CITY OF PORT ST LUCIE

ENGINEERING STANDARDS FOR LAND DEVELOPMENT

COMMERCIAL, RESIDENTIAL SUBDIVISIONS AND CAPITAL IMPROVEMENT PROJECTS

List of Revisions

1st Edition – December 2020

Table of Contents

List of Figures

List of Tables

1. Introduction

1.1 Purpose

The City of Port St Lucie's *Engineering Standards for Land Development: Commercial, Residential Subdivision and Capital Improvement Projects* provides standards for the design and construction of transportation and drainage facilities as well as the use of easements and rights-of-way for development projects within the City of Port St. Lucie.

The standards within this document are applicable to all new development. Limitations imposed by existing conditions may make it infeasible to apply these standards to redevelopment projects; however, in that event, the standards shall apply to the extent that safety, legal, economic, and environmental considerations allow.

The terms "shall" and "must" are used when the requirement is mandatory. Other terms such as, "recommended" and "preferred" indicate desirable procedures or methods. The requirements of this document do not provide relief from standards imposed by federal, state, or other agencies. In the event of conflicts with federal, state, or other regulations, the more stringent regulation shall prevail. In case of a disagreement in the interpretation of any of these standards, the decision of the City Manager shall prevail.

1.2 Acronyms and Abbreviations

Acronyms and abbreviations used in this document shall have the meanings listed in Table 1-1.

Table 1-1 Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ADAAG	American Disabilities Act Accessibility Guidelines
AKA	Also Known As
APL	Approved Product List
APS	Accessible Pedestrian Signal
ASIC	American Society of Irrigation Consultants
BMAP	Basin Management Action Plan
BMP	Best Management Practice – Stormwater Erosion and Sediment Controls
CCU	Central Control Unit
CFS	Cubic Feet per Second
CSM	Cubic Feet per Second per Square Mile
CD	Compact Disc
CDD	Community Development District
CIP	Capital Improvement Program
CO	Certificate of Completion
DR	Dimension Ratio

Table 1-1 Acronyms and Abbreviations

DRI	Development of Regional Impact
EOP	Edge of Pavement
EOR	Engineer of Record
EPA	United States Environmental Protection Agency
ERP	Environmental Resource Permit (SFWMD)
ERU	Equivalent Residential Unit
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FFE	Finished Floor Elevation
FFWCC	Florida Fish and Wildlife Conservation Commission
FHWA	United States Department of Transportation, Federal Highway Administration
FIRM	Flood Insurance Rate Map
FP&L	Florida Power and Light Company
FS	Florida Statutes
GDC	General Development Corporation
HDPE	High Density Polyethylene
IPS	Iron Pipe Size
ITE	Institute of Traffic Engineers
LBR	Limerock Bearing Ratio
LED	Light Emitting Diodes
MB	Megabyte
Mg/l	Miligrams per liter
MPUD	Master Planned Unit Development
MS4	Municipal Separate Stormwater System
MUTCD	*Manual on Uniform Traffic Control Devices for Streets and Highways* – FHWA
NAVD	North American Vertical Datum of 1988
NCHRP	National Cooperative Highway Research Program
NGVD	National Geodetic Vertical Datum
NEC	National Electric Code
NESC	National Electric Safety Code
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NSLRWCD	North St Lucie River Water Control District
NTU	Nephelometric Turbidity Units
PDF	Portable Data Format (electronic file)

Table 1-1 Acronyms and Abbreviations

POA	Property Owner Association
PSM	Professional Surveyor and Mapper
PTZ	Pan/ Tilt/ Zoom
PUD	Planned Unit Development
PVC	Polyvinyl Chloride
QPL	Qualified Product List
RCV	Remote Control Valve
ROW	Right-of-way
SAD	Special Assessment District
SEU	Special Exception Use
SFWMD	South Florida Water Management District
SPRC	Site Plan Review Committee
SWPPP	Stormwater Pollution Prevention Plan
TIS	Traffic Impact Study
TMDL	Total Maximum Daily Load
TPO	Transportation Planning Organization
UPS	Uninterrupted Power Supply
USACE	United States Army Corps of Engineers
USGS	United States Geological Society
USPS	United States Postal Service

1.3 Reference Manuals

Standards and guidelines which are referenced in the following technical publications, latest edition, shall be considered part of this document and are adopted by reference for use in the City of Port St Lucie.

- *A Policy on Geometric Design of Highways and Streets* – AASHTO
- *Access Management Guidebook – FDOT*
- *Access Management in the Vicinity of Intersections* - FHWA
- *American Disabilities Act Accessibility Guidelines* – Federal Agencies
- American Society of Irrigation Consultants
- *Color Specifications for Retro-reflective Sign and Pavement Marking* Materials – Code of Federal Regulations, Appendix to Subpart F of Part 655 of Title 23.
- *Complete Streets Implementation Plan* – FDOT and Smart Growth America
- *Design Manual* – FDOT
- *Drainage Manuals* – FDOT
- *Driveway Information Guide - FDOT*

- *Environmental Resource Permit Applicant's Handbook, Volume I, SFWMD and FDEP*
- *Environmental Resource Permit Applicant's Handbook, Volume II, SFWMD*
- *Environmental Resource Permit Information Manual Volume IV*, SFWMD
- *Flexible Pavement Design Manual* - FDOT
- *Florida Building Code* – Florida Statutes
- *Florida Building Code*, Plumbing, Appendix 'F'
- Florida Department of Environmental Protection Regulations
- Florida Fish and Wildlife Conservation Commission Regulations
- *Florida Intersection Design Guide* – FDOT
- Florida Irrigation Society Irrigation Design Standards
- *Florida Roundabout Guide* - FDOT
- Florida Statutes
- *Guide for the Development of Bicycle Facilities* - AASHTO
- *Guide for the Planning, Design, and operation of Pedestrian Facilities* - AASHTO
- *Highway Capacity Manual* – Transportation Research Board
- *Maintenance of Signs and Sign Supports* – FHWA
- *Manual of Uniform Minimum Standards for Design, Construction and Maintenance For Streets and Highways* – FDOT. Reference is made as the Florida Greenbook.
- *Manual on Uniform Traffic Control Devices for Streets and Highways* – FHWA
- *Manual on Uniform Traffic Studies* – FDOT
- *Median Handbook* – FDOT
- *Parking Generation* - ITE
- *Parking Standards* – Urban Land Institute
- *Plans Preparation Manual* – FDOT
- *Report 420, Impacts of Access Management Techniques* - NCHRP
- *Report 672, Roundabouts: An Informational Guide (TRB 2010*) - NCHRP
- *Rigid Pavement Design Manual* - FDOT
- *Roadside Design Guide* - AASHTO
- *Soil Survey of St Lucie County* – United States Department of Agriculture, Soil Conservation Service
- South Florida Water Management District Regulations
- St Lucie County Fire District Regulations
- *Standard Plans for Road and Bridge Construction* – FDOT. Reference is made as the FDOT Standard Plans Index #.

- *Standard Specifications for Road and Bridge* Construction – FDOT. Reference is made as the FDOT Standard Specifications Section XXX.
- *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* - AASHTO
- *Storm Drain Handbook* – FDOT
- *The Dimensions of Parking* – Urban Land Institute
- *The Standard Highways Signs and Markings* - FHWA
- *Traffic Engineering Manual* - FDOT
- *Traffic Signing Handbook* - ITE
- *Transportation and Traffic Engineering Handbook* – ITE
- *Trip Generation* – ITE
- United States Environmental Protection Agency Regulations
- *Utility Accommodations Manual* - FDOT
- *Vegetation Control For Safety* - FHWA

1.4 Amendment

The City Engineer shall review this document annually and recommend amendments to reflect updates in local, state or federal legislation, updated policy, clarifications, or other such reason with due cause.

1.5 Fees

The review and permitting/inspection fees for commercial and subdivision developments are provided in City Code Section 57.01.

2. Drainage Right-of-Way

2.1 Purpose

The City's stormwater management system exists for the benefit of all residents. To accomplish this responsibility, the City has designated certain land as drainage rights-of-way. Drainage rights-of-way, owned and maintained by the City, are used for the collection, treatment, and/or conveyance of stormwater within canals, ditches, swales, culverts, ponds, and/or drainage control structures. The requirements for City-owned drainage rights-of-way are provided in this chapter.

2.2 Protection and Use

(a) No work within a drainage right-of-way shall occur without the prior approval of the City Engineer. Any work within a right-of-way requires and shall be subject to the requirements of the right-of-way permit and City Code, Chapter 54, Article II, Right-of-Way Permit. Prior to any excavation within a right-of-way, a utility locate shall be completed.

(b) Aerial utility lines shall have a minimum clearance of forty feet from the utility line to the top of a canal bank. Aerial utility lines shall not be located above drainage structures.

2.3 Abandonment

(a) Abandonment of a drainage right-of-way is rare and shall only be used for special circumstances. Requests to abandon drainage rights-of-way shall be submitted to the City Engineer and shall include, at a minimum:

(1) Abandonment of Right-of-Way Application (Appendix A).

(2) Review fee, a fee schedule is provided in City Code Section 57.01.

(3) Letter of request which clearly demonstrates that the abandonment:

a. Does not hinder the current or future location of any drainage or stormwater management facility,

b. Is not detrimental to the public interest, and

c. Provides a positive benefit to the City.

(4) Aerial and site photographs showing location and current conditions of site.

(5) Signed and sealed legal description and sketch of the right-of-way to be abandoned.

(6) Concept plan showing proposed use, if applicable.

(7) No objection letters from utility companies (phone, electric, cable, gas, etc.).

(b) The City Engineer will review the application, obtain the City Utility Systems Department recommendation, obtain a draft ordinance from the City Legal Department, prepare a summary/recommendation memorandum, and forward the complete package to the City Manager requesting review and consideration by the City Council.

(c) The applicant shall be responsible for all costs relating to the abandonment, including the costs associated with the preparation and recording of plats, warranty deeds, legal and sketch, or other such instruments required to accomplish the abandonment.

3. Road Right-of-Way

3.1 General

Road rights-of-way are provided for the benefit of all City residents. The intent of road right-of-way standards is to create uniformity in design, engineering, and use practices to promote safety and sustainability. Information about the classification, minimum width, protection, use, and abandonment of City-owned and maintained road rights-of-way is presented in this chapter. Requirements for the design, permitting, and construction are provided in chapters 8, 16, and 17 respectively.

3.2 Classification

All roadways within the City have an urban designation. The following roadway functional classifications are provided in the City's Comprehensive Plan:

(a) *Principal arterial*. Primarily focuses on carrying through traffic. Principal arterials provide service that is relatively continuous, long in trip length, and high operative speeds.

(b) *Minor arterial*. Provides service for through traffic movement similar to a principal arterial but provides greater land access and distributes traffic to smaller geographical areas than the principal arterial.

(c) *Collector*. Provides both land access and traffic circulation between local roads and/or arterial roads. A collector provides service that is relatively moderate in volume, of moderate trip length, and moderate speed.

(d) *Local*. Permits direct access to abutting property and connections to a higher order roadway. A local street provides service that is relatively low in volume and short average trip length or minimal through traffic movements.

3.3 Required Widths

Unless approved otherwise, the minimum mid-block right-of-way widths for newly constructed private roadways are provided in City Code Section 156.093(C). The minimum mid-block right-of-way widths for newly constructed public roadways are provided in section 8.6. Additional width may be necessary to accommodate turn lanes and the adjacent facilities within the right-of-way. The required components of the right-of-way are discussed in section 8.6.

3.4 Protection and Use

3.4.1 General

(a) Prior to any excavation within a right-of-way, a utility locate shall be completed. With the exception of the initial construction of the road, any work within the road right-of-way requires and shall be subject to the requirements of the right-of-way permit and the provisions of City Code, Chapter 54, Article II, Right-of-Way Permit. Work within the right-of-way shall use measures to protect adjacent properties from temporary or permanent impacts. Encroachment onto adjacent properties is not allowed unless the applicable easement or agreement is obtained.

(b) Approved US Postal Service mailboxes or newspaper delivery boxes and newspaper vending machines are exempt from the right-of-way permit.

(1) Mailboxes or newspaper delivery boxes within the road right-of-way shall be in accordance with the US Postal Service requirements and FDOT roadside safe zone requirements.

(2) Newspaper vending machines shall be in accordance with City Code, Chapter 54, Article V, Newspaper Vending Machines.

3.4.2 Memorial Markers

(a) As a public service and to increase awareness of highway safety, it is a City policy to fabricate and install highway safety memorial markers within the City rights-of-way to memorialize people who have died as a result of a vehicle related crash and to remind motorists to protect human life by driving safely.

(b) Requests for markers shall be made to the City Engineer in accordance with City Code Chapter 54, Article VI, Signage, Section 55.62, Memorial Markers. The markers will be made and installed by the City Public Works Department. The markers will remain in place for twelve months and the department reserves the right to have them removed due to construction or other maintenance needs. No other objects are to be placed on or around memorial markers.

(c) The markers may not necessarily be placed at the exact location where the fatality occurred due to restricted space, safety concerns, property owner complaints, or other constraints. The Public Works Department only installs markers on City-owned roads and does not have the authority to install markers on County or state roadways. Memorial markers will not be erected where they are prohibited by other governmental entities.

3.4.3 Location Signs - Private Facility

The City does not have a program for the location of directional signage for private facilities within the City's road right-of-way.

3.4.4 Temporary Signage

Temporary signage is not permitted within the City's right-of-way unless approved by the City Council in accordance with City Code Chapter 155, Sign Code.

3.4.5 Utilities

(a) The placement of utilities within the right-of-way shall be in accordance with all applicable codes, the right-of-way permit, and City Code Chapter 54, Article IV, Utilities. Additionally, the following requirements shall apply:

(1) Above ground utility appurtenances shall be located beyond the clear and recovery zone, use frangible designs (where appropriate), and shall not impede sight distance.

(2) Underground utilities parallel and perpendicular to roadways shall maintain a minimum vertical clearance of thirty-six inches below grade.

(3) Underground utilities, with the exception of City-owned and maintained utilities shall be located, at a minimum, five feet from the edge of pavement.

(4) Underground crossings of the road pavement shall be perpendicular unless approved otherwise.

(5) Aerial crossings shall be in accordance with the National Electrical Code.

(6) All utility construction and maintenance shall be performed with proper slopes, shoring,

stabilization, safety gear and trained personnel.

(7) All excavated material in excess of the quantity required for backfill and unusable material shall be disposed of at the right-of-way permittee's expense, and not placed within the limits of the right-of-way unless so directed by the City.

(8) Imported material shall be at the expense of the right-of-way permittee.

(9) Trees and/or shrubs harmed or destroyed shall be replaced by the right-of-way permittee.

(10) All debris shall be removed at the expense of the right-of-way permittee.

(11) Bore casings shall extend past the pit by a minimum of five feet. The backfill in the bore pit shall be compacted to a stabilized and non-yielding condition. Jack and bore or directional bore casings shall be a minimum depth of thirty-six inches below the subgrade of any road unless approved otherwise.

(12) In the analysis of a request for open cutting, primary consideration shall be given to the safety and convenience of the public. Open cutting shall not be allowed on recently paved or resurfaced roadways. Where open cutting is permitted, restoration shall be in accordance with the Standard Pavement Restoration Detail provided in chapter 20. Open cutting of pavement shall generally not be allowed, but may be considered under one or more of the following conditions:

   a. Subsurface obstructions

   b. Limited space for jacking pits

   c. Condition of roadway surface, including imminent resurfacing and rebuilding

   d. Prohibited by facility design

(13) Stabilization/restoration shall begin as soon as possible and in accordance with applicable permit conditions. Replacement sod shall be of the same type as the original grass.

(14) Attachments to bridges shall be carefully reviewed and may be considered provided the attachment will not:

   a. Create a potential hazard

   b. Affect the integrity of the structure

   c. Adversely affect aesthetics of the structure

   d. Hinder maintenance operations

   e. Block the view of traffic control devices

(15) Where attachments to bridges are permitted, the following criteria shall be followed:

   a. Where possible, the utility line should be in conduit so that maintenance can be accomplished from the ends of the structure.

   b. Materials used for casing and attachments shall be such that it will not require routine maintenance such as painting.

   c. Flammable fluid pressure lines shall not be attached to structures.

   d. Attachments shall be effectively isolated from the structure so as not to induce corrosion of the structure.

3.5 Abandonment

(a) Abandonments of road rights-of-way are reserved for unusual or special circumstances. Generally, requests of this nature are completed as part of a development and are addressed in the Site Plan Review process. For requests outside the Site Plan Review process, applications to abandon a road right-of-way shall be submitted to the City Engineer in accordance with City Code Section 54.04. The request shall include a completed Abandonment of Right-of-Way Application (Appendix A) and the required supporting documentation.

(b) The City Engineer will review the application, obtain the Utility Systems Department recommendation, obtain a draft ordinance from the Legal Department, prepare a summary/recommendation memorandum, and forward the complete package to the City Manager requesting review and consideration by the City Council.

(c) The applicant shall be responsible for all costs for the preparation and recording of plats, warranty deeds, legal and sketch, or other such instrument(s) as required to accomplish the abandonment.

4. Easements

4.1 General

Easements allow specific non-property owners to cross or otherwise use a private property for a specified purpose. The property owner's use of an easement is regulated to preserve the intended use of the easement. Typical uses of easements include, but are not limited to utilities, stormwater facilities, sidewalks, flowage of stormwater, crossing property owned by others, access for emergency vehicles, or the preservation of land such as a conservation easement. The purpose of this chapter is to provide information on the easements provided on the original or subdivided GDC lots within the City.

4.2 Vacating Internal Easements on GDC Lots

Plats for lots created by GDC state that when more than one lot is developed as a single site, the outside boundaries of the site carry the side easements. In other words, the internal easements are "removed" when several lots are developed as a single parcel. Therefore, within the GDC areas, when lots are combined the abandonment of the internal easements is not required.

4.3 Use of GDC Lot Easements

The property owner's use of an easement within a GDC lot shall be as provided below in Table 4-1.

Table 4-1 Use of Easements on GDC Lots

Description	6- or 10-Foot Easement	20-Foot Easement
Accessory Pad Moveable Accessory Building Dumpster Pad Lighting Parking Lot Signage	Prohibited because the setback requirement will not be met.	As allowed by the Revocable Encroachment Permit – section 16.6.
Detention Area	Allowed, provided the detention area will not affect access or hinder or impeded the existing or future use of the easement as determined during the plan review process.	
Landscaping/Irrigation (Refer to City Code Section 154.03(I) for listing of allowable plants near utilities.)	Allowed, provided it is easily removable, does not hinder, impede, or effect the use of the easement.	As allowed by the Revocable Encroachment Permit – section 16.6.
Masonry/Stone Wall	As allowed by the Revocable Encroachment Permit – section 16.6.	As allowed by the Revocable Encroachment Permit – section 16.6.
Metal/Wood Fence	Allowed, provided it is easily removable and does not hinder or impede the use of easement. Fences are permitted through the Building Department.	
Structure	Prohibited because the setback requirement will not be met.	

4.4 Abandonment of Easement on GDC Lot

(a) Due to the existing use or potential future use, the City rarely abandons easements. Of particular concern to the City are the twenty-foot wide easements along drainage rights-of-way which are of critical importance and, for that reason, are not abandoned. However, encroachments into easements for certain limited uses are allowed pursuant to the revocable encroachment permit as described in section 16.6.

(b) In those instances, where an abandonment of easement is appropriate, applications for abandonment of easement shall be submitted to the City Engineer in accordance with City Code Chapter 55, Article II.

(c) The City Engineer will review the application, obtain the Utility Systems Department recommendation, obtain a draft ordinance from the Legal Department, prepare a summary/recommendation memorandum, and forward the complete package to the City Manager requesting review and consideration by the City Council.

(d) The applicant shall be responsible for all costs for the preparation and recording of plats, warranty deeds, legal and sketch, or other such instrument(s) as required to accomplish the abandonment.

5. Stormwater Management

5.1 General

Numerous individual and master stormwater management systems discharge into City and/or SFWMD systems and ultimately into the St Lucie River Estuary. This city-wide system protects, maintains, and enhances the safety and general welfare of the residents and provides a benefit to all properties within the City. Design requirements for all stormwater management systems within the City are discussed in this chapter.

5.2 System Information Sources

Information regarding the stormwater management system within the City includes the following sources:

(a) City's Infrastructure Map – the general flow direction, culvert sizes, culvert inverts, flow line elevations, control elevations, identification number, and structure information for the City's swale and canal systems.

(b) City's Control Structure Inventory System – the identifications, locations, sizes, inverts of the control structures located within the City.

(c) SFWMD - permit data base.

5.3 Stormwater Fee

Funding for the operation, maintenance and construction of the stormwater management system is provided through the City's stormwater fee. The annual stormwater fee rate (dollars per ERU) is approved by City Council as part of the City's Annual Budget. The ERU calculation is based upon the impervious area of a property as outlined in City Code Chapter 51 Stormwater Utility System. The fee is assessed and collected as a non-ad valorem fee on the annual property tax bill.

5.4 Permitting

(a) Before beginning any activity that could affect wetlands, alter surface water flows, or contribute to water pollution appropriate state and federal permits are required. The SFWMD Environmental Resource Permit (ERP) covers activities such as dredging and filling in wetlands, constructing flood protection facilities, providing stormwater containment and treatment, site grading, building dams or reservoirs and other activities affecting state waters.

(b) With the exception of the items identified below, permitting of stormwater management systems within the City shall follow the requirements set forth by SFWMD.

  (1) Exfiltration systems may be used however; the system shall be sized to provide the 0.5-inch dry pretreatment volume plus up to 3.2 inches in the trench and void spaces. The remainder of the water quality volume shall be treated in an open retention or detention basin prior to discharge from the site.

  (2) Development that is up to ten acres in size and eligible for the SFWMD General Permit pursuant to Section 403.813(12), Florida Statutes known as the "10/2 General Permit" is limited to a discharge rate of 0.5 cfs per acre. A slightly higher discharge rate may be approved provided that drainage calculations show that the:

a. Proposed site elevations are compatible with adjacent properties;

b. Proposed discharge does not adversely impact downstream systems;

c. The smallest size bleeder of six-square inches is the only discharge device being used; and

d. The post-development discharge is equal to or less than the pre-development discharge.

(3) Total retention systems are highly discouraged and allowed only if the applicant clearly demonstrates that:

a. There is no legal positive outfall for the project; and

b. The project strictly follows the SFWMD guidelines for a retention system.

(c) Information regarding the SFWMD permit requirements can be found on the SFWMD website: http://www.sfwmd.gov

5.5 System Requirements

Stormwater management systems shall comply with applicable federal and state regulations as well as the following:

(a) Surface water shall not be channeled or directed into a sanitary sewer system.

(b) Existing surface water flow patterns shall not be adversely affected by the construction or operation of a stormwater management system.

(c) The passage of drainage from offsite areas through the site shall be maintained and accommodated by the proposed development.

(d) Runoff shall be treated and attenuated in a retention/detention facility prior to discharge into the City's stormwater management system.

(e) Natural areas and existing waterbodies may be used for stormwater treatment facilities provided the use does not conflict with environmental, water quality, or public use considerations.

(f) Access to all stormwater water management facilities for operation and maintenance activities shall be legally and physically available.

(g) Stormwater treatment facilities shall not be located within one-hundred feet of a public drinking water well (62-555.312(3), FAC).

(h) Stormwater treatment facilities shall not be located within seventy-five feet of a private drinking water well (62-555.312(3), FAC).

(i) Stormwater management areas and swales shall be a minimum of fifteen feet from a septic system (64E-6.005, FAC).

(j) Stormwater pipes shall be a minimum of ten feet from septic systems (64E-6.005, FAC).

(k) A dry retention/detention area shall not be located within one-hundred feet of a sewage treatment percolation pond. (SFWMD, *ERP Applicant's Handbook, Volume II*, Section 4.5)

(l) A wet detention area shall not be located within two-hundred feet of a sewage treatment percolation pond. (SFWMD, *ERP Applicant's Handbook, Volume II*, Section 4.5).

(m) Wet detention areas shall be a minimum of seventy-five feet from septic stabilization facilities (64E-6.0005, FAC).

(n) Wet detention areas shall be separated from wetland preservation, creation, or restoration areas as required by SFWMD. (*ERP Applicant's Handbook, Volume II*, Section 3.12).

5.6 Flood Protection

(a) The following minimum flood protection criterion shall be used in the design and development of all projects within the City.

(1) Finished Floor Elevation

a. The FFE for all buildings subject to special flood hazards within the City shall comply with Chapter 152, Floodplain Management, of the City Code.

b. The FFE for buildings located within a development with a permitted master stormwater management system shall be at or greater than the minimum grade established in the SFWMD permit. The SFWMD criteria is the one-hundred-year three-day event with zero discharge and the one-hundred-year flood elevation per FEMA FIRMs.

c. The FFE for buildings on a site without a permitted master stormwater management system shall be a minimum of twenty-four inches above the crown of the road in front of the property. Corner lots shall use the nearest intersection elevation.

d. The deviation from FFE established by this chapter and shown in the permit documents shall be limited to plus three inches; in no circumstance shall the FFE be less. A deviation greater than plus three inches requires the review and approval of the City Engineer.

e. In no case shall the FFE of a building adversely impact the drainage of adjacent buildings or property.

f. The slab elevation of accessory use structures constructed on lots zoned for single family dwellings shall be compatible with the site drainage plan for the dwellings

(2) Parking Lot Elevation

a. Equal to or greater than the stage of the ten-year one-day event.

b. A minimum of two feet higher than the average wet season water table.

(3) Road Crown Elevation

a. A minimum of two feet higher than the average wet season water table.

b. Local Roads. Ten-year one-day stage.

c. Collector Roads. Twenty-five-year one-day stage.

d. Arterial Roads. Twenty-five-year three-day stage.

e. Bridges. Fifty-year three-day stage.

(4) Perimeter Elevation

a. Perimeter elevations of the site shall meet or exceed the design storm stage.

(b) The EOR is responsible for determining if additional criteria such as, but not limited to, fluctuating receiving water stages, historic data, or flood insurance map information needs to be included in the evaluation of flood protection stages. In no circumstance shall the flood protection criteria be reduced to accommodate site specific conditions.

(c) Any portion of the system storage that is not recovered within twelve days of the design storm event shall be removed from the flood routing analysis to determine the minimum elevation for flood protection.

5.7 Water Quality Treatment Volume

(a) Water quality treatment is provided by detaining or retaining stormwater in a system prior to discharge. The total water quality volume in a system shall be provided by one or a combination of the following:

(1) Wet Detention – Volume shall be provided for the first inch of runoff from the developed project or the total runoff of 2.5 inches times the percent impervious, whichever is greater.

(2) Dry Detention – Volume shall be equal to seventy-five percent of the wet detention volume.

(3) Retention (if approved) – Volume shall be equal to fifty percent of the amount computed for a wet detention system.

(4) The City stormwater management systems are within and contribute stormwater to the St Lucie River Basin/Estuary.

a. The St Lucie River Basin is an impaired water body that does not meet state water quality standards for nutrients nitrogen and phosphorus.

b. The St Lucie River Basin has an adopted TMDL to achieve 0.081 mg/l total Phosphorus and 0.72 mg/l total nitrogen at the Roosevelt Bridge pursuant to 62-304.705, FAC.

c. A BMAP has been adopted to achieve the goals of the St Lucie River Basin TMDL.

d. Proposed projects may need to provide nutrient analysis and additional treatment to provide reasonable assurance of compliance with the TMDL and BMAP goals in accordance with SFWMD requirements.

e. Applicants are encouraged to have a pre-application meeting with SFWMD prior to submitting construction applications to the City.

(b) As part of the required water quality volume, at least 0.5 inch of dry pretreatment, as required by SFWMD, shall be provided for:

(1) Commercial projects

(2) Industrial projects

(3) Projects that discharge into the Savannas which have greater than forty percent impervious area.

(4) Systems that contribute stormwater to the North Fork St Lucie River, an impaired waterbody / Outstanding Florida Water, shall be designed in accordance with the requirements of the SFWMD *Environmental Resource Permit Applicant's Handbook Volume II, Appendix E*.

5.8 Discharge

(a) The stormwater management system shall be designed to provide the required water quality treatment and attenuation for the design storm event (twenty-five-year three-day event unless indicated otherwise) prior to discharge.

(b) The discharge from a development shall cause no adverse impacts to off-site properties. The discharge rate may be determined by one or more of the following:

(1) Historic discharges (i.e., pre = post).

(2) Discharge permitted by an existing SFWMD permit.

(3) Discharge specified in SFWMD criteria (e.g., 31.50 cfs per square mile for the C-23 Canal, 30.25 cfs per square mile for the C-24 Canal).

(4) Capacity of the downstream system.

(5) Discharge imposed by drainage basin studies conducted by the City.

(6) Approximately 0.5 cfs per acre (twenty-five-year three-day event) for projects that are less than ten acres in size and eligible for the "10/2 General Permit."

5.9 Commercial or Industrial Phased Developments

Commercial or industrial projects that will be subdivided and/or where the entire system is not constructed initially shall provide, at a minimum:

(a) A water quality system for one inch of runoff detention in the master system for the total developed site.

(b) The master system shall be located in a legally defined common area and shall not utilize exfiltration trench.

(c) The individual sites shall provide the remainder of the water quality volume (2.5-inch x percent impervious – 1 inch) on site.

(d) The individual sites may use a properly designed and maintained exfiltration trench.

(e) A collection and conveyance system, within a recorded easement, that interconnects the detention system with the outfall and access points available to each individual parcel.

(f) Deed restrictions on the undeveloped parcel(s) identifying:

(1) The flood protection requirements.

(2) Additional detention required for water quality.

(3) The assumed impervious area used in the design calculations.

5.10 System Calculations

(a) Stormwater management system calculations include, but are not limited to, the generation of pre- and post-development runoff hydrographs, routing the post-development hydrograph through a detention system, sizing the outfall structure to control post development discharges, sizing pipes, and checking to ensure the downstream drainage facilities are adequate.

(b) Calculations shall demonstrate that the proposed stormwater management system meets flood protection criteria, meets allowable offsite discharge, and that the system will not adversely affect other properties. Calculations shall be prepared and certified (signed and sealed) by the EOR and submitted for review by the City and/or SFWMD, as appropriate.

(c) The SFWMD *Environmental Resource Applicant's Handbook, Volume II* (Latest Edition) provides references and example calculations to assist in preparing and reviewing stormwater system calculations. When using the SFWMD examples or data, be aware that the City requirements for exfiltration volume, discharge rate for a development less than ten acres, and the use of retention basins is more stringent than SFWMD requirements.

5.11 Design Requirements

Design requirements for the components of a stormwater management system including, but not limited to the exfiltration trench, detention areas, discharge structure, and control device, are provided in following sections.

5.11.1 Design Storm

Unless indicated otherwise by an existing permit, the twenty-five-year three-day storm event shall be used as the design storm.

5.11.2 Exfiltration Trench

(a) In an exfiltration system, stormwater passes through a perforated pipe and infiltrates into the surrounding rock trench and ground. When an exfiltration trench is utilized, soil permeability and water table conditions must be such that the trench system can percolate the required stormwater volume within a specified time following a storm event and then return to a dry condition when the drawdown of the treatment volume is completed. Appropriate design and regular maintenance are key to maximizing the useful life of an exfiltration system.

(b) Soils within the City tend to be classified as poorly to very poorly draining with a relatively high water table. Over the years, these conditions coupled with a lack of regular maintenance have shown that systems relying on an exfiltration system alone have a short useful life (possibly five to ten years). Sediment accumulation and clogging by fines can reduce the life of an exfiltration trench. Total replacement of the trench is often the only means of restoring the treatment capacity of the system. Periodic replacement of the trench should be considered routine operational maintenance when selecting this management practice. Because of the short useful life and the long-term costs to maintain and replace exfiltration systems, the City's allowable use of exfiltration trench is different from that of SFWMD.

(c) Within the City, exfiltration trench may be used to achieve the 0.5 inch of dry pretreatment; however, the remainder of the water quality volume shall be provided within an above ground detention area. The detention area will provide storage and help to minimize flooding in the event that the trench system deteriorates or fails.

(d) Exfiltration trench used within the City shall meet the following requirements:

(1) Maximum credit – 0.5-inch dry pretreatment plus up to 3.2 inches (trench and void spaces)

(2) Design calculations shall follow the examples and requirements presented in the SFWMD Applicant's Handbook, Volume II.

(3) A soils report prepared and signed and sealed by a Geotechnical Engineer shall be provided with the design calculation. The soils report shall identify the average wet season water table elevation and the hydraulic conductivity of the soil.

(4) Design of the exfiltration trench shall be in accordance with SFWMD Applicant's Handbook, Volume II.

5.11.3 On-Site Retention

A retention system does not have a control structure that allows the release of water from the system. Because of this, it is extremely important to ensure that the system is designed and maintained properly

to prevent overflow. A retention system shall only be allowed in cases where positive legal outfall is not possible and the system strictly complies with the SFWMD requirements for a dry retention system. Additionally, the system shall operate such that the allows percolation and returns the basin to a dry condition within twelve days of the design storm event.

5.11.4 On-Site Detention

Detention systems allow the release of stormwater through a control structure. This system requires that the soil permeability, water table conditions, and discharge system be such that the system percolates and releases the desired runoff volume within a specified time following a storm event. The requirements for wet detention (lakes) and dry detention are provided below.

5.11.4.1 Wet Detention

Wet detention areas are generally incorporated into larger projects which require permitting by SFWMD. For this reason, only general siting and dimensional requirements for wet detention areas are identified below.

(a) Inlet structures shall be designed to dissipate the energy of water entering the pond.

(b) The flow path of water from the inlets to the outlet of the pond must be maximized to promote good mixing with no dead spots, minimize short circuiting, and maximize pollutant removal efficiency and mixing.

(c) If short flow paths are unavoidable, the effective flow path can be increased by adding diversion barriers such as islands, peninsulas, or baffles to the pond.

(d) A minimum twenty-foot maintenance and access easement with slopes no steeper than 4:1 (horizontal: vertical) shall be provided around the perimeter of all wet detention areas at the control elevation. These easements, shall be legally reserved to the operation entity and for that purpose by dedication on the plat, deed restrictions, easements or other such recorded document so that the intended use is maintained by subsequent owners.

(e) Area. One-half acre minimum.

(f) Width. One-hundred feet minimum for linear areas in excess of two-hundred feet length. Irregular shaped areas may have narrower reaches but shall average at least one-hundred feet.

(g) Side slopes. No steeper than 4:1 (horizontal: vertical) from top of bank out to a minimum depth of two feet below the control elevation, or an equivalent substitute. Constructed side slopes steeper than 3.5:1 (horizontal: vertical) shall be considered a substantial deviation. Side slopes shall be top soiled and stabilized through seeding or planting from two feet below to one foot above the control elevation.

(h) Alternative side slope criteria for golf course detention areas adjacent to tee areas, bunkers, and greens.

  (1) The design and final constructed side slopes adjacent to tee areas, bunkers, and greens contiguous to golf course wet detention areas shall be no steeper than 2:1 (horizontal: vertical) for the area above the permitted control elevation. For purposes of this rule, the tee area is limited to an area specifically constructed and designated as the location from which a golfer makes his/her first shot toward a designated hole. The green is the area of shortest grass around the hole. Bunkers (sand traps) consist of a prepared area of ground, often a hollow, from which turf or soil has been removed and replaced with sand-like material.

(2) For those portions of the wet detention areas adjacent to tee areas, bunkers, and greens with final constructed side slopes steeper than 3.5:1 (horizontal: vertical), the final constructed side slopes below the control elevation shall not be steeper than 8:1 (horizontal: vertical) to a depth of two feet below the control elevation or equivalent substitute.

(i) Bulkheads - Bulkheads shall be allowed for no more than forty percent of the shoreline length, but compensating littoral zone must be provided based on a 4:1 (horizontal: vertical) side slope.

5.11.4.2 Dry Detention

Dry detention areas shall have:

(a) Well-draining sands.

(b) A pond bottom elevation that is, at a minimum, one foot above the wet season water table or project control elevation, whichever is higher.

(c) Side slopes that are as flat as possible with a maximum of 4:1 (horizontal to vertical).

(d) Mosquito control ditches or other appropriate features for such purpose.

(e) Mechanisms for returning the groundwater level in the area to the wet season water table elevation.

5.11.5 Discharge Structure

All stormwater discharges from a development shall be made through a structural facility. Earth berms are not considered a structural facility. These discharge or control structures shall:

(a) Be non-operable unless otherwise approved by SFWMD.

(b) Meet FDOT Standard Specifications Section 425 and FDOT Standard Plans Index Series 425-XXX.

(c) Include a baffle skimmer in accordance with FDOT Standard Plans Index 425-070.

(d) Directly flow into existing storm systems, manmade ditches, swales, or canals that are easily able to absorb concentrated discharges.

(e) Flow into a spreader swale prior to discharge into a receiving water or adjacent ecosystem that may be degraded by a direct discharge. The spreader swale shall be of a length that reduces the discharge velocity to historic rates or rates less than two feet per second.

5.11.6 Control Device/Bleed Down Mechanism

Gravity control devices that allow the discharge of stormwater from the system and provide a means to remove water from the bottom of the system shall meet the following requirements:

(a) Sized to allow a maximum discharge of 0.5 inch in twenty-four hours.

(b) Projects shall have the ability to recover the system to the pond bottom or control elevation within twelve days or less.

(c) Underdrains/side drains can be used and are encouraged within large dry detention ponds. Underdrains/side drains can be used to assist with system recovery by conveyance of water to the control device but shall not bypass the water quality bleeder or system control weirs. Underdrain/ side drain designs should not discharge ground water below the wet season water table.

(d) In order to provide a dry detention system, the control device/bleed down orifice shall be located one foot below the bottom of the detention area.

(e) The gravity control orifice minimum size shall be either a:

(1) "V" notch with a minimum dimension of two inches and twenty degrees; or

(2) Circular orifice with a minimum three-inch diameter.

(f) Systems that discharge only through a minimum size bleed down device are presumed to meet the maximum discharge quantity criteria except for projects where zero discharge is required.

(g) Control elevations shall be established such that they are consistent with and maintain surrounding land control and average wet season water table elevations, consistent with water use permits, wetlands, and have a maximum depth of six feet below natural ground.

(h) Control structure design should consider access to the structure and the removal of debris from the structure during a storm event. Baffles and debris skimmers shall be over sized such that they do not become the hydraulic control of the flow and will provide for debris removal both upstream and downstream with common hand tools.

(i) The location of the structure should be such that is can be easily accessed during the peak stage of the design storm event by pedestrian or non-commercial vehicle

(j) If the system is not able to recover to the control elevation or bottom of a dry pond, then the retained volume shall be excluded from the design storm flood protection analysis.

5.12 Illicit Discharge

It shall be considered unlawful to dump or drain any illicit discharge to the stormwater system or in any freshwater lake, canal, river, stream, tidal, or coastal water of the City. The following fluids are not considered illicit discharges:

(a) Air conditioner condensation

(b) De-chlorinated pool water (less than one part per million)

(c) Discharge from a potable water source

(d) Diverted stream flows

(e) Flow from wetlands

(f) Individual car washing

(g) Landscape irrigation

(h) Lawn watering

(i) Residential building wash water (without detergents)

(j) Rising ground water

(k) Street wash water

(l) Uncontaminated ground water

(m) Water line flushing

5.13 Inspection and Maintenance

(a) Applications for development approval that include a storm water management system shall include a maintenance plan for the system to include but not limited to inspection schedules, sedimentation removal depths, pre- and post-storm inspections, construction plans, maps, and technical data as

necessary for the effective operation and maintenance of the system in perpetuity. As part of the final certification the maintenance plan shall be amended to include record drawings of the storm water management system.

(b) The City may conduct periodic inspections to ensure that the project is constructed and operating in compliance with the approved plans and in a manner that protects the public health and safety and resources of the state. No person shall refuse immediate entry or access to any authorized person of the City who requests entry for purposes of such inspection. Special attention shall be made during inspection to ensure that:

(1) Soil is stabilized to prevent sediment discharge to waters in the state;

(2) The system is kept free of debris, trash, garbage, oils and greases, and other refuse;

(3) Oil and grease separators, skimmers, or collection devices are working properly and do not allow the discharge of oils or greases. Oils and greases or other materials removed from such a device shall be disposed of at a sanitary landfill or other lawful means; and

(4) All structures are operable and have not become damaged, or clogged with vegetation, trash, or sediment.

(c) In the event that the stormwater management system is found to be inoperable, in poor working order, or disrepair, the City Engineer shall give the property owner written notice. Failure to take corrective action within thirty days shall constitute a violation and the City will address the issue through its Code Compliance processes or take immediate action and back charge the owner should it be determined that the inoperable nature of the system threatens life, safety, welfare or property.

6. Drainage

6.1 General

Design requirements for drainage system components located within the City are provided in this chapter.

6.2 Parking Lot Slopes

The minimum slope to promote positive drainage within a parking lot is 0.005 feet per feet or 0.50 percent, a greater slope should be considered when possible. In no circumstance shall an accessible route within the pavement or curb area exceed ADA slope requirements.

6.3 Curb and Gutter

Curb and gutter or gutters shall meet the requirements of FDOT Standard Specifications Section 520 and FDOT Standard Plans Index Series 520-XXX. Slopes shall not be less than 0.003 feet per feet or 0.3 percent.

6.4 Roadway Spread

The allowable stormwater spread from a rainfall intensity of four inches per hour shall be as provided in Table 6-1. The spread calculations shall be submitted to the City along with the construction plans.

Table 6-1 Roadway Spread

Road Classification	Allowable Spread
Local	Below the crown of the road
Collector	1/2 travel lane width of outside travel lane
Arterial	Leaves 8 feet of lane clear of outside travel lane
Evacuation Route	1/3 travel lane width of outside travel lane

6.5 Manholes and Inlets

(a) Manholes, inlets (curb or ditch bottom), and gratings shall meet the requirements of FDOT Standard Specifications Section 425 and FDOT Standard Plans Index Series 425-XXX. Tops for the structures shall be designed to withstand traffic loading, bicycle traffic, or pedestrians, as appropriate. Open bottom inlets are encouraged in effective recharge areas. Manhole spacing shall be as located outside the wheel path of vehicles and as provided in Table 6-2.

Table 6-2 Structure Spacing	
Pipe Size – Round or Equivalent (inches)	Maximum Spacing (feet)
15	200
18	300
24-36	400
>42	500

(b) For roadways, curb inlets shall be spaced so that the inlets intercept one-hundred percent of the design flow without exceeding the allowable spread of water onto the travel lanes as provided in section 6.4. Inlets shall not be located in radius returns or within drop curb locations.

6.6 Roadway Underdrains

In cases where soils exhibit adverse water table characteristics, underdrains and/or fill or other acceptable alternative that will provide necessary measures to maintain the structural integrity of the road will be required. Underdrains shall be required whether they are provided as part of the design or if conditions during construction reveal the need. Requirements for underdrains are as follow:

(a) Underdrains shall be used where the seasonal high water table cannot be maintained at a level two feet below the base of the roadway.

(b) The use of limerock base in conjunction with an underdrain system is prohibited.

(c) Underdrains shall be designed with free gravity outlet at carefully selected discharge points.

(d) Erosion control measures shall be provided, as needed at, all discharge points.

(e) Provisions to clean the underdrain system shall be provided.

(f) Filtering media shall consist of stone, gravel or slag, and shall contain no friable materials.

(g) The design of the underdrain shall be by a geotechnical engineer based upon the results of field testing.

6.7 Drainage Pipes

Drain pipes connecting structures or a structure to an outfall shall meet the following requirements:

(a) Design shall be based upon a three-year frequency for new work.

(b) Design for a pipe that is replacing a swale shall be based upon a ten-year frequency.

(c) Pipe design calculations shall:

(1) Be based on the Rational Method. Storm drains associated with drain systems (exfiltration trench, french drains, underdrains, etc.) or detention systems (ditches/swales, etc.) may be performed using hydrographs to account for storage.

(2) The minimum time of concentration shall be ten minutes.

(3) Calculations for pipe size shall be based on open channel or pressure flow, as appropriate using the Manning's equation. Calculations shall indicate the source of the roughness coefficient, "n".

(4) With the exception of exfiltration trench, french drains, underdrains, etc., the slope of the pipe shall produce positive flow with a desired minimum velocity of two feet per second at full flow.

(5) Hydraulic grade calculations:

a. Tailwater elevation shall be based on the design storm event.

b. Hydraulic grade may exceed the top of a ditch bottom inlet.

c. Systems with greater than two-thousand feet shall consider major and minor losses in the calculation.

d. For velocities greater than 7.5 feet per second, the calculation shall consider all losses.

e. For systems only considering minor losses, the hydraulic grade shall be one foot below the elevation of the structure gutter.

f. For systems considering major and minor losses, the hydraulic grade shall be equal to the elevation of the structure gutter.

(6) Be documented and submitted to the City along with the construction plans.

(d) The minimum pipe size installed within road rights-of-way shall be fifteen-inch round or equivalent.

(e) Pipes installed under roadways or within road rights-of-way shall be reinforced concrete pipe (Class III) with rubber gaskets, or by approval of the Public Works Department and on a case by case basis corrugated profile wall polypropylene pipe.

(f) All pipe joints shall be wrapped with filter fabric that is centered on the joint with a minimum total length of two feet. Filter fabric shall meet the requirements of FDOT Standard Specifications Section 985.

(g) The selection of the pipe material is subject to the use, location, soil type, ground water conditions and available cover. The following pipe materials are acceptable:

(1) Reinforced concrete pipe conforming to FDOT Standard Specifications Section 430. – Required within road rights-of-way

(2) Corrugated aluminum pipe conforming to FDOT Standard Specifications Section 945.

(3) Corrugated polyethylene pipe conforming to FDOT Standard Specifications Section 948.

(4) Corrugated profile wall polypropylene pipe conforming to FDOT Standard Specifications Section 948.

(5) Polyvinyl chloride pipe conforming to FDOT Standard Specifications Section 948.

(h) End treatments for pipes are subject to the specific hydraulic, structural, and safety requirements for the site. End treatments shall meet the requirements of FDOT Design Standard Plans Index Series 430-XXX, unless otherwise approved by the City Engineer.

6.8 Roadway Culverts

Roadway culverts convey stormwater under the road between two open systems such as swales. The design of the culverts:

(a) Shall have sufficient capacity to convey the ten-year storm event without damage to the end treatments, approaches, road or adjacent areas.

(b) The backwater elevation shall be maintained at or below the travel lane elevation.

(c) The highest tail water elevation that can be reasonably expected to occur with the storm event shall be used.

(d) The minimum pipe size installed within road rights-of-way shall be fifteen-inch round or equivalent.

(e) Pipes installed under roadways shall be reinforced concrete pipe (Class III) with rubber gaskets, or by approval of the Public Works Department and on a case by case basis corrugated profile wall polypropylene pipe.

(f) All pipe joints shall be wrapped with filter fabric that is centered on the joint with a minimum total length of two feet. Filter fabric shall meet the requirements of FDOT Standard Specifications Section 985.

(g) The selection of the pipe material is subject to the use, location, soil type, ground water conditions and available cover. The following pipe materials are acceptable:

(1) Reinforced concrete pipe conforming to FDOT Standard Specifications Section 430.

(2) Corrugated profile wall polypropylene pipe conforming to FDOT Standard Specifications Section 948.

(h) End treatments for pipes are subject to the specific hydraulic, structural, and safety requirements for the site. End treatments shall meet the requirements of FDOT Standard Plans Index Series 430-XXX, unless otherwise approved by the City Engineer.

6.9 Bridge-Culverts and Bridges

The hydraulic design of bridge-culverts and bridges shall be done in accordance with good engineering practices and comply with FDOT guidelines. Design of these facilities shall be completed and documented in a permanent record file. The file shall address all design standards in sufficient detail that an independent engineer with expertise in bridge hydraulics can fully interpret and understand development of the final design. The design may include, but is not limited to, the following items:

(a) Backwater Analysis.

(b) Tailwater Analysis.

(c) Completed Bridge Hydraulics Recommendations Sheet provided in the FDOT Plans Preparation Manual.

(d) Bridge Hydraulics Report.

(e) Evidence of Field Review.

(f) Hydrologic analysis including sources of data and methodology.

(g) Alternative analysis or evaluation of structure sizes (length and vertical height/clearance). This evaluation shall be done consistent with FDOT policy for bridge hydraulic design.

(h) Deck drainage analysis.

(i) Supporting hydraulic computations. .

(j) Applicable regulatory agency (SFWMD, FDEP, USACOE, Coast Guard, etc.) documents that affect the final design.

6.10 Driveway Culverts

(a) The roadside swale system within the City is a critical component of the City's stormwater management system. Driveways that crosses a roadside swale shall have a driveway culvert. The following shall apply to driveway culverts located within City road right-of-way:

(1) Commercial driveways shall be reinforced concrete pipe conforming to FDOT Standard Specifications Section 430.

(2) Residential driveways shall be corrugated metal pipe conforming to FDOT Standard Specifications Section 945, or by approval of the Public Works Department and on a case by case basis corrugated profile wall polypropylene pipe conforming to FDOT Standard Specifications Section 948. Polypropylene pipes will require end treatments, such as miter end sections or end walls.

(3) Shall extend a minimum of four feet beyond both sides of driveway.

(4) Shall have mitered ends or headwalls in accordance with FDOT Standard Plans Index Series 430-XXX.

(5) The ends of the culvert shall be a minimum of ten feet from inlets, side lot pipes, or cross drains.

(6) Driveway culvert inverts, sizes and lengths shall be provided by the Public Works Department.

(7) The design of the driveway culvert is based upon the ten-year frequency storm.

(8) If any alternate method of drainage is necessary, it shall be reviewed and approved by the City Engineer.

(9) The installation of any drainage pipe across the entire front of any lot in the city is prohibited unless roadway improvements require the piping of the swale.

(10) The contractor shall obtain a site work permit to install a new driveway as provided in section 16.3.

(11) The contractor shall obtain a driveway/culvert permit to modify an existing driveway culvert as provided in section 16.4.

(12) Property owners shall be responsible for the maintenance of the road ROW from the edge of the pavement to the owner's property line including the driveway, driveway culvert, and swale as specified in City Code Section 41.08(g).

(b) The construction plans shall show the driveway culvert and mitered end sections with a label that indicates: *"The culvert material, size, inverts and lengths shall be supplied by the City of Port St Lucie Public Works Department after the completion of the driveway stakeout inspection."*

6.11 Clearances

The following minimum clearances shall be provided for stormwater drain pipes and structures:

(a) Crown of pipe and gutter of structure – per FDOT Standard Plans Index.

(b) Pipe cover (minimum and maximum) – per manufacturer.

(c) Horizontal clearance of five feet.

(d) Vertical clearance of eighteen inches.

(e) In no circumstance shall an electrical or gas facility come into direct contact with a storm drain or structure.

(f) Utility conflict structures shall be in accordance with FDOT Standard Plans Index 125-001.

6.12 Open Channel Systems (Swales and Canals)

(a) Hydrologic data used for the design of open channel systems shall be based on one of the following methods, as appropriate, for the particular site:

(1) Frequency analysis of observed gage data;

(2) Regional or local regression equation developed by the USGS calibrated with available observed data for the basin or nearby basins;

(3) Rational equation for basins up to six-hundred acres calibrated with available observed data for the basin or nearby basins;

(4) For outfalls from stormwater management facilities, the method used for the design of the facility may be used and calibrated with available observed data for the basin or nearby basins; or

(5) For regulated or controlled canals, verified hydrologic data.

(b) The design of the open channel system shall:

(1) Be based on the Manning's Equation.

(2) Include the source of the roughness coefficient, "n".

(3) Minimize the use of linings.

(4) Include the design velocity for the canal.

(5) Include the recommended maximum velocity for the type of surface.

(6) Be documented and the calculations (hydrologic analysis, hydraulic analysis, and analysis of channel lining requirements) submitted to the City along with the construction plans.

6.12.1 Swales

Any rework or new swales installed in City road right-of-way shall comply with the following standards. Variations in the requirements may be approved by the City Engineer in the event that limited right-of-way or existing conditions prohibit the achievement of these standards.

(a) Swales and ditches shall be accessible for maintenance.

(b) Shall be sized to accommodate stormwater flows from contributing drainage areas for the ten-year one-day frequency.

(c) The flow line elevations shall be in accordance with the City's drainage program.

(d) The minimum allowable swale grade shall be 0.05 percent (0.0005 foot per foot) with positive slope or as approved by the City Engineer.

(e) Maximum side slope will be 4:1 (horizontal to vertical).

(f) Shall be sodded.

(g) The rework of roadway swales within the originally platted City lots shall include the installation of a plastic swale liner in accordance with Standard Swale Liner Detail provide in chapter 20. The plastic swale liner is provided by the Public Works Department.

(h) Property owners shall be responsible for the maintenance of the road ROW from the edge of the pavement to the owner's property line including the driveway, driveway culvert, and swale as specified in City Code Section 41.08(g).

6.12.2 Canals

Canals within the City are under the jurisdiction of either the City, SFWMD (C-24 and C-23), the NSLRWCD (northwestern area), or St Lucie County. Design requirements for an outfall to a canal depends upon site specific conditions such as location in relation to a control structure, slope of the banks, and the control elevation of the canal. The type of end treatment, energy dissipation, and slope stabilization, as appropriate, will be reviewed and addressed on a case by case basis by the appropriate agency. New canals, unless approved otherwise by City Council, shall be designed, at a minimum, to the following standards:

(a) Canals shall be sized to accommodate stormwater flows from contributing drainage areas for the twenty-five-year frequency.

(b) The minimum allowable grade shall be 0.05 percent (0.0005 foot per foot) or as approved by the City Engineer.

(c) With the exception of areas with continuous standing or flowing water or areas that will be lined, canals shall be sodded.

(d) Lining material shall be reviewed and approved by the City Engineer.

(e) Side slopes shall be designed in accordance with the lining manufacturer recommendations and soil conditions.

(f) The maximum side slope for an unlined canal shall be 4:1 (horizontal to vertical) from the top of bank out to a minimum depth of two feet below the control elevation.

(g) Side slopes stabilized with sod or plantings extending from two feet below to one foot above the control elevation.

(h) The minimum canal bottom width shall be five feet to accommodate mitered end sections and maintenance mowers.

(i) V-bottom canal sections are not permitted due to siltation and maintenance issues.

(j) For dry canals, the bottom elevation shall be one foot above the estimated seasonal high groundwater elevation to enable mowing.

(k) A minimum of one foot of freeboard above the design stage shall be provided in the canal.

(l) Shall be accessible for maintenance.

7. Erosion and Sediment Control

7.1 General

(a) Land clearing activities, including the construction of stormwater management systems, shall be designed, constructed, and maintained at all times so that erosion and sedimentation from the system, including the areas served by the system, do not cause violations of applicable state water quality standards in receiving waters.

(b) Further, because sedimentation of offsite lands can lead to public safety concerns, erosion and sediment controls shall be designed and implemented to retain sediment on-site as required by Section 62-40.432(2), FAC. In particular, the erosion and sediment control requirements described in the SFWMD *Environmental Resource Permit Applicant's Handbook Volume I, Part IV*, shall be followed during construction of the system.

7.2 Requirements

The operator of any construction project that disturbs one acre or more, or is part of the larger common plan of development or sale which disturbs one acre or more, is required to obtain the proper stormwater permit from the FDEP and to comply with all the terms and conditions of the permit.

7.3 Best Management Practices (BMPs)/Stormwater Pollution Prevention Plan (SWPPP)

(a) BMPs are methods that have been determined to be the most effective, practical means of preventing or reducing pollution of non-point sources from entering into a stormwater system and/or surface waters. BMPs for a development shall be as specified in the approved SWPPP. Requirements for the SWPPP are provided in section 14.7.

(b) If it is found upon site inspection that the approved BMPs are insufficient, BMP's must be adjusted to correct the sediment and erosion problem. Additionally, the City Engineer is authorized to issue stop work orders on any site that has not obtained or is not in compliance with the applicable stormwater permit. Upon issue of such stop work order all site work affected thereby shall immediately cease until such time the City Engineer authorizes the work to resume.

8. Roadways

8.1 General

All roadways within the City shall be designed pursuant to the requirements contained in this chapter unless approved otherwise by City Council.

8.2 Access Management

(a) Access management considers the appropriate number of access points, appropriate type of access (i.e., full, right-in and right-out, etc.), spacing of the access points, modifications to medians, modifications to intersections, need for turn lanes, and cross access with adjacent properties. Because of the many potential scenarios, access management shall be reviewed and considered on a case by case basis using the guidelines contained within this section, knowledge of the roadway system, FDOT and 2FHWA guidelines, and accepted engineering practices.

(b) Successful access management in the vicinity of an intersection is a critical component of maintaining the safety and capacity of a roadway system. FHWA's *Access Management in the Vicinity of Intersections* recommends the following access management considerations:

(1) Locating driveways on the appropriate roadway functional classification;

(2) Limiting driveways within the functional area of an intersection improves safety;

(3) Reducing the number and types of conflict points created by a driveway may reduce crashes;

(4) Eliminating left-turn movements at driveways is beneficial from a safety perspective;

(5) Median treatments can impact safety;

(6) Reducing driveway density reduces crashes; and

(7) Properly designed driveways influence safety and mobility at the driveway.

(c) The document also provides the following guidelines for the location of which may be applicable considerations for developments within the City.

(1) Suburban Areas:

a. Locate driveways upstream of the vehicle queue caused when the downstream traffic signal is red.

b. Prohibit median openings that allow movements across the left turn lane(s) of an intersection.

c. In the case of a traversable median, align the driveways on opposite sides of the road with an offset that allows vehicles to making opposing left turns without creating a conflict point for the two vehicles in the traversable median.

d. In the case of a traversable median, if it is not possible to align driveways on opposite sides of the road without creating a conflict point for the two vehicles in the traversable median, locate the driveways directly across the street from one another.

e. Raised medians on the major roadways that prohibit left-turn movements will improve pedestrian and bicycle safety by reducing the number of potential conflict points.

f. A channelized island between the in-bound and out-bound movements of a right-turn-only driveway will provide a pedestrian and bicyclist refuge area.

g. Minimization of the driveway width will help to reduce pedestrian and bicyclist crossing distance and exposure.

h. Locate pedestrian and bicyclist travel ways at driveways so that the driver is visible to the pedestrian and bicyclist and vice versa. Do not block the sight line with landscaping or signage.

i. Provide appropriate signage at driveways for the pedestrian, bicyclist and driver.

(2) Urban Areas:

a. Development of a right-turn lane for the driveway on the through road may require the removal of on-street parking.

b. Avoid locating on-site parking stalls within the driveway throat.

c. Replace gated parking entries with alternate options to decrease the entrance time and reduce queues on the main roadway.

d. Locate bus bays and stops on the far side of the driveway to maximize sight distance for motorists exiting a driveway.

e. Locate driveways on lower volume roadways, where possible.

f. Sign and stripe driveways for right-turn, outbound movements only, where possible.

g. Locate driveways on one-way streets, where possible.

h. Locate driveways that serve left-turning inbound vehicles near the center of the block to reduce interaction with upstream and downstream intersections.

i. Locate driveways upstream from an intersection and to provide motorist sufficient room to maneuver and make necessary lane changes in anticipation of the downstream intersection.

j. Use colored pavement across driveways in combination with crosswalk markings, audio/visual treatments for drivers and pedestrians and bicyclists where exiting vehicles have limited sight distance.

k. Restrict inbound driveway speeds by designing the driveway access with appropriate radii.

l. Smaller driveway radii of twenty-five to thirty-five feet are more sensitive to pedestrian movements because motorists have to slow down to complete the turn. However, on-street parking and bike lanes increase the radius, so care should be taken to balance vehicle and pedestrian safety.

