. The schedule of fees and charges shall be maintained in the offices of the Public Works Director and the City Manager. Should work commence prior to the issuance of a permit, the permit fee shall be double the normal permit fee.

6.1.13 ADDITIONAL PERMIT REQUIREMENTS

If required, permits issued by the following agencies shall be obtained prior to the issuance of a Notice to Proceed:

- a. Florida Department of Transportation (F.D.O.T.),
- b. Florida Department of Environmental Protection (F.D.E.P.),
- c. Army Corps of Engineers (A.C.E.),
- d. South Florida Water Management District (S.F.W.M.D.),
- e. Osceola County.

6.1.14 INSPECTIONS AND TESTS

Staged inspections during construction are required, and it shall be the responsibility of the developer or his contractor to notify the City Engineer and arrange for these inspections.

Tests which are required under this section shall be performed by a competent engineering testing laboratory which shall have an engineer registered in Florida as one of the responsible officials of the firm.

During construction and upon completion of the following construction stages, the builder shall notify the City Engineer that each stage is ready for inspection and shall await clearance by the City Engineer before proceeding to the next stage. Some stages may run concurrently with the approval of the City Engineer.

- a. Tree marking and protection;
- b. Clearing and grubbing;
- c. Utility systems;
- d. Storm drainage;
- e. Stabilization of subgrade;
- f. Underdrains;
- g. Curb and gutter and backfill;
- h. Inlets, box culverts, and all other concrete structures when steel is in place prior to pouring;
- i. Base course during construction or mixing;
- j. Finishing base course prior to paving;
- k. Wearing surface during application;
- l. Cleanup and dressing of right-of-way limits;
- m. Sodding and/or seeding;
- n. Street name signs and traffic control signs;
- o. Pavement marking;
- p. Final inspection.

The City Engineer shall require a minimum of twenty-four (24) hours notice to schedule inspections.

The purpose of these inspections is to ensure compliance with the approved development plan and to advise the City Council whether or not the roads, storm drainage, utilities, and other required improvements being constructed appear to qualify for acceptance by the City. The City accepts no responsibility or liability for the work, nor for any contractual conditions involving acceptance, payment, or guarantees between the contractor and the developer, by virtue of these staged inspections. The City assumes no responsibility or commitment guaranteeing acceptance of the work, nor for subsequent failure, by virtue of these staged inspections. However, if any aspect of the work being performed does not comply with acceptable standards, corrections shall be required by the City Engineer as a condition for City acceptance. All required improvements shall be installed, and have the approval of the City Engineer and/or other City department(s) prior to acceptance by the City Council.

6.1.15 INSPECTION OF FACILITIES

Inspections and verifications of site improvements including, but not limited to, pavement and drainage facilities in the approved development shall be conducted by the City of St. Cloud Public Works Department, Civil Engineering Division. Pavement

and drainage facilities shall be constructed to the standards specified herein. No inspections shall be conducted without first making application and obtaining a permit therefore from the Public Works Department, and upon payment of such reasonable fees as may be set from time to time by resolution of the City Council. The schedule of fees and charges shall be maintained in the Public Services Office.

6.1.16 DEFECTIVE OR UNAUTHORIZED WORK

- a. All work that has been rejected or condemned shall be repaired, or, if it cannot be satisfactorily repaired, shall be removed and replaced at the builder's expense. Materials not conforming to the requirements of the specifications shall be removed immediately from the site of the work and replaced with satisfactory material by the builder at his own expense.
- b. Upon reasonable cause, due justification by, or if not in accordance with approved plans and specifications, and at the request of the City Engineer, the builder shall, at any time before final acceptance of the work, remove or uncover such portions of the finished work as may be directed. After examination, the builder shall restore the said portions of the work to the condition required by the approved plans and specifications.
- c. Failure to reject any defective work or material during construction shall not prevent later rejection upon discovery prior to acceptance or obligate the City of St. Cloud to final acceptance.

6.1.17 COMPLETION OF INSTALLATION OF REQUIRED IMPROVEMENTS

Upon completion of the above inspections or prior thereto, the following must be provided to the City Engineer:

- a. *Test results.* Test results as required; and,
- b. *Maintenance bond.* Maintenance bond for facilities to be conveyed to the City; and,
- c. *Record drawings.* At or prior to the final inspection, the owner shall provide an AutoCAD diskette and two (2) sets of record drawings, including standard details. These drawings shall be black-line prints showing all approved changes and deviations from the original plans, including the exact location of all utilities, street systems, traffic controls, and drainage systems, both on-site and off-site, signed and certified by the engineer of record and by a professional land surveyor; attesting to the fact that the plans, to the best of his knowledge, are correct. The record drawings shall show only the actual facilities constructed; original design features that no longer apply shall not be shown. If facilities dedication to the City is desired, record drawings shall be submitted no less than five (5) working days in advance of the desired date of acceptance by the City.
- d. *F.D.E.P.* "clearance for service" letter(s); and,
- e. *Surveyor's letter* (per Florida Statutes Chapter 177), if required; and,
- f. *Itemized cost sheets.* Itemized cost sheets (engineer's estimate or copy of contract), with review and approval of City Engineer, for all facilities dedicated to the City; and,
- g. *Certification* of all dedications for lands, easements and rights-of-way.
- h. *Benchmarks* shall be provided on all control structures constructed as part of the development. All benchmarks shall be placed by a registered land surveyor and he/she shall certify that all benchmarks are in place prior to the certificate of completion being issued.

Upon satisfactory completion of the installation of required improvements, a certificate of completion shall be signed by the City Engineer.

6.1.18 RESPONSIBILITY DURING MAINTENANCE PERIOD

All improvements to be owned and operated by the City shall be covered by a maintenance bond in the amount of ten per cent (10%) of the construction cost, but shall not be less than a minimum of one thousand dollars (\$1,000). The bond shall be in effect for two (2) years from the date of acceptance by the City Engineer on the certificate of completion. During that maintenance period, the owner/developer shall be expected to provide any maintenance required by the City Engineer. This includes, but is not limited to:

- a. Repair and replacement of any system component, failed section of paving, etc.; and,
- b. Control of erosion, replacement of sod, removal of soil washed onto pavement or into drainage system.

6.1.19 MAINTENANCE BOND RELEASE INSPECTION

- a. Approximately sixty (60) days prior to the expiration of the scheduled two-year maintenance period, the City Engineer will schedule and perform a final inspection.
- b. Prior to release of the maintenance bond the owner/developer shall be required to correct any maintenance problems and design deficiencies, which may have manifested themselves during the maintenance period.
- c. The maintenance bond shall be renewed as required and shall remain in effect until released by the City.

6.1.20 DECORATIVE ENTRANCES WITHIN RIGHTS-OF-WAY

Where a developer is specifically permitted by the City to construct decorative landscaping within the right-of-way of any street, the developer shall provide a maintenance agreement acceptable to the City for perpetual maintenance of such landscaping and shall provide for removal of such landscaping on order by the City for cause. The City shall not accept liability or responsibility for maintenance of landscaping in rights-of-way and shall be held harmless for damage done to same in work performed by the City in such right-of-way. A two hundred foot (200') minimum sight distance must be maintained each way at intersections. Walls or other private structures are prohibited in the rights-of-way.

6.1.21 STANDARD DRAWINGS ADOPTED

Standard drawings for purposes of implementing this Article may be adopted from time to time by resolution of the City Council. Such resolution is not subject to the procedure for amendment of these land development regulations.

DIVISION 2 STREETS

6.2.1 GENERAL

The character, width, grade and location of all streets and bridges shall conform to the standards in this section and shall be considered in their relation to existing and planned streets, to topographical conditions, to public convenience and safety, and in their appropriate relation to the proposed uses of the land to be served by such streets. Whenever not modified by these standards, the guidelines and standards of the

"Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways, State of Florida," the "American Association of State Highways and Transportation Officials," and Florida Department of Transportation Standard Specifications for Road and Bridge Construction, current edition, referred to therein, shall be the minimum acceptable standard.

A. LEVEL OF SERVICE

Level of service is a qualitative measure of the effect of a number of factors, which include speed and travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience and operating costs. The basis for the level of service definitions is to monitor effects and for the setting of improvement priorities. The adopted levels of service established by the City can be found in the City of St. Cloud Comprehensive Plan.

St. Cloud recognizes the Institute of Transportation Engineers Trip Generation, current edition: An Information Report, Institute of Transportation Engineers, for purposes of projecting traffic impacts of land development requests. Applicants who wish to provide additional traffic projections based on more complete, more current or otherwise superior analysis may do so. For uses not included in the I.T.E. document, the applicant shall provide the City with projections. All projections and data submitted shall be reviewed by the City, and accepted if determined to be accurate.

B. FUNCTIONAL CLASSIFICATION OF STREETS

The definitions of the functional classifications of roads, recognized by the City of St. Cloud, are as stated in the City of St. Cloud Comprehensive Plan and the Osceola County Comprehensive Plan.

C. CONTINUATION OF EXISTING STREET PATTERN

The proposed street layout shall be coordinated with the street system of the surrounding area. Streets on the proposed site shall be connected to streets in adjacent areas where required to provide for proper traffic circulation.

Half-streets and substandard rights-of-way and pavement widths shall be prohibited. Where a previously dedicated incomplete street, improved or unimproved, abuts or is within a tract to be developed, the remainder of the right-of-way shall be dedicated and the full street improved according to City standards.

D. STREET ACCESS TO ADJOINING PROPERTY

Street stubs to adjoining areas shall be provided when required to give access to such areas or to provide for proper traffic circulation. Street stubs in excess of two hundred fifty feet (250') shall be provided with a temporary cul-de-sac turnaround. This temporary cul-de-sac shall meet the requirements as specified in the "Cul-de-sac" sub-section of this article. The developer of the adjoining area shall pay the cost of restoring the street to its original design cross section and extending the street.

E. DEVELOPMENT ON RAILROADS OR LIMITED ACCESS HIGHWAYS

Where a development abuts or contains a railroad right-of-way, limited access highway or arterial street, the City Engineer may require that the developer provide a street that shall be approximately parallel to and on each side of such right-of-way. The street shall be located at a distance suitable for the appropriate use of the intervening land, including park purposes in residential districts or commercial and

industrial uses in appropriately zoned districts. The separation of such street from the adjoining right-of-way shall be determined with due regard for the requirements of approach grades and future grade separations.

F. ADDITIONAL RIGHT-OF-WAY AND/OR PAVEMENT WIDTH

Additional right-of-way and/or pavement width may be required by the City Engineer designee to promote public safety and convenience or to ensure adequate access, circulation and parking. Whenever any street shows future need for improvement within the area to be developed, the appropriate right-of-way and pavement shall be required. Where a development abuts or contains an existing street of inadequate right-of-way or pavement width, additional right-of-way and pavement in conformance with minimum City standards shall be required to be dedicated.

G. DEDICATION OF RIGHT-OF-WAY

On any arterial or collector street within a minimum of one hundred fifty feet (150') (or as required) of its intersection with another arterial or collector, or at any other location where provisions of this article require additional right-of-way, the right-of-way shall be increased by at least ten feet (10') (or as required) to permit proper design of auxiliary lanes and tapers. This additional right-of-way shall be dedicated or conveyed as a public right-of-way.

Rights-of-way requirements shall be based upon a twenty-year planning period according to the most current MetroPlan Plan or any official City transportation plan as may be adopted. All rights-of-way shall be transferred to the City by means of a recorded deed, or by dedication to and official acceptance by the City Council.

STREET REQUIREMENTS (Minimum)

TYPE	RIGHT-OF-WAY	EASEMENT (Each Side) - If Required
Alley	20 Ft.	10 Ft.
Frontage	50 Ft.	10 Ft.
Minor Collector	60 Ft.	10 Ft.
Major Collector	80 Ft.	15 Ft.
Arterial	100 Ft.	15 Ft.
Local Roads (30 MPH and greater)		
4 Lane without parking	100 feet	10 Ft.
2 Lane without parking	60 feet	10 Ft.
2 Lane with parking (1-side)	72 feet	10 Ft.
2 Lane w/ bike lane and parking (1-side)	72 feet	10 Ft.
2 lane with parking on both sides	84 feet	10 Ft.
2 lane w/ bike lane and	84 feet	10 Ft.

parking on both sides		
Local Roads (25 MPH)		
4 Lane without parking	80 feet	10 Ft.
2 Lane without parking	50 feet	10 Ft.
2 Lane with parking (1-side)	58 feet	10 Ft.
2 lane parking on both sides	66 feet	10 Ft.

H. EASEMENTS

Where necessary for safety and convenience, as determined by the City Engineer, easements of suitable width shall be required.

The term “utility easement” shall allow, but not be limited to, the installation of sanitary and storm sewers, water, gas, electrical, telephone and telegraph, and cable television lines. Such easements shall be centered on rear or side lot lines where necessary. Front yard easements shall be a minimum of ten feet (10') in width. Rear lot easements shall have a minimum width of seven and five-tenths feet (7.5') per lot (fifteen feet (15') total) and side lot easements shall be a minimum width of five feet (5') per lot [ten feet (10') total], except that a minimum total width of twenty feet (20') must be provided where necessary for storm or sanitary sewers systems. Additional total width for storm and sanitary sewers shall be provided when pipe size or depth of cover dictate.

“Drainage easements” for storm sewers shall be provided as determined necessary by the City Engineer. No open drainage ditches shall be permitted within the boundaries of any development, or abutting any blocks, or tiers of lots, within any development, except as may be provided in Section 6.17.4 of this article.

“Environmental control easements” shall be required, as necessary, for all retention/detention ponds, berms, swales, and other pollution control measures. No modification or demolition of any approved measure within this easement may be done without the approval of the City Engineer.

Where necessary for safety and convenience, “pedestrian, bicycle, and service easements” of suitable width shall be required as determined by the City Engineer.

Landscape buffers may be permitted within easements as long as the landscaping does not interfere with utilities located within the easement.

I. OFF-SITE EASEMENTS

Any off-site easements, which are needed to make the system function, shall be included in the proposal for development and made criteria for plan approval.

Easements for all facilities shall be shown on construction drawings and approved by the City Engineer and, if applicable the electric utility. The easements and rights-of-way must be executed, accepted by the City Council, and recorded in the public records prior to final site acceptance.

J. NO CITY EXPENSE

Easements shall be provided and maintained at no expense to the City.

K. OTHER CRITERIA

Streets shall also be arranged in accordance with the following criteria:

1. Be integrated with the street system of the surrounding area in manner which is not detrimental to existing neighborhoods; and,
2. Be such that the use of local streets by through traffic is discouraged; and,
3. Facilitate and coordinate with the desirable future development of adjoining property of a similar character and provide for local circulation and convenient access to neighborhood facilities.

L. CUL-DE-SACS

Cul-de-sacs shall be constructed per the abutting street specifications. Cul-de-sacs with no on-street parking shall be provided with a turnaround having an outside roadway diameter of at least one hundred feet (100'), and a street right-of-way diameter of at least one hundred twenty feet (120'). Cul-de-sacs shall have a maximum length of eight hundred feet (800') including the turnaround. Larger roadway and right-of-way diameters shall be required by the City Engineer, if determined necessary.

M. Roadway Improvements

At the time of development, the property owner/developer shall improve the right-of-way adjacent to the development. These improvements shall meet or exceed the City roadway standards and include (but are not limited to) sidewalks, drainage, striping, signage, and paving. These improvements are required for the entire extent of the development even if the development does not construct an access point onto the improved roadway. Larger roadways and right-of-way may be required by the City Engineer, if determined necessary.

DIVISION 3

CONSTRUCTION STANDARDS FOR STREETS

6.3.1 CLEARING AND GRADING OF RIGHTS-OF-WAY

The developer shall clear all rights-of-way and recovery areas which shall conform to minimum standards, according to the Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways, prepared by the Florida State Department of Transportation. Trees may be selectively retained in the recovery area and all grades, including grades for streets, alleys, and drainage, shall be consistent to grades approved for the subdivision. All debris shall be moved from rights-of-way.

A. SUBGRADE

All unstable materials such as muck, peat, plastic clays, or marls shall be removed from roadbed areas. The areas then shall be backfilled with suitable material, and the subgrade stabilized. The materials to be added for stabilization, if needed, shall be either high bearing soil, sand clay, ground limerock, or any other material, which is suitable.

SUBGRADE REQUIREMENTS

TYPE	THICKNESS	WIDTH	DENSITY **	LBR	FBV
Alley	10"	12" beyond curb	98%**	40	50 psi
Frontage	10"	12" beyond curb	98%**	40	50 psi
Local	10"	12" beyond curb	98%**	40	50 psi
Minor Collector	10"	12" beyond curb	98%**	40	50 psi
Major Collector	12"	12" beyond curb	98%**	40	50 psi
Arterial	12"	12" beyond curb	98%**	40	50 psi

**Per AASHTO T-180

Written test results, taken by a competent testing laboratory, shall be submitted giving Florida Bearing Value (F.B.V.) sufficient to obtain uniform results for each and every type of soil appearing in the roadbed or at random locations designated by the City Engineer.

After the subgrade is mixed, brought to grade, and ready for base course construction, it shall be tested for density. Written test results by a competent testing laboratory shall be submitted to the Public Services Department for review and approval prior to commencing the next stage of road construction. Spacing between samples taken for testing shall not exceed two hundred fifty feet (250') and shall alternate from center to side to center to opposite side, etc. and/or as directed by the City Engineer. Separate test results shall be required if stabilization is performed under curb areas separately from stabilization of the roadbed.

B. LIMEROCK BASE COURSES

This base course, including the materials to be used, shall be constructed in accordance with the most current, applicable F.D.O.T. specifications, and shall be compacted in one (1) layer if six inches (6") thick or two (2) layers if eight inches (8") thick or greater.

The following criteria shall be utilized when designing a limerock base:

1. Separation between the seasonal high water table and the bottom of the limerock base shall be a minimum of two feet. When underdrains designed by a professional engineer are included to create the required separation from the seasonal high water table, this separation may be reduced to eighteen inches (measured from the invert of the underdrain to the bottom of the base).
2. The bottom of the limerock base shall be a minimum of one foot above the top of the weir elevation of the outfall for the nearest controlled pond of the pond where the road's drainage discharges.

The most conservative number generated from items 6.3.1.6(1) and 6.3.1.6(2) shall prevail.

Following compaction, written test results by a competent testing laboratory shall be submitted to the Public Services Department for review and approval prior to commencing the next stage of road construction. Spacing between samples taken for testing shall not exceed two hundred fifty feet (250') and shall alternate from center to side to center to opposite side, etc. and/or as directed by the City Engineer. Tests shall be required for each layer if construction is in two (2) layers. The contractor shall make borings in areas designated by the City Engineer to enable measurement of thickness.

Finished limerock base courses shall be primed immediately upon achievement of finished grade and density and continuously maintained free of damage until the wearing surface is applied. The wearing surface shall be applied immediately upon completion, but no later than fifteen (15) days.

C. CRUSHED CONCRETE BASE COURSE

This base course, including the materials to be used, shall be constructed in accordance with the most current, applicable F.D.O.T. specifications, and shall be compacted in one (1) layer if six inches (6") thick or two (2) layers if eight inches (8") thick or greater.

The following criteria shall be utilized when designing a crushed concrete base:

3. Separation between the seasonal high water table and the bottom of the crushed concrete base shall be a minimum of two feet. When underdrains designed by a professional engineer are included to create the required separation from the seasonal high water table, this separation may be reduced to eighteen inches (measured from the invert of the underdrain to the bottom of the base).
4. The bottom of the crushed concrete base shall be a minimum of one foot above the top of the weir elevation of the outfall for the nearest controlled pond of the pond where the road's drainage discharges.

The most conservative number generated from items 6.3.1.6(1) and 6.3.1.6(2) shall prevail.

Following compaction, written test results by a competent testing laboratory shall be submitted to the Public Services Department for review and approval prior to commencing the next stage of road construction. Spacing between samples taken for testing shall not exceed two hundred fifty feet (250') and shall alternate from center to side to center to opposite side, etc. and/or as directed by the City Engineer. Tests shall be required for each layer if construction is in two (2) layers. The contractor shall make borings in areas designated by the City Engineer to enable measurement of thickness.

Finished crushed concrete base courses shall be primed immediately upon achievement of finished grade and density and continuously maintained free of damage until the wearing surface is applied. The wearing surface shall be applied immediately upon completion, but no later than fifteen (15) days.

BASE COURSE REQUIREMENTS

	Limerock				Crushed Concrete			
TYPE	THICKNESS	WIDTH	DENSITY PER AASHTO T-180	LBR	THICKNESS	WIDTH	DENSITY PER AASHTO T-134	LBR
Alley	6"	6"	98%	100	6"	6"	98%	100
Frontage	6"	6"	98%	100	6"	6"	98%	100
Local	6"	6"	98%	100	6"	6"	98%	100
Minor Collector	8"	6"	98%	100	8"	6"	98%	100
Major Collector	8"	6"	98%	100	8"	6"	98%	100
Arterial	8"	6"	98%	100	8"	6"	98%	100

WIDTH = 6 inches beyond the edge of pavement only in areas where curb and gutter construction is omitted.

D. WEARING SURFACE

Asphalt used for the wearing surface shall be per Florida Department of Transportation Standard Specifications for Road and Bridge Construction, current edition. Ponded water due to paving inaccuracies shall be limited to a water depth of no greater than one-fourth inch (1/4"). Ponding in excess of this depth shall require correction.

A certified copy of the design mix shall be filed with the City Engineer stating the type of design stability of the product used. Any deviation from this stability requirement shall be considered only after review and documentation of the special circumstances with the City Engineer.

WEARING SURFACE

TYPE	MIN THICKNESSES	MIN PAVEMENT WIDTH/LANES	DENSITY	F.D.O.T. SEC. 331	MIN STRUCT. NUMBER
Alley	1-1/2"	18 Ft.**	96% LAB	Marshall Field Stability of 1500 psi	3.5
Frontage	1-1/2"	22 Ft.	96% LAB	Marshall Field Stability of 1500 psi	3.5
Local	1-1/2"	VARIES	96% LAB	Marshall Field Stability of 1500 psi	3.5
Minor Collector	2.5"	24 Ft.	96% LAB	Marshall Field Stability of 1500 psi	3.7
Major	3"	32 Ft.	96% LAB	Marshall Field Stability of 1500	3.7

Collector				psi	
Arterial	4"	24 Ft. or 48 Ft.	96% LAB	Marshall Field Stability of 1500 psi	4.0

** 18 ft. including any curbs that may be required.

Where a subdivision collector is required, a pavement design shall be submitted with the construction plans to determine the minimum pavement structure required. However, in no case, shall a structural number less than 3.5 with a minimum of three (3) inches of Type SP or Type S asphaltic-concrete surface course be provided.

Where a connection is made to a street functionally classified as a Arterial or Collector, the minimum structural number required within the right-of-way of the functionally classified street shall be based on the minimum pavement design, but in no case less than:

Collector: 3.70 with a minimum of 3 inches of Type SP or Type S asphaltic-concrete surface course

Arterial: 4.00 with a minimum of 4 inches of Type SP or Type S asphaltic-concrete surface course

A minimum structural number of 4.00 is required on all road types, if heavy vehicles are ten (10) percent or more of the total daily driveway trips.

For commercial or industrial parks, a pavement design shall be submitted with the construction plans to determine the minimum pavement structural number required. However, in no case shall a structural number of less than 3.5, with a minimum of three (3) inches of Type S asphaltic-concrete surface course be allowed.

On divided two-lane roads (boulevards), minimum pavement width for each lane shall be fourteen feet (14'), exclusive of curbs and gutters. On four-lane roads, minimum lane widths shall be twelve feet (12') each, with provisions for left-turn storage, acceleration, deceleration, tapers, or channels as may be required by the City Engineer.

Additional pavement width may be required due to proposed features.

A four lane section shall be required when the proposed development's A.D.T. exceeds 7000.

STREET GRADING AT CENTERLINE

% GRADE OF STREET C/L	ALLEY	FRONTAGE	LOCAL	MINOR COLLECTOR	MAJOR COLLECTOR	ARTERIAL
Maximum	10.00%	10.00%	10.00%	8.00%	8.00%	6.00%
Minimum	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%

DIVISION 4 BLOCKS

6.4.1 GENERAL

The length, widths, and shapes of blocks shall be determined with due regard to:

- a. provision of adequate building sites suitable to the special needs of the type of use contemplated; and,
- b. zoning requirements as to lot sizes and dimensions; and,
- c. need for convenient access, circulation, control and safety of street and pedestrian traffic, and fire protection; and,
- c. limitations and opportunities of topography, with special emphasis on drainage of the proposed subdivision and the possible adverse effects of that drainage on properties surrounding the subdivisions.

A. BLOCK LENGTH

Block length shall not exceed fourteen hundred feet (1,400') nor be less than three hundred feet (300') between intersecting streets, except that the Council may, where special conditions exist, approve blocks of greater length.

DIVISION 5

LOTS

6.5.1 GENERAL

The lot size, width, depth, shape, orientation and the minimum building setback lines shall be appropriate for the location and the type of development, zoning, and the use contemplated. Lot arrangement and design shall be such that all lots shall provide satisfactory and desirable building sites.

A. DIMENSIONS

Lot dimensions shall be determined by the particular land use and building size proposed, and the following:

- 1. Corner residential lots. Corner lots for residential use shall have a minimum fifteen per cent (15%) greater width area than a corresponding minimum interior lot requirement to accommodate setbacks from both streets.
- 2. Commercial, industrial off-street parking. Depth and width of properties reserved or laid out for commercial and industrial purposes shall be adequate to provide for the off-street service and parking facilities required by the type of use and development contemplated. Due to high lot coverage of building, parking, and roads, lot size should include suitably sized and located areas to accommodate on-site stormwater retention and, where possible, percolation.
- 3. Street access. The development of the land shall be such as to provide each lot, by means of a street or access way, with satisfactory and permanent access to an existing public street. Where automobiles backing onto adjacent roadways from driveways are anticipated to present a potential traffic flow or safety problem, the City may require provisions such as turnaround areas or horseshoe driveways, or other access-control measures as deemed necessary. Lots not having full frontage on a street shall have an access way of at least a thirty-five foot width and suitable for access by emergency vehicles.

B. DOUBLE-FRONTAGE LOTS

Double-frontage lots shall be permitted only where necessary to separate a development from adjacent collector and arterial roadways, to overcome disadvantage of topography and orientation, or to limit individual driveway access where necessary to preserve the carrying capacity of roadways. Where double-

frontage lots are created, they shall all front in the same direction. The rear of the lots shall be screened from the abutting roadway by a wall of brick or masonry construction six feet (6') in height, and not nearer than one foot (1') to the right-of-way line. Access rights along the rear of such lots shall be prohibited.

DIVISION 6 INTERSECTIONS

6.6.1 INTERSECTION DESIGN MINIMUM CRITERIA

The design and locations of urban intersections shall be consistent with the terms included in this resolution, as provided for in Ordinance 2014-26, and the specifications of Section III, Paragraph 9, Intersection Design, of the "Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways" as prepared by the Florida Department of Transportation. Streets shall be laid out to intersect as nearly as possible at right angles. Multiple intersections involving the juncture of more than two (2) streets shall be prohibited. Sight distances shall be provided to comply with the specifications contained in the Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways.

A. INTERSECTION SEPARATION

Spacing for non-signalized urban street intersections by functional classification.

1. An arterial may intersect another arterial if aligned with and extending an existing arterial on the other side of the intersection or at a desirable distance of one (1) mile from the intersection of existing arterials.
2. A collector may intersect an arterial if aligned with and extending an existing collector which intersects the arterial or at a desirable distance of one-quarter mile from the intersection of an existing collector and the arterial.
3. Intersections between local streets and arterials should be avoided. In cases where they do intersect, the local street shall be aligned with and extending an existing local street which intersects the arterial or at a desirable distance of eight hundred feet (800') from any other street intersection.
4. A collector may intersect another collector if aligned with and extending an existing collector on the other side of the intersection or at a desirable distance of six hundred sixty feet (660') from the intersection of any other intersection.
5. A local street may intersect a collector if spaced at a minimum distance of six hundred sixty feet (660') from any other intersection or, in the case of T-intersection, at a desirable distance of three hundred thirty feet (330') from any other street intersection.
6. A local street may intersect another local street if aligned with and extending another local street on the other side of the intersection or at a minimum distance of one hundred fifty feet (150') from any other intersection.

B. SPACING FOR SIGNALIZED URBAN INTERSECTIONS

In order that distances between signals are capable of providing reasonable cycle lengths, intersections that are planned to be signalized shall be spaced a minimum of one quarter mile.

C. MINIMUM SPACING REQUIREMENTS THAT MAY BE REDUCED

The minimum spacing requirements of this article may be reduced given the particular conditions of the proposed development, the minimums cannot be met and such reduction shall not compromise operational and safety standards.

D. RADII AT INTERSECTIONS

The minimum intersection radii of back of curb at all typical intersections approximating a right angle shall be as follows:

INTERSECTION RADII - MINIMUM

ROAD CLASSIFICATION	ALLEY	FRONTAGE	LOCAL	COLLECTOR	ARTERIAL
Alley	n/a	25 Ft.	25 Ft.	25 Ft.	25 Ft.
Frontage	25 Ft.	25 Ft.	25 Ft.	25 Ft.	25 Ft.
Local	25 Ft.	25 Ft.	30 Ft.	35 Ft.	35 Ft.
Collector	25 Ft.	25 Ft.	35 Ft.	35 Ft.	35 Ft.
Arterial	25 Ft.	25 Ft.	35 Ft.	35 Ft.	40 Ft.

Appropriate special radii shall be designed, subject to approval by the City Engineer, for other than right angle intersections.

DIVISION 7

**TURN LANES, TAPERS, STORAGE,
DECELERATION AND ACCELERATION LANES**

6.7.1 GENERAL

Turn lanes, tapers, storage, deceleration and acceleration lanes reduce conflict between the traffic on driveways or intersecting streets and the traffic on the through street. This conflict reduction is achieved by providing turning vehicles with a refuge area where tapers, acceleration, deceleration, storage and turning maneuvers may be accomplished. Turn lanes, tapers, storage, deceleration and acceleration lanes shall be designed to the following criteria:

- a. the speed limit of the accessed street is thirty-five (35) or greater; and,
- b. the parcel of property accessing the street is projected to generate five hundred (500) or more vehicle trips per day, or fifty (50) or more vehicle trips in any hour; and,
- c. the parcel of property accessing the street is residential and has fifty (50) or more dwelling units; and,
- d. at any development as a traffic impact analysis may warrant; and,
- e. at the intersection of an arterial/collector road with another arterial, collector or subdivision collector roadway, left and right turn lanes will be required.
- f. at any parcel of property where a use changes to one that meets one of the above conditions; and,
- g. at any location, where grade or other unusual conditions indicate turn lanes to be desirable, as determined by the City Engineer.

Turn lanes shall not be provided along subdivision or local roads unless the City Engineer determines that turn lanes are warranted due to safety concerns. The exception is the intersection of a subdivision collector road with another subdivision collector/collector/arterial roadway, in which case turn lanes shall be provided if warranted based on Table 6.9.2(l) of this Code.

All required turning lanes shall be designed and constructed in accordance with current FDOT standards.

DIVISION 8 MEDIANS

6.8.1 GENERAL

Medians may be required and shall be consistent with standards provided by the Manual of Minimum Standards for Design and Maintenance for Streets and Highways, published by the Florida Department of Transportation.

To ensure traffic safety, capacity, and control, median openings shall be spaced the maximum distance apart that will allow safe and adequate traffic circulation.

Median openings may be permitted only where the need and location is justified in the opinion of the City Engineer, taking into consideration, but not limited to, the following:

1. Potential number of left turns into or out of the driveway.
2. Length of frontage along the street right-of-way line of the property proposed to be developed.
3. Distance of proposed opening from intersections or other openings.
4. Lengths and widths of proposed storage lanes as functions of the estimated, maximum number of vehicles to be in the lane during peak hour.
5. Safety concerns.

DIVISION 9 GENERAL DRIVEWAY REQUIREMENTS

6.9.1 SPACING AND DESIGN OF DRIVEWAYS

All driveways constructed, altered, or removed within the City limits shall be constructed, altered, or removed as provided for in this article. No person shall make any curb cut for a driveway, walkway or any other purpose without first obtaining a permit from the City Engineer. Charges for the permit shall be made according to the established fee schedule. Permits shall be required from Osceola County or Florida Department of Transportation for roads under their jurisdiction.

6.9.2 DESIGN SPECIFICATIONS

A. LOCATION

1. No driveway shall be permitted in the radius return of an intersection or that will create a hazard as determined by the City Engineer.
2. No driveway shall be permitted with its center nearer than fifty feet (50') from the edge of the nearest right-of-way line of an intersecting street, except for single family residences where special conditions exist and as approved by the City Engineer.
3. No single-family residential driveway or commercial driveway shall overlap the radii or flare of another driveway.

B. ANGLE

All driveways shall be constructed as nearly to a right angle to the street or roadway as possible. This requirement may be waived for one-way driveways, provided that the angle chosen represents improved ingress or egress compared to a right angle driveway.

C. GRADE

All driveways shall cross the sidewalk area at the sidewalk grade established by the City Engineer. In cases where property slopes down from the street, the driveway shall be constructed in such a manner as to raise the driveway to a height, equal to the top of the curb, at the right-of-way line, or at a more appropriate point, as determined by the City Engineer, before the down slope of the driveway begins. The driveway shall be designed so that approach, ramp and departure angles do not exceed the maximum as determined by the appropriate design vehicle.

D. CURB

Concrete for the construction of any driveway curbs shall be at least three thousand (3,000) p.s.i. concrete.

E. CONSTRUCTION SPECIFICATIONS

All driveways shall be constructed in conformance to the plans and specifications approved by the City Engineer and/or D.R.C.

F. EXISTING DRIVEWAYS AND ACCESS POINTS

Existing driveways shall not be relocated, altered or reconstructed without a permit approving the relocation, alteration, or reconstruction and such driveway shall be subject to the provisions of this article.

When the use of any driveway is discontinued, the owner(s) shall, at his own expense, remove the driveway and replace all necessary curbs, gutters, sidewalks, swales, and grass areas.

When the use of any driveway is changed, the owner(s) of the subject property shall reconstruct the driveway in conformance with these specifications.

Any owner of property on which there is a roadway access point lawfully in existence as of the effective date of this article, but which is determined by the City to present a hazard to the public safety and welfare due to the location of curb cuts or other matters regulated within this article and which does not comply with these new regulations, shall be required to reconstruct or alter such hazardous situation within two (2) years from written notification by the City. In the case of a hazard, which is determined to be immediate and severe, a lesser amount of time may be prescribed for compliance by the property owner following a public hearing by the City Council.

6.9.2 ACCESS MANAGEMENT

A. INTENT AND PURPOSE

The intent and purpose of access management is to provide safe access to land development while preserving the flow of traffic in terms of safety, capacity, and speed by:

1. Controlling and regulating the spacing and design of driveways, medians, and traffic signals.
2. Limiting the number of conflict points a vehicle experiences in its travel.
3. Separating conflict points as much as possible where they cannot be completely eliminated.
4. Removing slower turning vehicles which require access to adjacent sites from the traffic lanes of through vehicles.
5. Requiring cross access between development parcels.

B. APPLICABILITY

This section shall apply to the following:

1. Any project connecting directly or indirectly to collector, arterial, or controlled access roadways, including projects connecting to roadways on the State highway system, unless compliance with these regulations is specifically prohibited or deemed not permissible by the Florida Department of Transportation (FDOT).
2. This section also applies to projects connecting to City-owned or maintained rights-of-way within the City. In the case of the State system or municipalities, the City Engineer shall consult with the FDOT and/or any other affected agency in the application of these regulations. In the event of a conflict between these regulations and State or Osceola County access-management regulations, permits, or approvals, the more restrictive regulations shall apply.
3. Any project connecting to a local roadway, but deemed to require access-management review by the City Engineer. If access-management review is required, standards for collector roads shall apply to local roads.

C. EXEMPTIONS

This section shall not apply to the following:

1. Projects within the City that connect only to roadways that are not owned or maintained by the City.

2. Government owned or leased property that contains fire stations or other emergency response vehicles.
3. Utility, government, or government contracted vehicles utilized to construct or maintain public infrastructure.

D. NONCONFORMING ACCESS/SIGNIFICANT CHANGE

Driveways not conforming with the standards herein shall be designated as nonconforming and shall be brought into compliance when:

New or modified access connection permits are requested.

Substantial improvements are proposed to the nonconforming property that affects the existing driveway connection.

There is a change in the use of the property, including land structures or facilities that results in (a) an increase in the trip generation of the property exceeding twenty-five (25) percent (either peak hour or daily), or exceeding 50 gross peak hour trips, AM or PM, whichever is higher, more than the existing use; or (b) an increase in truck traffic equal to or greater than ten (10) percent of the total gross trips generated by the site. Trip generation shall be determined in accordance with the Institute of Transportation Engineers (ITE) Trip Generation Manual (ITE Manual) trip rate, latest edition, or other trip rate as approved by the City Manager or designee. When such additional traffic is projected, the City will review data to determine if modifications to an existing connection will be required.

If the principal activity on a property with nonconforming access features is discontinued for a consecutive period of 365 days.

When due to site specific conditions, such as limited sight distance, high-traveling speed (forty-five, [45] mph or greater), or the presence of 10% or more heavy vehicles utilizing the access, a modification of access is required by the City Engineer to ensure public safety.

E. ACCESS MANAGEMENT ANALYSIS

All projects subject to this section shall complete the necessary Development Review Application and complete any required traffic analysis. However, the City Engineer may require more detailed access-management information or a more detailed access-management study where the City Engineer determines:

1. That the information on the Development Review Application is inadequate to determine compliance with these access-management regulations.

2. That the information or study is necessary to ensure the safety of the traveling public.

3. In the event a study is done, the following standards shall be followed:

a. The Level of Service standards for through movements on all Major City Road segments (facilities) shall be consistent with the standards in the City's latest adopted Comprehensive Plan.

b. The volume/capacity (v/c) ratio of turning movements on Major City Roads cannot exceed 1.2 for Trip-Reducing Projects or exempt uses and 1.0 for other nonexempt uses with a maximum delay of 120 seconds. Delays of up to 150 seconds are acceptable for turning movements with a v/c ratio less than 0.8. However, in all cases, the turn-lane length provided should be long enough to accommodate the forecasted demand.

c. For all access driveways and local street connections to Major City Roads, approach delays of up to 150 seconds will be acceptable.

Based on the information or study provided, the City Engineer may impose conditions on any access permit or project approval granted including, but not limited to, conditions requiring improvements, such as turn lanes.

F. ACCESS ORDER

Every owner of property which abuts a road on the City road system has a right to reasonable access to the abutting City road system if no other access is provided, but does not have the right of unregulated access to such roadways.

The order of preference for providing access to collector, arterial, and controlled access roadways for all land uses shall be as follows:

1. Connections in accordance with corridor access-management plans where adopted and approved by the City, approved by the FDOT for roads on the State highway system, or Osceola County for roads maintained by Osceola County.

2. Connections to existing or extended local public streets where such access will not create an operational or safety conflict with residential uses and accesses.

3. Access to collector roadways.

4. Access to arterial roadways.

5. Access to controlled-access roadways.

G. Driveway Design Criteria

The access rights of an owner of property abutting City roads are subject to reasonable regulation to ensure the public's right and interest in a safe and efficient roadway system. For the purposes of determining whether an access is safe and efficient the latest editions of the FDOT *Driveway Manual*, American Association of State Highway and Transportation Officials manuals, the FDOT *Roadway and Traffic Design Standards Manual*, and the FDOT *Manual on Uniform Minimum Standards* (Green Book) may be used. Property owners are encouraged to use joint access where available.

H. NUMBER AND SPACING OF DRIVEWAYS

Every owner of property which abuts a road on the City road system has a right to reasonable access to the abutting City roadway system, but does not have the right of unregulated access to such roadways. No building shall be erected on a lot or parcel of land subject to this Code, nor shall any Building Permit be issued unless such lot or parcel abuts or has legal access to a street dedicated to and accepted by the Mayor and the City Council Members, is shown on a legally recorded subdivision plat, or such lot or parcel is authorized pursuant to this Code.

One (1) driveway shall be permitted for ingress/egress purposes to any project. For projects proposing more than one (1) two (2) way driveway based upon parcel size, projected trip generation of the site, amount of roadway frontage, and other design considerations, additional drives may be permitted if approved by the City Engineer.

Notwithstanding the foregoing, the City Engineer may require any project which is permitted one (1) or more driveway connections to provide cross access or a frontage/reverse-frontage road connecting such project to neighboring projects or properties if such project later has reasonable access to a collector or arterial roadway through such cross access or frontage/reverse-frontage road, the City Engineer may terminate the permit(s) for the original driveway(s).

The City Engineer may issue one (1) or more temporary access points for the project where the City Engineer anticipates that a future access for a project will:

1. Be safer.
2. Create better traffic circulation.
3. Create less traffic conflicts.
4. Be more consistent with these access management regulations, but such future access is not feasible at the time such project is reviewed.

The issuance of any Temporary Access Permit pursuant to these regulations is not a vested right or property right and is subject to modification or termination by the City provided that each project maintains reasonable access.

All accesses shall be functional at the time of development impact. A functional access shall be defined as a constructed two (2) lane connection to a paved city road.

The following access requirements are established:

Table 6.9.2(H)

Number of Dwelling Units within Development	Functional Accesses	Emergency Accesses
0-50	1	0
51-100	1	0
101-200	1	0
201-500	1	1
501 or greater	2	2

I. ACCESS CONTROL

The following general standards shall be used in evaluating proposed access connections to City and State arterials and collectors:

Table 6.9.2(I)

Arterial/Collector Standards

Facility Type	Posted Speed	Corner Clearance/Connection Spacing (min)	Median Opening Spacing (min)		Signal Spacing (min)
			Directional	Full	
Arterial	> 35	660'	1,320'	2,640'	2,640'
	< 35	440'	660'	1,320'	2,640'
Collector	> 35	440'	660'	1,320'	1,320'
	< 35	245'	330'	660'	1,320'

NOTE 1: Corner clearance and connection spacing are measured from the edge of the pavement on one (1) connection to the closest edge of the pavement of the neighboring roadway or connection.

NOTE 2: Distance between median openings and signals are measured from the center of the opening or intersection to the center of the adjacent opening or intersection.

NOTE 3: Up to ten (10) percent deviations from these requirements may be permitted for good cause upon approval by the City Engineer. Deviations greater than or equal to ten (10) percent require a variance.

J. ISOLATED CORNER PROPERTIES

If, due to a property's size, the City Engineer finds that corner clearance standards cannot meet Table 6.9.2(I), and where cross access which meets or exceeds the minimum corner clearance standards cannot be obtained with a neighboring property or is not feasible in the

opinion of the City Engineer, then the following minimum corner clearance measurements can be used to permit connections:

Table 6.9.2 (J)
Corner Clearance for Isolated Corner Properties

Median Type	Position	Access Allowed	Minimum (Feet)
With Restrictive Median	Approaching Intersection	Right-In/Out	115
	Approaching Intersection	Right-In Only	75
	Departing Intersection	Right-In/Out	230
	Departing Intersection	Right-Out Only	100
Without Restrictive Median	Approaching Intersection	Full Access	230
	Approaching Intersection	Right-In Only	100
	Departing Intersection	Full Access	230
	Departing Intersection	Right-Out Only	100

NOTE 1: Corner clearance and connection spacing are measured from the edge of the pavement on one (1) connection to the closest edge of the pavement of the neighboring roadway or connection.

NOTE 2: Up to ten (10) percent deviations from these requirements may be permitted for good cause upon approval by the City Engineer. Deviations greater than or equal to ten (10) percent require a variance.

K. THROAT DISTANCES

The length of driveways or "throat length" shall be designed in accordance with the anticipated storage length for entering vehicles to prevent vehicles from backing into the flow of traffic on the public street or causing unsafe conflicts with on-site circulation.

> 4.5 acres (main driveway)	Minimum 100 feet
< 4.5 acres (main driveway)	Minimum 75 feet
Other driveways	Minimum 40 feet

Up to ten (10) percent deviations from these requirements may be permitted for good cause upon approval by the City Engineer. Deviations greater than or equal to ten (10) percent require a variance.

L. DRIVEWAY WIDTH AND RADII

The following minimum standards shall be utilized for all driveways:

1. Access width for any type of access with or without curbs shall be measured exclusive of the radii or flared sections.
2. One (1) way access shall have a minimum width of fifteen (15) feet.
3. A minimum twenty-four (24) feet in width shall be used for any two (2) way access.
4. The initial fifty (50) feet of the inbound lane from a City road into the project shall be a minimum fifteen (15) feet in order to facilitate the movement of traffic off high-speed facilities with a posted speed equal to or greater than forty-five (45) miles per hour.
5. A minimum thirty-four (34) feet of width shall be used for any two (2) way access when one (1) or more of the following apply to the access:
 - a. Multiunit vehicles are intended to use the access; or
 - b. Single unit vehicles in excess of thirty (30) feet in length will use the access.
6. Maximum widths shall be determined during the plan review process.
7. No access shall have a turning radius of less than twenty-five (25) feet, when a radial return is required.
8. Radii on collector or arterial roads shall have a minimum radius of thirty-five (35) feet. A fifty (50) foot radius shall be required for an access when multiunit or single unit vehicles exceeding thirty (30) feet in length are intended to use the access or on high-speed facilities with a posted speed equal to or greater than forty-five (45) miles per hour. Wheel-tracking diagrams shall be submitted to determine radii used to support entrance geometrics.

Up to ten (10) percent deviations from these requirements may be permitted for good cause upon approval by the City Engineer. Deviations greater than or equal to ten (10) percent require a variance.

M. CROSS ACCESS/FRONTAGE ROADS

1. General Requirement

To further the goals of reducing conflict points and improving traffic circulation along collector and arterial roadways, each project shall be required to provide one (1) or more minimum twenty-four (24) foot wide travel lane(s) connecting the project to neighboring properties, projects, travel lanes, or roadways in a location to be determined by the City Engineer or

designee during the review of the project, except in cases where all neighboring properties or projects are existing, platted, single-family residential subdivisions with no legally available roadway points of connection. Such travel lane(s) shall be free and clear of buildings, parking spaces (except as permitted by the cross-access/parking standards set forth below), landscaping, retention ponds, or any other obstruction that would prevent the free flow of traffic between the project and neighboring properties, projects, or roadways. The City Engineer or designee may determine that a travel lane or frontage/reverse-frontage road wider than twenty-four (24) feet is required if warranted based on the size and trip generation of the project and adjacent projects, or if required pursuant to an adopted frontage/reverse-frontage road or access-management plan or other approved master roadway plan.

2. Cross Access/Parking Standards

a. For properties with an existing developable depth less than or equal to 400 feet along arterials and collector roadways, parking spaces may connect to the twenty-four (24) foot travel way, but shall not obstruct the connection point between the properties.

b. For properties along arterial and collector roadways exceeding a developable depth of 400 feet; or for properties otherwise required to provide for a frontage/reverse-frontage road pursuant to the Comprehensive Plan, zoning amendment, DRI conditions of approval, an approved frontage/reverse-frontage roadway plan, access-management plan, or other approved master roadway plan, parking spaces shall not connect to the twenty-four (24) foot travel way and shall not obstruct the connection point between properties.

c. For infill development, parking-space connections to the twenty-four (24) foot travel way shall be similar to the adjacent property(ies), but shall not obstruct the connection point between the properties.

d. When only two (2) adjacent developments can interconnect, parking spaces may connect to the twenty-four (24) foot travel way, but shall not obstruct the connection point between the properties.

e. If all uses along a proposed/possible interconnect are office and/or industrial, and the combined trip generation rate is less than 600 daily trips, parking spaces may connect to the twenty-four (24) foot travel way, but shall not obstruct the connection point between the properties.

3. Cross-Access/Construction Standards

a. If the development is located within the R-3 or higher Land Use Classification, the cross access shall be constructed with a minimum pavement structural number of 2.96 with a minimum two (2) inches of asphaltic-concrete surface course.

b. If the development is located within the R-1 or R-2 Land Use Classification, the cross access shall be stabilized to LBR-40.

N. OTHER DESIGN ELEMENTS

1. Within the right-of-way, maximum grades shall be limited to ten (10) percent, unless the City Engineer finds that significant physical constraints require the use of a steeper grade, the steeper grade is in conformance with current FDOT standards, and access by the largest anticipated vehicle can be properly accommodated.
2. The horizontal axis of an access to the roadway shall be at a right angle to the centerline of the road. An angle between ninety (90) and sixty (60) degrees may be approved only if the City Engineer finds that significant physical constraints require a skew angle less than ninety (90) degrees.
3. An access that has a gate across it shall be designed so that a minimum of seventy-five [75] feet is provided between the right-of-way line and the gate.
4. The access shall be designed to facilitate the movement of vehicles off the highway to prevent the queuing of vehicles on the traveled way. An access shall not be approved for parking areas that require backing maneuvers within the City right-of-way. All off-street parking must include on-site maneuvering areas to permit vehicles to enter and exit the site in a forward gear.

P. MAINTENANCE

The permittee, successors-in-interest, and occupants of the property serviced by the access shall be responsible for the maintenance beyond the edge of the traveled way. The City shall maintain the culverts under the accesses which are an integral part of the drainage system in the right-of-way.

Q. ALTERNATIVE STANDARD PROCEDURES

Except where these regulations specifically allow for deviation by the City Engineer, if an applicant wishes to deviate from the requirements of this section, a variance must be submitted to the Development Review Committee (DRC) and approved by the City Council.

R. ACCESS VIOLATIONS

1. Violations: The City may elect to cite the owner(s) or occupant(s) of the property or project for any conditions on such property or within the right-of-way that are prohibited by these regulations or applicable permit conditions.
2. Corrective Action: When closure or modification of an access or driveway or other corrective action is required or when the owner(s) and/or occupant(s) of the property in violation has not corrected the condition(s) in violation, the City or other authority may complete the necessary corrective action with public funds or may contract with an individual, firm, or other legal entity for such services. An invoice shall be submitted to the owner(s) for payment of the costs incurred by the City or its contractor. The owner(s) shall be required to pay all costs incurred, including any administrative costs, within thirty (30) days of the date of the invoice. If payment

is not made by the owner(s) within thirty (30) days of the date of the invoice, the City may impose a lien upon the property for the costs of performing the corrective action, administrative costs, interest, and recording fees. The lien shall be of the same priority as liens for ad valorem taxes and, as it represents costs expended for the benefit of the property itself, the lien shall be superior to all other encumbrances, whether secured and regardless of priority. Such lien shall be duly recorded in the official records of the City and shall accrue interest at the rate of eight (8) percent per annum from the date of recording. Upon foreclosure of the lien, the City shall be entitled to all costs and attorney's fees incurred as a result.

3. The authority to correct dangerous conditions provided by this section does not impose any affirmative duty on the City to warn of or to correct such conditions. Making such repairs does not create a continuing obligation on the part of the City to make further repairs or to maintain the property, and does not create any liability against the local governing body for any damages to the property if such repairs were completed in good faith.

DIVISION 10 COMMERCIAL DRIVEWAYS

6.10.1 REQUIRED SUBMITTALS

Information required by this Section on plans submitted to the Development Review Committee (D.R.C.) shall include:

- a. a complete plot plan showing all proposed and/or existing buildings and parking layouts and shall include a North arrow and date; and,
- b. existing and proposed driveway locations and widths on the site and within one hundred fifty feet (150') of the site on both sides and both directions on the collector or arterial roadway and within fifty feet (50') on local streets; and,
- c. distances to nearest median cuts, if applicable; and,
- d. street pavement types and widths, curb types, and right-of-way widths; and,
- e. proposed and/or existing off-street loading and unloading facilities, interior parking arrangements and interior traffic circulating arrangements; and,
- f. retaining walls, drainage, utility poles, trees and other physical features, which affect the driveway location.

Separate plans for driveways shall not be required when the above information is included on a site plan submittal.

Completed plans shall be submitted to the Public Services Department for review and permit processing.

6.10.2 DENSITY CONSIDERATIONS

The choice of the proper location of driveways must involve consideration of the amount of conflict, which can be expected to occur both within the parking area and on the abutting streets. One (1) primary concept which shall be followed is to reduce the number of driveways to a practical minimum and to promote consolidated driveway usage wherever possible, thus providing fewer locations where conflicts may occur.

The area to which the driveway provides access shall be of sufficient size and design to allow all necessary functions for loading, unloading, parking and standing to be carried out on private property and completely off the street right-of-way.

- a. Parking areas shall be so designed and marked as to provide for orderly and safe movement and storage of vehicles.
- b. No design shall be permitted which requires any vehicle to back out onto a public street except when the driveway is for single family detached or duplexes.
- c. Facilities with drive-in windows must be so designed that waiting vehicles do not extend into the street or right-of-way.

6.10.3 COMMERCIAL/INDUSTRIAL DRIVEWAYS AND INTERNAL CIRCULATION

- a. Vehicular circulation must be completely contained within the property. Vehicles located within one portion of the development must have access to all portions without using the adjacent street system.
- b. Acceptable plans must illustrate that proper consideration has been given to the surrounding street plan, traffic volumes, proposed street improvements, vehicular street capacities, pedestrian movements, and safety.
- c. No driveway shall intersect the radius return of an intersection.
- d. Appropriate special radii or flare shall be designed, subject to the approval of the City Engineer, for other than right-angle intersections.
- e. Six inch (6") by sixteen inch (16") vertical concrete curbing, or an approved equal, shall be required along the perimeter of all paved areas within the proposed project where deemed necessary for drainage and/or traffic control. A top of curb height of six inches (6") above the pavement shall be maintained.
- f. Concrete pavement may be utilized in lieu of asphalt paving upon submittal of an acceptable design thickness, which would generally be a minimum of five inches (5") for automobile traffic and six inches (6") for other vehicles.
- g. All other driveways shall maintain a minimum side lot line setback distance equal to the radius or flare return dimension.
- h. For developments projected to generate three thousand (3,000) A.D.T. or more, a traffic impact analysis shall be required, and the development's access provisions shall be considered based on the analysis.

DIVISION 11

RESIDENTIAL DRIVEWAYS

6.11.1 REQUIRED SUBMITTALS

No driveway permit shall be issued until there is filed with the City Engineer an application and two (2) copies of plans showing the location and dimensions of all proposed improvements.

A. RESIDENTIAL DRIVEWAY PLAN SUBMITTALS

Information required by this Section on residential driveway plans shall include:

- 1. all existing and/or proposed buildings, carports, and parking slabs and shall include complete dimensional, separation, and setback measurements; and,
- 2. all existing and/or proposed driveway configurations including complete measurements; and,
- 3. distances to nearest driveway(s) on same side of street.

B. WIDTH

Residential driveways shall be designed to meet a minimum width of ten (10) feet. The width shall be measured at the right-of-way/property line.

C. RESIDENTIAL DRIVEWAY SETBACK

All residential driveways shall seek to maintain a five-foot (5') MINIMUM setback from the nearest side lot line. A return of three feet (3') shall be provided on each side of the driveway where it meets the street. Any and all deviations from the above criteria shall receive approval from the City Engineer prior to initiation in the field. In no case shall a driveway be permitted within a three foot (3') setback from the nearest side lot line.

D. RESIDENTIAL DRIVEWAY APPROACHES

Driveway approaches shall be:

- ♦ Concrete, a minimum of 2500 psi at 28 days, at least six inches (6") thick with 6" X 6" - #10 W.W.M. reinforcing, or
- ♦ Fibermesh concrete, a minimum of 2500 psi at 28 days, with polypropylene fiber reinforcing, six inches (6") thick. Contractors/residents choosing to use fibermesh concrete are required to submit mix design certification from the supplier (trip ticket) at the proposed pour site location. Certification must be on file at the City of St. Cloud, Civil Engineering Division, prior to issuance of a Certificate of Occupancy by the Building Department, or
- ♦ Asphaltic concrete on a limerock, which shall be of the same section as the adjacent road, may be used as an alternate material specification upon approval, or
- ♦ Brick pavers may be used as an alternative material.

** Please refer to the St. Cloud Civil Engineering Driveway Detail Sheet for specific horizontal dimensions and expansion joint requirements.

6.11.2 SEPERATION FROM DRAINAGE INLETS

The edge of the flares of all residential driveways shall be located a minimum of five feet away from and drainage inlet. This provision may be waived by the City Engineer, if the site cannot feasibly accommodate the driveway or the inlet is unable to be relocated.

DIVISION 12

JOINT USE DRIVEWAYS AND SERVICE ROAD PROVISIONS

6.12.1 GENERAL

In order to provide ease and convenience for ingress and egress, but more importantly to provide the maximum safety with the least amount of conflicts with the traffic flow on public streets classed collector or arterial, the number and location of driveways shall be regulated relative to the intensity or size of the property being served and the amount of frontage which that property being served and the amount of frontage which that property has on a given street and in accordance with the principles for joint-use driveways and service roads as listed in this article.

6.12.2 ARTERIAL STREETS

Properties fronting on arterial streets with less than one hundred and fifty (150) linear frontage feet shall have indirect access to the arterial by means of either joint-use driveways or service roads, or in the case of corner parcels, by access to the collector or other facility that intersects the arterial. The following conditions shall apply:

- A. When a parcel of property is located where there is no existing service road, and the planned use of the subject parcel is incompatible with existing uses of abutting properties (e.g., single-family residential), making a joint-use driveway undesirable, a temporary driveway with direct access from the subject parcel to the arterial, or in the case of a corner parcel, to the collector or other facility that intersects the arterial, will be allowed provided that:
 - 1. access rights to the subject parcel are dedicated to the City; and,
 - 2. the necessary cross access easement for a planned service road shall be conveyed to the City; and,
 - 3. when the use of an abutting property changes to a compatible use, a joint-use driveway shall be provided by the owner(s) of the subject property jointly with the owner(s) of the abutting property, which use has changed, at a location approved by the City Engineer, and the temporary driveway discontinued (if not used as the joint-use driveway); or,
 - 4. when the use of two (2) or more abutting properties changes to a compatible use, a service road fronting the subject properties shall be provided by the owners of the subject properties and the cross access easement conveyed to the City and access to the individual properties shall be from the service road only, and the service road shall access the arterial or a facility intersecting the arterial at a location approved by the City Engineer.
- B. When a parcel of property is located where there is no existing service road, and the planned use of the subject property is compatible with existing uses of one (1) or more abutting properties, a service road, fronting the subject property, shall be provided by the owner(s) of the subject property and the cross access easement conveyed to the City, and access to the individual property shall be from the service road only, and the service road shall access the arterial or a facility intersecting the arterial at a location approved by the City Engineer.
- C. When a parcel of property is located where there is an existing service road to the abutting properties, an extension of the service road, fronting the subject property, shall be provided by the owner(s) of the subject property, and the necessary cross access easement for the service road shall be conveyed to the City, and access to the subject property shall be from the service road only, and the service road shall access the arterial or a facility intersecting the arterial at a location approved by the City Engineer.

6.12.3 COLLECTOR STREETS

Properties fronting on collector streets with less than one hundred and fifty (150) linear frontage feet shall have indirect access to the collector street by means of either joint-use driveways, or service roads, or in the case of corner parcels, by access to the facility (if not an arterial) that intersects the collector. The following conditions shall apply:

- A. When a parcel of property is located where there is no existing or planned service road and the planned use of the subject property is incompatible with existing uses of abutting properties (e.g., single-family residential), making a joint-use driveway undesirable, a temporary driveway with direct access to the collector street, or in the

case of a corner parcel, to the facility (if not an arterial) that intersects the collector street, will be allowed provided that:

1. access rights to the parcel are dedicated to the City; and,
2. the necessary cross access easement shall be conveyed to the City, in order to provide for (4.) below; and,
3. when the use of an abutting property changes to a compatible use, a joint-use driveway shall be provided by the owner(s) of the subject property jointly with the owner(s) of the abutting property, which use has changed, at a location approved by the City Engineer and the temporary driveway discontinued (if not used as the joint-use driveway); and,
4. joint-use driveways, with required cross access easements, serve as many adjoining properties as necessary to maintain the minimum spacing of driveways as listed in this article.

B. When a parcel of property is located where there is no existing service road, but a service road is planned, and the planned use of the subject property is incompatible with existing uses of adjoining properties (i.e., single-family residential), making a joint-use driveway undesirable, a temporary driveway with direct access to the collector street, or in the case of a corner parcel, to the facility (if not an arterial) that intersects the collector street, will be allowed provided that:

1. access rights shall be dedicated to the City; and,
2. the necessary cross access easement for the planned service road shall be conveyed to the City; and,
3. when the use of an adjoining property changes to a compatible use, a joint-use driveway shall be provided by the owner(s) of the subject property jointly with the owner(s) of the adjoining property, which use has changed, at a location approved by the City Engineer and the temporary driveway discontinued (if not used as the joint-use driveway); or,
4. when the use of two (2) or more adjoining properties changes to compatible uses, a service road, fronting the subject properties, shall be provided by the owners of the subject properties and the necessary cross access easement for the service road conveyed to the City, and access to the subject properties shall be from the service road only, and the service road shall access the collector, or facility (if not an arterial) intersecting the collector, at a location approved by the City Engineer.

C. When a parcel of property is located where there is an existing service road to the adjoining properties, an extension of the service road, fronting the subject property, shall be provided by the owner(s) of the subject property and the necessary cross access easement for the service road conveyed to the City, and access to the subject property shall be from the service road only, and the service road shall access the collector or a facility (if not an arterial) intersecting the collector at a location approved by the City Engineer.

6.12.4 PROPERTIES WITH ONE HUNDRED FIFTY OR MORE LINEAR FRONTAGE FEET

A. Properties fronting on collector or arterial streets with one hundred and fifty (150) or more linear frontage feet where there are existing or planned service roads shall

have the same requirements as properties with less than one hundred and fifty (150) linear frontage feet.

- B. Properties fronting on arterial or collector streets with one hundred fifty (150) or more linear frontage feet where there are no existing or planned service roads shall have the spacing of adjacent driveways regulated as listed in this article. If those spacing requirements cannot be met, joint-use driveways shall be required as listed in this section.

DIVISION 13 PARKING STALL REQUIREMENTS

6.13.1 MINIMUM DIMENSIONS

Off street parking stalls shall be designed and constructed to meet the minimum dimensions as shown in the following tables:

COMMERCIAL AND RESIDENTIAL DEVELOPMENT OTHER THAN SINGLE FAMILY DETACHED OR DUPLEX (*Ord. 2000-51, 12/14/00*)

PARKING ANGLE	WIDTH OF STALL	DEPTH OF STALL	MINIMUM TRAVELWAY WIDTH
0	10'	23'	24'
45	10'	19'10"	16'
60	10'	21'	18'
90	10'	20'	24'

Concrete or asphalt pavement for the construction of parking stalls in commercial developments shall be of the same cross section dimensions as the driveway approaches or as approved by the City Engineer.

RESIDENTIAL - SINGLE FAMILY ATTACHED OR DETACHED AND DUPLEX ONLY

WIDTH OF STALL	DEPTH OF STALL	MINIMUM DRIVEWAY WIDTH
8'	20'	10'

Concrete for the construction of parking stalls in single family or duplex residential developments shall be at least two thousand five hundred (2,500) p.s.i. and at least four inches (4") thick.

DISABLED PARKING (*Ord. 2000-51, 12/14/00*)

WIDTH OF STALL	DEPTH OF STALL	MINIMUM DRIVEWAY WIDTH
12' *	20'	As commercial above

* The width of a stall shall include an additional five (5) foot access way parallel to the stall and running the entire length (per the Americans with Disabilities Act Accessibility

Guidelines and the Florida Accessibility Code). Up to two disabled parking stalls may share the same required access way if both spaces are parallel and adjacent to it.

6.13.1 ALTERNATIVE PARKING STALL MATERIALS

In support of low impact developments, alternative materials (grass, geogrid, concrete pavers, etc.) for parking stalls may be presented for approval by the City Engineer. Gravel or other loose materials are not acceptable alternative materials. These alternative parking materials must meet all applicable A.D.A. standards. The property owner is responsible for the maintenance of these parking areas.

DIVISION 14 SIDEWALKS

6.14.1 GENERAL

It is the intent of the City that every new residential subdivision or commercial development constructs its portion of the City's sidewalks. This is intended to apply to vacant property or new construction. However, if expansion exceeds the lesser of 50% of the gross floor area of the existing structure or 5,000 square feet, this provision is also applicable. If a variance to these provisions is granted, the owner/developer shall be required to contribute, in lieu of construction, an amount equal to the cost of construction of the required sidewalk to the City to use in constructing or completing pedestrian/bikeway systems.

Sidewalks shall be required in the following locations:

1. *Commercial*. All abutting rights-of-way adjacent to the property shall have sidewalks. Internal sidewalks shall be required for internal connectivity and shall conform to the most recent A.D.A. requirements. All sidewalks shall be constructed prior to the certificate of occupancy for the structure being issued.
2. *Residential*. All abutting rights-of-way adjacent to the subdivision or complex shall have sidewalks. Sidewalks for internal connectivity within public areas shall be shall be constructed as part of the site development. All sidewalks shall conform to the most recent A.D.A. requirements.
3. *Residential/duplex lots*. All abutting rights-of-way adjacent to the property shall have sidewalks. These sidewalks shall be constructed prior to the certificate of occupancy for the structure being issued. All sidewalks shall conform to the most recent A.D.A. requirements.
4. *Infill Residential/duplex lots*. Sidewalks are not required for infill lots in areas where sidewalks are not currently constructed or shown to be constructed on an approved sidewalk plan.

Sidewalk construction for improvements described in subsection 6.14.1.1 and 6.14.1.2 may be deferred for a period not to exceed three (3) years from the date of final acceptance of the required local street improvements. The surety shall be in the amount of one hundred ten percent (110%) of the engineer of record's certified estimate to construct said sidewalk system.