(3) Rural Areas:

a. Provide adequate throat depth and on-site circulation for vehicles to easily exit a major roadway and minimize the speed differential.

b. Pave the shoulders near driveways to provide additional entry and exit width and thus higher entry and exit speeds to help minimize the speed differential.

c. Frontage roads that parallel the major roadways may be employed as a means to provide access to each of the adjacent properties.

d. Paved shoulders that are at least four feet wide can provide benefit to bicyclist and pedestrians.

8.3 Network Requirements

The road network establishes traffic flow patterns and conflicts and is the basis of the roadway safety and efficiency criteria. The layout of the road network shall consider and implement the following criteria:

(a) The roadway layout shall be logical and easily understood by the user.

(b) Circulation patterns created by the network shall be compatible with adjacent areas.

(c) Flow patterns shall be designed to interconnect neighborhoods while discouraging through motorized traffic on local streets.

(d) The road network shall be compatible with mass transit, pedestrian and bicycle traffic.

(e) The road network shall reduce conflicts and eliminate substantial speed differentials and hazardous turning and crossing maneuvers.

(f) The number of intersections shall be kept to a minimum but should meet land use needs and flow requirements.

(g) As the land surrounding the roadway is developed, the intent and purpose of the network and road classification shall be maintained through the implementation of access management practices and policies for driveways and medians.

8.4 Subdivision Roadways

In the development of a subdivision, the roadway layout shall meet the requirements of City Code Chapter 156, Article VI. These requirements include, but are not limited to, the allowed length of residential blocks, maximum length of dead-end streets, requirements for temporary turn arounds, etc.

8.5 Entry Gates

Gates are allowed on private roadways or property unless the development order or other such agreement specifically prohibits the use of gates. Gates are prohibited on public roads owned and maintained by the City. As allowed, gates on private roadways or property shall demonstrate the following minimum standards:

(a) Access shall be provided at all times for police, fire, city inspection, mail delivery, garbage pickup, utility, school buses, and other health and safety-related vehicles. Access must not require drivers to exit their vehicles.

(b) Access for pedestrians and bicycles must be provided along the perimeter of the gate.

(c) Turn around areas for vehicles that are denied access shall be provided. The turnaround area shall be of sufficient size to accommodate a bus or commercial truck, as appropriate.

(d) The minimum distance from the road right-of-way to the beginning of the queuing for the gate shall be one-hundred feet. The City Engineer may request a greater length in cases where a large number of units will be served by the gate, the development will have a large volume of long vehicles, the operation for opening the gate is a lengthy process, or the entry is located on a major roadway.

(e) The gated area shall provide a minimum unobstructed vertical clearance meeting the requirements of the Fire District.

(f) Gates may be either a swinging or sliding type.

(g) Manual operation of the gate shall be possible with one person.

(h) For the purposes of emergency vehicles, the gate must have the ability to be opened with a Knox Key Box, siren, or a breakaway design in accordance with the requirements of the St Lucie County Fire District.

8.6 Roadway Section

The required minimum section for all newly constructed private roadways, are presented in City Code Section 156.093(C). The required minimum section for all newly constructed public roadways are detailed in Table 8-1 and graphically shown in the Standard Roadway Details for 6-, 4- and 2-Lane sections provided in Chapter 20. The configuration of the intermediate phasing of roadways (for example, the construction of the first two lanes of a four-lane roadway) shall be approved by the City Engineer.

Table 8-1 Roadway Section Requirements

Road Type/ Ultimate Number of Lanes	Midblock ROW Width (feet)	Travel Lane Width (feet)[1]	Median Width (feet)[2]	Bike Lane Width (feet) and Location	Sidewalk Width (feet) and Location[3]	Utility Easement Width (feet) and Location[4]
Arterial 6 Lanes	160	11	30	7 Both Sides	8-10 Both Sides	10 Both Sides
Arterial or Collector 4 Lanes	135	11	30	7 Both Sides	8-10 Both Sides	10 Both Sides
Collector or Local 2 Lanes Undivided	85	12	0	7 Both Sides	6 One Side	10 Both Sides
Collector or Local 2 Lanes Divided	85	12	16	7 Both Sides	6 Both Sides	10 Both Sides

[1]Outside curb and gutters are required.
[2]Median width includes curb and gutters (two feet each side).
[3]Six feet sidewalks minimum. Where site characteristics allow & on a case by case basis eight feet or wider sidewalks shall be required.
[4]Located outside the ROW.
[5]Street and/or pedestrian lighting within subdivisions shall be as required in City Code Section 156.117.

8.7 Pavement Design

(a) The minimum roadway pavement design standards are presented in Table 8-2. All pavement designs shall be prepared and signed and sealed by a professional engineer. The recommended pavement design shall include supporting geotechnical investigations. The inclusion of edge, strip, trench, or underdrains where seasonal high groundwater levels are within two feet of any base layer or irrigated medians are planned shall also be included in the design.

(b) Designs shall consider future traffic loadings as well as construction traffic. Roadways with higher traffic volumes, significant truck traffic, emergency routes, or such reason, as determined by the City Engineer, shall exceed the minimum standards to ensure that the facility will reach a full term service life. FDOT's *Flexible Pavement Design Manual* shall be used as a basis of reference for pavement designs greater than the minimum standards.

(c) Alternate types of pavement, base and subgrade which are equal to or superior to those specified may be approved by the City Engineer. Application for such approval shall be accompanied by written data, calculations and analysis which show, by accepted engineering principles, that the alternate types are equal or superior to those specified.

Table 8-2 Flexible Pavement Design Standards

Description	Pavement Type			
	Arterial	Collector	Local	Parking Lot
Structural Number (minimum)	4.0	3.5	3.0	2.18
Portland Cement Concrete (minimum thickness is 6 inches)	-	-	-	FDOT approved Class 1 Concrete.
Asphalt Thickness (inches)	3.0	2.5	1.5	1
Optional Base Group (FDOT Standard Spec. Section 285 With 8-inch minimum thickness)	9	6	6	4
Subgrade Thickness (inches)	12	12	12	12
Subgrade Compacted or Stabilized	LBR 40	LBR 40	LBR 40	LBR 40

8.8 Geometric Elements of Roadway Design

The geometric design shall provide the simplest geometry and promote interconnectivity and facilitate the movement of all drivers, bicyclists, and pedestrians. The horizontal and vertical alignment of the roadway shall be designed in accordance with the FDOT *Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways* and the FDOT Design Manual.

8.9 Medians

Requirements for roadway medians:

(a) All roads with four or more travel lanes shall include a median.

(b) Median design shall be in accordance the FDOT Greenbook.

(c) Landscaped medians shall have a two-foot paver band, adjacent to the back of curb, for all rights-of-way with a width of eighty feet or more.

(d) Left turn channelization shall provide storage space for left-turn entry and for left-turn exiting vehicle refuge.

(e) The preferred end treatment for a median opening is the bullet-nose design.

(f) Minimum spacing between median openings is provided in Table 8-3. Distances may be greater if the median opening falls within the operational area of an intersection, if required by the City Engineer, or if a posted speed greater than forty-five mph is used.

Table 8-3 Median Spacing[1]

Median Type	Minimum Spacing (feet)
Full Access	660
Restricted Access	330

[1]Source: Florida Statue 14-97.003 for Access Class 7

8.10 Intersections

Roadway intersections shall:

(a) Be designed in accordance with FDOT standards.

(b) Involve the junction of only two roadways.

(c) Create an angle that is near ninety degrees. Angles less than seventy-five degrees are not acceptable.

(d) Provide centerline offsets of three-hundred feet or more with adjacent intersections.

(e) Provide a minimum radius of thirty feet for a local or collector road and forty feet for an arterial.

(f) Include appropriate turn lanes.

8.11 Roundabouts

Roundabout design is highly dependent upon site specific conditions as well as experience of the designer and sound engineering judgement. The use of a roundabout shall be documented and justified using the standard justification report outlined in the *Florida Roundabout Guide* by FDOT. Lane widths, turning radii, super elevation, grades, horizontal clearance, clear zone, border width shall follow the FDOT *Plans Preparation Manual* or the AASHTO *Policy on Geometric Deign for Streets and Highways*.

8.12 Driveways

Driveway design shall follow FDOT Standard Plans Indexes 000-515 and 000-516, and the *Driveway Information Guide*. A driveway shall provide sufficient lanes to produce efficient traffic flow while providing a safe environment for all users (vehicles, pedestrians, bicyclist, disabled users, bus patrons, etc.). Efficient traffic flow means that the difference in speed between the turning vehicle and through traffic are minimized, encroachment of the turning vehicle into adjacent lanes is minimized, adequate sight distance is provided and there is sufficient operational area to prevent spill back into the public road. Driveways shall meet the following general standards:

(a) Approved by the entity owning the connecting roadway.

(b) Recommended for approval by the Site Plan Review Committee, if applicable.

(c) Permitted through the driveway permitting process, if applicable.

(d) Shared driveways with cross access and interconnected parking lots shall be used where possible.

(e) When there is a choice, driveways shall be located on the street with the lowest classification and least traffic volume.

8.12.1 Driveway Geometry

Driveways shall meet the following geometric standards:

(a) Turnouts are located within the extended property line.

(b) Located outside acceleration or deceleration lanes and tapers.

(c) Coordinated with median openings.

(d) For undivided roadways, driveways shall align with those across the street if possible. Otherwise, driveway shall be offset to minimize jog maneuvers, overlapping left turns or other unsafe conditions.

(e) As close as possible to ninety degrees with the roadway. In accordance with FDOT Standard Plans Index 000-515, angles ranging from ninety- to sixty-degrees will be considered and may be allowed depending upon the circumstances of the use.

(f) Widths shall meet City Code Section 158.222(B)(2).

(g) Grades shall follow the guidelines of FDOT Standard Plans Index 000-515 which indicates the maximum grade for a non-residential driveway is ten percent and twenty-eight percent for a residential driveway; however, grades less than these are desirable and recommended. The maximum difference in grade should be no more than the recommend twelve percent. Additionally, the grade of the proposed driveway will need to consider visibility so that a sight distance problem is not caused (e.g., downgrade of a driveway at a point of super-elevation on the roadway).

(h) Channelization with divisional islands to serve as pedestrian refuges, traffic separation, and/or to direct traffic should be considered where there is a large pavement area, to channelize right-in and right-out movements, for high traffic volumes, for high volumes of larger vehicles, where a traffic signal is located or will be located in the future, and/or where there are two or more entrance lanes.

(i) Length shall be sufficient so that queuing, stacking, maneuvering, standing, and parking is completed beyond the right-of-way line. The driveway throat length is measured from the ultimate edge of pavement to the first internal drive aisle or parking space as shown in Figure 8-1.

(j) Recommended minimum throat lengths are provided in Table 8-4. Careful consideration of future road widening shall be made when determining the required driveway length. Where a site is being redeveloped or the site is on a small property with no reasonable alternative access, it may be difficult to obtain the lengths presented in Table 8-4. In these cases, the driveway and site layout shall maximize the available length.

Figure 8-1 Driveway Throat Length

Table 8-4 Driveway Throat Length	
Description	Minimum Length (feet)
Major Development - four or more lanes	300
Regional Shopping Center over 150,000 square feet	250
Community Shopping Center 100,000 to 150,000 square	150
Small Strip Shopping Center	50
Small Single Commercial Development	30

Source: Driveway Information Guide: Exhibit 36 - Recommended Minimum Driveway Length for Major Entrances, FDOT.

8.12.2 Number of Driveways

Driveways shall be limited to the number provide in City Code Section 158.222(B)(3). The number of driveways shall be the minimum number necessary to provide reasonable access to the overall site and not the maximum available for that frontage.

8.12.3 Number of Access Points for Residential Subdivisions

The minimum number of external vehicular access points for residential subdivisions shall adequately serve the subdivision and as recommended for approval by the Site Plan Review Committee.

8.12.4 Separation from Intersections

City Code Section 158.222(B)(4) provides the minimum standards for the spacing required between a driveway and intersection.

8.12.5 Spacing between Driveways

Spacing between driveways shall be measured from the midpoint of each driveway and have the minimum distances provided in City Code Section 158.222(B)(5).

8.12.6 Movement Restrictions

Movement restrictions at driveways shall be required whenever one of the following conditions occurs:

(a) A warranted left turn lane is not feasible.

(b) Exiting vehicle would be required to drive through the queue or cross a left turn lane of a signalized intersection.

(c) Provision of a median with two-way channelization providing storage for left-turn entry and refuge for left-turn existing vehicles meeting FDOT design criteria is not possible.

(d) The location of the driveway will unnecessarily increase conflicts, or negatively impact the safety of the traveling public, or the function of the adjacent roadway.

8.12.7 Right Turn Lanes

(a) The use of a continuous right turn lane shall be avoided. Exclusive right turn lanes for driveways are required when the operational aspects of the driveway meet the volume and speed criteria presented in Table 8-5, where a traffic study indicates that the LOS is degraded by the proposed development, or where required for safety reasons even though the peak hour turn volumes may be lower than specified in Table 8-5.

Table 8-5 Unsignalized Driveway Right Turn Lanes[1, 4, 5]	
Roadway Posted Speed Limit	Number of Right Turns Per Hour
45 mph or less	80-125 [2]
Over 45 mph	35-55 [3]

[1]Source: FDOT Access Management Guidebook, Table 27

[2]The lower threshold of eighty right turn vehicles per hour would be most used for higher volume (greater than 600 vehicles per hour, per lane in one direction on the major roadway) or two-lane roads where lateral movement is restricted. The 125 right turn vehicles per hour upper threshold would be most appropriate on lower volume roadways, multilane highways, or driveways with a large entry radius (fifty feet or greater).

[3]The lower threshold of thirty-five right turn vehicles per hour would be most appropriately used on higher volume two lane roadways where lateral movement is restricted. The fifty-five right turn vehicles per hour upper threshold would be most appropriate on lower volume roadways, multilane highways, or driveways with large entry radius (fifty feet or greater).

[4]A posted speed limit of over forty-five mph may be used if the operating speeds are known to be over forty-five mph during the time of peak right turn demand.

[5]Projecting turning volumes is, at best, a knowledgeable estimate. Keep this in mind especially if the projections of right turns are close to meeting the guidelines. In that case, consider requiring the turn lane.

(b) An exclusive right turn lane shall be required, even if the speed and volume criteria is not met, when one of the following conditions exist:

(1) Developments that have a high volume of buses, trucks, or trailers.

(2) Poor internal circulation that may cause backups onto the roadway.

(3) Heavier than normal peak flows on the roadway.

(4) Very high operating speeds on the roadway.

(5) Areas where turns are not expected.

(6) Roadways with curves, hills, or other sight distance restrictions.

(7) Gated entrances.

(8) An area with a history of crashes, especially rear end collisions.

(9) Intersections or driveways just after a signalized intersection where acceleration typically occurs.

(10) A driveway with a severe skewered angle.

(11) Areas of heightened safety concern.

8.12.8 Left Turn Lanes

A left turn lane for driveways shall be provided:

(a) Whenever a driveway is served by a median opening.

(b) On a two-lane road, on curves, or whenever speeds are forty-five mph and greater.

(c) Where a traffic study shows that the LOS is degraded by the proposed traffic.

(d) When warranted by the NCHRP Report 745 analysis and Report 279.

8.13 Clear Visibility Triangle

In order to provide a clear view of intersecting streets and driveway entrances, a triangular area of clear visibility shall meet the following standards.

(a) Nothing shall be located, erected, placed, planted, or allowed to grow in such a manner as to impede vision between a height of three feet and eight feet within the triangular area.

(b) Road Intersections: The clear visibility triangle shall be formed by drawing a line twenty-five feet along each property line abutting the right-of-way starting at the point where the two property lines intersect or their projections intersect, then connecting the two end points with a straight line as shown in Figure 8-2.

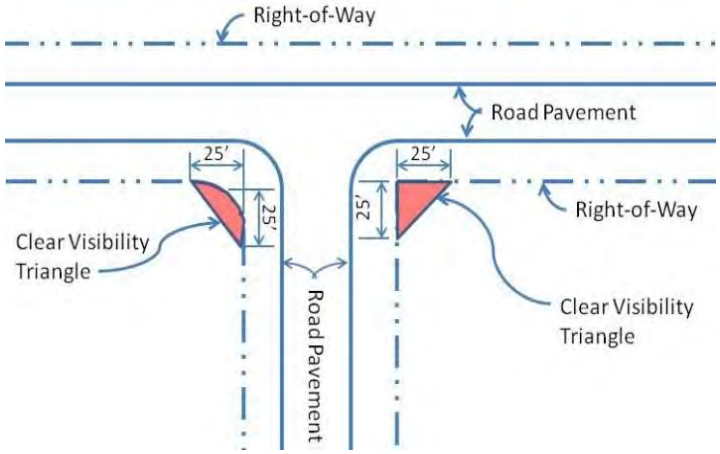


Figure 8-2 Clear Visibility Triangle at Intersection

(c) Driveways: A clear visibility triangle shall be formed as shown in Figure 8-3. Beginning at the intersection of the driveway with the road right-of-way, then along the right-of-way for a distance of twenty-five feet, then in a straight line across the property to a point on the edge of the driveway twenty-five feet from the point of beginning. Where driveways are curved or intersect with the street at other than right angles, the visibility triangle shall be measured from the point of the curve most projecting into the driveway.

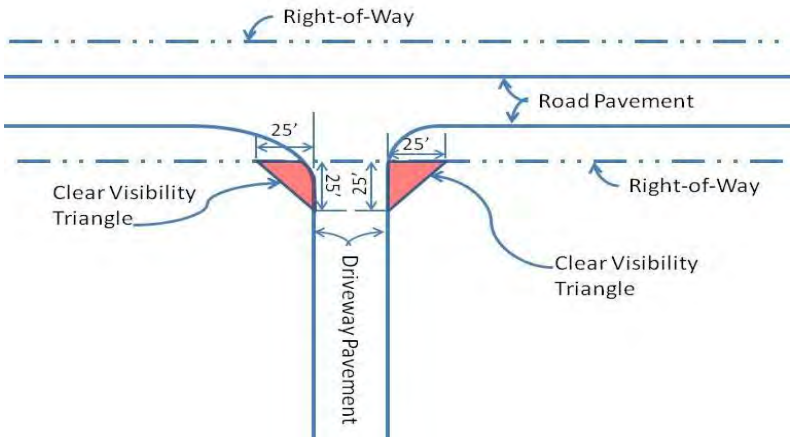


Figure 8-3 Clear Visibility Triangle at Driveway

8.14 Sight Distance

Sight distance applies to all intersections and driveways and is intended for the purpose of clear sight development and maintenance. Designs and maintenance of intersections and driveways within the City shall meet the requirements of FDOT Design Manual.

8.15 Roadside Clear Zone

The roadside clear zone provides space and time for the driver to retain control of the vehicle and avoid or reduce collision with roadside objects. Roadside clear zone width shall be in accordance with the FDOT Design Manual.

8.16 Sidewalks

Sidewalks shall meet the following requirements:

(a) Designed and constructed in accordance with the FDOT Greenbook and ADA standards.

(b) Minimum width of five feet when separated from the back of curb. Sidewalks constructed as part of a road improvement project shall have a minimum width of six feet as provided in Table 8-1.

(c) Minimum width of six feet when located adjacent to the curb.

(d) Maximum cross slope of 1.5 percent

(e) Grades less than 8.33 percent

(f) Curb ramps at all intersections

(g) Sidewalks shall be constructed with three-thousand psi concrete

(h) A minimum sidewalk thickness of six inches is required for the following cases:
   (1) Located within a concrete driveway
   (2) Within five feet of an intersection
   (3) Within easements and drainage rights-of-way

(4) Areas of special concern as requested by the City Engineer

(i) If a sidewalk thickness of six inches is not required, a four-inch-thick sidewalk is acceptable.

8.17 On Street Parking

On street parking shall be allowed within Traditional Neighborhood Developments or in designated Community Redevelopment Areas as approved by the City Council on local or collector streets. On street parking shall be located so that it is outside the radius of the intersection and does not hinder the intersection sight distance.

8.18 Traffic Calming

The City's traffic calming policy is provided in Appendix B.

8.19 Beautification Policy

The City's beautification policy is provided in Appendix C.

9. Traffic Controls, Signals and Lights

9.1 Traffic Controls

(a) Traffic controls include pavement markings, signs, and other devices used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, bikeway, or private road open to public travel. The purpose of traffic controls is to provide for the orderly and predictable movement of traffic. Therefore, the standardization of use is of utmost importance.

(b) The determination of need, warrant, and placement of traffic controls shall be as determined by the design documents or as revised later due to a systematic engineering judgment and/or study. Traffic controls added, removed, or relocated shall only be completed with the approval of the owner of the right-of-way. The design and installation of all traffic controls shall be in accordance with FDOT Standard Plans, MUTCD, and NEC.

9.1.1 Pavement Markings

Pavement markings include, but are not limited to, pavement markings, raised pavement markers (RPM's), curb markings, delineators, and colored pavements. In some instances, markings supplement other traffic control devices. The following standards relating to pavement markings shall be used in the City:

(a) Temporary paint markings may be used on a construction project for the first lift of asphalt as allowed by FDOT guidelines. Temporary paint may also be used as interim measure prior to the placement of thermoplastic on the final lift of asphalt at the discretion of the City's project manager.

(b) The final lift of asphalt shall be provided with thermoplastic pavement markings after an acceptable curing time. Curing time is typically thirty days.

(c) Contrasting color, permanent tape shall be applied to all concrete surfaces, specifically bridge decks.

(d) Striping removal shall follow FDOT specifications.

(e) Hydroblasting to remove pavement markings from the final lift shall not be permitted.

(f) Black paint to remove or cover up pavement markings shall not be permitted.

9.1.2 Signage

The determination of need, design requirements, and vertical and horizontal placement of traffic control signs within the road right-of-way shall be in accordance with MUTCD, and the FDOT Standard Plans. Memorial markers are discussed in section 3.4.2, signs for private facilities are discussed in section 3.4.3 and temporary signage is discussed in section 3.4.4

9.2 Signals

All traffic signal installations or modifications shall require a signalization plan that is signed and sealed by a professional engineer registered in Florida. The signalization plan shall be reviewed and approved by the City and permitted prior to starting any work. Upon completion of the work, one set of signed and sealed record drawings along with electronic versions (PDF and DWG formats) shall be submitted to the City.

9.2.1 Traffic Signals

Traffic signals shall meet the requirements for the latest edition of the following: MUTCD; FDOT *Standard Plans*, *Standard Specifications for Road and Bridge Construction*, *Traffic Engineering Manual*, *Minimum Specifications for Traffic Control Signals and Devices*, *Plans Preparation Manual*, *Intersection Design Guide*, *District 4 Signal Design Guidelines*, and the Fiber Optic Specifications (Appendix D). Specific traffic signal requirements are listed below:

(a) General

(1) Equipment and materials shall be listed on the FDOT APL (Latest Edition).

(2) The City shall be supplied with one Honda EU 3000i portable invertor generator (or equivalent) upon completion of a traffic signal that will be owned and maintained by the City.

(3) Span wire assemblies shall not be permitted within the City, unless otherwise approved.

(4) Span wire assemblies, where approved, shall be perpendicular, box and dropped-box span assemblies. Diagonal spans may only be used for flashing beacon assemblies or where approved by the City Engineer.

(5) Annual power and maintenance costs of traffic signals on private roads are the sole responsibility of the owner of the road, unless a signed agreement has been executed.

(6) Upon completion of the work, one set of signed and sealed record drawings along with electronic versions (PDF and DWG formats) shall be submitted to the City.

(7) For projects that will be owned and maintained by the City, shop drawings for the materials including, but limited to, controller assemblies, mast arms, luminaires, street name signs, optical vehicle detector systems, signal heads, traffic monitoring cameras, fiber optic materials, pull boxes, cable, conduit, etc. shall be provided to the City for review and approval.

(8) For projects that will be owned and maintained by the City, warranty information and transfers shall be submitted to the City prior to the final acceptance by the City.

(b) Design/Operation

(1) For programed flash operation, the major street is to flash yellow and the minor street is to flash red.

(2) The controller shall operate an approved FDOT Signal Operating Plan.

(3) Signal timing displayed for local operation shall be suggested timings based on the St Lucie TPO volume counts. Actual timing and coordination plans are to be determined by the City.

(c) Controller Assembly

(1) The controller assembly shall be a Naztec TS2 Type 1 Cabinet with a Number 7 key.

(2) The top of the foundation shall be twelve inches above the sidewalk or the edge of pavement if there is no sidewalk.

(3) A disconnect switch shall be mounted on a separate concrete pole on controller cabinet corner.

(4) Controller base shall have four conduits: two for communication cable and two for power. The conduits shall be terminated in the communication pull box.

(5) The controller cabinet shall be oriented with the door opening away from the roadway so that the technician can view the entire intersection while working in the cabinet.

(6) A concrete pad that measures forty-eight- by thirty- inches, preferable, shall be constructed adjacent to the controller cabinet. The pad elevation shall match the elevation of the sidewalk. In the absence of sidewalk, the concrete pad elevation shall match the elevation of the edge of pavement. The pad shall have a six-inch eyebolt, protruding from the concrete at the hinge side of the cabinet, that can be used to secure a generator.

(d) Mast Arms

(1) Mast arm assemblies shall follow FDOT Design Guidelines and Design Standards.

(2) Mast arm foundations shall be in accordance with FDOT Standard Plans.

(3) Mast arm shop drawings shall be reviewed and approved by the City prior to procurement of mast arms.

(4) Top of mast arm foundations within a sidewalk shall match the finish contour and elevation of the sidewalk.

(5) Final location of mast arm is to be field determined and approved by the City.

(b) Luminaires

(1) Luminaires on mast arm uprights shall be 120 Volt, LED and 250 watt HPS equivalent.

(2) Luminaires shall be wired on a separate breaker in the disconnect box.

(c) Street Name Signs

(1) Illuminated street name signs shall have 10-inch series “C” Letters.

(2) Signs shall be rigidly mounted to the mast arm.

(3) Signs shall be wired to a single photo cell located in the controller cabinet.

(d) Optical Vehicle Detectors

(1) Inductive loop technology and microwave technology shall not be permitted for vehicular detection, unless otherwise approved by the City Engineer. Video detection is preferred. In instances where video detection is not feasible, inductive loops will be considered as an alternative.

(2) All video power cables, processors, and equipment shall be provided for a complete and operational video detection system that complies with the City’s existing video system.

(3) Processors shall be Iteris Edge II, with Iteris Edge connect and Iteris TS2-IM module and shall be capable of multi zone detection.

(4) Cameras shall be Iteris RZ4-WDR.

(5) Cameras shall be mounted above the mast arm using astro bracket hardware at a height that allows the required detection and as recommended by the system manufacturer.

(6) All detection camera brackets shall be drilled and tapped for 1/4-20 set screw after installation to prevent camera from laying over in high winds.

(7) Anti-seize shall be used on all mounting hardware for the camera brackets.

(8) The detection system shall be equipped with an LCD monitor for configuration of the detector loops.

(9) Manufacturers shall be present at turn on for programming and setup.

(e) Signal Heads

(1) Five-section signal heads shall have an additional terminal strip installed in the red ball signal head with a red and neutral jumper wire attached for the ease of replacing the red ball LED signal.

(2) All signal heads shall have back plates installed in accordance with FDOT standards.

(3) Signal heads shall be vertically and rigidly mounted to the mast arms.

(4) Anti-seize shall be used on all mounting hardware for the camera brackets.

(5) Weep holes shall be drilled in all signal heads/pedestrian signals.

(f) Traffic Monitoring Camera

(1) New and modified traffic signals shall include the installation of a pan tilt zoom traffic monitoring camera.

(2) Traffic monitoring camera shall be Bosch Autodome IP Starlight 700HD Pan Tilt Zoom.

(3) The camera shall have surge and lighting protection and shall be mounted with mast-o-bracket and neoprene wrap.

(4) The mounting location shall be determined by the City.

(5) Anti-seize shall be used on all mounting hardware for the camera brackets.

(g) Electrical

(1) Electrical work shall meet the requirements of the NEC, NESC, and the FDOT Specifications for Road and Bridge Construction.

(2) Components shall be properly grounded and bonded per NEC requirements.

(3) Conductor and/or wire connections shall be butt spliced and waterproof. Wire nuts will not be accepted.

(4) An UPS, Novus FXM 2000 with a network interface card installed and configured, shall be provided for the signals.

(5) The UPS shall be located in a Novus Fortex FX 200 cabinet that is mounted on a concrete pad alongside the controller foundation.

(6) Signal conductor within the cabinet shall completely encircle inside of cabinet before termination to allow slack for knock downs.

(7) Signal conductor shall pass through hole in the mounting bracket into signal mounting pipe and into signal head so cable is not exposed to the elements.

(8) Wire nuts shall not be used within the controller cabinet, street light circuit or signal circuit. Approved connections are terminal strips, water tight butt splices (rubber tape electrical tape, scotch cote) and split bolts.

(9) All signal upright hand holes shall have terminal strips installed for the termination of signal conductor from the controller cabinet to the signal heads/pedestrian signals.

(10) All ground wiring within pull boxes requiring termination to ground rod shall be attached using cad weld ignitors.

(11) All spare signal conductor within controller cabinet shall be terminated directly to ground/neutral bars.

(12) All signal conductor within the upright hand hole and controller cabinet shall be properly labeled using flag tie wraps.

(13) The electrical feed source shall be coordinated with FP&L.

(h) Fiber Optics

(1) New and modified traffic signals shall be interconnected to the City's ITS network via fiber optic. This requirement may be waived by the City Engineer if the new or modified traffic signal is not located within a reasonable distance of an existing fiber optic trunk line.

(2) Fiber optic ethernet switch shall be Siemens/Ruggedcom RS-900G-HI-D-2SC10-XX, and shall be fully configured for operation, including assigned IP Address determined by the City.

(3) Pull box (Fiber Optic) - Tier 15 (minimium)

a. Box: Quazite – PG1730BB18 – 17L x 30W x 18H (inches), Cover: Quazite – PG1730CA00

b. Box: Synertech - S1730B18FA –17L x 30W x 18H (inches), Cover: Synertech - S1730HBBOA

(4) Splice Box (Fiber Optic) - Tier 15 (minimium)

a. Box: Quazite – PG3048BB – 30L x 48W x 36H (inches), Cover: Quazite – PG3048HC00

b. Box: Oldcastle – 3048-36 - 30L x 48W x 36H (inches), Cover- Oldcastle - Uni-half 3048

(5) Splice Closures (Fiber Optic): Tyco FOSC-450-C6-6-NT-0-C6V

a. Enclosure Splice Tray: FOSC-ACC-C-Tray-24

b. Basket: FOSC-ACC-C-Basket

(6) Fiber Optic Cable

a. Corning/Siecor – 096EU4-T4701D20 - 96 Fiber ALTOS® Gel-Free Cable Non-Armored SMFE 1.4/0.4/0.3 dB/km 12f/tube. Print in feet.

b. Corning/Siecor – 012EU4-T4701D20 - 12 Fiber ALTOS® Gel-Free Cable Non-Armored SMFE 1.4/0.4/0.3 dB/km 12f/tube. Print in feet.

(7) The following pay items (shown using the FDOT item number, quantity and format) shall be incorporated into the signalization plans for each intersection:

a. Closed Circuit Television Items

i. 686-101-2 Video Data Serial Converter (Furnish and Install) - 1 Each

ii. 686-101-3 Copper Data Patch Cables 5 (Furnish & Install) - 1 Each

iii. 686-101-4 Camera Assembly, Bosch 36XG5, Smoked Lens w/ Composite Cable & Gasket (Furnish & Install) - 1 Each

iv. 686-101-5 Mount, Mastobrac and Neoprene Wrap (Furnish & Install) - 1 Each

v. 686-101-6 Video Coax Patch Cables w/ Splitter (Furnish & Install) - 1 Each

vi. 686-101-8 Maintenance Unit -Surge Arrestor Panel for Power, Data, Video w/ Interface (Furnish & Install) - 1 Each

vii. 686-101-7C Multi-Voltage Power Supply Module (Furnish & Install) - 1 Each

b. Electronics

i. 686-101-1 FO Ethernet Switch 1000BaseF, 2opt-8cu (Furnish & Install) - 1 Each

ii. 686-101-1B FO Ethernet Switch 1000BaseF, 2opt-8cu POE (Furnish & Install)

iii. 686-101-1C Cisco Industrial 4000 8GT8GP4G-E FO Ethernet

c. Fiber Optic Cable – Outside Plant Installation

iv. 101-1 Mobilization and Documentation – Lump Sum

v. 633-TW Tracer Wire w/ Radio Detection System Balancing for Citywide Locate System (Furnish & Install) – Linear Feet

vi. 633-113-123 FO Cable 96F, SM, LT, UG (Furnish & Install) - Linear Feet

vii. 633-113-DM ROW Delineator Marker Post Orange 6-feet (Furnish & Install) - 1 Each

viii. 633-1-121 FO Cable 12F, SM, Drop Cable (Furnish & Install) - Linear Feet LF

ix. 633-2-31 FO Connection (Install) Splice - 1 Each

x. 633-2-31 FO Connection (Install) Termination - 1 Each

xi. 633-7-12 FO Splice-Term. Cabinet, 12F, Wall/Rack (Furnish & Install) - 1 Each

xii. 633-9-A FO Jumper, Duplex ST-ST, SM, 10-Feet (Furnish & Install) - 1 Each

xiii. 633-9-B FO Jumper, Duplex SC-ST, SM, 10-Feet (Furnish & Install) - 1 Each

xiv. 633-9-C FO Jumper, Duplex LC-ST, SM, 10-Feet (Furnish & Install) - 1 Each

xv. 633-9-12 FO Splice Closure 12F, Aerial/UG (Furnish & Install) - 1 Each

xvi. 633-9-96 FO Splice Closure 96F, Aerial/UG (Furnish & Install) - 1 Each

xvii. 635-1-15 FO Pullbox (Furnish & Install) - 1 Each

xviii. 635-1-15A FO Splicebox (Furnish & Install) - 1 Each

(8) For additional information on the City's fiber optic network, refer to Appendix D, City of Port St Lucie Fiber Optic Network Minimum Design Standards and Details

9.2.2 Traffic Signal Spacing

Traffic signal spacing shall be in accordance with Florida Administrative Code Rule 14-97, Table 2 – Access Management Standards for Controlled Access Facilities. The majority of roads in the City are

Class 7, which has a minimum spacing of 1,320 feet between signals. The roadway access class shall be approved by the City Engineer.

9.2.3 Pedestrian Signals

Pedestrian signals shall meet the following requirements as well as the applicable requirements presented for traffic signals in Section 9.2.1Traffic Signals:

(a) Equipment and materials shall be listed on the FDOT APL.

(b) Pedestrian signal design and placement shall follow FDOT guidelines and ADAAG.

(c) All new and modified pedestrian signals shall be APS type with audible indications.

(d) All Pedestrian Signals shall countdown during pedestrian change interval.

(e) Shop drawings of new and modified pedestrian signals and appurtenances shall be submitted to the City and approved prior to procurement.

9.3 Roadway and Pedestrian Lighting

All roadway and pedestrian lighting installations or modifications shall require a lighting plan that is signed and sealed by a professional engineer registered in Florida. The lighting plan shall be reviewed and approved by the City prior to starting any work. Lighting for roadways and pedestrians shall meet the following requirements:

(a) General

(1) Alternative energy-efficient lighting technologies, such as LED shall be required for all new construction and modification of existing facilities, unless otherwise approved by the City Engineer.

(2) Annual power and maintenance costs for roadway and pedestrian lighting on private roads are the sole responsibility of the owner of the road, unless a signed agreement has been executed.

(3) Upon completion of the work, one set of signed and sealed record drawings along with electronic versions (PDF and DWG formats) shall be submitted to the City.

(4) For projects that will be owned and maintained by the City, shop drawings for the materials including, but limited to, pull boxes, cable, conduit, poles, transformer bases, etc. shall be provided to the City for review and approval.

(5) For projects that will be owned and maintained by the City, warranty information and transfers shall be submitted to the City prior to the final acceptance by the City.

(b) Design

(1) All roadway lighting design, including but not limited to spacing and placement, shall meet or exceed minimum criteria established by FDOT design guidelines and the ITE Traffic Engineering Handbook.

(2) Illumination levels shall meet criteria set forth in FDOT's Plans Preparation Manual, Volume 1.

(c) Pull Boxes

(1) Armorcast Products #A6001946TAPXX12 polymer concrete box or equivalent.

(2) Box dimension is 13W x 24L x 12H (inches) with an open bottom.

(3) Load rating of box shall be a minimum of 20,000 pounds.

(4) Lid shall be non-metallic, have a non-skid surface, stamped "street lighting", and be secured to the box.

(5) Where possible, pull boxes shall not be located within a sidewalk. Approval from the City shall be obtained prior to installation within a sidewalk.

(6) Pull boxes shall never be placed within sidewalk ramps or a road.

(7) A pull box shall be located two feet, maximum, from each pole.

(8) Each pull box shall be supplied with a grounding rod and shall be properly grounded in accordance with FDOT specifications.

(d) Conductor, Cable, Conduit

(1) Conductor and/or cable shall be housed in two-inch schedule forty conduit.

(2) One spare conduit shall be provided for conduit run, including roadway crossings.

(3) Each spare conduit shall be supplied with a pull string.

(4) Conductor at the pole hand holes and pull boxes shall be looped in the pole and/or pull box with sufficient length (about three feet) to completely remove connectors and splices one foot outside the hand hole and pull box to make connections and splices accessible for changing fuses and troubleshooting the system.

(e) Poles

(1) Hand holes for poles and transformer bases shall be located opposite approaching traffic.

(2) Each pole shall be equipped with an accessible fuse and fuse holder with protective boots.

(3) Each pole shall be equipped with a lightening arrestor that is properly grounded.

(f) Construction

(1) All workmanship and materials shall be in accordance with the FDOT Standard Plans (Latest Edition) and FDOT Specifications for Road and Bridge Construction (Latest Edition).

(2) Equipment and materials shall be listed on the FDOT QPL/APL.

(3) Poles, luminaires and bases shall be fabricated in accordance with AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals,* and shall have been tested by FHWA approved methods. Certification for tests shall be submitted to the City with the shop drawings.

(4) Pulling Cable

a. Pulling device shall be connected to the copper wire, not the jacket.

b. Pulling stress shall be as specified by the manufacturer.

c. Pulling compound shall be used in accordance with the manufacturer's requirements.

d. Bends shall meet the manufacturer's requirements.

(5) Electrical Work

a. Electrical work shall meet the requirements of the NEC, NESC, and the FDOT Specifications for Road and Bridge Construction.

b. Components shall be properly grounded and bonded per NEC requirements.

c. Conductor and/or wire connections shall be butt spliced and waterproof. Wire nuts will not be accepted.

d. The electrical feed source shall be coordinated with FP&L.

10. Landscaping and Irrigation

10.1 General

All landscaping and irrigation shall be placed and maintained in accordance with applicable codes, approved construction plans, the Right-of-Way Permit, SFWMD Water Use Permit, and the Beautification Policy Guidelines set forth in Appendix C.

10.2 Privately Owned Property

(a) Landscaping and irrigation within private property shall be in accordance with City Code Chapter 154.

(b) Landscape materials within private developments shall be maintained in a manner that ensures public safety. Landscaping shall meet the requirements for the clear visibility triangle (Section 8.13), sight distance for intersections and driveways (Section 8.15), and not overhang so that the use of sidewalks or roadways is hindered.

(c) Sprinkler heads and irrigation systems installed adjacent to public roadways and sidewalks shall be designed to ensure public safety and shall not spray water over or on the roadway or sidewalk area. Irrigation systems shall not be operated during high pedestrian or vehicular travel times.

10.3 City-Owned Property

(a) Any landscaping or irrigation located within City-owned property, including rights-of-way, which causes or contributes to the deterioration of the road shoulder; swale; roadway systems; drainage pipes; drainage structures; drainage systems; creates a hazard for drivers, pedestrians, or bike users; or interferes/hinders the operation and/or maintenance of roadway or drainage systems shall be subject to removal at the discretion of the City.

(b) The installation and/or maintenance of landscaping within a City-owned property or right-of-way by entities other than the City requires an agreement, approved by City Council, between the entity and the City, and installed in accordance with the Beautification Policy Guidelines set forth in Appendix C.

(c) All landscaping provided on City-owned property shall include an irrigation system that meets the requirements set forth in Appendix F.

10.4 Tree Root Barriers

Any tree locations less than five feet to City-owned or maintained curb, pavement, or sidewalk shall have a root barrier that is at least twenty-four inches deep and fifteen feet long (centered) parallel to the pavement, curb or sidewalk. Larger trees may require deeper and/or longer barriers.

11. Bicycle and Pedestrian Facilities

11.1 General

Opportunities for bicycle and pedestrian mobility should be enhanced through site design strategies that seek to shorten walking distances and increase accessibility between neighborhoods, schools, recreation areas, community centers, shopping areas or employment centers. Development shall be designed to support bicycle and pedestrian mobility in accordance with the following:

(a) Accessible routes that meet the requirements of the ADA.

(b) Connecting the development to the adjacent roadway sidewalk system.

(c) Providing easements that connect the development to schools, parks, playgrounds, roads or other facilities.

(d) Pedestrian ways between parking areas, the building entrance, surrounding street sidewalks, external sidewalks, outparcels, and abutting properties.

(e) Pedestrian circulation shall be provided between abutting commercial properties through the use of walkways and similar pedestrian-oriented facilities.

(f) Pedestrian facilities may be incorporated into the required landscape buffer.

(g) Bicycle and pedestrian amenities, such as benches, water fountains, or bicycle racks, should be provided for developments where possible and appropriate as required in the City of Port St Lucie Citywide Design Standards.

11.2 Sidewalks

All new roadways shall have sidewalks as provided in section 8.6. New development and revisions to existing development shall provide sidewalks along adjacent existing roadways in accordance with City Code Section 158.222(E).

12. Parking Areas

12.1 General

(a) Parking requirements shall be in accordance with the City Code Section 158.221. The design of the parking lot should provide a continuous flow of traffic, allow safe movement of pedestrians, and create obvious and simple circulation patterns.

(b) Driveways for parking areas is discussed in section 8.12. Parking spaces shall be located outside the throat of the driveway as discussed in section 8.12.1

12.2 Number of Parking Spaces

(a) The number of standard paved parking spaces required for the particular land use and zoning is provided in City Code Section 158.221(C). In addition to the standard parking spaces, the appropriate number of accessible parking spaces for disabled persons shall be provided in accordance with Section 553.5041, Florida Statutes.

(b) For developments with unpaved parking areas, pursuant to City Code Section 158.221(H); the required number of accessible parking spaces shall be based on the total number of parking spaces provided (sum of the paved and unpaved parking spaces). Additionally, the unpaved spaces shall be considered impervious area in stormwater calculations.

12.3 Parking Spaces

(a) Off-street parking spaces shall be designed in accordance with City Code Section 158.221(B).

(b) On-street standard parallel parking, where permitted, shall have the following characteristics:

(1) Stall Length – twenty-two feet

(2) Stall Width – twelve feet

(3) Allowable distance of the space to an intersection - Per FDOT Standard Plans Index 711-001.

(c) Accessible parking spaces shall be dimensioned, stripped and signed, and constructed in accordance with FDOT Standard Plans Index 711-001.

12.4 Stacking

(a) The locations and lengths of vehicular stacking areas for facilities including, but not limited to, schools, day care, car washes, and drive-up windows, shall be provided in accordance with standards that promote the general safety and welfare of the public.

(b) Stacking shall meet requirements of City Code Section 158.221(I). At a minimum, a commercial drive-through shall provide the stacking capacity provided in Table 12-1, unless the queuing analysis indicates a greater length is required.

Table 12-1 Drive Thru Stacking Requirements			
Facility/Use	Measured From	Minimum Vehicle Stacking (1 Vehicle = 20 feet)	
		Spaces per Approach	Length (Feet)
Bank	Window	6	120
	Pneumatic Tube	3	60
	ATM	3	60
Car Wash (automatic)	Entry	3	60
Car Wash (self-serve)	Entry	1	20
Drug Store	Window	3	60
	Pneumatic Tube	3	60
Restaurant	Window (last service)	8	160

12.5 Cross Access

As required below, adjacent developments shall provide a cross access and easement for vehicles and pedestrians to allow circulation between sites. This requirement also applies to a site that abuts an existing developed property unless the SPRC deems it to be impractical.

(a) Cross access shall be provided for developments fronting an arterial and may be required for developments fronting a collector.

(b) At a minimum, the cross access connection shall consist of a paved twenty-foot-wide (minimum) connection to both neighboring properties.

(c) A cross access agreement between each side neighboring property shall be executed by both parties and recorded in the public records of St Lucie County. If unable to obtain a cross access agreement and connection with an existing development, the proposed development shall provide the cross access on its site.

12.6 Lighting

Lighting within parking lots shall meet the requirements of City Code Section 158.221(B)(7).

12.7 Maintenance

All parking areas shall be maintained free of pot holes, debris, weeds, broken curb, broken wheel stops and shall be clearly striped with signs and posts in good condition and functioning lights.

13. Waste and Recycling Facilities

13.1 General

Waste and recycling areas shall meet the requirements set forth in City Code Section 158.232. Additionally, the following should be considered:

(a) It is the City's preference that the waste and recycling facilities are located outside drainage easements. However, if there is no other alternative, they may be located within the drainage easement provided that the setback requirements are met and a revocable encroachment permit is obtained.

(b) Pads shall be of the appropriate thickness and have sufficient reinforcement to accommodate the anticipated loading.

(c) Access areas should be of sufficient area to accommodate the collection vehicle.

(d) The approach to the waste/recycling area should facilitate a looping or circle ingress/egress path that reduces the need for the collection vehicle to back up.

14. Submittals

14.1 General

(a) The general format and content of submittals are provided in the following subsections. Submittals are generally made as part of the site plan review or permitting process for commercial developments. All submittals shall include a transmittal summary with the following information:

(1) Contact information for the applicant, engineer of record and owner.

(2) Project identification including, if appropriate, the site plan review project "P" number assigned by the Planning and Zoning Department.

(3) List of items included in the submittal

(4) Reason for the submittal

(5) Action requested of staff

(b) In addition to the items listed above, resubmittals shall include a list of the revisions in the transmittal summary, revisions on drawings shall be shown in the revision block with a number to identify the revision, and revisions to documents shall be shown by an underline and strikeout format.

(c) Electronic file submittals shall be done such that each pdf is named according to the convention provided in Table 14-1. If a submittal includes a document that is not on the list, the file name shall clearly reflect the content of the submittal.

Table 14-1 Electronic Submittal File Names

Document	File Name
Aerial	Aerial.pdf
Annexation	Annexation.pdf
Application	Application.pdf
As-Builts	AsBuilts.pdf and .dwg
Boundary Survey	BoundarySurvey.pdf and .dwg
Citywide Design Standards	CitywideDesignStandards.pdf
Clearing Plan	Clearing.pdf
Conceptual Building Elevations	ConceptualBuildingElevations.pdf
Conceptual Floor Plan	ConceptualFloor.pdf
Conceptual Site Plan	ConceptualSite.pdf
Construction Plan	Construction.pdf
Cover Letter	CoverLetter.pdf
Development of Regional Impact (DRI)	DRI.pdf
DRI Notice of Proposed Change	DRINOPC.pdf
DRI Substantial Deviation	DRISD.pdf
Drainage/Stormwater Plan	Drainage.pdf
Final Plat	Plat.dwg and .pdf
Irrigation Plan	Irrigation.pdf

Table 14-1 Electronic Submittal File Names	
Document	File Name
Landscape Plan	Landscape.pdf
Legal Description	Legal.pdf
Legal Description and Sketch	LegalAndSketch.pdf
Limited Mixed District Rezoning	LMDRezoning.pdf
Listed Species Survey	ListedSpeciesSurvey.pdf
Mass Grading Plan	MassGrading.pdf
Master Planned Urban Development	MPUD.pdf
Owner Authorization	OwnerAuthorization.pdf
Paving and Drainage Plan	Paving.pdf
Permit (FDOT, SFWMD, USACOE,etc.)	Permit*Agency*.pdf [1]
Planned Urban Development	PUD.pdf
Preliminary Plat	PreliminaryPlat.pdf
Proof of Ownership	ProofOfOwnership.pdf
Public Art Checklist	PublicArtChecklist.pdf
Record Drawings	RecordDrawings.pdf & .dwg
Response to Comments	ResponseToComments*X*.pdf [2]
Site Plan	SitePlan.pdf or dwg
Special Exception Use	SEU.pdf
Stormwater Pollution Prevention Plan (SWPPP)	SWPPP.pdf
Street Lighting Plan	StreetLighting.pdf
Topographic Survey	TopographicSurvey.pdf
Traffic Report/Study/Analysis	Traffic.pdf
Tree Survey	Tree.pdf
Water and Sewer Plan	Utility.pdf

[1]Name should include the permitting agency, for example the SFWMD permit would be named PermitSFWMD.pdf.

[2]X is the response number: first response=1, second response=2, etc.

14.2 Plats

Plats submitted for review prior to recording shall meet the requirements of City Code Section 156.056.

14.3 Topographic and Boundary Surveys

A boundary survey is used to establish the perimeter of a property as it relates to the legal description. Topographic surveys are a mapping of the physical features of the property. A topographic survey may or may not be combined with a boundary survey. The following items shall be included on a topographic or boundary survey, as applicable.

(a) Prepared and certified by a registered professional surveyor and mapper in the State of Florida.

(b) Be of the form and format specified byChapter 5J-17, FAC.).

(c) Formatted for standardized sheet size of 24-inch by 36-inch.

(d) Scale greater than or equal to one inch equals 50 feet.

(e) Date of survey shall be within one year of the submittal.

(f) Show and label the location of existing streets within and adjacent to the property.

(g) Revisions are clearly noted in revision block as well as shown and labeled on survey.

(h) Show and label benchmark and control points.

(i) Boundary, limits, nature and extent of wooded areas, specimen trees, and other significant physical features.

(j) Topographic surveys shall also include:

(1) Dimensions, size, finished floor elevations, and setbacks from property line for existing structures on the site.

(2) Features (e.g., lakes, marshes, wetlands, canals, waterways, soil types, wooded areas, specimen trees, contours or spot elevations, structures, finished floor elevations, etc.) within 200 feet of the site.

(3) Features of the subject property (e.g., lakes, marshes, wetlands, canals, waterways, soil types, wooded areas, specimen trees, contours or spot elevations, etc.) shall be shown and labeled.

(k) The vertical datum shall reference NAVD of 1988 unless prior arrangements have been made. The reason for this is that in rare circumstances, such as the development of a new phase under a previously permitted project using the NGVD, the use of the NGVD may be warranted and accepted by the City.

14.4 Concept Plan

The concept plan is for the purpose of demonstration and discussion. The plan provides the basic parameters of a development without the details or expenses associated with preparing a site or construction plan. The content and detail of the concept plan varies depending upon the project. Items typically of interest to the Public Works Department include, but are not limited, to the following:

(a) Recent aerial showing location of site and adjacent properties.

(b) Overall plan view on one sheet.

(c) Traffic access points and type of access requested (i.e., full access, right-in and right-out, in only, exit only).

(d) General location of Stormwater detention area and discharge location.

(e) Preliminary traffic information – peak hour trips using the latest version of the ITE Manual with reference to the ITE version and code number and a trip distribution map for each driveway.

(f) Preliminary drainage information – Identification of the applicable SFWMD permit, the method of collection, treatment, and discharge, the general location of the detention area, and discharge. If known, identify the flood protection stages for the roadway, finished floor and twenty-five-year three-day event.

(g) Project phasing, if applicable.

(h) Offsite roadway or drainage improvements needed to support the proposed development.

(i) Proposed roadway sections.

14.5 Clearing Plan

Any project that disturbs an area of one or more acres is required to obtain a clearing permit. An approved clearing plan and SWPPP (section 14.7) is required to obtain a clearing permit. Additionally, for projects that disturb one acre or more, submit a copy of the NOI submitted to the FDEP. A clearing plan shall include the items specified in City Code Section 154.23.

14.6 Mass Grading Plan

An approved mass grading plan and SWPPP (section 14.7) allows the construction of lakes, detention areas, canals/ditches shown on the approved PUD or DRI master plan prior to approval of the subdivision or construction plans. The mass grading plan shows areas to be cleared, filled, or excavated, rough contours, stockpile areas, and haul routes. The mass grading plan shall include the items specified in City Code Section 154.23.

14.7 Stormwater Pollution Prevention Plans (SWPPP)

A SWPPP (aka erosion and sediment control plan) provides details for the reduction/prevention of stormwater runoff pollution from the proposed development. Approval of the SWPPP is required for the issuance of a clearing permit, mass grading permit, or site work permit. The SWPPP shall include the items specified in City Code Section 154.23.

14.8 Site Plans

Site plans shall be prepared and signed and sealed by a professional engineer, architect, or landscape architect registered in Florida. An approved site and construction plan is required for the issuance of a site work permit. The site plan shall include sufficient information and be consistent with practices of plans preparation within the industry. The plans shall include the items specified in City Code Section 158.238.

14.9 Construction Plans

Construction plans shall be prepared and signed and sealed by a Professional Engineer registered in Florida. In addition to the information provided on the site plan, the construction plans shall include sufficient information and be consistent with practices of plans preparation within the industry. The following items, as appropriate, should be included in the construction plans.

(a) Cover sheet with name of project, site map, sheet index, key map.

(b) Standard Road Design and Construction Notes, if applicable, provided in chapter 20, shall be included in the plan notes.

(c) Demolition plan, if applicable.

(d) Stormwater Management Plan: Existing and proposed drainage patterns, drainage area map, design, specifications, and calculations for onsite and offsite improvements. Identify the flood protection stages for the roadway, finished floor and perimeter berm. Along with the signed and sealed drainage

calculations, the EOR shall provide a maintenance schedule for the proposed on-site stormwater management system.

(e) Signed and sealed geotechnical test results and a location map representative of conditions for swales, retention areas, detention areas, or exfiltration trenches.

(f) An erosion and sedimentation control plan or SWPPP (section 14.7) that describes the type and location of control measures, the stage of development at which they will be put into place or used, and maintenance provisions.

(g) Paving and road design: appropriate horizontal and vertical controls, pavement section, cross-sections, profiles, signs, sight distance, pavement markings, traffic signals, pedestrian signals, street lights, pedestrian lights, sidewalks, and specifications for onsite and offsite improvements.

(h) Grading and excavation details and elevations including the interface of the proposed development with abutting properties.

(i) Proposed utility infrastructure plans, including sanitary sewer, water, stormwater management, telephone, electric, cable television, etc. (cross sections and profiles).

(j) Spot and finished elevations at all property corners, corners of all structures or dwellings, existing or proposed first floor elevations within 200 feet of the site.

14.10 Opinion of Probable Cost

(a) An opinion of probable cost is submitted by the EOR to the Public Works Department. The estimate may be the basis of a performance guarantee, permit fee for a new development, maintenance guarantee, or for a capital improvement project.

(b) The estimate shall be prepared and certified by a Professional Engineer registered in Florida. The estimate shall include a line item along with the unit of measure, estimated quantity (based upon a set of signed and sealed construction plans), estimated unit cost (based upon current market conditions) and extended line item cost.

14.11 Site Work Estimates

A certified cost estimate from the EOR or the contractor's itemized contract for the work shall be submitted to the Public Works Department. This estimate will be used as the basis of the inspection portion of the Public Works Department permit fee. The permit fee is provided in the fee schedule provided in City Code Section 57.01. The site work costs shall include all site work needed to provide the paving and drainage components of the work which includes:

(a) Earthwork

(b) Grading

(c) Embankment

(d) Stormwater collection, conveyance, treatment, storage, and discharge facilities

(e) Roadway and parking area subgrade, base, and asphalt or concrete

(f) Concrete work: curb/gutter, sidewalks

(g) Stabilized surfaces and sod

14.12 Drainage Calculations

Stormwater and drainage calculations shall demonstrate the project meets the minimum design guidelines presented in chapters 5 and 6. Calculations shall be signed and sealed by a Professional Engineer licensed in the state of Florida. The number of copies and content will be as specified in the contract documents, as agreed upon for the specific project or as required for the site plan review process.

14.13 Equivalent Residential Unit (ERU) Stormwater Calculations

Newly platted parcels, rezoned parcels, and construction plans shall include a calculation for the stormwater equivalent residential units for the proposed development. The calculation shall be completed on a worksheet, provided to the Public Works Department, by the EOR and then signed by the EOR and the property owner. This calculation will be used to determine the stormwater fee for the rezoned, developed, or renovated property.

14.14 Geotechnical Reports

Geotechnical reports shall be signed and sealed by a Professional Engineer licensed in the State of Florida. The number of copies and content will be as specified in the contract documents, as agreed upon for the specific project, or as required for the site plan review process.

14.15 Traffic Studies

(a) For projects reviewed as part of the site plan review project, a traffic study shall be completed in accordance with the *St Lucie TPO Standardized Traffic Impact Studies (TIS) Methodology and Procedures for St Lucie County, City of Fort Pierce and the City of Port St Lucie*. This document is provided in Appendix E.

(b) Traffic studies completed for a specific purpose or use outside of the site plan review process shall be completed as specified in the contract documents for the specific project.

14.16 Shop Drawings

Shop drawings shall be submitted for capital improvement projects. Shop drawings, as specified in the standards, such as drainage structures, pipes, reinforcing steel, cement mix for sidewalks, asphalt mix for pavement, pedestrian or street lighting components, traffic signal components, etc. shall be reviewed and approved by the EOR prior to submittal to the Public Works Department. The number of copies and the submittal requirements are project specific and shall be included in the specifications for the work and as agreed upon at the preconstruction meeting.

14.17 Completion Certification

Certification of completion shall be on company letter head and signed and sealed by the EOR. The certification letter shall clearly indicate:

(a) Date of construction completion.

(b) That the work was observed by the certifying engineer or his/her representative.

(c) Certification statement - all facilities have been constructed in substantial conformance with the approved plans and specifications.

14.18 Operation and Maintenance Manuals

Operation and maintenance manuals, as specified in the contract documents or as requested, in writing, at the preconstruction meeting by the City shall be provided by the developer or contractor. These manuals are generally required for mechanical, electrical, or specialized components of systems that will be owned and maintained by the City.

14.19 Record Drawings

(a) Newly completed construction for roadways, sidewalks, street/pedestrian lighting, traffic signals, landscaping, irrigation or stormwater management facilities that will be owned and maintained by the City requires a record drawing survey and completion certifications prior to final inspection and acceptance. Signed and sealed record drawings shall be provided to the City in both .dwg and .pdf formats.

(b) Record drawing surveys shall be prepared by a professional surveyor and mapper licensed in the State of Florida in accordance with 5J-17.052(1), FAC. At a minimum, the record drawings shall include the following and the minimum technical requirements for record drawings shall include:

(1) Horizontal Control Plan.

a. Accuracy certification of the horizontal control plan.

b. Survey monuments - installation and accuracy certifications.

(2) Paving Plans. Top of curb, gutter, and pavement centerline elevations at all grade breaks, curb returns, valley gutters, plus any other location necessary to adequately show drainage.

(3) Drainage

a. State Plan Coordinates (northing and easting), size, material, top elevation, and invert of all pipes at all changes in alignment.

b. State Plan Coordinates (northing and easting), top elevation, invert, and description of headwalls, structures, detention ponds and lakes.

c. Elevation of all drainage control points (e.g., weir, bleeder, top of berm, etc.)

d. Finished floor elevation.

(4) Signing & Striping Plans

a. State Plan Coordinates (northing and easting) and identification of each sign.

b. Plan showing pavement markings: arrows, wording, and symbols, and raised pavement markers.