SIDEWALK WIDTHS AND SETBACKS

STREET CLASSIFICATION	WIDTH	SETBACK FROM RIGHT-OF-WAY/ PROPERTY LINE
Local	5'	1'
Collectors/Arterials	5'	2'

NOTE: Sidewalks shall be constructed parallel with the street.

Contraction joints shall be cut or tooled at intervals equaling the sidewalk width, with expansion joints placed at all cold joints or fixed objects (per City standard typical detail). The minimum separation between the sidewalk and the roadway, where Miami curb is utilized, shall be three feet (3'). Where this separation is not possible within the right-of-way, every effort shall be made to locate the sidewalk on an easement on private property or otherwise achieve the desired separation. If it is not possible to maintain the minimum separation, sidewalks shall be constructed adjacent to a raised standard curb. In no case shall a sidewalk be constructed adjacent to a Miami curb.

The proposed sidewalk system shall be included in all site and building plans.

All proposed sidewalks along designated collector and arterial street improvements shall not be deferred.

When a development abuts a bikeway corridor or increased pedestrianway travel is anticipated because of project design or type, the width of sidewalk may need to be increased to ten feet (10').

DIVISION 15 CURB RAMPS

6.15.1 GENERAL

Curb ramps shall be constructed for all sidewalks at their intersection with a driveway and/or a street. All curb ramps shall conform to the most recent A.D.A. requirements. When sidewalks are present on both sides of the road, curb ramps and crosswalks shall be installed with a maximum spacing of four hundred feet (400') to allow pedestrians to safely cross the road.

DIVISION 16 PAVEMENT MARKING AND TRAFFIC CONTROLS

6.16.1 GENERAL

Uniform construction shall be required (i.e., matching of existing or future construction of signage in the City of St. Cloud). Note: Whereas several methods and various materials may apply to any one situation, St. Cloud shall have "placement" authority and "material preference" and in addition "devices and markings" preference.

The City of St. Cloud traffic personnel shall decide what signs and materials or other devices will be necessary for each given project as it arises. The expense of incurred labor, materials, and overhead shall be billed, at set reasonable rates as may be established from time to time by resolution of the City Council, to the person(s)/agency or company responsible for the construction request.

A. DESIGN

1. Intersection improvements. Intersection improvements and traffic control devices such as acceleration, deceleration, and turning lanes, signalization devices, and other traffic control devices shall be designed and installed within the project area

and on abutting streets and highways in accordance with the Manual for Uniform Traffic Control Devices and/or F.D.O.T. Standard Index as directed by the City Engineer who will provide specifications on required materials.

All traffic signals shall be equipped with an Opticom Traffic Signal Pre-emption System. The system shall be usable by designated vehicles approaching from intersection directions as determined by the City Manager or his designee. Prior to installation, the system plans shall be reviewed and approved by the City of St. Cloud Fire Rescue Department and the City of St. Cloud Traffic Control Division.

2. Street name signs. Street name signs shall be installed at all intersections. See standard drawings.
3. Street names. All street names shall be subject to approval by the "Osceola County Department of Public Safety 911 System."

B. CONDITIONAL CLAUSE

In the event any such project requires labor and/or material greater than the personnel of the Traffic Control Division can provide, the applicant shall perform outside services, at the approval of the Traffic Control Division, and be subject to design and material preferences per M.U.T.C.D. This includes all signs, road markings, traffic signals and any other devices in the traffic control industry.

C. PEDESTRIAN CROSSWALKS

Pedestrian crosswalks, where used, shall be in accordance with the Manual on Uniform Traffic Control Devices (M.U.T.C.D.) and the F.D.O.T. Standard Index.

D. FIRE VEHICLE ACCESS ROUTE MARKING

1. FIRE LANES

Fire lanes shall be provided for all buildings that are set back more than one hundred fifty feet (150') from a public right-of-way or exceed thirty feet (30') in height and are set back over fifty feet (50') from a public right-of-way. Fire lanes shall be marked with free-standing signs, marked curbs, sidewalks, and/or other traffic surfaces that have the words, "No Parking Fire Lane," in contrasting colors, spaced no greater than one hundred feet (100') apart.

- a. No parking fire lane signs. Signs shall be twelve inches (12") wide by eighteen inches (18") in height, white with three inch (3") high red letters no less than one-half inch ($\frac{1}{2}$ ") wide to read "No Parking Fire Lane." Signs shall be spaced not greater than sixty feet (60') apart. Signs shall be mounted on rear of building only, with bottom of sign mounted not less than seven feet (7') above ground level.
- b. Fire lane striping. Where a curb is provided, four inches (4") of curb top and face shall be painted traffic yellow with stripes four inches (4") wide extending outward to a width of two feet (2') from the curb.
- c. Fire lane lettering. Letters shall not be less than twenty-four inches (24") in height and not less than two inches (2") in width, painted with traffic yellow paint to read, "No Parking Fire Lane," and shall be staggered on each side of a double yellow line, no greater than one hundred feet (100') apart, to be read with the flow of traffic. Double traffic yellow lines shall be painted around buildings wherever fire lanes are placed.

- d. Maintenance. Signs and painting are to be maintained by the responsible party of the property.
- E. ACCESS TO BUILDINGS BY FIRE APPARATUS
 1. EMERGENCY VEHICLE ACCESS

Every building hereafter constructed shall be accessible to fire department apparatus by way of access roads with all-weather driving surfaces of not less than twenty feet (20') of unobstructed width, with adequate roadway turning radius capable of supporting the imposed loads of fire apparatus and having a minimum vertical clearance of thirteen feet six inches (13'6").
 2. ACCESS AND FIRE FLOW DURING CONSTRUCTION

During construction, when combustibles are brought on to the site in such quantities as deemed hazardous by the fire official, access roads and a suitable supply of water, acceptable to the fire department, shall be provided and maintained. Completion of the base installation, including the appropriate tack coating and sanding, shall be considered sufficient for vehicular access. The following requirements must be met before water is made available to the site:

 - a. a clearance letter from the Florida Department of Environmental Protection (F.D.E.P.) to place a public drinking water facility into service; and,
 - b. a fire flow test by the St. Cloud Fire Department with results verifying minimum specifications have been met.
 3. FIRE DEPARTMENT ACCESS/FIRE LANE OBSTRUCTION

Designated fire lanes or roads deemed necessary for fire department access by the fire official shall be maintained in an operable condition. Prior to the obstruction of any right-of-way, fire department access route, or fire lane due to construction, modification or other activity, which may prohibit the passage of emergency vehicles, the fire department shall be notified.
 4. WAIVER

Where these requirements are not practical or are currently satisfied, the City Engineer may, by written finding and release to the building official, waive the above prerequisites.

DIVISION 17

STORM WATER MANAGEMENT REQUIREMENTS

6.17.1 GENERAL REQUIREMENTS

Protection of water resources is critical to the public health, safety, and welfare. Innovative approaches to storm water management shall be encouraged and the concurrent control of erosion, sedimentation, and flooding shall be mandatory. No site alteration shall adversely affect the existing surface water flow pattern, cause siltation of wetlands, pollution of downstream wetlands, or reduce the natural retention or filtering capabilities of wetlands. All storm water management proposals shall meet or exceed the South Florida Water Management District requirements or the City of St. Cloud stormwater management criteria, whichever is more stringent.

The stormwater management regulations presented within shall be applied to any new development or redevelopment activity that meets one or more of the following criteria:

- a. New development;

- b. Redevelopment that involves the creation of an addition 1,000 square feet or more of impervious cover or the total impervious lot coverage is over 80%.

Redevelopment that involves less than an addition 1,000 square feet of impervious cover or the total lot coverage is less than 80% is exempt from this article.

6.17.2 STORM WATER MANAGEMENT

A storm water management system shall be provided for all areas of the project and shall accommodate the handling of storm water runoff that flows into or across the project area from outside the project, without additional flooding of any other lands. The system shall be designed for long life, low maintenance cost, and ease of maintenance by normal maintenance methods. Soil types shall be considered and full development of the basin assumed for selection of proper runoff coefficients within the basins involved. The system and all of the components shall be designed by a Florida registered engineer in accordance with accepted engineering principles for stormwater runoff and/or design floods resulting from rain storms as designated by the South Florida Water Management District.

Demonstrate through hydrologic and hydraulic analysis:

- a. For stormwater leaving the site, post-construction runoff hydrographs for the 10-year 72 hour and 25-year 72 hour storm events does not exceed, at any point in time, the preconstruction runoff hydrographs for the same storm events.
- b. All roads and parking areas shall be protected from the 10-year 24 hour storm event.
- c. The stormwater ponds for the site are designed to accommodate the 100-year 72 hour storm event will not impact developments downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;

All new development within areas of special flood hazard as delineated on the latest edition of the official Flood Insurance Rate Maps (FIRM) shall comply with the following requirements:

- a. Establish, to the satisfaction of the City Engineer, the elevation of the base flood (100-year 72 hour storm event/flood).
- b. The engineer shall compute the receiving water system stages and submit the results to the City Engineer for review and concurrence before utilizing such results in further computations.
- c. All detention/retention systems shall be designed taking into consideration the tailwater elevation of the receiving water system (i.e., lake, canal, ditch, pond, etc.) established above.

6.17.3 VOLUMETRIC REQUIREMENTS

Retention, detention, or both retention and detention in the overall system, including swales, lakes, canals, greenways, etc., shall be provided for one of the three following criteria or equivalent combinations thereof:

- a. wet detention volume shall be provided for the first inch of runoff from the developed project, or the total runoff of two and one half inches ($2\frac{1}{2}$ ") times the percentage of imperviousness, whichever is greater; and/or,
- b. dry detention volume shall be provided equal to seventy-five percent (75%) of the above amounts computed for wet detention; and/or,

- c. retention volume shall be provided equal to fifty percent (50%) of the above amounts computed for wet detention. Retention volume included in flood protection calculations requires a guarantee of long term operation and maintenance of system bleed-down ability. Examples of such guarantee include evidence of excellent soil percolation rates, such as coastal ridge sands, or an operations entity, which specifically reserves funds for operation, maintenance and replacement.

A positive outfall for all runoff in excess of that retained shall be provided to a natural drainageway through appropriate easements, etc. If the downstream facilities are inadequate to convey the peak discharge for the design rainfall above, the proposed development must accommodate that portion of runoff above the downstream systems actual capacity.

6.17.4 OPEN CHANNELS AND OUTFALL DITCHES

Open drainage ways are not permitted unless a variance request is first obtained through the City Council.

6.17.5 DISPOSITION OF STORM WATER RUNOFF

- a. Treatment of storm water runoff. All drainage facilities shall be designed to minimize pollution, to remove oils, suspended solids, and other objectionable material in storm water runoff to within acceptable limits.
- b. On-site percolation. Sites shall be developed to maximize the amount of natural rainfall, which is percolated into the soil, and to minimize direct overland runoff into adjoining streets and water courses. Storm water runoff from roofs and other impervious surfaces shall be diverted into swales or terraces on the lot when possible. Whenever land within two hundred feet (200') of a lake, and sloping toward said lake, is developed, terraces sloping away from the lake, a tree line, or other acceptable barrier shall be provided to minimize storm water runoff into the lake and to maximize aquifer recharge.
- c. Street drainage. Street drainage shall be diverted to a storm water management system meeting or exceeding the requirements given herein. Existing lakes shall not be used as detention areas. Positive drainage facilities shall be provided for all detention areas to handle the runoff from storms, which exceed the ten (10) year seventy-two (72) hour storm in duration and severity.

6.17.6 CURBS AND GUTTERS

All streets shall be paved and drained utilizing curb-and-gutter construction. All curb and gutter shall be constructed to Florida Department of Transportation Standards and Specifications for Road and Bridge Construction, Section 520, current edition. "Inverted crowns" shall be prohibited.

The width of curb and gutter shall be a minimum of twenty-four inches (24") and shall be either F.D.O.T. Type 'F' or Miami curb and gutter, depending upon the flow to be handled. Simple vertical curbing shall not be acceptable to the City. Approved surmountable median curb, F.D.O.T. type, may be used around median dividers on the high side of pavement. All curbing designed to handle water shall incorporate an approved gutter design. There shall be a stabilized subgrade beneath all curbs and one foot (1') beyond the back of curb.

No water valve boxes, meters, portions of manholes, or other appurtenances of any kind relating to any underground utilities shall be located in any portion of a curb-and-gutter section.

The minimum allowable flow line grade of curbs and gutters shall be 0.24 per cent (0.24%), except in intersections where flatter grades shall be allowable. The tolerance for ponded water in curb construction is one-fourth inch (1/4") maximum; if exceeded, the section of curb shall be removed and reconstructed to grade.

Plastering shall not be permitted on the face of the curb. Joints shall be sawed at intervals of ten feet (10'), except where shorter intervals are required for closures, but, in no case, less than four feet (4') intervals.

After concrete has set sufficiently, but, in no case, later than three (3) days after construction, the curbs shall be backfilled.

All cross-street valley gutters shall be constructed of concrete.

6.17.7 RETENTION/DETENTION

The actual acreage required shall depend on the percolation rate for the specific site and the manner in which the site is developed. All retention/detention areas shall be grassed in accordance with City regulations, and shall be planted in trees, shrubs, or other growing plants that take up large volumes of nutrients.

6.17.8 STORM DRAINAGE INTO NATURAL WATER BODIES

Where an outfall is utilized which discharges into (a) lake, (b) canal or stream with a daily mean discharge of less than five (5) cubic feet per second, or (c) a canal or stream which flows into a lake within one (1) mile, the first one inch (1") of rainfall from each storm shall be retained and either percolated into the ground, collected and evaporated, or given chemical-physical treatment. Runoff from rainfall in excess of the first one inch (1") and outfalls into canals and streams with an average daily flow exceeding five (5) cubic feet per second shall be treated as specified in 6.17.5(a) the introductory paragraph (c) of this section. Outfalls into lakes shall be designed to prevent lake bottom scour. Acceptable methods include use of energy dissipator, or extending the outfall to discharge at a depth of ten feet (10') or half the maximum depth of the lake.

6.17.9 INLET SPACING

Street inlets shall be spaced so as to accept one hundred per cent (100%) of design runoff. Typically, the maximum allowable gutter run shall be one thousand two hundred feet (1,200') on streets with standard curb and gutter, and six hundred feet (600') on streets where Miami curbs are approved for special application by the City Engineer. Actual required spacing will depend on the characteristics of each site.

Computation for drainage culverts, ditch sizes, and inlet spacings shall be based on the storm frequency required in the "Stormwater Management" subsection and shall be submitted to the City Engineer for approval.

6.17.10 NATURAL WATERCOURSE

Should the proposed development area contain an existing natural watercourse drainage way, channel, etc., such natural watercourse and the vegetation inherent therewith shall be maintained and the proposed development designed so as to preserve same. However, the use of such natural watercourse to carry off runoff from any development shall be permitted if provision for control of sediment in the excess runoff is made prior to entrance of the runoff to the natural watercourse. This does not preclude the use of wetlands for storage and treatment of storm water runoff as long as the design drainage system does not measurably degrade the affected area.

6.17.11 RETENTION/DETENTION BASINS

All detention basins shall be readily accessible from streets or public rights-of-way and shall be situated so that maintenance can be easily performed.

- a. Special engineering design shall be provided to limit oils, suspended solids and other objectionable material. Flow-through type detention ponds are not acceptable. Diversion boxes or other design features shall be incorporated to prevent flushing of detention areas by heavy rains. The diversion box shall be fitted with a skimmer to minimize discharge of floating debris.
- b. All drainage facilities shall be of low maintenance design. It is the owner's responsibility to maintain the drainage facilities on-site along with detention treatment facilities. These facilities shall be inspected for maintenance annually by the enforcement branch of the City Engineer's office.
- c. Detention basins shall be so designed that all detained water from the designed storm is removed after the fourth day. If this is not accomplished by percolation and evaporation, the basin must include a bleed down mechanism to relieve the excess amount and return it to the discharge side of the diversion box.
- d. Side slopes - for purposes of public safety, water quality enhancement, and maintenance, all wet retention areas shall have side slopes no steeper than four horizontal to one vertical (4:1) out to a depth of two feet (2') below the control elevation. Side slopes below a water depth of two feet (2') shall be no steeper than two horizontal to one vertical (2:1). Side slopes shall provide soil conditions suitable to sustain plant growth and control erosion.
- e. Dry detention basins shall have side slopes no steeper than two horizontal to one vertical (2:1). Side slopes shall provide soil conditions suitable to sustain plant growth and control erosion.

6.17.12 UNDERGROUND EXFILTRATION SYSTEMS

Underground exfiltration systems are not allowed unless a site specific geotechnical soil analysis, signed and sealed by a licensed professional engineer, has been approved by the City of St. Cloud according to the following criteria:

- a. Systems shall be designed for the retention volumes specified in Section 6.17.3 for retention systems, exfiltrated over one (1) hour for retention purposes, prior to overflow, and based on test data for the site. (Note: Such systems shall not be acceptable on projects to be operated by entities other than single owners or entities with full time maintenance staff.)
- b. A safety factor of two (2) or more shall be applied to the design to allow for geological uncertainties.
- c. A dry system is one with the pipe invert at or above the average wet season water table.

6.17.13 PIPE MATERIALS PERMITTED

Pipe shall be in accordance with the latest edition of the standard specification sheets of the City of St. Cloud. The minimum diameter of any pipe utilized for any portion of an enclosed storm drainage system shall be fifteen inches (15").

Reinforced concrete pipe (RCP) shall be utilized within City of St. Cloud street right-of-way. Alternate pipe materials for pipes that will not be maintained by the City of St. Cloud will be considered.

6.17.14 INLETS, MANHOLES, AND JUNCTION BOXES

Precast structures shall be utilized and shall be built in accordance with ASTM-478 and FDOT specifications.

A pipe shall extend through walls and be flush with inside wall. Masonry shall be constructed around them neatly. Anti-hydro cement shall be used around all pipe connections to precast inlets, manholes, and junction boxes. Plastered areas should not crack and be properly prepared to bond to old surfaces. Paved inverts are required.

For all concrete structures, all fins and irregular projections shall be chipped off flush with the surface immediately following the removal of forms. All projecting wires and nails shall be cut off at least one-half inch under the surface. All cavities produced by metal spacers, form tiles, bolts, honeycomb spots, etc., shall be carefully cleaned, saturated with water, and then carefully painted with mortar. All construction and expansion joints in the completed work shall be left carefully tooled and free of mortar and concrete. Joint filler shall be left exposed for its full length, with clean edges. Mortar topping for upper horizontal surfaces shall not be used.

All horizontal tongue and groove joints in precast inlets, manholes, and junction boxes shall be sealed in preformed flexible plastic joint sealer conforming to Federal Specification: SS S0210 (GSA-FSS), "Ram-Nek," as manufactured by the K. T. Snyder Co., Inc., Houston, Texas, or approved equal. External, horizontal joints shall be sealed with six inch (6") wide plastic or rubber backed butyl compound wrap (.035" or .065" thick). Concrete surface shall be treated with primer, prior to placing wrap sealer, and shall not be stretched during installation (EZ Wrap as manufactured by the Press-Seal Gasket Corporation or approved equal material).

For all concrete surfaces, which are to receive a surface finish, the contractor shall remove the forms and finish the concrete immediately after the concrete has set sufficiently. Minimum manhole diameters for intersecting pipe sizes shall be as follows:

EQUIVALENT PIPE DIAMETER (INCHES)	INSIDE DIAMETER (FEET)
Up to 30	4.00
30 to 48	6.00
48 and Larger	Special Design

6.17.15 RINGS AND COVERS

Rings and covers shall conform to the City of St. Cloud standard drawings.

6.17.16 UNDERDRAINS

Where underdrains are being utilized, they shall be a minimum diameter of six inches. Underdrains must be designed with free gravity outlet at carefully selected discharge points. All underdrains shall be designed to meet the minimum separation requirements specified in section 6.3.1. Erosion control measures shall be provided as needed at all discharge points.

Underdrain cleanouts shall be provided and installed as shown in the standard drawings. The installation shall be in straight alignment with equal distances from the back edge of the curb or right-of-way/property line. Underdrain cleanouts shall be equally spaced a maximum of 300 L.F. apart as measured along the underdrain piping.

The City Engineer shall inspect the underdrain system for compliance prior to the expiration of the required maintenance bond.

6.17.17 NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES

To the maximum extent feasible, the peak runoff control shall be met by incorporating low impact development strategies. The applicant shall identify the nonstructural measures listed below and incorporated into the design of the project.

Nonstructural stormwater management measures incorporated into site design shall:

- a. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
- b. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
- c. Maximize the protection of natural drainage features and vegetation;
- d. Minimize the decrease in the "time of concentration" from preconstruction to post-construction. "Time of concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the watershed to the point of interest within a watershed;
- e. Minimize land disturbance including clearing and grading;
- f. Minimize soil compaction;
- g. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;
- h. Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:
 - (i) Site design features that help to prevent accumulation of trash and debris in drainage systems;
 - (ii) Site design features that help to prevent discharge of trash and debris from drainage systems;
 - (iii) Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments.

6.17.18 DEVELOPER CONTROL DURING CONSTRUCTION PERIOD

The developer shall be required during the entire construction period to control, regulate and maintain the development in such a manner as to prevent the accumulation of trash and debris, resulting from his construction activities, on both the site and adjacent public and private property which would detract from the enjoyment and pleasure in the natural scenic beauty of the City, and, in turn, injuriously affect the economic well-being of the public. The use of residential lots in nearby developments or substantially completed phases of the same development, under the ownership and control of said developer, for the bulk storage of construction materials substantially unrelated to the development of those residential lots is prohibited. A development shall be deemed to be substantially completed when seventy per cent (70%) of the planned units are completed and ready for occupancy, or are actually occupied.

6.17.19 EROSION CONTROL

Seeding, mulching, sodding, and/or other acceptable methods shall be used to prevent erosion during all construction activities. The developer shall be required to maintain curb and gutters free of accumulations of sand and earth. Temporary siltation basins may be required during construction. Maintenance shall be provided by the developer for the two (2) year period of the road guarantee and for each lot until final inspection is passed.

6.17.20 OFFSITE DRAINAGE

All new construction shall not block or hinder the natural flow of offsite stormwater. A collection system shall be provided for properties that currently accept offsite drainage and an offsite evaluation will be necessary for properties that appear not to accept offsite drainage.

The following criteria shall be utilized for construction projects:

1. *Properties that accept offsite drainage.* The offsite flow shall be collected and conveyed in a shallow swale or piped system. A shallow swale system shall not be more than one foot lower than natural grade and the side slopes shall not be steeper than one foot of vertical rise for every four feet of horizontal run. Plantings may be placed in the slope, but may not obstruct the flow line of the swale or the offsite flow into the swale. Sites where swales cannot meet the minimum criteria shall incorporate stormwater pipes into this system. This collection system shall be located within a separate tract and maintained in a mowed condition by the owner of the tract.
2. *Properties claimed to not affect offsite drainage.* If the owner does not believe that the site accepts offsite stormwater, the owner must provide proof that no adjacent properties drain onto the property. The following shall be submitted to the City Engineer for review and approval:
 - a. A certified survey extending a minimum of fifty feet beyond the property line with one-foot contours.
 - b. A drainage map showing at a minimum the surrounding properties, cross sections perpendicular to the property line every fifty feet, the preconstruction drainage patterns, and the post construction drainage patterns.

If the owner does not wish to complete the above studies to determine if the site does not accept offsite stormwater, a shallow swale system or piped stormwater system which meets the criteria of section 6.17.20(1) may be installed in lieu of the study.

6.17.21 ENFORCEMENT

Stop-work order; impose penalties. In the event that any person or entity authorized to conduct construction activity pursuant to these regulations violates the City's code, the City will issue a notice of violation, stop work order, or withhold the construction certificate of completion until the issue is addressed. If the violation poses an immediate hazard to the safety and public health, the City will take a necessary action to protect the public and will impose penalties as elaborate in Chapter 24 Article VII of the City's code.

WATER AND WIND EROSION CONTROL

6.18.1 CONSTRUCTION EROSION CONTROL

An erosion control plan and detailed description of the measures to be taken during construction to control erosion within the limits of the project and to prevent the deposition of sediment in off-site systems or receiving water bodies shall be submitted with final engineering construction plans of the development. Included with this submittal shall be calculations supporting the effectiveness of the proposed plans.

- A. *Erosion control plan.* The erosion control plan, details and calculations shall document the measures necessary to limit the transport of sediment outside the limits of the projects to the volume and amount of that existing prior to the commencement of construction. The preconstruction condition shall be satisfied for the total anticipated construction period. Provisions must be made to preserve the integrity and capacity of check weir, sediment basins, slope drains and grading patterns, required to meet this provision throughout the project construction life.
1. Temporary fence. The erosion control plan shall include provisions for a temporary six-foot fence suitable for mitigating wind erosion and for providing visual relief during construction. Fences shall withstand normal wind loads. The developer may, in lieu of temporary fencing:
- i. Erect the required buffer yard screens as required in the landscaping plans if it meets the intent of the erosion control plan.
 - ii. Disturb less than ten (10) acres and provide adequate means to control materials from leaving the construction site. Logical phasing of the disturbed areas will need to be shown on the erosion control plan if the site is larger than 10 acres.
- B. *Stockpiling materials.* No excavated materials shall be stockpiled in such a manner as to direct runoff directly off the project site, into any adjacent water body, or stormwater collection facility.
- C. *Exposed area limitation:* The surface area of open, raw, erodible soil, exposed by clearing and grubbing or excavation and filling operations shall not exceed ten (10) acres. This requirement may be waived for large projects with an approved dust control plan which demonstrates that opening of additional areas will not significantly affect off-site deposit of sediments. This authorization shall be a written waiver from the City Engineer. Any violations of the dust control plan will result in the immediate voiding of this waiver and could result in the construction activities being suspended until the site is brought back into compliance.
- D. *Inlet protection.* Inlets and catchbasins shall be protected from sediment-laden storm runoff until the completion of all construction operations that may contribute to the inlet.
- E. *Temporary seeding and mulching.* Areas opened by construction operations that are not anticipated to be dressed and receive final grass treatment within 30 days shall be seeded with a quick growing grass species which will provide an early cover during the season in which it is planted and will not later complete with permanent grassing. The rate of seeding shall be 30 pounds per acre. Slopes steeper than 4:1 shall receive mulching of approximately two (2) inches loose measure of mulch material cut into the soil of the seeded area to a depth of four (4) inches.
- F. *Temporary grassing.* As required by the city the seed or seeded and mulched area

shall be rolled and watered to assure optimum growing conditions for the establishment of a good grass cover.

- G. *Temporary regressing.* If, after 14 days, the temporary grassed areas have not attained a minimum of 75% good grass cover, the area will be reworked and additional seed applied sufficiently to establish the desired vegetative cover. 75% of good stand of grass must be established within 30 days of the initial treatment or area shall be sodded.
- H. *Maintenance.* All features of the project designed and constructed to prevent erosion and sediment, shall be maintained during the project construction life, so as to function as they were originally designed and constructed. The contractor is responsible for keeping any temporary grass shall be kept in a mowed condition.

6.18.2 PERMANENT EROSION CONTROL

The erosion control facilities of the project shall be designed to minimize the impact on off-site facilities. All stormwater discharge from the project limits shall be routed through detention basins to trap suspended sediments and discharge facilities from these basins shall be provided with a skimming device to trap floatable debris. A copy of the site's FDEP NPDES permit shall be provided to the Public Services Department prior to a Notice to Proceed being issued.

- A. *Permanent seeding.* All areas which have been disturbed by construction shall, at a minimum, be fertilized and seeded in accordance with city road construction specifications.
- B. *Permanent seeding and mulching.* In addition to the minimum requirements above, slopes from 6:1 to 3:1, inclusive, will be mulched with a uniform thickness of approximately two inches, loose measure, of mulch material incorporated into the soil by mixing to a depth of four inches.
- C. *Permanent sodding.* All retention/detention basins shall be solid sodded. All exposed areas, including public rights-of-way, with slopes steeper than 4:1 shall be solid sodded.
- D. *Strip sodding.* Strip sod, one foot wide or greater, shall be placed adjacent to all curbs, walkways and pavement. In areas with a sidewalk, the entire area between the sidewalk and the back of curb, and/or pavement, shall be sodded.
- E. *Regrassing.* All grassed areas will be maintained to assure a good stand and sufficient ground cover to minimize erosion. If, after 30 days, an adequate ground cover has not been established, the area will be regrassed.
- F. *Additional fertilizer.* Grassed areas not accepted within 90 days of their completion shall be refertilized at an application rate of 250 pounds per acre.
- G. *Maintenance:* Prior to the project being accepted by the City, the contractor is responsible for mowing the grass to remain in compliance with the City Code.

DIVISION 19 FILL

6.19.1 INTENT AND PURPOSE

The intent and purpose of this section is to regulate the placement of fill, as fill activity may cause adverse impacts to watersheds, drainage patterns, native habitats, air, and water quality and may create erosion and sedimentation problems. In addition,

unauthorized changes in topography, including filling of drainageways and relocating conveyances, could increase the flood potential and the impact of a destructive storm on human life, private structures, and public facilities.

6.19.2 APPLICABILITY

This section shall apply to all fill activity within the City of St. Cloud.

6.19.3 EXEMPTIONS FROM SITE DEVELOPMENT REQUIREMENTS FOR FILL

The following activities are exempt from the permit requirements of this section, but shall nonetheless be required to meet the substantive standards of this section:

- A. Fills of less than 10,000 cubic yards on parcels that are five (5) acres or larger. Where fills of greater than 10,000 cubic yards are proposed on parcels that are five (5) acres or larger, a site development permit shall be required.
- B. Fills of any size within the footprint of a structure for which a Building Permit has been issued.
- C. Fills of less than five (5) cubic yards, provided that cumulative fills do not exceed five (5) cubic yards.
- D. Fills that have been authorized with construction plan approval.
- E. Fill incidental to agricultural operations on a parcel of land that is classified by the County Property Appraiser as bona fide agricultural land under the agricultural assessment. Fills that are not incidental to agricultural operations require a permit under the same conditions as any other permit, even if proposed on a parcel that is classified by the County Property Appraiser as bona fide agricultural land.

6.19.4 PROHIBITIONS AND REQUIREMENTS

- A. Fill may not be placed on any property without prior approval in the form of a Fill Permit Application.
- B. No fill may be placed within a wetland or designated special flood hazard area identified as a floodway, except as allowed in conjunction with a Building Permit for a principal structure or a preliminary site plan. If allowed, the fill shall be placed to the standards of this Code and the applicable Technical Bulletin as issued by the Federal Emergency Management Agency.
- C. Fill shall be placed in a manner so as to ensure no fugitive particulate interference with neighboring properties.
- D. Fill shall be placed so as to allow for the continued viability of protected trees on site.

6.19.5 GENERALLY

Prior to the issuance of such permit, a plan drawn to scale or accurately dimensioned shall be submitted for review and approval which shows the following:

- A. Legal description and boundaries of the property, or a parcel ID number, or an address.
- B. Location of all wetlands.
- C. Location of all trees of ten (10) inches diameter at breast height or larger, within the proposed fill area.
- D. Sketch or drawing showing the location of the proposed fill and location and depth of any drainage improvements (pond, pipe, swale, etc.).
- E. Flow arrows showing the direction of the existing drainage flow.
- F. Proposed fill volume.
- G. Existing and proposed elevation of property.

6.19.5 SPECIFIC REQUIREMENTS OR STANDARDS AND APPROVAL CRITERIA

Prior to the issuance of any permit for a fill, the City Engineer shall examine the plan and shall determine whether the proposed fill adversely affects the drainage pattern of the surrounding area, floodplain management, wetland setbacks, or existing patterns.

In addition to meeting the requirements for all plans as set out above, if required by the City or if a permit is sought after placement of fill for which a permit was required (known as an "after-the-fact fill permit"), the plan shall show the following:

- A. The existing and proposed grades, including the proposed fill volume;
- B. The existing and proposed drainage improvements and their depth (pond, pipe, swale, etc.);
- C. The existing and proposed topography, including surface water areas and the existing and proposed direction of the drainage flow;
- D. Contain scaled drawings; and
- E. Be signed and sealed by a Florida registered engineer and shall show a positive outfall of overflow into the City drainage system. The plan, once approved, shall become a condition upon which the fill is permitted, and any change or addition shall constitute a violation of this section unless such change or addition is examined by the City.

DIVISION 20

ENFORCEMENT PROVISIONS, VARIANCES, AND APPEALS

6.20.1 ENFORCEMENT PROVISIONS

A. VIOLATION

It shall be a violation of this article for any person to construct, open, modify, or dedicate any street, driveway, drainage structure, or landscaping without first having obtained plan approval or otherwise having complied with the provisions of this article.

B. PENALTIES FOR VIOLATIONS

- 1. Any person, whether as owner, lessee, principal, agent, employee or otherwise, who violates any of the provisions of this code, or permits any such violation to continue, or otherwise fails to comply with the requirements of this code or of any plan or statement submitted and approved under the provisions of this code, shall be guilty of an ordinance violation and subject to prosecution as provided for in the City Code. At the option of the City, any violation may be processed through the City's Code Enforcement Board.
- 2. Nothing herein contained shall prevent the City from taking such other lawful action, including, but not limited to, resorting to equitable action, including injunctive relief, as is necessary to prevent or remedy any violation.