(5) Traffic and Pedestrian Signal Plans. State Plan Coordinates (northing and easting) of all fixture poles, cabinets, boxes, or other signal related furniture.

(6) Street and Pedestrian Light Plans. State Plan Coordinates (northing and easting) and identification number of each light.

(7) Landscape Plans (Professional surveyor and mapper license not required). Confirmation of the material, types, general location, and number installed.

(8) Irrigation Plans

a. State Plan Coordinates (northing and easting) of all controllers, timers, and electrical boxes.

b. Confirmation of the location, size and type of pipe and heads.

c. Zoning and electrical diagrams.

15. Improvement Guarantees

15.1 General

The requirements and procedures for performance and maintenance guarantees for public improvements are provided in City Code Chapter 156, Article VII, Improvement Guarantees.

15.2 Performance Guarantees

Prior to the Planning and Zoning Department releasing a final plat for recording, public improvements that support the development must be either accepted as final by the City or ensured by a performance guarantee in the appropriate amount and form. The performance guarantee ensures the timely completion of the work and that the work is completed in accordance with the approved plans. The requirements for a performance guarantee are provided in City Code Chapter 156, Article VII, Improvement Guarantees.

15.3 Maintenance Guarantees

A maintenance guarantee is required for all improvements, constructed by an owner/developer, that are turned over to the City prior to the completion of a one-year, minimum, warranty period. The maintenance guarantee protects the City against defects and faults in the materials or workmanship that may occur after the work is completed. The requirements for a maintenance guarantee are provided in City Code Chapter 156, Article VII, Improvement Guarantees.

15.4 Partial Release of Guarantees

The partial release of performance guarantees for work that will be owned and maintained by others shall be completed in accordance with City Code Chapter 156, Article VII, Improvement Guarantees.

15.5 Final Paving Course and Pavement Markings

The required schedule for the completion of the final paving course and pavement markings held under a performance guarantee shall be in accordance with City Code Chapter 156, Article VII, Improvement Guarantees.

16. Project Permitting

16.1 Clearing Permit

A project that disturbs one acre or more is required to have approval prior to clearing the property. Requirements for a land clearing permit are provided in City Code Chapter 154 Landscaping and Land Clearing Code, Article III Land Clearing. The process for completing a clearing permit application follows:

(a) Submit the following information to the Planning and Zoning Department:

(1) A completed Planning and Zoning Department compliance form requesting a clearing permit.

(2) The approved land clearing plan that is signed and sealed by a Florida Registered Engineer

(3) Completed tree removal permit application and payment of the permit application fee, as required. The tree removal permit application and current fee may be obtained from the Planning and Zoning Department.

(4) Upland mitigation fee, if required—for current fee amount, refer to the Planning and Zoning Department.

(b) The Planning and Zoning Department will review the compliance package and once it is found to be sufficient and in compliance with the approved plans, the Planning and Zoning Department will forward the packet to the Public Works Department.

(c) Submit the following items, as one application package, to the Public Works Department. If submitted electronically, please upload to Project Fusion at https://fusion.cityofpsl.com/ or via email sent to the Public Works Department at engpw@cityofpsl.com in PDF format and include "Clearing Permit Application" along with the project name and City's project number in the subject line. If files are larger than ten MB please upload files to the FTP site https://submit.cityofpsl.com/

(1) A completed Construction Permit Application found in Appendix A.

(2) The approved land clearing plan signed and sealed by a Florida Registered Engineer.

(3) The approved SWPPP signed and sealed by a Florida Registered Engineer.

(4) Documentation of plan approval from the Community Development District (if applicable).

(5) A copy of the approved SFWMD permit, if applicable.

(6) For projects that disturb one acre or more, submit a copy of the NOI submitted to the FDEP.

(7) A copy of the approved USACE permit, if applicable.

(8) Electronic PDF files of the items listed above on a CD; or submitted via Project Fusion or email to engpw@cityofpsl.com.

(d) Install perimeter sediment and erosion and turbidity controls.

(e) Request an onsite meeting by completing the Preconstruction Meeting Request Form (Appendix A) and submitting to engpw@cityofpsl.com. The responsible authority (per NOI), the general contractor, and the EOR will need to attend the meeting. An SFWMD representative, Community Development District representative, and Florida Fish and Wildlife Conservation representative should attend the meeting if available.

(f) After completion of a satisfactory inspection of the perimeter sediment and turbidity controls (occurs along with the preconstruction meeting), onsite meeting, and review of the complete application package, a clearing permit will be issued to the applicant by the Public Works Department.

(g) The total time to process the clearing permit application varies with an average of ten working days for both departments to review the information, hold the site meeting and issue the permit. Applicants are cautioned that the actual time frame may be different than the average. A better project specific estimate for the time to receive a clearing permit may be obtained by calling the project reviewer.

(h) Once issued, the applicant shall have the clearing permit available at the location of the work during working hours. The work shall be completed in accordance with the approved clearing permit, specifications, and sediment and erosion control plan.

(i) A clearing permit is void if inspections have not occurred within six months of the permit issuance or inspections have not occurred within a period of six months. A new permit and payment of the review fee is required if a permit is voided.

16.2 Mass Grading Permit

An active development order (such as an approved site plan, plat or building permit) in the construction phase of development or an approved PUD or DRI that desires to create lakes, detention areas, swales, ditches, or other such rough grading as shown on the approved master plan may obtain approvals for clearing and mass grading. The process for completing a clearing and mass grading permit application follows:

(a) Submit the following information to the Planning and Zoning Department:

(1) A completed Planning and Zoning Department compliance form requesting a clearing and mass grading permit.

(2) The approved land clearing plan that is signed and sealed by a Florida registered engineer

(3) The approved mass grading plan that is signed and sealed by a Florida registered engineer

(4) Completed tree removal permit application and payment of the permit application fee, as required. The tree removal permit application and current fee may be obtained from the Planning and Zoning Department.

(5) Upland mitigation fee, if required—for current fee amount, refer to the Planning and Zoning Department.

(b) The Planning and Zoning Department will review the compliance package and once it is found to be sufficient and in compliance with the approved plans, the Planning and Zoning Department will forward the packet to the Public Works Department.

(c) Submit the following items, as one application package, to the Public Works Department. If submitted electronically, please upload to Project Fusion at https://fusion.cityofpsl.com/ or via email sent to the Public Works Department at engpw@cityofpsl.com in PDF format and include "Clearing Permit Application" along with the project name and City's project number in the subject line. If files are larger than ten MB, please upload files to the FTP site https://submit.cityofpsl.com/.

(1) A completed Construction Permit Application found in Appendix A.

(2) The approved land clearing plan signed and sealed by a Florida registered engineer.

(3) The approved SWPPP signed and sealed by a Florida registered engineer.

(4) The approved mass grading plan that is signed and sealed by a Florida registered engineer.

(5) Documentation of plan approval from the Community Development District (if applicable).

(6) A copy of the approved SFWMD permit, if applicable.

(7) For projects that disturb one acre or more, submit a copy of the NOI submitted to the FDEP.

(8) A copy of the approved USACE permit, if applicable.

(9) Electronic PDF files of the items listed above on a CD or submitted via email to engpw@cityofpsl.com.

(d) Install perimeter sediment and erosion and turbidity controls.

(e) Request an onsite meeting by completing the Preconstruction Meeting Request Form (Appendix A) and submitting to engpw@cityofpsl.com. The responsible authority (per NOI) the general contractor, and the EOR will need to attend the meeting. An SFWMD representative, Community Development District representative, and Florida Fish and Wildlife Conservation Commission representative should attend the meeting if available.

(f) After completion of a satisfactory inspection of the perimeter sediment and turbidity controls (occurs along with the preconstruction meeting), onsite meeting, and review of the complete application package, a clearing and mass grading permit will be issued to the applicant by the Public Works Department.

(g) The total time to process the clearing and mass grading permit application varies with an average of ten working days for both departments to review the information, hold the site meeting and issue the permit. Applicants are cautioned that the actual time frame may be different than the average. A better project specific estimate for the time to receive a clearing permit may be obtained by calling the project reviewer.

(h) Once issued, the applicant shall have the clearing and mass grading permit available at the location of the work during working hours. The work shall be completed in accordance with the approved clearing permit, specifications, mass grading plans, and sediment and erosion control plan.

(i) A clearing and mass grading permit is void if inspections have not occurred within six months of the permit issuance or inspections have not occurred within a period of six months. A new permit and payment of the review fee is required if a permit is voided.

16.3 Site Work Permit

The site work permit is required for the construction of site work associated with new development or improvements to existing developments. Site work includes the work necessary to construct drainage, stormwater, roadway, parking lots, etc. The process for completing a site work permit application follows:

(a) Submit the following information to the Planning and Zoning Department:

(1) A completed Planning and Zoning Department compliance form requesting a site work permit.

(2) One set (folded) 24- x 36-inch signed and sealed Civil/Site plans (paving, grading, drainage, SWPPP, and landscaping/irrigation, as appropriate).

(3) One approved site plan 24 x 36-inch.

(4) One CD or USB flash drive containing all items submitted.

(b) The Planning and Zoning Department will review the compliance package and once it is found to be sufficient and in compliance with the approved plans, the Planning and Zoning Department will forward the packet to the Public Works Department.

(c) Submit the following items, as one package, to the Public Works Department. If submitted electronically, please upload to Project Fusion https://fusion.cityofpsl.com/ or via email sent to engpw@cityofpsl.com in PDF format and include "Site Work Permit Application" along with the project name and City's project number in the subject line. If files are larger than ten MB please upload files to the FTP site https://submit.cityofpsl.com/.

(1) Three sets (folded) 24- x 36-inch signed and sealed Civil/Site plans (paving, grading, drainage, SWPPP, and landscaping/irrigation, as appropriate).

(2) A completed Construction Permit Application found in Appendix A.

(3) Calculation of the Stormwater ERU (Appendix A) with signature of the engineer and owner.

(4) An itemized cost estimate for the total site work signed and sealed by the EOR, or a copy of the contractor's bid with a letter from the EOR certifying that the bid is acceptable for the project.

(5) Documentation of plan approval from the Community Development District (if applicable).

(6) A copy of the approved SFWMD Permit for this project (if applicable).

(7) For projects that disturb one acre or more, a copy of the NOI submitted to the FDEP.

(8) For projects that disturb one acre or more a SWPPP.

(9) A copy of the approved USACE permit, if applicable.

(10) A copy of approved driveway permit from FDOT, County, or other Agency, as appropriate.

(d) Install perimeter sediment and erosion and turbidity controls.

(e) Request an onsite meeting by completing the Preconstruction Meeting Request Form (Appendix A) and submitting to engpw@cityofpsl.com. The responsible authority (per NOI), if possible, the general contractor, and the EOR will need to attend the meeting. An SFWMD representative, Community Development District representative, and Florida Fish and Wildlife Conservation Commission representative should attend the meeting if available.

(f) The Public Works Department will review the package, calculate the site work permit fee, and forward the fee amount to the applicant. Site work permit fees are based upon a percentage of the total site work cost plus the fees for culverts, traffic signals, or pedestrian lights, or street lights as provided in the fee schedule found in City Code Section 57.01.

(g) The applicant shall remit the site work permit fee. The fee may be paid with cash, check, or credit card. The fee is nonrefundable.

(h) After completion of a satisfactory inspection of the perimeter sediment and turbidity controls (occurs along with the preconstruction meeting), onsite meeting, review of the complete application package, and payment of the fee, the applicant will be notified by the Public Works Department to pick up the site work permit and the compliance form.

(i) The total time to process the site permit application varies with an average of ten working days for both departments to review the information, hold the site meeting and issue the permit. Applicants are cautioned that the actual time frame may be different than the average. A better project specific estimate for the time to receive a site work permit may be obtained by calling the Public Works Department prior to submittal.

(j) Once issued, the applicant shall have the site work permit available at the location of the work during working hours. The work shall be completed in accordance with the approved construction plans.

(k) A site work permit is void if inspections have not occurred within six months of the permit issuance or inspections have not occurred within a period of six months. A new permit and payment of the review fee is required if a permit is voided.

16.4 Driveway/Culvert Permit

Developments that obtain a site work permit do not require a separate driveway/culvert permit. For projects where the modification of a driveway/culvert is the only work to be completed, a driveway/culvert permit is required. Requirements for a driveway permit are provided in City Code Chapter 54 Rights-of-Way, Article III Driveway Permit. The process for completing a driveway/culvert permit application follows:

(a) Submit the following information to the Public Works Department. If submitted via email, please send to engpw@cityofpsl.com in PDF format and include "Driveway/Culvert Permit Application" along with the project name in the subject line. If files are larger than ten MB please upload files to the FTP site https://submit.cityofpsl.com/

(1) A completed driveway/culvert permit application found in Appendix A.

(2) One 11- by 17-inch signed and sealed Civil/Site plans.

(b) Payment of the driveway/culvert permit fee as provided in the fee schedule found in City Code Section 57.01. The fee may be paid with cash, check or, credit card. The fee is nonrefundable.

(c) After satisfactory review of the complete application package and payment of the fee, a driveway/culvert permit will be issued to the applicant by the Public Works Department.

(d) The total time to process the driveway/culvert permit application varies with an average of five working days to review the information and issue the permit. Applicants are cautioned that the actual time frame may be different than the average. A better project specific estimate for the time to receive a driveway/culvert permit may be obtained by calling the Public Works Department prior to submittal.

(e) Once issued, the driveway/culvert permit shall be available at the location of the work during working hours. The work shall be completed in accordance with the approved construction plans.

(f) Satisfactory form board and final inspections are required to close out the permit.

(g) A driveway permit is void if inspections have not occurred within six months of the permit issuance or inspections have not occurred within a period of six months. A new permit and payment of the review fee is required if a permit is voided.

16.5 Right-of-Way Permit

A right-of-way permit is required for any excavation or work within the City's right-of-way as provided by City Code Chapter 54 Rights-of-Way, Article II Right-of-Way Permit. Please note that the construction of driveways within the city right-of-way is covered under a driveway/culvert permit or commercial site work permit rather than right-of-way permit. The process to complete a right-of-way permit application follow:

(a) Submit the following information to the Public Works Department. If submitted electronically upload to Cobra Public at https://cobrapublicweb.cityofpsl.com/ in PDF format and include "Right-

of-Way Permit Application" along with the project name in the subject line. If files are larger than ten MB please upload files to the FTP site https://submit.cityofpsl.com/.

(1) A completed right-of-way permit application found in Appendix A.

(2) Vicinity map.

(3) Excavation plan.

(4) Certificate of insurance in accordance with City Code Chapter 54 Rights-of-Way, Article II Right-of-Way Permit.

(5) Construction Surety in accordance with City Code Chapter 54 Rights-of-Way, Article II Right-of-Way Permit.

(6) Maintenance of traffic plan in accordance with FDOT guidelines if traffic is interrupted or if any roads or sidewalks will be closed.

(b) After a satisfactory review of the complete application package, a right-of-way permit will be issued to the applicant by the Public Works Department via email. Typically, the permit is ready within five working days; however, the time to process the permit is highly dependent upon staffing levels and work load and the time will fluctuate.

(c) A right-of-way permit is void if inspections have not occurred within twelve months of the permit issuance or inspections have not occurred within a period of twelve months.

16.6 Revocable Encroachment Permit

The Revocable Encroachment Permit allows encroachments into the twenty-foot-wide easements along drainage rights-of-way for certain limited uses. These uses are limited to removable structures which meet the required zoning setbacks as provided in Table 4-1. The requirements of a revocable encroachment permit are provided in City Code Chapter 55 Easements, Article III Revocable Encroachment Permits. The process to complete a revocable encroachment permit application is as follows:

(a) Obtain and complete a Revocable Encroachment Permit Application (Appendix A) and gather the required submittal documentation noted on the application.

(b) Submit the application and supporting documentation to the Public Works Department.

(c) If submitted via email, please send to engpw@cityofpsl.com in PDF format and include "Revocable Encroachment Permit Application" along with the project name and City's project "p" number, if applicable, in the subject line. If files are larger than ten MB please upload files to the FTP site https://submit.cityofpsl.com/.

(d) The Public Works Department will process and review the application. If approved by the City Engineer, the application and all exhibits will be recorded in the St. Lucie County Public Records.

16.7 Road/Lane Closure Request

A road/lane closure request is required for work that will interrupt the flow of traffic on City-owned and maintained streets or sidewalks. Requirements for a road/lane closure request are provided in City Code Chapter 54 Rights-of-Way, Article VII Road, Lane and Sidewalk Closure Permits . Additionally, the request may be extended by sending an email request or calling to advise of the reason and time for the extension. The process to complete a road/lane closure request is as follows:

(a) Submit the following information to the Public Works Department via email or in person. If submitted via email, please send to rdclosure@cityofpsl.com in PDF format and include "Road/Lane Closure Request" along with the project name in the subject line. If files are larger than ten MB please upload files to the FTP site https://submit.cityofpsl.com/.

(1) A completed road/lane closure request found in Appendix A or https://www.cityofpsl.com/government/departments/public-works/commercial-residential-review-permitting/commercial-residential-forms.

(2) Vicinity map.

(3) Detour plan, if appropriate.

(4) Maintenance of traffic plan in accordance with FDOT guidelines.

(b) After a satisfactory review of the application package, the road/lane closure request will be processed by the Public Works Department. Notification will only be provided to the requestor if additional information is needed or if the request is denied.

17. Construction Standards

17.1 General

Construction activities are highly visible and have the potential to significantly impact the public. It is very important that the site is maintained in a safe and orderly manner and that the work is conducted in a manner to minimize impacts to residents. This chapter provides information on construction standards for projects within the City.

17.2 Utility Locates

At least two days prior to work, contact Sunshine One Call of Florida at 811 or sunshine811.com for location of utilities within rights-of-ways and/or easements.

17.3 Work Hours

Work hours shall be from 7:00 am to sundown in accordance with City Code Chapter 94, unless a permit authorizing work to extend beyond this time is approved. A permit allowing the extension of work hours is issued by the Port St Lucie Police Department.

17.4 Site Maintenance

The work area shall be maintained to ensure that the site and surrounding area is maintained in a neat and orderly manner by removing litter, managing stockpiles and equipment, mowing regularly, maintaining roadways that access the site, and using dust and noise control measures.

17.5 Vertical Datum

Unless otherwise approved, the vertical datum shall reference NAVD of 1988. The reason for this is that in rare circumstances, such as the development of a new phase under a previously permitted project using the NGVD, the use of the NGVD may be warranted and accepted by the City. The datum shall be clearly designated on the cover and note sheet of the survey, plans, calculations, etc.

17.6 Maintenance of Traffic

(a) The contractor shall, at all times, maintain traffic as specified in this chapter. When deemed necessary in the interest of public safety, the City Engineer, Chief of Police, Public Works Director or their designee, has the right to require that the work is stopped and traffic operations are resumed.

(b) Maintaining traffic flow during construction or maintenance activities in or adjacent to roadways requires the following:

  (1) Work shall be scheduled to keep traffic delays to a minimum.

  (2) Unless otherwise provided in the road closure permit, all roads and sidewalks shall be kept open to all traffic by the permittee. If a sidewalk is approved for temporary closure, a continuous ADA compliant pathway shall be required to allow safe passage around the work area.

  (3) The provision and maintenance of barricades, temporary approaches, warning signs, delineators, flagmen, pilot cars, or other such traffic maintenance devices shall be in accordance with FDOT and the MUTCD.

(4) All expenses for preparing, implementing, and maintaining the MOT plan shall be borne by the permittee.

(5) Materials or equipment at the work site shall not be located within clear zones or impede the sight or passage of vehicular or pedestrian traffic.

(6) Pedestrians shall be given adequate warning of hazardous areas in and about the construction project.

a. Where pedestrian activity is low, it is desirable to direct pedestrians to the opposite side of the street in advance of the work area. Signs shall be used in conjunction with barricades/longitudinal control devices for this purpose.

b. In areas where the pedestrian volume is high and the normal passage area becomes part of the work area, the contractor shall provide an alternate or temporary ADA compliant pathway.

(7) Excavations and/or trenches which cannot be properly restored, including the placement of the final surface course of asphalt, prior to opening to traffic by the end of the work period, shall be bridged to provide for unobstructed traffic flow.

(8) Steel Plates used to bridge excavations or trenches shall be subject to the approval of the City Engineer:

a. Contractor shall submit a plan designed and signed/sealed by a professional structural engineer licensed to practice in the state of Florida.

b. Steel plates shall be pinned to the roadway.

c. Trench or excavation walls shall have proper shoring to prevent cave-ins and to adequately support the steel plates and traffic loads and shall be included as part of the structural engineer's design.

d. Contractor shall install "Steel Plate Ahead" signs in advance of work area. These signs shall be maintained for the entire duration.

e. The use of steel plates shall not exceed fourteen days, unless approved otherwise by the City Engineer.

17.7 Abatement of Erosion and Water Pollution

(a) Sediment is solid, small particle material that may include organic and non-organic substances and debris. Erosion is the process of transporting sediment from one location to another location by air or water. Erosion during and immediately following construction is a major contributor to siltation and the conveyance of organic debris and nutrients to water bodies. Siltation reduces the flowage and holding capacity of stormwater facilities (pipes, structures, swales, canals, detention areas, etc.) and organic debris and nutrients reduces the water quality of lakes and the river.

(b) Stormwater control measures to minimize the impact of this erosion sedimentation shall be incorporated on all projects in the City. For projects that disturb one acre or more, a detailed description of these measures shall be included in the SWPPP which is submitted as part of the construction plans. Erosion and sediment controls shall be provided, used and maintained in accordance with the NOI, approved construction plans, SWPPP, and NPDES requirements. Additionally, the following requirements shall be met:

(1) The "operator" of any construction project that disturbs one acre or more, or is part of the larger common plan of development or sale which disturbs one acre or more, is required to obtain the

proper stormwater permit from the FDEP and to comply with all the terms and conditions of the permit.

(2) The City Engineer, or their designee, is authorized to issue stop work orders on any site that is not in compliance with the applicable stormwater permits for SFWMD, FDEP NPDES, etc. or that has failed to obtain said permit and upon issue of such stop work order all site work affected thereby shall immediately cease until authorized by the City Engineer.

(3) No land-disturbing activity shall occur in, adjacent to, or near wetlands, or the shoreline of the North Fork of the St. Lucie River unless a buffer zone, as described in City Code Section 157.05 is provided along the margin of the watercourse.

(4) BMPs shall be properly used and maintained.

a. Perimeter sediment and erosion control devices shall be installed around the perimeter of the site to prevent sediment from leaving the site boundary.

b. A construction entrance shall be installed and maintained to prevent sediment from entering public roadways.

c. Inlet protection is required to prevent sediment from entering any storm system.

d. Turbidity barriers or other such sediment and control devices shall be used adjacent to wetlands or other surface waters.

(5) The angle for graded slopes and fills shall not be greater than the angle which can be retained by vegetative cover, or other adequate erosion-control, devices or structures.

(6) Groundcover sufficient to restrain erosion must be planted or otherwise provided within seven calendar days on portions of cleared land upon which further construction activity is not being undertaken.

(7) Temporary seeding or sodding, adequate covering, or chemical application, on exposed soils, including stockpiles of topsoil, sand, or other construction fill, shall be used where delays in construction of more than seven calendar days are anticipated.

(8) Stabilize newly created slopes in or adjacent to wetlands or other surface waters to prevent erosion and turbidity.

(9) Maintain construction equipment to minimize the amount of oils, grease, antifreeze, gasoline or other such vehicle fluids from release into the environment.

(10) Control the release or discharge from stockpile areas.

(11) Inspections as per the SWPPP, shall be once every seven days and within twenty-four hours of a 1/2" of rain. Any necessary remedies shall be performed within a reasonable time depending upon the severity of the issue.

(12) Dewatering operations shall meet the following requirements:

a. Dewatering permits from SFWMD shall be obtained prior to dewatering.

b. Turbid water, water greater than twenty-nine NTU above natural background conditions, shall not be discharged from the project site.

17.8 Clearing and Grubbing

Requirements for clearing and grubbing and the removal of the resultant products and debris within construction areas are identified below.

(a) Dust control is mandatory.

(b) All appropriate permits and approvals shall be obtained prior to start of activity.

(c) Existing trees, vegetation, and sensitive areas that are designated to remain shall be protected in accordance with Chapters 154 and 157 of the City Code.

(d) Sediment and erosion controls shall be installed and inspected prior to clearing and grubbing operations.

(e) Clearing and grubbing shall consist of the removal and disposal of all timber, brush, stumps, roots, grass, weeds, sawdust, rubbish, buildings, septic tanks, pipe, foundations and all other deleterious material resting on or protruding through the surface.

(f) All clearing and grubbing shall be in accordance with FDOT Standard Specifications.

(g) Wells to be abandoned shall be done so in accordance with FDEP and SFWMD requirements.

(h) In all areas of roadway construction and embankment, trees, stumps, roots, and other deleterious materials shall be removed to a depth of not less than one foot below the subgrade.

(i) Materials from clearing and grubbing operations shall be disposed of in accordance with current City, County, State and Federal Regulations.

17.9 Earthwork

Earthwork shall include all excavation, removal of unsuitable material, provision of suitable material, shaping, filling, sloping and finishing necessary for the construction, preparation and completion of all embankments, subgrades, shoulders, ditches, slopes, gutters, intersections, approaches, private entrances, driveways, parking lots and other works all in accordance with the required alignment, grade and cross sections shown on the plans or as directed by the City Engineer. All earthwork shall comply with approved plans and FDOT *Standard Specifications*.

17.10 Roadway

(a) Preparation, materials, construction and testing of roadway subgrade, base, bituminous treatments, surface courses, geonet, geofabric, and concrete pavement shall meet the requirements of FDOT S*tandard Specifications for Road and Bridge Construction*.

(b) With the exception of limited applications, the use of concrete pavement on City-owned and maintained facilities is not routinely approved.

(c) The use of graded, crushed concrete base material is acceptable on privately owned and maintained parking areas with a certification from the EOR that the materials are of a satisfactory gradation, free of deleterious materials, and will achieve a fine to coarse aggregate mixture that will support the intended use. The use of graded, crushed concrete base material is not acceptable on City-owned or maintained roadways or projects.

17.11 Sidewalks

Sidewalks, unless otherwise approved by City Council, shall be constructed to the following standards:

(a) Designed and constructed to conform to ADA standards, Section 522 of the FDOT Standard Specifications, FDOT Standard Plans Index Series 522-XXX. A tooled joint is the only acceptable method of constructing an expansion joint. Saw cutting expansion joints is not permitted.

(b) Shall be designed with a maximum cross slope of 1.5 percent.

(c) Shall meet FDOT Specifications which call for 3,000 psi. with a minimum thickness of four inches, except across driveways, maintenance areas, curb ramps or within 5 feet of roadways where the minimum thickness is six inches.

(d) Sidewalks and accessible pathways shall not be constructed using brick.

(e) Sidewalk repairs shall be a minimum of four feet in length.

17.12 Restoration and Stabilization

(a) All areas disturbed by construction shall be restored and stabilized to a condition as good as or better than the original condition in accordance with the approved plans, applicable permits, and NPDES requirements.

(b) For construction that involves the crossing or disturbance of a swale the contractor shall be responsible for restoration of all disturbed swale areas. Furthermore, a new or replacement plastic swale liner shall be installed as specified by approved plans.

(c) The following areas shall be properly sodded with a satisfactory performance turf (sod) and shall be the same kind as the existing sod:

(1) All retention/detention basins.

(2) All exposed areas within pubic rights-of-way.

(3) Areas with slopes steeper than 4:1 (horizontal: vertical).

(4) A three-foot-wide strip of sod (three rows), unless otherwise approved, shall be placed adjacent to all curbs, walks and pavements.

(5) A ten-foot-wide strip of sod shall be placed adjacent to any drainage right-of-way.

(6) Swales.

17.13 Irrigation

(a) The City uses a central control system for monitoring and controlling irrigation systems within road rights-of-way. For that reason, components of the irrigation system installed within city-maintained road rights-of-way shall be compatible with this system and meet the requirements set forth in this chapter and Appendix F.

(b) For situations not specifically addressed by these specifications, the design, materials, and installation shall meet or exceed the Florida Building Code, Plumbing, Appendix 'F', Florida Irrigation Society Irrigation Design Standards, and the American Society of Irrigation Consultants requirements. In the event there is a conflict among these standards, the most conservative and restrictive shall govern.

(c) The supply source of irrigation quality water may be from lakes, canals, reuse water facilities, or designated groundwater wells.

18. Project Inspection

18.1 General

This chapter presents the required inspections for permits issued by the City. All other inspection requirements, types, frequency, and standards shall be in accordance with the governing specifications.

18.2 Pavement Inspections

Testing for the roadway section shall be in accordance with FDOT and conducted by a Florida certified laboratory. The following are minimum testing requirements; however, the City reserves the right to request additional testing for due cause.

(a) Subgrade – Testing for the thickness, bearing value and density shall be randomly selected locations within each five-hundred-foot interval (maximum) for density or one-thousand feet per LBRs along the length of the roadway or every six-thousand square feet of parking area. Satisfactory passing test results shall be provided to the City, City's CEI, or EOR for the project prior to proceeding with the base course.

(b) Base - Testing for the thickness and density shall be randomly selected locations within each five-hundred-foot interval (maximum) along the length of the roadway or every six-thousand square feet of parking area. There shall be no less than one test per roadway or parking area. Satisfactory base test results shall be provided to the City, City's CEI, or EOR for the project prior to proceeding with the asphalt or concrete wearing surface.

(c) Asphalt – Roadway and parking area asphalt shall be tested to meet a minimum of ninety-four percent of the maximum laboratory density for the asphalt mix design. Testing may be done by core sampling. Testing shall be at randomly selected locations within each three-hundred-foot interval (maximum) along the length of the roadway or every six-thousand square feet of parking area.

18.3 Site Work Inspections

Inspectors will make scheduled and unscheduled site visits to determine how the work is proceeding. The EOR or a representative is required to schedule required inspections and shall be on site during the following site work inspections:

(a) Drainage: Observation of the pipe and pipe joints, prior to the pipe being backfilled. The City Inspector also observes backfill operations and structure tie-ins.

(b) Concrete: The City Inspector will inspect the overall line/grade of the forms for concrete work outside the limits of the building including sidewalks, pavement, curb and gutter. The City Inspector may also observe the placement of concrete.

(c) Pavement Subgrade: Visual inspection of the compaction and materials and a string line to visually inspect the grade, proof roll, as needed, to ensure that the material is not yielding.

(d) Pavement Base: Visual inspection of the compaction and materials and a string line to visually inspect the grade, proof roll, as needed, to ensure that the material is not yielding.

(e) Asphalt: The City Inspector will observe paving operations and may test temperature of the asphalt mix.

(f) Final: The site work will be inspected for overall condition and conformance to the construction plans. The following items, but not limited to, will be inspected: retention/detention areas, control

structures, drainage structures, pavement surface, pavement markings, signage, sidewalks, site grading and other specifications shown on the plans.

18.4 Traffic Signals and Lighting Inspections

Traffic signal and lighting inspections shall be conducted by the City for all new or modified facilities prior to acceptance.

18.5 Driveway Culvert and/or Swale Inspections

Driveway culvert and/or swale inspections are required for areas that have roadway swale drainage. The swales within the City serve as the collection and conveyance system for the City's drainage system and, for this reason; the City controls modifications to this system. For projects that require a driveway and culvert pipe that crosses a swale and/or modifications to the swale, there are three inspections.

(a) Stakeout Inspection. For this inspection, the City surveys the swale surrounding the development and specifies the horizontal and vertical location of the swale and driveway culvert(s) as well as the culvert size on a cut-sheet. The day after the stakeout is completed; the cut sheet will be available from the Public Works Department. The Contractor shall use this cut sheet to establish the location and grades of the swale and the driveway culvert as well as the size of the driveway culvert.

(b) Driveway Culvert Inspection. Inspection of the driveway culvert prior to backfill, is optional; however, it is strongly recommended as there are minimal tolerances. The driveway culvert tolerances are as follow:

  (1) No tolerance is allowed for culverts that are set too high.

  (2) A one-inch tolerance is allowed for inverts that are set too low.

(c) Final Swale Inspection. City confirms that the following requirements have been met.

  (1) The swale, driveway and culvert(s) are constructed in accordance with the cut sheet.

  (2) Culvert(s) is clear of debris.

  (3) The swale and right-of-way are clear of debris.

  (4) Swale liner installed (where appropriate).

  (5) Ground stabilized, sodded and graded to promote proper drainage.

  (6) Adjacent properties and swales (including the lot(s) directly across the street) are restored to original condition or better.

18.6 NPDES Inspections

Inspections are performed on commercial projects to verify that the project is in compliance with the approved SWPPP and state water quality standards. The frequency of inspections shall occur as stated in the approved FDEP Phase II MS4 Permit for the City.

19. Project Acceptance

19.1 Privately Owned Development Projects

The EOR shall provide the following information prior to the Public Works Department accepting the project and the Building Department issuing a CO. The following documents shall be submitted via email in PDF format to engpw@cityofpsl.com and the email shall include the Project Name and Project # in the subject line. If files are larger than ten MB, please upload files to the FTP site https://submit.cityofpsl.com/.

(a) Satisfactory final inspection report from Public Works Department.

(b) Satisfactory final swale and driveway culvert inspection, if applicable, from Public Works Department.

(c) Letter from SFWMD accepting the Engineer's Construction Completion Certification, if applicable.

(d) Letter of certification from the EOR (signed and sealed).

(e) Electronic copy of the record drawing (both PDF and DWG format).

(f) Inspection test results (density and compaction tests for work within City's right-of-way).

19.2 City-Owned Development Projects

For a capital improvement project, the project closeout documentation shall be in accordance with the requirements of the contract documents. At a minimum, the close out documentation for development projects that will be City-owned shall include:

(a) Deposit of the appropriate maintenance guarantee, if required, in accordance with City Code Chapter 54, Article II, Right-of-Way Permit or City Code Chapter 156, Article VII, Improvement Guarantees.

(b) Satisfactory final inspection report from Public Works Department.

(c) Satisfactory final swale and driveway culvert inspection, if applicable, from Public Works Department.

(d) Letter from SFWMD accepting the Engineer's Construction Completion Certification, if applicable.

(e) Letter of certification from the EOR (signed and sealed).

(f) Electronic copy of the record drawing (both PDF and DWG format).

(g) Inspection test results.

(h) Releases of liens from subcontractors.

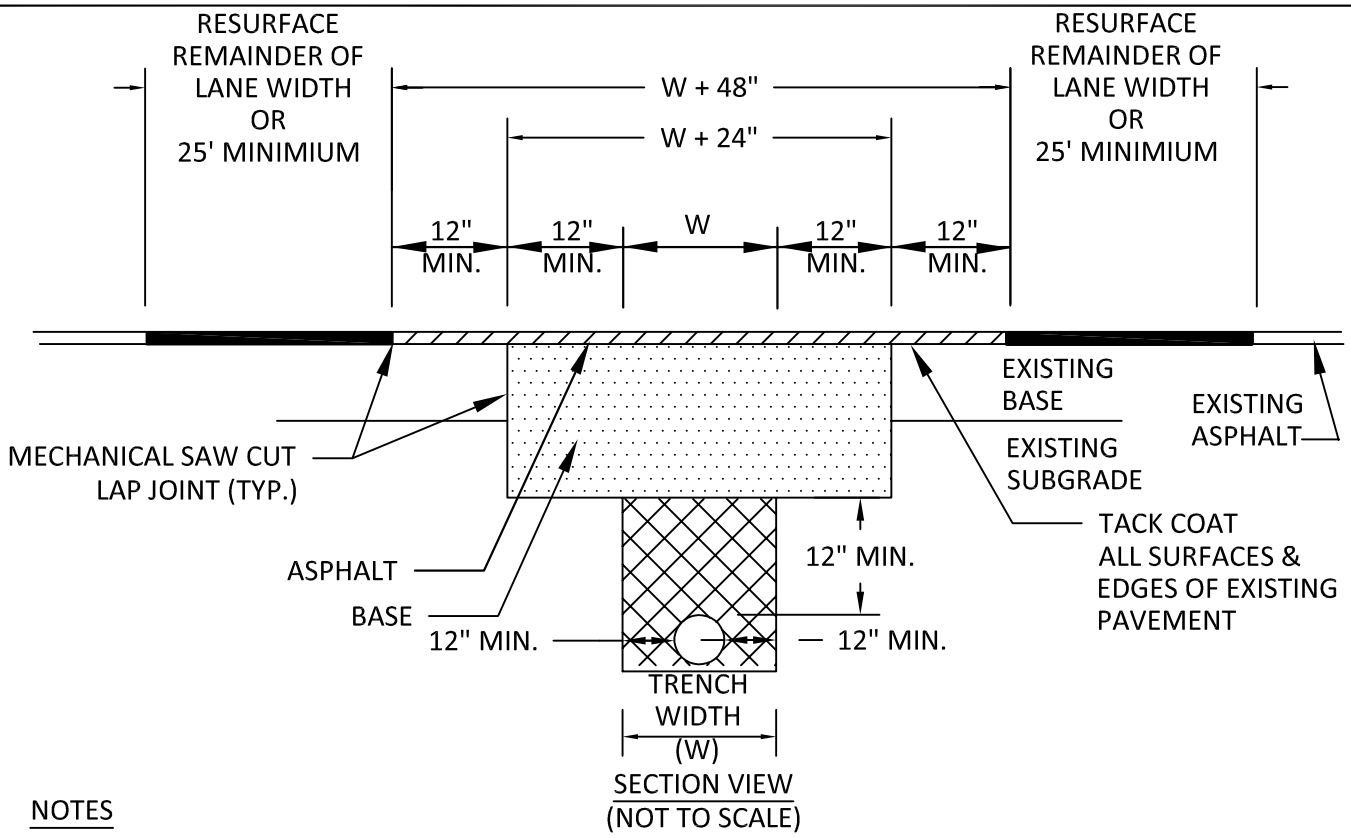
19.3 Roadway Turnover

(a) A request to turn over the ownership and maintenance responsibilities of a roadway that were previously owned and maintained by others may be submitted to the City Engineer. The City Engineer will review the request and prepare a recommendation memo that identifies the reasons for the acceptance, rejection, or need for further information regarding the turnover request. The request, recommendation of the City Engineer, and a draft resolution will be submitted to City Council for review and consideration.

(b) The turnover of roadways, constructed by others, to the City shall follow the procedures outlined in the City Code Section 156.150.

20. Standard Details

- Pavement Restoration
- Swale Liner
- Roadway Section - 2 Lanes Divided and Undivided
- Roadway Section - 4 Lanes
- Roadway Section - 6 Lanes
- Road Construction Plan Notes

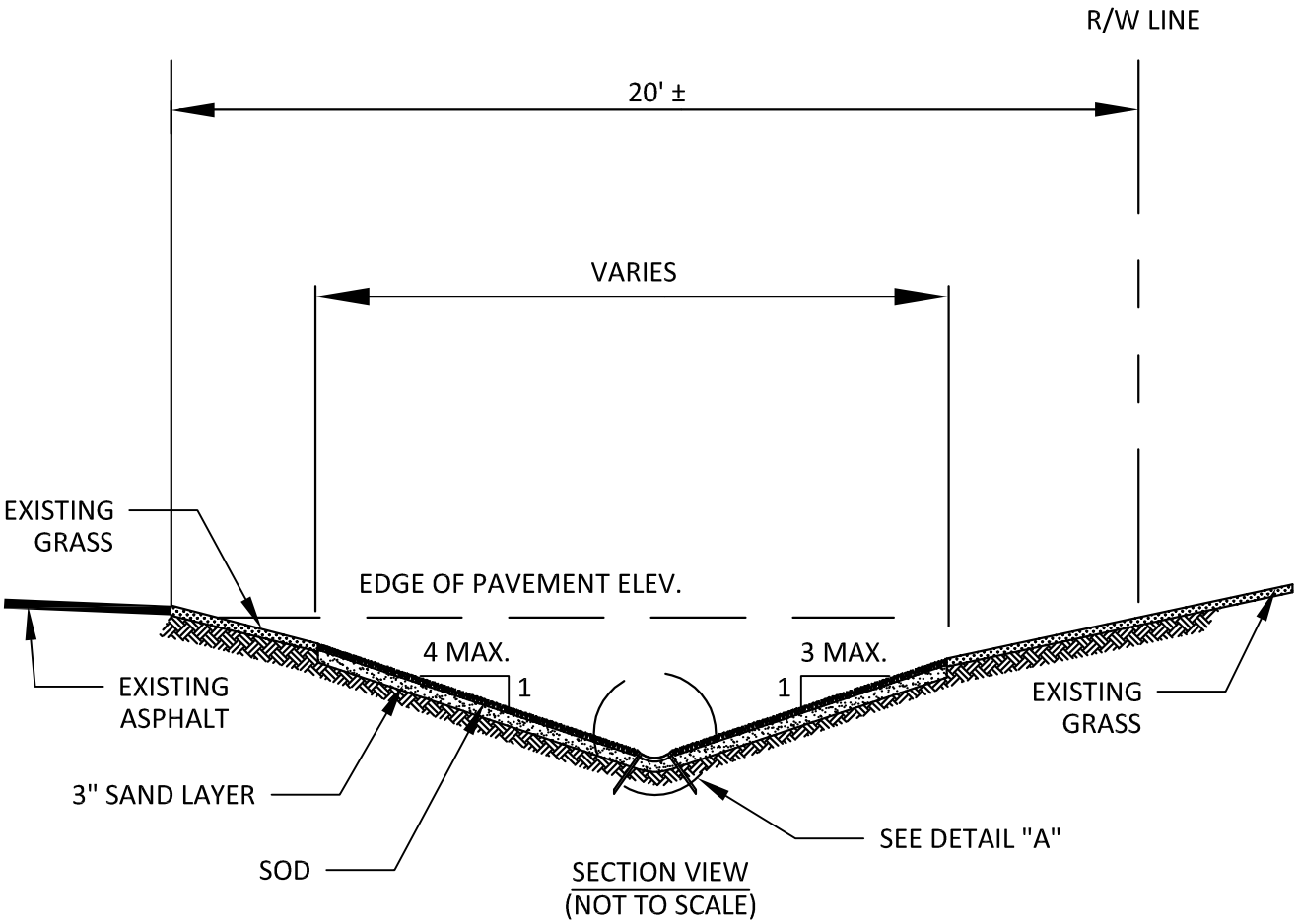


SECTION VIEW
(NOT TO SCALE)

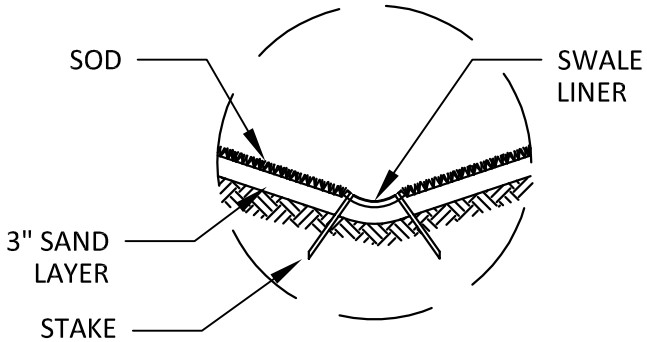
NOTES

1. OPEN CUTTING OF EXISTING PAVEMENT MUST BE APPROVED BY THE PUBLIC WORKS DIRECTOR OR THEIR DESIGNEE
2. ASPHALT: (UNLESS OTHERWISE DIRECTED BY PUBLIC WORKS INSPECTION STAFF)
   MIN. 1.5" SP-9.5 ON LOCAL STREETS
   MIN. 2.5" SP-9.5 ON COLLECTOR ROADWAYS
   MIN. 3.0" SP-9.5 ON ARTERIAL ROADWAYS
3. BASE: (UNLESS OTHERWISE DIRECTED BY PUBLIC WORKS INSPECTION STAFF)
   MIN. 16' COQUINA OR LIMEROCK LBR 100, COMPACTED TO 98% MAX. DENSITY, PER AASHTO T-180, PLACED IN 6' MAX. LIFTS
4. SUBGRADE SHALL BE GRANULAR AND ANGULAR AND SHALL HAVE A MINIMUM LBR OF 40.
5. JOINTS SHALL BE MECHANICALLY SAWED PARALLEL OR PERPENDICULAR TO THE ROADWAY.
6. PERPENDICULAR CUTS SHALL HAVE FULL LANE WIDTH RESURFACING .
7. LONGITUDINAL CUTS SHALL HAVE A MINIMUM OF 25 FEET BEYOND THE SAW CUT RESURFACED. UNLESS OTHERWISE DIRECTED BY PUBLIC WORKS INSPECTION STAFF.
8. WHEN AN ARTERIAL OR MAJOR COLLECTOR STREET IS OPEN CUT WITHIN THE LIMITS OF THE ROADWAY INTERSECTION, THE ENTIRE INTERSECTION SHALL BE RESURFACED.
9. THE CONTRACTOR SHALL DOCUMENT ALL PAVEMENT MARKINGS AND REFLECTIVE PAVEMENT MARKERS (RPMS) PRIOR TO RESURFACING. THE CONTRACTOR SHALL REPLACE PAVEMENT MARKINGS AND RPMS AT THE SAME LOCATIONS UNLESS NOTED OTHERWISE ON THE PLANS. ALL PAVEMENT MARKINGS AND RPMS SHALL BE IN ACCORDANCE WITH FDOT STANDARDS.
10. ASPHALT PAVING OF TRENCH TO BE COMPLETED 30 DAYS PRIOR TO FULL RESURFACING OF LIMITS TO ALLOW FOR SETTLEMENT.

CITY OF PORT ST. LUCIE FLORIDA "A City for All Ages"	**ENGINEERING STANDARDS FOR LAND DEVELOPMENT** **COMMERCIAL, RESIDENTIAL SUBDIVISION, AND CAPITAL IMPROVEMENT PROJECTS**	**UTILITY / ROAD OPEN CUT PAVEMENT RESTORATION**	**DATE: 6/13/2020** **SHEET: 1 OF 1**



SECTION VIEW
(NOT TO SCALE)

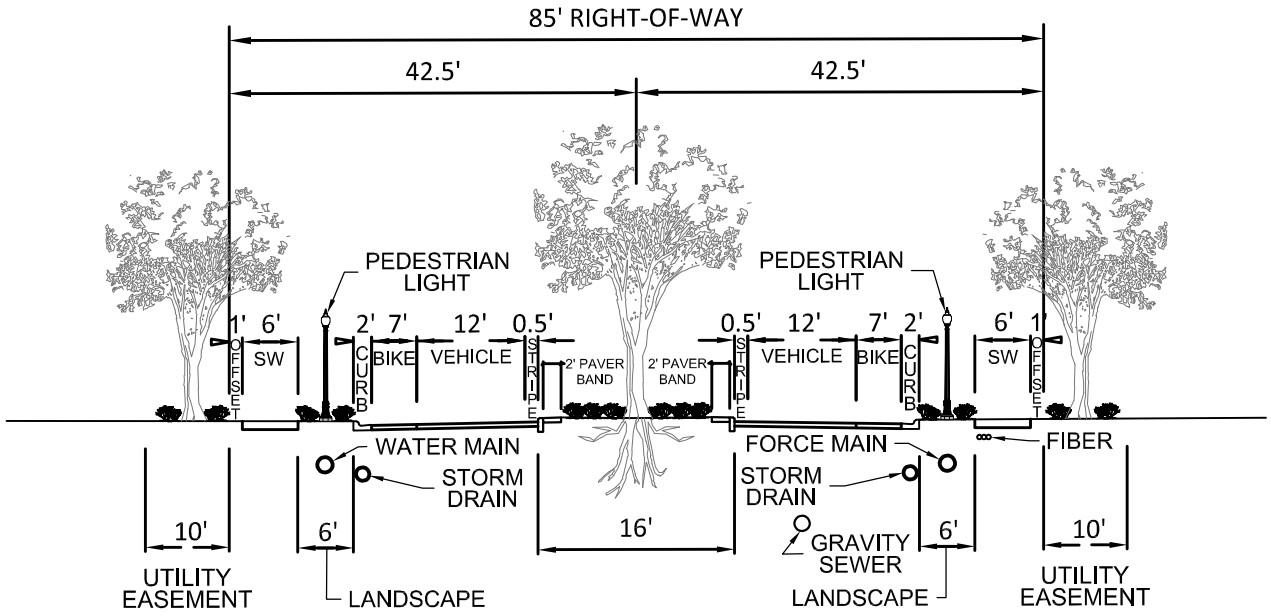


DETAIL "A"
(NOT TO SCALE)

NOTES

1. SWALE LINER: 1/4 SECTION OF 12" ID SMOOTH INNER WALL PERFORATED BLACK POLYETHYLENE PIPE.
2. STAKE AND CAP: 1/2" DIAMETER X 12" LONG PVC WITH CAP THRU LINER AT CORRUGATION AT 2' INTERVALS.
3. PROVIDE A 1-1/2" GAP BETWEEN LINER SECTIONS FOR EXPANSION.
4. SWALE LINER, STAKES, AND CAPS PROVIDED BY THE PUBLIC WORKS DEPARTMENT.

CITY OF PORT ST. LUCIE FLORIDA "A City for All Ages"	**ENGINEERING STANDARDS FOR LAND DEVELOPMENT** **COMMERCIAL, RESIDENTIAL SUBDIVISION, AND CAPITAL IMPROVEMENT PROJECTS**	**SWALE LINER**	**DATE: 6/13/2020** **SHEET: 1 OF 1**

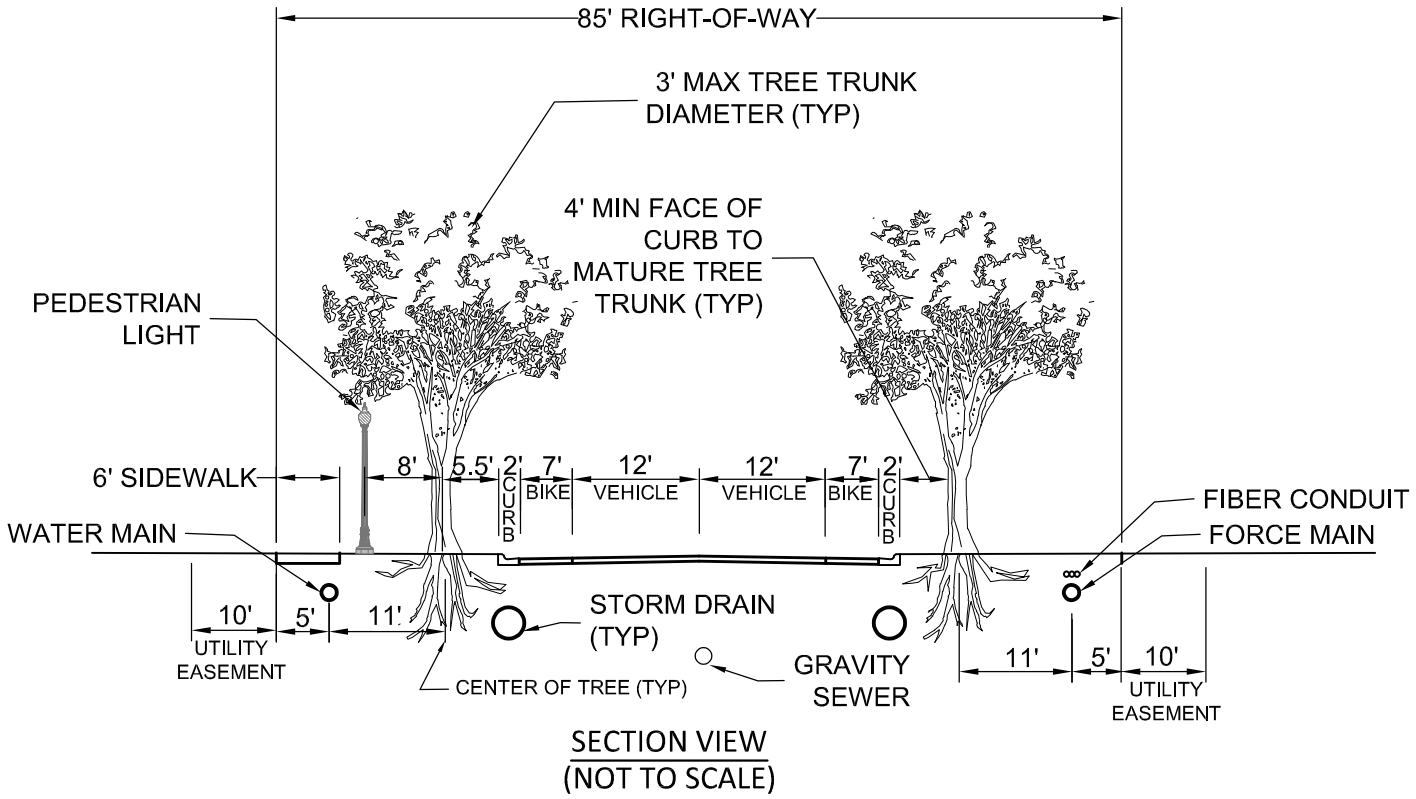


SECTION VIEW
(NOT TO SCALE)

NOTES:

1. MINIMUM REQUIREMENTS ARE SHOWN.
2. 6 FT. SIDEWALK MINIMUM. WHERE SITE CHARACTERISTICS ALLOW & ON A CASE BY CASE BASIS 8 FT. OR WIDER SIDEWALKS SHALL BE REQUIRED.
3. ADDITIONAL RIGHT-OF-WAY MAY BE REQUIRED AT INTERSECTIONS.
4. ALTERNATIVE SECTIONS WILL BE PROCESSED AS A VARIANCE TO THE CITY CODE.
5. ADDITIONAL RIGHT-OF-WAY WILL BE REQUIRED FOR RECLAIM WATER LINES.
6. TREES, WHERE APPLICABLE, SHALL HAVE NON-INVASIVE ROOT SYSTEMS AND A CANOPY THAT HAS A VERTICAL CLEARANCE OF 13'6" AT MATURITY.
7. TREES LOCATED LESS THAN FIVE FEET TO CITY OWNED OR MAINTAINED CURB, PAVEMENT, OR SIDEWALK SHALL HAVE A ROOT BARRIER.
8. F.D.O.T. CLEAR ZONE AND SIGHT DISTANCE REQUIREMENTS SHALL BE MAINTAINED.
9. IRRIGATION FACILITIES ARE NOT SHOWN.
10. PEDESTRIAN LIGHTS AND/OR STREET LIGHTS SHALL BE PROVIDED - SECTION DOES NOT SHOW STREET LIGHTS.

CITY OF PORT ST. LUCIE FLORIDA "A City for All Ages"	**ENGINEERING STANDARDS FOR LAND DEVELOPMENT** **COMMERCIAL, RESIDENTIAL SUBDIVISION, AND CAPITAL IMPROVEMENT PROJECTS**	**ROADWAY SECTION 2-LANE ROAD DIVIDED**	**DATE: 6/13/2020** **SHEET: 1 of 1**



SECTION VIEW
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NOTES:

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2. 6 FT. SIDEWALK MINIMUM. WHERE SITE CHARACTERISTICS ALLOW & ON A CASE BY CASE BASIS 8 FT. OR WIDER SIDEWALKS SHALL BE REQUIRED.
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7. TREES LOCATED LESS THAN FIVE FEET TO CITY OWNED OR MAINTAINED CURB, PAVEMENT, OR SIDEWALK SHALL HAVE A ROOT BARRIER.
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9. IRRIGATION FACILITIES ARE NOT SHOWN.
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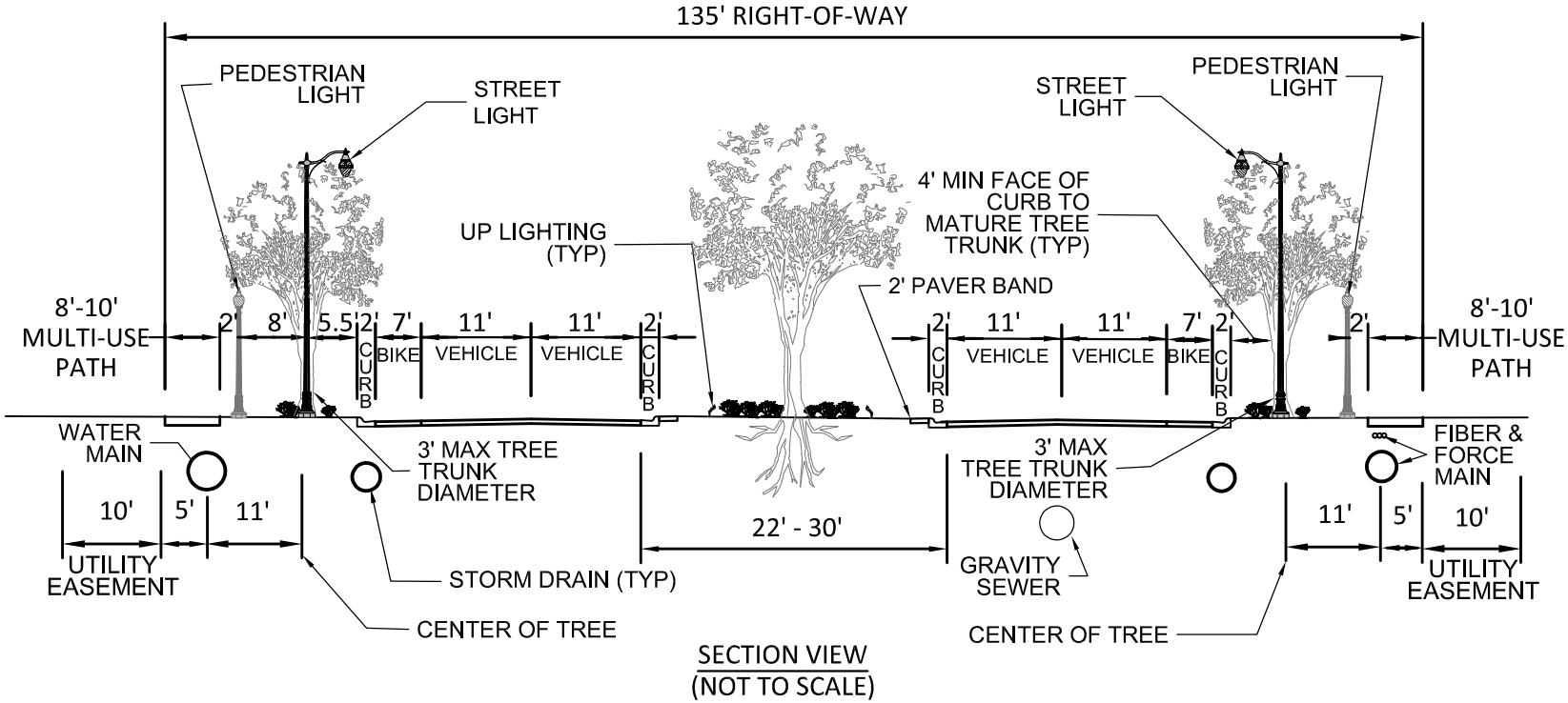
CITY OF PORT ST. LUCIE FLORIDA "A City for All Ages"	**ENGINEERING STANDARDS FOR LAND DEVELOPMENT** **COMMERCIAL, RESIDENTIAL SUBDIVISION, AND CAPITAL IMPROVEMENT PROJECTS**	**ROADWAY SECTION 2-LANE ROAD UNDIVIDED**	**DATE: 6/13/2020** **SHEET: 1 of 1**

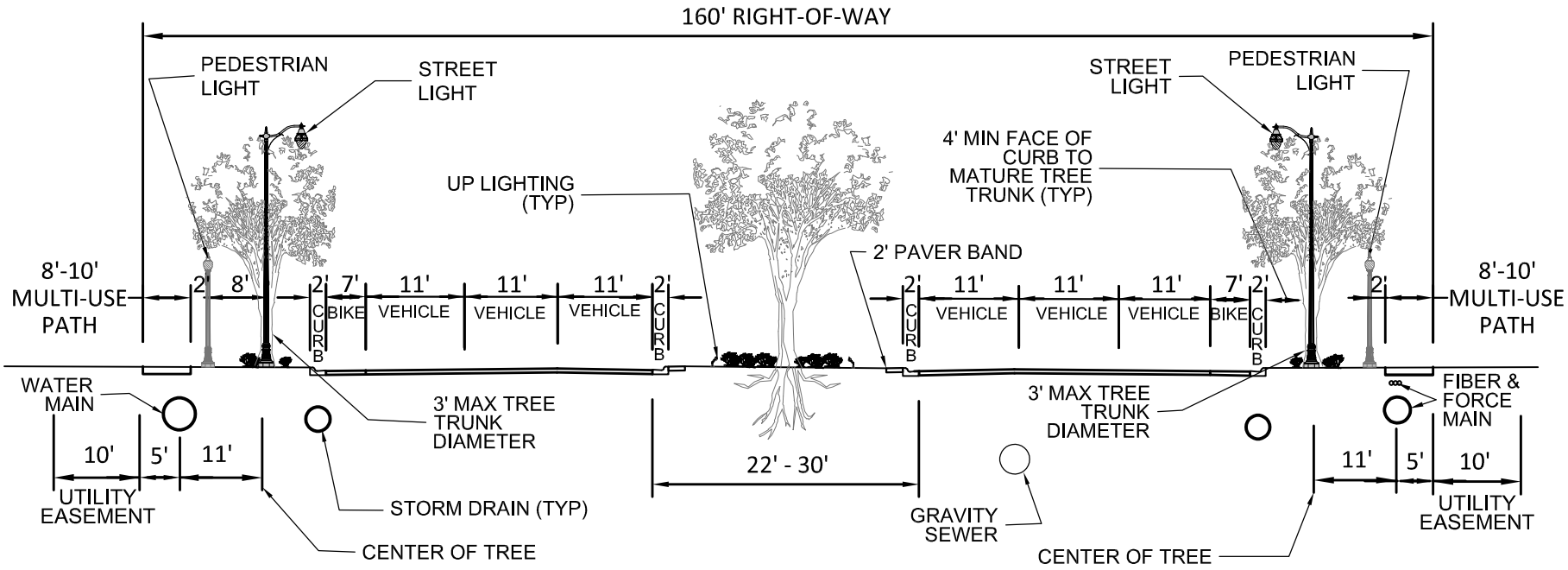


SECTION VIEW
(NOT TO SCALE)

NOTES:

1. MINIMUM REQUIREMENTS ARE SHOWN.
2. 8 FT. or 10 FT. MULTI-USE PATHS ARE REQUIRED. ON A CASE BY CASE BASIS & WHERE SITE CHARACTERISTICS DO NOT ALLOW WIDER SIDEWALKS A 6 FT. SIDEWALK MAY BE CONSIDERED.
3. ADDITIONAL RIGHT-OF-WAY MAY BE REQUIRED AT INTERSECTIONS.
4. ALTERNATIVE SECTIONS WILL BE PROCESSED AS A VARIANCE TO THE CITY CODE.
5. ADDITIONAL RIGHT-OF-WAY WILL BE REQUIRED FOR RECLAIM WATER LINES.
6. TREES, WHERE APPLICABLE, SHALL HAVE NON-INVASIVE ROOT SYSTEMS AND A CANOPY THAT HAS A VERTICAL CLEARANCE OF 13'6" AT MATURITY.
7. TREES LOCATED LESS THAN FIVE FEET TO CITY OWNED OR MAINTAINED CURB, PAVEMENT, OR SIDEWALK SHALL HAVE A ROOT BARRIER.
8. F.D.O.T. CLEAR ZONE AND SIGHT DISTANCE REQUIREMENTS SHALL BE MAINTAINED.
9. IRRIGATION FACILITIES ARE NOT SHOWN.
10. PEDESTRIAN LIGHTS AND/OR STREET LIGHTS SHALL BE PROVIDED - SECTION SHOWS BOTH.

CITY OF PORT ST. LUCIE FLORIDA "A City for All Ages"	**ENGINEERING STANDARDS FOR LAND DEVELOPMENT** **COMMERCIAL, RESIDENTIAL SUBDIVISION, AND CAPITAL IMPROVEMENT PROJECTS**	**ROADWAY SECTION 4-LANE ROAD**	**DATE: 6/13/2020** **SHEET: 1 of 1**



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9. IRRIGATION FACILITIES ARE NOT SHOWN.
10. PEDESTRIAN LIGHTS AND/OR STREET LIGHTS SHALL BE PROVIDED - SECTION SHOWS BOTH.

CITY OF PORT ST. LUCIE FLORIDA "A City for All Ages"	**ENGINEERING STANDARDS FOR LAND DEVELOPMENT** **COMMERCIAL, RESIDENTIAL SUBDIVISION, AND CAPITAL IMPROVEMENT PROJECTS**	**ROADWAY SECTION 6-LANE ROAD**	**DATE: 6/13/2020** **SHEET: 1 of 1**

NOTES

1. FDOT “STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION”, LATEST EDITION, SHALL APPLY TO THE DESIGN AND CONSTRUCTION OF FACILITIES SHOWN ON THIS SET OF PLANS, UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE.

2. FDOT “STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION”, LATEST EDITION, SHALL APPLY TO THE DESIGN AND CONSTRUCTION OF FACILITIES ON THIS SET OF PLANS, UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE.

3. THE FHWA “MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES”, LATEST EDITION, SHALL APPLY TO THE DESIGN AND CONSTRUCTION OF ALL PAVEMENT MARKINGS, SIGNS, REFLECTIVE MARKERS, SIGNALS, TRAFFIC CONTROL DEVICES, ETC. UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE.

4. THE FDOT “MANUAL OF UNIFORM MINIMUM STANDARDS FOR DESIGN, CONSTRUCTION, AND MAINTENANCE FOR STREETS AND HIGHWAYS”, LATEST EDITION, SHALL APPLY TO THE DESIGN AND CONSTRUCTION OF FACILITIES SHOWN ON THIS SET OF PLANS, UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE.

5. THE FDOT "DESIGN MANUAL", LATEST EDITION, SHALL APPLY TO THE DESIGN AND CONSTRUCTION OF FACILITIES SHOWN ON THIS SET OF PLANS, UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE.

(NOTES ARE TO BE INCLUDED ON CONSTRUCTION PLANS FOR ALL ROADWAY PROJECTS)

Appendix A: Applications, Forms, Worksheets

- Abandonment of Easement Application
- Abandonment of Right-of-Way Application
- Commercial Development Review of Traffic Patterns (Policy 19-01)
- Construction Permit Application (clearing and/or mass grading and/or site work)
- Driveway/Swale Permit Application
- Preconstruction Meeting Request Form
- Revocable Encroachment Permit Application
- Right-of-Way and Easement Permit Application
- Road/Lane Closure Request
- Stormwater ERU Calculation Worksheet
- Traffic Calming Request and Petition Form

PLEASE CHECK WITH THE DEPARTMENT, PRIOR TO USING APPLICATION,

TO MAKE SURE THAT THE APPLICATION IS THE MOST RECENT VERSION.

THE MOST RECENT VERSIONS CAN BE FOUND HERE
HTTP://WWW.CITYOFPSL.COM/GOVERNMENT/DEPARTMENTS/PUBLIC-WORKS/COMMERCIAL-RESIDENTIAL-REVIEW-PERMITTING/COMMERCIAL-RESIDENTIAL-FORMS

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT

Abandonment of Easement Application

February 2020

Commercial Project Name: _____

Commercial Project Number (P#): _____

Commercial Project Address: _____

Contact Name: _____

Contact Company: _____

Contact Address: _____

Phone Number: _____

Email Address: _____

Process

- Public Works Department Review
- Utility Engineering Department Review
- Two (2) Council Meetings

Required Submittal Documentation

☐ Application

☐ Written request indicating the reason(s) for the request

☐ Copy of recorded deed

☐ Site Plan/Survey (legal or letter size only)

☐ "No Objection" letters from utility companies (contact list below)

☐ $135.00 Fee - Cash, Check, or Credit Card (checks made payable to: City of Port St Lucie)

Utility Contact Information

Comcast	Mr. Rick Johnson Rick_Johnson@cable.comcast.com	561-402-4513
AT&T	Mr. Ivan Arill Ia7286@att.com	321-388-9719
Florida Power & Light	Mr. Nate Holzmacher Nate.Holzmacher@fpl.com	772-337-7013
Florida City Gas	Ms. Holly Coombs Holly.Coombs@nee.com	321-638-3419

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT

Abandonment of Right-of-Way Application

February 2020

Commercial Project Name: _____

Commercial Project Number (P#): _____

Commercial Project Address: _____

Contact Name: _____

Contact Company: _____

Contact Address: _____

Phone Number: _____

Email Address: _____

Process

- Public Works Department Review
- Utility Engineering Department Review
- Two (2) Council Meetings

Required Submittal Documentation

. Application

☐ Letter of request which clearly demonstrates that the abandonment:
- Is consistent with the Traffic Element of the Comprehensive Plan,
- Will not eliminate access to any property,
- Does not hinder the current or future location of any public or private utility,
- Is not detrimental to the public interest, and
- Provides a positive benefit to the City.

☐ "No Objection" letters from utility companies (contact list below)

☐ $135.00 Fee - Cash, Check, or Credit Card (checks made payable to: City of Port St Lucie)

Utility Contact Information

Comcast	Mr. Rick Johnson Rick_Johnson@cable.comcast.com	772-402-4513
AT&T	Mr. Ivan Arill Ia7286@att.com	321-388-9719
Florida Power & Light	Mr. Nate Holzmacher Nate.Holzmacher@fpl.com	772-337-7013
Florida City Gas	Ms. Holly Coombs Holly.Coombs@nee.com	321-638-3419

PUBLIC WORKS DEPARTMENT POLICY
Policy # 19-01pwd

TO: Public Works Department Regulatory Staff **FROM:** Bob Sweeney, Public Works Director

EFFECTIVE DATE: December 1, 2019 **INITIATED BY:** City Manager's Office

POLICY TITLE: Commercial Development Review – Traffic Generation, Stacking & Circulation

PURPOSE STATEMENT

To ensure traffic patterns associated with new or amended Commercial Development sites and projects are contained on site and do not adversely affect off-site pedestrian and vehicular traffic.

DEFINITIONS

Commercial Development – Any development on private land that is not a stand-alone single-family residence. This category includes, but is not limited to: educational institutions, gas stations or convenience stores, car wash facilities, places of worship, hospitals, laboratories and other medical facilities, recreational facilities, plant nurseries, mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and industrial complexes.

POLICY

All Commercial developments within the jurisdiction of, or affecting city owned or maintained roadways and pedestrian paths; shall provide the following with Special Exception Use, Site Plan, Plat, and Construction Plan submittals for review and approval:

- Traffic Study and Generation – A Traffic Study and Generation rates shall be provided as required per City Code Sections 156.057, 158.222(A)(3) and 160.80(C).

- Traffic Stacking and/or Management Plan – A traffic stacking and/or management plan shall be provided in accordance with City Code Section 158.221(I).

    - Applicants for proposed schools or amendments to existing schools, both public and private, shall present the Traffic Stacking and Management plan to City Council for approval concurrently with the Site Plan and/or Plat request for approval.

- Traffic Circulation – Adequate traffic circulation shall be provided per City Code Sections 156.095 and 158.221((B)(2).

- Public Works Staff will coordinate with Planning and Zoning Staff to ensure all site-specific Traffic Impact information is adequately provided in Staff Reports to both Planning & Zoning Boards and City Council; via review of Planning & Zoning Board and Council Agenda Item preparation.

Online Contractor ID # _____

- ☐ *Clearing*
- ☐ *Mass Grading*
- ☐ *Site Work*

CITY OF PORT ST LUCIE
PUBLIC WORKS DEPARTMENT
Construction Permit Application

Revised July, 2017

Project Name (include Phase if applicable):

City Project Number (P#):

Project Street Address or Location:

Contractor Company	***Contractor Contact***
Name: _____	*Name:* _____
Address: _____	*Phone Number:* _____
_____	*Cell Number:* _____
Fax Number: _____	*Email:* _____

This permit includes driveway connection(s) and work within the adjacent City owned road right-of-way shown on the approved construction plan.

Engineer of Record and Contractor Acknowledgement of NPDES/Permitting Requirements

NPDES Program Manager - Dale Majewski 772/ 344-4128 (772/ 344-4222 for deaf and hearing impaired)

- ☐ *< 1 Acre disturbed*
- ☐ *> 1 Acre disturbed, provide a copy of the FDEP NOI*
- ☐ *> 1 Acre dsiburbed, provide SWPPP*
- ☐ *Provide a copy of the SFWMD Permit/Modification (if applicable)*
- ☐ *Provide a copy of the 10/2 Permit Self Certification (if applicable)*

Contractor Acknowledgement - Protection of Endangered, Threatened, or Listed Species

By signing this permit, the Contractor certifies that he has and will comply with City, State and Federal requirements for the protection or relocation of endangered, threatened or listed species.

Signature: _____ *Date:* _____

Print Name: _____

This section to be completed by the Public Works Department

Date Issued:	*Issued By:*	*Preconstruction Meeting Date/Time:*
	Reviewed and Approved By:	

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT

Driveway/Swale Permit Application

August, 2018

Applicant: _____

Contact Name: _____ Phone # _____

Project Name: _____ P# _____

Lot:_____ Block: _____ Section: _____ Address: _____

Description of work: _____

_____

☐ Concrete ☐ Pavers ☐ Other _____

☐ Widen existing driveway, repair existing driveway or replace existing culvert pipe -

Current driveway width: _____ New driveway width: _____

☐ Add an additional driveway – driveway width: _____

Distance from LEFT _____ or RIGHT _____ property lines to proposed new driveway

DO NOT REMOVE THE DRIVEWAY in the City right-of-way until the Driveway Stakeout has been completed
Culvert pipe may need to be replaced to meet City Code requirements

To schedule inspections please call 772-871-5177 or 772-344-4222 (TDD deaf and hearing impaired)

Required Inspections

☐ Stakeout ☐ Driveway Inspection ☐ Final Inspection

Do not write below this line

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT

Pre-Construction Meeting Request

October, 2016

- Perimeter sediment and erosion control measures and turbidity control, if applicable, must be in place prior to the Pre-Construction Meeting, clearing, or construction.
- The meeting shall include representatives from:
  - The responsible authority (as per the NOI) if possible.
  - The General Contractor
  - The Engineer of Record
  - The City of PSL Public Works Commercial Inspections Division
  - The City of PSL NPDES Division - (projects disturbing 1 acre or more)
  - SFWMD
- Compliance Form and/or Public Works Construction Permit may be picked up at the main office after the meeting.

Send Request to engpw@cityofpsl.com

TODAY'S DATE:
COMPANY MAKING REQUEST:
PERSON MAKING REQUEST:
PHONE NUMBER:
EMAIL ADDRESS:

PROJECT NUMBER (PXX-XXX):
PROJECT NAME:
LOCATION OF PROJECT:

Please request the Pre-Construction Meeting a minimum of 5 business days prior to the date you are requesting.

PREFERRED DATE & TIME OF MEETING:
ALTERNATE PREFERRED DATE & TIME OF MEETING:
**CITY OF PORT ST LUCIE WILL EMAIL THE CONFIRMED DATE & TIME OF MEETING TO THE EMAIL ADDRESS PROVIDED ABOVE.*

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT

Revocable Encroachment Permit Application
Required Submittal Documentation

February 2020

1. Revocable Encroachment Permit Application – Completed in legible print or typed
2. Written Request from Property Owner – Name, Address, Phone Number included, Email address if applicable
3. Copy of the current deed
4. Notarized Owners Signature page, labeled "Exhibit A"
5. A legible 8-1/2- x 11-inch or 8-1/2 x 14-inch site plan labeled (use appropriate scale), labeled "Exhibit B", clearly showing the following information:
   a. Project Name
   b. Project Number (P##-###)
   c. North Arrow
   d. Legal Description
   e. Label and Dimension the Easement
   f. Label and Dimension every "Encroachment" Feature (e.g., 6-foot masonry wall, irrigation well, light poles etc.) from Two Intersecting Property Lines or from One Parallel Property Line, as appropriate.
6. Legal description of the encroachment area; provide locations of all features encroaching into the easement. Please contact Public Works if you have questions. (can be located on Exhibit B or a separate sheet if necessary– labeled as "Exhibit C")
7. Application fee plus the recording fees. Checks made payable to: City of Port St. Lucie.
   a. $80.00 Revocable Encroachment Permit application plus St. Lucie County recording fees.
   b. St. Lucie County Recording Fees = $10.00 first page, $8.50 each additional page *(*5 pages minimum)*
      - Permit = 3 pages (applicant completes form provided by City)
      - Exhibit "A" - Notarized Owners Signature form = 1 page (applicant completes form provided by City)
      - Exhibit "B" - Site Plan with improvements = 1-page minimum (provided by applicant)
      - Other pages (such as LLC affidavits or additional sheets for site plan) may be necessary and are determined on a case by case basis

   For help in determining the fees please contact the Public Works Department once all documents are completed.
8. Letters from Utility Companies, on their letterhead, stating that the utility has no objection to the proposed improvement within the easement are recommended but not required.

Utility Contact Information

Comcast	Mr. Rick Johnson Rick_Johnson@cable.comcast.com	561-402-4513
AT&T	Mr. Ivan Arill Ia7286@att.com	321-388-9719
Florida Power & Light	Mr. Nate Holzmacher Nate.Holzmacher@fpl.com	772-337-7013
Florida City Gas	Ms. Holly Coombs Holly.Coombs@nee.com	321-638-3419

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT

Revocable Encroachment Permit Application

October 1, 2016

Commercial Project Name: _____

Commercial Project Number: _____

Parcel ID Number: _____

Property Legal Description

Lots/Tracts: _____

Block: _____

Section: _____

Property Address: _____

Present Owner(s) of Record: _____

Contact Information

Contact Name: _____

Contact Company: _____

Contact Address: _____

Phone Number: _____ Fax Number: _____

Email Address: _____

Check List

- ☐ Application
- ☐ Copy of the current deed
- ☐ Written Request from Property Owner – Name, address, phone number, email address
- ☐ Revocable Encroachment Permit – 3 pages
- ☐ Exhibit A - Notarized Owner's Signature page
- ☐ Exhibit B ☐ Exhibit C *only if needed (LLC)
- ☐ Application Fee plus the recording fees. Checks made payable to: City of Port St Lucie
- ☐ "No objection" letters from utility companies are recommended but not required.

Prepared by and when recorded return to:
City of Port St. Lucie, Public Works Department
121 SW Port St. Lucie Boulevard, Bldg. B
Port St. Lucie, Florida 34984
Telephone: 772-871-5177
(Reviewed by: Margaret M. Carland, Deputy City Attorney)

Commercial Project Name: _____

Site Plan Project No. _____

Parcel ID Number: _____-_____- _____ - _____/____

Property Legal Description: Lot(s)_____, Block ____, PORT ST. LUCIE SECTION _____

Site Address: _____, Port St. Lucie, FL

Present Owner(s) of Record: _____

REVOCABLE ENCROACHMENT PERMIT

THIS REVOCABLE ENCROACHMENT PERMIT ("Permit") is issued by the **CITY OF PORT ST. LUCIE, a Florida municipal corporation** ("CITY"), to _____ _____("PERMITEE") to allow PERMITTEE to encroach in, over, upon, or under CITY'S easement for the sole purpose of constructing, maintaining and utilizing _____ _____. PERMITEE agrees to and accepts the below terms, conditions and restrictions of this Revocable Encroachment Permit, as evidenced by the attached Exhibit "__A__," which is incorporated herein, and acknowledges that said terms, conditions and restrictions shall run with PERMITEE'S real property and be binding upon PERMITEE'S heirs, legal representatives, members, assigns, and successors in interest.

The issuance of the Permit by CITY for the proposed encroachment(s), as depicted in Exhibit "__B__," which is attached hereto and incorporated herein, is for the benefit of PERMITEE'S property located at the street address _____ _____ in Port St. Lucie, Florida, and more fully described as follows:

[PROPERTY LEGAL DESCRIPTION PER DEED]

_____

_____

_____

_____

This Permit is subject to the following requirements, conditions, restrictions, limitations and obligations:

1. ENCROACHMENT. PERMITEE shall construct for its use only those improvements that are depicted and more fully described in the attached Exhibit(s) _____ for the purpose of constructing, placing, using and maintaining _____ _____, which are proposed to encroach upon CITY'S existing easement.

Present Owner(s) of Record: _____

Property Address: _____, Port St. Lucie, FL

2. TERM/REVOCATION. This Permit shall run with the land and the terms and conditions set forth herein, and all of the duties and liabilities created hereby, shall be a benefit to and a burden upon the owners and occupants of the land, their assigns, and their successors in interest. The permission granted by CITY for shared use of the existing described lands *is subject to revocation* by CITY upon written notice to the property owner of record, as listed in the public tax records, at the time the written notice is issued. Furthermore, this Permit neither conveys to PERMITEE any right, title or interest in or to any of the legal or equitable easement rights of CITY, nor serves as CITY'S abandonment of its rights in and to the easement being encroached upon.

If CITY exercises its right to revoke this Permit and provides PERMITEE with written notice of such revocation, PERMITEE and/or any successors, assigns or future holders of interest in the land shall be responsible for the removal of the encroachment(s), obstruction(s), or structure(s) and the restoration of the terrain, at PERMITEE'S sole cost and expense, within thirty (30) days of PERMITEE'S receipt of CITY'S written notice of revocation, unless the emergency of the situation requires the removal of the encroachment to be accomplished in a shorter period of time. Said written notice of CITY'S revocation of this Permit shall be made by certified mail, return receipt requested, hand-delivery, or personal service. In the event that removal of the encroachment(s) and restoration are not accomplished within thirty (30) days after PERMITEE'S receipt of CITY'S notice of revocation, CITY shall be hereby authorized to remove the encroachment(s). PERMITEE agrees to immediately reimburse CITY for any and all costs incurred for said removal and restoration. The CITY shall have the right to make an assessment against the real property and collect the costs of removal and restoration in the same manner as general taxes are collected under state and local laws.

3. INDEMNIFICATION. PERMITEE releases, waives, relinquishes, discharges, holds harmless, and will indemnify CITY, its officers, elected officials, employees, agents, successors and assigns, from and against any and all claims, actions, damages, costs, losses, expenses, causes of action, demands and liabilities of any nature and character whatsoever, that PERMITEE may have, known or unknown, arising in any manner from or related to PERMITEE'S construction, maintenance, repair, removal, or utilization of the above-described encroachment(s). The types of claims, actions, causes of action, demands and liabilities that are released, waived, discharged, relinquished, and will be indemnified herein include, but are not limited to, claims for any future revocation of this Permit by CITY, or acts of PERMITEE'S contractors, agents, employees, members, invitees, and consultants. Further, PERMITEE understands that this release, hold harmless and indemnification agreement detailed in this paragraph shall inure to the benefit of CITY, its officers, elected officials, employees, agents, successors, and assigns, and that it shall bind PERMITEE and PERMITEE'S heirs, legal representatives, members, assigns and successors in interest.

4. PRIORITY OF USE. This Permit is made subordinate to the right of CITY to use said easement area for its intended purpose. It is understood and agreed that if CITY subsequently determines, in its sole discretion, to use or occupy the area of the encroachment, then the encroachment hereby authorized may be modified or removed completely. The public use and/or condition of the encroachment area shall be restored by spreading material uniformly over the site, and seed and sod as necessary, at PERMITEE'S sole cost and expense, and to the satisfaction of the Public Works Director/City Engineer or City Manager. CITY'S decision as to the necessity of restoring such public use, occupancy, or improvements shall be final and

Present Owner(s) of Record: _____

Property Address: _____, Port St. Lucie, FL

binding upon PERMITEE and PERMITEE'S heirs, legal representatives, members, assigns and successors in interest.

5. EXCAVATION. PERMITEE shall contact Sunshine State One-Call of Florida, Inc. (SSOCOF), prior to any digging or excavation. Chapter 556 of the Florida Statutes requires the excavator to contact SSOCOF (Toll Free 1-800-432-4770) to obtain a valid locate ticket and have the locate ticket available at the job site to insure compliance.

6. CONFLICTING PERMITS. If a prior encroachment conflicts with this Permit, the new PERMITTEE must arrange for any necessary removal or relocation with the prior PERMITTEE. Any such removal or relocation will be at no expense to the CITY.

7. NO PRECEDENT ESTABLISHED. This Permit is issued with the understanding that any action herein is not to be considered as establishing a precedent, as to the utility or the acceptability, of any permit to any other or future situation. Each approval of a Revocable Encroachment Permit will be determined on a case-by-case basis using the policy guidelines approved by the Port St. Lucie City Council.

CITY:

CITY OF PORT ST. LUCIE,

a Florida municipal corporation

By: _____
Gregory J. Oravec, Mayor

Signed, sealed and delivered in the presence of:

_____
Witness Signature
Print Name: _____

_____
Witness Signature
Print Name: _____

STATE OF FLORIDA)
) ss
COUNTY OF ST. LUCIE)

On this _____day of _____, 20____, GREGORY J. ORAVEC as Mayor of the City of Port St. Lucie, a Florida municipal corporation, and authorized to act on behalf of the City of Port St. Lucie, who is personally known to me, executed the foregoing instrument for the purposes therein expressed.

_____
Signature of Notary Public

_____
Print Name of Notary Public
Notary Public, State of Florida
My Commission expires _____

NOTARY SEAL/STAMP

REVOCABLE ENCROACHMENT PERMIT

Present Owner(s) of Record: _____

Property Address: _____, Port St. Lucie, FL

EXHIBIT "__A__"

PERMITEE, _____ is the owner of the property for which the Revocable Encroachment Permit ("Permit") is being issued, and after reviewing the terms, conditions and restrictions of the Permit, PERMITEE has applied for and accepts this Permit, and PERMITEE has read and knows the contents thereof, and for PERMITEE and PERMITEE'S heirs, legal representatives, members, assigns, and successors in interest, as owners or occupants of the parcel of land therein described, PERMITEE agrees to abide by and be bound by all of the terms, conditions, restrictions and provisions thereof.

DATED this _____ day of _____, 20___.

PERMITEE:

Signed in the presence of:

_____ By:_____
Witness

Print Name:_____ Print Name: _____

_____ Title:_____
Witness

Print Name: _____

STATE OF)
) ss
COUNTY OF)

I HEREBY CERTIFY, that on this ___ day of _____, 20____, before me, an officer duly authorized to administer oaths and take acknowledgments _____, as _____, of _____, and authorized to act on said entity's behalf, is personally known to me or proven by producing the following identification _____to be the person who executed the foregoing instrument freely and voluntarily for the purposes therein expressed.

_____
Print Name of Notary Public

NOTARY SEAL/STAMP Notary Public, State of _____

My Commission expires_____

AFFIDAVIT OF MEMBERS, MANAGING MEMBERS, AND MANAGERS OF FLORIDA LIMITED LIABILITY COMPANY

WE,

(Print full name(s) and all title(s) of persons and entities in the following spaces; if more space is needed, print additional names and titles on a separate paper to be marked as Exhibit "A" and attach Exhibit "A" to this Affidavit; the list of names and titles shall include all names on the list required by Section 608.4101(1)(a), Fla. Stat. (2010), as same may be amended from time to time)

Full name:	Title(s):
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

hereby swear or affirm that:

1. The foregoing persons or entities set forth above and on Exhibit "A", if applicable, which Exhibit "A" is attached hereto and incorporated herein by reference hereto, constitute and are all of the Members and Managers, as those terms are defined in Section 605.0102, Fla. Stat. (2015), as same may be amended from time to time, of the Florida Limited Liability Company known as _____ _____ (Print name of the Florida limited liability company as the name appears in the Articles of Organization currently filed with the Secretary of State of the State of Florida);

2. There are no Members or Managers of the aforesaid Florida Limited Liability Company other than the persons or entities set forth above and on Exhibit "A," if applicable.

3. There are no provisions in any Articles of Organization of the aforesaid Florida Limited Liability Company or in any operating agreement, written or oral, of the aforesaid Florida Limited Liability Company, as those terms are defined in Section 605.0102, Fla. Stat. (2015), as same may be amended from time to time, which prohibit, restrict, or limit in any way or in any manner the

execution of the instrument or document attached hereto and incorporated herein by reference hereto, to wit, _____ (Print the title of the instrument or document) by any of the foregoing persons or entities set forth above and on Exhibit "A," if applicable, for and on behalf of the aforesaid Florida Limited Liability Company and to bind and obligate the aforesaid Florida Limited Liability Company as set forth in the foregoing instrument or document.

4. All of the foregoing persons or entities set forth above and on Exhibit "A," if applicable, are authorized by the foregoing Florida Limited Liability Company, to execute the instrument or document attached hereto and incorporated herein by reference hereto, to wit, _____ _____ (Print the title of the instrument or document) for and on behalf of the aforesaid Florida Limited Liability and to bind and obligate the aforesaid Florida Limited Liability Company as set forth in the foregoing instrument or document.

5. All of the provisions of this Affidavit shall be construed in accordance with the laws of the State of Florida.

_____ _____

Signatures Print Name and Title(s)

Sworn to and subscribed before me this ____ day of _____, 20__, by _____, [ ] who is personally known to me or [ ] who has produced _____ as identification and who did take an oath.

_____

Notary Signature

NOTARY SEAL/STAMP

_____

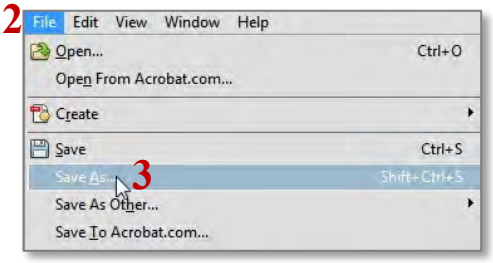
Print Name of Notary

(*Add additional Signature, Title(s), and Notary Public areas for all other LLC Members and Managers, as needed*).

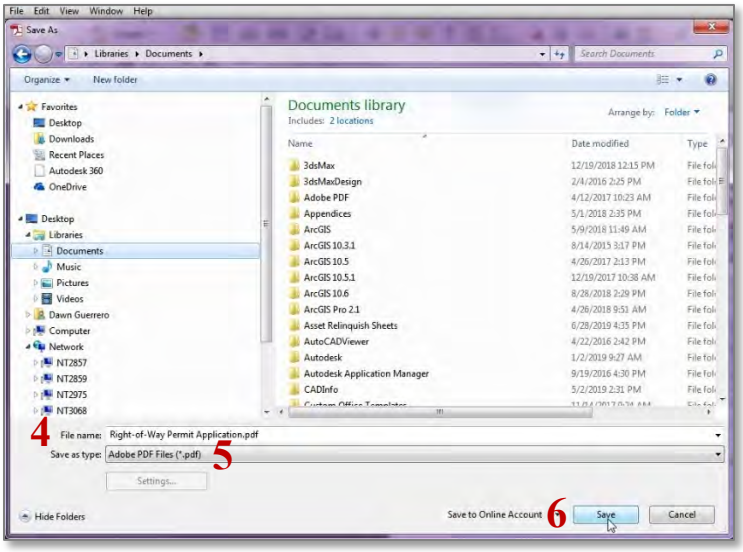
Electronic Permit Submittal Instructions

Right-of-Way (Excavation) Permit Application

1. Complete fillable form on your PC
2. Click **FILE**
3. Click **SAVE AS**



4. Enter file name
5. Save as type – PDF
6. Click **SAVE** – Electronic fillable form will save to your PC



7. Compose email to RWexc@cityofpsl.com
   a. Make sure to reference the application in the subject line, along with the location of the project being requested
   (ex.: ROW Permit – 123 SW Main St.)
8. Attach the following to the email (see page 2 of application)
   a. Completed application
   b. Vicinity Map
   c. Maintenance of Traffic Plan (if applicable)
   d. Certificate of Insurance
   e. Any other pertinent files
9. Click **SEND**

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT
Right-of-Way and Easement (Excavation) Permit Application
Revision Date: June 2020

For City Use Only	Online Contractor ID#
Permit # _____	

Applicant/Permittee Information	***Contractor Information***
Company:	Company:
Project/Job Number:	
Contact:	Contact:
Address:	Address:
Phone:	Phone:
Email Address:	Email Address:
Job Location (Street(s), Lot/Block/Section/Unit or Subdivision):	
Purpose of work in right-of-way or excavation:	
Method of work in right-of-way or excavation:	
I, _____, intending to be legally bound, hereby certify that the work authorized by the issuance of this permit will be installed in accordance with all applicable Port St. Lucie City Codes of Ordinances and other appropriate permits.	
Estimated start date:	Estimated end date:

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT
Right-of-Way and Easement (Excavation) Permit Application
Revision Date: June 2020

**** SEE ATTACHED SHEET FOR SUBMITTAL AND PERMIT REQUIREMENTS ****

Unless specifically stated, the permit is void if work has not started within twelve (12) months from the date of the Public Works Director or Designee's signature.

For City Use Only City Approvals	
Public Works Reviewer	Date
Public Works Irrigation Reviewer	Date
Utility Systems Dept Reviewer	Date
Public Works Director or Designee	Date

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT
Right-of-Way and Easement (Excavation) Permit Application
Revision Date: June 2020

Required Submittal Items

☐ Completed application
☐ Vicinity map
☐ Excavation plan
- _ North Arrow
- _ Right-of-way lines
- _ Edge of pavement
- _ Distance from right-of-way to proposed excavation site
- _ Conduit/cable size and type
- _ Typical cross section
- _ Depth of utility
- _ Method of proposed road crossing (directional bore, open cut, etc.)
- _ Method of repair and restoration
- _ Existing PSL utilities and conflict resolution statement
- _ Existing sidewalks, driveways, and conflict resolution statement

☐ _ Will this work require lane or sidewalk closures? Yes ◯ No ◯
If yes, a Maintenance of Traffic plan in accordance with FDOT Standard Plans is required. Prior to the start of work a City of Port St. Lucie Road/Lane & Sidewalk Closure Request Form must be submitted to the Public Works Dept. (Sec. 97.04)

☐ Certificate of insurance (Sec. 97.12)
- _ Up to date coverage
- _ $2,000,000 aggregate, for bodily injury and property damage liability
- _ Commercial automobile liability insurance covering any auto with limits not less than $1,000,000 per accident
- _ Workers' compensation insurance and employers' liability in accordance with Chapter 440, Florida Statutes, and
- _ Commercial general liability insurance with no less than $1,000,000 each occurrence.
- _ A waiver of subrogation is required in favor of the City of Port St. Lucie under each policy
- _ Except workers' compensation and employers' liability, said certificate(s) shall clearly state that coverage required has been endorsed to include the City of Port St. Lucie, a political subdivision of the State of Florida, its officers, agents and employees as additional insured, and include the specific area in which the permit is issued.
- _ The certificate of insurance shall be current and shall evidence policies issued from a company or companies duly licensed by the state and acceptable to the City.

☐ _ Is this work associated with an approved SPRC project? Yes ◯ No ◯
If yes, please provide the permit number (PXX-XXX):

Permit Requirements

A. Permits are required for all work performed in any Right-of-Way provided for public use in the City of Port St. Lucie. (Sec. 97.10)

B. **Notice of Commencement:** All stakeholders including residents within the project limits shall be notified a minimum of 48 hours prior to but no greater than seven (7) days of any construction activity. The Public Works/Engineering Department shall be notified via RWexc@cityofpsl.com at least 48 hours in advance of any construction activity. Lack of notification could result in nullification of the permit. (Sec. 97.12)

C. The Right-of-Way permit, and if applicable the Road/Lane Closure permit, shall be available at the location of the work during working hours. (Sec. 97.14)

D. When pedestrian and/or vehicular traffic are to be affected during the course of construction a City of Port St. Lucie Road/Lane & Sidewalk Closure Request Form shall be required. (Sec. 97.04)

E. When encroaching work requires a sidewalk closure, an alternate pedestrian route shall be required. Alternate pedestrian routes shall meet the requirements of FDOT Standard Plans, Index 102-660. (Sec. 97.04)
   a. Provide a 5' wide temporary walkway, except where space restrictions warrant a minimum width of 4'.
   b. Provide a cross-slope with a maximum value of 0.02 for all temporary walkways.

c. Maintain temporary walkway surfaces and ramps that are stable, firm, slip-resistant, and free of any obstructions or hazards such as holes, debris, mud, construction equipment and stored material.

d. Meet the requirements of FDOT Index 522-002 for temporary curb ramps.

e. Place pedestrian longitudinal channelizing device(s) (LCD) across the full width of the closed sidewalk. For temporary walkways, similar to Sidewalk Diversion, place LCDs to delineate both sides of the temporary walkway.

f. For sidewalk diversions, ensure that there is sufficient R/W for placement of temporary sidewalk and pedestrian longitudinal channelizing devices.

F. The permittee is responsible for obtaining necessary permits from other governing agencies, including but not limited to, the Florida Department of Transportation (FDOT), the Florida Department of Environmental Protection (FDEP), and the South Florida Water Management District (SFWMD).

G. All crossings of existing pavement shall be made by trenchless technology at a minimum depth of thirty-six (36) inches, unless otherwise authorized by the City. (Sec. 97.15)

H. Open cutting of existing pavement will generally not be allowed but may be considered under one or more of the following conditions: (Sec. 97.15)

a. Sub-surface obstructions

b. Extreme high-water table

c. Limited space for jacking pits

d. Condition of roadway surface including resurfacing and reconstruction

I. The permittee is responsible for restoring all disturbed areas and/or damaged facilities authorized by this permit to better than, or equal to, its original condition, and to the satisfaction of the City. (Sec. 97.16)

J. Following completion of all permitted work, sodding shall be required for any disturbed rights-of-way.

K. The work shall be completed in accordance with the approved Right-of-Way permit, specifications, plans and the Engineering Standards for Land Development.

L. The permittee shall hold the City, its agents and employees, harmless from any liability or responsibility for any accident, loss, or damage to persons or property resulting from or caused by any activities associated with the issuance of this permit.

M. Final Inspection: The permittee agrees to notify the Public Works/Engineering Department via RWexc@cityofpsl.com upon completion of work so that final inspection may be made. A list of any and all deficiencies found at time of final inspection will be noted and provided to the permittee. Final acceptance will be granted once the outstanding items have been addressed.

N. Upon completion of the approved work, the permittee shall submit certified density tests, bore logs, and other related material that demonstrate compliance with the maximum FDOT Standard Specifications for Roadway and Bridge Construction in effect at the time the permit is issued.

O. The permittee shall be responsible for all defects occurring within one year from final acceptance and shall be liable for all damages resulting from any defects.

P. Repair work completed as the result of an excavation that is found to be defective within one year of the repair shall be repaired by the permittee in accordance with the Engineering Standards for Land Development. (Sec. 97.17)

Q. In consideration for the granting of this permit, the permittee agrees that if the City determines that it is necessary to relocate the licensed lines, the permittee will relocate said lines at its sole expense within sixty (60) days upon receipt of written notification from the City.

R. All existing PSLUD utilities must be shown on permit plans. In order to request information regarding our existing utilities, fill out the online request for utility information.

S. Permit plans must contain and conform to the following note: "*A minimum of 5' horizontal and 18" vertical separation shall be maintained from all existing City of PSL Utilities, including water meters and services.*"

CITY OF PORT ST LUCIE
PUBLIC WORKS DEPARTMENT
Road/Lane & Sidewalk Closure Request Form
Revision Date: October 2019

Permit #: _____
** For City Use Only

Request Date: _____

Applicant / Company Name: _____ Applicant Phone Number: _____

Applicant Email (optional): _____

Type of Closure (Click all that apply):

☐ Road ☐ Lane ☐ Sidewalk ☐ Full Closure ☐ Intermittent Closure

Start Date of Closure: _____ End Date of Closure: _____

Start Time of Closure: _____ End Time of Closure: _____

Street Name of Closure: _____

Cross Streets Affected:

Between: _____ and: _____

Detour Street(s): _____

MOT Index Used:
(Reference Index Number) _____

Description of Work Activities:

Return the completed form and any attachments to the Public Works/Engineering Department via email at rdclosure@cityofpsl.com.

**** For City Use Only ****

Approved By: _____ Date Approved: _____

Authorized By: _____ Date Authorized: _____

Comments:

General Conditions of
Road/Lane Closure Request Form

1. **Lane/Shoulder Closure** requests must be submitted a minimum of 48 business hours prior to requested closures and at minimum be accompanied by a detailed site map of the work zone and surrounding affected areas.
2. **Road/Sidewalk Closure** requests must be submitted a minimum of 14 days prior to requested closures and be accompanied by a detailed Maintenance of Traffic plan from FDOT's Standard Plans. When traffic control requires detours, and/or road closures, plan must be accompanied by the certification of plans preparer.
3. A copy of the road/lane closure request form must be onsite for the duration of a closure.
4. Request forms should callout direction of travel to be affected.

The City Engineer or designee can at anytime request that a road/lane closure be removed from the roadway if deemed to be unauthorized.

Unauthorized Road/Lane Closures

Sec. 97.04. - Interruption of traffic on streets.

It shall be unlawful for any person to block, obstruct, or otherwise interrupt the flow of traffic upon the streets within the city without having first obtained a permit from the city manager or his designee to do so. The city manager or his designee is authorized to impose such conditions and restrictions on any permit issued hereunder that he deems appropriate to insure the smooth flow of traffic within the city.

(Ord. 86-10, passed 3-25-86)
Cross reference— Penalty, see section 10.99

Sec. 10.99. - General penalty.

Any person, firm, or corporation who violates any provision of this Code for which another penalty is not specifically provided shall, upon conviction, be subject to fines as follows:

- First offense: $50.00
- Second offense: $200.00
- if uncontested and paid within 30 days of receipt of citation. If contested, the fine shall not exceed $500.00 plus filing fee and court costs.
- A third and subsequent offense shall constitute a misdemeanor of the second degree punishable as provided in Sections 775.082 and 775.083, F.S.

(Ord. No. 12-04, 2-27-12)

City of Port St Lucie Public Works Department
Stormwater ERU Calculation
Non-Residential Commercial Development

Revised October 2018

Date: _____ Project "P" Number: _____

Project Name: _____

Address: _____

Legal Description: _____

Parcel Tax ID: _____

A. Governing Documents / Fee Rate Information

- *Stormwater Program Stormwater Utility Analysis and Implementation*, Camp Dresser & McKee, November 1988
- Ordinance 93-47
- Stormwater ERU = $163.00 (Approved 2018/19 City Budget)

B. Submittals (Please Check Provided Items)

- ☐ Site Plan Approved by City Council (11" x 17" preferable)
- ☐ Recorded Plat
- ☐ Recorded Document(s) Showing Limits of Jurisdictional Wetland
- ☐ Recorded Document(s) Showing Limits of Publically Owned Drainage Area
- ☐ Recorded Document(s) Showing Limits of Publically Owned Road
- ☐ Recorded Document(s) Showing Limits of Conservation Area

C. Development Information (Complete the Following Based Upon Attached Documents)

Development Information		
Description	Area (Acres)	Area (Square Feet)
a. Impervious Area (e.g., pavement, sidewalks, building, lake surface at control elevation, etc.)		
b. Pervious Area (e.g., open areas, green spaces, landscaped areas, etc.)		
c. Dry Detention Area		
d. Jurisdictional Wetland Area (copy of recorded document provided)		
e. Publically Owned Drainage Area (copy of recorded document provided)		
f. Publically Owned Road (copy of recorded document provided)		
g. Conservation Area (copy of recorded document provided)		
Total Property Area (a+b+c+d+e+f+g)		
Eligible Property Area (a+b+c)		

City of Port St Lucie Public Works Department
Stormwater ERU Calculation
Non-Residential Commercial Development

Project Name: _____

Date: _____

D. ERU for Developed Area (Complete Based Upon Info on Sheet 1, Item C)

- Developed ERU = Impervious sf / 2,280 sf per ERU = _____ / 2,280 = _____

E. ERU for Undeveloped Area (Complete Based Upon Info on Sheet 1, Item C)

- Eligible Property Area sf = _____sf
- Impervious Land Allowance sf = Impervious sf x 1.25 = _____ x 1.25 = _____sf
- For Sites with On-Site Detention
  Detention Credit sf = Eligible Property Area sf / 18 = _____ /18 = _____sf
- Undeveloped ERU = (Eligible Property Area sf - Impervious Land Allowance sf - Detention Credit sf) x (0.15/2,280 sf per ERU)

  Undeveloped ERU = (_____ - _____- _____) x (0.15/2,280)

  Undeveloped ERU = (_____) x (0.000066)

  Undeveloped ERU = _____

F. ERU for Site (Complete Based Upon Info From Items D and E)

- ERU for Site = Developed ERU + Undeveloped ERU

  ERU for Site = _____ + _____

ERU for Site = _____

City of Port St Lucie Public Works Department
Stormwater ERU Calculation
Non-Residential Commercial Development

Project Name: _____

Date: _____

G. Certification of Calculation

I_____ (print name), the representative for the above stated property, certify that the approved site development data used in the calculation is true and that I verified the calculation for accuracy.

Representative Signature: _____ Date: _____

H. Owner Acceptance of ERU Calculation

I, _____ (print name), the owner of the above stated property, understand that this calculation will determine the number of stormwater ERUs for this project and that these ERUs will be used to calculate the annual Stormwater Fees for this property.

Owner Signature:_____Date:_____

I. Review and Acceptance By Public Works Department

I, _____ (print name), a representative of the Public Works Department, have reviewed and accepted the calculation.

Representative Signature: _____Date:_____

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT

TRAFFIC CALMING REQUEST FORM

Name: _____

Address: _____

Street for Review (From/To): _____

Day Phone No.: _____ Email Address:_____

Identify yourself: ☐ Homeowner ☐ Developer ☐ City Staff

If a homeowner, do you belong to a neighborhood association? ◯ Yes ◯ No

If yes, which one? _____

Are you willing to be the "Point of Contact" regarding this Traffic Calming request in your neighborhood?

◯ Yes ◯ No*

*If no, please revise information section of form with someone willing to be the point of contact.

Please check any issues that apply to your street:

☐ Speed of automobile traffic
☐ Volume of automobile traffic
☐ Number of accidents
☐ Cut-through traffic
☐ High pedestrian volume
☐ Lack of amenities (sidewalks, crosswalks, etc.)

Please elaborate on the specific problems on your street or in your neighborhood:

_____

_____

_____

_____

_____

Once completed, please send your completed request form AND petition sheet(s) to:

City of Port St. Lucie Public Works
121 SW Port St. Lucie Blvd, Building B
Port St. Lucie, FL 34984

TRAFFIC CALMING REQUEST PETITION FORM

Name (Print)	Address	Phone Number	Signature

By signing this petition, you acknowledge that the physical location for traffic calming measures will be determined solely by the City Engineer and/or Public Works staff and that no public input will be accepted in regards to the location of proposed traffic calming measures.

Appendix B: Traffic Calming Policy and Guidelines

City of Port St. Lucie
Neighborhood Traffic Calming Policy

Adopted May 18, 2020

INTRODUCTION

The City of Port St. Lucie is committed to ensuring the overall safety and livability of residential neighborhoods. One way to meet this commitment is through a collaboration of City staff and property owners to manage traffic in neighborhoods and address documented traffic concerns. The City of Port St. Lucie Neighborhood Traffic Calming Policy provides a process to request, evaluate, and implement appropriate traffic calming measures.

CONSIDERATIONS

Traditional transportation improvements have generally focused on capacity, speed and safety. While these are still concerns, another dimension, traffic calming, is often added to maintain or restore the livability of a neighborhood. This is done by incorporating physical elements that prohibit and/or slow vehicular traffic. The Institute of Transportation Engineers (ITE) defines traffic calming as:

> *"….the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users."*

Unlike traffic control devices such as stop signs and speed limit signs which require enforcement, traffic calming measures[1] are self-enforcing. Traffic calming measures generally serve one of the following three functions[2]:

- Precludes through-traffic and only allows local traffic
- Discourages, but still allows through-traffic
- Allows through- and local traffic

Determining the appropriate type of traffic calming for a roadway requires coordination and consideration of how the existing roadway network functions. The City's existing roadway network is a traditional layout[3] which:

- Allows distribution of traffic over a network of streets, thus reduces the need to widen roads;
- Creates a highly interconnected network that provides a choice of routes, thus providing options for detour routes and accessibility for emergency services;

[1] Traffic Calming Measure - an element of a traffic calming plan selected from among those devices authorized herein for use within the city.

[2] Federal Highway Administration "*Traffic Calming State of the Practice"* (FHWA-RD-99-135)

[3] "*Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways"*, commonly referred to as "The Florida Greenbook,"

- Provides the ability to choose the most direct route to a destination, thus reducing the travel distance and the associated time and fuel;
- Creates smaller blocks of development that can be highly supportive of pedestrian, bicycle, and transit modes of travel;
- Provides a block structure that allows greater flexibility for land use to evolve over time.

Because of the layout of the City's road network, traffic calming measures that hinder the distribution of traffic may result in the need for widening other roadways, delaying emergency response time, or causing drivers to seek routes to bypass the traffic calming. For that reason, consideration of the function and type of roadway is necessary. Within the City's roadway network, the streets and roads are classified as local, collector, or arterial, depending on the use and function as described below:

- Local streets allow direct access to abutting property and characteristically have lower volume, lower speed, shorter trip lengths, and less through-traffic (e.g., Starfish Avenue, Carnation Road, Best Street, etc.).
- Collector streets provide both access and traffic movement between the local streets and arterial roads. A collector street provides moderate volume, speeds, trip lengths, and volume of through-traffic (e.g., Morningside Boulevard, Rosser Boulevard, Mariposa Avenue, etc.).
- Arterial roads focus on the movement of higher volumes, speeds, trips lengths, and through-traffic (e.g., Port St Lucie Boulevard, Prima Vista Boulevard, Southbend Boulevard, etc.).

Due to the functional nature of the roadways, traffic calming measures are commonly used on local streets, occasionally used on collector streets, and in rare circumstances arterial roads.

GOALS AND GUIDELINES

To balance the community's need for transportation mobility, efficiency, safety, and livability, the City's Neighborhood Traffic Calming Policy will be based upon the following goals and guidelines:

Goals

- Provide and maintain a safe traditional roadway network.
- Maintain and/or improve neighborhood livability by reducing the impact of vehicular traffic on residential streets.
- Encourage citizen involvement in the neighborhood traffic calming process.

Guidelines

- Encourage, but not require, through-traffic to use higher classification roads (i.e., collector streets and arterial roads).
- Re-route traffic from one street to another of equal classifications if, and only if, the result is a more equal distribution of the traffic volumes. Shifting a traffic problem from one street to another or one neighborhood to another is not an acceptable alternative.
- Reduce the average speed of motor vehicles within neighborhoods to acceptable levels.
- Implement cost-effective measures for solving identified traffic problem(s).

- Improve safety for non-motorists in the City right-of-way.
- Preserve reasonable emergency vehicle ingress/egress.
- Maintain reasonable vehicular access. Traffic calming measures should encourage and enhance pedestrian and bicycle access to and throughout the neighborhood.
- City-owned local streets[4] and collector streets[5] are eligible to be considered for traffic calming measures following this policy, guidelines, and criteria.
- City-owned arterial roads[6] will only be considered for traffic calming measures on a case by case basis and must be sponsored (nominated) by a City Council member, the City Manager, or the City Engineer. The following petition and application process does not apply to arterial roads.
- The City may employ traffic calming measures, including but not limited to the ones listed in Appendix A, to achieve the objectives identified.
- The City shall follow the Neighborhood Traffic Calming Policy to ensure there is consistency and collaborative process for the community while maintaining the efficient use of funding.
- The City shall ensure that all projects receive input from area property owners and affected organizations.
- All projects shall receive City Council approval before installation of permanent traffic calming devices.
- An application for traffic calming on a road or street which does not qualify for traffic calming may be resubmitted after three years.

TRAFFIC CALMING PROCESS

The four-step process to request a traffic calming study, review and consider the request, obtain consensus from the property owners within the traffic study area, and to implement the project is described below. The Applicant is responsible for the first and third steps.

Step 1 – Neighborhood Contact Person or Applicant[7] Requests Study: A Neighborhood Contact Person or Applicant may request a traffic calming study for a local or collector roadway. To request a study, the Applicant completes and submits a request form and petition to the Public Works Department. The petition must include the signatures of at least 50% of the property owners fronting the street on which the traffic calming study is requested. The requested street shall be between two (2) significant intersections and shall not be only a segment of a contiguous street. A copy of the request form and petition is provided in Appendix B. Please note that only roadways classified as local or collector are eligible to be considered for traffic calming measures under this

[4] As defined by the "Port St. Lucie Functional Classification" provided in the Transportation Element of the City's Comprehensive Plan.
[5] As defined by the "Port St. Lucie Functional Classification" provided in the Transportation Element of the City's Comprehensive Plan.
[6] As defined by the "Port St. Lucie Functional Classification" provided in the Transportation Element of the City's Comprehensive Plan.
[7] Neighborhood Contact Person or Applicant – a property owner along the requested street who has submitted a request for the Traffic Calming Study and serves as a liaison between the City and the community.

policy. Traffic calming on arterial roadways will be considered individually on a case-by-case basis.

Step 2 - Review and Consideration of the Request by City Staff: City Staff will review the petition and application to evaluate and determine the eligibility of the request. During this process, Staff will keep the Applicant informed of the findings of the review. Staff will review the petition to ensure an adequate number of signatures have been obtained and also gather data on site conditions. If both criteria are met, Staff will conduct a traffic study, and research traffic incidents for the subject roadway. The data will be used by Staff to classify the roadway and determine if traffic calming measures are appropriate. After determining that traffic calming measures are appropriate, Staff or an engineering consultant will prepare a conceptual traffic calming plan and hold a public information meeting. Based upon the results of the public information meeting, Staff or an engineering consultant will prepare a recommended traffic calming plan. These actions are further described below.

Eligibility: To be eligible for traffic calming, all the following criteria must be met. If all criteria are met, in addition to the minimum number of signatures on the petition, the application continues in the review process. If all the criteria are not met, the application is closed, and the Applicant is notified that the road does not meet the requirements for traffic calming. To be eligible for traffic calming, the roadway shall:

- Be classified as a local or collector roadway
- Not be designated an emergency and evacuation route.
- Have no more than two travel lanes.
- Be under the jurisdiction of the City.
- Be at least 1,000 feet in length.
- Not be a partial segment of a contiguous street.

Data Collection: If the eligibility criteria mentioned above is met, the following data will be collected to determine roadway conditions.

- Site conditions: Visual survey to confirm that the roadway has proper signage, pavement markings and sight distance. Any irregularities will be corrected.
- Traffic Study: A traffic count[8], speed study[9], and classifications of vehicles using the roadway will be collected and recorded.
- Incident records: Crash records and other traffic incident reports will be collected.

Traffic Conditions: The collected data will be reviewed and used to document traffic conditions and determine if traffic calming measures are appropriate for the roadway. The four types of traffic conditions and recommended traffic calming are outlined below.

Type I - Minor Excessive Speed and Volume: This designation is provided for roadways with traffic that meet the following conditions:

[8] Traffic Count - a manual or automated count of the number of vehicles traversing a street.
[9] Speed Study - a study using equipment to measure, collect, and statistically analyze the speeds of vehicles.

- The measured 85th percentile speed[10] is between 5 and 8 miles per hour above the posted speed limit and;
- Average annual daily trips (AADT) are between 300 and 800 vehicles per day (vpd).

Roadways with minor excessive speed and volume (Type I) will be addressed through enforcement and education. The Port St. Lucie Police Department and/or St. Lucie County Sheriff's Office will be notified of the situation and requested to increase enforcement on a random basis during the hours when most the speeding violations occur. Additionally, neighborhood flyers or other such means of informing drivers using this road may be provided.

Type II - Excessive Speed and Volume: This designation is for roadways with traffic volumes greater than 800 average annual daily trips (AADT) and one of the following:

- The measured 85th percentile speed is 9 miles per hour or greater than the posted speed limit, or;
- The hourly volume is greater than 12% of the average daily traffic, or more than 10 daily trips per household.

Roadways classified as having excessive speed or volume (Type II) will continue to the conceptual traffic calming plan phase.

Type III – Other: Any local or collector roadway that does not meet the minimum criteria to be classified as Type II, but the collected volume and speed data are both within 20% of the minimum criteria required (2 mph and 160 vpd), and any of the following extenuating circumstances are present:

- a large number or high frequency of accidents,
- numerous bus stops,
- numerous residential driveways,
- roadway geometry issues, or
- a lack of sidewalks,

a roadway may be classified as Type III by the City Council upon recommendation by the Public Works Director or designee. The Public Works Director or designee will present these recommendations to City Council semi-annually for their consideration.

Roadways classified as Type III will continue to the conceptual traffic calming plan phase.

Type IV – None of the Above: Roadways that do not exhibit Type I, Type II, or Type III conditions are not eligible for traffic calming.

[10] 85th Percentile Speed - speed at which 85% of the vehicles are traveling at or below. For the purposes of this Policy, the 85th Percentile Speed considered will be the average 85th Percentile Speed of both directions.

Conceptual Traffic Calming Plan: Roadways that are classified as having excessive speed or volume (Type II) or other (Type III) will be further analyzed to define a Study Area[11] and to create a conceptual traffic calming plan.

Public Information Meeting: A public information meeting will be conducted to present the conceptual traffic calming plan and to obtain input from the public and affected agencies. Property owners within the study area will be given notice of the public information meeting. Means of notification may include door hangers, newspaper, Public Service Announcements on PSLTV Channel 20, City's Webpage http://www.cityofpsl.com/, mailings, or variable message boards located within the study area.

Any property owner who is unable to attend the meeting may submit comments, in writing, for consideration. Additionally, the following agencies will be notified that traffic calming measures are being considered: St. Lucie County Fire Rescue, Port St. Lucie Police Department, St. Lucie County Sheriff's Office, and the St. Lucie County School Board.

Recommended Traffic Calming Plan: Based upon the input received from the public and agencies, Staff or an engineering consultant will develop a recommended traffic calming plan for the study area.

Step 3 - Applicant Petition for Recommended Traffic Calming Measures: After completion of the recommended plan for traffic calming measures, the Public Works Department will provide a petition form and a map highlighting the study area, as well as the type and locations of the recommended traffic calming devices to the Applicant. The Applicant may elect to obtain signatures of 75% of the property owners within the study area indicating that they support the construction of the proposed traffic calming measures. Or the Applicant may request in writing that the City mail ballots to all property owners within the study area. If the City mails ballots, only those ballots received by the City will be considered. A non-returned ballot does not constitute a vote in the negative. A vote in the affirmative from 75% of the returned ballots is required to proceed to step 4.

Step 4 - Project Implementation by City Staff: City Staff will implement the mechanisms needed to fund, design, obtain City Council approval, construct, and evaluate the project after construction as further described below.

Funding: The design and construction of traffic calming measures will not begin until a funding source is identified and secured. Potential funding options may include, but are not limited to: private sources, public/private partnerships, City's Five Year Capital Improvement Program Budget, Community Development Grant Block Program, Neighborhood Planning Programs, and/or grants.

Design: A professional engineer licensed to work in Florida will prepare the traffic calming construction plans and estimate of construction cost based upon the recommended plan.

[11] Study Area - the defined area which has been determined to be impacted by proposed traffic calming measures. The Study Area may cross traditional neighborhood boundaries.

City Council Consideration: The petition with the signatures of 75% of the property owners or the ballot summary results in support of the traffic calming plan, the construction plans, probable cost estimates, construction funding sources, and a construction schedule will be submitted to City Council for review and consideration.