6.20.2 VARIANCES

The City Council, upon the recommendation and advice of the City Manager, may grant variances from the provisions of this article, which shall not be contrary to the public interest where, owing to special conditions, it finds a literal enforcement of such provisions, would result in unnecessary hardship.

6.20.3 APPEALS PROCEDURE

A. APPEAL OF STAFF DECISION

Any person aggrieved by the decision of any City official in the enforcement or interpretation of this article, may appeal such decision to the City Council of the City

of St. Cloud within thirty (30) days from said decision. The City Council by majority vote, may affirm, reverse, or modify the decision of the City official.

SECTION 2: Article VII, Utilities, of the St. Cloud Land Development City Code, is hereby amended to read as follows (underlined indicates added language, strikethrough indicates deleted):

DIVISION I BASIC INFORMATION

7.1.1 GENERAL

The procedures, specifications and standards set forth herein are to provide for expeditious processing of Environmental Utility Facility Permit Applications and assure uniformity and quality of construction of potable water and sanitary sewage facilities which meet one or more of the following conditions:

- Facilities to be constructed within the corporate limits of the City of St. Cloud;
- Facilities to be constructed outside the City corporate limits, but within the Chapter 180 -Urban Service Area, as defined by Division 13 of this Article;
- Facilities to be dedicated to the City for ownership;
- Facilities to become future additions to the City utility system.

These procedures, specifications and standards shall be applicable to the permitting, design and construction of such systems meeting one or more of the above conditions and the applicable provisions herein shall be incorporated into all plans and specifications for said systems.

A. Pre-design Conference

The owner/developer, at their discretion, shall be responsible for requesting a pre-design conference with the City Engineer. At the pre-design conference, the owner, his/her engineer, and the City Engineer is required.

B. Utility Coordination

The developer shall be responsible to coordinate with all public and private utilities concerning his/her development. All utilities shall be given a minimum of a two-week notice prior to commencement of construction.

C. Construction

Utility lines of all kinds, including but not limited to those of franchised utilities, electric power and light, telephone and telegraph, cable television, water, sewer, reuse and gas, shall be constructed and installed beneath the surface of the ground unless it is determined by the City Engineer that soil, topographical, or any other compelling conditions make the installation of such utility lines as prescribed herein unreasonable or impracticable. It shall be the developer's responsibility to make the necessary arrangements with each utility in accordance with the utility's established policies. Nothing in this subsection shall be construed to prohibit any entity furnishing utility service within the City from collecting, as a condition precedent to

the installation of service facilities, any fee, prepayment or construction in aid of construction which may be required.

7.1.2 SUBMISSION OF DOCUMENTS

Engineering documents for construction of water, sewage and/or reuse systems in the City of St. Cloud shall be submitted to and for review by the City of St. Cloud Public Services Department. The submitted documents shall be prepared by a competent professional engineer registered under Chapter 471, Florida Statutes, 1941, and amendments thereto.

A. Documents to be Submitted

1. Plans - 12 sets, or as specified;
2. Specifications - as may be applicable;
3. Completed Florida Department of Environmental Protection (FDEP) water extension application form, with supporting data (applicable to potable water supply and distribution facilities including a hydraulic analysis report))one (1) set for the City's records, plus additional sets as required for submittal to FDEP and for the project engineer;
4. Completed FDEP sewer extension application form, with supporting data (applicable to sanitary sewage facilities including lift station report) - one (1) set for the City's records, plus additional sets as required for submittal to FDEP and for the project engineer.
5. Two (2) copies of reclaim distribution system hydraulic analysis report if reclaim service is being provided.

B. Review by the City of St. Cloud

The City Engineer will review and approve (or disapprove) the plans and specifications and retain one set with all remaining sets of the appropriate application forms (signed as necessary) and engineering documents returned to the applicant. Only similar and identical copies of approval plans and specifications are to be issued by the applicant for construction purposes.

C. Revisions

All revisions affecting the design or construction of the proposed facilities must receive approval of the City Engineer before they are incorporated in the construction of the proposed facilities.

7.1.3 COMMENCEMENT OF WORK

A. Notification

The City Engineer shall be notified in writing of the proposed date of the beginning of construction. Any time that work is to stop for a period of time in excess of five (5) working days, other than stoppage beyond the contractor's control, the City Engineer shall be notified of such interruption. No construction work shall be started prior to approval of the plans and specifications by the City Engineer, or by other interested agencies having jurisdiction. The City Engineer shall be notified not less than twenty-four (24) hours in advance of the start of actual construction, and all materials to be incorporated therein shall be available for inspection at least forty-eight (48) hours before installation.

B. Preconstruction conference

A preconstruction conference shall be held at least two (2) days before the commencement of construction. The developer shall be responsible for arranging this conference with the City Engineer.

7.1.4 USE OF CITY RIGHT-OF-WAY

Permission for use of City right-of-way shall be obtained from the City through completion of a Right-of-Way Utilization Permit Application.

All facilities to be owned and maintained by the City shall be *located on City property*, within City or other approved rights-of-way or on easements dedicated to the City for uses intended.

7.1.5 FEES

The City of St. Cloud will determine and collect the applicable connection fee(s) and other charges for sewer, reuse and/or water services.

7.1.6 OTHER STANDARDS

These guidelines and project specifications may contain certain abbreviated references to standards or specifications of various organizations, including but not limited to the following:

AASHO, American Association of State Highway Officials
AAMA, Architectural Aluminum Manufacturer's Association
ACI, American Concrete Institute
ACPA, American Concrete Pipe Association
AISC, American Institute of Steel Construction

ANSI (USASI, ASA), American National Standards Institute (formerly United States of America Standards Institute, formerly the American Standards Association)
API, American Petroleum Institute
AGC, Associated General Contractors of America
ASHRAE, American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME, American Society of Mechanical Engineers
ASTM, American Society for Testing Materials
AWS, American Welding Society
AWWA, American Water Works Association
CISPI, Cast Iron Soil Pipe Institute
CRSI, Concrete Reinforcing Steel Institute
FDEP, Department of Environmental Protection, State of Florida
DIPRA, Ductile Iron Pipe Research Association
DOT, Department of Transportation, State of Florida
DPC, Department of Pollution Control, State of Florida
EPA, Environmental Protection Agency, United States
FS, Federal Specifications
IEEE, Institute of Electrical and Electronic Engineers
IES, Illuminating Engineering Society
NCPI, National Clay Pipe Institute
NEC, National Electrical Code
NEMA, National Electrical Manufacturers Association

NFPA, National Fire Protection Association

NLA, National Lumber Association

NSF, National Sanitation Foundation Testing Laboratory, Inc.

OSHA, Occupational Safety and Health Administration (U.S. Space Department of Labor)

PS, Product Standards (Published by National Bureau of Standards, U.S. Department of Commerce)

TPI, Truss Plate Institute

TSS (S), "Ten-State Standards", i.e., Recommended Standards for Sewage Works

TSS (W), "Ten-State Standards", i.e., Recommended Standards for Water Works

UL, Underwriters Laboratories

UNI-B, Uni-Bell Plastic Pipe Association

WEF, Water Environmental Federation Manual of Practice [No. 8, & 9]

When standards or specifications are indicated herein by reference, the referenced portion shall apply to the most recent edition of the publication and shall have the same force and effect, to the extent indicated by the references thereto, as if they were included herein in their entirety.

7.1.7 APPROVAL OF SOURCES OF MATERIALS AND EQUIPMENT

The source of any required materials or equipment shall be subject to approval by the Public Services Department before shipment to the job site. The owner, manufacturer, or authorized representative of the supply source shall be required to submit representative samples for inspection or tests and/or shop drawings. The results obtained from testing such samples may be used for preliminary approval, but this preliminary approval will not constitute final acceptance of the materials. All materials proposed for use may be tested at any time during their preparation and use. If after trial, it is found that sources of supply that have been approved do not furnish a product of uniform quality, or if the product from any source proves unacceptable at any time, the Owner/Developer shall furnish approved material from another source. A minimum of four (4) sets of shop drawings will be required for all materials and equipment.

7.1.8 APPROVAL AND ACCEPTANCE OF MATERIALS

Materials may be sampled either before shipment or after being received at the place of construction. All materials shall be in a new and unused condition. All sampling, inspecting and testing shall be done in accordance with methods hereinafter prescribed. The Owner/Developer shall provide such facilities as may be required for conducting field tests and for collecting and forwarding samples. The Owner/Developer shall not use or incorporate into the work any materials represented by the samples until tests have been made and the material found to be acceptable. Only materials that conform to the requirements of the approved specifications and/or that have been approved by the City Engineer shall be used in the work. Any material that, after approval, has for any reason become unfit for use shall not be incorporated into the work.

7.1.9 SAMPLING AND TESTING

A. Standards

Except as otherwise provided, sampling and testing of materials, and the laboratory methods and testing equipment used, when required, shall be in accordance with

the latest published standards (including published tentative) authoritative for the type of test required and performed by a competent engineering testing laboratory which shall have a professional engineer registered in Florida as one of the responsible officials of the firm.

B. Costs

The testing of samples and materials shall be made at the expense of the Owner/Developer, unless otherwise specifically authorized or approved in writing by the City Engineer.

C. Location

It is expected that all inspections and testing of materials and equipment will be done locally. If the builder desires that inspections or tests be made outside of the local area, all expenses, including per diem for any duly authorized representative of the Public Services Department shall be borne by the Owner/Developer.

7.1.10 LEGAL RESTRICTIONS AND PERMITS

The Owner/Developer is assumed to be familiar with all federal, state, county, City and other laws, codes, ordinances, and regulations that in any manner affect those engaged or employed in the work, the materials or equipment used in or upon the site, or the conduct of the work. The Owner/Developer at all times shall observe and comply with all federal, state, county, City and other laws, codes, ordinances and regulations in any manner affecting the conduct of the work. The Owner/Developer shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incidental to the due and lawful prosecution of the work.

7.1.11 PUBLIC CONVENIENCE AND SAFETY

A. Maintenance of Traffic

Materials stored at the site of the work shall be so placed and the work shall at all times be so conducted as to cause no obstruction to vehicular or pedestrian traffic. No roadway shall be closed or opened except by express permission of the City Engineer or such other authorized public agency having jurisdiction.

B. Protection of Persons and Property

Precaution shall be exercised at all times for the protection of persons and property. The safety provisions of applicable laws, building codes and construction codes shall be observed. Machinery, equipment and other hazards shall be guarded in accordance with the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in convention of applicable law.

7.1.12 USE OF EXPLOSIVES

Explosives shall not be used unless specifically approved in writing by the City Manager or designee. If the use of explosives is so approved, the Owner/Developer shall obtain all the necessary permits from the proper authorities, and blasting shall be done in accordance with their regulations. The Owner/Developer shall use the utmost care not to endanger life or property. The Owner/Developer shall assume all responsibility for damages caused by blasting, and only competent persons shall handle or use explosives. All explosives shall be stored in a secure manner, with each storage place marked clearly "DANGER-EXPLOSIVES", and shall be in the care of a competent watchman at all times.

7.1.13 CHEMICAL USAGE

All chemicals used during project construction or furnished for project operations, whether toxic, hazardous or of other classification, must show approval of either U.S. Environmental Protection Agency or U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict conformance with product labels and all other applicable regulations.

7.1.14 PROTECTION AND RESTORATION OF PROPERTY

A. Public and Private Property

The Owner/Developer shall not enter upon private property for any purpose without first obtaining permission from the property owner, and he shall use every precaution necessary to prevent damage or injury to any public or private property, trees, fences, monuments, and underground structures, etc., on and adjacent to the site of the work.

B. Right-of-ways

The Owner/Developer shall not do any work that would affect any railway track, pipeline, telephone, telegraph, cable television, or electric transmission line, or other structure, or enter upon the right-of-way or other lands appurtenant thereto, until authority therefore has been secured from the proper persons.

C. Responsibility

The Owner/Developer shall be responsible for all damage or injury to property of any character resulting from any act, omission, neglect or misconduct in his/her manner or method of executing said work, from his/her non-execution of said work, or from defective work or materials. The Owner/Developer shall not be released from said responsibility until the work has been completed and accepted and the warranty requirements fulfilled, as per Section 7.1.27 of this Article.

D. Restoration

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof on the part of the Owner/Developer, he shall restore such property, at his/her own expense, to a condition equal to or better than that existing before such damage or injury was done by repairing, rebuilding or otherwise restoring, as may be directed, or he shall make good such damage or injury in a manner acceptable to the damaged or injured party.

7.1.15 WORK IN STREET

A. Traffic regulations

The Owner/Developer shall provide bypasses, crossings, and other means or the maintenance of one-way traffic in all streets, and two-way traffic, wherever possible, in all streets where work is in progress. Construction operations shall be carried on only between 8:00 a.m. and 5:00 p.m. on Monday through Friday, except observed City holidays, unless otherwise approved by the City Engineer, or in cases of emergency. The Owner/Developer shall plan and schedule his/her operations to impose the least possible interference with normal traffic flow; and, any such interference shall be cleared by the City Engineer or such other authorized public agency having jurisdiction.

B. Guardrails and barricades

The Owner/Developer shall provide, erect, and maintain effective barricades, danger signals, and signs on all intercepted streets or highways and in other locations where required for the protection of the work and the safety of the public. Barricades or obstructions which encroach on, or are adjacent to, public rights-of-way shall be provided with lights which shall be kept burning at all times between sunset and sunrise. Conformity with state, county and City laws and regulations is required in the use of streets and highways. The Owner/Developer shall be responsible for all damages resulting from any neglect or failure to meet these requirements. Watchmen shall be provided as required by local regulations or as necessary to fulfill the requirements stated herein.

C. Traffic and services

Adequate means of access to all public and private properties during all stages of construction shall be provided. Unless approval in writing is secured from the property owner or City, there shall be no interruption of service to present customers of such utilities requiring repairs, changes or modifications caused by the construction work.

D. Applicable codes

The State of Florida Department of Transportation "Utility Accommodation Guide Procedure 616-400" and its "Uniform Manual for Traffic Control Devices" and the City of St. Cloud right-of-way Utilization Regulations shall be followed as applicable.

7.1.16 DISRUPTION TO EXISTING SYSTEM OPERATION

The Owner/Developer shall perform operations necessary for connecting to the existing system at times of minimum flow rate. Said operations shall be accomplished expeditiously in order to minimize service disruption. All schedules shall be coordinated with, and approved by, the City of St. Cloud Public Services Department, or the appropriate utility involved.

7.1.17 MINIMIZING SILTATION AND BANK EROSION

During all dewatering or other operations involving the use and disposal of water, suitable means shall be provided by the Owner/Developer to minimize soil erosion, siltation, and sedimentation of natural or artificial ditches, soil erosion, siltation and sedimentation of natural or artificial ditches, drainage channels, streams, lakes or other waterways. The City Engineer must approve such means proposed by Owner/Developer prior to any dewatering, pumping or other water-involved operations. If required, in the opinion of the City Engineer, methods such as stilling basins, baffles, siltation basins, matting, spread-disposal, recharge pits, etc., shall be used by the builder to minimize siltation and bank erosion, with said methods in full compliance with the FDEP, SFWMD, and City of St. Cloud Pollution Control requirements.

7.1.18 SURVEY AND CONSTRUCTION STAKES

It shall be the responsibility of the contractor to provide and set in place all construction stakes and marks for lines, grades and measurements necessary or required for the proper prosecution and control of the utility installation work. The contractor shall be responsible for the accuracy and preservation of the stakes and marks. The plans shall also show or describe the reference points or monuments from which the contractor shall lay out the work and the builder shall preserve these reference points. The contractor shall immediately restore any damaged, dislodged or lost reference points, at their expense.

7.1.19 BENCH MARKS AND MONUMENTS

The Owner/Developer shall carefully maintain all benchmarks, monuments and other reference points. All benchmarks shall be based upon N.G.V.D. datum. Survey monuments or benchmarks which have to be disturbed by construction work shall be carefully witnessed before removal and replaced upon completion of the work by a professional land surveyor, registered in and by the State of Florida.

7.1.20 NAMEPLATES

With the exceptions noted, each piece of equipment shall be provided with a substantial nameplate of non-corroding metal, securely fastened in place. The nameplate shall be clearly and permanently inscribed with the manufacturer's name, model or type designation, serial number, principle rated capacities, electrical or other power characteristics, and similar information as appropriate. This requirement shall not apply to

standard, manually operated hydrants, gate, globe, butterfly, check or plug valves; or accessories and specialties not having an electrical drive or connection.

7.1.21 CHARACTER OF EQUIPMENT

Equipment used on any portion of the work shall be such that no damage to the work, roadways, adjacent property, or other objects will result from its use.

7.1.22 SANITARY PROVISIONS

The Owner/Developer shall provide and maintain in a neat and sanitary condition such accommodations for the use of his/her employees as may be necessary to comply with the requirements and regulations of the state, local health department, or other agencies having jurisdiction.

7.1.23 CONFORMITY WITH PLANS AND ALLOWABLE DEVIATIONS

The entire installation and each part thereof shall be constructed according to the approved plans. Any deviation from the plans and working drawings that may be required must have prior approval of the City Engineer.

7.1.24 SUBSTITUTIONS OR "APPROVED EQUALS"

Whenever a material or article required is specified or shown on the approved plans by using the name of the proprietary product or if a particular manufacturer or vendor is listed, it shall be considered that this was done only for the purpose of establishing a standard of quality for the specified materials. Any material or article which will perform the function imposed by the general design will be considered, provided the City Engineer is assured the material or article so proposed is of equal substance, form and function. Such substitutions shall not be purchased or installed without written approval from the City Engineer.

7.1.25 INSPECTIONS

A. Purpose

The purpose of these inspections is to ensure compliance with the approved development plan and to advise the City Council whether or not the roads, storm drainage, utilities, and other required improvements being constructed appear to qualify for acceptance by the City. The City accepts no responsibility or liability for the work, or for any contractual conditions involving acceptance, payments or guarantees between the contractor and the developer, by virtue of these stage inspections. The City assumes no responsibility or commitment guaranteeing acceptance of the work, or for subsequent failure, by virtue of these stage inspections. However, if any aspect of the work being performed does not comply with acceptable standards, corrections will be required by the City Engineer as a condition for City acceptance. All required improvements shall be installed, and have the approval of the City Engineer and/or other City department(s) prior to acceptance by the City Council.

B. Staged inspections

1. Staged inspections during construction are required, and it shall be the responsibility of the developer or his/her contractor to notify the City Engineer and arrange for these inspections. The applicable stages of inspections will be determined by the City Engineer.

2. During construction and upon completion of the following applicable construction stages, the builder shall notify the City Engineer when each stage is ready for inspection and will await clearance by the City Engineer before proceeding to the next stage:

- (a) Clearing and grubbing
 - (b) Removal of unsuitable material
 - (c) Water main installation
 - (d) Reuse main installation
 - (e) Sanitary sewer force main installation
 - (f) Sanitary sewer gravity main installation
 - (g) Sanitary sewer manhole installation
 - (h) Lift station set and "pump down" test
 - (i) Storm drainage system installation
 - (j) Stabilization of subgrade
 - (k) Underdrain installation
 - (l) Curb, gutter, and backfill
 - (m) Inlets, box culverts, and all other concrete structures when steel is in place prior to pouring
 - (n) Base course during construction or mixing
 - (o) Finishing base course prior to paving
 - (p) Wearing surface during application
 - (q) Clean up and dressing of right-of-way limits
 - (r) Sodding and seeding (erosion control and landscaping)
 - (s) Street name signs and traffic control signs
 - (t) Pavement marking
 - (u) Substantial completion inspection
 - (v) Final inspection
3. The City Engineer will require a minimum of twenty-four (24) hours notice to schedule all inspections, except for (u) & (v), which shall require notices pursuant to 7.1.25.D and 7.1.25.E.

C. Periodic

The City Engineer will periodically visit the project site to make a visual inspection of the progress of the work and methods of construction. Upon observation of work not done in accordance with the plans and specifications, the City Engineer will notify the developer's contractor, and the developer or designee, and request that the necessary corrections be made, or tests performed to assure compliance with the specifications, at no cost to the City.

D. Substantial completion

The City Engineer shall be notified when the project is substantially completed. By substantial completion it is meant that the project has been completed to the stage that is ready for operation and development of a final "punch list". Upon receiving a minimum of forty-eight (48) hours verbal request, excluding weekends and holidays, for substantial completion inspection of the completed work, the City Engineer, or his/her representative, together with the representatives of other interested agencies, shall conduct the inspection and prepare a "punch list." of unfinished

correction required portions of the work which will be reviewed with the developer's contractor, who shall complete all items thereon prior to requisition of a final inspection, as described below.

E. Final

The City Engineer shall be notified when the "punch list." generated at the Substantial Completion inspection, has been completed and the project is 100% complete. Upon receiving a seventy-two (72) hour written request, excluding weekends and holiday, for final inspection of the completed work, the City Engineer, or his/her representative, together with representatives of other interested agencies, shall perform the final inspection.

F. Inspection by other agencies

Any Local, State or Federal agencies having legal interest in the project shall have free access to the site for inspecting materials and work. The Owner/Developer shall afford them all necessary facilities and assistance for doing so. Any instructions to the Owner/Developer resulting from these inspections shall be given through the City Manager or designee. These rights of inspection shall not be construed to create any contractual relation between the Owner/Developer and these agencies.

G. Inspections of private facilities

Inspections and verification of private streets and drainage facilities in the approved development shall be conducted by a registered professional engineer. The results shall be submitted to the City Engineer, on a form approved by the City Engineer.

7.1.26 DEFECTIVE AND UNAUTHORIZED WORK

A. Duty to Repair and Replace

All work that has been rejected or condemned shall be repaired or, if it cannot be satisfactorily repaired, shall be removed and replaced at the Owner/Developer's expense. Materials not conforming to the requirements of the specifications shall be removed immediately from the site of the work and replaced with satisfactory material by the Owner/Developer at his/her own expense.

B. Final acceptance

Upon reasonable cause, due justification by, and at the written request of the City Engineer, the Owner/Developer shall, at his/her own expense, at any time before final acceptance of the work, remove or uncover such portions of the finished work as may be directed. After examination, the builder shall restore the said portions of the work to the condition required by the approved plans and specifications.

Failure to reject any defective work or material during construction shall not prevent later rejection upon discovery prior to acceptance or obligate the City to final acceptance.

7.1.27 WARRANTY

The Owner/Developer shall furnish to the City of St. Cloud a guarantee, to remain in full force and effect for a period of two years from the date of acceptance of the project by the Public Services Department. This guarantee shall provide that the Owner/Developer shall repair or replace all work performed and materials and equipment furnished that were not performed or furnished in accordance with the approved plans and specifications, or that become defective before the expiration of said two (2) year period. Such guarantee shall be covered by a maintenance bond, underwritten by a surety licensed to do business in the State of Florida. Notice to the Owner/Developer

that any part of the project needs to be repaired, replaced or made good during the guarantee period shall be given in writing by the City Manager or designee. If the Owner/Developer refuses or neglects to do such work within seven (7) calendar days from the date of service of such notice, or in the event such work requires longer than seven (7) calendar days for completion, and the Owner/Developer has not provided satisfactory evidence of his/her intention to perform such work within the time limit established by the City Engineer, the City Engineer shall have the work done by others and the cost thereof shall be paid by the Owner/Developer or his/her surety. The maintenance bond shall not be released until the foregoing obligations have been fully discharged.

7.1.28 COMPLETION

A. As-built Drawings & Digital Format

Prior to the project sign-off, the owner/developer shall provide an AutoCAD (Release 2004 or higher) CD or DVD of the project and three (3) complete sets of signed and sealed "as-built" record drawings, including standard details, to the Public Services Department. The AutoCAD digital format of the project shall follow the City of St. Cloud CADD Standards as approved by City Manager and on file in the Department of Planning and Zoning. The drawings shall be signed and certified by the engineer of record and by a professional land surveyor; attesting to the fact that the plans, to the best of his/her knowledge, are correct. "As-built" drawings shall show all facilities including pre-existing facilities as well as those constructed as part of the applicable project. If facilities dedication to the City is desired, as-built drawings shall be submitted five (5) working days in advance of the desired date of acceptance by the City.

B. Certificates of Compliance

Certificates of compliance with the specifications furnished by the material supplier shall be submitted on all material used in the completion of this work upon request by the City Engineer.

C. Test results

All required test results shall be submitted prior to acceptance of the project by the City

D. Other requirements

Other requirements for acceptance of the completed project shall include, but are not limited to, an itemized construction cost document, approved FDEP construction applications, and official FDEP clearance for use. The City Engineer may withhold final acceptance of the project by the City until the requirements for "as-built" drawings and related records have been met.

7.1.29 SCOPE OF THESE SPECIFICATIONS AND STANDARDS

The facilities and work related thereto by these specifications and standards include potable water mains and service piping, reuse mains and services, gravity sanitary sewers and service laterals, sanitary sewer force mains, sanitary sewer pumping stations and/or holding tanks, wastewater treatment facilities, and water treatment facilities.

7.1.30 FLORIDA WATER STAR PROGRAM

A. REQUIRED PARTICIPANTS

All new residential projects are required to become certified under the Florida Water Star Program (FWS) (www.floridawaterstar.com). The requirements outlined by the FWS program shall be met by the developer.

B. USE OF CURRENT FLORIDA WATER STAR VERSION

The most recent version of the FWS Basic Qualifications Point List at the time of DSA execution shall be designated for use on the project. All certification inspections shall use the version of the point list in effect at the time of execution of the DSA.

C. COMPLIANCE SCHEDULE

The property shall be certified under the FWS prior to the later of either the date of receipt of water service or the date the certificate of occupancy for that property is issued.

D. NON COMPLIANCE PENALTY

If the potable and irrigation/reuse meters have been installed on the property prior to compliance with FWS, The City has the right to discontinue water and or irrigation/reuse service with prior notice to the property owner. Service shall not be restored until the property in question fully complies with FWS.

E. CERTIFICATION INSPECTION

Certification under the FWS program shall be completed by a certified professional. The City may provide the certification inspection. Obtaining the certification inspection from another source is permissible except when the other source has a vested interest in the project.

F. CERTIFICATION COORDINATION

The efficiency of the certification inspection shall be enhanced by coordination with the city early in the planning process. Coordination should include review of the typical irrigation and landscaping plans, plumbing appliance and fixture specifications.

7.1.31 REAR YARD GRASS REQUIREMENTS

St. Augustine (AKA Captiva, Floratam, Floratine, Palmetto, Raleigh, Sapphire, Seville, and Sir Walter) is prohibited from being installed in the rear yard for all new residential projects. For the intent of this section, the rear yard is the portion of the yard between the rear property line and the house extending to both side property lines. For corner lot homes, the rear yard shall stop at the edge of the house and not extend to the property line adjacent to the right of way. Drought tolerant and low water ground cover shall be used in the rear yard.

DIVISION 2

UTILITY EXCAVATION, TRENCHING, AND BACKFILLING

7.2.1 GENERAL

This section covers excavation, backfill, fill and grading associated with utility trench and structural construction. The 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.

7.2.2 SOIL BORINGS AND SUBSURFACE INVESTIGATIONS

The contractor shall examine the site and undertake subsurface investigations including soil borings before commencing the work. The City will not be responsible for presumed or existing soil conditions in the work area.

7.2.3 EXISTING UTILITIES

Contractor shall locate existing utilities in the areas of work. If utilities are to remain in place, the contractor shall provide adequate means of protection during earthwork operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, the contractor shall consult the owner of such piping or utility immediately for directions. Payment for damage and repair to such piping or utilities is the contractor's responsibility.

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

7.2.4 MATERIALS

A. General

Materials for use as bedding and backfill shall be as described under this section. The Contractor shall, upon request by the City, make an appropriate sample of this material available for testing by the City or its designated representative.

B. Structural Fill

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

C. 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 six (6) inches 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 (12%) by weight finer than the No. 200 mesh sieve unless finer material is approved for use in a specific location by the City.

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 the City, is not suitable for reuse, shall be spoiled as specified herein for disposal of unsuitable materials.

D. 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-inch in largest dimension, and shall be no more than 5 percent (5%) by weight finer than the No. 200 mesh sieve.

E. Bedding Rock

Bedding rock shall be 3/16-inch to 3/4-inch washed and graded stone (FDOT #57). This stone shall be graded so that 90 to 100 per cent will pass a 3/4-inch screen and 95 to 100 per cent will be retained on a No. 8 screen. No stones larger than 1-inch in any dimension shall be accepted.

F. Unsuitable Material Below Trench Grade

Soil unsuitable for a proper foundation encountered at or below trench grade, such as muck or other deleterious material, shall be removed for the full width of the trench and to the depth required to reach suitable foundation material, unless special design considerations received prior approval from the City Engineer. Backfilling below trench grade shall be in compliance with the applicable provisions of subsection 7.2.8.

G. Extra Utility-bedding Material

When rock or other non-cushioning material is encountered at trench grade, excavation shall be extended to six (6) inches below the outside of the bottom of the utility, and a cushion of sand or suitable crushed rock shall be provided.

H. Excavated Material

Excavated material to be used for backfill shall be neatly deposited at the sides of the trenches where space is available. Where stockpiling of excavated material is required, the contractor shall be responsible for obtaining the sites to be used.

I. Material Disposal

Excess, unsuitable, and cleared or rubbed material resulting from utility installation, shall be removed from the work site and disposed of at locations secured by the contractor. Excess excavated material shall be spread on the disposal site and graded in a manner to drain and not disturb existing drainage conditions.

J. Borrow

Should there be insufficient satisfactory material from the excavations to meet the requirements for fill-material, borrow shall be obtained from a source secured by the contractor, and approved by the City Engineer.

K. Roadway and Pavement Restoration

Where the only practical installation requires pavement removal, the following restoration policy will be adhered to:

1. Pavement or roadway surfaces cut or damaged shall be replaced by the developer in equal or better condition than the original, including stabilization, base course, surface course, curb and gutter, or other appurtenances. The contractor shall obtain the necessary permits (City of St. Cloud, "Right-of-Way Utilization Permit", State of Florida, Department of Transportation, "Utility Permit", and other applicable authorization), prior to any roadway work. Additionally, the developer shall provide advance notice to the appropriate authority, as required, herein before prior to construction operations.
2. Restoration shall be in accordance with the requirements set forth in Article X, Right-of-Way Utilization, and this division. The materials of construction and method of installation, along with the proposed restoration design for items not referred to or specified herein, shall receive prior approval from the City Engineer.

3. Where existing pavement is removed, the surfacing shall be mechanically saw-t prior to trench excavation, leaving a uniform and straight edge, with minimum disturbance to the remaining adjacent surfacing. The width of cut of this phase of existing pavement removal shall be the minimum necessary to allow for installation of the utilities.
4. Immediately following the specified backfilling and compaction, a temporary sand seal coat surface shall be applied to cut areas. This temporary surfacing shall provide a smooth traffic surface with the existing roadway and shall be maintained until final restoration. Said surfacing shall remain for ten (10) days in order to assure the stability of the backfill under normal traffic conditions. Following this period and prior to fifteen (15) days after application, the temporary surfacing shall be removed and final roadway surface restoration accomplished.
5. In advance of final restoration, the temporary surfacing shall be removed and the existing pavements mechanically sawed straight and clean to the stipulated dimensions. Following the above operation, the developer shall proceed with the requirements set forth in the Article X, "Right-of-Way Utilization," and this division.

L. Protection and Restoration of Property

During the course of construction, the contractor shall take special care and provide adequate protection in order to minimize damage to vegetation, surface areas, and structures within the construction of right-of-way, easement or site, and take full responsibility for the replacement or repair thereof.

M. Clean-up

Work site clean up and property restoration shall follow behind construction operations without delay.

7.2.5 SHEETING AND BRACING IN EXCAVATIONS

A. 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, the 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.

B. 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 (1) foot above the top of any pipe unless otherwise directed by the City. If during the progress of the work, the City decides that additional wood sheeting should be left in place, it may direct the contractor to do so. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given by the City 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 the City 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 the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

The contractor shall construct the cofferdams and sheeting outside the neat lines of the foundation unless indicated otherwise to the extent he deems it desirable for his/her 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 the contractor at his/her own expense so as to provide the necessary clearances and dimensions.

7.2.6 DEWATERING, DRAINAGE AND FLOTATION

A. General

The contractor shall excavate, construct and place all pipelines, concrete work, fill, and bedding rock, in-the-dry. In addition, the contractor shall not make the final 24-inches of excavation until the water level is a minimum of two (2) feet below proposed bottom of excavation. For purposes of these specifications, "in-the-dry" is defined to be a condition in which the trench bed for the pipe is stable, firm and unyielding. The City reserves the right to ask the contractor to demonstrate that the water level is a minimum of two (2) feet below proposed bottom of excavation before allowing the construction to proceed.