Construction: Upon City Council approval and funding availability, the traffic calming measures will be constructed within one year.

Project Evaluation: Approximately six months after the traffic calming project is completed, traffic data will be collected and compared to the previously collected "before" data. The comparison will evaluate the traffic calming measures to determine if corrective measures or other actions are needed.

REMOVAL OF TRAFFIC CALMING MEASURES

With the approval of City Council, traffic calming measures may be removed or altered at any time for the following reasons:

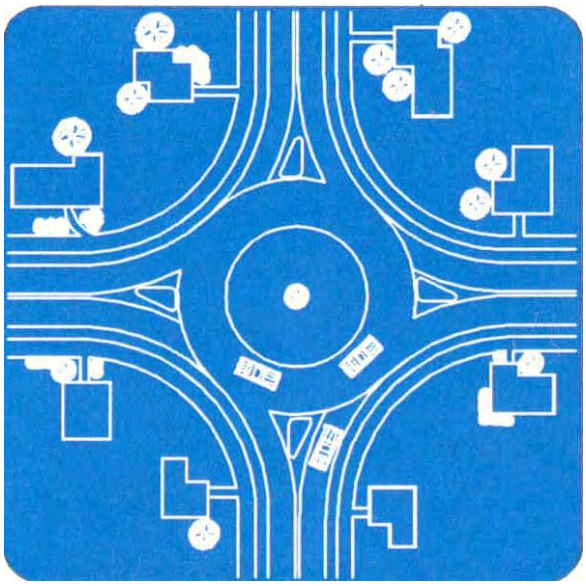
- Emergency response is significantly impacted.
- The traffic count for the street exceeds 5,000 vehicles per day.
- Determination by the Public Works Director that it is in the best interest of public safety.

Property owners within the traffic calming area may request removal of the traffic calming measures after the measures have been in place for two years by submitting a petition to the City. The petition shall request removal of the traffic calming measures, acknowledge that the property owners will pay for the removal, and include the signatures of at least 75% of the property owners within the calming area. Upon receipt of the petition, the City will assess the property owners within the traffic calming area for the costs and then remove the traffic calming measures.

Appendix A

Examples of Traffic Calming Measures

Roundabouts



A raised circular structure that deflects the flow of traffic in a counter-clock-wise direction around the circle. The objectives of roundabouts are to slow traffic and reduce the number and severity of crashes. Roundabouts are designed to accommodate all sizes of vehicles. Unlike traffic circles, roundabouts are used on higher volume streets.

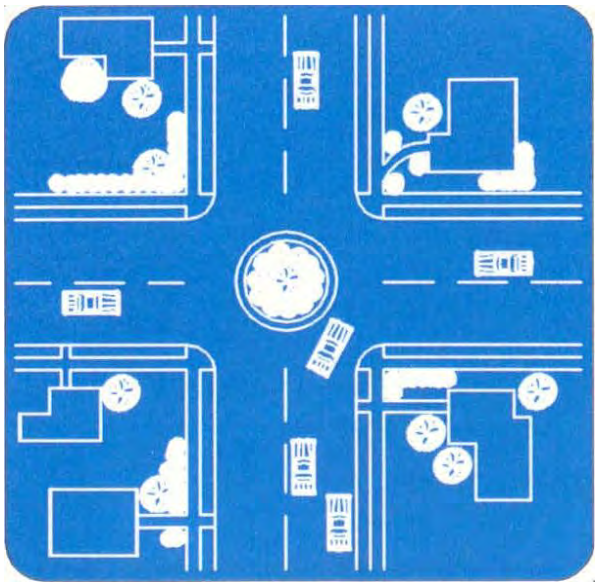
Good for: Locations with a history of accidents, intersections with irregular approaches or high u-turn volumes.

Advantages:	Disadvantages:
• Moderate traffic speeds • Landscaping and hardscape can make it aesthetically pleasing • Enhanced safety compared to traffic signals • Minimizes queuing at the approaches • Less expensive to operate than traffic signals.	• May be difficult for large vehicles to circumnavigate • May require the elimination of some on-street parking • Landscaping must be maintained by the property owners or by the municipality. • Requires more right-of-way than signalized intersection

Cost Estimate: $250,000 - $1,250,000

Effectiveness:	Similar Measures:
• Average 29% reduction in accidents, with a reduction from 9.3 to 5.9 accidents per year (from a sample of 11 sites; source: *Roundabouts: An Informational Guide*)	• By constructing a small island in a neighborhood intersection and leaving the existing curbs, you have a Traffic Circle

Traffic Circles



Traffic circles are raised islands, placed in intersections, around which traffic circulates. Not intended for high volume or large vehicle traffic. Traffic circles sometimes employ stop or signal control or give priority to entering vehicles. Some traffic circles impose control measures within the circulating roadway or are designed with weaving areas to resolve conflict movement.

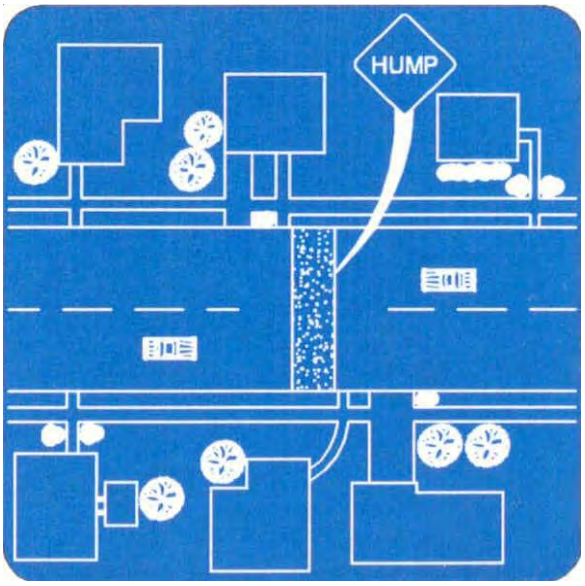
Good for: Calming intersections, especially within neighborhoods, where large vehicle traffic is not a major concern but speeds, volumes, and safety are problems.

Advantages:	Disadvantages:
• Very effective in moderating speeds and improving safety • If designed well, they can have positive aesthetic value • Placed at an intersection, they can calm two streets at once	• Difficult for large vehicles (such as fire trucks) to circumnavigate • May require the elimination of some on-street parking • Landscaping must be maintained by the property owners or by the municipality

Cost Estimate: $25,000 - $150,000

Effectiveness:	Similar Measures:
• Average of 11% decrease in the 85th percentile travel speeds, or from an average of 34.1 to 30.2 miles per hour (from a sample of 45 sites) • Including a large sample from Seattle, an average of 73% decrease in accidents, or from an average of 2.2 to 0.6 accidents per year (from a sample of 130 sites)	• By placing a raised island in a midblock location, you have a Center Island Narrowing • By enlarging the intersection and the center island, inserting splitter islands at each approach, setting back the crosswalks away from the circulating lane, and implementing yield control at all approaches, you have a Roundabout

Speed Humps



Speed humps are rounded raised areas generally 10 to 14 feet long (in the direction of travel), making them distinct from the shorter "speed bumps" found in many parking lots, and are 3 to 4 inches high. Speed humps shall not be used on primary access routes. The objective is to slow traffic and reduce the number and severity of crashes.

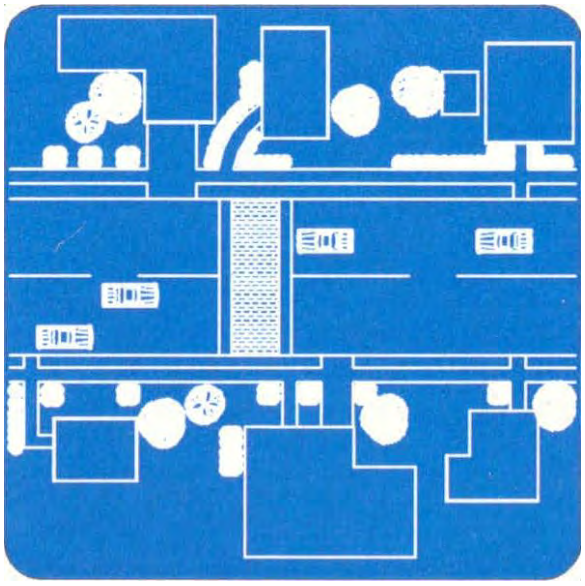
Good for: Locations where very low speeds are desired and reasonable and where noise and exhaust fumes are not a major concern.

Advantages:	Disadvantages:
• Relatively inexpensive • Relatively easy for bicycles to cross if designed appropriately • Very effective in slowing travel speeds	• Causes a "rough ride" for drivers, and can cause severe pain for people with skeletal disabilities • Forces large vehicles, such as emergency vehicles, to travel at slower speeds • Increases noise and air pollution • Questionable aesthetics

Cost Estimate: $5,000 - $12,000 each

Effectiveness (12' Hump):	Similar Measures:
• Average of 22% decrease in the 85th percentile travel speeds, or from an average of 35.0 to 27.4 miles per hour; (from a sample of 179 sites) • Average of 11% decrease in accidents, or from an average of 2.7 to 2.4 accidents per year (from a sample of 49 sites)	• By lengthening the hump with a flat section in the middle, you have a Speed Table • By turning an entire crosswalk into a speed hump, you have a Raised Crosswalk; and • By raising the level of an entire intersection, you have a Raised Intersection

Speed Tables



Speed tables are flat-topped speed humps often constructed with brick or other textured materials on the flat section. The tables are generally 3 to 4 inches high, have a six-foot sloped approach, with a ten-foot top, and a six-foot sloped departure profile. Speed tables are typically long enough for the entire wheelbase of a passenger car to rest on the flat section. The long flat areas with gently sloped ramps give speed tables higher speeds than speed humps. The brick or other textured materials improve the appearance of speed tables, draw attention to them, and may enhance safety and speed-reduction.

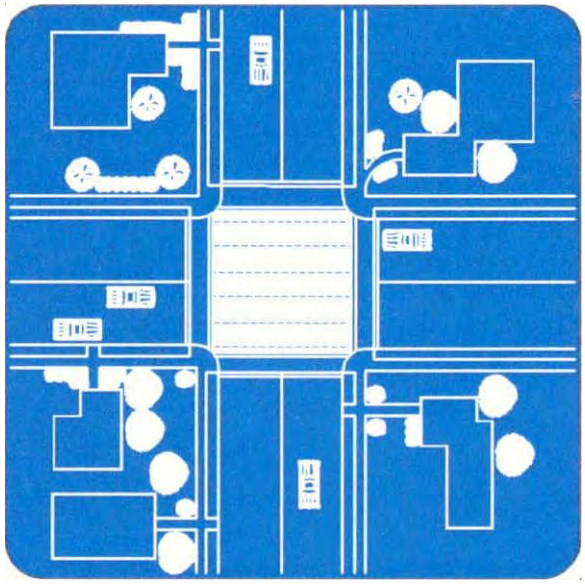
Good for: Locations where low speeds are desired but a somewhat smooth ride is needed for larger vehicles.

Advantages:	Disadvantages:
• Smoother on large vehicles (such as fire trucks) than speed humps • Effective in reducing speeds, though not to the extent of speed humps	• Questionable aesthetics if textured materials are not used • Textured materials, if used, can be expensive • May increase noise and air pollution

Cost Estimate: $10,000 - $15,000 each

Effectiveness (22' Table):	Similar Measures:
• Average of 18% decrease in the 85th percentile travel speeds, or from an average of 36.7 to 30.1 miles per hour; (from a sample of 58 sites) • Average of 45% decrease in accidents, or from an average of 6.7 to 3.7 accidents per year (from a sample of 8 sites)	• By removing the flat section in the middle, you have a Speed Hump • By placing a crosswalk on the flat section, you have a Raised Crosswalk; and • By raising the level of an entire intersection, you have a Raised Intersection

Raised Intersections



Raised intersections are flat raised areas (3 to 4 inches) that cover an entire intersection with ramps on all approaches and often with brick or other textured materials on the flat section. By modifying the level of the intersection, crosswalks are more readily perceived by motorists to be "pedestrian territory". The objectives are to slow traffic and reduce the number and severity of crashes.

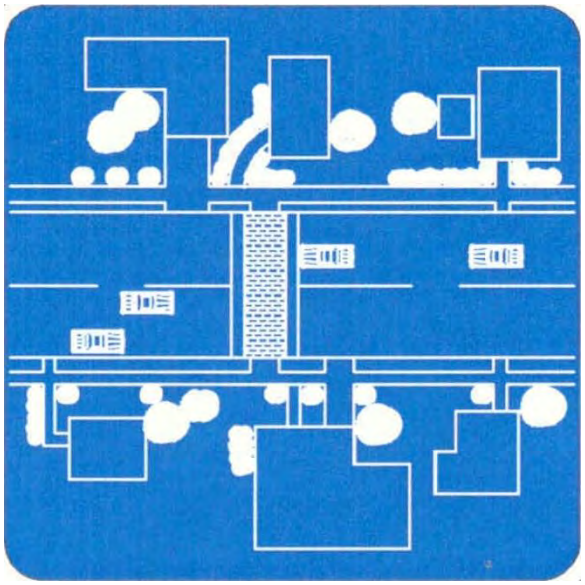
Good for: Intersections with substantial pedestrian activity and areas where parking spaces need to be retained

Advantages:	Disadvantages:
• Improves safety for both pedestrians and vehicles • Can have positive aesthetic value • Calms two streets at once	• Expensive, varying by materials used • Impacts to drainage need to be considered • Less effective in reducing speeds than speed humps, speed tables, or raised crosswalks

Cost Estimate: $25,000 - $50,000

Effectiveness:	Similar Measures:
• Average of 1% decrease in the 85th percentile travel speeds, or from an average of 34.6 to 34.3 miles per hour; (from a sample of 3 sites)	• By raising only a single crosswalk, you have a Raised Crosswalk • By raising only a short section to a flat level (without a crosswalk), you have a Speed Table; and • By raising an even shorter section and constructing it without a flat top, you have a Speed Hump

Raised Crosswalks



Raised crosswalks are speed tables outfitted with crosswalk markings and signage to channelize pedestrian crossings, providing pedestrians with a level street crossing. Also, by raising the level of the crossing, pedestrians are more visible to approaching motorists.

Good for: Locations where pedestrian crossings occur at haphazard locations and vehicle speeds are excessive.

Advantages:

- Improve safety for both pedestrians and vehicles
- Can have positive aesthetic value
- Effective in reducing speeds, though not to the extent of speed humps

Disadvantages:

- Textured materials, if used, can be expensive
- Impacts to drainage need to be considered
- May increase noise and air pollution

Cost Estimate: $10,000 - $15,000

Effectiveness:

- For a 22-foot Speed Table (the most similar device for which data is available):
  - Average of 18% decrease in the 85th percentile travel speeds, or from an average of 36.7 to 30.1 miles per hour; (from a sample of 58 sites)
  - Average of 45% decrease in accidents, or from an average of 6.7 to 3.7 accidents per year (from a sample of 8 sites)

Similar Measures:

- By removing the crosswalk markings and signage, you have a Speed Table; and
- By removing the crosswalk and the flat section in the middle, you have a Speed Hump
- By raising the level of an entire intersection, you have a Raised Intersection

Less Common
Traffic Calming Measures

***Semi-Diverter Island**:* Installed on the ingress side of the street in which entry is being prohibited. Vehicles are still allowed to exit from the street but entrance is prohibited. This feature prohibits cut-through traffic.

Mid-Block Island: Constructed mid-block in the center of the roadway separating travel lanes and may reduce lane widths. Mid-block islands slow traffic. These features address vehicle speeds and may discourage cut-through traffic

Splitter Island: May provide landscaping and channelization to lanes at the entrances to a neighborhood. Splitter islands slow traffic and discourage cut-through traffic.

Roadway Narrowing: Reduces the width of pavement while maintaining two- way traffic. Landscaping planted in conjunction with the narrowing may further enhance the feature and impact driver behavior by reinforcing the impression that the pavement area is limited. Roadway narrowing slows and may discourage cut-through traffic.

Chicanes: Changes the alignment of the roadway so that the street is not straight. This eliminates driver tendencies to accelerate on a straight street and may add beautification opportunities without significantly impacting emergency services. Two-way traffic and full access for larger vehicles and emergency services is maintained. These features address vehicle speeds and may discourage cut-through traffic.

Appendix B

Traffic Calming Request Form and Petition Form

CITY OF PORT ST. LUCIE
PUBLIC WORKS DEPARTMENT

TRAFFIC CALMING REQUEST FORM

Name: _____

Address: _____

Street for Review (From/To): _____

Day Phone No.: _____ Email Address: _____

Identify yourself: ☐ Homeowner ☐ Developer ☐ City Staff

If a homeowner, do you belong to a neighborhood association? ☐ Yes ☐ No

If yes, which one? _____

Are you willing to be the "Point of Contact" regarding this Traffic Calming request in your neighborhood?

☐ Yes ☐ No*

*If no, please revise information section of form with someone willing to be the point of contact.

Please check any issues that apply to your street:

☐ Speed of automobile traffic
☐ Volume of automobile traffic
☐ Number of accidents
☐ Cut-through traffic
☐ High pedestrian volume
☐ Lack of amenities (sidewalks, crosswalks, etc.)

Please elaborate on the specific problems on your street or in your neighborhood:

_____

_____

_____

_____

_____

Once completed, please send your completed request form AND petition sheet(s) to:

City of Port St. Lucie Public Works
121 SW Port St. Lucie Blvd, Building B
Port St. Lucie, FL 34984

TRAFFIC CALMING REQUEST PETITION FORM

Name (Print)	Address	Phone Number	Signature

By signing this petition, you acknowledge that the physical location for traffic calming measures will be determined solely by the City Engineer and/or Public Works staff and that no public input will be accepted in regards to the location of proposed traffic calming measures.

Appendix C

Roadway Classifications – Transportation Element Of The Comprehensive Plan

Table 2-1 Local Roadway System

Local Name	From	To	Federal Functional Classification System	Port St. Lucie Functional Classification
Airoso Boulevard	St. James Drive	Port St. Lucie Boulevard	Urban Principal Arterial	Urban Principal Arterial
Alcantarra Boulevard	Savona Boulevard	Port St. Lucie Boulevard	NDA	Urban Collector
Bayshore Boulevard	St. James Drive	Port St. Lucie Boulevard	Urban Minor Arterial	Urban Principal Arterial
	Port St. Lucie Boulevard	Oakridge Boulevard	Urban Collector	Urban Minor Arterial
Becker Road	Village Parkway	Savona Blvd	Urban Collector	Urban Principal Arterial
	Savona Boulevard	Port St. Lucie Boulevard	Urban Minor Arterial	Urban Principal Arterial
	Port St. Lucie Boulevard	Florida Turnpike	Urban Principal Arterial	Urban Principal Arterial
	Florida Turnpike	Gilson Road	Urban Minor Arterial	Urban Principal Arterial
Biltmore Street	S. Macedo Boulevard	Thornhill Drive	NDA	Urban Collector
California Boulevard	Del Rio Boulevard	Savona Blvd	Urban Collector	NDA
	Savona Boulevard	St. Lucie West Blvd	Urban Minor Arterial	U-PA south SLW Blvd to Crosstown Pkwy
	St. Lucie West	West Torino Parkway	Urban Minor Arterial	Urban Minor Arterial
Cameo Boulevard	Crosstown Parkway	Port St. Lucie Boulevard	NDA	Urban Collector
Cane Slough Road	U.S. 1	Lennard Road	Urban Minor Arterial	Urban Minor Arterial
Cashmere Boulevard	Del Rio Boulevard	Crosstown Parkway	Urban Collector	Urban Minor Arterial
	Crosstown Parkway	St. Lucie West Blvd	Urban Collector	Urban Principal Arterial
	St. Lucie West Blvd	East Torino Parkway	Urban Collector	Urban Principal Arterial
Commerce Center Parkway	North City Limit	Crosstown Parkway	Urban Minor Arterial	Urban Minor Arterial
Community Boulevard	Westcliffe Lane	Discovery Way	NDA	Urban Principal Arterial
Crosstown Parkway	Village Parkway	Manth Lane	Urban Minor Arterial	Urban Principal Arterial

Local Name	From	To	Federal Functional Classification System	Port St. Lucie Functional Classification
Darwin Boulevard	Becker Road	Port St. Lucie Boulevard	Urban Collector	Urban Principal Arterial
Del Rio Boulevard	Port St. Lucie Boulevard	California Boulevard	Urban Collector	Urban Principal Arterial
	California Boulevard	McKenzie Street	Urban Collector	Urban Minor Arterial
Discovery Way	Community Boulevard	Village Parkway	NDA	Urban Principal Arterial
East Torino Pkwy/Torino Pkwy	California Boulevard	Midway Road	Urban Minor Arterial	Urban Minor Arterial
Floresta Drive	Bayshore Boulevard	Prima Vista Boulevard	Urban Minor Arterial from Prima Vista Boulevard to Airoso Boulevard and Urban Collector from Airoso Boulevard to Bayshore Boulevard	Urban Collector
	Prima Vista Boulevard	Port S. Lucie Blvd	Urban Minor Arterial	Urban Principal Arterial
	Port S. Lucie Blvd	Southbend Boulevard	Urban Minor Arterial	Urban Principal Arterial
Florida Turnpike	South City Limit	North City Limit	FIHS	FIHS
Gatlin Boulevard	I-95	Port St. Lucie Blvd	Urban Principal Arterial	Urban Principal Arterial
Glades Cut-Off Road (SLC)	Range Line Road	Midway Road	Urban Minor Arterial	Urban Minor Arterial
Gowin Drive	Port St. Lucie Boulevard	Westmoreland Blvd	NDA	Urban Collector
Grand Drive	Jennings Road	Walton Road	NDA	Urban Collector
Green River Parkway	Walton Road	Martin County Line	Urban Collector	Urban Minor Arterial
Heatherwood Boulevard	California Boulevard	Cashmere Boulevard	NDA	Urban Collector
Hillmoor Drive	Tiffany Avenue	Lennard Road	NDA	Urban Collector
Import Drive	Salvateirra Boulevard	Gatlin Boulevard	Urban Collector	Urban Collector
Indian River Drive	South City Limit	North City Limit	Urban Minor Arterial	Urban Minor Arterial
Interstate 95	South City Limit	North City Limit	FIHS	FIHS
Jennings Road	U.S. 1	Lennard Road	Urban Collector	Urban Minor Arterial

Local Name	From	To	Federal Functional Classification System	Port St. Lucie Functional Classification
Lennard Road	U.S. 1	Walton Road	Urban Minor Arterial	Urban Principal Arterial
	Walton Road	North City Limit	NDA	Urban Minor Arterial
LTC Parkway	Midway Road	Glades Cut-Off Road	NDA	NDA
Lyngate Drive	Veteran's Memorial Parkway	U.S. 1	Urban Collector	Urban Minor Arterial
Manville Drive	Selvitz Road	St. James Drive	NDA	Urban Collector
Mariposa Avenue	Lennard Road	Calais Street	Urban Collector	Urban Collector
Melaleuca Boulevard	Lennard Road	Green River Parkway	Urban Collector	Urban Principal Arterial
Midway Road[(1)]	West City Limit	McCarty Road	Rural Principal Arterial	NDA
	McCarty Road	East City Limit	Urban Principal Arterial	NDA
Morningside Boulevard	Lyngate Drive	River Vista Drive	Urban Collector to Westmoreland, Urban Local to end	Urban Collector
North Macedo Blvd	Selvitz Road	Bayshore Boulevard	NDA	Urban Collector
North Torino Parkway	Torino Parkway	West Blanton Road	Urban Collector	Urban Minor Arterial
Oakridge Boulevard	Bayshore Boulevard	Southbend Boulevard	Urban Collector	Urban Minor Arterial
Paar Drive	Rosser Boulevard	Darwin Boulevard	Urban Collector	Urban Principal Arterial
Peacock Boulevard	Cashmere Boulevard	St. Lucie West Boulevard	Urban Collector	Urban Principal Arterial
Port St. Lucie Boulevard	South City Limit	U.S. 1	Urban Principal Arterial	Urban Principal Arterial
Prima Vista Boulevard	Bayshore	U.S. 1	Urban Principal Arterial	Urban Principal Arterial
Range Line Road[(1)]	South City Limit	Midway Road	Urban Minor Arterial	Urban Minor Arterial
Rosser Boulevard	Gatlin Boulevard	Paar Drive	Urban Collector	Urban Collector
Savage Boulevard	Import Drive	Gatlin Boulevard	Urban Collector	Urban Collector
Savona Boulevard	Becker Road	California Boulevard	Urban Minor Arterial	Urban Principal Arterial

Local Name	From	To	Federal Functional Classification System	Port St. Lucie Functional Classification
Selvitz Road	Midway Road	Bayshore Boulevard	Urban Minor Arterial	Urban Principal Arterial
	Bayshore Boulevard	Floresta Drive	Urban Collector	Urban Principal Arterial
Southbend Boulevard	Becker Road	Floresta Drive	Urban Minor Arterial	Urban Principal Arterial
South Macedo Boulevard	Bayshore Boulevard	Thornhill Drive	NDA	Urban Collector
St. James Drive	Airoso Boulevard	Midway Road	Urban Principal Arterial	Urban Principal Arterial
St. Lucie West Blvd	I-95	Bayshore Boulevard	Urban Principal Arterial	Urban Principal Arterial
Thornhill Drive	Bayshore Boulevard	Floresta Drive	Urban Collector	Urban Minor Arterial
Tiffany Avenue	U.S. 1	Grand Drive	Urban Collector	Urban Collector
Tradition Parkway	Stony Creek Way	I-95	NDA	Urban Principal Arterial
Tulip Boulevard	Port St. Lucie Boulevard	Port St. Lucie Boulevard	Urban Collector	Urban Minor Arterial
U.S. 1	South City Limit	North City Limit	Urban Principal Arterial	Urban Principal Arterial
Veterans Memorial Parkway	U.S. 1	Port St. Lucie Boulevard	Urban Minor Arterial	Urban Principal Arterial
Village Green Drive	U.S. 1	Tiffany Avenue	Urban Collector	Urban Principal Arterial
Village Parkway	Crosstown Parkway	Becker Road	Urban Principal Arterial	Urban Principal Arterial
Walton Road	U.S. 1	Indian River Drive	Urban Minor Arterial	Urban Principal Arterial
Westcliffe Lane	SW Community Boulevard	Village Parkway	NDA	Urban Principal Arterial
Westmoreland Boulevard	U.S. 1	Port St. Lucie Boulevard	Urban Collector	Urban Minor Arterial
West Torino Parkway	West Blanton Road	California Boulevard	Urban Collector	Urban Minor Arterial

Source: FDOT, City of Port St. Lucie, 2012

NDA - No data available

(1) Not maintained by City of Port St. Lucie.

Appendix C: Beautification Policy Guidelines

PUBLIC WORKS BEAUTIFICATION POLICY GUIDELINES

CITY OF PORT ST. LUCIE, FLORIDA

PREPARED FOR

CITY OF PORT ST. LUCIE PUBLIC WORKS DEPARTMENT

JUNE, 2019

PREPARED BY

COTLEUR & HEARING

Cotleur & Hearing
1934 Commerce Lane · Suite 1 · Jupiter · Florida · 33458
561-747-6336 · Fax 561-747-1377 · Lic.# LC-C000239

CULPEPPER & TERPENING, INC
CONSULTING ENGINEERS | LAND SURVEYORS

Special Acknowledgements

The City of Port St. Lucie Beautification Policy was initiated by the Port St. Lucie Public Works Department, to accomplish the goals set by the City Council in the City Strategic Plan. The policy provides the framework for the addition of landscape beautification elements to public improvement projects. Cotleur & Hearing and Culpepper and Terpening, Inc., in collaboration with the Public Works Department, City Mangers Department, Neighborhood Services Department, Planning and Zoning Department, Parks and Recreation Department, and Utility Systems Department, acted as consultants for the City of Port St. Lucie. The policy document identifies the variables involved in the design of public landscape elements and provides the City flexibility when considering its application.

City Council:

Mayor Gregory J. Oravec
Vice Mayor Shannon M. Martin, District 3
Stephanie Morgan, District 1
John Carvelli, District 2
Jolien Caraballo, District 4

City of Port St. Lucie:

Patricia Roebling, P.E. City Engineer, Assistant City Manager
Roxanne M. Chesser, P.E., Interim Director, Public Works Department
John Dunton, Deputy Director, Public Works Department
In coordination with Neighborhood Services, Planning and Zoning,
Parks and Recreation, PSL Utility Systems

Landscape Architecture Consultant:

Cotleur & Hearing
1934 Commerce Lane · Suite 1 · Jupiter · Florida · 33458
561-747-6336 · Fax 561-747-1377 · Lic.# LC-C000239

Contact:
Daniel T. Sorrow, PLA, AICP, LEED AP BD+C

Engineering Consultant:

CULPEPPER & TERPENING, INC
CONSULTING ENGINEERS | LAND SURVEYORS
2980 South 25th Street, Fort Pierce, Florida 34981
151 SW Flagler Avenue, Stuart, Florida 34994
Phone (772) 464-3537 Fax (772) 464-9497 CT-ENG.COM

Contact:
Stef Matthes, P.E.

TABLE OF CONTENTS

Sections

List of Tables

List of Images

List of Graphics

List of Attachments

PORT ST. LUCIE BEAUTIFICATION POLICY GUIDELINES

Port St. Lucie, Florida

CULPEPPER & TERPENING, INC
CONSULTING ENGINEERS | LAND SURVEYORS

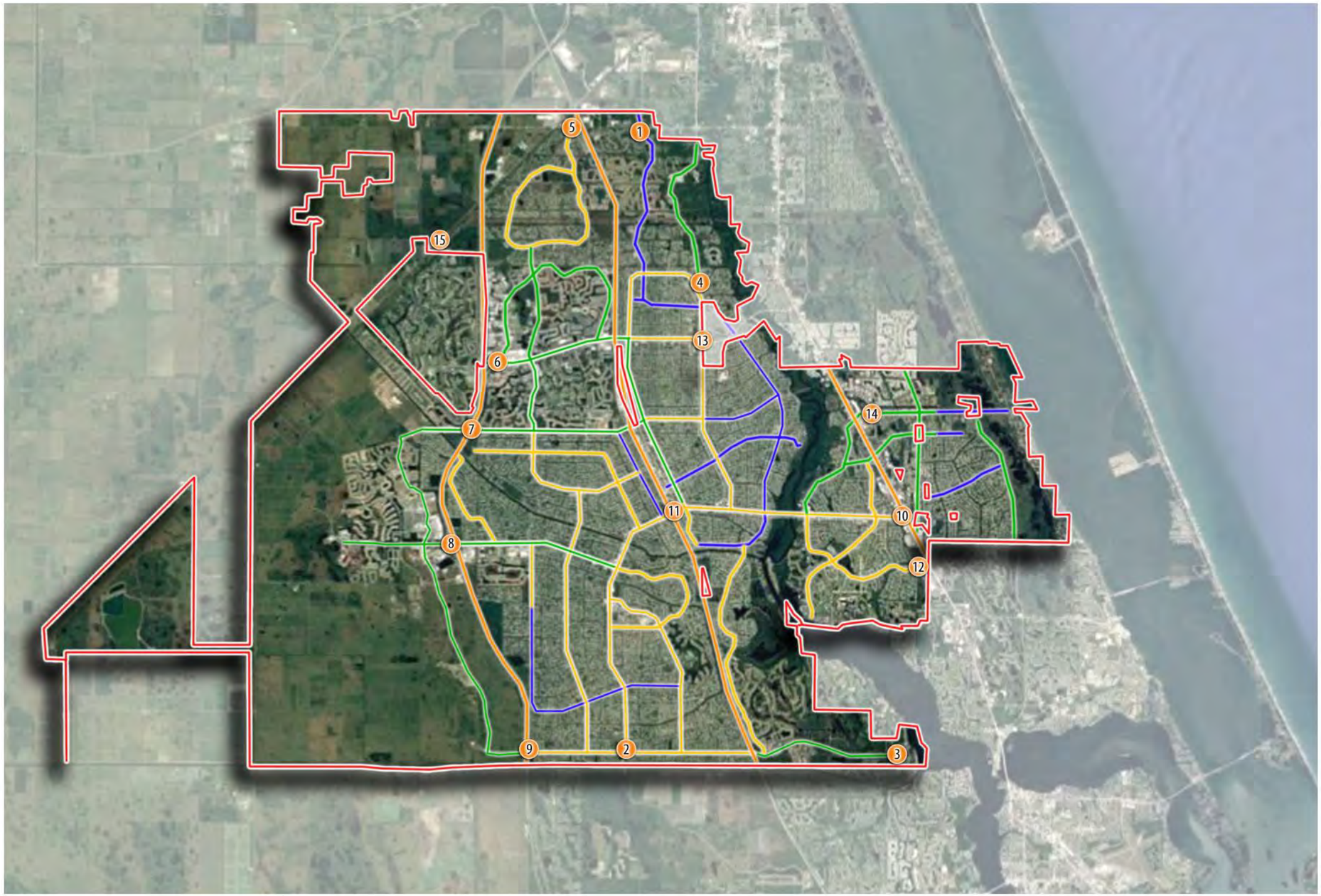
Cotleur & Hearing

KEY

- PORT ST. LUCIE BOUNDARY
- 80' RIGHT-OF-WAYS
- 100' RIGHT-OF-WAYS
- 150' RIGHT-OF-WAYS
- INTERSTATES/HIGHWAYS

CITY GATEWAYS

1. SELVITZ ROAD/ MIDWAY ROAD
2. PSL BOULEVARD/ CITRUS BOULEVARD
3. GILSON ROAD/ BECKER ROAD
4. ST. JAMES DRIVE/ AIROSO BOULEVARD
5. MIDWAY ROAD/ TORINO PARKWAY
6. I-95/ ST. LUCIE WEST BOULEVARD
7. I-95/ CROSSTOWN PARKWAY
8. I-95/ GATLIN BOULEVARD
9. I-95/ BECKER ROAD
10. US 1/ PORT ST. LUCIE BOULEVARD
11. TURNPIKE/ PORT ST. LUCIE BOULEVARD
12. US 1/ WESTMORELAND BOULEVARD
13. PRIMA VISTA BLVD/ AIROSO BLVD
14. WALTON ROAD/ VILLAGE GREEN DRIVE
15. COMMERCE CENTER DRIVE/ GLADES CUTTOFF ROAD



MASTER PLAN

1.0 Introduction

1.1 Overview

The purpose of this policy is to address landscaping issues associated with Action 1.3.2 of the City of Port St. Lucie Strategic Plan, which is the beautification component of the Strategic Plan. The following policy guidelines, typical landscape sections, and Landscape details were developed to be consistent with all codes and regulations from applicable agencies. The goal is to elevate the City of PSL to a new quality of life, improved safety for pedestrians and vehicles, increased property values, and a boost in business interest. The guiding documents and codes that were used in the creation of this policy, include the Port St. Lucie Land Development Code, Port St. Lucie Utilities Systems Code, St. Lucie County Fire District Code, FPL Right Tree Right Place, and Florida Department of Transportation/ American Association of State Highway and Transportation Officials Regulations. This policy document can serve as a guide for future city right-of-way improvement projects.

1.2 Health/Community Benefits

The benefits from having an enhanced streetscape within the City of Port St. Lucie are extensive and can potentially elevate the city's character and beauty. Increased vegetation and tree canopy coverage throughout the City will improve the air quality and prevent negative effects from runoff. In a growing city, with just under two hundred thousand residents, it is vital for there to be sufficient green space to counteract the negative effects of a variety of different pollutants, including noise pollution, air pollution, and water pollution. The aforementioned benefits will improve the City and increase residential/business interest.

Providing tree canopy coverage along sidewalks increases walkability by decreasing the surrounding air temperature. The net cooling effect of a healthy tree can be equivalent to ten (10) room-size air conditioners, with temperature differentials of 5 to 15 degrees. It is important to plan for the planting of trees along a sidewalk in the future if they are not planted when the sidewalk is constructed.

Vehicles contribute a majority of pollutants that affect the overall quality of life. Trees have the ability to filter out some of these air pollutants through their normal respiration, and buffer the noise associated with vehicle traffic. One acre of forest absorbs up to six (6) tons of carbon dioxide and puts out four (4) tons of oxygen per year, and urban street trees may absorb even more carbon dioxide. The city owns 158 miles of drainage rights-of-way. The stormwater runoff associated with these rights-of-way carries measurable levels of toxicity and can be harmful to every ecosystem present within the City of PSL. As the runoff collects and condenses so do the toxins and other materials picked up along the way. Providing vegetation along the roadways and drainage swales will not only help prevent erosion, it will filter this runoff water. Trees alone can absorb up to 60% of the precipitation from a rainfall event. By starting the filtration process at the source of the pollutant, runoff toxicity will be reduced before it has the opportunity to negatively impact the St. Lucie River. The river is an incredible resource to the City of Port St. Lucie and part of preserving that resource is planting responsibly and planting the right vegetation in the right place.

Attracting New Business

With a new streetscape, the properties along the enhanced right of ways would see an increase in value. Additionally, due to this increase in land value and the overall improvement of the City, businesses will recognize the opportunity to move to Port St. Lucie. A commonly used practice for municipalities to attract new business is the creation of a business improvement district. An initial investment is put towards improving the infrastructure of an area, this investment is rewarded by businesses investing in the area by opening stores within the improved area. Though a vast majority of the right of ways marked for improvement are residential, the impact will be seen within the commercial districts as well. With greater property values and interest from residential home buyers, businesses will recognize the growing opportunity within the City of PSL.

Residential Safety

Providing additional landscaping and canopy tree coverage along the City owned right of ways will increase the comfort and quality of life for the residents of Port St. Lucie. The new landscaping, designed with the goals, objectives, and policies of this report will improve vehicular safety by setting a standard for the city. Framing the roadways with trees and vegetation reduces the field of vision for traveling motorists, causing them to slow down. To achieve this safety goal, there are several factors to be considered: the vehicle conditions, the pedestrian conditions, and the landscaping around both. The policies outlined in this report provide for a city wide standard along these residential roadways that will increase the areas of visibility at intersections, reduce the vehicle and pedestrian conflict intersects, and create a scenery completely unique to the City of Port St. Lucie.

1.3 Tree Planting and Maintenance

In order for the trees to properly establish, there are several key factors including installation and maintenance to consider. First, utilizing trees that are best suited to the conditions that they are being planted in will increase their survival and produce the best look and most benefit to the City's residents. The City of Port St. Lucie has an extensive list of recommended trees which are very well suited to the area as a whole. However, picking the right tree involves more than geographical concerns. Factors such as moisture, sun light, and soil type must be considered when choosing species for a particular site.

When installing the trees, proper methodology shall be used to ensure each trees' survival. Due to site specific parameters, there may be a need for certain trees to be pruned on a regular frequency. This pruning shall be overseen by a certified arborist to ensure the trees survival. Additionally, there will need to be regular maintenance for all landscape material to ensure its continued health and beauty, as well as prevent any injury to Port St. Lucie residents from dead or dying plant material.

The primary concern for initiating this policy will be the tradeoffs between city aesthetic and the cost necessary to achieve it. One way to maximize the desired aesthetic and minimize the cost is by designing the streetscape using low maintenance vegetation. Places such as Indian River County and the City of Fort Pierce have installed streetscape designs centered around canopy trees surrounded by sod. This design creates a clean look and low maintenance costs. Another benefit to centering streetscape design around low maintenance canopy trees is reducing the burden put on property owners along specific right of ways that may require recommended

planting zones on private property. Currently within the City of Port St. Lucie, residents are required to maintain the drainage area within the right-of-way in front of their property. If residents plant landscape within the recommended planting zone, outlined by this policy, the property owner will be responsible for maintaining the landscape. For vacant lots it will continue to be the responsibility of the city to maintain any plantings in the rights-of-way.

Another issue within the city is the visibility restrictions caused by median landscaping. It is recommended that median shrub plantings be maintained at 18'' above the top of curb and not exceed 24'' tall. This recommended shrub height will remain consistent across all areas needing clear sight lines.

According to the Public Works Department, it costs the City of Port St. Lucie approximately $3,128.00 to maintain one acre of land. This includes the maintenance for medians, roundabouts, and areas within the right of ways that are directly adjacent to undeveloped land.

It is recommended that the landscape planted within private property or within the area between the property line and the edge of the roadway directly in front of residential properties along 60' rights-of-way is maintained by the property owner. Thus, the City's maintenance costs would not increase due to landscaping planted on private property or within the area in between the right-of-way line and the edge of the roadway. It is currently the responsibility of the property owner to maintain the swale located within the right of way. Landscaping can be planted within the rights-of-way provided it meets all clear zone criteria, sight distance criteria, and spacing from paved surface and utility requirements.

1.4 Canopy Loss, Tree Assessment/Inventory

Restoring the City of Port St. Lucie's canopy loss due to clearing activities and development in general is a major priority for the City. Out of this concern the City's tree giveaway program was born. The City has begun to give trees to residents in an effort to increase the canopy tree coverage lost due to development. The goal being one tree per resident, or approximately 190,000 trees. This program is very important for the future of the landscaping within city owned right of ways. As part of citizen participation, it is recommended that the tree giveaway program begin supplying street trees to residents along 60' rights-of-way that need to utilize private property recommended planting zones. This is recommended to be voluntary for the home owner. Part of the tree giveaway program is a GIS database of all the trees planted as part of the program. This is recommended to continue and incorporate street trees planted as part of right-of-way improvements.

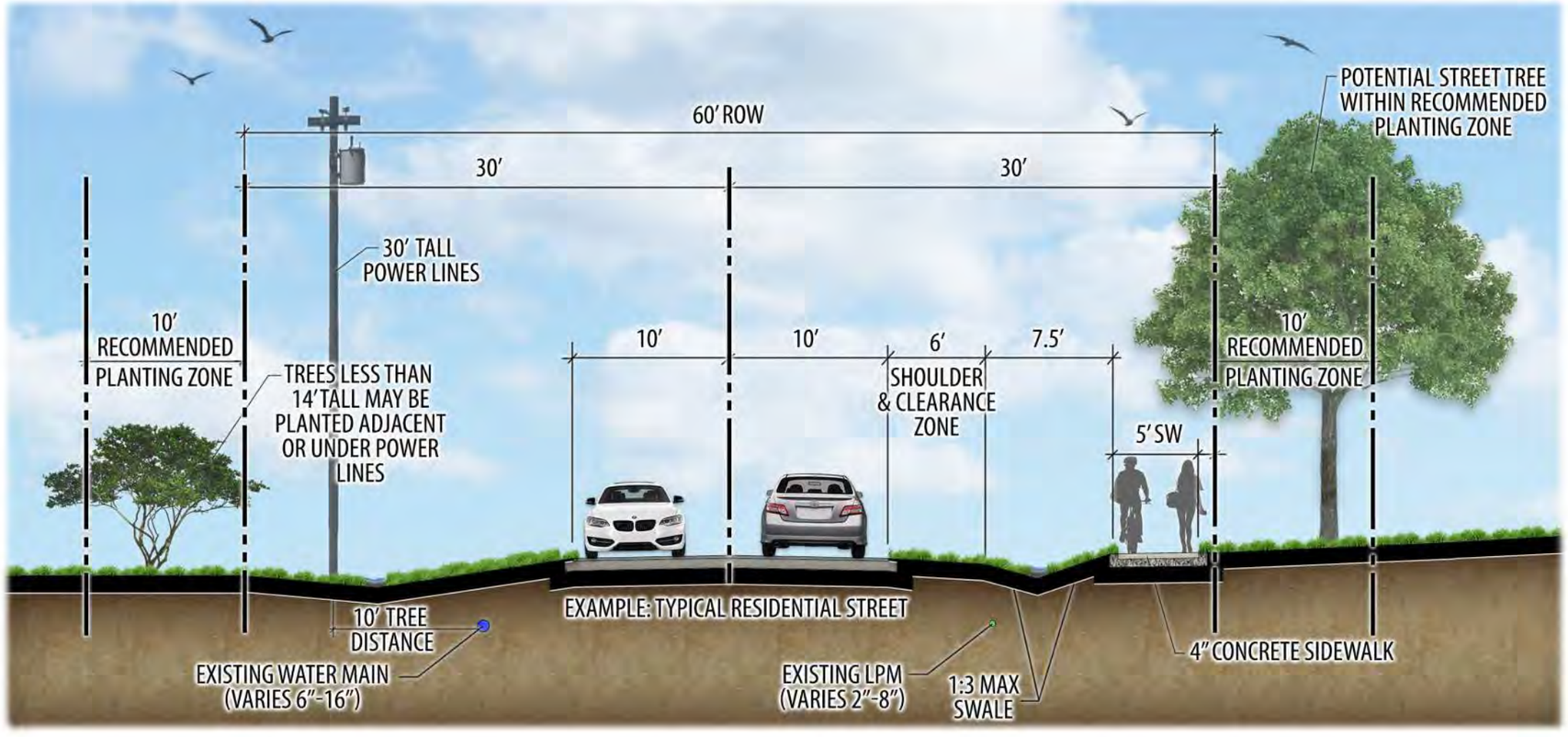
2.0 Design Considerations

2.1 60-foot Right-Of-Way Residential Street Design Options

1. The graphics below (Graphics 2-3) show how a typical 60-foot residential street could look with the addition of a side walk. With the restriction in plantable landscape areas due to the addition of a sidewalk there are two options available:

    - A 60-foot residential street with a sidewalk improvement would need to include a 10' recommended private property planting zone adjacent to both sides of the street, otherwise there would be no opportunity for landscaping (See Graphics 2-3). In conjunction with the Tree Giveaway Program, the City's Neighborhood Improvement & Community Engagement (NICE) program started by the Neighborhood Services Department, can recommend the street trees picked by each neighborhood. This would be voluntary by the residents of each community, but conditions would be in place if the residents should choose to accept the street tree giveaway. The first condition being, the tree shall be planted within the recommended planting zone and will not be moved out of it. The second condition being, the continued maintenance of the trees being given to residents will be the sole responsibility of the homeowner. Additional landscape within this 10' recommended planting zone will not be discouraged. Residents will not be restricted from planting their own landscaping within this 10' recommended planting zone, so long as it complies with the applicable planting regulations within this policy. The residents of all neighborhoods subject to these improvements will continue to be responsible for the maintenance of the right-of-way up to the edge of pavement on a residential street. It is recommended to have large canopy trees being planted at 40 feet on center and small trees planted at 30 feet on center.

    Note: Per these guidelines, landscaping may be restricted along all rights-of-way due to overhead powerlines. If powerlines are present in landscape area, small trees (grow to a height less than 14 feet) shall be the street tree. See Problem Solving section for guidance on potential issues.



FPL LANDSCAPE REQUIREMENTS	
TREE SIZE (HT')	SETBACK FROM POWERLINES
LARGE (40'+)	50' MINIMUM
MEDIUM (21'-40')	30' MINIMUM
SMALL (14' AND LESS)	CAN BE ADJACENT TO OR UNDER POLES
LARGE PALMS	MAXIMUM PALM FROND LENGTH PLUS 20'

PSL LANDSCAPE/UTILITIES/PUBLIC WORKS/ SLC FIRE REQUIREMENTS
TREES LESS THAN 20', PLANTED UNDER POWERLINES, CAN COUNT AS SHADE TREE 1:1
TREES SHALL NOT BE PLANTED WITHIN 10' OF ANY PSL UNDERGROUND UTILITY
TREES PLANTED CLOSER THAN 5' TO SIDEWALK OR STRUCTURE SHALL HAVE A ROOT BARRIER
TREES OVERHANGING ROADWAYS MUST HAVE A CLEARANCE OF 13'6'' AT MATURITY

60' EXISTING PLATTED AND CITY-OWNED RIGHT-OF-WAY SECTION

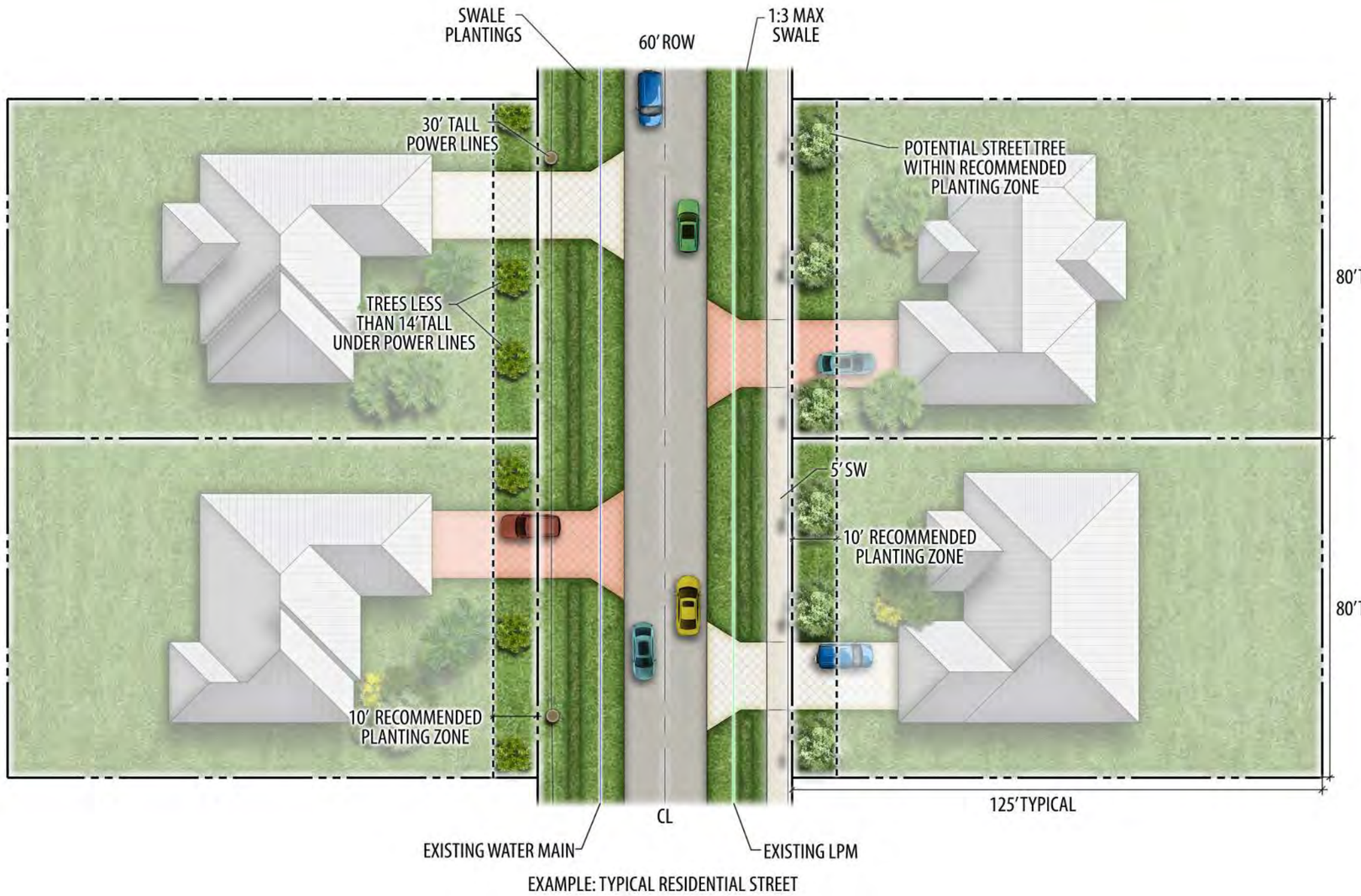
North

PORT ST. LUCIE BEAUTIFICATION POLICY GUIDELINES

Port St. Lucie, Florida

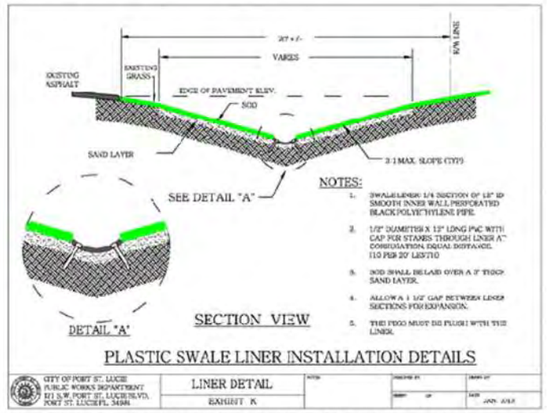
CULPEPPER & TERPENING, INC
CONSULTING ENGINEERS | LAND SURVEYORS

Cotleur & Hearing



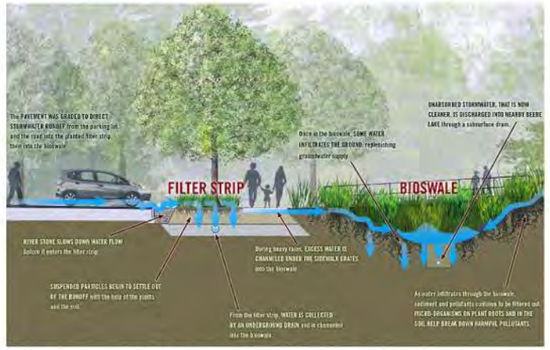
EXAMPLE: TYPICAL RESIDENTIAL STREET

CURRENT SWALE APPLICATION



HTTP://WWW.CITYOFPSL.COM/GOVERNMENT/DEPARTMENTS/PUBLIC-WORKS/COMMERCIAL-RESIDENTIAL-REVIEW-PERMITTING/COMMERCIAL

CITY PILOT PROGRAM BIOSWALE APPLICATION



HTTPS://WWW.SUSTAINABLECAMPUS.CORNELL.EDU/INITIATIVES/STORMWATER-MANAGEMENT

FPL LANDSCAPE REQUIREMENTS	
TREE SIZE (HT')	SETBACK FROM POWERLINES
LARGE (40'+)	50' MINIMUM
MEDIUM (21'-40')	30' MINIMUM
SMALL (14' AND LESS)	CAN BE ADJACENT TO OR UNDER POLES
LARGE PALMS	MAXIMUM PALM FROND LENGTH PLUS 20'

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TREES PLANTED CLOSER THAN 5' TO SIDEWALK OR STRUCTURE SHALL HAVE A ROOT BARRIER
TREES OVERHANGING ROADWAYS MUST HAVE A CLEARANCE OF 13'6'' AT MATURITY

North

60' EXISTING PLATTED AND CITY-OWNED RIGHT-OF-WAY TYPICAL PLAN VIEW

2.2 Sidewalk Expansion Projects

The graphics below (See Graphics 4-5) show how existing 80-foot and 100-foot rights-of-way can be improved to include sidewalks with properly designed landscaping. It is the intent of these graphics to provide the guidelines for planting along portions of existing rights-of-way that will be part of the master sidewalk program, and for those rights-of-way that already have sidewalks constructed. The installation of the designed landscaping shall not be made mandatory upon the installation of the sidewalk. This policy is to be used to design the right-of-way improvements, so landscape and irrigation can be installed at a future date.

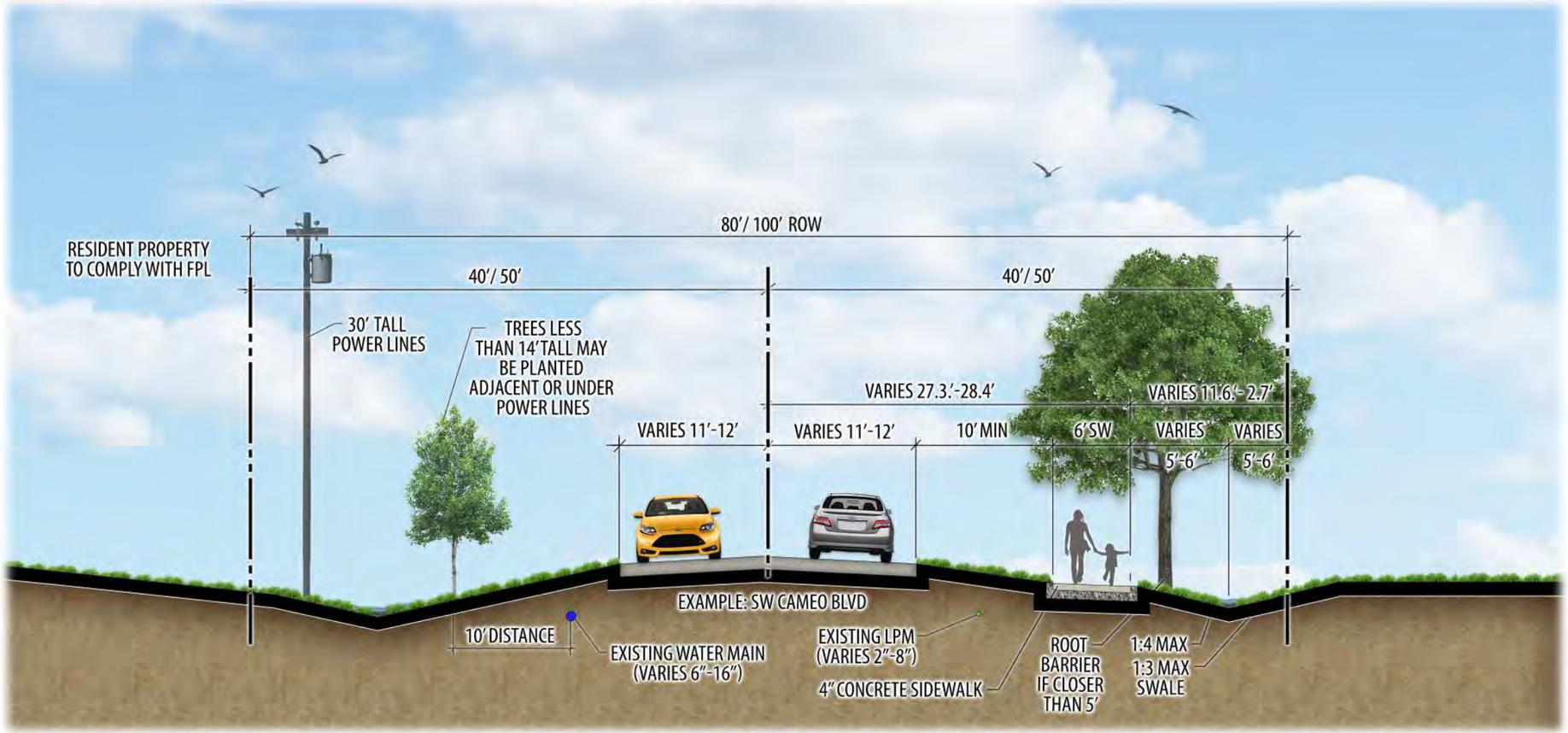
80/100-foot Rights-Of-Way

For existing 80 and 100-foot rights-of-way within the City, there are two different landscape sections to show the options for enhancement. The difference in the two sections are the quantity of plantings provided. A 100 linear foot section of the basic 80-foot right-of-way planting plan will include two (2) large canopy trees spaced at 40 feet on center and three (3) small trees spaced at 30 feet on center (See Graphic 4). This plan will cost approximately $84,480.00 per mile and includes the capital costs and installation costs of the trees. The more enhanced 80 and 100-foot right-of-way shows what additional landscaping could look like (See Graphic 5). The increased landscaping will add additional costs, but it is recommended that certain major intersections have more enhanced landscaping to signify a gateway and for safety purposes.

Pedestrian Amenities

It is recommended that certain pedestrian amenities be provided along Port St. Lucie sidewalk expansion projects. Such amenities include but are not limited to benches, trash receptacles, recycling receptacles, pet waste stations, and bike racks. These amenities will provide for a greater experience for Port St. Lucie residents, and reduce the potential for litter to collect along sidewalks (See Image 1). Landscaping around these amenities will be provided on a case by case basis and will be designed to be site specific for the location of amenities. It shall be noted that the example below represents a typical sidewalk pedestrian amenity and not a City detail. Future sidewalk pedestrian amenities should remain consistent and be located near bus stops where possible, but amenity areas should be designed on a case by case basis.

Image 1: Typical Pedestrian Amenities for Port St. Lucie Residents.



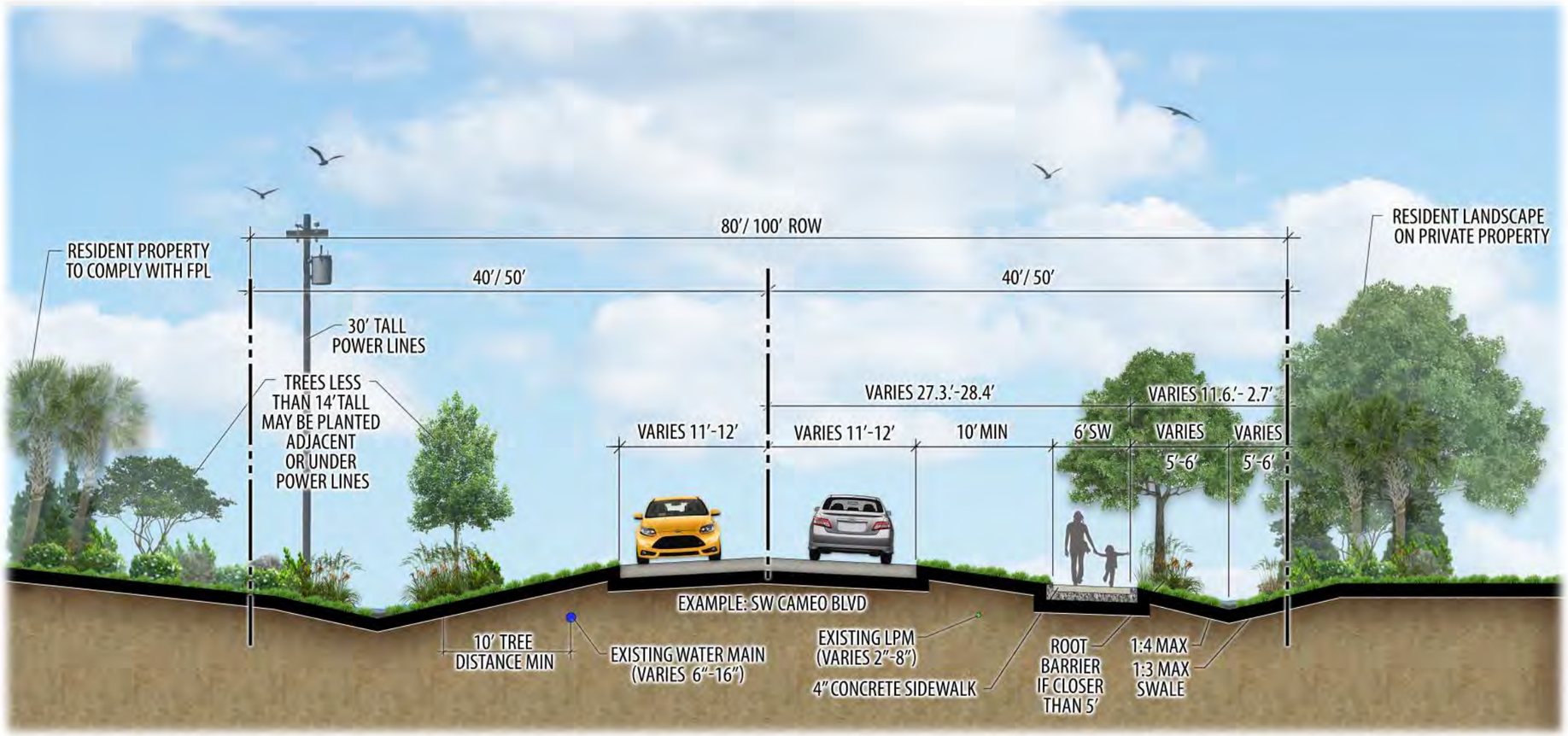
FPL LANDSCAPE REQUIREMENTS	
TREE SIZE (HT')	SETBACK FROM POWERLINES
LARGE (40'+)	50' MINIMUM
MEDIUM (21'-40')	30' MINIMUM
SMALL (14' AND LESS)	CAN BE ADJACENT TO OR UNDER POLES
LARGE PALMS	MAXIMUM PALM FROND LENGTH PLUS 20'

TYPICAL PEDESTRIAN SIDEWALK AMENITIES

PSL LANDSCAPE/UTILITIES/PUBLIC WORKS/ SLC FIRE REQUIREMENTS
TREES LESS THAN 20', PLANTED UNDER POWERLINES, CAN COUNT AS SHADE TREE 1:1
TREES SHALL NOT BE PLANTED WITHIN 10' OF ANY PSL UNDERGROUND UTILITY
TREES PLANTED CLOSER THAN 5' TO SIDEWALK OR STRUCTURE SHALL HAVE A ROOT BARRIER
TREES OVERHANGING ROADWAYS MUST HAVE A CLEARANCE OF 13'6'' AT MATURITY

80' / 100' EXISTING PLATTED AND CITY-OWNED RIGHT-OF-WAY SECTION

North



FPL LANDSCAPE REQUIREMENTS	
TREE SIZE (HT')	SETBACK FROM POWERLINES
LARGE (40'+)	50' MINIMUM
MEDIUM (21'-40')	30' MINIMUM
SMALL (14' AND LESS)	CAN BE ADJACENT TO OR UNDER POLES
LARGE PALMS	MAXIMUM PALM FROND LENGTH PLUS 20'

TYPICAL PEDESTRIAN SIDEWALK AMENITIES

PSL LANDSCAPE/UTILITIES/PUBLIC WORKS/ SLC FIRE REQUIREMENTS
TREES LESS THAN 20', PLANTED UNDER POWERLINES, CAN COUNT AS SHADE TREE 1:1
TREES SHALL NOT BE PLANTED WITHIN 10' OF ANY PSL UNDERGROUND UTILITY
TREES PLANTED CLOSER THAN 5' TO SIDEWALK OR STRUCTURE SHALL HAVE A ROOT BARRIER
TREES OVERHANGING ROADWAYS MUST HAVE A CLEARANCE OF 13'6'' AT MATURITY

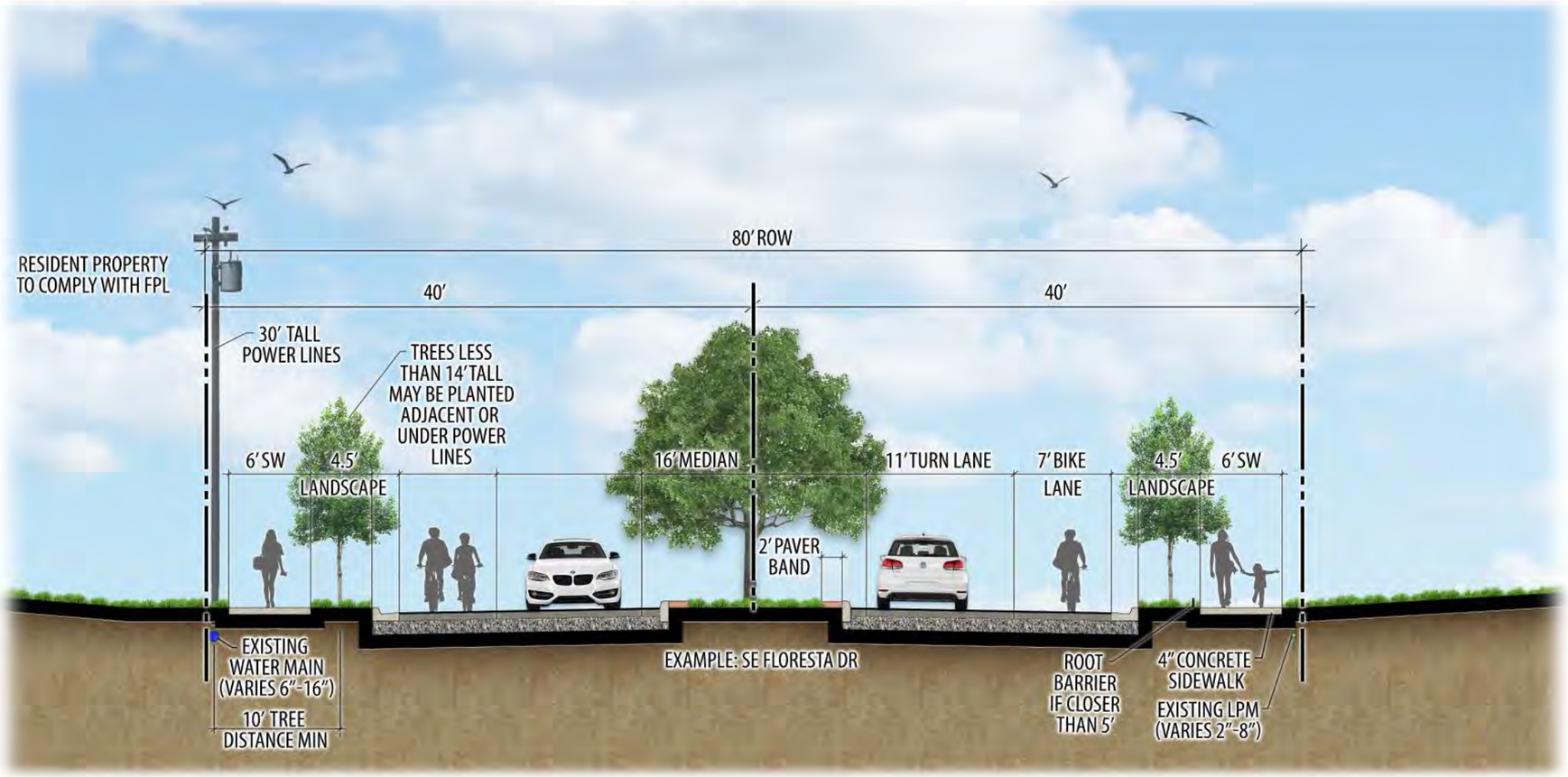
80'/ 100' EXISTING PLATTED AND CITY-OWNED RIGHT-OF-WAY SECTION ENHANCED

North

2.3 Right-Of-Way Improvements

For 80, 100, and 150-foot rights-of-way that will be improved within the City of Port St. Lucie, there are different levels of investment that will yield different aesthetics. Providing street trees and sod brings a clean aesthetic and keeps maintenance costs low (See Graphics 6-8). It is recommended that City gateways and intersections receive consideration for enhanced landscape. Enhanced landscape at intersections may increase the safety of PSL residents by reducing distractions associated with intersections (See Graphic 9).

It is recommended that all improved right-of-way medians be constructed with a 24-inch boarder. This boarder may improve safety conditions for motorists and City landscape crews by creating distance from the City landscape crews and traveling vehicles.



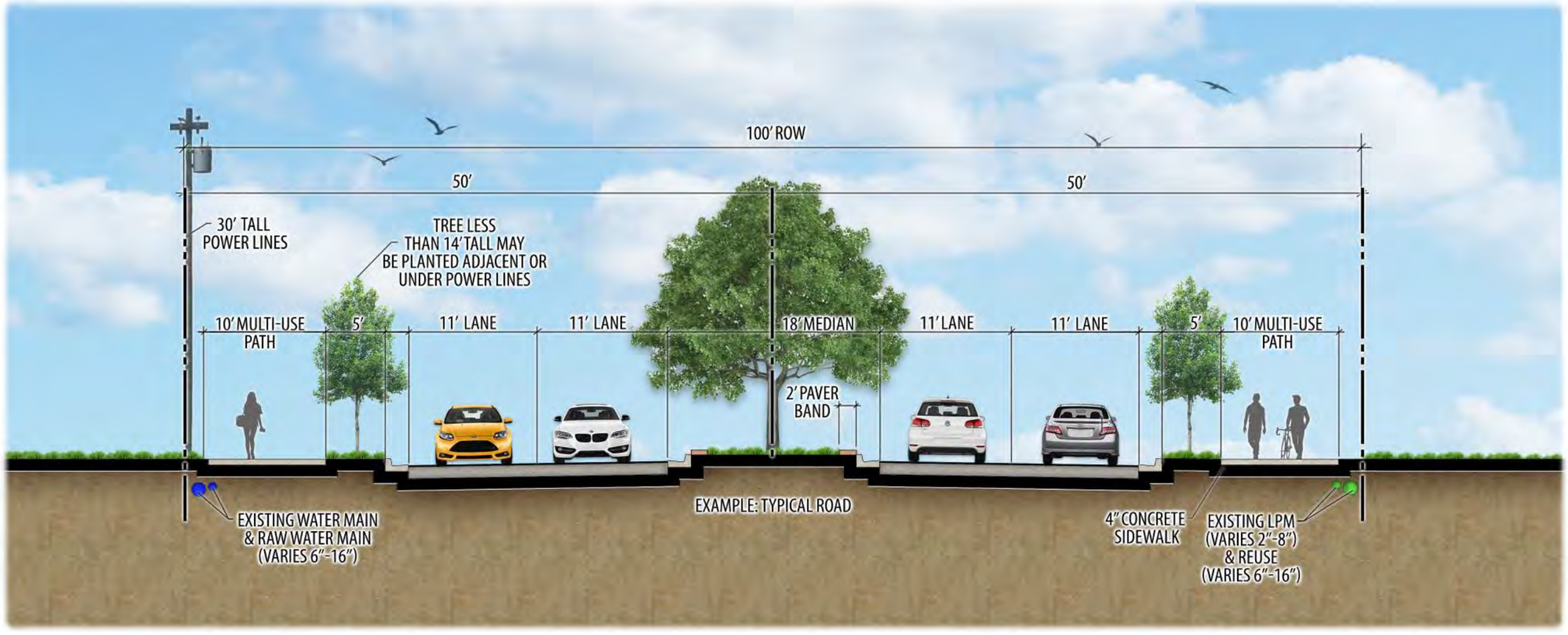
FPL LANDSCAPE REQUIREMENTS	
TREE SIZE (HT')	SETBACK FROM POWERLINES
LARGE (40'+)	50' MINIMUM
MEDIUM (21'-40')	30' MINIMUM
SMALL (14' AND LESS)	CAN BE ADJACENT TO OR UNDER POLES
LARGE PALMS	MAXIMUM PALM FROND LENGTH PLUS 20'

TYPICAL PEDESTRIAN SIDEWALK AMENITIES

PSL LANDSCAPE/UTILITIES/PUBLIC WORKS/ SLC FIRE REQUIREMENTS
TREES LESS THAN 20', PLANTED UNDER POWERLINES, CAN COUNT AS SHADE TREE 1:1
TREES SHALL NOT BE PLANTED WITHIN 10' OF ANY PSL UNDERGROUND UTILITY
TREES PLANTED CLOSER THAN 5' TO SIDEWALK OR STRUCTURE SHALL HAVE A ROOT BARRIER
TREES OVERHANGING ROADWAYS MUST HAVE A CLEARANCE OF 13'6'' AT MATURITY

80' EXISTING PLATTED AND CITY-OWNED RIGHT-OF-WAY SECTION

North



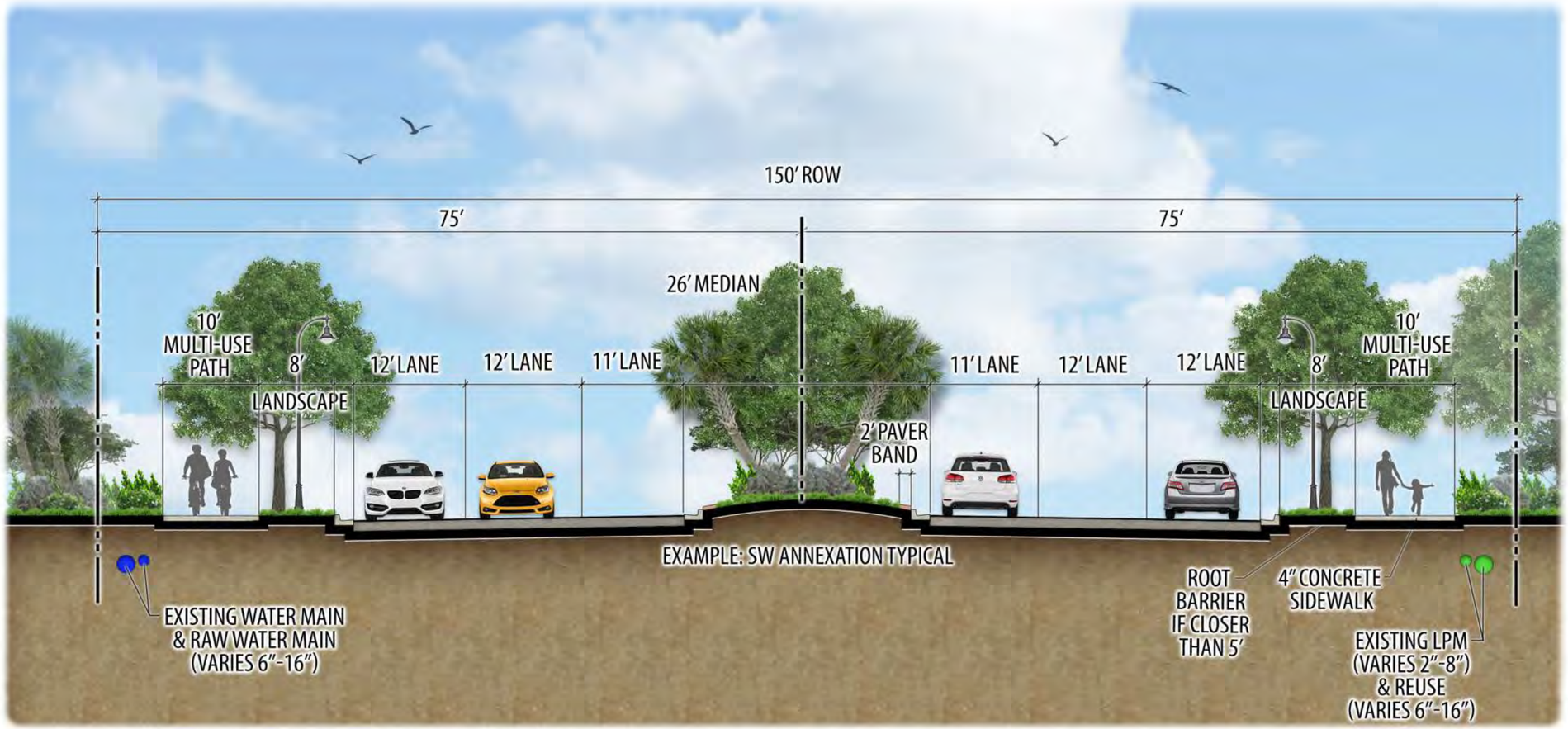
FPL LANDSCAPE REQUIREMENTS	
TREE SIZE (HT')	SETBACK FROM POWERLINES
LARGE (40'+)	50' MINIMUM
MEDIUM (21'-40')	30' MINIMUM
SMALL (14' AND LESS)	CAN BE ADJACENT TO OR UNDER POLES
LARGE PALMS	MAXIMUM PALM FROND LENGTH PLUS 20'

TYPICAL PEDESTRIAN SIDEWALK AMENITIES

PSL LANDSCAPE/UTILITIES/PUBLIC WORKS/ SLC FIRE REQUIREMENTS
TREES LESS THAN 20', PLANTED UNDER POWERLINES, CAN COUNT AS SHADE TREE 1:1
TREES SHALL NOT BE PLANTED WITHIN 10' OF ANY PSL UNDERGROUND UTILITY
TREES PLANTED CLOSER THAN 5' TO SIDEWALK OR STRUCTURE SHALL HAVE A ROOT BARRIER
TREES OVERHANGING ROADWAYS MUST HAVE A CLEARANCE OF 13'6'' AT MATURITY

100' EXISTING PLATTED AND CITY-OWNED RIGHT-OF-WAY MEDIAN SECTION

North

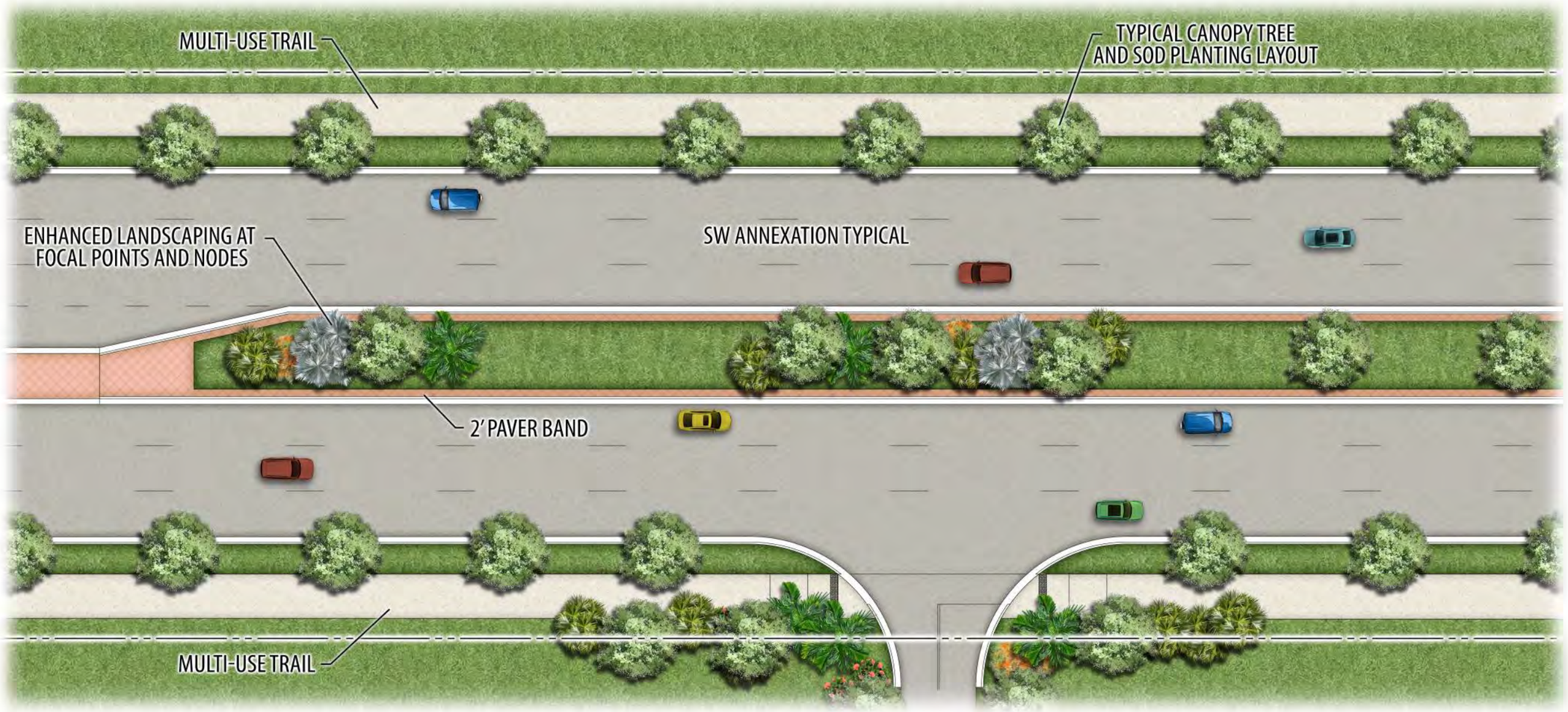


TYPICAL PEDESTRIAN SIDEWALK AMENITIES

PSL LANDSCAPE/UTILITIES/PUBLIC WORKS/ SLC FIRE REQUIREMENTS
TREES LESS THAN 20', PLANTED UNDER POWERLINES, CAN COUNT AS SHADE TREE 1:1
TREES SHALL NOT BE PLANTED WITHIN 10' OF ANY PSL UNDERGROUND UTILITY
TREES PLANTED CLOSER THAN 5' TO SIDEWALK OR STRUCTURE SHALL HAVE A ROOT BARRIER
TREES OVERHANGING ROADWAYS MUST HAVE A CLEARANCE OF 13'6'' AT MATURITY

North

150' EXISTING PLATTED AND CITY-OWNED MEDIAN RIGHT-OF-WAY SECTION ENHANCED



150' EXISTING PLATTED AND CITY-OWNED RIGHT-OF-WAY PLAN ENHANCED (PLAN VIEW)

North

Guidance for Landscape Placement

The three primary right-of-way widths that are either being constructed or planned to be improved are the 80-foot, 100-foot, and 150-foot (See Graphics 6-9). The landscape options allowed by the guiding documents for the three (3) rights-of-way are all very similar. The primary concerns being the location of overhead powerlines, proximity to underground utilities, and clear line of sight. It is recommended that special consideration be given to the City gateways. It may be beneficial for these areas to have enhanced landscape to signify the entrance into Port St. Lucie (See Graphic 1).

Overhead Powerlines

Rights-of-way that have buried powerlines will have reduced conflicts with overhead powerlines and large canopy trees can be consistently used. However, for those rights-of-way with powerlines, there will likely be instances where one or both sides of the right-of-way have overhead powerlines. In these situations, the landscape along this side of the right-of-way must conform to the guidelines set out in the policy to not have a tree taller than 14 feet closer than 30 feet to the powerlines.

Utility Setbacks

Another concern for right-of-way improvement projects will be the utility setback distance of 10 feet from any water or sewer line. Additionally, no landscape except for Sod grasses can be located within 5 feet of any PSLUSD appurtenance such as a water meter assembly, backflow device, fire hydrant or sewer cleanout. Unique situations may exist on rights-of-way to be improved, existing utilities must be identified to ensure that street trees are not planted over them.

Clear Line of Sight/ Lateral Offsets

When designing the landscape for right-of-way improvements careful consideration must be paid to both clear line of sight concerns and lateral offsets from the roadways. As detailed in this policy document sight triangles must be provided at intersections of all roadways in accordance with FDOT regulations. Field adjustments may be necessary to accommodate unique situations. Along curbed roadways lateral offsets shall be incorporated into the design as dictated by the speed limit, in accordance with FDOT regulations (See Graphic 10).

Round-a-bout Construction

When designing round-a-bouts within the City of Port St. Lucie, landscape shall be incorporated at the beginning of the design process. Not only will this save cost when installing landscaping, it will improve safety conditions of the round-a-bout. FDOT standards require all landscaping to be installed at the time of construction to prevent drivers from approaching the round-a-bout too quickly. Enhanced landscapes at round-a-bout and intersections should be installed on a case by case basis to improve the safety of Port St. Lucie rights-of-way (See Graphic 11). Round-a-bouts may also provide a location for the placement of public artwork.

TYPICAL 30 MPH POSTED SPEED ROAD

FL GREEN BOOK CLEARZONE AND LATERAL OFFSETS FOR TREES								
Type of Facility	DESIGN SPEED (mph)							
	25 and Below	30	35	40	45	50	55	60 and Above
	MINIMUM CLEAR ZONE (feet)							
Flush Shoulder ***	6	6 Local 10 Collectors 14 Arterials	6 Local 10 Collectors 14 Arterials	10 Collectors 14 Arterials	14 Arterials and Collectors ADT < 1500 18 Arterials and Collectors ADT ≥ 1500	14 Arterials and Collectors ADT < 1500 18 Arterials and Collectors ADT ≥ 1500	18 Arterials and Collectors ADT < 1500 24 Arterials and Collectors ADT ≥ 1500	18 Arterials and Collectors ADT < 1500 30 Arterials and Collectors ADT ≥ 1500
Curbed*	1 ½	4**	4**	4**	4**	N/A ****	N/A****	N/A****

* From Face of Curb

** On projects where the 4 foot minimum offset cannot be reasonably obtained and other alternatives are deemed impractical, the minimum may be reduced to 1 ½'
on rural section.

**** Curb and gutter not to be used on facilities with desighn speed > 45 mph

Note: ADT in Table refers to Design Year ADT

DESCRIPTION	SPEED (MPH)													
	30		35		40		45		50		55		60	
TREE DIAMETER	DIAMETER AT BREAT HEIGHT(INCHES)													
WITHIN LIMITS OF SIGHT WINDOW	>4≤11	>11≤18	>4≤11	>11≤18	>4≤11	>11≤18	>4≤11	>11≤18	>4≤11	>11≤18	>4≤11	>11≤18	>4≤11	>11≤18
	DISTANCE (FEET)													
MINIMUM SPACING (C. TO C. OF TRUNK)	22	91	27	108	33	126	40	146	45	165	52	173	60	193

PASSENGER VEHICLE	
DESIGN SPEED	DISTANCE
30	335
35	390
40	445
45	500
50	555
55	610
60	665
65	720

TYPICAL SITE TRIANGLE AND CLEAR ZONE REGULATIONS

North

NOTES:

*LANDSCAPE SHALL BE INSTALLED CONCURRENT WITH THE CONSTRUCTION OF THE ROUNDABOUT

*ROUNDABOUT PLANT MASSINGS ENHANCED TO REDUCE MOWING REQUIREMENTS

NTS

North

EXISTING PLATTED AND CITY-OWNED TYPICAL ROUNDABOUT PLAN & SECTION

2.4 City Park Planting

To create a seamless transition between the streetscape and all of the City Public Parks there will need to be consistency in design. The streetscape design will need to compliment the City's parks and provide some transitions into them if necessary. The goal is to highlight the presence of the park without creating an inconsistency in the street landscaping. Public parks are often comprised mostly of native vegetation. This means plantings such as Live Oak (Quercus virginiana), slash pine (Pinus elliottii), saw palmetto (Serenoa repens), and sabal palms (Sabal palmetto) may be needed. These species can be worked into the streetscape corridor plan for a harmonious and blended landscape park/design. This design recommendation is not mandatory.

2.5 Drainage Swales

Shown below is a standard detail for the City of Port Saint Lucie (See Image 2). This 20+/- foot drainage swale is lined with Bahia sod grass, and there is a plastic liner that is installed at the base of the swale. The purpose of this drainage infrastructure is to direct runoff from yards and roads away from homes within the community and prevent flooding. However, the minor ecological treatment this runoff may receive before it enters the ecosystems of the area is not enough to significantly reduce its impacts. Planting native, water-loving vegetation within these drainage swales will increase the level of filtering the runoff receives before it is channeled away through the City of PSL's 1600 miles of drainage swales. By starting this policy change, the city may gain immediate aesthetic elements with the increased native vegetation, as well as long term benefits impacting the ecosystems that depend on clean water and the St. Lucie River.

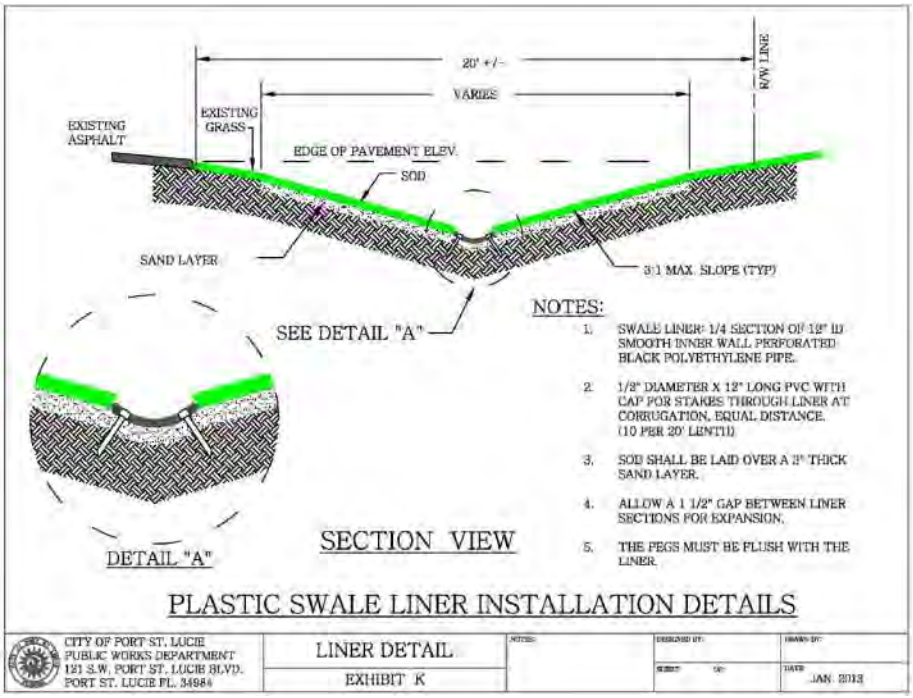


Image 2: Port St. Lucie Standard Swale Liner Detail

Image 3: Installation of a Standard Drainage Swale within PSL

Creating a bioswale system has numerous benefits for the City. It will enhance the aesthetic quality of the City and will bring a more modern and sustainable approach to planning the future of Port St. Lucie. Another benefit that additional vegetation within the drainage swales will provide is increased habitat for native species historically present throughout Port St. Lucie; which have since been pushed out due to development. Bioswales, with enhanced planting, offer an environmentally friendly alternative to the more traditional trench used today and create greater harmony between Port St. Lucie residents and the important wildlife (See Graphic 3).

Image 4: Examples of Bioswales

When planted with water loving and native grass species; drainage swales require very little maintenance. Currently within the City of Port St. Lucie residents are responsible for maintaining the drainage swales within their property. This practice would continue with the updated bioswales. Other than mowing around the bioswale, there would be minimal routine maintenance expenses. It is recommended to have semi-annual removal of unwanted/invasive species from the bioswale. The city has instituted a pilot program to understand the feasibility and costs associated with the installation and maintenance of a bioswale. The pilot program will be conducted on City owned property and will be expanded if the results of the test are favorable.

2.6 Neighborhood Branding

Typical Landscape Entry Signage

As outlined in the City of Port St. Lucie Strategic Plan, a goal for the City and many of the residents is to identify and brand the neighborhoods within the City. The Neighborhood Services Department through the Neighborhood Improvement & Community Engagement Program (NICE Program) has identified 27 distinct neighborhoods within the City. Some of these neighborhoods already have names and entry signage, but many do not. Based on their location within the city there are a variety of different signs and plant pallets that can be explored to provide a sense of identity at the entrance to these neighborhoods (See Graphic 12). It is recommended that input from residents be taken into consideration when designing entry features for the identified neighborhoods.

Neighborhood Planting

The Neighborhood Services Department can utilize this beautification policy to discuss the street tree pallet for individual neighborhoods. With the help of neighborhood focus groups, street trees can work with entry signage designs to brand neighborhoods and provide a sense of place for the residents. It is recommended the selection of street trees along the residential streets of the identified neighborhoods be done with input from neighborhood focus groups. It is also recommended some street trees planted within the residential rights-of-way and recommended private property planting zones be donated to property owners through the Neighborhood Services Department's tree giveaway program. This policy will reaffirm the City's commitment to providing an increase in canopy coverage throughout the City, provide increased community involvement, and reduce City maintenance costs associated with landscape improvements.

EXISTING SIGN INSTALLATIONS

NEIGHBORHOOD SIGNAGE

3.0 Problem Solving

When developing this landscape policy (specifically for the 60', 80', and 100' rights-of-way), there are several codes and standard practices that need to be referenced to ensure public safety and compliance. The primary regulations that were examined when developing this landscape policy include City of Port St. Lucie Utilities Code (PSLUSD), City of Port St. Lucie Land Development Landscape Code (PSLLDC), St. Lucie County Fire District Code, Florida Power and Light (FPL) Right Tree Right Place, and Florida Department of Transportation (FDOT). However, the primary concerns when examining this policy implementation are the tradeoffs between a simple design and an enhanced design. A cost benefit analysis must be done to ensure maximum effectiveness while not exceeding the City's budget capacity, and to provide for low future maintenance costs.

3.1 Conflicts with FPL

To assist in the development of this landscape policy and design for the City of Port St. Lucie, FP&L's Right Tree Right Place document and the City's existing powerline conditions were analyzed. A vast majority of Port St. Lucie's rights-of-way are lined with overhead powerlines. One design scenario that will face future right-of-way enhancement projects will be the location of these overhead powerlines. To utilize large canopy trees for sidewalk shade cover, it is suggested that whenever possible, the sidewalk be located opposite of any overhead powerlines. Large canopy trees must be located at minimum 50 feet from any overhead powerlines, measured from the trunk. It is anticipated that sidewalks will not always be constructed opposite of overhead powerlines. In these instances, the street tree planted next to the sidewalk needs to be less than 14 feet tall. (See Table 1)

OVERHEAD POWERLINE LANDSCAPE SETBACK REQUIREMENTS	
TREE SIZE (Ht)	SETBACK FROM POWERLINES
LARGE (40'+)	50' MINIMUM
MEDIUM (21'-40')	30' MINIMUM
SMALL (14' AND LESS)	10' MINIMUM FROM POLE
LARGE PALMS	MAXIMUM PALM FROND LENGTH PLUS 10'

Table 1: Overhead Powerline Landscape Setback Requirements
Note: Due to constantly evolving codes and standards this may need to be updated in the future.

3.2 City Separation Requirements

To ensure code compliance, current PSL Utility codes, Ch.154 of the PSL Code of Ordinances, and St. Lucie County Fire codes were reviewed. The designs included in this document were created with these codes in mind, but in some circumstances do not lend themselves to the best design or the best practices, from a landscape and urban design perspective.

Planning and Zoning:

The primary concern regarding street trees from a Planning and Zoning Department standpoint are the tree separation requirements. The maximum spacing for large canopy trees is 50-60 feet, medium trees 40-50 feet, small trees 30-40 feet. It shall be noted that these are the maximums set out by the code. It is recommended that the distance for tree spacing be 40 feet for large trees and 30 feet for small trees.

Utilities:

The primary concern for the Utility Systems Department is the setback distance for any PSLUSD owned utility line. No tree shall be planted closer than 10 feet to a water or sewer line and no landscaping other than sod grasses shall be located within 5 feet of a PSLUSD appurtenance such as a water meter assembly, backflow device, fire hydrant or sewer cleanout.

Public Works:

The primary concerns for Public Works Department is going to be the setback distance from sidewalks and other right-of-way improvements. Large canopy trees such as Live Oaks (*Quercus virginiana*) have large root systems that can potentially impact paved areas such as sidewalks and even roads. The minimum recommended planting distance from paved or concrete areas is 5 feet. Root barriers may be required if street trees are planted closer than 5 feet to a paved or concrete sidewalk.

St. Lucie County Fire:

The St. Lucie County Fire District is primarily concerned with the proper maintenance of street trees. Any tree overhanging a roadway must be kept no less than 13 feet 6 inches above the road. This is to facilitate the passing of fire truck and ambulances without being impeded by low hanging branches.

PSL PLANNING AND ZONING/ UTILITIES/ PUBLIC WORKS/ FIRE DEPARTMENT REQUIREMENTS
STREET TREE MAXIMUM SPACING, LARGE 50-60, MEDIUM 40-50, SMALL 30-40
TREES SHALL NOT BE PLANTED WITHIN 10' OF ANY PSL UNDERGROUND UTILITY
TREES PLANTED CLOSER THAN 5' TO SIDEWALK OR STRUCTURE SHALL HAVE A ROOT BARRIER
TREES OVERHANGING ROADWAYS MUST HAVE A CLEARANCE OF 13'6"

Table 2: PSL Planning and Zoning, Utilities, Public Works, Fire Requirements

3.3 Recommended Private Property Planting Zone

Due to overhead powerlines, City utilities, and clear zones, there are reductions in allowable planting area within the City's residential streets (60' rights-of-way). A solution to this problem is a 10' recommended private property planting zone located along the resident's property that fronts the right-of-way. A 10' recommended planting zone would allow the residents to plant outside the right-of-way. The 10' recommended planting zone would allow for residents of Port St. Lucie to

have an identifiable streetscape, and this will provide greater options for tree selection along each right-of-way. Designating a 10' recommended private property planting zone is completely voluntary on behalf of the residents and can help to establish a defined look for a community street.

3.4 Tree Selection

The City of Port St. Lucie has a list of suggested trees. Attached to this document is that list. After review of the landscape code, and the list of suggested trees it is recommended that the trees used within the City's rights-of-way remain consistent with the suggested list.

3.5 FDOT Regulations

When planting landscape next to an FDOT owned right of way, there are several factors that need to be accounted for: clear zones, lateral offsets, and intersection sight triangles are the most important factors to consider. The purpose of these areas is to prevent vehicle to vehicle and vehicle to pedestrian accidents. The City of Port St. Lucie follows a majority of these rules when designing and reviewing projects. However, Port St. Lucie has not adopted FDOT regulations into the City code. This policy document recommends that full consideration be given to each of these safety standards when installing landscaping within City owned rights-of-way.

Intersection Sight Triangles

The purpose of a sight triangle is to ensure that there is a clear line of sight for a certain distance based on the design speed of the road. Within this triangle there can be shrubs, groundcovers, and trees, but the trees, depending on their diameter, need to be spaced a certain distance apart. For example, on a two lane: two way right of way with a speed limit of 30 miles per hour, there needs to be a sight triangle measuring 14.5' from the edge of the travel lane and extending 355' in either direction. (Please see Table 3/ Image 5)

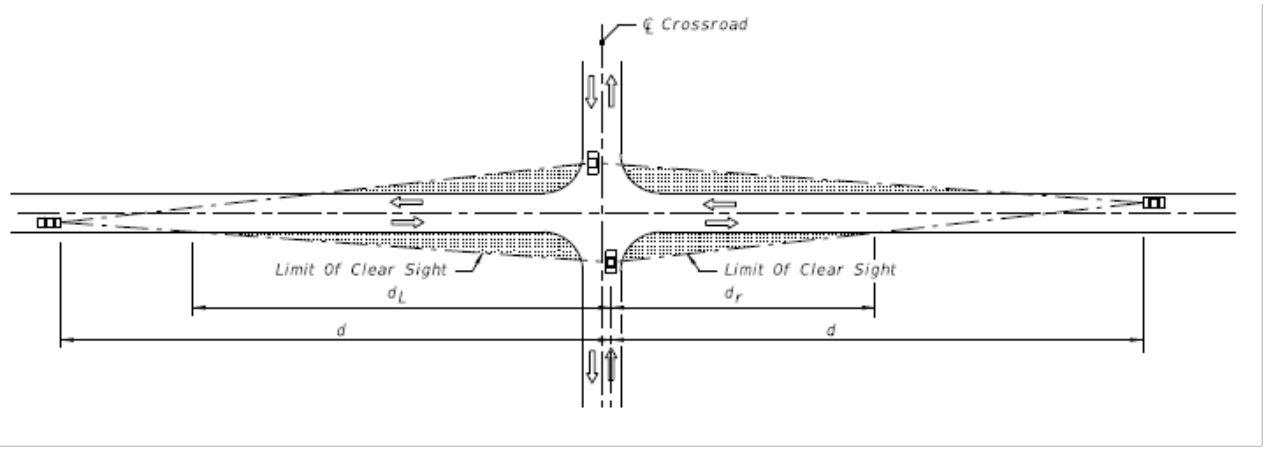


Image 5: FDOT Sight Distance Triangles

PASSENGER VEHICLE SIGHT DISTANCE TRIANGLE DIMESNISON	
DESIGN SPEED (MPH)	DISTANCE (FEET)
30	335
35	390
40	445
45	500
50	555
55	610
60	665
65	720

Table 3: Sight Distance Regulations for Passenger Vehicles. All sight triangles must be measured using a 14.5' setback from the edge of the travel lane.

DESCRIPTION	SPEED (MPH)													
	30		35		40		45		50		55		60	
TREE DIAMETER	DIAMETER AT BREAT HEIGHT(INCHES)													
WITHIN LIMITS OF SIGHT WINDOW	>4≤11	>11≤18	>4≤11	>11≤18	>4≤11	>11≤18	>4≤11	>11≤18	>4≤11	>11≤18	>4≤11	>11≤18	>4≤11	>11≤18
	DISTANCE (FEET)													
MINIMUM SPACING (C. TO C. OF TRUNK)	22	91	27	108	33	126	40	146	45	165	52	173	60	193

Table 4: Tree Separation within Sight Triangles

Lateral Offsets

A Lateral offset is the distance from a specified point on the roadway to a roadside hazard, such as a tree. The regulations for safe roadways has specific criteria for lateral offsets based on the type of road, design speed, and the type of landscaping. For example, a two lane: two-way right-of-way with a design speed of 30 mph and curbing along the length of the road, will require a 1.5ft lateral offset from the face of the curb. Given the same criteria but with a 40-mph design speed, the lateral offset would be 4ft. However, trees with a 4" caliper measured at 6" above grade, can be located within the lateral offset. (Please see Table 5)

Clear zones

Clear zones are provided in an attempt to provide sufficient recoverable slope to the side of a roadway for an errant vehicle to regain control. This means that there must be a specific width adjacent to the roadway that is dependent upon the design speed of that roadway. For example, a two lane: two-way roadway without curbing (like a majority of the 60' right of ways within PSL), with a design speed of 30 mph, will need to have a 6' wide clear zone running parallel on either side. Within this clear zone there cannot be any trees. (Please see Table 5)

FL GREEN BOOK CLEARZONE AND LATERAL OFFSETS FOR TREES								
Type of Facility	DESIGN SPEED (mph)							
	25 and Below	30	35	40	45	50	55	60 and Above
	MINIMUM CLEAR ZONE (feet)							
Flush Shoulder ***	6	6 Local 10 Collectors 14 Arterials	6 Local 10 Collectors 14 Arterials	10 Collectors 14 Arterials	14 Arterials and Collectors ADT < 1500 18 Arterials and Collectors ADT ≥ 1500	14 Arterials and Collectors ADT < 1500 18 Arterials and Collectors ADT ≥ 1500	18 Arterials and Collectors ADT < 1500 24 Arterials and Collectors ADT ≥ 1500	18 Arterials and Collectors ADT < 1500 30 Arterials and Collectors ADT ≥ 1500
Curbed*	1 ½	4**	4**	4**	4**	N/A ****	N/A****	N/A****

* From Face of Curb

** On projects where the 4 foot minimum offset cannot be reasonably obtained and other alternatives are deemed impractical, the minimum may be reduced to 1 ½'

*** Use rural for urban facilities when no curb and gutter is present. Measured from the edge of through travel lane on rural section.

**** Curb and gutter not to be used on facilities with desighn speed > 45 mph

Note: ADT in Table refers to Design Year ADT

Table 5: FL Green Book Clearzone and Lateral Offsets for Trees

3.6 Unique Situations

When designing the future improvements to the City of Port St. Lucie's rights-of-way, there are unique landscape situations that these policy Guidelines can aid in finding solutions. These situations may include conflicts with City utilities, overhead powerlines, and clear line of sight. When designing the landscape for these areas, and subsequently the hardscape, thought must be given to the placement of the trees selected. The design of the sidewalks in particular should take into consideration the landscape elements.

3.7 Liability

The residents of Port St. Lucie that live along 60-foot rights-of-way with sidewalks and plant within the 10' recommended planting zone, will not be held liable for any damages done to the sidewalks or swales. So long as, canopy trees are not planted closer than 5 feet to said sidewalk, as recommended in this policy. Since the trees will be planted within the recommended planting zone, the responsibility of repairing the sidewalks is the burden of the City. Residents will continue to be encouraged to report any damages done to the sidewalks, especially the sidewalk that is directly in front of their property, for the safety and wellbeing of others. It shall be noted that individual residents will not be responsible for the reporting of damage, but their participation in such matters may expedite repairs. Residents will maintain the landscape within the right-of-way in front of their property.

4.0 Estimated Costs

4.1 Landscape Estimate for 60-foot Right-Of-Way

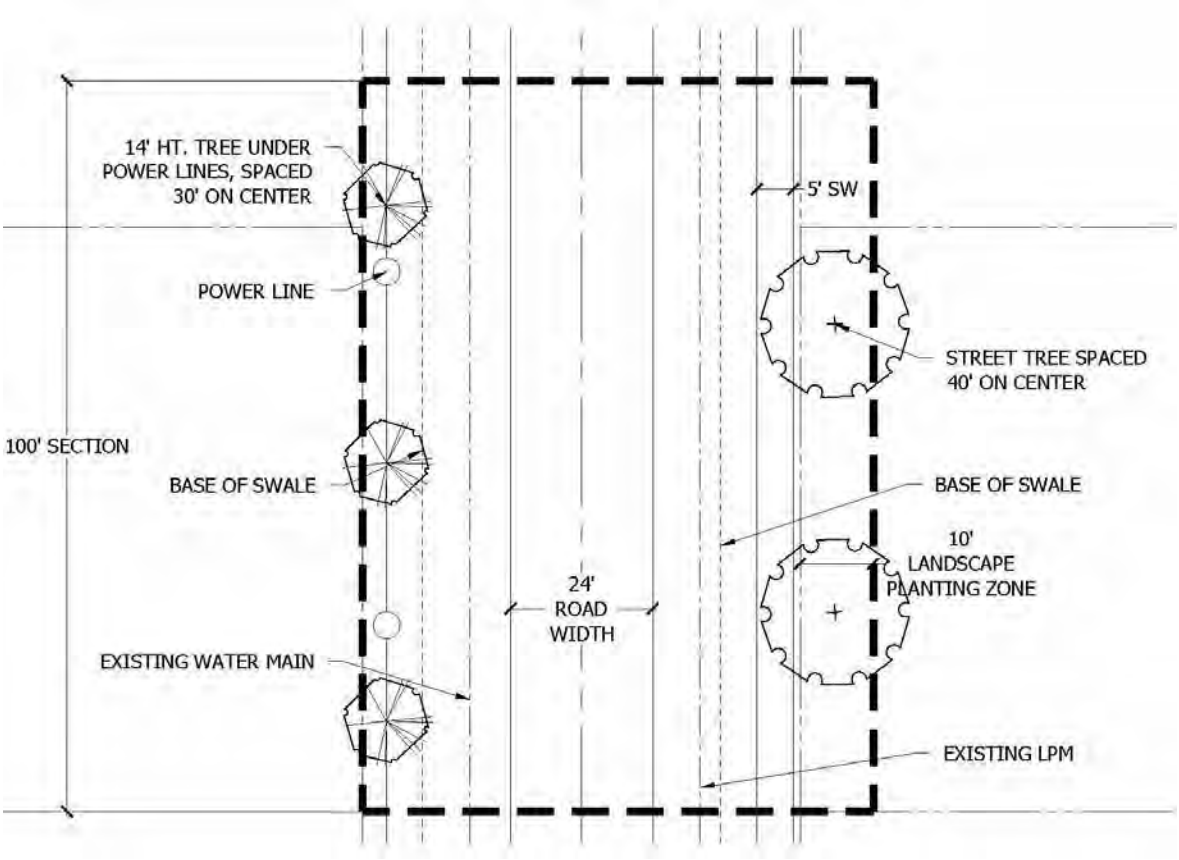


Image 6: Typical 100-foot Plan View Section of 60-foot Right-Of-Way

LANDSCAPE COST FOR 60-FOOT RIGHT-OF-WAY			
SPECIES LIST	QTY	PRICE PER UNIT	TOTAL
SMALL TREE (LESS THAN 20')	3	$200.00	$600.00
LARGE CANOPY TREE	2	$500.00	$1,000.00
		TOTAL PER 100'	**$1,600.00**
		TOTAL PER MILE	**$84,480.00**

Table 6: Landscape Cost for 60-foot Right-Of-Way with Sidewalk

4.2 Landscape Estimate for 80-foot/100-foot Right-Of-Way

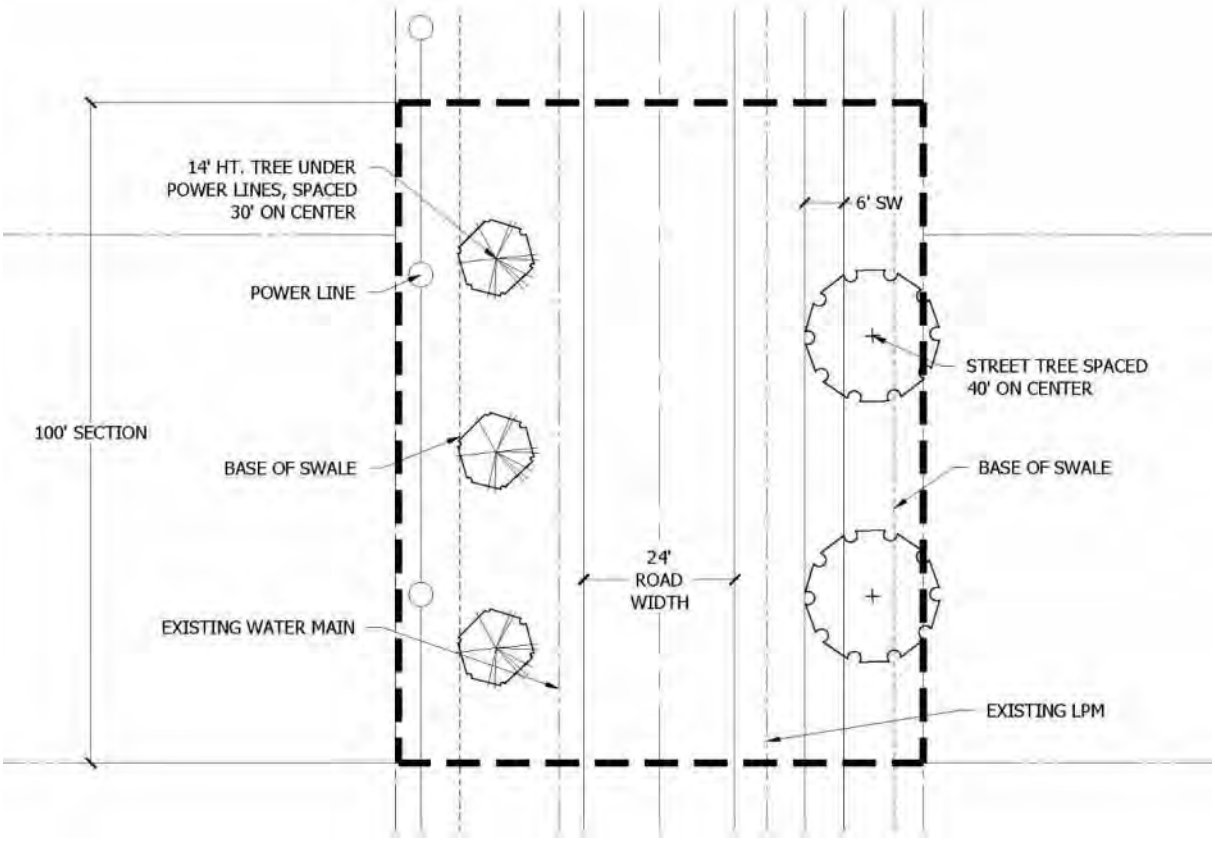


Image 7: Typical 100-foot Plan View Section of 80-foot/100-foot Right-Of-Way

LANDSCAPE COST FOR 80-FOOT/100-FOOT RIGHT-OF-WAY			
SPECIES LIST	QTY	PRICE PER UNIT	TOTAL
SMALL TREE (LESS THAN 20')	3	$200.00	$600.00
LARGE CANOPY TREES	2	$500.00	$1,000.00
		TOTAL PER 100'	**$1,600.00**
		TOTAL PER MILE	**$84,480.00**

Table 7: Landscape Cost for 80-foot/100-foot Right-Of-Way

4.3 Landscape Estimate for Enhanced 80-foot/100-foot Right-Of-Way

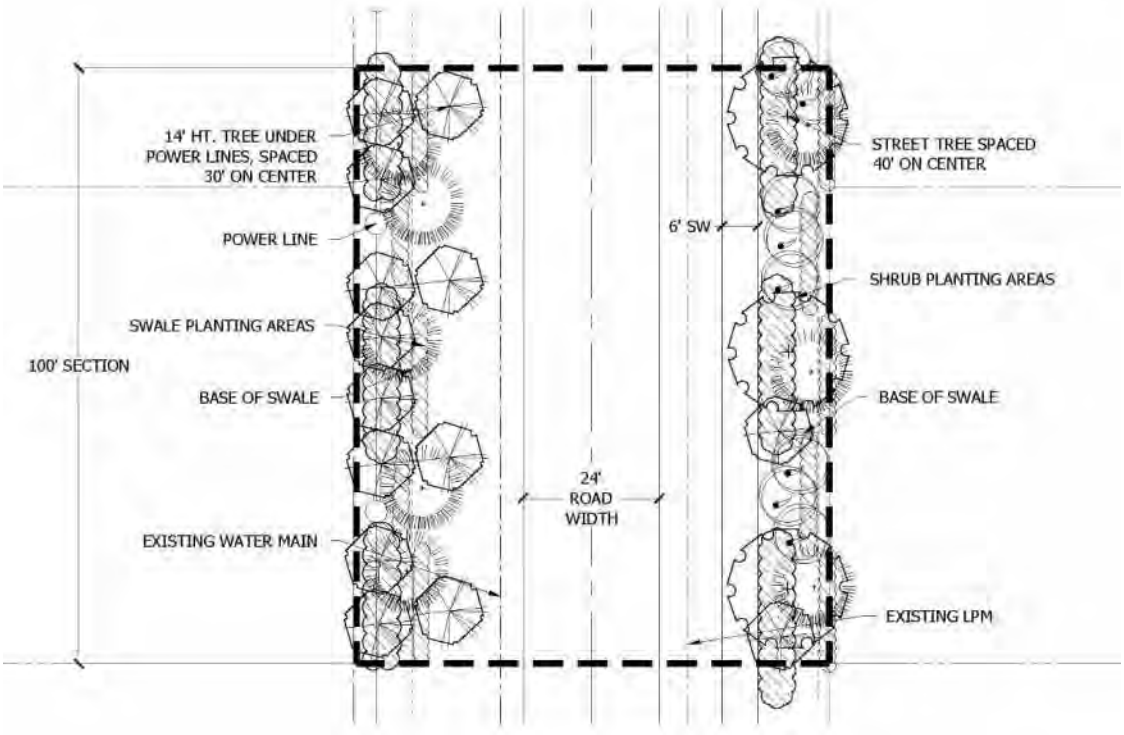


Image 8: Typical 100-foot Plan View Section of Enhanced 80-foot Right-Of-Way

LANDSCAPE COST FOR 80-FOOT ENHANCED RIGHT-OF-WAY			
SPECIES LIST	QTY	PRICE PER UNIT	TOTAL
SMALL TREES (LESS THAN 20')	12	$200.00	$2,400.00
LARGE CANOPY TREES	3	$500.00	$1,500.00
PALM TREES	8	$200.00	$1,600.00
WETLAND TREES	8	$100.00	$800.00
SWALE PLANTINGS	50	$4.00	$200.00
SHRUB PLANTINGS	114	$12.00	$1,368.00
		TOTAL PER 100'	**$7,868.00**
		TOTAL PER MILE	**$415,430.40**

Table 8: Landscape Cost for Enhanced 80-foot Right-Of-Way

4.4 Landscape Estimate for 150-foot Right-Of-Way

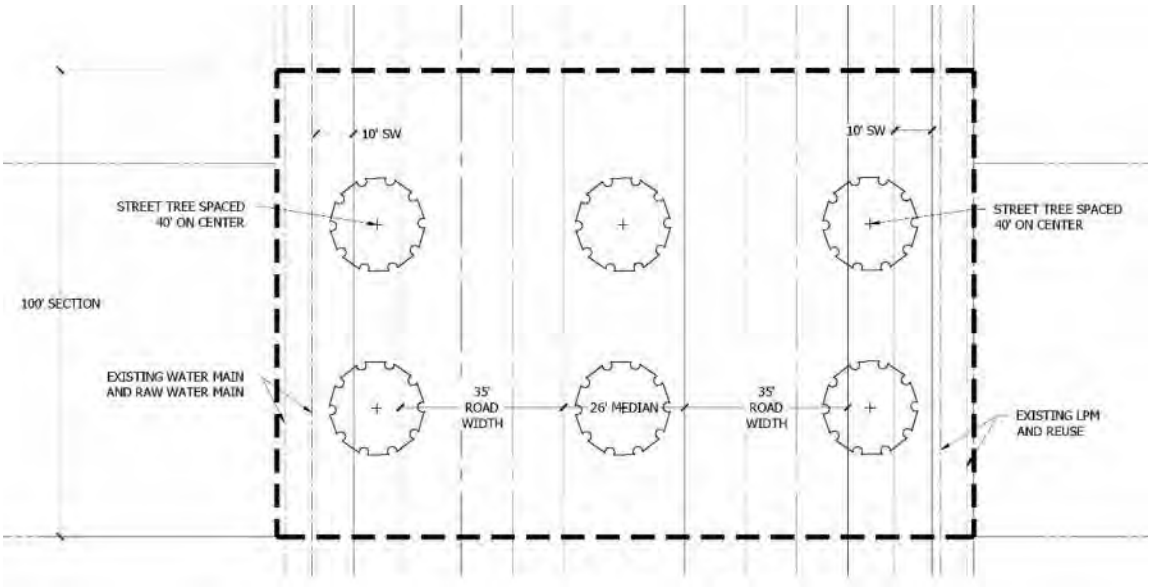


Image 9: Typical 100-foot Plan View Section of 150-foot Right-Of-Way

COST FOR 100 LINEAR FEET OF 150' RIGHT-OF-WAY			
SPECIES LIST	QTY	PRICE PER UNIT	TOTAL
LARGE CANOPY TREES	6	$500.00	$3,000.00
		TOTAL PER 100'	**$3,000.00**
		TOTAL PER MILE	**$158,400.00**

Table 9: Landscape Cost for 150-foot Right-Of-Way

4.5 Landscape Estimate for Enhanced 150-foot Right-Of-Way

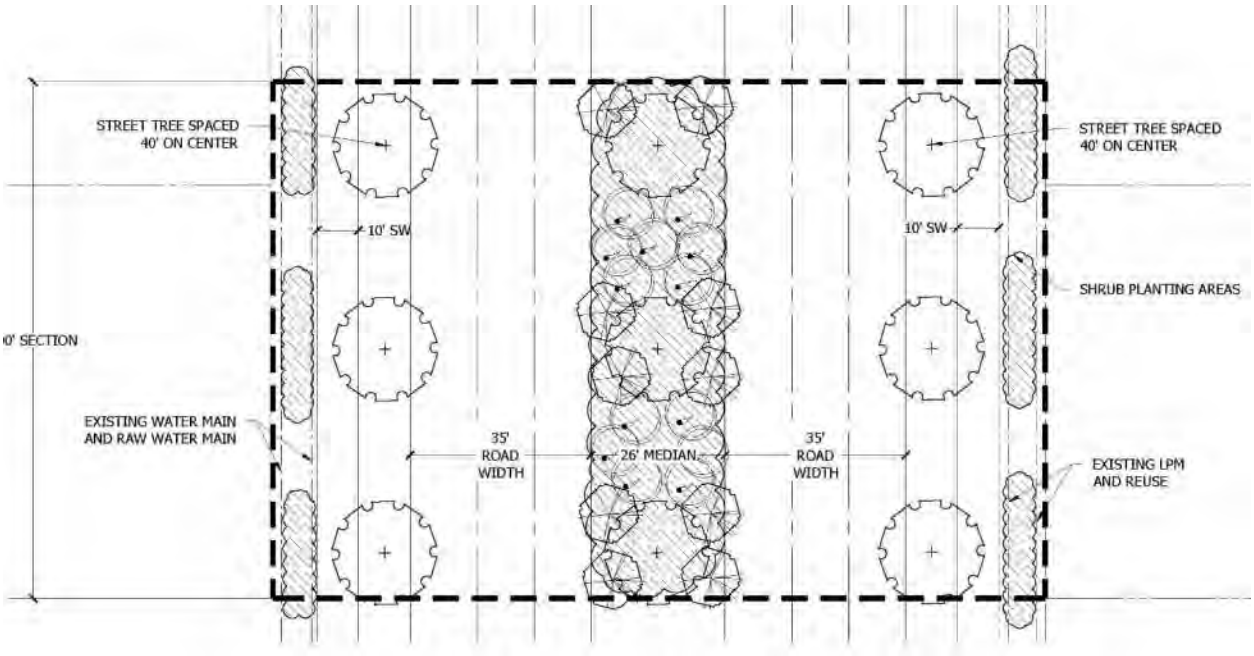


Image 10: Typical 100-foot Plan View Section of Enhanced 150-foot Right-Of-Way

COST FOR 100 LINEAR FEET OF 150' RIGHT-OF-WAY			
SPECIES LIST	QTY	PRICE PER UNIT	TOTAL
SMALL TREES (LESS THAN 20')	10	$200.00	$2,000.00
LARGE CANOPY TREES	6	$500.00	$3,000.00
PALM TREES	10	$200.00	$2,000.00
SHRUB PLANTINGS	400	$12.00	$4,800.00
		TOTAL PER 100'	**$11,800.00**
		TOTAL PER MILE	**$623,040.00**

Table 10: Landscape Cost for Enhanced 150-foot Right-Of-Way

4.6 Long Term Funding

A major hurtle for the implementation of any street tree program are the costs associated with plant material and installation. There are several programs within the City that can aid in funding the installation of street trees as recommended in this beautification policy. The recently initiated Tree Giveaway Program uses recycling proceeds to give trees to Port St. Lucie residents. Targeted tree giveaways may become possible through the Neighborhood Improvement & Community Engagement Program (NICE Program) if an allocation for street trees is made an annual budget item. The City's Tree Preservation Fund may also aid in the funding of street tree projects. Other long-term funding opportunities exist through, special assessment districts, capital improvement districts, and urban forestry grants.