Discharge from dewatering shall be disposed of in such a manner that it will 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. At no time shall the construction site dewatering activities result in exceeding the water quality standards as set forth in Chapter 62-302, Florida Administrative Code (F.A.C.) as required by the FDEP. Additionally, where private property will be involved, advance permission shall be obtained by the contractor.

B. Additional Requirements

The contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly, and dispose of properly, all water entering excavations and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, 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. Continuous pumping will be required as long as water levels are required to be below natural levels.

It is expected that wellpoints will be required for pre-drainage 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.

The 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.

7.2.7 EXCAVATION

A. 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 the City. Unauthorized excavation, as well as remedial work directed by the City shall be at the contractor's expense. Such remedial work shall be performed as directed by the City.

If requested by the City, 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 the City.

If the contractor excavates below grade through error or for his/her own convenience, or through failure to properly dewater the excavation, or disturbs the subgrade before dewatering is sufficiently complete, he may be directed by the City to 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 the City until required for backfill or 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 the contractor. Any permits required for the hauling and disposing of this material shall be obtained by the contractor prior to commencing hauling operations.

B. 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 form work, 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.

C. 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 the City.

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

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 detail sheets. Bell holes shall be made as required.

7.2.8 BEDDING AND BACKFILL

A. 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 the City, making due allowance for settlement of the material. Fill shall be placed only on properly prepared surfaces which have been inspected and approved by the City. If sufficient select common or common fill material is not available from excavation on site, the 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. The Contractor shall assign a sufficient number of men to this work to insure 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". The contractor shall dewater excavated areas as required to perform the work and in such manner as to preserve the undisturbed state of the natural inorganic soils.

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 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 insure 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. The 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 this manual. Backfill or fill material shall not be placed on surfaces that are muddy, frozen or contain frost or ice.

B. Bedding and Backfill for Structures

Bedding rock shall be used for bedding under all structures as indicated on the detail sheets. The contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed. Structural fill shall be used as backfill against the exterior walls of the structures. Fill shall be compacted sufficiently in accordance with 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, the 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 (3) feet either side of the center line of the pipe in level layers not exceeding eight (8) 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.

C. Bedding and Backfill for Pipes

Bedding for pipe shall be as shown on the plans as shown on the detail sheets. The contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.

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 detail sheets.

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 (1) foot above the top of the pipe. The filling shall be carried up evenly on both sides. Compaction shall be in accordance with this manual. 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 this manual.

7.2.9 COMPACTION

A. General

The contractor shall control soil compaction during construction to provide the percentage of maximum density specified. The contractor shall provide the City copies of all soils testing reports, prepared by a geotechnical/soils engineer, demonstrating compliance with these specifications.

When existing trench bottom has a density less than that specified under these specifications, the 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.

B. Percentage of Maximum Density Requirements

Fill or undisturbed soil from the bottom of the pipe trench to one (1) foot above the pipe shall be densified to a minimum density of ninety-five percent (95%) of the maximum dry density as determined by AASHTO T-180.

Backfill from one (1) foot above utility pipes to grade shall be densified to a minimum density of ninety-five per cent (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 nine-five per cent (95%) of the maximum dry density as determined by AASHTO T-180.

All trenches cut in pavements or areas to be paved within the jurisdiction of the City of St. Cloud, shall be restored to these specifications and shall have backfill, compaction as determined by AASHTO T-180, laboratory method, and shall be equal to ninety-eight per cent (98%) of maximum density, to the bottom of the subgrade elevation. Compaction in other areas below the subgrade shall not be less than ninety-five per cent (95%) of maximum density in accordance with City standard detail. Other specifications may be required by the agency having jurisdiction of the roadway but the restoration shall be brought to these standards as a minimum.

C. Compaction Tests

One compaction test location shall be required for each run of pipe between manholes, and for every 100 square feet of backfill around structures as a minimum.

The City may determine that more compaction tests are required to certify the installation depending on field conditions. The locations of compaction tests within the trench shall be in conformance with the following schedule:

1. At least one test for each twelve-inch (12") layer of backfill within the pipe bedding zone for pipes 24 inches and larger.
2. One test at an elevation of one (1) foot above the top of the pipe.
3. One test for each two (2) feet of backfill placed from one (1) 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.

7.2.10 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.

7.2.11 MAINTENANCE

Contractor shall protect newly graded areas from traffic and erosion and keep them free of trash and debris. Contractor shall repair and re-establish 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.

7.2.12 INSPECTION AND QUALITY ASSURANCE

A. 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 the City if elevations of existing grade vary from elevations shown on drawings.

B. Quality Assurance

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

The contractor, at his/her 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 the City.

Quality control testing shall be performed during construction to ensure compliance with these specifications. Contractor shall allow the testing service to inspect and approve fill materials and fill layers before further construction is performed. The contractor shall give copies of all test results in a report form to the City Engineer to demonstrate compliance with compaction requirements stipulated in this manual.

DIVISION 3

UTILITY LINE INSTALLATION REQUIREMENTS

7.3.1 BORING AND JACKING OPERATIONS

A. General

The installation of a casing pipe by the method of boring and jacking shall be covered by these specifications. The overall work scope shall include, but not be 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 detail sheets, and restoration. Boring and jacking operations shall be performed within the right-of-way and/or easements shown on the Plans and Specifications. It shall be the responsibility of the contractor to submit the necessary permit documents and data to the appropriate authority and receive approval thereof. For casing pipe crossings under roadways, railroads, or other installations not within the jurisdiction of the City, the contractor shall comply with the regulations of said authority in regard to design, specifications and construction.

B. Pipe Material

1. Steel Casing

Steel casings 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 PIPE NOMINAL DIAMETER	CASING OUTSIDE DIAMETER	CASING WALL THICKNESS
4"	12"	.250"
6"	16"	.250"
8"	20"	.250"
10"	24"	.250"
12"	24"	.250"
16"	30"	.312"
18"	36"	.375"
20"	36"	.375"
24"	42"	.500"

Field and shop welds of the casing pipes shall conform to 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.

2. Carrier Pipe

- a. The carrier pipe for potable water and reuse shall be a minimum of AWWA/C900/RJ/DR18 polyvinyl chloride pipe (PVC), or a minimum pressure class 150 ductile iron pipe, greater if otherwise indicated. PVC carrier pipe joints shall be restrained. Ductile iron pipe shall comply with all areas of these specifications. Carrier pipe joints shall be individually restrained.
- b. The carrier pipe for gravity and force main sewer shall be a minimum of AWWA/C900/RJ/DR18 polyvinyl chloride pipe (PVC), or a minimum pressure class 150 ductile iron pipe, greater if otherwise indicated. PVC carrier pipe joints shall be restrained.. The inside coating for ductile iron pipe shall be Protecto 401, Permite or approved equal. Ductile iron pipe shall comply with all areas of these specifications. Carrier pipe joints shall be individually restrained.
- c. 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 pre-manufactured casing spacers, as outlined in section 7.3.1.H and as illustrated on the City's standard detail.
- d. Maximum spacing of spacers shall conform to Chapter 7-2 of AWWA Manual "M23" or manufacturer's recommendations, whichever is more stringent. A minimum of three (3) supports per pipe length is required. Additional supports shall be installed for PVC pipe to prevent sagging.
- e. All Carrier pipes shall have at a minimum 3 10AWG U.G. Copperhead tracer wires or approved equal. Locate balls shall be installed at both ends of the jacking pipe and along the bore in green areas.

C. 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 the City. 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 the City.

D. Workmanship

1. The boring and jacking operations shall be done simultaneously with continuous installation, until the casing pipe is in final position. Correct line and grade shall be carefully maintained. Add-on sections of casing pipe shall be full-ring welded to the preceding length, development water-tight total pipe strength joints. The casing installation shall produce no upheaval, settlement, cracking, movement or distortion of the existing roadbed or other facilities. Following placement of the carrier pipe within the steel casing, masonry plugs are to be installed at each open end. Casing pipe and welds shall be asphaltic coated using Koppers 300M or equal with a minimum thickness of 20 mils.
2. Casing pipe holes shall be mechanically bored through the soil by a cutting head on a continuous auger mounted inside the pipe. The auger shall extend a minimum distance beyond the end of the pipe casing to preclude formation of voids outside of the pipe shell.

3. The casing pipe shall be adequately protected to prevent crushing or other damage under jacking pressures.
4. Required boring and jacking pits or shafts shall be excavated and maintained to the minimum dimension. Said excavations shall be adequately barricaded, sheeted, braced, and dewatered as required.

E. Pipe Handling

Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe shall not be dropped. 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 the City.

F. 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 the contractor at no additional cost to the City.

G. Dewatering

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

H. 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 pre-manufactured casing spacers. Casing spacers shall 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.

I. 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.

J. Miscellaneous Requirements

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 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 filled with clean sand, if required in the Bore and Jack permit. Masonry plugs are to be installed at each open end of the casing. Plugs shall be suitable for restraining the earth load while allowing drainage of the casing.

7.3.2 DIRECTIONAL BORING

A. General

Directional boring shall be permitted at the discretion of the City Engineer. Horizontal directional boring has become an accepted method of underground utility construction. Directional bores for water, sewer and reuse piping shall be considered by the City Engineer based upon a set of three (3) controlling parameters: economics, service requirements, and jurisdiction.

B. Materials

Piping material for directional boring use shall be HDPE. HDPE shall be a minimum DR-11 with butt fused joints and manufactured by Plexico, CSR Poly, or approved equal. The engineer of record is responsible for verifying the suitability of the material for the installation. The City may require certified engineering calculations showing that installation procedures will not exceed manufactures recommendations for the pipe.

C. Workmanship

Directional boring work shall be performed by Contractors that specialize in such work, only. Prior to undertaking any directional bore work, the Contractor must supply the City Engineer with written evidence that confirms minimum experience requirements of either two (2) continuous years, or a minimum of fifty (50) installations of the pipe size and length of bore to be installed. No work will be authorized until the City Engineer has approved the boring contractor's credentials.

All operations connected with directional boring installations, including burp holes, machine pits, drilling mud, and surface restoration shall be considered a part of the directional boring contractor's work. Any areas that are uplifted by the contractor's operations (mud blowouts, etc.) shall be fully restored to original condition. Pipe deflections shall not exceed manufacturer's and/or AWWA limitations in any direction. The installation shall be fully pressure tested at the completion of installation to the standards of 7.6.4, 7.8.5, and 7.9.4 of Divisions 6, 8 and 9.

Directional boring work shall conform to the lines and/or grades indicated on the plans. The Contractor shall utilize boring/pulling machinery of sufficient capacity for the pipeline size and length of bore. Once a pullback has begun, it shall be continuous with no more than 30-minute intervals between sectional installations. Progress of the initial bore shall be closely and continuously monitored with an electronic tracking device that is capable of pinpointing both the horizontal and vertical positions of the bore head within six (6) inches. The bore head shall be configured so as to allow changes in both the horizontal and vertical directions should electronic tracking dictate such changes. The locations of all existing underground utilities must be clearly identified prior to commencing work, and the vertical clearance requirements of the City's standard details must be strictly

adhered to. Pipe shall be installed a minimum of 3 feet and a maximum of 6 feet below existing facilities unless approved otherwise. Contractor shall provide a boring log to the City upon completion of the installation. All directional bores shall have 3 10AWG U.G. Copperhead tracer wires or approved equal. The tracer wires shall terminate in a wire pit as described in the City Standard Details. Locate balls shall be installed at both ends of the directional bore and along the bore in green areas.

7.3.3 PRESSURE PIPE RESTRAINT

A. General

Pressure pipe fittings and other items requiring restraint shall be secured in accordance with Sections 7.3.3.–B and 7.3.3.–C. Use of thrust blocks or other restraining assemblies may be allowed but will require approval on a case by case basis and they shall be as specified in this manual.

For all pipe, restraint to prevent movement of lines under pressure at bends, tees, caps, valves, hydrants etc., shall be by using restrained joints with materials such as Certainteed, Certa-Loc, Uniflange, Megalug, or approved devices, as specified in this manual.

B. 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 fitting manufacturer and the joints shall be capable of holding against withdrawal for line pressures 50 percent (50%) above the normal working pressure. Any restrained joints that allow for elongation upon pressurization will not be allowed in those locations where the pipe comes out of the ground.

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 the engineer and shown in a tabular form as depicted on the "Restrained Pipe Table" in the detail sheets.

Wherever two (2) 45-degree bends are used in place of a 90-degree bend and the minimum restrained joints required from one (1) 45-degree bend extend beyond the other 45-degree bend, the two (2) 45- degree bends will be considered as though a 90-degree bend were located midway between the two (2) 45-degree bends.

C. Mechanical Restraining Devices

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

The number of joints to be restrained shall be based on the "Restrained Pipe Table" in the detail sheets.

7.3.4 PRESSURE CONNECTION

A. General

Installations of pressure connections four (4) inches and larger shall be made in accordance with this section.

B. Tapping Sleeves

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

1. 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. Sleeves shall have a bituminous coating.

2. Tapping Sleeves

For potable and reuse applications sleeves shall be fabricated of minimum carbon steel, ASTM A285 Grade C with fusion bonded epoxy coating, minimum 12 mil thick. 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 304 stainless steel. Gasket shall be vulcanized natural or synthetic rubber. Stainless steel for sanitary sewer force main applications (JCM 432 or approved equal, maximum working pressure = 150 PSI, maximum test pressure = 200 PSI).

3. Tapping valves

Tapping valves shall meet the requirements of this manual 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.

C. Notification and Connection to Existing Mains

All connections to existing mains shall be made by the contractor only after the connection procedure and his/her work scheduling has been reviewed and approved by the City. The contractor shall submit a written request to the City a minimum of five (5) working days prior to scheduling said connections. In his/her request he shall outline the following:

1. Points of Connection, fittings to be used, and method of flushing and disinfection if applicable.

2. Estimated construction time for said connections.

The City shall review the submittal within three (3) working days after receiving it and inform the contractor regarding approval or denial of his/her request. If his/her request is rejected by the City, the contractor shall resubmit his/her request modifying it in a manner acceptable to the City.

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

D. 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 twelve (12) inch diameter or less the minimum diameter cut shall be two (2) inches less than the nominal diameter of the pipe to be attached. For larger taps the allowable minimum diameter shall be two (2) to three (3) inches less than the nominal diameter of the pipe being attached. After the tapping procedure is complete the contractor shall submit the coupon to the City.

DIVISION 4

PIPE FITTINGS, VALVES AND APPURTENANCES

7.4.1 GENERAL

This division includes the material and installation standards for pipe fittings, valves and appurtenances. Required specialty items not included under this division shall be high quality and consistent with approved standards of the industry for the applicable service installation. Unless otherwise stated, all materials shall comply with the specifications as listed in this article.

7.4.2 Pipe and Fittings

A. General

All pipe and fittings shall be clearly marked with the name or trademark of the manufacturer. All pressure pipe and fittings shall be suitable for a minimum of one hundred fifty (150) psi working pressure. Reduced pressure ratings of 100 to 150 psi may be approved by the City Engineer on a case by case basis for sewer force main applications using HDPE piping systems. All conventionally laid pipes shall be installed with a three (3) inch wide metallic continuous tape. Tape shall be buried no less than twelve (12) inches deep and no more than eighteen (18) inches below finished grade. Locate balls shall be installed every twenty-five (25) feet and at all fittings. All directional bore and jack and bore pipe shall be installed with 3 10AWG U.G. Copperhead tracer wires or approved equal terminating in a wire pit for location purposes. The tracer wire shall be taped to the pipe, or as approved by the City Engineer. Tracer wire shall be installed in one continuous run where possible. Where one continuous run is not possible, the wire shall be connected to the next

run of wire using a wire nut and a splice kit. Splice kits shall be waterproof and have silicone or similar type sealant to prevent wire corrosion. Splice kits shall be Ranger Serviseal closure with Poly-bee sealant or approved equal. A locate ball shall be installed at both ends of the directional bore and along the bore in green areas.

B. Ductile Iron

1. All ductile iron pipe of nominal diameter four (4) through fifty-four (54) inches shall conform to ANSI/AWWA A21.51/C151. A minimum of Pressure Class 150 pipe shall be supplied for all sizes of pipe unless specifically called out in the detail sheets, or required by the City.
2. Any fittings required shall be mechanical joint ductile iron conforming to ANSI/AWWA A21.10/C110, 150 psi minimum pressure rating, or ductile iron compact fittings four (4) through twelve (12) inches in accordance with ANSI/AWWA A21.53/C153. Compact fittings may not be used in sanitary sewer force main construction.
3. Joints for ductile iron pipe and fitting joints shall be push-on or mechanical joints conforming to ANSI/AWWA A21.11/C111. Where called for in the plans, restrained or flanged joints shall be provided. Flanged joints shall conform to ANSI Standard B 16.1-125 LB. Restrained joints shall conform to Division 3 of this manual.
4. Coatings and Linings
 - (a) Ductile iron pipe and fittings, when used for gravity sewage service or force main service, shall receive an exterior bituminous coating as specified in ANSI Specifications A21.51. Interior coating shall be Protecto 401, Permite, or approved equal with a minimum DFT of 40 mils.
 - (b) Ductile iron pipe and fittings for water and reuse supply shall receive an exterior bituminous coating as specified above under paragraph (a) and shall be cement mortar lined and bituminous sealed in accordance with ANSI Standard A21.4.
5. Polyethylene Encasement

The pipe shall be polyethylene encased (8 mil) where shown on the detail sheets or required by the City in accordance with ANSI/AWWA A21.51/C105.

C. Polyvinyl Chloride (PVC)

1. All pressure pipe and fittings (water, reuse and pressure sewer) shall be manufactured from clean virgin Type I, Grade I rigid, unplasticized polyvinyl chloride resin conforming to AWWA C-900, DR-18 or AWWA C-905, DR-26. Gravity sewer pipe and fittings of this material shall conform to ASTM Designation D-3034, SDR35. PVC pipeline colors shall be:

Water	Blue
Reuse	Purple
Pressure Sewer	Green
Gravity Sewer	Green
2. Connections for pipe one and one-half (1½) inches in diameter and larger shall be rubber compression ring type. Pipe shall be extruded with integral thickened wall bells without increase in DR. Usage of twin gasket coupling type pipe will be allowed as long as its quality is comparable to that of the integral bell type.

Rubber ring gaskets shall consist of synthetic compound meeting the requirements of ASTM Designation D1869, and suitable for the designated service. Other connections shall be solvent welded sleeve type joints.

E. Polyethylene Plastic Pipe

Pipe and/or tubing shall comply with ASTM D-3350 (materials), PE3408, designation D-2239 (pipe) and D-2737 (tubing), conform to AWWA C901 or AWWA C906 as appropriate, and be approved for potable water or reuse service by the National Sanitation Foundation and bear the NSF seal. Pipe and tubing ½-inch through 3-inch diameter shall be rated for a minimum working pressure of two hundred psi and the dimension ratio (DR) shall not exceed nine (9) for copper tube size. Fittings shall be brass, equipped with compression type connections. Pipe larger than three (3) inches shall not exceed DR-11 unless approved by the City Engineer for certain sewer force main applications. In no event shall a DR rating exceeding DR17 be approved. All joints shall be butt fused or coupled by electrofusion couplers.

F. Brass Fittings

AWWA C-800-66 with exposed threads covered with a protective plastic coating, as manufactured by Mueller, Ford, or approved equal. All brass fittings shall be lead free.

7.4.3 VALVES

A. General

The valve type, size rating, flow direction arrow if applicable, and manufacturer shall be clearly marked on each unit. Valves shall open left (counterclockwise) with an arrow case in the metal of operation handwheels and nuts indicating the direction of opening. All valves, other than the plug and check types, shall be of resilient wedge design.

B. Resilient Wedge Gate Valves

1. General

All gate valves sixteen (16) inches and larger shall be resilient wedge side-actuating gate valves with gear reduction. Such valves shall be resilient wedge, manufactured to meet or exceed the requirements of AWWA C509, latest revision, and in accordance with the following specifications. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve. Gate valves that are not buried shall be iron body, bronze-mounted gate valves, conforming to AWWA C509, with the exception that valves shall be outside screw and yoke (OS&Y) rising stem type. Valves shall have cast iron hand wheels or chain operators with galvanized steel chains, as required.

2. Material

The valve body, bonnet, and bonnet cover shall be cast iron ASTM A126, Class B. All ferrous surface inside and outside shall have a fusion-bonded epoxy coating. A two (2) inch wrench nut shall be provided for operating the valve. All valves are to be tested in strict accordance with AWWA C509.

3. Miscellaneous Requirements

The valves shall be non-rising stem with the stem made of cast, forged, or rolled bronze as specified in AWWA C509. Two stem seals shall be provided and shall be of the o-ring type. The stem nut must be independent of the gate.

The resilient sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.

D. Check Valves

Valves shall be of the silent type, have weights, outside operator arms, and conform to AWWA C508. Units shall be rated for one-hundred-fifty (150) psi minimum working pressure and shall permit full flow area equal to that of the connecting pipe.

F. Air Release Valves - Air and Vacuum Valves

1. Sewage service valves shall be specially adapted for raw sewage service, cast iron or stainless steel body, with minimum 150 psi working pressure. Valves shall have two (2) inch inlets and outlets with backwash attachments. Reference City Standard Details for more information.
2. Water service (vent only) valves shall be cast iron body suitable for domestic water service, rated for a minimum 150 psi working pressure equipped with a vacuum ball to prevent air return. Reference City Standard Details for more information.

G. Valve Boxes

Units shall be adjustable, cast iron, minimum interior diameter of five (5) inches, with covers cast with the applicable inscription in legible lettering on the top, "SEWER", "REUSE" or "WATER". Reuse valve boxes shall have purple square covers. Boxes shall be suitable for the applicable surface loading and valve size. Valve boxes not in the pavement shall have around their tops, concrete pads, which will be flush with the finished grade at valve site (top of the curb or above is necessary) with minimum dimensions of twenty-four (24) by twenty-four (24) by six (6) inches with reinforcement. Reinforcement shall be #4 bars and concrete shall be Type 1, 3000 psi or fibermix. Round aprons twenty-four (24) inches in diameter by six (6) inches thick may be substituted for square pads as locate balls are utilized. All valve pads are to have a snake pit or approved equal for tracer wire access. A three (3) inch bronze identification disk identifying at a minimum the utility type, valve size, number of turns to open, and direction of turn to open shall be installed on all valve pads. Care shall be taken while constructing valve boxes to ensure that valve stems are vertical and the cast iron box has been placed over the stem with base bearing on compacted fill and top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Contractor shall remove any sand or undesirable fill from valve box prior to final inspection.

7.4.4 INSTALLATION

A. General Requirements

1. Piping, fittings, valves and appurtenances shall be installed in accordance with these standards.
2. Piping shall be installed along straight line and grade between fittings, manholes, or other defined points, unless definite lines of alignment, deflection or grade change have been established. Modification to approved alignment or grade

- during construction shall receive prior approval from the City Engineer and all resulting design considerations shall be resolved by the contractor.
3. Materials shall be cleaned and maintained clean, with all coatings protected from damage. The interior of the pipe shall be free of dirt and debris, and when work is not in progress, all open ends shall be plugged. Said plugs shall remain in the pipe until connection to another section of pipe or manhole is performed.
 4. Pipes, valves, fittings, or other items shall be inspected prior to installation and any items showing a fracture or other defect shall be rejected. However, ductile iron pipe showing an end crack, with no fracture indicated beyond that visible, may be salvaged by cutting off the damaged section twelve (12) inches past, providing the remaining pipe is sound.
 5. Underground piping shall not be driven to grade by striking it with an unyielding object. When the pipe has been properly bedded, enough compacted backfill shall be placed to hold the pipe in correct alignment. If necessary, precaution shall be taken to prevent flotation.
 6. Jointing shall be by an approved method and shall not require undue force to accomplish full satisfactory seating and assembly. Connections at structures shall be cut accurately and worked into place without forcing and shall align with the connecting point.
 7. Underground pressure piping systems shall be thoroughly secured at fittings and plugs. Fittings shall not be covered prior to inspection. Tie rods and clamps, or restrained joint assemblies to support the fitting properly shall be provided. Rods shall be placed one (1) to each side of the valve at 180° to each other and eighteen (18) inches from the tee.
 8. Subaqueous pipe laying may be permitted where conditions make it impractical to lay pipe in the "dry", provided the contractor submits his/her plans for laying pipe under water to the City Engineer and obtains advance approval thereof. If necessary, precaution shall be taken to prevent flotation.
 9. Disinfecting all potable water pipes shall be accomplished by the contractor following approved pressure testing. Unless alternate procedures are set forth under the applicable service standard, said disinfecting procedures shall be in accordance with AWWA standard C601 and witnessed by the City Engineer's representative.
 10. Ductile iron pipe (DIP) and PVC installations shall be performed in accordance with the applicable provisions of AWWA standard C600. All pipe installations shall be witnessed by the City Engineer's representative.
 11. Polyvinyl chloride (PVC) pipe-lubrication and/or solvent for pipe and fitting joints shall be nontoxic. Following making, solvent-type joints shall not be disturbed for five minutes and shall not have internal pressure applied for twenty-four (24) hours, or as recommended by the pipe manufacturer.

7.4.5 IDENTIFICATION

A. Potable Water

All PVC pipe shall be a solid blue color and shall have locating material, as listed in Subsection 7.4.2.A, buried directly above the pipe. This locating material shall be blue with black lettering. Blue locate balls shall be installed along the pipe at twenty-five (25) feet intervals and at all fittings.

B. Sewer Gravity and Force Mains

All PVC pipe shall be solid green color and force mains shall have the same type of locating material as listed in subsection 7.4.2.A buried directly above the pipe. This locating material shall be green for sewer force mains with black lettering. Green locate balls shall be installed along the pipe at 25 feet intervals and at all fittings.

C. Reclaimed (reuse) Water Mains

All PVC pipe shall be of a solid purple color with and shall have locating material listed in Section 7.4.2.A, buried directly above the pipe. This locating material shall be purple with black lettering. Purple locate balls shall be installed along the pipe at twenty-five (25) feet intervals and at all fittings.

D. Ductile Iron Pipe

All ductile iron pipe shall have an appropriately painted stripe within the top 90° of the pipe. The color of the stripe shall be in accordance with the color coding found in Section 7.4.2.C. Locate balls, of the appropriate color, shall be installed along the pipe at twenty-five (25) feet intervals and at all fittings.

E. HDPE Pipe

All HDPE pipe shall have an appropriately painted stripe within the top 90° of the pipe. The color of the stripe shall be in accordance with the color coding found in Section 7.4.2.C. 3 10AWG U.G. Copperhead tracer wires, the appropriate color for the installation, shall be taped to the pipe. Locate balls shall be installed at both ends of the bore and along the bore in green areas.

F. Lettering Specifications

All lettering shall appear on three (3) places at 120° intervals on the pipe diameter and shall run the entire length of the pipe and shall be a minimum of three-fourths (3/4) inch in height with the appropriate wording appearing one (1) or more times every twenty-one (21) inches along the length of the pipe. The lettering must be permanently impregnated into the pipe and may not be simply stenciled to the pipe surface. Lettering shall read as is acceptable for the intended use.

G. Alternative Locating System

As an alternative to tracer wire, a utility system may be identified using the ScotchMark Electronic Marker System by 3M. The appropriate marker must be used for the appropriate depth per manufacturer's recommendations. Markers shall be placed at all fittings and a maximum separation of 25 feet between markers and at all fittings and gate valves.

**DIVISION 5
SANITARY GRAVITY SEWERS**

7.5.1 GENERAL

This division includes general technical criteria for the design and installation of sanitary gravity sewer systems.

7.5.2 DESIGN STANDARDS

A. General

The developer shall comply with the applicable requirements specified within WEF [Manual of Practice No. 9] Chapter 20 of the latest edition of the Ten-State Standards Recommended Standards for Sewage Works (1978), by the Florida Department of Environmental Protection, and the standards set forth in this article. Sewer systems should be designed for the estimated ultimate tributary population, as delineated in the approved City of St. Cloud Comprehensive Plan (latest edition) except in considering parts of the systems that can be readily increased in capacity. The developer's engineer shall submit signed, sealed and dated design calculations with the plans for all sewer projects. Calculations shall show that sewers will have sufficient hydraulic capacity to transport all design flows. All offsite gravity mains shall be installed the entire length of the developed property.

B. System Design

1. Average Daily Flow (ADF)

The average daily flow is the standard base reference in the design of all wastewater systems. The sewer system design shall be based on full ultimate development as known, or projected. The ADF shall be determined from current established figures from the Florida Department of Environmental Protection. The following figure is for reference purposes only. The average daily flow (ADF) from domestic units shall be calculated at the minimum rate of 265 gallons per ERU per day, pursuant to City impact fee basis. Should the impact fee calculation basis change, this ADF value shall also change to conform. Flow requirements from commercial, industrial, institutional, or other special development areas shall be established based upon the proposed or actual use and the recommended flow allocations contained in the Department of Health Rules, FAC 64E-008 Table1, from existing records, or by estimated projections using the best available data with assumptions used in developing these flows to be specifically approved by the City Engineer.

2. Peak Design Flow

The peak flow is used in the design of all wastewater systems. It is the product of a peaking factor and the average daily flow (ADF). The peaking factor is a ratio of the average daily flow and the peak discharge, occurring during the maximum daily flow of the year. Gravity sanitary sewers shall be designed on the basis of ultimate development maximum rates of flow, which shall be the product of selected peak factors multiplied by the accumulative average daily flow (ADF) as calculated above. The following minimum peak factors shall be applicable for the range of average daily flow rates.

FLOW RANGE	MINIMUM PEAK FACTOR
Flows to 100,000 GPD	4.0
100,000 GPD to 250,000 GPD	3.5
250,000 GPD to 1,000,000 GPD	3.0

Flows greater than 1,000,000 GPD	2.5
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For design average daily flows above 2,000,000 GPD, peaking factors less than 2.5 may be considered if substantiated by extensive data. Under no circumstances shall peaking factors less than 2.0 be allowed.

3. Sewer Size Computation

(a) Minimum Diameter:

- (i) Main sewer - 8 inches
- (ii) Single lateral - 4 inches
- (iii) Commercial user lateral - 6 inches
- (iv) Multi-family user lateral - 6 inches

(b) Velocity in Pipes: (at peak flow)

- (i) Minimum - 2 feet per second
- (ii) Maximum - 7 feet per second

Sanitary sewers shall be sized to provide ample capacity for the maximum flow rates. Calculations for velocity shall be based on Manning's Formula, using a roughness coefficient ("n") of not less than 0.012, unless justifiably approved otherwise by the City Engineer. In general, the following minimum slopes shall be provided for PVC sewer sizes to twenty-four (24) inches.

MINIMUM SLOPE	
SEWER SIZE	(FEET PER 100 FEET)
8 Inches	0.32
12 inches	0.19
15 Inches	0.15
18 Inches	0.11
21 Inches	0.09
24 Inches	0.08

Minimum slopes slightly less than those indicated may be considered for eight (8) inch pipes in extreme situations, providing the depth of flow will not be less than 0.3 of the pipe diameter or the velocity less than 1.6 feet per second at design average daily flow, and justifiable reasons for the modification are presented to the City Engineer.

If material other than PVC is proposed for gravity sewer use, slopes shall be increased to reflect a manning coefficient ("n") of 0.013. Minimum velocity criteria (>2.0 FPS) shall apply.

4. Other Design Requirements

- (a) Sanitary sewer lines twenty-four (24) inches in diameter or less shall be installed with straight alignment and grade between manholes, with manhole spacing not to exceed four hundred (400) feet for sewers.

- (b) All sanitary sewers shall terminate at manholes.
- (c) Sewers of diverse sizes shall always join at manholes, with no size conversion between. Where different sizes join, the pipes shall be placed at elevations where the 0.8 depth points are equal, unless higher points are required.
- (d) Flow direction changes in excess of 90 degrees shall not be permitted in sewer alignments without special consideration. Where directional changes exceeding 45° occur, an extra flow line elevation drop of 0.1 foot across manholes shall be provided.
- (e) Where theoretical design velocities greater than fifteen (15) feet per second are calculated, due to topography or other reasons, special erosion control provisions shall be provided for sewer protection.
- (f) All sanitary sewer mains ten (10) feet in depth or deeper shall be a minimum of SDR26.

C. Standard Requirements

The materials of construction and general installation procedures shall comply with the specific applicable standards set forth under Division 2, Utility Excavation, Trenching and Backfilling; Division 3, Utility Line Installation Requirements; and Division 4, Pipes, Fittings, Valves and Appurtenances.

D. Location

Gravity sewers shall be located in dedicated rights-of-way or utility easements. Whenever possible, sewers shall be located under pavement in dedicated rights-of-way. All sewers located outside of dedicated rights-of-way shall require a minimum 20-foot easement. Additional easement widths shall be provided when the pipe size or depth of cover so dictate. If a gravity sewer is located adjacent to a road right-of-way, a minimum 10-foot easement shall be provided. Additional easement widths shall be provided if the pipe size or depth of cover so dictate. No gravity sewers shall be placed under retention ponds, tennis courts, or other structures. In general, gravity sewers shall not be located along side or rear lot lines. Placement of a gravity sewer along side or rear lot line may be allowed on a case-by-case basis if such a sewer configuration results in efficient placement and utilization of the sewer system. This criteria shall also apply to sewer placement in retention pond berms. In any event, no manholes shall be placed along side or rear lot lines.