Opportunities for Funding

- Tree Preservation Fund
- Neighborhood Improvement & Community Engagement Program (NICE Program)
- Special Assessment Districts
- Capital Improvement Districts
- Urban Forestry Grants
- FDOT Beautification Grants

5.0 Sister City Comparison

The City of Port St. Lucie has several sister cities within the State of Florida and a few of them are listed below. Most of these sister cities have similar characteristics to the City of Port St. Lucie but are not as large. There have been very few active attempts to address the beautification of the city rights-of-way within each of the identified sister cities. Almost none of the sister cities have embarked on a mission to take a comprehensive approach in developing a beautification policy. Cape Coral Florida has several streetscape beautification initiatives, but they are not of the same magnitude as those in the City of Port St. Lucie.

1. Port LaBelle, Florida

Population: 4,404

2. Port Charlotte, Florida

Population: 58,001

3. North Port, Florida

Population: 57,357

4. Port St. John, Florida

Population: 11,223

5. Port Malabar, now a subdivision in Palm Bay, Florida

Population: 2,886

6. Sebastian Highlands, Florida

Population: 23,432

7. Deltona, Florida

Population: 87,387

8. Key Biscayne, Florida

Population: 12,935

9. Cape Coral, Florida

Population: 179,804

6.0 Summary

The purpose of this policy is to address landscaping issues associated with Action 1.3.2 of the City of Port St. Lucie Strategic Plan, which is the beautification component of the Strategic Plan. The policy guidelines, typical landscape sections, and landscape details were developed to be consistent with all codes and regulations from applicable agencies. The goal is to elevate the City of Port St. Lucie to a new quality of life, improved safety for pedestrians and vehicles, increased property values, and a boost in business interest. As outlined within this policy document there are many factors to consider when designing the beautification elements of public rights-of-way projects such as the residential rights-of-way, sidewalk expansion, major right-of-way improvements, and neighborhood branding. The allocation of funds for the implementation of landscaping for these projects is recommended to be done on a case by case basis for greater flexibility, but the landscape element is recommended to be included in the design stage. By including landscape in the design stage of public improvement projects the landscaping will be able to be provided once funding becomes available. It is the intent of this beautification policy to provide a framework for the implementation of street trees and right-of-way landscaping within the City of Port St. Lucie.

The City of Port St. Lucie's 2009 Tree Planting Plan for the US Conference of Mayors Climate Protection Agreement has been used as a guiding principle on tree management, education, outreach, installation and management prior to the Public Works Beautification Policy Guidelines. The Beautification Policy Guidelines builds upon the work established through the Climate Protection Agreement.

Right Tree, Right Place

Caring for trees and your service

CHANGING THE CURRENT.

FPL.

Line clearing helps prevent outages

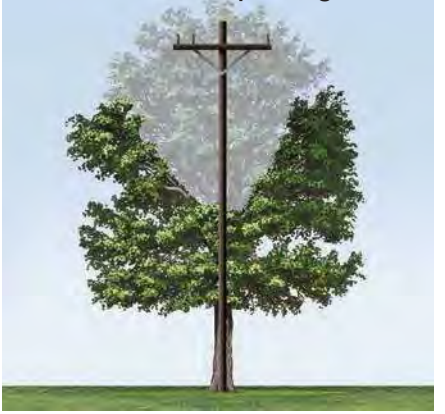
FPL is committed to delivering safe, reliable electric service to our customers. Trees, especially palm trees, can interfere with power lines and are one of the most common causes of power outages and flickers.

FPL's preventative maintenace program annually clears tree limbs and branches that can potentially cause safety issues and power outages from 15,000 miles of power lines. FPL **uses "directional pruning" to protect the health of your trees while helping them grow away from power lines.** Directional pruning is a professional technique of pruning trees away from power lines by removing entire branches and limbs down to the main trunk of the tree where trees normally shed them. This method directs future tree growth away from the power lines and reduces re-growth.

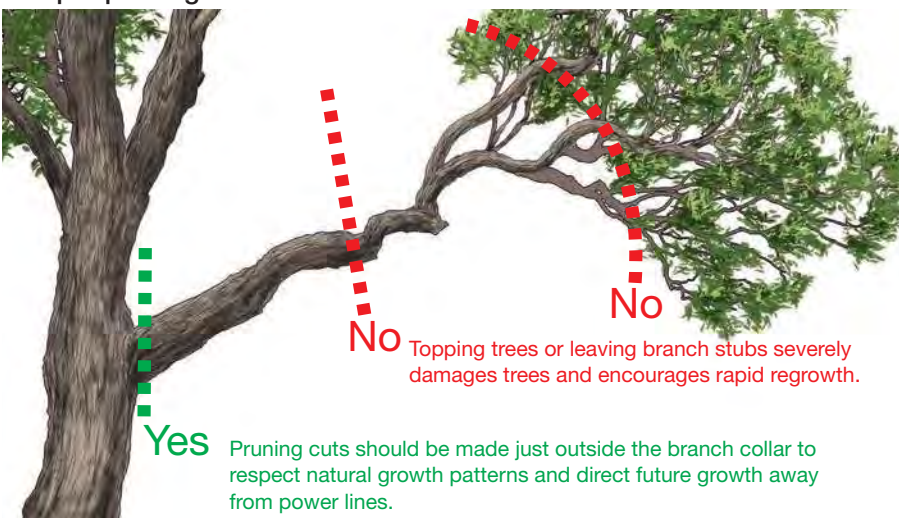
Directional pruning is an industry best practice with guidelines supported by the International Society of Arboriculture, American National Standard Institute and university research.

Side-trim directional pruning

V-trim directional pruning



Proper pruning for tree health



Plant the Right Tree in the Right Place

By selecting the right tree and planting it in the right place, you can help reduce power outages and flickers for you and your neighbors.

Trees come in all shapes and sizes, and often change dramatically over their lifetimes. **Before selecting a tree, make sure you know how tall, wide and deep it will be at maturity.** For a list of recommended trees for your area, please visit FPL.com/trees.

Where you plant your tree is just as important as what type of tree you plant. Blocking an unsightly view or creating some shade may be a priority, but you must also think about your tree's impact on existing utility lines as it grows taller and wider. At maturity, will its canopy reach the overhead lines? Keep in mind that the larger the power pole or structure, the farther back you should plant your tree. Planting trees that will interfere with power lines can jeopardize the reliability of your electric service. Taking the time to consider location now can prevent avoidable power disturbances for years to come.

It's never too late! To correct landscaping missteps of the past, try relocating or removing small trees to prevent future service issues. **No amount of trimming can substitute for smart landscaping and responsible maintenance by property owners.**

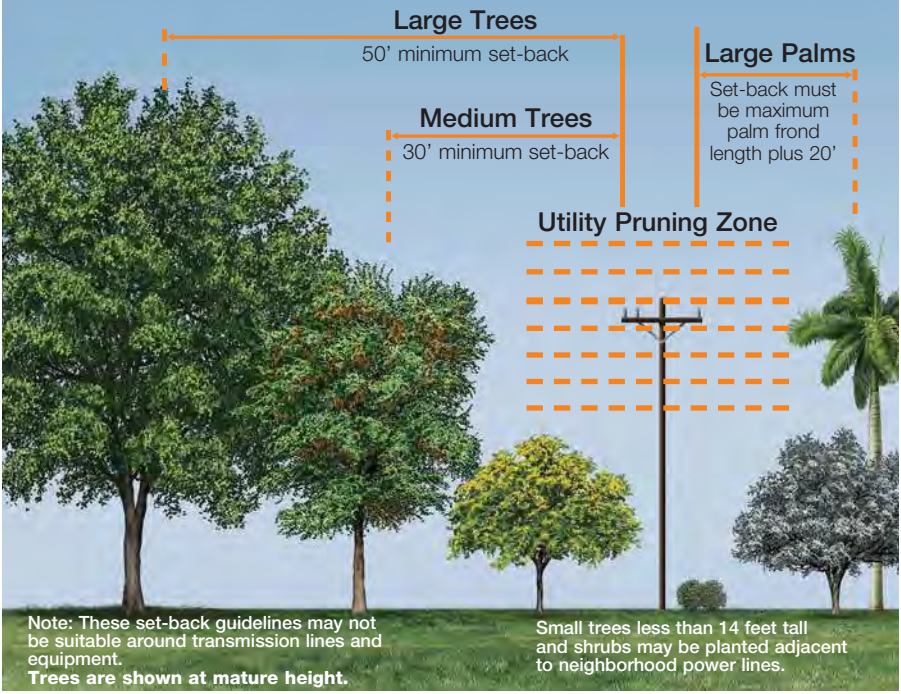
Trees in your neighborhood

When landscaping your home or business, remember to:

- Plant only small trees and shrubs in areas adjacent to power lines.
- Keep medium and large trees, including palms, at a safe distance from power lines.
- Keep transformers clear of vegetation at all times.

Room to grow

For the health of your trees and the reliability of your electric service, give your trees ample room to grow without interfering with power lines or equipment. FPL recommends the following set-back distances based on your tree's mature height.

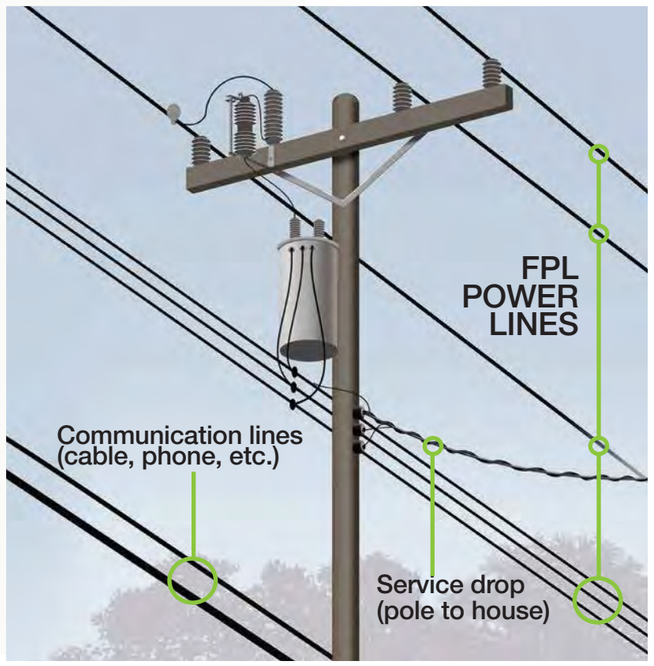


Smart landscaping starts with a plan

FPL is working hard to deliver worry-free energy, now and in the future, and we need your help. Use this landscape planning guide to help ensure reliable electric service for you and your neighbors.

1 Note the location of power lines

Power lines are usually located at the top of the utility pole, farthest from the ground. Cable television and telephone lines run closer to the ground, below power lines. When planting your trees, be sure to give them ample room to grow without interfering with power lines.

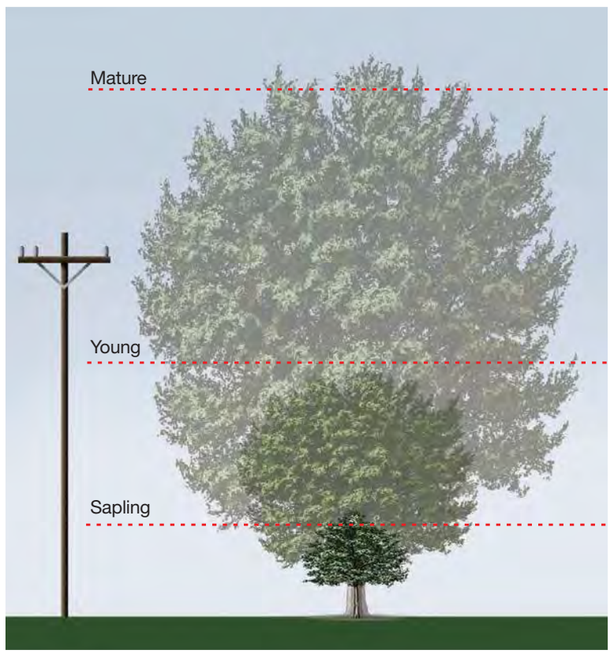


2 Find the right tree, choose the right place

Before selecting a tree, consider how tall, wide and deep it will be at maturity. Then carefully consider the location and appropriate set-back distances to prevent avoidable power disturbances for years to come.

3 Shading

Landscaping to shade your home from the sun is a low-cost, effective way to reduce your cooling costs.



4 Keep transformers clear

Keep the transformer cabinet clear at all times to allow for maintenance and repairs. Maintain a "clear zone" of 8 feet in the front and 3 feet in the back and on both sides.

Stay safe

When planting, what you can't see can hurt you, so before you reach for a shovel, reach for the phone. One easy call to 811 starts the process of getting underground utility lines marked. Make that call at least two full business days before you start digging; it's fast, free and required by law.

When doing yard work, always look up and note the location of power lines. **Never attempt to trim any vegetation growing near power lines**. When hiring landscapers or yard workers to trim your trees, remember to ask if they are licensed, insured and qualified to trim vegetation around power lines.

FPL focuses on preventive maintenance

Our strategy to clear vegetation from power lines is based on consistent, planned trimming cycles. Each year, FPL trims trees along 15,000 miles of power lines throughout the state.

FPL will notify you before line clearing begins in your neighborhood. FPL's preventive maintenance plan calls for clearing main power lines every three years and neighborhood lines every six years, on average.

To help ensure reliable electric service now and in the future, FPL may need to remove select trees, especially palm trees, bamboo and other fast-growing vegetation that cannot be managed effectively by pruning or trimming.

Your safety is important

If you decide to work outside, look up and note the location of power lines before you begin. Careful avoidance of power lines is extremely important during yard work, especially when using tools, ladders, poles or pruning saws. Be sure that ladders or scaffolds are far enough away so that you — and the ends of the tools you're using — don't come within 10 feet of neighborhood power lines. For taller, higher voltage transmission power lines, the setback distance increases to at least 30 feet.

Never attempt to trim any vegetation growing near power lines. Only specially trained line-clearing professionals should work around power lines.

Call before you dig. Florida law requires that you call **811** to locate and mark buried power lines and other utilities before you dig. Call 811 at least two business days before you begin work to avoid unintentionally hitting underground utility lines. This free service helps keep everyone safe.

FPL.com/trees
1-800-226-3545

TREE LINE USA

Arbor Day Foundation

Florida Power & Light Company has been named a Tree Line USA utility by The National Arbor Day Foundation.

ISA

TREES

P100003218

[APPENDIX C. - — CITY OF PORT ST. LUCIE SUGGESTED TREE LIST]

Appendix C: City of Port St. Lucie Suggested Tree List							
Common Name *(Species Name)*	**Native**	**Drought Tolerance**	**Frost Tolerance**	**Mature Size (Ft.) HXW**	**Growth**	**Plant Type**	**Description**
	APPROVED TREES — TYPE A						
Avocado ** *Persea amercicana*	No	X	T(28)	30'X25'	S	E	Large edible fruit.
Bald Cypress *Taxodium distichum*	Yes	XX	H	80'X25'	M	D	Long lived tree.
Elm, Chinese (Drake) *Ulmus parvifolia*	No	XX *	H	35'X35'	M	E	Weeping form
Golden Rain Tree *Koelreuteria elegans*	No	X	H	30'X20'	M	D	Yellow fall flowers, followed by attractive orange seed pods.
Golden Shower *Cassia fistula*	No	X	T	40'X35'	M	D	Yellow flowers in summer.
Gumbo Limbo *Bursera simaruba*	Yes	XX *	T	40'X35'	F	D	Use closer to coast, smooth reddish bark.
Holly, American *Ilex opaca*	Yes	XX	H	40'X20	M	E	Prefers acidic soils
Holly, East Palatka *Ilex attenuata*	Yes	X	H	30'X15'	S	E	Requires acid soil.

Hong Kong Orchid Tree *Bauhina x blakeana*	No	XX *	H	30'X25'	S	E	Pink-purple flowers all year.
Jacaranda *Jacaranda acutifolia*	No	XX *	T	40'X50'	M	D	Extensive roots, flowers in spring and summer.
Magnolia, Southern *Magnolia grandiflora*	Yes	XX *	H	80'X40'	M	E	Flowering shade tree, requires acid soil.
Mango ** *Mangifera indica*	No	X	T(25-30)	115'X33'	F	E	Large edible fruit.
Maple, Red *Acer rubrum*	Yes	/	H	50'X30'	F	D	Prefers wet soils.
Oak, Laurel *Quercus laurifolia*	Yes	XX *	H	80'X45'	F	E	Wildlife value, short lived tree.
Oak, Live *Quercus virginiana*	Yes	XX *	H	60'X40'	M	E	Long lived tree.
Palm, Bismark *Bismarckia nobilis*	No	XX *	H	30' to 60'	S	P	Massive fan palm
Palm, Canary Island Date *Phoenix canariensis*	No	XX *	H	40'	S	P	Nutrient deficiencies, needs extra magnesium.
Palm Edible date *Phoenix dactylifera*	No	XX *	H	70'	S	P	
Palm, Florida Royal	Yes	XX *	H	80'	M	P	Prefer rich, moist soils

Roystonea regia =R. elata							
Pine, Slash *Pinus elliotii var. densa*	Yes	XX *	H	100'X30'	F	E	Very sensitive to soil grade changes or compaction.
Palm, Wild Date *Phoenix sylvestris*	No	XX	H	40'	M	P	Also known as Toddy Palm or India date Palm.
Queens Crape Myrtle *Lagerstroemia speciosa*	No	XX	T	40'X30'	F	D	Pink to lavender flowering tree May to June
Red Bay *Persea borbonia*	Yes	XX	H	40'X30'	M	E	Dark purple fruit attracts birds.
Red Cedar *Juniperus silicicola*	Yes	XX *	H	35'X25'	F	E	Wildlife value.
Royal Poinciana *Delonix regia*	No	XX *	T(28)	40'X40'	M	D	Red-orange flowers in summer
Sweet Bay Magnolia *Magnolia virginiana*	Yes	XX	H	30X15	M	E	Dark green leaves. White flowers summer. Colorful red fruit in fall.
Sweetgum *Liquidambar styraciflua*	Yes	XX *	H	70'X40'	F	D	Glossy star-shaped leaves, prickly fruit balls in fall.
Sycamore (Buttonwood) *Plantinus occidentalis*	Yes	XX *	H	90'X60'	F	D	Large leaves, long-lived.
APPROVED TREES — TYPE B The following may be planted in clumps of two (2) and counted as one (1)							

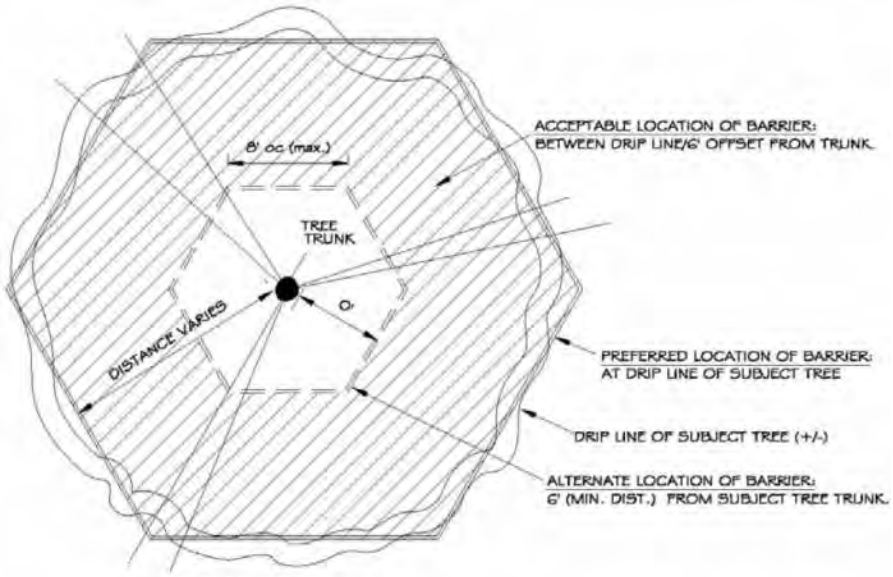
tree. The requirement may be reduced to one (1) tree when there is only space for a five foot landscape strip around a building façade. Type B trees will count as one tree for single family and townhouse lots.							
Buttonwood *Conocarpus erectus*	Yes	XX *	T(28)	35'X25'	M	E	Variety 'sericea' — Silver Buttonwood — 25'X20'
Cherry Laurel *Prunus caroliniana*	Yes	X	H	25'X15'	M	E	Poisonous to humans.
Crape Myrtle *Lagerstroemia indica*	No	XX *	H	25'X15'	M	D	Flowering Tree May to June.
Holly, Dahoon *Ilex cassine*	Yes	XX *	H	25'X15'	M	E	Requires acid soil.
Holly, Yaupon *Iley vomitoria*	Yes	XX *	H	20'X15'	S	E	
Japanese Privet *Ligustrum japonicum*	N	XX *	H	15'X20'	M	E	
Jerusalem Thorn *Parkinsonia aculeata*	No	XX *	H	20'X25'	F	D	Yellow flowering tree March to May, thorns.
Loquat *Eriobotrya japonica*	No	XX *	H	20'X15'	F	E	Edible fruit.
Palm, Cabbage *Sabal palmetto*	Yes	XX *	H	40'	S	P	Long-lived tree. Florida state tree.
Palm, Chinese Fan *Livistona chenensis*	No	X	H	25'	S	P	

Palm, Cliff Date *Phoenix rupicola*	No	XX *	H	25'	S	P	
Palm, Foxtail *Wodyetia bifurcata*	No	XX *	T(27)	30'	F	P	Tolerate a variety of well-drained soils
Palm, Pindo *Butia capitata*	No	XX *	H	15'	S	P	Wildlife value.
Palm, Washingtonia *Washingtonia robusta*	No	XX *	H	80'	F	P	Becomes very tall.
Palm, Windmill (Chusan) *Trachycarpus fortunei*	No	XX *	H	25'	S	P	
Pink Trumpet Tree *Tabebuia heterophylla*	No	XX	T(25)	25'X20'	F	D	Requires pruning to develop strong structure
Simpson's Stopper *Myrcianthes fragrans*	Yes	XX	H	20X15	S	E	
Silver Trumpet Tree *Tabebuia aurea = T. caraiba*	No	XX *	T(28)	25'X15'	M	D	Yellow flowers in Spring.
Wax Myrtle (Bayberry) *Myrica cerifera*	Yes	XX *	H	20'	M	E	Multiple trunks.
Required shrubs and ground cover shall be selected from the "Waterwise South Florida Landscapes" plant guide, published by the South Florida Water Management District, as amended. The plant material							

must be appropriate for the USDA plant hardiness zone.	
LEGEND	
Drought Tolerance	High — (XX), Moderate — (X), None — (/), Approved for Xeriscaping — (XX [*])
Growth	Slow (S), Moderate (M), Fast (F)
Type	Evergreen (E), Deciduous (D), Palm (P)
Frost Tolerance	Hardy (H), Tender (T)
[*] Drought tolerance will vary depending on soil conditions and other environmental factors.	
[**] This tree is only eligible to meet the requirements for single family houses.	

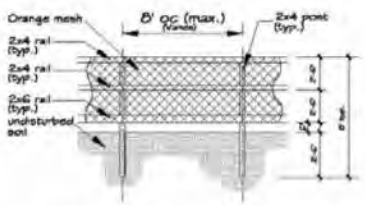
(Ord. No. 15-70, § 1, 9-14-15)

APPENDIX D. — TREE PROTECTION DETAIL



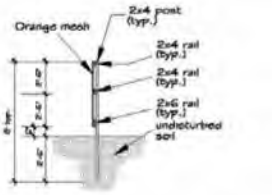
BARRICADE PLAN

N.T.S.



BARRICADE ELEVATION

N.T.S.



BARRICADE SECTION

N.T.S.

BARRICADE NOTES:

1. TREE PROTECTION BARRICADE TO BE ERECTED PRIOR TO COMMENCEMENT OF ANY WORK.
2. NO CONSTRUCTION WITHIN BARRICADE WITHOUT OWNER APPROVAL
3. EXCAVATION (IF APPROVED BY OWNER) WITHIN TREE PROTECTION AREAS IS LIMITED TO HAND TOOLS (NO MACHINERY)

(Ord. No. 15-70, § 1, 9-14-15)

Appendix D: Fiber Optic Network Minimum Design Standards and Details

2015

City of PSL

PSL USD,PW,MIS

CITY OF PORT ST LUCIE

FIBER OPTIC NETWORK

Minimum Design Standards and Details

Appendix C – City of Port St Lucie Utility Systems Department Minimum Standards Manual

V1.2 4-2015

Table of Contents

DESIGN

The Engineer of Record shall submit, through the City's Project Manager, the design plans for review to the City at the 60% and 90% plan review.

The plans should include the fiber optic conduit, pull box, and splice box location. The size of the conduit, fiber size and type and the type of splice/pull box shall also be included on the drawing. The location of the trunk line splice shall be shown for review and approval. A proposed splice diagram shall be included.

Midspan splices should be avoided to the trunk line and will need to be approved by the City.

CONSTRUCTION

The contractor shall provide complete installation of conduits and pull boxes including materials, equipment, labor and documentation, in accordance with these specifications and recognized industry standards and the system must be fully operational.

SHOP DRAWINGS

Shop drawings shall be submitted of all equipment and appurtenances required for a complete fiber optic infrastructure, which includes but is not limited to, the following:

- Conduit
- Pull Boxes, Splices Boxes, Splice Vaults, Splice Enclosures, Splice Cabinets
- Fiber Optic Cable
- Network Devices
- Digital Video Encoder
- Locate Tracer Wire
- Marking Tape
- Pull Tape
- Cable Route Markers
- Splice trays
- Fiber Optic Test Procedures

Shop drawings must be approved prior to construction. Any work conducted prior to approved shop drawings will be at the Contractors expense and may be required to be removed based on shop drawing approval.

PULL BOX, SPLICE BOX AND SWEEPS

Conduit plans need to be approved prior to construction. All items identified in the design section shall be shown on the construction plans.

Upon request, a schematic including proposed location of pull boxes at locations shown on the approved plans with provisions for maximum pull box spacing.

Pull Box spacing will be a maximum of 1000 feet. Splice box spacing intervals shall be a maximum of every 3000 feet. This establishes a pattern of one splice box after every two pull boxes (i.e. pull box, pull box, splice box, pull box, pull box, splice box, etc). Inside each pull and splice boxes the contractor shall provide 90 degree conduit sweeps as shown in Appendix A. In the conduit run, 45 degree conduit sweeps may be permitted, no more than 2, prior to a pull or splice box. These 45 degree conduit sweeps should be referenced on the construction plans and must be approved prior to construction.

SPLICING REQUIREMENTS

No splicing of the fiber optic cable system will be permitted without appropriate qualified City Public Works Traffic Operations Division staff present during splicing activity. Staff member will be determined

at the pre-construction meeting. The Staff Member may elect to not be present and still authorize splicing of the fiber optic cable system to be performed, if this is not reasonable or in emergency situations.

The contractor shall submit final splice diagrams for review and approval prior to splicing. Once the splice diagram is approved the contractor shall give a minimum of 3 business day notice to the City prior to construction.

AS-BUILT DRAWINGS

As-built drawings shall be provided by means of a secure method, ie, CD or thumb drive and shall not be transmitted via internet.

APPROVED PRODUCT LIST (QPL)

All material used shall be per the Approved products noted at the end of each appropriate section and shall be new, unused and of current design and manufacturer.

Any materials not found in the Approved products section shall not be used without the City's approval.

Materials not found in the Approved product section may be submitted for approval to the City. Documentation of the material's specifications shall be submitted to the City for approval. Any materials/products submitted for approval must meet the minimum specifications explicitly stated in this document.

All material will be inspected and verified prior to installation.

All other applicable specifications will be adhered to as directed by the City.

DEFINITION of TERMS:

CITY: The terms "City" and "the City" shall refer to the City of PSL personnel, or their representatives.

CONTRACTOR: "Contractor "shall mean an individual, firm, partnership, or corporation, and his, their or its heirs, executors, administrators, successors and assigns or the lawful agent of any such individual, firm, partnership, covenanter or corporation, or his, their or its surety under any contract bond, constituting one of the principals to the Contract and undertaking to perform the work specified in the design plans and specifications. Where any pronoun is used as referring to the word "Contractor", it shall mean the Contractor as defined herein.

ENGINEER OF RECORD: The terms "Engineer" and "Engineer of Record" shall be a duly licensed and registered engineer in the State of Florida.

1.0 FIBER OPTIC CABLE SYSTEM

1.1 FIBER OPTIC CABLE

Furnish fiber optic cable that shall be 100% compatible with the existing fiber optic cable plant.

1.1.1 MANUFACTURER:

The cable manufacturer shall be ISO9001 certified and shall be TL9000 registered.

1.1.2 CABLE CONSTRUCTON:

The cable shall be free of hazardous materials in compliance with RoHS 2002/95/EC. The cable shall be of all-dielectric (non-shielded, non-metal) construction. The cable shall be of loose-tube construction. The cable shall be of entirely gel-free construction.

1.1.3 OUTER JACKET:

- Carbon Black Medium Density Polyethylene (MDPE)
- 1.3mm Thickness
- UV Resistant
- Fungus Resistant
- 2.5mm White Length Markings in Feet (US)
- Labeled “City of PSL Fiber Optic Cable” after every length marking

1.1.4 RIPCORD: The cable shall contain at least one ripcord under the sheath (outer jacket).

1.1.5 WATER BLOCKING COMPOUND:

The cable shall contain a dry water blocking material under the outer jacket.

1.1.6 STRANDING/STRUCTURE:

The cable shall contain up to 12 buffer tubes wrapped around a central strength member in a reverse oscillation stranding structure.

1.1.7 STRENGTH MEMBER:

The central strength member shall consist of a dielectric, glass reinforced plastic (GRP) rod.

1.1.8 FILLER: Filler(s) may be used in the cable core. Fillers shall be 2.5mm in diameter.

1.1.9 BUFFER TUBES:

- Polypropylene
- Dry Water-Blocking Material inside (Gel-Free, Foam-Free)
- 2.5mm Outer Diameter
- EIA/TIA-598-B Color Code Compliant
- Exactly 12 fibers per Buffer Tube

1.1.10 OTHER:

Fibers shall not adhere to the inside of the buffer tube. Fibers shall not stick together. The optical fibers shall not require cleaning before placement into a splice tray.

1.1.11 OPTICAL FIBER CONSTRUCTION:

Optical fibers shall be dispersion-unshifted, step-index, single-mode fibers. Each fiber shall consist of a Germania-doped silica core surrounded by a concentric glass cladding. Fibers shall be a matched clad design. All fiber optic glass shall be from the same manufacturer. Fibers shall be coated with a dual layer acrylate protective coating. Fiber coatings shall be colored with ultraviolet (UV) curable inks. Fibers shall be colored in compliance with EIA/TIA-598-B.

1.1.12 OPTICAL FIBER GEOMETRY & OPTIC SPECIFICATIONS:

- Core Diameter: 8.2 µm
- Cladding Diameter: 125 µm +/- 0.7 µm
- Core-to-Cladding Concentricity: ≤ 0.5 µm
- Cladding Non-Circularity: ≤ 0.7%
- Coating Diameter: 245 µm +/- 5 µm
- Attenuation @ 1310 nm: ≤ 0.4 dB/km
- Attenuation @ 1550 nm: ≤ 0.3 dB/km
- Cutoff Wavelength: ≤ 1260 nm

1.1.13 CABLE OPERATING REQUIREMENTS:

- OPERATING TEMPERATURE RANGE: -40°F to 158°F.
- MINIMUM BEND RADIUS: 10 X cable outer diameter (installed), 15 X under tension
- CABLE STRENGTH/MAX PULLING TENSION: 600 lbf during installation, 200 lbf installed.
- CRUSHING RESISTANCE: Withstands a minimum compressive load of 125 lbf/in.

1.1.14 MANUFACTURER TESTING:

All optical fibers shall be 100% attenuation tested at the factory for compliance with performance specifications described herein. The attenuation data for each fiber shall be provided with each cable reel.

The cable shall be subjected to testing by the cable manufacturer in accordance with the following ANSI/EIA/TIA-455-xx testing procedures (FOTP's):

- FOTP-3, FOTP-41, FOTP-104, FOTP-25, FOTP-33 and FOTP-8
  (Result = Δ Attenuation ≤ 0.15 dB @ 1550 nm)
- FOTP-37 (Result = Δ Attenuation ≤ 0.3 dB @ 1550 nm)
- FOTP-82 without leakage through the open cable end.
  (1 meter of cable shall withstand 1 meter static head water pressure for 1 hour)
- FOTP-81 exhibiting no flow (drip or leak) of filling or flooding material @ 70° C.
- FOTP-181 without loss of fiber continuity.
  (Cable shall withstand a simulated lightning strike w/ 55kA peak current pulse)

1.1.15 MISCELLANEOUS:

The top and bottom ends of the cable shall be accessible for testing. Both ends of the cable shall be sealed.

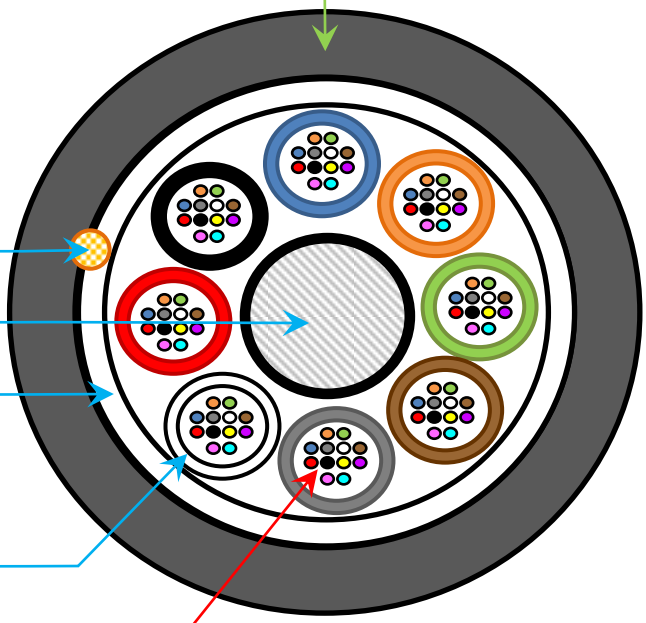
APPROVED FIBER OPTIC CABLES: Corning ALTOS Loose Tube, Gel-Free Cable Single-Mode (OS2)

GENERAL PROPERTIES

ISO 9001 Compliant Manufacturer
TL 9000 Registered Manufacturer
RoHS 2002/95/EG Compliant Materials
All-Dielectric (Non-Shielded, Non-Metal)
Gel-Free, Foam-Free Construction
Loose-Tube Cable
600 lbf Max Tensile Strength (Installation)
200 lbf Max Tensile Strength (Static)
125 lbf/in Crush Resistance
Operating Temperature Range of -40°F to 158°F
Minimum Bend Radius = 10 x Cable Diameter (Static)
Min. Bend Radius = 15 x Cable Diameter (Tension)

EXTERNAL PROPERTIES

1.3mm Medium Density Polyethylene (MDPE)
UV Resistant
Fungus Resistant
Black Color
2.5mm Length Markings in Feet (US)
Labeled "City of PSL Fiber Optic Cable" every X Feet



INTERNAL PROPERTIES

Easy Access Jacket Ripcord

Dielectric (GRP) Central Strength Member

Water-Blocking Tape (Outside of Buffer Tubes)

Up to 12 Buffer Tubes
Reverse Oscillation Stranding Structure
2.5m Polypropylene Buffer Tubes
EIA/TIA-598 Color Code Compliant Buffer Tubes
Dry Water-Blocking Material Inside Buffer Tubes
12 Fibers per Buffer Tube
All Fibers contained in Buffer Tubes

FIBER PROPERTIES

CONSTRUCTION:

- Dispersion-Unshifted Step-Index Single-Mode Fibers
- Germania-Doped Silica Core surrounded by a Concentric Glass Cladding
- Matched Clad Design
- Dual Layer Acrylate Coatings
- Ultraviolet (UV) Curable Inks
- EIA/TIA -598-B Color Code Compliant

GEOMETRY & OPTICS:

Core Diameter:	8.3µm
Cladding Diameter:	125µm +/-0.7µm
Core-to-Cladding Concentricity:	≤ 0.5µm
Cladding Non-Circularity:	≤ 0.7%
Coating Diameter:	245µm +/-5µm
Attenuation @1310nm:	≤ 0.4 dB/km
Attenuation @1550nm:	≤ 0.3 dB/km
Cut-Off Wavelength:	1260nm

1.2 FIBER OPTIC SPLICE CLOSURES

1.2.1 MANUFACTURER:

The splice closure manufacturer shall be ISO9001 certified and shall be TL9000 registered.

1.2.2 GENERAL:

Splice closures shall be "dome type" splice closures. Splice closures shall be designed for all outdoor applications (aerial, duct, buried, etc.). Splice closures shall be free of hazardous substances according to RoHS 2002/95/EC. Splice closures shall be constructed of a black thermoplastic material. Splice closures shall be capable of through, branch and mid-span type splice applications. Splice closures shall be airtight and prevent water intrusion. Splice closures shall permit pressurization. Splice closures shall not contain gel, or any substance which requires cleaning or removal before splicing.

1.2.3 ENTRY MECHANISM:

Splice closures shall allow tool-less re-entry via an exterior mechanical base-to-dome seal. The interior shall permit access to splice trays without kinking buffer tubes or macro-bending.

1.2.4 CABLE ENTRY PORTS:

Splice closures shall have a total of 6 cable entry ports: 5 round ports for cables up to 1.25" and 1 oval port supporting up to two 1" cables (feeder on mid-span splices). Splice closures shall permit the use of all ports without the use of expansion kits. Cable entry ports shall be sealed with heat shrinkable materials.

1.2.5 DIMENSIONS:

Splice closures shall have enough interior space to accommodate 10 feet of slack from each cable that enters the splice without exceeding the minimum bend radius of the cable.

Only 2 sizes of splice closure shall be used as directed by the City:

SMALL CLOSURES: ≤ 19"L x 10.5"W x 10.5"D (Accommodates 8 trays/192 splices)

- Through splices of 2 x ≤96 fiber trunk cables
- Drop splices of 2 x ≤96 fiber trunks and 1 x 12 fiber drop cable

LARGE CLOSURES: ≤ 28"L x 10.5"W x 10.5"D (Accommodates 8 trays/576 splices)

- Splices of 2 or more 144 fiber cables
- Complex splices of 3 or more trunk cables
- Upsizing may be required at locations depending on the City's future plans

1.2.6 SLACK BASKET:

Splice closures shall include a slack basket for managing loose buffer tubes.

1.2.7 SPLICE TRAYS:

Splice trays shall be specifically designed for use with the selected splice closure and shall fit accordingly into the splice closure. Splice closures shall use hinged splice trays. Splice trays shall be re-enterable. Splice trays shall provide storage and protection for 24 splices for small closures and 72 splices for large closures. Splice trays shall hold (splice sleeves) rigidly in place. Splice trays shall provide sufficient space to prevent macro-bending of the optical fibers.

APPROVED SPLICE CLOSURE: TYCO/RAYCHEM FOSC 400

1.3 PATCH PANELS

Furnish modular interconnect centers (Patch Panels) for installation inside the equipment cabinets.

1.3.1 MANUFACTURER:

The manufacturer shall be ISO 9001 certified and TL9000 registered.

1.3.2 PATCH PANEL CONSTRUCTION:

Patch panel housings shall be constructed of powder-painted baked-epoxy galvanized steel. Patch panels shall be designed for cable entry parallel to the rear of the panel. Cable openings shall be protected by grommets. The front of the panel shall form a shelf providing physical protection of connectors and routing options for the patch cords. The housing shall include strain relief, bend radius protection, and short-term cable retention clamps.

1.3.3 PORTS:

Patch panels shall provide 12 ST SM coupler ports with ceramic inserts on its front-facing panel.

- Compatible with pre-assembled coupling plates (6 or 8 ports per plate, 3 plates per row).
- Designed to contain 24 ports per unit of rack space (1U=1.75”H).
- Expandable up to 144 ports (24 ports per unit of rack space, 6U total).
- Dust caps included with all coupler ports.

Couplers shall be configured in an arrangement to facilitate easy access to each coupler pair.

APPROVED PATCH PANELS: 3M 8423 Rack Mount Patch Panel

1.4 PIGTAILS

1.4.1 MANUFACTURER:

The manufacturer shall be ISO 9001 certified compliant.

1.4.2 PIGATAIL CONSTRUCTION:

Pigtails shall consist of a standard 250µm fiber single-mode fiber enveloped with a 900µm tight buffer inside a 3mm jacket. The fiber shall be constructed with a Dual-Acrylate Slip Layer between the 250µm fiber and the 900µm tight buffer. Stripping the 900µm tight buffer off of the 250µm fiber shall only require the use of standard mechanical strippers and shall not require the use of thermal strippers.

The fiber type shall be single mode and the core characteristics shall be splice compatible with existing fiber, matching the specifications stated in Section 1.1.12.

Pigtails shall be individually labeled on the strain relief boot to indicate the fiber # (position) or which color fiber they are splice onto.

Pigtails shall be protected with dust caps on the connector ferrules until connected to a port.

1.4.3 SPECIFICATIONS:

Pigtails and their pre-assembled connectors shall also meet or exceed all of the following specifications:

CONNECTOR:

- Connector Type: ST (Non-Keyed/No Security)
- Polish/Contact Type: UPC (Ultra Polish/Physical Contact)
- Boot: Blue, Fungus Resistant material
- Body: Metal (Stainless-Steel, Nickel-Plated Zinc, etc.)
- Ferrule: 2.5mm Zirconia Ceramic
- Max. Typical Loss 0.15dB
- Reflectance/Back Reflection: ≤ -59dB
- Operating Temperature: -40°F to 185°F
- Intermateability Standard: TIA/EIA-604-2
- Durability Testing: ≤ 0.2 dB loss per 1000 rematings, FOTP-21

CABLE:

- Type: Simplex, Single-Mode
- Jacket: 3mm, Yellow, OFNR rated
- Length: 2 meters
- Minimum Bend Radius: 30mm
- Crush Resistance: 1000 N/10cm
- Tensile Strength: 200 N

GENERAL:

- Materials/Construction: LSZH, FRNC
- Substance Restrictions: RoHS Compliant construction

APPROVED PIGTAILS: L-com Item # FPT3SNG-ST-YLW-1 9/125 Fiber Pigtail ST, Yellow 1.0m

1.5 PATCH CORDS/CABLES

1.5.1 MANUFACTURER:

The manufacturer shall be ISO 9001 certified.

1.5.2 PATCH CORD CONSTUCTION:

Patch cordage shall be factory pre-assembled, pre-terminated patch cords that are compatible with the existing fiber system, adhering to the fiber specifications found in Section 1.1.12.

All inside plant (IP) assemblies shall meet NEC jacketing requirements for the application.

Jumpers shall be of the same fiber core size, performance and connector type as the existing cable system (see Section 1.1 “Fiber Optic Cable”).

Patch cords shall be protected with dust caps on the connector ferrules.

1.5.3 SPECIFICATIONS:

Patch cords and their connectors shall also meet or exceed all of the following specifications:

CONNECTOR:

- Connector Type: ST, SC, or LC (as specified by the City)
- Polish/Contact Type: UPC (Ultra Polish / Physical Contact)
- Connector Body: Metal (Stainless-Steel, Nickel-Plated Zinc, etc.)
- Connector Boot: 1 x Blue, 1 x White (for Tx/Rx Identification)
- Connector Ferrule: 2.5mm Zirconia Ceramic
- Max. Typical Loss: ≤ 0.15dB (UPC)
- Reflectance/Back Reflection: ≤ -59dB (UPC)
- Operating Temperature: -40°F to 185°F
- Intermateability Standard: TIA/EIA-604-2
- Durability Testing: ≤ 0.2 dB loss per 1000 rematings, FOTP-21

CABLE:

- Type: Duplex, Single-Mode
- Jacket: 3mm, Yellow, OFNR rated
- Length: 2 meters
- Minimum Bend Radius: 30mm
- Crush Resistance: 1000 N/10cm
- Tensile Strength: 200 N

GENERAL:

- Materials/Construction: LSZH, FRNC
- Substance Restrictions: RoHS Compliant construction

APPROVED PATCH CORDS:

ST to ST: L-com Item # SFODPST-02 9/125, Single mode Plenum Fiber Cable ST / Dual ST, 2.0m

ST to SC: L-com Item # SFODST-SC-02 9/125, Single mode Fiber Cable, Dual ST /Dual SC, 2.0m

1.6 SPLICING EQUIPMENT

1.6.1 MANUFACTURER:

The fusion splicer manufacturer shall be ISO9001 certified and TL9000 registered.

1.6.2 FUSION SPLICER FEATURES:

The fusion splicer shall be designed to splice standard single-mode fibers with a cladding diameter of 125µm and coating diameters from 250 µm to 900 µm.

The fusion splicer shall be equipped with a heat shrink oven compatible with 60mm splice sleeves.

The fusion splicer shall be equipped with a true splice loss measurement system (not only a splice loss *estimation* system).

The fusion splicer shall be equipped with a monitor display that allows inspection of the fiber ends with 120 X magnification.

1.6.3 SPECIFICATIONS:

The fusion splice shall also meet or exceed all of the following specifications:

- Typical Splice Loss (Standard Single-Mode): < 0.02 dB (similar fibers)
- Splice loss measurement accuracy: +/- 0.02 dB
- Operating Temperature Range: -15° to +50°C
- Relative Humidity: <95%, non-condensing
- Built-in GPS System
- Splice Data storage capability (including GPS location data)

The fusion splicer shall be new from the factory or serviced and certified by the manufacturer or its authorized representative within 6 months prior to its use for splicing. The Engineer shall be provided with a letter from the manufacturer or its authorized representative certifying compliance. The fusion splicer used shall have yearly calibration and provide the yearly certification certificate prior to splicing procedure.

APPROVED FUSION SPLICER: Corning M90e Fusion Splicer

1.7 OTDR TEST EQUIPMENT

The OTDR shall to be used for testing purposes shall be compatible with the installed fiber optic cable (single-mode 8/125 fiber) to be tested.

1.7.1 MANUFACTURER:

The manufacturer shall be ISO9001 certified and TL9000 registered.

1.7.2 SPECIFICATIONS:

- Test Wavelengths: 1310nm / 1550nm
- Event Dead Zone: 1m / 1m
- Attenuation Dead Zone: 5m / 6m
- Dynamic Range: 39dB / 38dB

- Distance Ranges (km): 5/10/30/100/275/1,000/10,000/20,000
- Loss Resolution: 0.001dB
- Sampling Resolution: 0.004m to 5m
- Sampling Points: Up to 128,000

1.7.3 FILE FORMAT:

The OTDR save all traces and data in the ".SOR" file format.

1.7.4 CALIBRATION:

The OTDR shall be new from the factory or serviced and certified by the manufacturer or its authorized representative within 1 year prior to its use for splicing. The Engineer shall be provided with a letter from the manufacturer or its authorized representative certifying compliance. The OTDR Test Equipment used shall have yearly calibration and provide the yearly certification certificate prior to testing procedure.

APPROVED OTDR: CORNING OV-1000 OTDR

1.8 INSTALLATION

1.8.1 PRECONSTRUCTION:

Before starting any installation, the City shall be notified 3 business days in advance. Failure to notify the City may result in rejection of the installation and may subject the contractor to be responsible for removal of the installation at no cost to City of PSL. Before installation, the cable to be installed shall be reel tested (Section 1.11.12).

1.8.2 PERSONNEL:

Personnel performing the cable installation shall be adequately trained, and shall be IMSA MOT Level 1 certified. All Contractor personnel (including subcontractors) shall be thoroughly familiar with and shall comply with all Occupational Safety and Hazard Act (OSHA) regulations.

1.8.3 MAINTENANCE of TRAFFIC (MOT) PLAN:

An approved MOT Plan shall be required any time work is being performed within the City of PSL Right of Way, regardless of permit requirements. MOT Plans shall conform to the latest FDOT Design Standards 600 Series and the latest Manual on Uniform Traffic Control Devices (MUTCD). The Contractor shall be responsible for setup and removal of all MOT devices.

1.8.4 COMPLIANCE:

The Contractor shall obtain a Road Closure Permit from the City of PSL or FDOT, where necessary. Cable shall be installed in compliance with NEC requirements where applicable. The Contractor shall receive an Excavation Permit from the City of PSL, where necessary.

1.8.5 INSTALLATION:

Conventional fiber optic cable installation techniques shall be used within the conduit in such a manner that the optical and mechanical characteristics of the cables are not degraded in any manner at the time of installation. Use of Air Blown Fiber System cable and/or Air Blown Fiber System installation techniques (such as HASB and the piston method) shall not be permitted. Cables shall not be pushed into conduits. (Pushing can violate the bend radius)

1.8.6 UNREELING:

Cable shall be rolled off of the spool. Spinning off the side of the spool end shall not be permitted. (It will put a twist in the cable for every turn on the spool.) The figure-eight configuration shall be used for storing cable at intermediate locations to prevent kinking or twisting when the cable must be unreeled and backfed. Pulling and reel locations should be set near the sharpest conduit bend locations (i.e. corner vaults, etc.) where possible.

1.8.7 PULLING:

Fiber optic cable shall be installed by hand or by using a mechanical pulling machine. When a mechanical/automated pulling machine is used it shall be equipped with a monitored tension meter/tension control. Cable pulling tension shall be continuously monitored; the pulling process shall not be allowed to exceed the maximum tension specified by the manufacturer of the cable. A proper wire mesh pulling grip and swivel shall be used in the cable pulling process.

1.8.7 PULLING continued…

Fuse links and breaks shall be used to insure that the cable will not be subjected to stresses exceeding 600 lbf.

The minimum-bending radius of the cable shall not be exceeded. Corner rollers (wheels), if used, shall not have radii less than the minimum installation bend radius of the cable. A series array of smaller wheels may be used for accomplishing the bend if the cable manufacturer specifically approves the array. Entry guide chutes shall be used to guide the cable into the pull-box conduit ports. When simultaneously pulling fiber optic cable with other cables, separate grooved rollers shall be used for each cable.

On runs over 100 feet, lubricating compound shall be used to minimize cable-to-conduit friction. Lubricating compound shall be a water-based compound specifically produced for fiber optic cable lubrication. Lubricants such as dish soap and other substitutes shall not be permitted.

Every effort shall be made to pull cables from a conduit in as straight an angle as possible. “Offset” pulling shall be avoided whenever possible. (Pulling on an angle can cause damage to the cable.) The number of 90° turns on a pull shall not exceed 4.

The cable shall be installed in continuous lengths from splice point to splice point, as indicated in the plans.

1.8.8 CABLE SLACK REQUIREMENTS:

Throughout the cable plant, pull and store excess cable slack at each pull box, splice box, hub, and each TMC or TOC. The following lengths of slack cable are minimums:

Fiber Pull Box:	50 ft.
Fiber Splice Box:	100 ft.
Bridge Barrier Wall:	20 ft.
Device Cabinet:	20 ft.
Hub Building (Inside):	100 ft.

Cable slack shall be neatly arranged and looped horizontally on the floor of each pull box. Coils of slack from separate cables shall be grouped together and taped individually.

Do not leave slack cable lying free (uncoiled) on the ground, bottom of a pull box, or floor of a Device Cabinet, Hub Building, etc., except during the installation/pulling process.

When coiling and storing cable slack the cable minimum bend radius shall not be exceeded. The cable slack/coils shall not protrude above the pull box/splice vault cover or in any way interfere with the placing or replacing the splice box cover.

1.8.9 LABELING & DOCUMENTATION:

Document the sequential cable length markings at each pull box and splice vault wall that the cable passes through and include this information with the as-built documentation.

Each cable that enters/exits a conduit inside a pull box shall be clearly labeled with a weatherproof tape/tag within 3 foot of the conduit. The tag/label shall indicate: the cable type, fiber count, length marking, "from" direction, and the cable's origination and termination points. The tag shall provide enough space for all info to be written clearly and legibly on its front.

1.8.10 INSPECTION:

Prior to splicing and/or termination, the City shall be notified immediately when cable installation (pulling) is complete so that they may be present during inspection of the cable installation. The cable shall be inspected at all accessible locations (pull boxes, splice vaults, traffic cabinets, etc.) for correctness and for damage to the cable that may have occurred or may have been preexisting.

Once the cable installation has been inspected and met by approval from the City, then the contractor may proceed with completion of the installation (splicing, termination, testing, etc.).

1.8.11 DAMAGE:

The City shall be notified immediately of any damage to the cable, including, but not limited to: any nick that penetrates the outer jacket of the cable (even if buffer tubes, gel, fibers, etc., are not exposed); any kinks, twists, warps, bends, or crushing of the cable that result in a deformation that does not restore to normal on its own, even if the damage appears to be only superficial.

If any damage to the fiber optic cable occurs before, during or after installation, the contractor shall not attempt to repair the damage before the City has been notified and exercised its option to inspect the damage. Once inspected, the City will choose the repair method and direct all repair operations, including but not limited to: placing fiber splints, sealing, splicing and re-splicing cable, etc. The City reserves the right to perform any repairs itself wherever it deems necessary.

1.9 FIBER OPTIC SPLICING REQUIREMENTS

All fibers in the fiber optic cable shall be spliced and/or terminated.

1.9.1 SPLICE PLAN:

Provide a splice plan showing the location and configuration of the splices in the system for approval by the City. All splicing shall be performed according to the plan. Document each splice location and identify the source and destination of each fiber in each splice tray. Document all fiber colors and buffer jacket colors used during installation. Develop and document a sequential fiber numbering plan as required in the TIA/EIA-598-A standard.

1.9.2 FUSION SPLICING:

The fusion technique shall be used for all splices and terminations. A fusion splicing machine (Fusion Splicer) shall be used to splice all optical fiber as specified in Section 1.6.

1.9.3 PERSONELL:

All splicing personnel shall be adequately trained for the fusion splicing, and shall possess a fiber optic splicing certification from an industry recognized authority such as IMSA or ETA.