E. Manholes and Grease Traps

1. Manholes shall be precast polymer concrete. Brick manholes are not acceptable. The minimum inside diameter of manholes shall be forty-eight (48) inches for sewer main pipe sizes up to twenty-four (24) inches in diameter, with submittal of special designs for larger pipes. Manholes are to be placed at one end of jack and boring sections for gravity sewer lines. No interior ladders shall be permitted in manholes. Minimum concrete wall thickness shall be two (2) inches. Reference City Standard Details for more information.
2. Precast polymer manholes shall have all exterior joints shall be wrapped with WrapidSeal or approved equal exterior wall joint sealant.
3. Fiberglass manholes shall not be utilized.

4. Manhole frames and covers shall be composite, 36-inch in diameter, with City of St. Cloud Sanitary Sewer badging, and shall have a nominal minimum 36-inch opening. Covers shall have no perforations and shall be marked with the words "Sanitary Sewer" and "City of St. Cloud" and shall bear the City logo. Private manholes shall not bear the words "City of St. Cloud". Frames and covers shall be fully bedded in mortar to the correct finish grade elevation, with adjustment brick courses placed below, as detailed for precast polymer manholes. Refer to City Standard Details for more information.
5. Manhole flow channels shall have smooth and carefully shaped bottoms, built-up sides and benching constructed from concrete so as to provide a smooth transition of flow through the manhole. Channels shall conform to the dimensions of the adjacent pipe and provide changes in size, grade and alignment evenly.
6. A drop connection shall be required for invert elevation differences greater than two (2) feet and shall require specific approval by the City Engineer. Drop connections are not preferred and should not be utilized unless absolutely necessary.
7. Where additional pipe connections or modification of existing factory-made openings are required on existing precast concrete manholes, all cutting relevant thereto shall be performed only by a power driven abrasive wheel or saw. It is specifically noted that such connections to existing manholes shall be installed in accordance with the details for new units and shall be caulked watertight with non-shrinking grout around the rubber gasket.
8. All pre-cast grease traps shall conform to the above manhole requirements.

F. Pipe Depth, Bedding and Protection

Special care shall be exercised in the design and installation to provide adequate bedding for the type of pipe used, taking into consideration trench width and depth, superimposed loadings above grade and the material in accordance with established design criteria and special supporting bedding or facilities shall be provided as required. Minimum cover for pipes shall be thirty-six (36) inches unless approved by the City Engineer. Cover depths of less than thirty-six (36) inches shall only be considered where a protective cover is provided and approved by the City Engineer. Special care shall be exercised in the design and installation to provide adequate bedding for the type of pipe used, taking into consideration trench width and depth, superimposed loadings above grade and the material below trench grade. Pipe loading capacities shall be computed in accordance with established design criteria and special supporting bedding or facilities shall be provided as required.

G. Connections at Structures

Where sanitary sewers connect to manholes or other structures a flexible connection adapter shall be installed. Pipe bells shall not be installed at the wall face. Connection material shall permit permanent adhesion by cement grout.

H. Transition Connections

Where pipes of alternate materials are to be connected between manholes, suitable approved transition couplings shall be installed.

I. Pipe Cutting

The cutting of pipe shall be performed by the proper tools and methods, as per specific pipe type.

J. Service Connections

Installation shall be performed by proper methods, including WYE branches installed in the sewer main at the point of connection, and the service pipe and required fittings extended to or near the property line. The service lateral shall be perpendicular to said property line, and terminate with PVC plugs. The contractor shall be responsible for installation of the service line to within + two (2) feet of the property line. The plumber shall be responsible for making the connection to the service line and installing all necessary fittings and cleanouts. This cleanout shall be considered the City's point of service for all sanitary sewer connections. The minimum single service pipe size shall be six (6") inches in diameter for commercial use and four (4") inches in diameter for residential use. The minimum double service pipe shall be eight (8) inches in diameter with a six (6) inch double wye for commercial use and six (6) inches in diameter with a four (4) inch double wye for residential use. Single service connections should be used where feasible. Approval of double service connection use will be on a case by case basis by the City Engineer. On curbed streets, the exact location of each installed service shall be marked by etching or cutting the letter "S" in the concrete curb. Minimum letter dimensions shall be one (1) inch in height. Plastic or brass markers may be used in lieu of etching as approved by City Engineer. Under no circumstances shall a service be located under a paved driveway. Should a service relocation be desired, it shall be the responsibility of the property owner or his/her duly authorized representative to secure written approval of said relocation from the Public Services Department, coordinate with the Public Works Department during the actual relocation, and bear all costs incurred with abandoning the existing service and installation of the new service, including the removal and reinstalling of service location marking(s). All services shall be of the single connection type and be marked by a buried electronic marker and a vertical PVC or wood 2"X4" marker. Double service connections may be approved on a case by case basis by the City Engineer. Plumbers shall install and connect service sewer pipe at the property line by removing the PVC plug. The cleanout shall be installed at the property line as per the City's standard details. Sewer cleanouts not in the pavement shall have concrete aprons around their tops, flush with the finished grade, with minimum dimensions of eighteen (18) by eighteen (18) by four (4) inches with reinforcement. Reinforcement shall be #4 bars and concrete shall be Type 1, 3000 psi or fibermix. Round aprons eighteen (18) inches in diameter by four (4) inches thick may be substituted for square pads. Refer to City Standard Details for more information.

K. Protection of Water Systems

The horizontal separation between sanitary sewers, reclaim mains, and existing or proposed water mains shall be in accordance with the City of St. Cloud Standard Details and as required by the Florida Department of Environmental Protection

L. Sanitary Sewer Pipe Laying

1. Laying of sewer pipe shall be accomplished to line and grade in the trench only after it has been dewatered and the trench has been prepared in accordance with Section 7.2.6. Refer to Section 7.2.8 for additional bedding requirements. Mud, silt, gravel and other foreign material shall be kept out of the pipe and off of

the jointing surface.

2. All pipe laid shall be retained in position so as to maintain alignment and joint closure until sufficient backfill has been completed to adequately hold the pipe in place. All pipes shall be laid to conform to the line and grade shown on the plans.
3. Variance from established line and grade that results in a sag of 0.5 to one (1) inch or a reduction in slope exceeding 6% of the original design slope but that still meets the minimum slopes specified in Section 7.5.2.B.3 shall require that the design engineer or engineer of record certify, on a case-by-case basis, that this sag or variance from line and grade will not result in detrimental effects on the system and its original design. For variations over 6% that result in the slope not meeting the minimums specified in 7.5.2.B.3, the City Engineer shall review the installation and determine whether the line will be accepted or requires replacement. This variation in line and grade will not be allowed if it results in a level or reverse sloping invert. Variations in line and grade exceeding a one (1) inch sag shall be required to be replaced and brought to proper line and grade.
4. The sewer pipe, unless otherwise approved by the City Engineer, shall be laid up grade from point of connection on the existing sewer or from a designated starting point. The sewer pipe shall be installed with the bell end forward or upgrade. When pipe laying is not in progress, the open end of the pipe shall be kept tightly closed with an approved, temporary plug.

7.5.3 TESTING

A. General

All projects shall be tested upon completion of installation in the presence of the City Engineer, representative(s) of the contractor, and/or other authorized agencies with a minimum forty-eight (48) hours advance notice (not including weekends or holidays). It shall be the responsibility of the contractor to have all newly installed lines tested at their expense, with the results provided to the City. Testing shall conform with Unibell recommended practice, UNI-B-5-78 and UNI-B-6-79, and the following requirements. All equipment for performing tests and making measurements shall be furnished by the contractor at his/her own expense, unless specified and agreed to otherwise in writing with the City Engineer. Sections of sewer which fail to pass the required tests shall have the defects located and repaired or replaced and be retested until within the specified allowance at the contractor's own expense. Decisions as to the type(s) and method(s) of testing required will be made at the pre-construction conference by the City Engineer upon approval of the City Engineer. As part of the Maintenance Bond release procedure, the sanitary sewer collection system shall be cleaned by the Owner/Developer and visually inspected by the City.

B. Cleaning

Prior to any tests, all sewer lines shall be cleaned and inspected for major defects. Pre-cleaning by appropriately sized sewer cleaning ball or by high velocity jet or other method may be necessary.

C. Visual Test

All sewer lines shall be inspected visually to verify accuracy of alignment and freedom from debris and obstructions. The method of testing shall be closed circuit television. The full diameter of the pipe for straight alignments shall be visible when viewed between consecutive manholes. A full video report from closed circuit television inspections conducted by contract TV inspectors employed by the Developer shall be provided to the City on a minimum of a CD and include a written report corresponding to the video results. The video report shall be submitted in a PACP database (reference City Standard Detail – General Notes for the correct PACP version). The inspection shall stop and directly view all lateral connections. The inspection shall stop and examine all defects in the pipe and joints. Video inspections shall include voice analysis at each location where the inspection stops, identifying the footage and clock location. Footage and pipe run, identified by manholes, shall be displayed on the video at all times. All sewer lateral connections shall be videoed from the standpipe to the sewer main. Closed circuit television video taped inspections that are performed by the City's Line Systems Division (optional); shall be scheduled by contractor in advance to verify availability. All manholes shall be easily accessible for City's television truck and equipment. All manholes shall have pipe inverts poured and ring and covers installed to finished grade elevation. Inside of manholes shall be clean and free from all debris. Developer has the option to hire their own T.V. inspection contractor or pay the City of St. Cloud for T.V. inspection per the fee schedule and payment requirements in place at the time the work is conducted..

D. Leakage Test

Points for leakage measurement will be selected by the City Engineer. All gravity sewer mains shall be low air pressure tested as specified by Unibell with a minimum of a seven (7) psi for seven (7) minute test. Pressure test shall be completed after sewer lateral and appurtenance installation. Plugs, caps, and branch connections must be secured against blow-off during leakage test.

E. Deflection Testing

Unless specified and approved otherwise, the maximum allowable pipe deflection (reduction in vertical or horizontal inside diameter) shall be 7½%. The City Engineer reserves the right to require the contractor to perform random deflection tests of pipe before final acceptance at construction locations between successive manholes where the construction encountered unstable trench walls or bottoms, heavy rainfall, high ground water levels, deep lines, or difficulty in achieving compaction. Should random test locations be unsatisfactory, then the contractor shall deflection test the entire sewer system. All locations with excessive deflection shall be excavated, and repaired by re-bedding and/or replacement of the pipe. Other devices for testing include calibrated television, photography, properly sized mandrell, sewer ball, or deflectometer.

DIVISION 6
SANITARY SEWAGE FORCE MAINS
(PRESSURE SEWERS)

7.6.1 GENERAL

This division includes the general requirements for design and installation of force main systems serving sanitary sewage pumping stations. The relevant provisions of other divisions of this article shall be applicable to this division unless otherwise indicated herein or approved by the City Engineer. The developer's engineer shall submit signed, sealed and dated design calculations with the plans for all force main projects.

7.6.2 DESIGN STANDARDS

A. Reference

The developer shall comply with the applicable criteria set forth in WEF [Manual of Practice No. 9], and the Florida Department of Environmental Protection requirements. Additionally, ASCE publication "Pipeline Design for Water and Wastewater" may be used as a design guide, if not in conflict with other requirements.

B. System Design

Force main systems shall be of adequate size to efficiently transmit the total ultimate peak operational flows, applied by the connected sewage pumping station(s) to the effluent point. Consideration shall be given to possible future connecting pumping stations and this probability shall be reviewed with the City Engineer. Capacity computations shall be coordinated with the proposed pumping system(s), along with any future flow requirements, if applicable. In order to provide adequate pipeline cleansing, force main flow velocity shall not be less than two (2) feet per second at ultimate design minimum pumping capacity; or exceed eight (8) feet per second as a maximum; however, with multiple pumping station systems or phase development, this requirement may not be possible and the system design shall receive special attention regarding cleaning maintenance. All transmission mains offsite shall be designed to run the length of the property and shall have a minimum diameter of four (4) inches.

C. Operational Cost Considerations

In addition to initial capital expenditure, long term pumping station operational costs shall also receive consideration when sizing force main systems.

D. Location

Sanitary sewer force mains shall be located in dedicated rights-of-way or utility easements. All force mains located outside of dedicated rights-of-way shall require a minimum 15-foot easement. Additional easement widths shall be provided when the pipe size or depth of cover so dictate.

7.6.3 STANDARD REQUIREMENTS

A. General

The materials of construction and general installation procedures shall comply with specific applicable standards set forth under Division 2, Utility Excavation, Trenching and Backfilling; Division 3, Utility line Installation Requirements; and Division 4, Pipe Fittings, Valves and Appurtenances.

B. Joint Restraining

Pressure piping fittings and other items requiring restraint shall be braced with restraining assemblies as required by design. Restraining devices shall be designed for the maximum pressure condition (testing) and the safe bearing loads for the horizontal thrust.

C. Pipe Depth and Protection

The standard minimum cover for sewage force main systems shall be thirty-six (36) inches from the top of the pipe to finish grade. Where this condition cannot be met, special consideration will be given, with final decision resting with the City Engineer.

D. Air and Vacuum Venting

Where the force main profile is such that air pockets or entrapment (high points) could occur resulting in flow blockage, provisions for air release shall be provided. Where free flow will occur during operation or after pumping stops, combined air release and vacuum valve assemblies shall be provided. These valves are to be automatic unless otherwise specified and/or approved by the City Engineer. Reference City Standard Details for more information.

E. Valve Locations

Sufficient valves shall be provided on manifolded force main systems to facilitate effective isolation of the pipe system for repairs and maintenance. On straight runs of force mains, valve spacing shall not exceed 1000 feet. Additional valves shall be provided at points of connection, where force mains are to be extended and where force mains intersect to facilitate isolation of pipe segments. At predetermined connection branches or ends, the valves shall be restrained by mechanical joints.

F. Branch Connections

Wye fitting connections are acceptable provided the connection is restrained.

G. Clean-out Connections

Should force mains appear to be susceptible to sedimentation clogging, as created by depressed crossings or extended low flow (velocity) periods, suitable cleanout connections or pig ports shall be provided.

H. Terminal Discharge

Force mains shall enter the terminal facility (gravity sewer manhole, pumping station wet well, or other) at a point equal to the operational water level of said receiving unit. Should an elevation drop be required to obtain the outlet connection, the prior down-slope of the force main shall not exceed forty-five (45) degrees, and adequate air venting shall be provided at the profile breakpoint. Manholes shall be constructed in accordance with Section 7.5.2.E and City Standard Details.

I. Identification

In order to preclude possible domestic water tapping, all installed underground sanitary sewage force mains shall be green in color, with clearly marked locator tape buried above the pipe, and tracer wire secured to the pipe pursuant to 7.4.2.1.

J. Aerial Crossings

1. Structural Support

Support shall be provided for all joints in pipes utilized for aerial crossings. The supports shall be designed to prevent overturning and settlement.

2. Expansion Protection

Expansion joints shall be provided between the aerial and buried sections of the pipe.

3. Flood Clearance

For aerial stream crossings, the impact of flood waters and debris shall be considered. The bottom of the pipe shall be placed no lower than one (1) foot above the 100 year flood elevation.

4. Pipe Material and Joints

Flanged joints shall be used. Pipe and flange material shall be ductile iron, minimum class 53. All above ground pipe shall be painted as specified in ARTICLE 28 for aboveground wastewater force mains. Use of epoxy coated steel pipe may be allowed on a case-by-case basis.

5. Valves

Underground valves shall be provided at both ends of the crossing so that the section can be isolated for testing or repair. The valves shall be easily accessible and not subject to flooding. An air release/vacuum relief valve shall be installed at the high point of the crossing.

6. Guards

Appropriate guards shall be installed at both ends of the crossing to prevent pipe access to the public.

7. Permits and Requirements of Other Agencies

It shall be the responsibility of the developer to obtain all applicable regulatory permits. When the Aerial Crossing is accomplished by attachment to a bridge or drainage structure, the developer shall meet all requirements of the Agencies who own or have jurisdiction over such structures.

K. Underwater Crossings

1. Pipe Material and Cover

A minimum cover of three (3) feet plus a six (6) inch concrete slab shall be provided over the pipe. The pipe material shall meet appropriate AWWA Standards for use in submerged conditions.

2. Valves

Valves and a poly pipe whip shall be provided at both ends of the water crossings so that the section can be isolated for testing or repair. The valves and whips shall be easily accessible, and not subject to flooding. Both valves and whips shall be provided in a manhole or a valve vault.

3. Permits

It shall be the responsibility of the developer to obtain all applicable regulatory permits, including dredge and fill permits.

7.6.4 TESTING

A. General

The contractor shall perform hydrostatic testing of all sanitary sewage force mains, as set forth in the following, and shall conduct said tests in the presence of representatives of the City Engineer and/or other authorized agencies with forty-eight (48) hours advance notice provided.

B. Piping and Appurtenances

Facilities to be tested shall be within sections between valves or adequate plugs, with prior approval from the City Engineer. Testing shall not proceed until restraining devices are installed. All piping shall be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While piping is being filled with water, care shall be exercised to permit the escape of air from extremities of the test section, with additional release blocks provided if required.

C. Hydrostatic Testing

1. Hydrostatic testing shall be performed at one hundred (100) psi for all sizes of force mains. The testing procedures shall continue for an uninterrupted period of not less than two (2) hours. PVC testing shall be in accordance with the applicable provisions as set forth in Section 13 of AWWA standard C6005. The allowable rate of leakage shall be less than the number of gallons per hour determined by the following formula:

$$L = N \times D / 7400 \times \sqrt{P}$$

For 100 psi test: $L = 0.00135 \times ND$

L = allowable leakage in gallons per hour

N = number of joints in section tested

D = nominal inside diameter of the pipe in inches

P = test pressure maintained during the leakage test in pounds per square inch gauge

7400 = Predetermined Constant

2. The testing procedures shall include the continued application of the specified pressure to the test system, for the two (2) hour period, by way of a pump taking supply from the container suitable for measuring the volume displaced from said container. Pressure loss shall not exceed two (2) P.S.I.G. for the duration of the two (2) hour test. The gauge used for measuring pressure shall be oil damped and capable of clearly registering a one (1) P.S.I.G. change of pressure.
3. Should the test fail, necessary repairs shall be accomplished by the contractor and the test repeated until the results are within the established limits. The contractor shall furnish the necessary labor, water, pumps, gauges, and all other items required to conduct the required sanitary sewage force main testing and shall perform the necessary system repairs required to comply with the specified hydrostatic test.
4. Pressure testing for HDPE piping systems shall be in accordance with the manufacturer's recommendations. A test plan shall be submitted to the City Engineer for review and approval.

DIVISION 7

SEWAGE PUMPING STATIONS

7.7.1 GENERAL

- A. This division includes the general requirements for the design criteria and installation of sewage pumping stations.
- B. The design, materials of construction and installation procedures shall comply with the applicable provisions set forth under the following Codes and City of St. Cloud L.D.C. Articles.
 - Southern Building Code (S.B.C.) - Building and Structural Sites
 - Southern Building Code (S.B.C.) - Building and Structures
 - Southern Building Code (S.B.C.) - Painting
 - National Electrical Code (Modified) N.E.C. - Electrical
 - Article VII - Division 2 - Utility Excavation, Trenching and Backfilling
 - Article VII - Division 4 - Pipe, Fittings, Valves and Appurtenances

Article VII - Division 5 - Sanitary Gravity Sewers
Article VII - Division 6 - Sanitary Sewage Force Mains
Article VI - Division 10 – Commercial Driveways

- C. All information shall be signed and sealed by a professional engineer licensed in the state of Florida. Submittals will be reviewed and approved by the City before approval of the site construction plans.

7.7.2 DESIGN STANDARDS

A. References

The developer shall comply with the applicable regulations established by the Florida Department of Environmental Protection. Additionally, the criteria provided in Chapter 40, , of the Ten-State Standards Recommended Standards for Sewage Works, and WEF [Manual of Practice No.9] may generally be utilized as design guidelines, if not in conflict with state, county, City, or other regulatory agency requirements.

B. Design Flows

Sewage pumping station wetwells shall be designed for the total ultimate development flow from all contributory areas. The design average daily flow shall be computed at the unit rates set forth under Division 5. The maximum required pumping capability shall be the product of selected peak factors times the average daily design flow from the total service area. In general, the following factors shall be applicable for the range of flow indicated in gallons per minute (GPM) unless larger values are required or smaller amounts are justified with prior approval from the City Engineer.

DESIGN AVERAGE DAILY FLOW	PEAK FACTOR
Less than 100,000 GPD	4.0
100,000 to 250,000 GPD	3.5
250,000 to 500,000 GPD	3.0
500,000 to 1,000,000 GPD	2.5
Greater than 1,000,000 GPD	2.0
1 Million gallons per day = 694 gallons per minute	

C. Site

Pumping stations shall be INSTALLED on readily accessible sites outside of the right-of-way, unless otherwise approved by the City Engineer, and shall have adequate area provided for operation and maintenance of the facility and designed for safe ingress and egress of the City's vacuum truck. The site shall be a tract dedicated to the City. The site shall have a width and depth a minimum of fifty (50) feet by fifty (50) feet or twice the depth of the wet well. Larger sites may be required depending on the equipment being installed within the site. The site shall be well drained and not subject to flooding. Site preparation, pavement and walkways as necessary for good all-weather operations, site security and landscaping shall be in accordance with S.B.C. (see 7.7.2.Q).

D. Structures

Where buildings and/or structures are constructed, the relevant provisions of S.B.C. shall apply, with special design consideration where applicable.

E. Hoisting Equipment

Where required in large installations, in order to assist in maintenance operations, hoisting equipment shall be provided to lift pumps, motors, and other heavy equipment. Hoists shall be sized to accommodate the load for which provided, and may be hand-operated to a capacity of two (2) tons. Those units above two (2) ton capacity shall be motor-driven. Where hoisting equipment cannot be permanently installed or at minor equipment items, hoist eyes shall be installed over the unit.

F. Ventilation Facilities

When required ventilating fans or blowers, ductwork and other appurtenances shall be installed in accordance with the recommendations of the ASHRAE Guide. Ducts shall be of non-corrosive material, such as aluminum, fiberglass, etc.

G. Piping System

1. Approved Pipe, Fittings and Valves

The following material or items shall be suitable for the indicated operational service.

(a) Gravity sewer influent pipe and fittings (within the limits of the site) – PVC, SDR35 (24" diameter or less).

(b) Sewer pressure pipe and fittings inside wet well and valve vault shall be HDPE DR11 with necessary electrofused fittings, transitions, M.J. adapters, etc., required per pump station standard drawing internal and external pipe, plumbing configuration. (Special Note: No raw sewage piping shall be less than four (4) inch diameter).

(c) Sewage service valves (valve vault plumbing) - gate valves (resilient wedge), with non-rising stem and handwheels for exposed units; or, gate valves with non-rising stem and handwheels for underground; and, check valves as specified for "General Service", Article VII, Division 4.

(d) Potable water -Polyethylene tubing, with appropriate fittings, backflow preventer and valves (Article VII, Division 4).

2. Connections at Structures

Where pressurized pipes are to extend into or through structures from the exterior, flexible connections shall be provided with Kor-N-Seal rubber boot or "link seal" connectors.

3. Supports and Restraining

Special consideration shall be given to the support and restraining for piping systems (Article VII, Division 4). This requirement shall apply to both interior and exterior systems, with restraining of flanged pressure piping required where flexible connections are used.

H. Station Water System

All sewage pumping stations shall be provided with a station water system, with adequate capacity and pressure, for wash-down, pump seal water or other non-potable utilization. Said supply shall be completely separated from the potable supply by use of reduced pressure type backflow preventers or other approved

protective systems. Hose bibs shall be provided at convenient locations to facilitate maintenance.

I. Flow Meters

Flow meters indicating, totalizing and recording flow meters shall be provided for all sewage pumping stations with ultimate rating of 15000 gallons per minute or larger, or as directed by the City Engineer.

J. Pressure Gauges

Gauges and gauge taps, per City standard detail, shall be provided for each sewage pump discharge. The gauges shall read in pounds per square inch of water, with a range suitable for the required service, and shall be 3½-inch dial, stainless steel case, "Duragauge", as manufactured by Ashcroft, or approved equal. Gauges shall be equipped with diaphragms (neoprene or stainless steel), or other separating device, to preclude sewage from entering the mechanism. Liquid filled only.

K. Emergency Connections

For sewage pumping stations not equipped with stationary stand-by power generators, an approved emergency power receptacle, pursuant to City standard details, shall be provided. In addition to the emergency receptacle, a pumping bypass connection shall be provided. Said connection shall be located downstream of the pump chamber, with easy access and shall be coupled to the discharge main with valving as required for making a dead hook-up. The emergency pump connection shall be located within valve chamber or pump housing. The connection pipe shall be ductile iron, four (4) inches in diameter, with City standard "Quick" connector and cap.

L. Surge Control

Surge control valves, or other approved systems, shall be provided for all sewage pumping stations or where hydraulic conditions indicate the necessity, as determined by the City Engineer.

1. Surge Control Valves

The standard pump check valves shall be deleted and replaced by power-operated control valves. Said system shall include an approved control valve, equipped with pneumatic, hydraulic or electric operators; controlling fixtures and switches; duplex air compressors with receiver tank for pneumatic operation; piping and fittings; and other required appurtenances. Special consideration shall be given to emergency closing.

M. Telemetry System

All new lift stations shall be supplied with a SCADA telemetry system in accordance with the City standard of Data Flow Systems (DFS). The control system shall be a "Tac Pack" or "Telemetry Control Unit (TCU)" with a "back-up" relay logic system actuated by a toggle switch on the inner door marked as "Bypass".

N. Odor Control

All new lift stations shall require an odor control system.

O. Pump Selection

1. For pumping stations with a maximum flow demand of one thousand (1,000) gallons per minute (GPM) or less, a minimum of two (2) pump units shall be provided. Where the peak design flow exceeds one thousand (1,000) GPM, three (3) or more units shall be included in the facility. In all cases standby pumping

- capacity shall be provided, such that if any one pump is out of service, an alternate unit is available at equal or greater capacity.
2. The selected sewage pump system shall have the minimum capacity of pumping the design peak flow at the maximum computed system total dynamic head (TDH) requirements, with the largest pumping unit out of service. The pumps shall be capable of meeting all system hydraulic conditions without motors overloading.
 3. Hydraulic efficiency shall be considered for pump selection. Hydraulic efficiency shall be maximized using only standard motors and impellers from an approved manufacturer. Nonstandard motors or trimmed impellers will not be accepted.
 4. Head-capacity curves shall be prepared for the proposed pumping system in order to determine the various operational conditions. Hydraulic computations shall be in accordance with good engineering practice, with pipe friction loss calculated by the "Hazen-Williams Formula", using standard friction factors based on the materials utilized; however, not greater than "C-120" for PVC and HDPE, or "C=110" for all other piping material, unless the justification for higher values is authorized by the City Engineer. The system head-capacity analysis shall be based on ultimate rated capacity and provide the following:
 - (a) One pump operating at the proposed station only
 - (b) One pump operating at all lift stations on the force main system including the proposed station

P. Wetwell Design

The wetwell structure shall provide a minimum capacity between operational water levels sufficient to allow a minimum of five (5) minutes between successive starts of the pumps. A minimum of twenty-four (24) inches between shutoff and lead pump start levels shall be provided. A minimum of twelve (12) inches between lead and lag pump shall be provided. A minimum of six (6) inches between lag pump and influent/alarm elevation shall be provided. Low water levels shall provide adequate submergence to preclude pump inlet vortexing, air binding or other design considerations. Operational maximum high water levels shall not exceed the invert elevation point of the lowest gravity influent pipe. Where the wet well extends below the ground water table, the structure shall be designed to eliminate any possibility of flotation. No interior ladders shall be permitted in the wetwell. An aluminum access hatch shall be required with lockset and recessed handle and utilizing Series X retro-grating. The wetwell shall have a minimum of three (3) wire brackets. The wetwells shall be constructed of the same materials as sanitary sewer manholes. They shall be of a precast polymer concrete construction. All exterior seams shall be treated with WrapidSeal or approved equal sealant.

Q. Submersible Wastewater Pumps

1. General

The equipment covered by these specifications is intended to be standard pumping equipment of proven ability as manufactured by a reputable firm having at least five (5) years experience in the production of such equipment. The equipment furnished shall be designed, constructed, and installed in accordance with the best practices and methods, and shall operate satisfactorily when installed as shown on the drawings.

All parts shall be so designed and proportioned as to have liberal strength, and stiffness and to be especially adapted for the work to be done. Ample space shall be provided for inspection, repairs, and adjustment. All necessary foundation bolts, plates, nuts, and washers shall be furnished by the equipment manufacturer, and shall be of Type 304 stainless steel. Brass or stainless steel nameplates giving the name of the manufacturer, voltage, phase, rated horsepower, speed, and any other pertinent data shall be attached to each pump. The nameplate rating of the motors shall not be exceeded.

The pumps shall be capable of handling raw unscreened domestic wastewater and minimum 3" diameter solid spheres. Pump operation shall be controlled automatically by means of float-type liquid level sensors in the wet well. Pumps shall be mounted in the wet well using stainless steel base plates as shown on the drawings. Pumps shall be manufactured by ABS.

2. Shaft

The pump shaft shall be of Series 300 or 400 stainless steel or carbon steel. When a carbon steel shaft is provided, the manufacturer shall demonstrate that any part of the shaft which will normally come in contact with the wastewater has proven to be corrosion resistant in this application. The shaft and bearings shall be adequately designed to meet the maximum torque required for any start-up or operating condition and to minimize vibration and shaft deflection. As a minimum, the pump shaft shall rotate on two (2) permanently lubricated bearings. The upper bearing shall be a single row ball bearing. The lower bearing shall be a two row angular contact ball bearing, if required to minimize vibration and provide maximum bearing life.

3. Impeller

The impeller shall be constructed of gray cast iron, ASTM A-48, Class 30. All external bolts and nuts shall be of Type 304 stainless steel. Each pump shall be provided with a replaceable metallic wear ring system to maintain pump efficiency. As a minimum one stationary wear ring provided in the pump volute or one rotating wear ring provide on the pump impeller shall be required. A two part system is acceptable. Only open impeller designs shall be allowed.

4. Mechanical Seal

Each pump shall be provided with a tandem double mechanical seal running in an oil reservoir, composed of two separate lapped face seals, each consisting of one stationary and one rotating tungsten carbide ring with each pair held in contact by a separate spring, so that the outside pressure assists spring compression in preventing the seal faces from opening. The compression spring shall be protected against exposure to the pumped liquid. Silicone carbide may be used in place of tungsten carbide for the lower seal. The pumped liquid shall be sealed from the oil reservoir by one face seal and the oil reservoir from the air-filled motor chamber by the other. The seals shall require neither maintenance nor adjustment, and shall be easily replaced. Conventional double mechanical seals with a single spring between the rotating faces, requiring constant differential pressure to effect sealing and subject to openings and penetration by pumping forces shall not be considered equal to tandem seal specified and required.

5. Guides

A sliding guide bracket shall be an integral part of the pump casing and shall have a machined connecting flange to connect with the cast iron discharge connection, which shall be bolted to the floor of the wet well with stainless steel anchor bolts and so designed as to receive the pump discharge flange without the need of any bolts or nuts. Sealing of the pumps to the discharge connection shall be accomplished by a simple linear downward motion of the pump with the entire weight of the pumping unit guided by no less than two (2) Type 316 seamless tubular stainless steel guides which will press it tightly against the discharge connection. No portion of the pump shall bear directly on the floor of the wet well and no rotary motion of the pump shall be required for sealing. Sealing at the discharge connection by means of a diaphragm or similar method of sealing will not be accepted as an equal to a metal to metal contact of the pump discharge and mating discharge connection specified and required. Approved pump manufacturers, if necessary to meet the above specification, shall provide a sliding guide bracket adapter. The design shall be such that the pumps shall be automatically connected to the discharge piping when lowered into place on the discharge connection. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or fastenings to be removed for this purpose, and no need for personnel to enter the wet well. Each pump shall be fitted with a Type 304 stainless steel, 3/4" lifting chain of adequate strength and rigid lifting bale. A 1/4" stainless steel cable, air craft rating, may be provided between the cable holder and the lifting chain.

6. Motors

A. General Requirements

All motors shall be built in accordance with latest NEMA, IEEE, ANSI and AFBMA Standards where applicable. Pump motors shall be housed in an air-filled, water-tight casing and shall have Class F insulated windings which shall be moisture resistant. Motors shall be NEMA Design B, rated 155 degrees C maximum. Pump motors shall have cooling characteristics suitable to permit continuous operation, in a totally, partially or non-submerged condition. The pump shall be capable of running continuously in a non-submerged condition under full load without damage, for extended periods. The motor shall be capable of a minimum of 10 starts per hour. If required by the CITY, before final acceptance, a field running test demonstrating this ability, with 24 hours of continuous operation under the above conditions, shall be performed for all pumps being supplied. Motors less than 20 horsepower shall be rated 208 volt, 3 phase. Motors 20 horsepower and greater shall be 480 volt, 3 phase.

B. Heat And Moisture Sensors

Each motor shall incorporate a minimum of one internal temperature overheating sensing device and one internal moisture sensing device. These protective devices shall be wired into the pump controls in such a way that if excessive temperature or moisture is detected the pump will shut down. These devices shall be internally self-resetting. Pump controls in the cabinet that are tripped shall require manual resetting.

In lieu of internal moisture and temperature sensors, each pump motor shall have its motor winding insulation resistance monitored automatically by an automatic megger solid state electronics module. Each automatic megger must have an individual disconnect terminal plug, manual shut off switch, three lights to indicate 10 M ohm, 5 M ohm, and 1 M ohm, resistance values, two output circuits for external alarms, and two switches for manual testing. The power source shall be 110 VAC fused at 0.24 AMP. The test voltage shall be 500-700 volts d.c. The automatic megger shall monitor the motor resistance only when the motor is off and shall activate an alarm system when the motor resistance drops to 1 M ohm.

C. Cables

Cables shall be designed specifically for submersible pump applications and shall be properly sealed. A type CGB water-tight connector with a neoprene gland shall be furnished with each pump to seal the cable entry at the control panel. The pump cable entry seal design shall preclude specific torque requirements to insure a water-tight and submersible seal. The cable entry shall be comprised of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the entry body containing a strain relief function, separate from the function of sealing the cable. The assembly shall bear against a shoulder in the pump top. The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the motor interior from foreign material gaining access through the pump top. Secondary sealing systems utilizing epoxy potting compounds may be used. When this type of sealing system is used the manufacturers shall supply a cable cap as part of the spare parts for each pump. All cables shall be continuous, without splices from the motor to the control panel, unless otherwise approved by the CITY.

The junction chamber, containing the terminal board, shall be perfectly leak

proof.

D. Pump Control System

Refer to Section Q for control system specifications.

7. SHOP PAINTING

Before exposure to weather and prior to shop painting, all surfaces shall be thoroughly cleaned, dry and free from all mill-scale, rust, grease, dirt and other foreign matter. All pumps and motors shall be shop coated with a corrosion resistant paint proven to withstand an environment of raw wastewater. All nameplates shall be properly protected during painting.

Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during periods of storage and erection and shall be satisfactory to the CITY up to the time of the final acceptance test.

8. HANDLING

All parts and equipment shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until

installation is completed and the units and equipment are ready for operation. Finished surfaces of all exposed pump openings shall be protected by wooden planks, strongly built and securely bolted thereto. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

9. WARRANTY

The pump manufacturer shall warranty the units being supplied to the CITY against defects in workmanship and material for a period of five (5) years or 10,000 hours.

10. TOOLS AND SPARE PARTS

One (1) set of all special tools required for normal operation and maintenance shall be provided. All such tools shall be furnished in a suitable steel tool chest complete with lock and duplicate keys.

The manufacturer shall furnish the following spare parts for each pump supplied:

- 1.) 1 - upper bearing.
- 2.) 1 - lower bearing.
- 3.) 1 - set of upper and lower shaft seals.
- 4.) 1 - set of "O-Rings" or gaskets required for replacement of bearings and seals.
- 5.) 1 - set impeller wear ring.
- 6.) 1 - shaft sleeve (if applicable).
- 7.) 1 - cable cap (if applicable).

Spare parts shall be properly packaged and labeled for easy identification without opening the packaging and suitably protected for long term storage under humid conditions. Spare parts and tools shall be delivered to the CITY at or prior to the time of pump station start-up.

R. PUMP STATION ELECTRICAL POWER AND CONTROL SYSTEM

1. GENERAL

This section specifies the electrical power and control system requirements for wastewater pump stations. These requirements apply to duplex pump panels. Similar requirements shall apply when more than two pumps are involved except for the quantity of control equipment and panel size shall be increased accordingly. The manufacturer of the control panel shall provide data to indicate that the manufacturer has a minimum of three (3) years experience in the building of pump control panels.

A pump station control panel shall be provided for each wastewater pump station. Control panels shall be manufactured by Taek Force; or approved equal. The control panel shall respond to liquid level float switches to automatically start and stop pumps as well as sound an audible and visual alarm upon high wet well levels. The control panel shall operate two (2) or three (3) electrical submersible pumps as required by the design at the power characteristics stipulated. The control function shall provide for the operation of the lead pump under normal conditions. If the incoming flow exceeds the pumping capacity of the lead pump, the lag pump shall automatically start to handle this increased flow. As the flow decreases, both pumps shall be cut off at elevation as shown on the PLANS.

Pumps shall alternate positions as lead pump at the end of each cycle. A failure of the alternator shall not disable the pumping system. The alternator shall include a safe, convenient method of manual alternation and also have provisions to prevent automatic alternation without disturbing any wiring.

The control panel shall consist of main circuit breakers and generator breaker with mechanical interlock, an emergency power receptacle, a circuit breaker and magnetic starter for each pump motor, and 15 ampere, 120 volt circuit breakers as required (one each minimum, i.e., control circuit and convenience outlet.). All pump control operations shall be accomplished by a float type liquid level control system with all control components mounted in one common enclosure. Control switches shall provide means to operate each pump manually or automatically. When operated in the automatic mode, the control assembly shall provide means to manually select or automatically alternate the position of the "lead" and "lag" pumps after each pumping cycle. A float type liquid level control system shall continuously monitor wet well liquid level and control operation of the low-level cutoff for the pumps and shall operate off a 24 volt circuit.

2. PANEL CONSTRUCTION

The duplex pump panel shall be housed in a NEMA 4X, Type 304, 14 Gauge stainless steel enclosure with 30% extra mounting space for additional equipment. Enclosure shall have provisions for padlocking the door and a dead front inner door unit for mounting controls. All exterior hardware and hinges shall be stainless steel.

There shall be permanently affixed to the interior side of the exterior enclosure door both a nameplate and a 10" x 12" pocket for log sheet storage. The nameplate shall contain the following information, voltage, phase, rated horsepower, speed, date manufactured and pump and control panel manufacturer's name, address, and telephone number, pump data, including impeller data, operating point and head, KW input, and amps at the operating point and at least two other points on the pump curve.

The control panel enclosure shall be Underwriters Laboratories (UL) 50 type 4X

listed.

3. POWER SUPPLY AND MAIN DISCONNECT

Power supply to the control panel shall be either, 208/230 volt, 3 phase, 4 wire (20 hp and less) or 480 volt, 3 phase, 4 wire (>20hp). Minimum service shall be 100 AMP. Single phase power shall not be accepted.

Nonfusible safety service main disconnects shall be installed at all stations. In all 208 volt systems, disconnects should be installed between the meter and the panel and on all 480 volt systems, disconnect should be installed ahead of the meter. LED power available indicators shall be supplied on all legs.

Lift stations shall be provided with permanent emergency backup pump.

4. Circuit Breakers

A. Main Breakers

The panel shall have an inter-lock system between the normal power main breaker and the emergency breaker to ensure only one breaker is in the "on"

position at a time. Both breakers shall be equal in size. Main breakers shall be manufactured by Square D, or approved equal.

B Circuit Breakers

All circuit breakers shall be heavy duty molded case breakers. The handle on the circuit breakers shall be operational through the inner door. Breakers shall be inverse time types only. Circuit breakers shall be manufactured by Square D or approved equal.

5. Motor Circuit Protectors

Each pump motor shall be protected by a 3-pole motor circuit protector. Motor circuit protectors shall be manufactured by Square D or approved equal. The Motor Circuit Protector shall be operated by a toggle-type handle and shall have a quick-make, quick-break overcenter switching mechanism that is mechanically trip-free from the handle so that the contacts cannot be held closed against a short circuit and abnormal currents which cause the Motor Circuit Protector to trip. Tripping shall be clearly indicated by the handle automatically assuming a position midway between the normal ON and OFF positions. All latch surfaces shall be ground and polished. All poles shall be so constructed that they open, close, and trip simultaneously. Motor Circuit Protector must be completely enclosed in a high-strength glass polyester molded case. Ampere ratings shall be clearly visible. Contacts shall be of non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes.

6. Motor Starter And Selector Switches

The panel shall contain two or three motor starters as applicable. The motor starter shall be across the line magnetic starter with individual overload protection on each power leg with reset installed through the inner door unit. Motor starters shall be manufactured by Westinghouse, Square D or approved equal. Local power company regulations shall govern.

Selector switches shall be installed on the face of the inner door unit. Selector switch shall be a heavy duty oil tight "Hand-Off-Auto" three position switch to control the operation mode of each pump motor starter.

7. Pump Alternator

An eight pin plug-in solid state alternator shall be provided to change the pump starting sequence on each pumping cycle. Pump alternators shall be manufactured by Diversified or approved equal. A three position alternator test switch shall be provided to control the alternation operation. Switch positions to include the "Auto" to provide normal automatic sequence, "Off" position to disable alternator, and "test" position with a spring return to allow the alternating of the pump sequence to check alternator operation.

8. Lights And Alarms

A. Indicator Lights

There shall be installed on the face of the inner door unit, heavy duty oil tight indicator lights or L.E.D. as shown on the STANDARD DRAWINGS.

B. High Level Alarm

A vapor proof red light and horn shall be mounted on top of the panel for high level alarm. Also, there shall be an alarm silence push-button on the exterior of the panel which will silence the horn and automatically reset when these signals

are restored to normal. The push-button shall be heavy duty oil tight. The red globe shall be the screw-on type.

C. Panel Interior Light

An interior LED light shall be installed in the panel.

9. Emergency Power Receptacle

This item shall only be required on stations that do not have a permanent standby generator system. The panel shall have an external mounted generator receptacle of the required size. Emergency power receptacles shall be manufactured by Russell Stoll #JRSB1044FR.

10. Additional Requirements

A. Wiring

All power wires shall be THHN, THW or THWN 75 Degree C insulated stranded copper conductors and shall be appropriately sized for the given load application. All control circuit wire shall be type THW; Size 14, stranded type. All wiring within the enclosure shall be neatly routed by the use of slotted type wiring duct with snap on type covers. Wiring on the rear of the inner door shall be neatly bundled with nylon ties and include sufficient loop across the hinges to prevent wire damage, with each end of conductor marked (I.D.), Color: Red, 24 volt; white, neutral; black, 120 volts.

B. Junction Box

A junction box shall be installed in the electrical conduit between the wet well and the control panel. The junction box shall be exterior rated for this type of installation. All wires shall go through the junction box and sufficient wire left in the junction box for future use. Seal-offs shall be installed between the junction box and the control panel. Additional seal-offs may also be installed between the junction box and the wet well and may be required in accordance with local regulations.

C. Terminal Points

Terminal points of all terminal strips shall be permanently identified. All terminal numbers and identifying nomenclature shall correspond to and be shown on electrical diagrams. All wiring shall be permanently shown on electrical schematic diagrams.

D. Engraved Nameplates

All circuit breakers, control switches, indicator pilot lights and other control devices shall be identified with permanently affixed legend plates and lamicoid-type engraved nameplates where applicable.

E. Surge Protector

A surge protector shall be included and wired to protect motors and control equipment from lightning induced line surges. All surge protectors shall be U.L. approved and installed per respective power company requirements and manufacturers' specifications, surge protectors shall be attached to the main disconnects.

F. Elapsed Time Meters

Elapsed time meters shall be 115 volt non-reset type and shall totalize pump running time in hours and tenths of hours to 99999.9 hours.

G. Convenience Receptacle

On the face of the inner door unit, there shall be installed a 15 AMP 120 volt, duplex convenience receptacle. It shall be provided with its own single pole, 15 AMP circuit breaker for protection. Ground fault interrupt type shall be required.

H. Control Terminal Blocks

Control terminal blocks shall be of the clamp screw type, rated for 600 volts. Amperage rating shall accommodate the control circuit amperage. An additional 30 space terminal strip shall be installed in the cabinet for future use, with RTU equipment.

I. Control Power Transformers

There shall be a control power transformer with a minimum size of 2000VA to provide 120VAC power for: coils for starters, 15A duplex receptacle, indicator pilot lights, alarm horn, alarm light, pump alternator, elapsed time meters, etc. The secondary side shall have one leg fused and the other grounded. This control power transformer is required only on 480 volt control panels.

The signal required by the float switches and relays shall be 24VAC. This shall be provided by a 24VAC control power transformer properly sized with a fused secondary.

J. Control Relay

The level control relays shall operate from 24VAC. They shall be enclosed, plug-in 8 pin type with octal-style screw terminal sockets.

K. Electrical Schematic

There shall be permanently affixed to the interior side of the exterior enclosure door an electrical schematic diagram and a copy supplied to CITY personnel at start-up. The schematic diagram shall include the rated amperage and voltage for all components. The door schematic shall be laminated for preservation and legibility.

L. Phase Monitor

For all 208 through 480 volt stations, an eight pin plug-in type phase monitor shall be provided for protection of electrical components due to phase loss. Adequate dummy pin protection shall be provided to prevent accidental interchanging of the eight pin phase monitor with the eight pin alternator. This phase monitor shall be as manufactured by Diversified or approved equal.

11. TESTING, SERVICE AND WARRANTY

A. Testing

After fabrication in the control panel manufacturer's plant, an operational test shall be performed to check out the entire panel before delivery. Three phase source voltage to which the panel is intended for shall be used for the testing.

B. Service

The control panel manufacturer shall maintain a service organization in Central Florida that is available for service.

C. Warranty

The manufacturer shall furnish a five (5) year warranty against defects in materials and workmanship covering all parts and labor on all items supplied under this section.

S. Perimeter Fencing

Pumping stations shall have a six (6) foot high security type chain link fence around their perimeters, where necessary, as determined by the City Engineer. A decorative wall (not PVC) matching surrounding features may be required in lieu of perimeter fencing, as determined by the City Engineer.

1. Materials

The slats, posts, fastenings, fittings and other accessories for chain link fence shall meet the requirements of AASHTO M 181 with the following changes:

- a. The slats shall be opaque.
- b. The galvanizing of steel materials shall be hot-dipped galvanized.
- c. The weight of coating on posts and braces shall be 1.8 ounces of zinc per square foot, both inside and outside to meet the requirements of AASHTO M 111.

The base metal of the fabric shall be a good commercial quality 9 gage steel wire.

All posts and rails shall be in accordance with the following schedule:

End, corner and pull posts – 2 3/8" O.D., Schedule 40.

Line posts and gate frames – 2" O.D., Schedule 40.

Gate posts – 4 3/8" O.D., Schedule 40.

Post braces and top rail – 2 1/8" O.D., Schedule 20.

Tension wire shall be 0.177 inch coiled spring wire tensioned along the bottom.

Miscellaneous fittings and hardware shall be zinc coated commercial quality or better steel. Post caps, designed to provide a drive fit over the top of the tubular post to exclude moisture, shall be provided.

2. Installation

All posts shall be set three (3) feet deep in 12" diameter concrete footings. After the post has been set, aligned and plumbed, the hole shall be filled with 2500 p.s.i. concrete. The concrete shall be thoroughly worked into the hole so as to leave no voids. The exposed surface of the concrete shall be crowned to shed water. End, corner, pull and gate posts shall be braced to the nearest post with horizontal brace used as a compression member and a galvanized 3/8 inch steel truss rod and truss tightener used as a tension member. Corner posts and corner bracing shall be constructed at all changes of fence alignment of 30 degrees or more. All chain link fences shall be constructed with a top rail and bottom tension wire.

Swing gates shall be a minimum of two 8-foot wide double hung gates and hinged to swing through 180 degrees from closed to open and shall be complete with latches, locking device, stops keeper, hinges, slats and braces. Locking device shall be a vertical sliding tube with attached latch. Latch alone with a rod gate holder will not be accepted. Gates shall be the same height as the fence. Gate leaves less than 8 feet wide shall have truss rods or intermediate braces and gate leaves 8 feet or more in width shall have intermediate braces and diagonal truss rods or shall have a tubular members as necessary to provide rigid construction, free from sag or twist. Cantilever type gates may be required in lieu of the swing gates, as determined by the City Engineer.

Mechanical fence stretchers shall apply stretching.

T. Driveway

Service driveway shall be twelve (12) feet wide and have a minimum of six (6) inch thick concrete. All lift station driveways to conform to LDC Article VI Division 10 Commercial Driveways. The Driveway shall be perpendicular to adjacent roadway (public or private). Where a perpendicular driveway location is not possible, the width shall be increased to sixteen (16) feet and shall have a forty (40) foot straightaway from back of the sidewalk. The driveway apron radius shall be a minimum of sixty (60) feet.

Instances where the lift station driveway is connected to roads where the speed limit is in excess of twenty-five (25) miles per hour, an additional driveway or means for turning around prior to entering the road shall be installed prior to the equipment entering the road.

7.7.3 REQUIRED SUBMITTALS

Submittals shall be provided to the City in triplicate and include the following:

- A. Shop and erection drawings showing all important details of construction, dimensions and anchor bolt locations.
- B. Descriptive literature, bulletins, and/or catalogs of the equipment.
- C. Data on the characteristics and performance of each pump. Data shall include guaranteed performance curves, based on actual shop tests of similar units, which show that they meet the specified requirements for head, capacity, efficiency, NPSHR, submergence and horsepower. Curves shall be submitted on eight and one-half (8½) inch by eleven (11) inch sheets, at as large a scale as is practical. Curves shall be plotted from no flow at shut off head to maximum manufacturer recommended pump capacity. Catalog sheets showing a family of curves will not be acceptable.
- D. Complete layouts, wiring diagrams, telemetry or control schematics, including coordination with other electrical control devices operating in conjunction with the pump control system. Suitable outline drawings shall be furnished for approval before proceeding with manufacture of any equipment. Standard preprinted sheets or drawings simply marked to indicate applicability will not be acceptable.
- E. A drawing showing the layout of the pump control panel shall be furnished. The layout shall indicate all devices mounted on the door and in the panel shall be completely identified.
- F. The weight of each pump.
- G. Complete motor data shall be submitted including:
 - X Nameplate identification
 - X No-load current
 - X Full load current
 - X Full load efficiency
 - X Locked rotor current
 - X High potential test data
 - X Bearing Inspection report

7.7.4 ELECTRICAL GROUNDING SYSTEM

A. General

A grounding system shall be installed as per National Electrical Code, Local Codes and Ordinances. The DRAWINGS shall clearly show the Electrical Grounding System. An underground perimeter cable grounding system shall be installed with connections to at least the following equipment:

1. Wet Well Cover
2. Valve Vault Cover
3. Control Panels
4. Generator
5. Utility Company Transformer
6. Main Disconnect Switch
7. Fence

B. Material and Installation

The drawings shall show details of material and installation to construct a completely functional and operational Electrical Grounding System.

7.7.5 INSPECTION AND TESTING

A. General

Testing of pumping stations shall be done prior to acceptance of the project which it services. Testing shall be witnessed by representatives of the City Engineer, project engineer, project contractor, and the lift station manufacturer. The test will only be conducted once the lift station is connected to permanent power.

A factory representative knowledgeable in pump operation and maintenance shall inspect and supervise a test run at the pumping station covered by this manual. A minimum of one (1) working day shall be provided for the inspections. Additional time made necessary by faulty or incomplete work or equipment malfunctions shall be provided as necessary to meet the requirements in this manual at no additional cost to the City. Upon satisfactory completion of the test run, the factory representative shall issue the required manufacturer's certificate.

The test run shall demonstrate that all items of this Manual have been met by the equipment as installed and shall include, but not be limited to, the following tests:

1. That all units have been properly installed.
2. That the units operate without overheating or overloading any parts and without objectionable vibration.
3. That there are no mechanical defects in any of the parts.
4. That the pumps can deliver the specified pressure and quantity.
5. That the pumps are capable of pumping the specified material.
6. That the pump controls perform satisfactorily.

B. Pumping Capacity

Pumping capacity, by means of on-site pump down testing, shall be proven in the field after installation of pumping station. The designing engineer shall submit a letter stating testing results.

7.7.6 SEWAGE HOLDING TANKS

A. General

This section includes general technical criteria for the design and equipment required for the construction of sewage holding tanks. Holding tanks must meet FDEP requirements.

Sewage holding tanks, as referred to herein, shall mean a tank and related appurtenances designed specifically for the purpose of temporarily storing raw or partially-treated wastewater for a limited period of time to preclude over-loading of City sewage facilities, with the tank contents pumped or otherwise discharged to the sewage system during off-peak hours in a condition suitable for treatment.

B. Standard Requirements

1. Facility Location

A site plan shall be prepared, showing relative position of tank(s) with respect to property served, adjacent property, fencing and landscaping, with inlet, discharge piping and connection(s) to system(s) indicated. Where there is any possibility of flotation, all sewage holding tanks shall be suitably secured to prevent such occurrence.

2. Tank Capacity

The volume shall not be less than the design average daily flow expected from the contributing collection system, over a 48-hour period.

3. High Water Overflow

A maximum water level overflow shall be provided where discharge is possible to a sanitary gravity sewer; otherwise a high water level alarm shall be installed at the 75% capacity level.

4. Tank Covering

Totally enclosed, or covered, tank(s) shall be installed where the facility is within 300 feet of any other property, an occupied structure or habitat, which is existing or proposed. Vertical vent stack(s) shall be provided, to at least thirty (30) feet above the surrounding terrain, for covered tanks.

5. Aeration

In order to preclude septicity, the holding tank shall be properly aerated by the application of not less than one (1) cubic foot of air per minute per 1,000 gallons of tank capacity. The air distribution system shall be designed to aerate the entire tank contents. Duplicate air compressors are recommended, but not required.

6. Effluent Pumps

Duplicate sewage pumps shall be provided, each sized to empty the entire volume of tank(s) in not more than six (6) hours, or less, when so specified by the City Engineer.

7. Flow Control

Sewage pumping station force mains discharging to holding tank(s) shall be provided with by-pass piping valved to allow for future normal discharge to the City sewer system, if later removal of the holding tank(s) is required. Said by-pass valve(s) shall remain CLOSED unless specifically authorized to be open by the City Engineer.

8. Tank Wash-down

An automatic fresh water wash-down cycle shall be provided for thorough cleaning of all tank walls following each pump-out cycle. Spray jets shall have sufficient pressure to flush off solid matter deposited on tank walls. If the wash-down water supply is from a potable system, the connecting pipe shall be provided with reduced-pressure differential relief type back-flow preventer, designed to provide total cross-connection control and approved for this purpose.

The automatic shut-off valve in this line (electric solenoid or motor-o rated), if utilized, should be installed ahead of said back-flow preventer.

9. Controls

The holding tank operational procedure shall be under total automatic control, with an adjustable timer mechanism and liquid level sensing device provided for the proper sequencing of operations. Said controls shall be coupled with the appropriate items (each sewage pump, air compressor(s), and wash-down water supply pump, or automatic control valve), in order to provide the required sequence function. Hand-Off-Automatic (HOA) selector switches shall be provided for each operating unit. Automatic controls shall be included for alternating the operation of sewage pumps and air compressors, if duplex units provided.

10. Site Work

All applicable items including, but not limited to, fencing and landscaping, shall be included. Specifically, landscaping of adequate height and density to properly screen the holding tank facilities shall be provided and planted around the outside of the fence perimeter.

C. Operation and Maintenance

The holding tank facilities and sewage pumping units in connection therewith shall be the responsibility of the builder; however, the facilities will be subject to inspections by the Public Services Department.

D. Termination of Operation

Removal of the holding tank facilities shall be accomplished by and at the expense of the builder when normal or routine service can be provided by the City, and such removals ordered by the City Engineer.

DIVISION 8

RECLAIMED WATER (REUSE) SYSTEMS

7.8.1 GENERAL

This division sets forth the general requirements for design and installation of reclaimed water distribution systems for irrigation service. All developments located within the DEP permitted reuse service area shall be connected to the City reuse system and will meet the criteria outlined below. Where true reuse infrastructure is unavailable, a jumper connection from potable water to reuse water shall be required. The jumper connection shall have a four (4) inch reduced pressure zone backflow device (or sized accordingly per hydraulic calculations). All developments shall be required to install the reuse main pipe the full extent of the property at a minimum of 8" diameter pipe.

7.8.2 DESIGN STANDARDS

A. Reference

Normal flow demands for design shall be calculated on the basis of full ultimate development as known, or projected. Design calculation shall use the current established figures of the Florida Department of Environmental Protection. Except in special circumstances, reuse pipelines shall be sized within the following constraints:

PIPELINE SIZE	DEADEND PIPE LENGTH LIMITATION	LOOPED PIPE LENGTH LIMITATION
2"	Cul-de-sac per Standard Detail	800'
4"	800'	1500'
6"	1500'	2500'
8"	3000'	5000'

Minimum reuse transmission line size shall be eight (8) inches. Larger size requirements will be determined by the City Engineer at the time of design review.

B. Life Span of System

The reuse system shall be designed and constructed for an economic life of not less than twenty (20) years.

C. Fire Hydrants

Fire protection is not an authorized use for the reuse system except in special cases. Therefore, hydrants cannot be connected to the system.

D. System Size Computation

The minimum design for reclaimed water distribution systems shall provide for at least one hundred (100) percent of the combined maximum day irrigation demand rate. The average daily irrigation demand is calculated at five hundred and fifty (550) gallons per day per ERU. The maximum day irrigation demand is the average daily demand multiplied by the peaking factor of 2.0. The allowable minimum service pressure under said design condition shall not be less than thirty (30) psi. For all proposed reclaim piping networks,, design computations shall be completed by the "Hardy Cross" procedure, or other methods suitable to the extent of the network, and provided to the City for review. Design flows and method of computation shall be subject to review and approval by the City Engineer.

E. Valve Locations

Valves shall be provided for all branch connections, dead ends, or other locations, as required to provide an operable easily maintained, and repairable reuse water distribution system. Valves are to be placed so that the maximum allowable length of reuse main required to be shut down for repair work shall be one thousand (1,000) feet in all areas. A minimum of two (2) valves shall be required at tees and three (3) at crosses unless inline valves are sufficiently close so as to duplicate this requirement.

F. Looped Mains

All mains shall be looped on the main size required for the area, when possible. The City Engineer and the Public Services Director shall approve the size of looped extensions authorized in developed areas where existing water mains do not conform with the requirements of this section.

G. Minimum Line Size

Unless otherwise approved by the City Engineer, no line smaller than four (4) inches, or cul-de-sac lines smaller than two (2) inches will be allowed.

7.8.3 STANDARD REQUIREMENTS

A. General

The materials of construction and general installation procedures shall comply with the specific applicable standards set forth under Division 2, "Utility Excavation, Trenching and Backfilling"; Division 4, "Pipe Fittings, Valves and Appurtenances", as well as "Standard Details - Reuse Water Distribution Systems".

B. Joint Restraining

Pressure piping, fittings and other items requiring restraint, shall be braced with restraining assemblies, pursuant to Section 7.3.3 and the City standard details.

C. Pipe Depth and Protection

The standard minimum cover for reclaimed water distribution systems shall be thirty-six (36) inches from the top of the pipe to finish grade. Should this design not be feasible, additional protection may be required by the City Engineer.

D. Connections at Structures

Where pipes are to extend into or through structures, flexible joints are to be provided at the wall face.

E. Special Exterior Protection for Corrosion

Extra protection shall be provided for underground ductile iron pipe and fittings within areas of severe corrosive conditions. This shall be accomplished by the installation of polyethylene encasement, through the area of concern. The soil test evaluation to determine the necessity for extra protection in suspect areas shall be set forth in ANSI standard A21.5. Additionally, where other existing utilities are known to be cathodically protected, ductile iron pipe crossing said utility shall be installed parallel to and within ten (10) feet of, and protection shall also be provided. Steel pipe shall not be installed in severe corrosion areas.

F. Air Venting and BLOW-offs

Where the reuse water main profile is such that air pockets or entrapment could occur, resulting in the blockage, methods for air release shall be provided. Air venting capabilities shall be provided for distribution mains by appropriately placing blow-offs, or other manual devices. At critical points on major mains, automatic air release assemblies shall be installed. Special care shall be taken to preclude any cross-connection possibility in the design of automatic air release valve application. All dead-end mains, temporary or permanent, shall be equipped with a manually operated blow-off at the terminal. Blow-offs shall be a minimum of two (2) inches and enclosed in a submerged readily accessible structure.

G. Service Connections

Connections to reuse water mains four (4) inches and larger shall be made by drilling the appropriate size hole and installation of service saddle, with services to smaller sizes accomplished by in-line fittings. Reuse service lines from the main to the curb stop shall have a minimum diameter of one (1) inch for single services and one and one-half (1½) inches for double service line shall extend into the area between the curbing and sidewalk, perpendicular to said line, and shall terminate with a plugged curb stop, pending meter installation. When required, meters shall be located between the roadway and sidewalk or in easement behind sidewalks, excluding driveway aprons. All curb stops shall be the double service type where possible, one piece brass construction with locking provisions and labeled for

reclaimed water. A distance of seven and one-half (7½) inches shall be required between meter connection branches. On curbed streets the exact location for each installed service shall be marked by a curb marker per the City details. Etching or cutting may be used in lieu of curb markers as approved by City Engineer. Minimum letter dimensions shall be one (1) inch in height. Where no curb exists, or is planned, locations shall be adequately marked by a method approved by the City Engineer. Only two (2) inch and smaller corporation stops shall be of the ball type. Service line depth shall be a minimum of eight (8) inches below final grade at termination point.

7.8.4 TESTING

A. Reclaimed Distribution Systems

The contractor shall perform hydrostatic testing of all water distribution systems, as set forth in the following, and shall conduct said tests in the presence of representatives from the City Engineer and/or other authorized agencies, with twenty-four (24) hours advance notice provided.

B. Piping and Appurtenances

Piping and appurtenances to be tested shall be within sections between valves, unless alternate methods have received prior approval from the City Engineer. Testing shall not proceed until restraining devices are installed. All piping shall be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While the piping is being filled with water, care shall be exercised to permit the escape of air from extremities of the test section, with additional release cocks provided if required.

C. Hydrostatic Testing

Hydrostatic testing shall be performed at one hundred fifty (150) psi unless otherwise approved by the City Engineer, for a period of not less than two (2) hours. Testing shall be in accordance with the applicable provisions as set forth in Section 13, AWWA standard C6005. The allowable rate of leakage shall be less than the number of gallons per hour determined by the following formula:

$$L = N \times D / 7400 \times \sqrt{P}$$

For 150 psi test: $L = 0.001655 ND$

L = allowable leakage in gallons per hour

N = number of joints in the section tested

D = nominal inside diameter of the pipe in inches

P = test pressure maintained during the leakage test in pounds per square inch gauge

7400 = pre-determined constant

D. Amount of Loss

The testing procedure shall include the continued application of the specified pressure to the test system, for the two (2) hour period, by way of a pipe taking supply from a container suitable for measuring water loss. The amount of loss shall be determined by measuring the volume displaced from said container.

E. Test Failure

Should the test fail, necessary repairs shall be accomplished by the contractor and the test repeated until within the established limits. The contractor shall furnish the necessary labor, water, pumps, gauges and all other items required to conduct the required water distribution system testing and perform necessary repairs.

F. HDPE Pressure Testing

Pressure testing for HDPE piping systems shall be in accordance with the manufacturer's recommendations. A test plan shall be submitted to the City Engineer for review and approval.

DIVISION 9

WATER DISTRIBUTION SYSTEM

7.9.1 GENERAL

This division sets forth the general requirements for design and installation of water distribution systems for potable service. All developments shall be connected to the City water system and will meet the criteria outlined below. In certain situations, the City Manager may recommend, and the City Council may approve, participation by the City in the cost of main line extensions. All developments shall be required to install the water main pipe the full extent of the property at a minimum of 8" diameter pipe.

7.9.2 DESIGN STANDARDS

A. Reference

Normal flow demands for design shall be calculated on the basis of full ultimate development as known, or projected. Design calculation shall use the current established figures of the Florida Department of Environmental Protection. The following figures are for reference purposes only. The average daily flow for domestic use shall be calculated at the minimum rate of 300 gallons per ERU per day. Maximum day demand to be used for design shall be based upon a peaking factor of 1.6 unless project data supporting an alternative peaking factor is supplied to and approved by the City Manager or designee. Flow demands for commercial, industrial or other special developments shall be established from existing records or by estimated projections, using the best available data.

B. Standards

Water distribution systems and/or water main extensions shall be designed and constructed in accordance with the fire protection requirements of the Insurance Services Office (ISO) and in accordance with Level of Service (LOS) objectives of the City of St Cloud Comprehensive Plan.

C. Life Span of System

The water system shall be designed and constructed for an economic life of not less than twenty (20) years.

D. Design Calculations

Developer's engineer shall submit signed, sealed and dated design calculations with the plans for all water distribution projects. Calculations 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 7.9.2.D.1.

1. System Size Computation

The minimum design for water distribution systems shall provide for at least one hundred (100) per cent of the combined maximum day demand rate plus required fire flow rate, with special provisions for peak flows in excess thereof. The allowable minimum service pressure under said design condition shall not be less than twenty (20) psi. Design computation shall be the "Hardy Cross" procedure, or other applicable methods, as dictated by the system configuration. Design flows and method of computation shall be subject to review and approval by the City Engineer and Fire Chief.

2. Valve Locations

Valves shall be provided for all branch connections, dead ends, fire hydrant stubs, or other locations, as required to provide an operable, easily maintained, and repairable water distribution system. Valves are to be placed so that the maximum allowable length of water main required to be shut down for repair work shall be five hundred (500) feet in commercial, industrial or multi-family residential areas, or one thousand (1,000) feet in other areas. A minimum of two (2) valves shall be required at tees and three (3) at crosses unless inline valves are sufficiently close so as to duplicate this requirement.

3. Prohibited Locations

No water meters or flow measuring devices shall be installed on any main serving a fire hydrant, standpipe, or sprinkler system, without prior clearance from the City Engineer.

4. Looped Mains

All mains shall be looped on the main size required for the area, when possible. The City Engineer shall approve the size of looped extensions authorized in developed areas where existing water mains do not conform with the requirements of this section.

5. Main Line Extensions

Main line extensions shall be a minimum of eight (8) inches or greater if so directed by the City Engineer. Main line extensions must be extended across the full property frontage to facilitate future connections and extensions.

6. Minimum Line Size

Unless otherwise approved by the City Engineer, no line smaller than eight (8) inches will be allowed.

7. FDEP Requirements

Developers must obtain and comply with the terms of DEP permits for system extensions. These permits must be acquired by the developer and provided to the City before any work is initiated on the water system.

8. Location

Water mains shall be located in dedicated rights-of-way or utility easements. All water mains located outside of dedicated rights-of-way shall require a minimum of 15-foot easement. Additional easement widths shall be provided and subject to approval by the City Engineer when the pipe size or depth of cover so dictate.

7.9.3 STANDARD REQUIREMENTS

A. General

The materials of construction and general installation procedures, with the exception of fire hydrants, shall comply with the specific applicable standards set forth under Division 2, "Utility Excavation", "Trenching and Backfilling"; Division 4, "Pipe Fittings, Valves and Appurtenances", as well as the "Standard Details - Water Distribution Systems".

B. Fire Hydrants

1. Fire Hydrant Location and Spacing

Location of all hydrants shall be subject to the approval of the City Engineer. Distance from or spacing for hydrants located within single-family residential subdivisions shall not exceed five hundred (500) feet and shall be connected to water mains no less than eight (8) inches in diameter. The City Engineer and the Fire Chief may require larger diameter mains for longer lines that are not connected to other mains at intervals close enough for proper mutual support. Fire hydrants in commercial, industrial, and high-density residential areas shall be spaced no greater than three hundred fifty (350) feet apart and shall be connected to mains no less than eight (8) inches in diameter. Eight (8) inch diameter water mains shall be used only in sections where they will complete a good grid with intersecting mains in each street or intervals not exceeding 600 feet. It shall be required that all mains be valved in accordance with the most recent requirements of the Insurance Services Offices Grading Schedule for Water Support. The City Engineer and the Fire Chief may require larger diameter mains for long lines that are not connected to other mains at intervals close enough for proper mutual support. The required distance between all hydrants shall be measured along the road right-of-way, and shall not be measured across private property not designed and used as a road right-of-way. No individual fire hydrant may be designed to deliver more than 1,000 GPM of required fire flow. Additional hydrants shall be provided if the required fire flow for any building served exceeds 1,000 GPM. Reference City Standard Details for hydrant placement distances from curbs and sidewalks.

2. Manufacturer

All fire hydrants shall be manufactured and tested in complete accordance with the latest edition of AWWA C502, Standard for Dry-Barrel Fire Hydrants, as published by the American Water Works Association and shall be installed as illustrated in the City's standard details. Hydrants shall be furnished without drains or with drains plugged.

3. Nozzles

Each hydrant shall have one (1) each four-and-one-half (4½) inch pumper nozzle and two (2) each two-and-one-half (2½) inch hose nozzles. The nozzle caps shall be furnished with rubber gaskets to prevent leakage. The threads and operating nut shall not be painted; the barrel of the fire hydrant shall be painted silver or other colors conforming to other jurisdictional requirements.

4. Stem Threads

Bonnet shall be of dry top design. All stem threads and bearings shall be protected with an automatic self-oiling or grease case system. Stem threads shall be low friction acme. Hydrants with stem threads (upper or lower) that are constantly exposed or immersed in water shall not be acceptable. Hydrants shall open "left", or counterclockwise.

5. Traffic Design

Hydrants shall be traffic design with break flange and lugs just above the ground line. Undercut bolts are not acceptable. Hydrants shall be compression type main valve that opens against system pressure. All operating parts, including valve seat, shall be removable through the barrel, without digging. The shoe shall have drain holes that will operate automatically. Toggle joints and mechanically operated drain valves are not acceptable. Main valve opening shall be at least five and one-fourth (5¼) inches to assure optimum flow.

6. Flow Charts

Flow charts shall be submitted for all hydrants. Flow charts shall be based on five (5) foot trench with six (6) inch diameter inlet. Flow loss shall not exceed 3.80 psi at one thousand (1,000) GPM through four-and-one-half (4½) inch pumper or 4.00 psi through two-and-one-half (2½) inch nozzles.

7. Vertical Distance

The vertical distance from the centerline of the nozzle caps to finished grade shall be eighteen (18) inches minimum. Hydrants shall be installed with breakable flange at a four (4) inch maximum distance above ground line.

8. Standard Hydrant

The City of St. Cloud standard hydrant shall be either the Mueller A-423, American Darling B84B, or approved equal.

9. Installation

Hydrants shall be installed plumb and in true alignment with the connection pipes to the water main. They shall be securely restrained.

10. Placement

Hydrant placement shall not be at a distance greater than twelve (12) feet from a paved stabilized area which can withstand the weight of a Class A pumper. Hydrant shall be a minimum of five (5) feet from a paved stabilized area as described above. Steamer port shall be correctly positioned for the proper connections. The distance may be greater upon specific approval of the City Manager or designee.

11. Valve Locations

An approved hydrant valve shall be located at and permanently connected to the water main tee with a mechanical joint anchor tee and adjustable coupling or approved restraint.

12. Fire Flow Tests

Fire flow tests will be conducted by the Fire Department upon completion of construction and must conclusively demonstrate that engineering and construction standards have, in fact, produced the requisite fire flows prior to occupancy of structures.

C. Joint Restraining

Pressure piping, fittings and other items shall be restrained as outlined in Section 7.3.3. Restraining assemblies shall be pursuant to the City's standard details. Said restraining devices shall be designed for the maximum pressure condition (testing).

D. Pipe Depth and Protection

The standard minimum cover for water distribution systems shall be thirty-six (36) inches from the top of the pipe to finish grade. Should this design not be feasible, additional protective measures, meeting the City Engineer's approval, must be employed.

E. Connections at Structures

Where pipes are to extend into or through structures, flexible joints are to be provided at the wall face.

F. Special Exterior Protection for Corrosion

Extra protection shall be provided for underground ductile iron pipe and fittings within areas of severe corrosive conditions. This shall be accomplished by the installation of polyethylene encasement, through the area of concern. The soil test evaluation to determine the necessity for extra protection in suspect areas shall be set forth in ANSI standard A21.5. Additionally, where other existing utilities are known to be cathodically protected, ductile iron pipe crossing said utility shall be installed parallel to and within ten (10) feet of, and protection shall also be provided. Steel pipe shall not be installed in severe corrosion areas.

G. Air Venting and Blow-offs

Where the water main profile is such that air pockets or entrapment could occur, resulting in the blockage, methods for air release shall be provided. Air venting capabilities shall be provided for distribution mains by appropriately placing fire hydrants, blow-offs, or other manual devices. At high points on all mains, automatic air release assemblies shall be installed. Special care shall be taken to preclude any cross-connection possibility in the design of automatic air release valve application. All dead-end water mains, temporary or permanent, shall be equipped with a manually operated blow-off at the terminal. Blow-offs shall be a minimum of two (2) inches and enclosed in a submerged readily accessible structure, in accordance with City standard details.

H. Service Connections

Connections to water mains four (4) inches and larger shall be made by drilling the appropriate size hole and installation of service saddle, with services to smaller sizes accomplished by in-line fittings. Water service lines from the main to the curb stop shall have a minimum diameter of one (1) inch for single services and one-and-a-half (1½) inches for double services. Service lines shall extend into the area behind the sidewalk, perpendicular to said line, and shall terminate with a plugged curb stop, pending meter installation. Meters shall be located at the property (ROW) line, or in easement behind sidewalks, excluding driveway aprons. All curb stops shall be the double service type where possible and one piece brass construction with locking provisions. A distance of seven-and-one-half (7½) inches shall be required between meter connection branches. On curbed streets the exact location for each installed service shall be marked by a curb marker per the City details. Etching or cutting a "W" may be used in lieu of a marker as approved by City Engineer.

Minimum letter dimensions shall be a height of one (1) inch. Where no curb exists or is planned, locations shall be adequately marked by a method approved by the City Engineer. All service connections two (2) inches and larger shall require a gate valve be installed at the service tap. Only one and a half (1-1/2) inch and smaller corporation stops shall be of the ball type. Service line depth shall be a minimum of eight (8) inches below final grade at termination point.

I. Automated Meter Infrastructure

All new meters are required to be AMI meters. The developer is required to have an AMI propagation study conducted by the City's AMI meter provider. This study shall prove whether the existing AMI infrastructure is adequate to provide service to the proposed development. If an additional AMI tower(s) is/are required to provide service, the developer is required to install the AMI tower(s) as part of the proposed development. The City Engineer may waive the propagation study requirement for the development on a case by case basis.

7.9.4 SERVICE PIPE, STOPS, FITTINGS, AND SERVICE SADDLES

A. Service Pipe

All service lines shall be 1", 1½" or 2" polyethylene tubing, blue in color, conforming to specifications in-AWWA C901. Services shall be PE 3408, DR 9 (PC 200).

B. Stops

Corporation stops shall be 1", 1½" or 2" brass, equipped with connections compatible with the polyethylene tubing and threaded in accordance with specifications in AWWA C800 and AWWA C901. Curb stops shall be sized to match the meter size and conform to the specifications in AWWA C800 and AWWA C901. The curb stops shall be the model(s) as indicated on the standard drawings and be lockable. All brass shall be lead free.

C. Fittings

Fittings shall be brass, cast and machined in accordance with specifications in AWWA C800 and AWWA C901, with compatible polyethylene tubing connections. All brass shall be lead free

D. Service Saddles

A service saddle shall be used for all service line taps. Service saddles shall be double strap, anchored by a minimum four (4) bolt pattern on a ductile iron saddle body. Straps and hardware shall be stainless steel. Bodies shall have a fusion epoxy or nylon coating.

7.9.5 SEPARATION OF WATER MAINS AND SEWERS

A. General

Water mains that are laid in the vicinity of pipelines designated to carry raw wastewater or reclaimed water (wastewater effluent) shall meet the horizontal and vertical separations specified by the City of St. Cloud Standard Details and as required by the Florida Department of Environmental Protection.

7.9.6 TESTING

A. Water Distribution Systems

The contractor shall perform, at his/her expense, the hydrostatic testing of all water distribution systems, as set forth in the following, and shall conduct said tests in the

presence of representatives from the City and/or other authorized agencies, with twenty-four (24) hours advance notice provided.

B. Piping and Appurtenances

Piping and appurtenances to be tested shall be within sections between valves, unless alternate methods have received prior approval from the City Engineer. Testing shall not proceed until restraining devices are installed. All piping shall be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While the piping is being filled with water, care shall be exercised to permit the escape of air from extremities of the test section, with additional release cocks provided if required.

C. Test Pressure and Duration

Hydrostatic testing shall be performed at one hundred fifty (150) p.s.i. unless otherwise approved by the City Engineer, for a period of not less than two (2) hours. Testing shall be in accordance with the applicable provisions as set forth in Section 13, AWWA standard C6005. The allowable rate of leakage shall be less than the number of gallons per hour determined by the following formula:

$$L = N \times D / 7400 \times \sqrt{P}$$

For 150 psi test: $L = 0.001655 ND$

L = allowable leakage in gallons per hour

N = number of joints in the section tested

D = nominal inside diameter of the pipe in inches

P = test pressure maintained during the leakage test in pounds per square inch gauge

7400 = pre-determined constant

D. Amount of Loss

The testing procedure shall include the continued application of the specified pressure to the test system, for the two (2) hour period, by way of a pipe taking supply from a container suitable for measuring water loss. The amount of loss shall be determined by measuring the volume displaced from said container.

E. Test Failure

Should the test fail, necessary repairs shall be accomplished by the contractor and the test repeated until within the established limits. The contractor shall furnish the necessary labor, water, pumps, gauges and all other items required to conduct the required water distribution system testing and perform necessary repairs.

7.9.7 DISINFECTION

Following the pressure testing, the contractor shall, at his/her own expense, disinfect all sections of the water distribution system. Advance notice shall be provided to the City Engineer before disinfection and shall be accomplished with the applicable provisions of AWWA standard C651, Disinfecting Water Mains, and all appropriate agency approvals.

A. Water tests

Care shall be taken to provide disinfection to the total system and extremities shall be carefully flushed to accomplish this end. After disinfection has been accomplished, the contractor shall, at his/her own expense, be responsible for having all necessary bacteriological samples collected and analyzed. Samples of water for bacteriological analysis shall be collected and analyzed by a State certified laboratory which is acceptable to the City. The bacteriological samples must be

taken in the presence of a City representative in order for them to be acceptable to the City for completion of the FDEP Certification of Completion form. Should these samples or subsequent samples prove to be unsatisfactory, then the piping shall be re-disinfected and new samples collected until a sufficient number of satisfactory samples are obtained.

B. Required Element

The contractor shall furnish all equipment and materials and perform the work necessary for disinfecting procedures, and bacteriological analysis, which may include additional disinfection and testing as required.

C. Temporary Jumper

Pursuant to Florida Administrative Code requirements, all new water main construction shall be first connected to existing system via a "Temporary Jumper", as described in the City's standard details. The temporary jumper shall have a reduced pressure zone backflow preventer. After the bacteriological samples have been collected, the new main shall have a minimum pressure of 20 psi via the temporary jumper at all times. Upon receipt of the F.D.E.P. potable water main clearance, the temporary jumper shall be removed and the corporation stops plugged at the main as shown on the standard drawings.

DIVISION 10

WAIVERS AND APPEALS

7.10.1 WAIVERS

The City Council may grant a waiver from the applicability or specific terms of these regulations when such waiver will not be contrary to the public interest and where, owing to special conditions, a literal enforcement of the provisions of this resolution would result in unnecessary hardship. Such waiver shall not be granted if it has the effect of nullifying the intent and purpose of these regulations. Furthermore, such waiver shall not be granted by the City Council unless and until the following:

A. Written Application

A written application for a waiver is submitted to the City Council demonstrating:

1. That special conditions and circumstances exist which are peculiar to the land, structures, or required subdivision improvements involved and which are not applicable to other lands, structures, or required subdivision improvements.
2. That a literal interpretation of the provisions of these regulations would deprive the applicant of rights commonly enjoyed by other properties with similar conditions.
3. That the special conditions and circumstances do not result from the actions of the applicant.

B. Public Hearing

A public hearing on the proposed waiver shall be held by the City Council. The costs of holding hearings and of sending notices shall be paid by the applicant upon the filing of such written application.

C. Findings

The City Council shall find that the standards in subsection 7.10.1.A have been satisfied, and that the waiver being granted is the minimum waiver required in order

to make possible the reasonable use of the land, buildings, and other improvements. The City Council shall further find that the granting of the waiver would be in harmony with the general purpose and intent of these regulations, will not be injurious to the surrounding territory, or otherwise be detrimental to the public.

D. Conditions

In granting any waiver, the City Council may prescribe appropriate conditions and safeguards to ensure that the purposes of these regulations are carried out, and to ensure that the waiver granted is the minimum necessary to allow reasonable use of the land and improvements.

7.10.2 APPEALS PROCEDURE

A. Appeal of Staff Decision

Any person aggrieved by the decision of any City official in the enforcement or interpretation of this article, may appeal such decision to the City Council of the City of St. Cloud within thirty (30) days from said decision. The City Council, by majority vote, may affirm, reverse, or modify the decision of said City official.

DIVISION 11

WASTEWATER TREATMENT FACILITIES

7.11.1 GENERAL

Any wastewater treatment facility, other than those owned or maintained by the City of St Cloud, shall comply with all design, permitting and construction requirements of the EPA and FDEP, as well as meet the requirements of Division 13, hereinafter.

DIVISION 12

WATER TREATMENT FACILITIES

7.12.1 GENERAL

Any water treatment facility, other than those owned or maintained by the City of St Cloud, shall comply with all design, permitting and construction requirements of the EPA and Florida DEP, as well as meet the requirements of Division 13, hereinafter.

DIVISION 13

CHAPTER 180 – URBAN SERVICE AREA

7.13.1 BOUNDARY DEFINITION

The boundary of the Chapter 180 – Urban Service Area shall be in accordance with Ordinance 2002-31, adopted by the City Council of the City of St. Cloud at its July 11, 2002 meeting (on file in the City Manager's office and the Public Services Department). It is recognized that future conditions may exist from time to time, which may necessitate amending the boundaries to include more or less area. Such amendments shall be made by the City Council and in accordance with Section 180.02, Florida Statutes.

7.13.2 REGULATED ACTIVITIES

A. Types Of Development

1. Subdivisions, Planned Unit Developments (PUD)

- (a) All property developments with the exception of individual lots that are not part of a subdivision or PUD, are regulated under the provisions of this article and the articles, ordinances or laws as they pertain to these developments, i.e., impact fees, connection fees, annexation requirements, etc.
- (b) All such developments must provide for, at its own cost, the design, construction, and connection to the City water supply and public sewerage systems and/or make provisions, on an interim basis, to provide adequate public water supply and sewage treatment and disposal measures in accordance with City requirements.
- (c) All developments must assure connection to public water and/or sewage system when made available by the City. Availability is defined as the provision of a connection point not to exceed one-quarter (¼) mile from the property boundary.

B. Water And Sewage Facilities

1. Private Water or Wastewater Companies

- (a) No person, corporation or private water or wastewater company may purchase, construct, improve, extend, enlarge and reconstruct water or wastewater facilities; operate, manage or control water or wastewater facilities within the Chapter 180 – Urban Service Area without the approval and permission of the City of St. Cloud under its utility facility permitting procedure.

C. Utility Facility Permits

The City hereby establishes a utility facility permit. Except for those sub-regional wastewater facilities which the City designs and constructs or which any person designs and constructs in accordance with a sub-regional wastewater treatment facilities agreement, no water treatment, wastewater treatment, or effluent disposal facilities shall be constructed, expanded, or modified by any person within the Chapter 180 – Urban Service Area without an appropriate and currently valid utility facility permit issued by the City, unless exempted by City rule or special act. In no event shall a utility facility permit be valid for more than three (3) years. No utility facility permit will be issued to any person until that person executes a utilities agreement with the City in accordance with Section 7 hereof. This utility facility permit will be required in addition to other applicable City or state permits, including but not limited to wastewater permits. No building permits or certificates of occupancy required for an applicant's improvements within the Chapter 180 – Urban Service Area shall be issued or, if mistakenly issued, valid until issuance of the utility facility permit.

D. Utility Facility Permit Applications

- 1. All persons who desire to construct, reconstruct, expand, install, operate and/or maintain water and wastewater facilities for which a utility facility permit is required shall:
 - (a) Make application on forms as prescribed by the City Manager, and
 - (b) Submit such information as the City Manager may require. The City Manager may require such person to submit any additional information reasonably necessary for proper evaluation of the application.

2. All applications and supporting documents shall be filed in triplicate with the City Manager.
3. All applications shall be accompanied by a non-returnable application fee in such amount as will be determined from time to time by the City as set forth by City resolution.
4. To insure the protection of the public health, safety, and welfare, any construction, modification or operation of water or wastewater facilities shall be in accordance with good professional engineering practices pursuant to Chapter 471, Florida Statutes, or as the Statute may be amended from time to time. Therefore, all applications and supporting engineering documents required hereby shall be certified by a professional engineer registered in the State of Florida.
5. Upon a determination by the City Manager that an application is complete, the City Manager shall place that application on the agenda of the City of St. Cloud for consideration by the City Council at the earliest regularly scheduled meeting when time is available for consideration of the application. The City Council may, in its discretion, schedule the consideration of an application received pursuant to these rules during any hearing held by the City Council to determine the granting or denial of a utility facility permit.

7.13.3 CONSULTATION

The applicant, or his/her engineer, may consult with the City Manager concerning the planning construction, expansion, modification or operation of any water or wastewater facilities, the efficiency of such devices or facilities, or other related problems related to said facilities. However any representation by the City Manager shall not relieve any person of any requirement of applicable special acts, general laws, these rules, or any other City laws, ordinances, rules, regulations, standards or permits.

7.13.4 UTILITY FACILITY PERMITS; CRITERIA FOR ISSUANCE OR DENIAL

- (a) A permit may be issued to the applicant upon such conditions as the City may direct, only if the applicant affirmatively provides the City with reasonable assurance based on plans, test results and other information, that the construction, expansion, modification, and operation of the water or wastewater facilities will not adversely affect the public interest or violate any provision of this division.
- (b) When the application for permit is found deficient in any respect, or required information has not been submitted to the City Manager, the application shall not be accepted. The City Manager shall notify the applicant in writing of the deficiencies or lacking information and allow a reasonable time for corrections or submittal of the necessary information.
- (c) If, after review of the application and all the information, the City determines that the construction, modification, expansion, or operation of the water or wastewater facilities will not be in accord with the rules, the City shall deny the permit.
- (d) The issuance of a utility facility permit does not relieve any person from complying with these rules.

7.13.5 WASTEWATER AND WATER FACILITIES MINIMUM REQUIREMENTS

In addition to the other requirements of these rules, the City may only issue a utility facility permit if the applicant complies with the following:

- (a) The proposed facility complies with applicable goals, objectives, and policies contained in the City of St. Cloud Comprehensive Development Plan as amended.
- (b) The applicant has received a special exception for said facilities pursuant to Article VII, Division 10.
- (c) The applicant has received a wastewater permit from the Florida Department of Environmental Regulation and the Health Rehabilitative Services as applicable.
- (d) The applicant has prepared plans and specifications in accordance with design criteria and guidelines adopted by City ordinance or resolution from time to time.
- (e) The applicant has executed a utilities agreement with the City providing the following:
 - (1) The applicant's responsibility to construct the water or wastewater facilities in accordance with City approved design criteria and plans and specifications.
 - (2) The applicant's responsibility to operate the water or wastewater facilities in accordance with applicable City, state and federal rules, regulations, laws, permits and approvals.
 - (3) The applicant's responsibility to dedicate an easement of such width as is determined by the City Manager to be necessary to construct a sewer line sufficient to carry the sewage of the design capacity of the wastewater treatment facilities or a water main sufficient to conduct the maximum hourly design flow required by the applicant's improvements from the approved location of said facilities or improvements to a point on the improved public road nearest to the applicant's property at the time of such approval.
 - (4) The applicant's responsibility to connect at its sole expense all its improvements to the nearest off-site City wastewater or water transmission line, as appropriate, with adequate transmission capacity for all such improvements.
 - (5) The applicant's responsibility to connect all its improvements to a regional, sub-regional, or area-wide water or wastewater treatment plant, as appropriate, and to pay all applicable sewer capital charges for the wastewater service capacity or water connection fees for water service capacity, as appropriate, necessary to serve said improvements in accordance with City rate resolutions, ordinances, permits and requirements.

7.13.6 UTILITY FACILITY PERMITS; SUSPENSION, REVOCATION AND RENEWALS

- (a) Utility facility permits shall be effective until suspended, or expired, and shall be subject to the provisions of these rules.
- (b) Failure to comply with the utilities agreement, these or any other applicable City rules shall be grounds for suspension or revocation of a utility facility permit.
- (c) A utility facility permit issued pursuant to these rules shall not become a vested property right to the permittee.
- (d) The City may revoke any utility facility permit issued by it if it finds that the permit holder or his/her agent:

- (1) Submitted false or inaccurate information in his/her application or operation or report.
- (2) Has violated law, these rules or utility facility permit conditions.
- (3) Has refused lawful inspection pursuant to this resolution.
- (e) Prior to sixty (60) days before the expiration of any utility facility permit, the permittee may apply for a renewal of the permit on forms and in a manner prescribed by the City Manager. Any such renewed permit may contain modifications if such modifications are required in the opinion of the City to alleviate any existing violation of any federal, state or City law, rule, regulation, permit or approval.

7.13.7 UTILITY FACILITY PERMITS, TRANSFERS

A utility facility permit is issued in the name of a person. Upon sale or legal transfer of water or wastewater facilities, and a legal assignment of the utilities agreement applicable to such facilities, the new owner must apply by letter for a transfer of the utility facility permit within thirty (30) days thereof. Unless the transferor notifies the City Manager of the transfer and to whom transferred, the transferor will remain liable for performances in accord with the utility facility permit until the transferee applies for a transfer of the utility facility permit.

7.13.8 VARIANCE PROCEDURES

(a) Applications for variances from the requirements of these rules shall be made to the City Manager. The City may approve an application for, and require of the applicant for a variance such information as is necessary to carry out the purposes of these rules.

(b) The City may grant a variance from the terms of these rules when such variance would not be contrary to the public interest and where, owing to special conditions, a literal enforcement of the provisions herein would result in unnecessary hardship. Such variance will not be granted if it has the effect of nullifying the intent and purpose of these rules. In granting any variance, the City may prescribe appropriate conditions and terms thereto.

7.13.9 APPEALS OF CITY DECISIONS

Any person aggrieved by the issuance or denial of a utility facility permit by the City may file a petition for *writ of certiorari* in the manner prescribed by law in the Circuit Court of Osceola County, to review said decision of the City.

7.13.10 INTERPRETATION AND APPLICATION

(a) In the interpretation and application of these rules, all provisions shall be:

- (1) Considered as minimum requirements.
- (2) Liberally construed in favor of the City; and
- (3) Deemed needed to neither limit nor repeal any other powers granted other state statutes, or City ordinances or City resolutions.

(b) The City of St. Cloud water and wastewater facility permit rules are cumulative and supplemental to existing City laws, ordinances, rules and regulations. The rules contained herein conflict or overlap with any other City law, ordinance, rule or regulation, which imposes the more stringent restriction shall prevail.

7.13.11 RESERVED

7.13.12 PRE-APPLICATION PHASE

Potential applicants who contact the City and/or county must be advised that the application procedure includes a utility facility permit to be obtained from the City of St. Cloud for the consideration of water and wastewater facilities in the Chapter 180 – Urban Service Area. This coordination necessitates cooperation by the County Building Department, Planning Department, Technical Review Committee and the County Engineering Department. Potential applicants would receive a copy of the appropriate facilities permit form for their particular needs and information for submittal to the City of St. Cloud City Manager or designee to initiate the preliminary application review phase.

7.13.13 PRELIMINARY APPLICATION

The completed preliminary application would be filed with the City Manager or designee for review, comment and placement on the Development Review Committee agenda for review by members of that committee.

7.13.14 SITE REVIEW RECOMMENDATIONS

The completed preliminary application will be reviewed by the Development Review Committee and its formal recommendations and additions forwarded to the City Manager for City Council approval.

7.13.15 FINAL REVIEW AND PERMIT ISSUANCE

After approval by the City Council a final review of the plans, specifications, and contractual agreements will be made by the City Manager in conjunction with the final plans and specifications and a permit issued for the proposed facilities.

DIVISION 14 DEFINITIONS

7.14.1 DEFINITIONS AS USED IN THIS ARTICLE

- (1) "Collection Facilities" means the lines, pipes, meters, and appurtenant equipment used to collect sewage from the building sewer and to transmit it to wastewater transmission facilities.
- (2) "City Rate Resolutions and Ordinances" means all resolutions and ordinances, either currently in effect or to be adopted in the future, by the City Council of St. Cloud, Florida, or its successors, which establish fixed rates, fees and charges for the City Water System and the City Wastewater System.
- (3) "Effluent Disposal Facilities" means those wastewater facilities necessary to detain, transmit, store, and dispose of wastewater previously treated at wastewater treatment facilities.
- (4) "GPD" means gallons per day on an annual average basis.
- (5) "Improvements" means those residential, commercial, institutional, industrial, or other structures, buildings, developments, and improvements to be constructed or developed by an applicant and to be served by water or wastewater facilities regulated by these rules. (See also Article II #82.)
- (6) "Interim wastewater facilities" means those wastewater facilities to be constructed and operated by a person other than the City on an interim, temporary basis until the

sewage flows treated and disposed of thereby are transferred to a regional, sub-regional, or area wide wastewater treatment plant.

- (7) "City of St. Cloud Wastewater System" means all facilities and interests in real and personal property owned, operated, managed or controlled by the City now and in the future and used to provide sewer or wastewater service to existing and future customers within the Chapter 180 – Urban Service Area and the City of St. Cloud.
- (8) "City of St. Cloud Water System" means all facilities and interests in real and personal property owned, operated, managed or controlled by the City of St. Cloud now and in the future and used to provide water services to existing and future customers within the total public service area and the City of St. Cloud.
- (9) "Rules" means the City of St. Cloud water and wastewater facility permit rules, or as they may be amended from time to time.
- (10) "Sewage" or "Wastewater" means a combination of water-carried wastes from residences, business buildings, institutions, industrial establishments and other customers of wastewater facilities, together with such ground, surface and storm waters as may be present.
- (11) "Sewer Capital Charges" means those fees and charges established and collected by the City at or before the issuance of buildings permits or certificates of occupancy to pay for or recover the capital costs of wastewater facilities, including but not limited to sewer connection fees and sewer impact fees, as set forth from time to time in City rate resolutions and ordinances.
- (12) "Subregional Wastewater Facilities" means those wastewater facilities planned, designed, and constructed in accordance with the City of St. Cloud Public Services Engineering Department design criteria for sub-regional wastewater treatment facilities adopted by resolution, and as amended from time to time by the City.
- (13) "Utilities Agreement" means an agreement prepared in accordance with the requirements of Section 7 of this resolution.
- (14) "Utility Facility Permit" means that permit issued by the City pursuant to Section 3 of Ordinance 85-Q.
- (15) "Wastewater Facilities" means all wastewater collection, transmission, treatment and effluent disposal facilities, whether interim or sub-regional, including all interceptors, lines, pipes, meters, couplings, pumps, force mains, plant and appurtenant equipment necessary to provide a sewer or wastewater service.
- (16) "Wastewater Service Capacity" refers to the amount of treatment plant capacity required to adequately serve the present and future needs of a project as defined by Article VII, Division 5.
- (17) "Wastewater Transmission Facilities" means those lines, pipes, force mains, pumps, meters and appurtenant equipment used to transmit sewage from the collection facilities to the headworks of the treatment facilities, as defined and determined by the City.
- (18) "Wastewater Treatment Facilities" means those facilities used to treat and filter sewage prior to effluent disposal. Wastewater treatment facilities do not include any portions of the collection facilities, wastewater transmission facilities or effluent disposal facilities.
- (19) "Water Connection Fees" means "Water Connection Fees" as defined by Article VII,

Division 1, Section 7.1.5.

- (20) "Water Distribution and Transmission Facilities" means those lines, pipes, force mains, pumps, meters and appurtenant equipment used to transmit and distribute potable water from the water treatment facilities to individual customers.
- (21) "Water Facilities" means any water treatment, production, distribution, or transmission facilities, including wells, plants, mains, pumps, meters and necessary appurtenant equipment, or any combination thereof. (See also Article II # 188).
- (22) "Water Service Capacity" refers to the amount of treatment plant capacity required to adequately serve the present and future needs of a project as defined by Article VII, Division 9.
- (23) "Water Treatment and Production Facilities" means any treatment and production facilities, including wells, plants, pumps, and necessary appurtenant equipment necessary to withdraw and treat raw water in order to produce potable water.

SECTION V. SEVERABILITY. It is declared to be the intent of the City Council that, if any section, subsection, sentence, clause, phrase, or portion of this resolution is for any reason held invalid or unconstitutional by a court of competent jurisdiction, such portion shall be deemed a separate, distinct and independent provision, and such holding shall not affect the validity of the remaining portions thereof.

SECTION VI. CONFLICT. All Resolutions of the City in conflict herewith are hereby repealed to the extent of the conflict.

SECTION VII. This resolution shall take effect immediately upon its adoption.

PASSED AND ADOPTED this 14th day of March 2019

CITY OF ST. CLOUD, FLORIDA

Nathan Blackwell, Mayor

ATTEST:

Linda Jaworski, City Clerk

LEGAL IN FORM AND VALID IF ADOPTED:
deBeaubien, Knight, Simmons, Mantzaris & Neal, LLP

Daniel F. Mantzaris, City Attorney

Attachment A