1.9.4 SPLICING EQUIPMENT PREPARATION:

Provide splice closures, organizers and incidentals, and cable end preparation tools and procedures, compatible with the cable type being delivered. Fusion splicing equipment shall be cleaned and calibrated per the manufacturer's specifications, and specifically adjusted to the fiber and environmental conditions at the start of each splicing shift.

1.9.5 SPLICE CLOSURE PREPARATION:

Select a splice closure appropriate for the application that complies with section (1.2 Splice Enclosures) and shall allow all of the fibers in each cable to be spliced and stored. All cables shall enter into the splice closure on only one side ("butt" configuration). Only one cable per entry port shall be allowed (except for mid-span "oval" ports). A minimum of 10 feet of cable from each cable entering the closure (i.e. 20 feet of trunk cable in mid-span splicing) shall be prepared and installed within the enclosure.

1.9.6 SPLICE TRAY PREPARATION:

Splice trays shall be selected that will accommodate the required number of splices and provide sufficient storage space and protection to prevent micro-bending of slack fiber. Accomplish loose tube entry using a mid-access tool or split-entry tool. Only open the buffer(s) that contain(s) the fibers to be spliced, and only cut the fibers that must be spliced. Buffer tubes shall be secured onto the splice tray and held rigidly in place. At least 36" of loose fiber shall be exposed for splicing and the remainder shall be stored as slack, along with any exposed fibers that will not be spliced.

1.9.7 SPLICING:

Perform fusion splicing according to latest version of the cable manufacturer's and fusion splicer's procedures, accepted standards, codes, and practices; or as directed by the City. Fibers shall not be fused or re-fused more than a total of 3 times.

1.9.8 SPLICE LOSS:

Individual splice loss shall not exceed 0 .05 dB loss.

1.9.9 SPLICE PROTECTION:

Each spliced fiber shall be packaged in a 60mm heat shrinkable splice protection sleeve with strength member. The protection sleeve shall cover the splice and any bare fiber stripped of its coating.

1.9.10 STORAGE:

A maintenance loop at each Pull Box or Fiber Splice Box shall be per Section 1.8.8.

1.9.11 LABELING:

Each cable entering a splice closure shall be clearly labeled with a weatherproof tape/tag within 1 foot of the splice closure, which shall indicate: the cable type, fiber count, length marking, "from" direction, and the cable's origination and termination points. Splice closures shall be tagged with a weatherproof tag/label. The tag shall provide enough space for all info to be written clearly and legibly on its front. Labeling shall include: date of installation, splicing technician name, splice diagram/chart reference #, etc. A splice diagram/chart shall be included inside the splice. The diagram will define each fiber from every cable that enters the enclosure.

1.10 FIBER OPTIC TERMINATION REQUIREMENTS

All fiber optic cables shall be terminated by means of fusion splicing onto factory pre-terminated assemblies (pigtails) with ST connectors. Patch Panels, Pigtails and Splice Trays shall be provided as specified earlier in this document. Patch panels shall accommodate all fibers entering equipment cabinets. Splice Trays shall be selected that fit accordingly into the patch panel.

1.10.1 PATCH PANEL PREPARATION:

The cable shall be clamped to the patch panel by means of a "hose clamp". The cable central strength member shall be secured (clamped) to the patch panel. Protective spiral wrap shall be placed and secured (taped) over the cable and buffer tubes where the cable enters the panel and passes through the grommet. 10 feet of cable entering the panel shall be prepared and installed within the enclosure.

Pigtails shall be spliced onto the bare fibers as detailed in section 1.9. The splicing sequence shall follow the order of the fiber # position within the buffer and cable.

Once all bare fibers have been terminated onto pigtails, the pigtails shall be connected to the ST coupler ports according to their position within the fiber or cable. Pigtails shall be arranged and secured neatly within the panel without crushing, exceeding the minimum bend radius, or introducing losses. Dust caps shall be placed on all unused coupler ports.

All fiber terminations shall be visually inspected, and optically tested for attenuation and reflectance, and shall exhibit an optical performance with a maximum insertion loss and a minimum return loss as stated in Section 1.4.

1.10.2 LABELING:

PATCH PANELS:

Patch panels shall be labeled to indicate which cable and direction they provide access to. Port plates shall be labeled to indicate which buffer within the cable they provide access to. Coupler ports shall be labeled to identify which fiber # or color that the port provides access to.

EQUIPMENT PATCH CORDS:

Patch cords that provide connections to network switches shall be labeled at each end to indicate the source cable & fiber #/color it connects to for transmit and receive, and which port on the switch it connects to.

JUMPER PATCH CORDS:

Jumper patch cords, if any, shall be labeled at each end to indicate which cable & fiber #/colors that they are connected to for transmit and receive, as well as a simple description of the link they are associated with (i.e. "backup link to router 9", etc.), and shall include labeling which indicates the "To" and "From" connection end points.

1.11 ACCEPTANCE TESTING

The Fiber Optic Cable Network shall be tested as follows:

1.11.1 MANUFACTURER'S TEST AND CERTIFICATION:

Each reel of fiber optic cable shall be accompanied by the manufacturer's test data (Section 1.1.14). The manufacturer's test data shall identify each fiber in each cable and list its factory-tested attenuation in dB/km. Attenuation shall meet attenuation requirements Section 1.1.12.

1.11.2 PRE-INSTALLATION TESTS (REEL TEST):

Notify the City 3 business days in advance of the cable installation date, so that the City may be present at the tests. At the direction of PSL, test the fiber optic cable at the site storage area prior to installation. Each optical fiber in the cable shall be tested from one end at one wavelength with a compatible OTDR. Test for continuity, length, anomalies, and approximate attenuation. Record each measurement with color, location and fiber type measured, and submit the documentation to the City in ".SOR" file electronic format. If the tested loss per Km exceeds the loss from the manufacturer's test data the City will reject the cable.

1.11.3 SPLICE TEST RESULTS:

Splice loss measurement test results from the fusion splicer shall be recorded and submitted to the City in an electronic format for evaluation. Test results shall include: Date and Time, Splicing Technician Name/ID, splice loss, and GPS location data for each fiber optic splice.

1.11.4 POST INSTALLATION TESTS (FINAL TEST):

1. Notify the City 3 business days in advance of the Final Testing so that the City may be present for the tests.
2. After installation (splicing and termination) is complete, the optical fibers shall be tested for loss characteristics. A full bi-directional test (using bi-directional averaging) shall be performed on all terminated fibers in each cable (including those extra fibers which the Contractor elects to include above those invoiced) using an Optical Time Domain Reflectometer (OTDR) (See Section 1.7). Fibers shall be tested at 1310nm and 1550nm.
3. The connection between the OTDR and each tested fiber shall be factory assembled patch cords, or launch cables equal to a length of 150% of the Dead Zone as published by the OTDR Manufacturer. The launch cable shall have the appropriate connectors to allow for connection to the terminated fiber port without the use of additional couplers.
4. Test result printouts shall include, but not be limited to, the following:
    a. Cable ID and Fiber ID;
    b. Distance of trace;
    c. Total Loss;
    d. Splice Loss;
    f. Beginning Testing Location;
    g. End of Fiber Testing Location;
    h. Operator/Technician Name or Initials;
    i. Date and Time test was performed;
    j. Test Wavelength;
    k. Test Pulse Width;
    l. Refractory Index

5. All installation test data shall be submitted in electronic format (.SOR file format) to the City as basis for acceptance.

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1.12 MULTI-PAIR CABLES (COPPER DATA CABLES):

Furnish and install multi-pair data cable (CAT5e) that will support full-duplex Fast Ethernet operations. Furnish all tools, materials, connectors, and required consumables, and perform all installation operations necessary to provide a complete, fully operational multi-pair data cable (CAT5e).

1.12.1 MANUFACTURER:

The manufacturer shall be ISO9001 certified and TL9000 registered.

1.12.2 SPECIFICATIONS:

Multi-pair data cable, CAT5e shall meet the following minimum specifications:

Frequency	100 MHz
Attenuation (min. at 100 MHz)	22 dB
Characteristic Impedance	100 ohms ± 15%
NEXT (min. at 100 MHz)	35.3 dB
PS-NEXT (min. at 100 MHz)	32.3 dB
ELFEXT (min. at 100 MHz)	23.8 dB
PS-ELFEXT (min. at 100 MHz)	20.8 dB
Return Loss (min. at 100 MHz)	20.1 dB
Delay Skew (min. at 100 MHz)	45 ns

NEXT = Near-End Crosstalk

PS-NEXT = Power Sum Near-End Crosstalk

ELFEXT = Equal-Level Far-End Crosstalk

PS-ELFEXT = Power Sum Equal-Level Far-End Crosstalk

1.12.3 CONNECTORS:

CAT5e cabling shall be terminated with Connectors shall be RJ-45 (8P8C) type connectors.

1.12.4 COMPLIANCE:

All Category 5E unshielded twisted pair/shielded twisted pair network cables and connectors shall be compliant with the EIA/TIA-568-A standard.

2 NETWORK DEVICES

Provide hardened, Managed Field Ethernet Switches (MFES) for drop termination connections in Traffic Cabinets. The MFES shall be 100% compatible and interoperable with the existing ITS trunk Ethernet network interface.

2.1 MANUFACTURER:

The manufacturer shall be ISO9001 compliant.

2.2 CONSTRUCTION:

All parts shall be made of corrosion resistant materials such as plastic, stainless steel, anodized aluminum, brass, or gold-plated metals. Every conductive contact surface shall be gold-plated or made of a noncorrosive, non-rusting, conductive metal. The MFESs shall be constructed with no moving parts (Fan-Less Design).

2.3 PHYSICAL/MECHANICAL:

Height:	≤ 8”H x ≤ 3”W x ≤ 5”D
Mounting:	DIN rail mounted

2.4 ELECTRICAL:

All wiring shall meet NEC requirements and standards.

- Power Consumption: ≤ 10W
- Input Voltage: 85-264 VAC

2.5 ENVIRONMENTAL:

- Operating Temperature Range: -40°C to +85°C
- Humidity: ≤ 95 % non-condensing
- Ingress protection: IP40 rated (1mm objects)
- Compliance: NEMA TS 2 Standard (Traffic Control Equipment)

2.6 ETHERNET PORTS:

8 “Fast Ethernet” (10/100BaseTX) Copper Ports.

- Copper ports shall be RJ-45 Type.
- Auto-negotiate speed (10/100/1000) and duplex (half/full).
- IEEE 802.3 standard compliant pinouts.

2 Fiber Optic single-mode “Gigabit Ethernet” (1000BaseX) ports

- Each optical port shall consist of a pair of SC or LC Type connectors only
- Optical power budget ≥ 15 dB

2.7 WARRANTY: 5 years manufacturer warranty from the date of purchase.

2.8 PERFORMANCE:

- Switching Latency: ≤ 7µs
- Switching Bandwidth: ≥ 5.6 Gbps

- VLANS: 255
- IGMP Groups: 255
- Minimum 32KB MAC address table (8192 MAC addresses)
- Minimum 4Kb VLAN address table
- Forwarding/Filtering rate: 14,888pps@10Mbps; 148,880pps@100Mbps; 1,488,800pps@1Gbps
- Minimum Mean Time Before Failures (MTBF) of 10 years (87,600 hours)

2.9 OTHER:

Diagnostic Light Emitting Diodes (LEDs) indicating Link, TX, RX and speed for each port, as well as Alarms and Power on unit. LED indicators shall be on the front panel of the unit.

2.10 MANAGEMENT CAPABILITIES:

The City shall be able to manage each MFES individually or as a group/cluster for switch configuration, performance monitoring, and troubleshooting. The MFES shall support setup/configuration and management and/or monitoring of all user programmable features and functions via the following:

- Local access to a Command Line Interface (CLI) via built-in serial (RS-232) port and/or USB port
- Remote access to the CLI via Telnet and SSH connections
- Remote access to a web server Graphical User Interface (GUI) via HTTP/SSL (128-bit encryption)
- Remote setup via Simple Network Management Protocol (SNMP) v1/v2/v3 (56-bit encryption)
- Remote setup via Trivial File Transfer Protocol (TFTP)
- Remote Monitoring (RMON)

2.11 CYBER SECURITY FEATURES:

The MFES shall support the following standard and advanced cyber security features:

- Multi-Level User Passwords
- SSH/SSL (128-bit encryption)
- Enable/Disable Ports
- MAC based port security
- Port based network access control
- Port-based VLANs and VLAN Tagging with GVRP
- Ability to generate an alarm and shut down ports if an unauthorized user accesses the network.

2.12 NETWORKING FEATURES:

Standard and advanced (layer 2+) networking features shall include, but are not limited to:

- Port Rate Limiting
- Port Mirroring
- Internet Group Messaging Protocol (IGMP) v1/v2 (Supporting “router-less” operation)
- Quality of Service (QoS) priority classify by port, tags, MAC address and IP type of service (ToS)

2.13 NETWORKING STANDARDS / IEEE COMPLIANCE:

The MFES shall comply with all applicable IEEE networking standards for Ethernet communications, including but not limited to:

- 802.3-10BaseT

- 802.3u-100BaseTX, 100BaseFX
- 802.3x-Flow Control
- 802.3z-1000BaseLX
- 802.3ab-1000BaseTX
- 802.3ad-Link Aggregation
- 802.1d-MAC Bridges
- 802.1d-Spanning Tree Protocol
- 802.1p-Class of Service (Quality of Service QoS)
- 802.1Q-VLAN Tagging
- 802.1w-Rapid Spanning Tree Protocol
- 802.1x-Port Based Network Access Control
- 802.1Q-2005 (formerly 802.1s) Multiple Spanning Tree Protocol (MSTP)

2.14 IETF RFC COMLIANCE:

- RFC768-UDP
- RFC783-TFTP
- RFC791-IP
- RFC792-ICMP
- RFC793-TCP
- RFC826-ARP
- RFC854-Telnet
- RFC894-IP over Ethernet
- RFC112-IGMP v1
- RFC1519-CIDR
- RFC1541-DHCP (Client)
- RFC2030-SNTP
- RFC2068-HTTP
- RFC2236-IGMP v2
- RFC2284-EAP
- RFC2475-Differentiated Services
- RFC2865-RADIUS
- RFC3414-SNMP v3-VSM
- RFC3415 v3-VACM

2.15 INSTALLATION REQUIREMENTS:

Furnish and identify all equipment and appurtenances by name, model number, serial number, technical support and warranty telephone numbers, and any other pertinent information required to facilitate equipment maintenance.

The MFES shall be mounted securely in a DIN rail mounting bracket, inside a field site cabinet, and shall be fully accessible by field technicians. Do not use self-tapping screws. Ensure that the MFES is protected from rain, dust, corrosive elements, and typical conditions found in a roadside environment. All wiring shall comply with NEC requirements and standards.

Connect devices to the power sources. Connect all remote ITS field devices to the appropriate MFES copper ports as specified in the plans. Connect the MFES to the fiber network trunk/drop cable termination panel as specified in the plans. Fiber optic patch cables shall be arranged and secured neatly in the patch panel and the minimum bend radius shall not be exceeded.
Use MFES units that can be serviced or replaced immediately when defective or damaged units must be removed and replaced. The Department shall return damaged units to the manufacturer for warranty repair or replacement.
All front panel status indicators (LEDs) shall remain unobstructed and visible.

2.16 FIELD TEST / VERIFIACTION REQUIREMENTS:

The Contractor shall arrange for and conduct the tests and is responsible for satisfying all inspection requirements prior to submission for the City's inspection and acceptance. The City reserves the right to witness all FATs. Complete the tests within five business days.

Once the MFES has been installed, conduct local Field Acceptance Tests (FATs) at the MFES field site according to the test procedures stated herein.

1. Verify that physical construction has been completed as detailed in the plans.
2. Inspect the quality and tightness of ground and surge protector connections.
3. Verify proper voltages for all power supplies and related power circuits.
4. Verify all connections, including correct installation of communication and power cables.
5. Verify connectivity by means of link LEDs.
6. Verify configuration of the MFES Internet Protocol (IP) addresses and subnet mask.
7. Verify the network connection to the MFES through ping and telnet sessions from a remote personal computer (PC).
8. Perform testing on multicast routing functionality.
9. Call the City to verify that all field devices are reachable over the network.

3 DIGITAL VIDEO ENCODER

Hardware-based network device able to accept a minimum of one analog National Television System Committee (NTSC) video input and digitize it for transport across IP networks, as well as command and control signals for PTZ cameras.

3.1 INTEROPERABILITY:

Encoders, decoders and any related software applications shall be 100% compatible with the City's existing Video/CCTV hardware devices from other manufacturers and developers that are currently in use by, or planned for purchase and use by the City of PSL, such as encoders, decoders, and its current Video Management Software (VMS) platform (Bosch "VIDOS"). Video and data packets produced by the encoder and placed onto the network shall allow reconstruction of digital video signals by hardware-based and software-based decoders that are also attached to the network.

3.2 PHYSICAL:

All exposed parts shall be constructed of corrosion resistant materials such as plastic, stainless steel, anodized or painted aluminum, brass or gold-plated metal.

- DIMENSIONS: >2" x >6" x >8"
- MOUNTING: DIN rail, or some other means that holds the device rigidly in place.

3.3 ELECTRICAL:

All wiring shall meet NEC requirements and standards.

- Input voltage: 89Vac to 135Vac @ 60Hz (may use power supply/converter)
- Power Consumption: ≤ 10W

3.4 ENVIRONMENTAL:

- Operating Temperature Range: +32°F to +122°F
- Max. Relative Humidity: 90% (Non-Condensing)

3.5 WARRANTY: 3 years

3.6 VIDEO SPECIFICATIONS:

Encoders shall operate with color and monochrome video. Encoders shall allow the user to select and adjust video resolution. Devices shall stream color and monochrome video at 30 frames per second (30fps) regardless of resolution.

3.7 H.264 FORMAT:

Encoder components shall employ video compression technology in accordance with the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) requirements detailed in the ISO/IC 14496-10:2009 standard. The encoder shall allow selection of various programmable fixed and variable H.264 bit rates.

3.8 INPUT/OUTPUT (I/O):

3.8.1 VIDEO:

- Inputs: 1 for PTZ Cameras / 4 for Video Detection Cameras

- Connector: BNC
- Impedance (Z): 75Ω, switchable
- Signal: Composite (analog), 1Vp-p, NTSC

3.8.2 COM PORT:

To transmit/receive command & control data from other devices (camera PTZ commands, etc).

- Inputs: 1
- Connector: Clamp (screw terminal)
- Signal: RS-232/422/485
- Data Rate: Up to 115Kbps
- Parity Bits: None, Odd, Even
- Stop Bits: 1 or 2

3.8.3 ALARM:

- Inputs: 1 for PTZ Cameras / 4 for Video Detection Cameras
- Connector: Clamp (non-isolated closing-contact)
- Activation Resistance: 10Ω max

3.8.4 RELAY:

- Output: 1
- Connector: Clamp
- Signal: 30Vp-p(SELV), 200 mA

3.9 NETWORK INTERFACE:

The encoder shall provide one 10/100BaseT "Fast Ethernet" port.

- Connector: RJ-45
- Auto-sensing
- Half/Full Duplex

3.9.1 PROTOCOLS:

RTP, Telnet, UDP, TCP, IP, HTTP, HTTPS, FTP, DHCP, IGMP v2/v3, ICMP, ARP, SMTP, SNTP, SNMP, 802.1x

3.9.2 ENCRYPTION:

TLS 1.0, SSL, AES

3.10 SERIAL INTERFACE:

Encoders shall provide/support a TCP/IP interface (Virtual COM port) to their serial port using a network socket connection with configurable IP address and port number.

3.11 FRONT PANEL STATUS INDICATORS:

Devices shall provide light-emitting diode (LED) displays, liquid crystal displays (LCD), or similar illuminated displays to indicate status for power, data activity, link status, and video transmission.

3.12 SOFTWARE:

Provide compatible decoder software with the encoder device at no additional cost.

Decoding and control software packages shall allow viewing of any video source connected to the network through an encoder, including pan-tilt-zoom (PTZ) control of any PTZ camera on the

network, the discovery of encoder and decoder devices on the network, and the control and management of the programmable parameters of these devices, at no additional cost. All equipment licenses, where required for any software or hardware in the system shall be provided.

Any software-based video decoder application shall provide PC desktop/laptop display of IP network video streams.

3.13 ONVIF CONFORMANCE:

To ensure future compatibility with encoder and decoder devices and software applications or Video Management Systems (VMSs) from other manufacturers and developers, encoder devices shall be fully compliant with the latest version of the Open Network Video Interface Forum (ONVIF) core specification. Encoder and decoder devices and related software applications shall support stream selection and switching as well as full control and configuration using ONVIF commands.

3.14 CONFIGURATION and MANAGEMENT:

Devices shall support local and remote configuration and management. Configuration and management function shall include access to all user programmable features, including but not limited to: addressing serial port configuration, video settings, device monitoring, and security functions. Devices shall support configuration and management via local serial login and remote telnet login, web browser and Simple network Management Protocol (SNMP).

The encoder and decoder devices shall be capable of unicast and multicast operation. Encoders shall support Session Announcement Protocol (SAP) and Real Time Streaming Protocol (RTSP).

3.15 INSTALLATION:

The encoder shall be housed in a field cabinet with protection from moisture and airborne contaminants, blowing rain, wind, sand, dust, humidity, roadside pollutants, vandalism and theft.
The encoder shall be mounted on a DIN rail, or secured in place by a similar mounting method that will hold the device rigidly in place.

The device shall be mounted so that the front panel and status indicators remain unobstructed and visible, and in such a way that technicians have easy access to the input/output connections for power, video, serial/control, Ethernet, etc.

4 GUARANTY PROVISIONS:

The manufacturers' warranties for the MFES, encoders, decoders, and software applications shall be fully transferrable from the Contractor to the Department. These warranties shall require the manufacturer to furnish replacements for any part or equipment found to be defective during the warranty period at no cost to the Department within 10 calendar days.

REFERENCES:

Corning Cable Systems - Generic Specification "Single-Mode Optical Fiber in Loose Tube … Cables"
Corning Cable Systems - Generic Specification "Gel-Free Loose Tube… Cables for Outdoor Applications…"
Corning Cable Systems – SRP-005-011 "Duct Installation of Fiber Optic Cable"
Corning Cable Systems - SRP-005-044 "Installing a Wire Mesh Pulling Grip On … ALTOS Cables"
Corning Cable Systems - Whitepaper "Air Blown Fiber Systems – A Technical Discussion"

5 CONDUIT

5.1 MATERIAL SPECIFICATIONS FOR UNDERGROUND INSTALLATION

5.1.1 HDPE

HDPE conduit shall be used for directional bores.

5.1.1.1 OUTER DUCT

Conduit shall be manufactured from virgin high-density polyethylene with PE 3408 resin. Conduit shall be extruded with uniform full-thickness orange only coloring. Printed or embossed striping is not permitted.

Conduit shall be labeled with durable identification giving the name of the manufacturer, conduit size (inner diameter trade size and wall thickness/rating), manufacture/date codes, and sequential foot marking.

Conduits shall be 2" in diameter (IPS) and shall conform to ASTM D-3305 meeting the following minimum requirements:

- Smoothwall DR 11
- Nominal outer diameter - 2.375"
- Average inner diameter - 1.926"
- Minimum Wall thickness - 0.216"
- Tensile Strength – 3,000 psi min (ASTM-D638).
- Elongation – 400% min.
- Melt Index – 0.4max (ASTM-D1238).
- Condition B – 20% failure max (ASTM-D1693).
- Cell classification -3340 or 34420 (ASTM-D3350).
- Impact – NEMA Standards Publication TC7 (ASTM-D2444).

Conduits shall be factory treated with an atomized silicone or manufactured in a manner to reduce friction during pulling fiber optic cable. The coefficient of friction shall be 0.09 or less.

Conduit shall be resistant to calcium chloride, potassium chloride, sodium chloride, sodium nitrate, benzene, ethyl alcohol, fuel oil gasoline, lubricating oil, and transformer oil and is protected against degradation due to oxidation and general corrosion.

Conduit shall be suitable for underground use in an ambient temperature range of -30 to 130 degrees F without degradation of material properties.

All underground conduit installations shall be 2" Schedule 80 PVC or HDPE conduit with a minimum of 30" of cover as shown on the approved plans and standard detail. The

contractor shall use the following methods for placement of the buried fiber optic cable conduit:

- Trenching
- Plowing
- Joint Trench Installation
- Directional Drilling where necessary, or
- Other methods approved by PSL and EOR

The top of the conduit shall be not less than 30" below grade, and shall have a minimum slope of 3" in each 100' away from buildings and toward pull boxes and other necessary drainage points.

If the required depth cannot be accomplished due to soil conditions or obstructions, additional mechanical protection shall be provided as indicated by the EOR and PSL. For underground conduit requiring additional mechanical protection, i.e. boring under railroads, shall boring depth, proximity to other utilities, a black steel pipe shall be installed as an outer sleeve/casing or other material specified by the EOR and approved by the PSL.

The conduit shall be run in straight lines except where a change of direction is necessary. Should unsuitable soils be found, the contractor shall contact the EOR and PSL for final determination. Where installation is conduit only (i.e., not a joint trench installation), unsuitable soils shall be removed up an additional 3" of depth and will be replaced with clean fine sands, tamped level and meet density requirements.

For all new duct runs a continuous marking tape shall be direct buried at 12"-18" below grade.

Every effort shall be made to minimize HDPE couplings. Couplings shall be airtight and watertight. All couplings shall be installed in accordance with the conduit and the coupling manufacturer's recommendations. Only couplings of the type specified below and approved by the conduit manufacturer are permitted. Couplings shall be accomplished only by hydraulic press-on or electro-fusion coupling methods. Hydraulic press-on couplings of seamless tool-grade tubular aluminum with sealing barbs and center stop shall be used. Hydraulic compression duct coupling tools and manufacturer's installation procedures shall be utilized to fully insert both conduit sections to the coupling center stop. Pre-fabricated electro-fusion couplings shall be used in accordance with the manufacturer's recommended automatic self-monitoring fusing machine and installation procedures.

5.1.1.2 INNER-DUCT

Provide factory lubricated, industry sized 1.25-inch inside diameter, low friction, coilable, conduit constructed of virgin high-density polyethylene outer duct. Said inner duct shall conform to ASTM D-2239 and meet the following minimum

requirements: Smooth wall SDR-11, nominal outer diameter of 1.592 inches, minimum inner diameter 1.360 inches and a minimum wall thickness of 0.106 inches.

Provide conduit with a smooth outer wall and ribbed inner wall and ensure the conduit is capable of being coiled on reels in continuous lengths, transported, stored outdoors and subsequently uncoiled for installation without affecting its properties or performance. Inner duct shall be furnished in the following factory extruded colors: orange, red, and yellow.

Furnish and install inner duct with an uninterrupted detectable Kevlar pull (mule) tape, with a minimum of 3-feet of excess tape extending out of each end of the outer duct; these pull tapes shall be utilized in future phases for the installation and detection of fiber optic cable.

Provide mechanical duct plugs that provide a watertight barrier when installed in an unused inner duct conduit. Provide duct plugs sized in accordance with the conduit furnished. Provide duct lugs that are removable. All conduits shall come with factory installed duct plugs to keep out dust, dirt, and water.

Provide mechanical sealing devices that provide a watertight barrier between the conduit and communications cable. Provide mechanical sealing devices sized in accordance with the conduit furnished and with appropriately sized holes for the communications cable. Provide mechanical sealing devices that are removable.

5.1.2 PVC CONDUIT

Use of PVC conduit materials is specifically required in joint trench applications and in other instances, if approved by PSL.

Conduit shall be 2” schedule 80 PVC manufactured to NEMA TC-2, Federal Specifications WC1094A and VC651.

All bends shall consist of a minimum 48” radius sweep. Sweeps shall be fabricated by the manufacturer and shall have no indications of deformations of the pipe circumference or scorching of the conduit, otherwise the material will be rejected.

No more than an equivalent 180° bend radius shall be allowed in any conduit run in-between hand-holes/pull-boxes. PVC conduit shall be manufactured and installed in 20’ lengths with bell and spigot design and all joints solvent welded and fully seated.

5.2 MATERIAL SPECIFICATIONS FOR ABOVE GROUND INSTALLATION

Conduit shall be 2” galvanized rigid steel (GRS), aluminum, or Schedule 80 PVC in accordance with ASTM D 1785. Rigid steel conduit material utilized shall be compliant with UL-6, ANSI C-80.1 and to Article 346 of the NEC. Aluminum conduits shall be of aluminum 6063 aluminum alloy, T-1 Temper, ANCI C80.5, and NEC 250.118(2). No reducing couplings or reduction in the inside diameter of conduit shall be permitted.

All required connectors, adapters, fittings, conduit straps or “U” guard clamps and incidentals required and necessary for above ground installations shall be galvanized and provided to construct a complete conduit/duct system.

The conduit for above ground use (a riser assembly on a utility service pole for the purpose of bringing power from above ground to underground conduit/duct, or bridge mounted or other above ground structure) consisting of galvanized rigid steel (GRS), aluminum, or Schedule 80 PVC conduit in accordance with ASTM D 1785 and as approved by the City.

Schedule 80 PVC conduit, aluminum or Rigid Metal Conduit (RMC) for bridge applicable. All rigid steel conduit material utilized shall be compliant with UL-6, ANSI C-80.1 and to Article 346 of the NEC. All aluminum conduits shall be of aluminum 6063 aluminum alloy, T-1 Temper, ANCI C80.5, and NEC 250.118(2). All required connectors, adapters, fittings, conduit straps or "U" guard clamps and incidentals required and necessary for above ground installations shall be galvanized and provided to construct a complete conduit/duct system.
No reducing couplings or reduction in the inside diameter of conduit shall be permitted. No intermediate metallic conduit (IMC) or thin-wall type electrical conduit shall be permitted on this project for outdoor use.

A galvanized metal conduit grounding bushing, or aluminum metal conduit grounding bushing on the terminating ends of all GRS/aluminum conduit runs. The bushings shall have an insert made of plastic or other suitable material to protect wiring installed in the conduit. The bushing shall have a compression-type grounding lug for bonding the conduit to the ground rod in the pull box. Do not field drill sealing bushings.

5.3 INSTALLATION REQUIREMENTS

5.3.1 SPLICING OF THE CONDUIT

Splice or join sections of conduit(s) using manufacturer's recommended splice kits. Upon approval, a junction box or pull box may be installed at locations where splicing or coupling of the conduit is necessary due to problems encountered with the installation.

5.3.2 DUCT PLUGS AND MECHANICAL SEALING DEVICES

Following the installation of conduit where the communications cable is not immediately installed use a duct plug to seal the ends of the conduit. Secure the pull line to the duct plug in such a manner that it will not interfere with the installation of the duct plug and provide a watertight seal.

In conduits containing communications cable, seal the conduit with an approved mechanical sealing device. Ensure the installation provides a watertight seal.

5.3.3 CONDUIT SEALS AND COUPLINGS

Conduit in which cable is placed shall be sealed with urethane foam duct seal; this material shall be inserted between the cable and the conduit.

5.4 TESTING OF CONDUIT

After installation of the conduit and completion of tamping/backfill process, a mandrel test shall be performed to ensure the conduit has not been damaged. A non-metallic mandrel with an outer diameter of at least 95% of the internal diameter of the conduit shall be passed through the conduit. If the mandrel fails to pass through the conduit, the defect shall be exposed and corrected. The test shall be repeated to assure that the defect has been satisfactorily corrected.

The PSL may accept alternative testing to demonstrate that the conductor can be pulled through the conduit if a written justification is submitted by the contractor.

6 LOCATE TRACER WIRE

Tracer wire shall be placed inside all conduits, terminating at the nearest pull box. The wire shall not be run into the cabinet.

The tracer wire shall be continuous and un-spliced between pull boxes, except in places were a directional drill occurs. The tracer wire shall be inside the conduit with fiber.

A continuity test shall be performed after installation to confirm that a continuous run of tracer wire was installed between pull boxes or directional drill. The tracer wire shall be tested before and after backfilling. The purpose of this test is to document that no damage or separation of the tracer wire has occurred during the installation of wire, backfilling of the trench, or box installation

7 MARKING TAPE

Marking tape shall be bright orange color, minimum 6" wide.
Marking tape shall be per the QPL, as specified, with " CAUTION PSL FIBER OPTIC CABLE CALL BEFORE DIGGING (800) 638-4097 " printed every 3' in black letters.

The tape shall be a dielectric, polyolefin film tape that is tear resistant, and corrosion resistant. The tape shall be constructed using material and ink colors, which will not change when exposed to acids and other destructive substances commonly found in the soil.

A marking tape shall be placed in the trench during cable installation, directly above the cable, 18" below grade. All conduit installed by use of directional boring shall not include the marking tape.

Marking tape shall be installed for the full length of the cable or conduit run.

8 PULL TAPE – MULE TAPE

Mule tape shall only be utilized if fiber optic cable is to be installed by the pull method. Pull tape shall be per the QPL. Mule tape shall be pulled in unison with the cable and left in all duct/s. In the case of conduit without fiber being pulled, a pull tape shall be pulled and left in the duct/s.

The tape shall have the following properties:

- Tensile strength of 1800 lbs
- Flat, not round, construction
- Printed foot markings
- Pre-lubricated for reduced pulling tension at start of cable pull, low susceptibility to absorption of moisture: moisture resistant
- Wire continuity testing shall be done.

9 CABLE ROUTE MARKERS

Markers shall be tubular in design and constructed of Type III high-density polyethylene material ultraviolet stabilized to help prevent their components from color fading, warping, absorbing water and deteriorating with prolonged exposure to the elements. Marker posts shall be orange in color.

The marker assemblies shall include the descriptive information " CITY OF PSL FIBER OPTIC CABLE – CALL BEFORE DIGGING (800) 638-4097" printed in black on an orange reflective background material that will not fade or deteriorate over time. The printed message shall be visible from all directions approaching the assembly.

As field conditions dictate, fiber markers shall be placed at approximately 500 foot intervals or as approved by the City on the rights-of-way line, but should be placed to avoid visual clutter in urban areas. Markers shall be placed at every pull box and midpoint. In unique situations, they could be shortened up to 250 feet or lengthened out to 750 feet, as approved by the City.

As field conditions dictate, fiber markers shall be placed at approximately 500 foot intervals or as approved by the City on the rights-of-way line, but should be placed to avoid visual clutter in urban areas. Markers should be as close to the property lines as possible. In unique situations, they could be shortened up to 250 feet or lengthened out to 750 feet, as approved by the City.

10 HUB SITES

Hub sites shall be installed at predetermined locations. The hub sites will provide full access and interconnections to ALL fibers in each cable that appear at these locations. The purpose of these locations is to provide an adaptable level of re-routing capabilities, which will be especially advantageous during emergency repair situations as well as routine and planned fiber network modifications. The re-routing capabilities gained from the locations will allow for network connectivity to be restored within minutes to hours, instead of hours to days, and will allow for fiber cable repairs and modifications to take place during normal working hours instead of overtime. The advantages gained in re-routing capabilities far outweigh any perceived disadvantages of increased exposure above ground.

Hub sites shall consist of a hub cabinet secured to a concrete pad. The Hub Cabinet specifications and construction shall be in accordance with the following:

- Enclosure shall be made from .125 thick aluminum type 5052-H32 and have the dimensions of 52.5 inches wide, 67.5 inches tall and 41.75 inches deep.
- The enclosure shall be weather tight, have provision for a screened air exhaust opening at the top of enclosure, all external hardware to be stainless steel.
- The enclosure should be equipped with 2 equal sized doors with three point latching system with nylon rollers at the top and bottom. Door handle is ¾" diameter stainless steel and can be padlocked. The doors must be tamper resistant.

The hub cabinet shall also include:

- 12 Volt 103 AH power supply rechargeable sealed lead battery
- Air-cooled Panel mounted Air conditioner with BTU/H Capacity 4000, 95/95 Rating BTU/H 3340, Ambient Temp, F, Max/Min, 125/0, Volts 115/100 or 230/200, Hz 60/50, Running Amps 13.6/13.3 or 5.8

The Contractor is to provide shop drawings for review prior to construction.

Within each hub cabinet, each fiber optic cable existing at the location shall be pulled into the cabinet and be terminated separately. Each cable shall be terminated into its own individual 3M 8423 patch panel found in section 1.3 of this document. More than one fiber cable shall *not* be terminated into one patch panel.

Each fiber in the fiber optic cable shall be terminated by fusion splicing it into a pigtail with an ST connector found in section 1.4 of this document. Each pigtail shall be terminated into an 8-port ST adapter plate (part # 8408-TS). Three individual 8-port adapter plates shall be used per each row of the 8423 patch panel for a total of 24 accessible ST connector ports per row of the patch panel. A total of three 8423 expansion kits shall be used to increase the storage capacity of the patch panel to provide accessible ST connector ports for 96 fibers per cable, even if the number of fibers in the cable is less than 96. Fiber optic pigtails shall be placed into the adapter plate ports starting with the lowest number fiber (#1 or Blue fiber or the blue buffer) in the upper left-most port and increasing from left to right and with the last fiber (#96 or Aqua fiber of the Black buffer) in the lower right-most port.

The following equipment shall be required to terminate all fibers at each hub location:

4 x	3M 8423 Fiber Distribution Unit (Patch Panel)	3M part # 8423
12 x	3M Fiber Distribution Unit Expansion Ring	3M product # 8423-EXP
48 x	3M Adapter Plates	3M Product # 8408-TS
16 x	3M Small Fiber Splice Tray	3M Product # 2522-24-SF
384 x	Fiber Optic Pigtails w/ ST Connector	L-com Item # FPT3SNG-ST-YLW-1

11 MDF(main distribution frame)-Indoor Facilities/Lift Station Panels-MIS

The following items are to be used in indoor facilities such as server rooms and at Lift Station Panels as described.

11. 1 Panels & Modules

There are 2 different modular couplers that would be required for Lift Station panel work dependent on required number of connections.

Simplex, UPC, 12F, Single-mode (OS2) panel shall be used when interconnect or cross-connect capability is required to securely mate 12 fiber strands connectors in a panel configuration. The design adapter shall have blue housing and the housing material shall be of metal. The adapter style shall be standard, ST Compatible, and ceramic.

Simplex, UPC, 6F, Single-mode (OS2) panel shall be used when interconnect or cross-connect capability is required to securely mate 6 fiber strands connectors in a panel configuration. The design adapter shall have blue housing and the housing material shall be of metal. The adapter style shall be standard, ST Compatible, and ceramic.

11. 2 Module Coupler-Rack Mountable Hardware

This module unit shall be used inside a building when fusion splicing a 96 fiber is needed.

The Splice Module (6.4 in x 1.4 in x 7.9 in) with Pigtails shall be preloaded and pre-routed for quick fusion splicing of either individual or ribbon fiber pigtails. The fiber cable type shall be single fiber (250 mm), single mode (OS2). The design hardware shall include the connector configuration ST, fiber count 6, module type CCH, with 6 splice protector single fiber heat-shrink. The number of splice protectors is 6. The connector type is ST, with 12-port with 3 meter length. The optical specification of the hardware is a typical module insertion loss, typical 0.15 dB and maximum of 0.4 dB. The design adapter shall be SC.

11. 3 Enclosures

There are three types of enclosures that would be required for various applications.

(1) For inside a building, Closet Connector Housing (CCH) provide interconnect and cross-connect capabilities between the outside plant, riser or distribution cables and opto-electronics. The housing must accept CCH connector panels CCH cassettes and CCH modules. The unit must be able to mount a rack 19-in, 23-in or cabinet mount. The dimension of the unit shall be (7 in x 19 in x 17 in) for proper rack placement. The design hardware consists of locking availability of front or rear, number of panels per housing of 12, panel or module type CCH and splice tray options of CCH Splice Cassette (CCH-CS).

(2) For connection of an exterior fiber cable to the inside fiber splice, the Closet Splice Housing (CSH) must provide storage and protection of fiber splices in individually accessible trays. The housing must

be able to accommodate a rank 19-in, 23-in or cabinet mount. The dimension of the unit shall be (5.25 in x 17 in x 12 in). The design hardware consists of locking availability of front or rear, and the splice tray options are up to (12) category 2R, 2S or 2 M.

(3) For Lift Station panels, the Single Panel Housing (SPH) shall provide storage, protection and termination of optical fiber cables. This unit shall include 1 panel per housing for a CCH module and include a 6- slot, 0.4-in splice holder which will accommodates up to 12 heat shrink single splices (double-staked) and/or six heat-shrink ribbon splices. The dimension of the unit shall be (6.3 in x 5.5 in x 2.0 in).

11. 4 Fan Out Kits

There are two types of fan out kits, indoor and outdoor.

(1) Indoor Fan Out Kits: The buffer tube fan out kits shall be specifically designed for the termination of 6- and 12- fiber buffer types. The fiber cable to be connected shall be 250 mm coated fibers. The indoor kit should provide a 900 mm fan-out assembly that is color coded to match the fiber color scheme. The fan-out assembly must be in lengths of 25 in or 47 in. The temperature operation range shall be 0 C to 70 C.

(2) Outdoor Fan Out Kits: The buffer tube fan out kits shall be specifically designed for the termination of 6- and 12- fiber buffer types. The outdoor kit should provide a 900 mm fan-out assembly that is color coded to match the fiber color scheme. The fan-out assembly must be in lengths of 25 in or 47 in. The temperature operation range shall be -40 C to 70 C.

11. 5 Connectors

There are three different type of ST compatible connecter based on intended use.

(1) For outdoor camera use: The connectors must be high precision zirconia ceramic ferrule connectors. The connector must be 62.5 mm multimode (OM1). The temperature range shall be 0 C to 60 C, meets TIA/EIA 568-B.3

The mechanical specifications shall be:

- durability <= 0.2 dB change by 500 remating, FOTP-21,
- nominal fiber outer diameter of 125 mm,
- tensile strength jacketed cable of 50 N, change <=0.2 dB, FOTP-6 (11 lb, change <= 0.2 dB FOTP-6)
- Tensile strength 900 mm cable of 4.9 N, change <= 0.2 dB, FOTP-6 (1.1 lb, change <= 0.2 dB, FOTP-6)

The optical specifications shall be:

- Insertion loss, typical 0.3 dB
- Insertion loss, max 0.75 dB
- Reflectance: <=-26 dB

(2) For Lift Station control panel: The connectors must be high precision zirconia ceramic ferrule connectors. The connector must be for single mode (OS2). The temperature range shall be 0 C to 60 C, meets TIA/EIA 568-B.3.

The mechanical specifications shall be:

- durability <= 0.2 dB change by 500 rematings, FOTP-21,
- nominal fiber outer diameter of 125 mm,
- tensile strength jacketed cable of 44 N, change <=0.2 dB, FOTP-6 (11 lb, change <= 0.2 dB FOTP-6)
- Tensile strength 900 mm cable of 4.9 N, change <= 0.2 dB, FOTP-6 (1.1 lb, change <= 0.2 dB, FOTP-6)

The optical specifications shall be:

- Insertion loss, typical 0.2 dB
- Insertion loss, max 0.5 dB
- Reflectance: <=-55 dB

(3) For certain approved application, when the newer style LC connector is to be used inside a building: The connectors must be high precision zirconia ceramic ferrule connectors. The connector must be for 50 mm multimode (OM2). The temperature range shall be 0 C to 60 C, meets TIA/EIA 568-B.3. The mechanical specifications shall be:

- durability <= 0.2 dB change by 500 rematings, FOTP-21,
- nominal fiber outer diameter of 125 mm,
- tensile strength jacketed cable of 44 N, change <=0.2 dB, FOTP-6 (11 lb, change <= 0.2 dB FOTP-6)
- Tensile strength 900 mm cable of 4.9 N, change <= 0.2 dB, FOTP-6 (1.1 lb, change <= 0.2 dB, FOTP-6)

The optical specifications shall be:

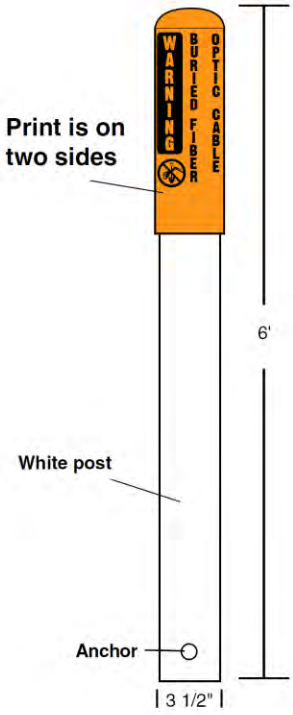
- Insertion loss, typical 0.2 dB
- Insertion loss, max 0.5 dB
- Reflectance: <=-55 dB

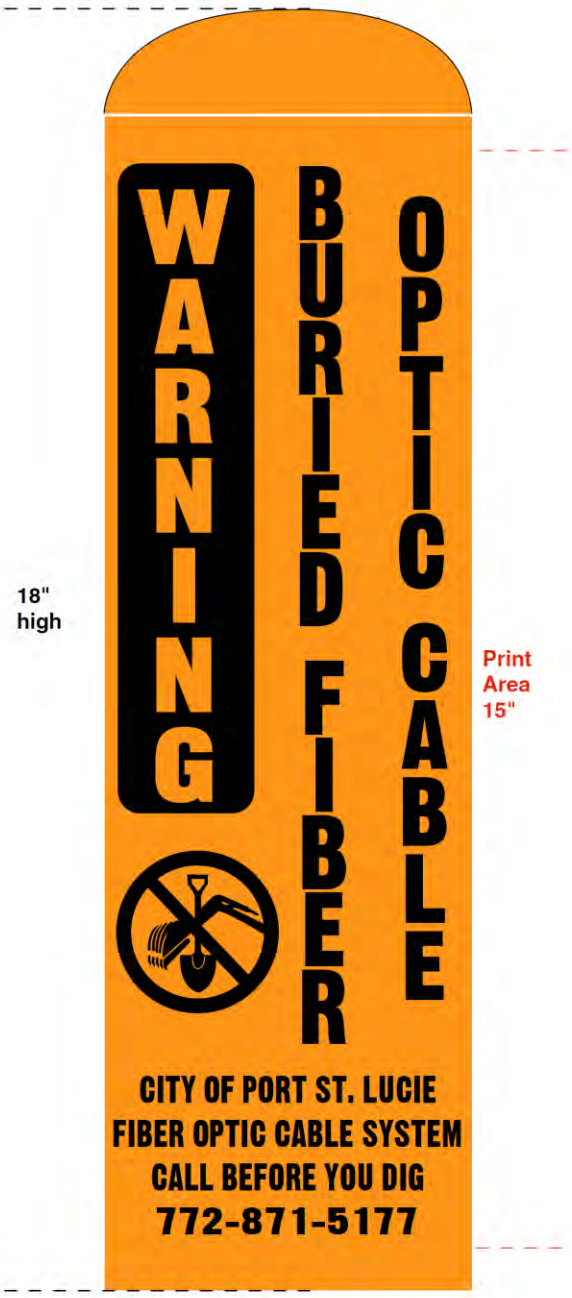
11. 6 Indoor Splice Trays

The indoor splice tray shall be able to provide optimum physical protection for fusion and mechanical splicing methods. The trays shall be engineered for indoor splice hardware with both loose tube and tight buffered optical cable designs. The tray shall consist of rugged aluminum base and cover with crimpable metal tabs for buffer tube strain-relief. The tray shall be black powder coated. The design hardware shall have heat shrink splice protectors, splice tray category of 2S, splice tray capacity for 12 fibers. The unit dimensions shall be (11.7 in x 3.9 in x 0.2 in) to fit into the rack.

Appendix A

1. Fiber optic boxes shall not be installed in roadways or driveways.
2. The fiber optic box shall be one of the products included on the FDOT Approved List of Traffic Control Signals and Devices Product List, Pull Box and Cover, Latest Edition.
3. Fiber optic boxes shall be installed flush with the finished grade surface.
4. Fiber optic box length (long side) shall be parallel to the roadway.
5. City of Port St Lucie standard Kevlar pull (mule) tape shall be installed in the empty conduits for future use.
6. Fiber optic boxes shall contain only Fiber Optic Cable, Conduit and Locate Wire. Fiber Optic boxes shall not contain electrical conduit or conductor. Electrical conduit and conductors shall be installed in separate boxes from each other.
7. Conduit center line shall be aligned to top edge of box to facilitate cable pulling.
8. All fiber optic boxes shall have 1'-0" wide (min) x 6" deep concrete aprons sloped away from box. Apron concrete shall have a minimum strength of 28 days of f'c= 3000 psi with 1-#4 bar in each direction. Apron is to be included in the cost of each box.
9. Fiber optic boxes shall meet FM 5-539 test procedure.
10. Fiber optic boxes shall be equipped with a nonskid cover secured by self-cleaning auger bolts and any other miscellaneous stainless steel hardware required for installation or as shown in the plans. All hardware shall be stainless steel.
11. Fiber optic boxes shall be made of polymer concrete and be designed, tested and certified to meet tier 15 vertical test load. The fiber optic boxes shall be marked "Fiber Optic" and identify the "tier 15" load.
12. All splices shall be properly weatherproofed by approved method.
13. The size and type of fiber optic communications conduit shall be shown on the plans.
14. The use of ground rods shall be shown in the plans. Ground rods shall be a minimum of 10' deep.
15. Refer to the PSLUSD Design Standards Section 11 Fiber Optic Cable, Latest Edition, for splice requirements, box requirements, fiber optic cable, ground rods and other pertinent information.





Qty: 50 each
Size: 6'
Material: Polydome
Color: Orange with black text
Scale: Shown @ 50%

Please inspect this proof carefully. We cannot be responsible for misspelled words, information or layout if Ok'd by the customer. This shows how your custom print job will be printed. Colors are a representation only and may vary from actual manufactured product.

FINAL ARTWORK APPROVAL O.K. to print? _____ YOUR P. O. #SNS010001180940

Date:_____ Name:_____ DRAWING # 09-0510

Appendix B

Sample Shop Drawing Cut Sheets

Allied **PVC Electrical Conduit**

Formerly Georgia Pipe

UL LISTED RIGID SCH-40 & SCH-80 PVC ELECTRICAL CONDUIT

Allied ½" through 6" PVC Electrical Conduit is Underwriters Laboratories listed and is subject to in-process quality control testing to assure compliance with the appropriate manufacturing standards.

Allied PVC Electrical Conduit is manufactured to conform to NEMA TC-2 specifications and is UL listed.

For Commercial, Industrial and Utility usage:
Allied PVC Electrical Conduit is proven durable and effective for years of maintenance-free performance in underground, encased and exposed applications in accordance with the National Electrical Code.

Corrosion Proof:
Resistant to most chemicals, PVC is not affected by any corrosive soils or salts.

Non-Magnetic and Non-Galvanic:
Properties of Allied PVC Electrical Conduit assure good insulation and no power loss or conductor heating.

Self Extinguishing:
Properties make PVC fire resistant.

Impact Resistant:
Allied PVC Electrical Conduit is tough, durable, and has high tensile strength, yet is easy to handle and install right on the jobsite.

Underwriters Laboratories Listed and 90° C Rated:
Allied Schedule-40 and Schedule-80 PVC Electrical Conduit has been listed, in accordance with the National Electrical Code, for use with 90°C conductors in underground, above ground, encased, or exposed applications.

allied TUBE & CONDUIT 16100 S. Lathrop Ave. • Harvey, Illinois 60426 • (708) 339-1610 • (800) 882-5543 • Fax (708) 339-0615

2

Allied **PVC Electrical Conduit**

Formerly Georgia Pipe

UL LISTED RIGID SCH-40 ELECTRICAL CONDUIT RATED FOR 90 DEGREE CELSIUS WIRING

Allied Schedule-40 is sunlight resistant and manufactured in accordance and complies to:

Underwriters Laboratories, Inc.	UL-651
NEMA	TC-2

UL LISTED

Meets or exceeds the requirements of NEMA TC-2 and UL-651 for Schedule 40 Conduit

Schedule 40 PVC Conduit Dimensions (10' lengths with belled ends)

Trade Size	No.	O.D.	Min. I.D.	Wall	Wt/Ft	Ft/Pallet
½	8102	.840	.622	.109	.164	6000
¾	8103	1.050	.824	.113	.218	4400
1	8104	1.315	1.049	.133	.321	3600
1¼	8105	1.660	1.380	.140	.434	3300
1½	8106	1.900	1.610	.145	.518	2250
2	8108	2.375	2.067	.154	.695	1400
2½	8110	2.875	2.469	.203	1.096	930
3	8112	3.500	3.068	.216	1.435	880
3½	8114	4.000	3.548	.226	1.729	630
4	8116	4.500	4.026	.237	2.043	570
5	8120	5.563	5.047	.258	2.776	380
6	8124	6.625	6.065	.280	3.600	260

SPECIAL INFORMATION

1. 20' lengths available on special request.
2. Minimum shipment: full pallet quantity per size.

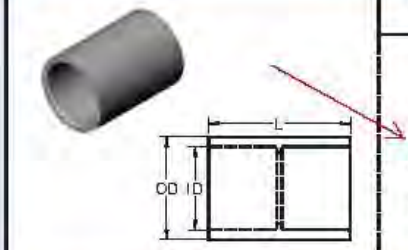
16100 S. Lathrop Ave. • Harvey, Illinois 60426 • (708) 339-1610 • (800) 882-5543 • Fax (708) 339-0615

allied TUBE & CONDUIT

3

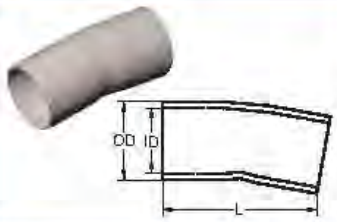
TINGS - Couplings and Adapters

COUPLINGS



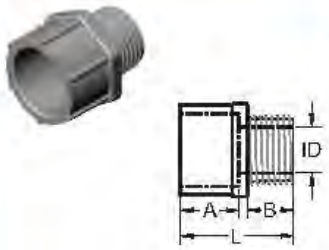
Size (in)	Part Number	Unit Quantity	Outside Diameter (OD) (in)	Inside Diameter (ID) (in)	Length (L) (in)
1/2	59601	150	1.080	0.840	1.437
3/4	59602	100	1.300	1.050	1.703
1	59603	50	1.590	1.315	2.031
11/4	59604	50	2.000	1.660	2.156
11/2	59605	25	2.230	1.900	2.281
2	59606	40	2.720	2.375	2.406
21/2	59607	20	3.320	2.875	3.187
3	59608	30	4.000	3.500	3.437
31/2	59609	20	4.500	4.000	3.625
4	59610	20	5.000	4.500	3.750
5	59611	10	6.120	5.565	4.187
6	59612	5	7.370	6.625	4.562

5° COUPLINGS



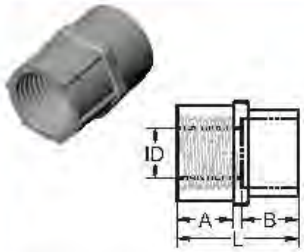
Size (in)	Part Number	Unit Quantity	Outside Diameter (OD) (in)	Inside Diameter (ID) (in)	Length (L) (in)
2	802731	15	2.375	2.049	4.0
21/2	802732	12	2.875	2.445	5.5
3	802733	10	3.500	3.042	6.0
31/2	802734	15	4.000	3.521	7.0
4	802735	15	4.500	3.998	7.0
5	802736	4	5.565	5.018	7.5
6	802737	6	6.625	6.031	11.0

TERMINAL ADAPTERS



Size (in)	Part Number	Unit Quantity	A (in)	B (in)	Inside Diameter (ID) (in)	Length (L) (in)
1/2	59615	200	0.750	0.700	0.591	1.550
3/4	59616	150	1.000	0.675	0.790	1.750
1	59617	100	1.115	0.625	1.000	1.860
11/4	59618	50	1.300	0.640	1.311	2.125
11/2	59619	30	1.425	0.725	1.530	2.250
2	59620	50	1.150	0.800	1.970	2.100
21/2	59621	25	1.900	0.800	2.346	2.930
3	59622	50	2.000	0.815	2.915	3.055
31/2	59623	30	1.715	1.000	3.385	3.055
4	59624	30	1.990	0.815	3.850	3.215
5	59625	12	2.000	1.725	5.015	5.985
6	59626	10	2.130	1.875	6.025	6.500

FEMALE ADAPTERS (NPT Tapered Thread)



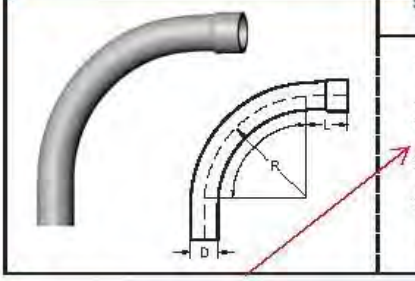
Size (in)	Part Number	Unit Quantity	A (in)	B (in)	Inside Diameter (ID) (in)	Length (L) (in)
1/2	59630	150	0.800	0.825	0.620	1.725
3/4	59631	100	0.800	1.000	0.820	1.900
1	59632	50	1.000	1.200	1.065	2.300
11/4	59633	30	1.015	1.300	1.395	2.425
11/2	59634	25	1.050	1.290	1.575	2.440
2	59635	30	1.075	1.375	2.050	2.550
21/2	59636	20	1.675	1.985	2.470	3.760
3	59637	25	1.630	2.150	3.090	4.100
31/2	59638	20	1.800	2.000	3.540	3.985
4	59639	15	1.755	2.185	4.025	4.210
5	59640	10	2.065	3.000	5.035	5.240
6	59641	6	2.065	3.000	6.045	5.235

RIGID PVC CONDUIT FITTINGS www.tycoelectrical.com

6

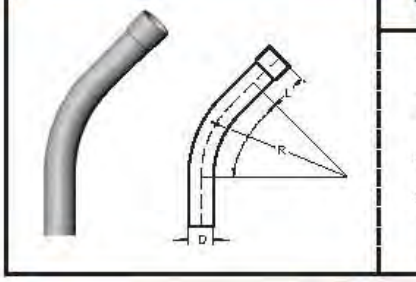
FITTINGS - Bends (Bell End Elbows)

90° ELBOWS - Bell End



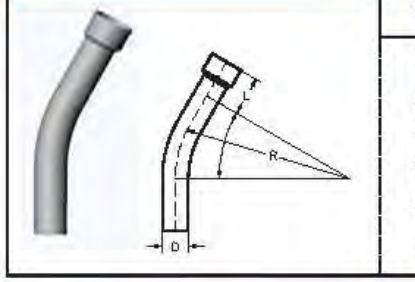
Size (in)	Part Number	Unit Quantity	Diameter (D) (in)	Length (L) (in)	Radius (R) (in)
1/2	802752	35	0.840	1.500	4.00
3/4	802753	50	1.050	1.500	4.50
1	802754	25	1.315	1.875	5.75
11/4	802755	20	1.660	2.000	7.25
11/2	802756	15	1.900	2.000	8.25
2	802757	10	2.375	2.000	9.50
21/2	802758	100	2.875	3.000	10.50
3	802759	50	3.500	3.125	13.00
31/2	802761	50	4.000	3.250	15.00
4	802762	50	4.500	3.375	16.00
5	802763	25	5.565	3.622	24.00
6	802764	25	6.625	3.740	30.00

45° ELBOWS - Bell End



Size (in)	Part Number	Unit Quantity	Diameter (D) (in)	Length (L) (in)	Radius (R) (in)
1/2	802765	70	0.840	1.500	4.00
3/4	802767	50	1.050	1.500	4.50
1	802768	50	1.315	1.875	5.75
11/4	802769	30	1.660	2.000	7.25
11/2	802770	15	1.900	2.000	8.25
2	802771	10	2.375	2.000	9.50
21/2	802772	12	2.875	3.000	10.50
3	802773	10	3.500	3.125	13.00
31/2	802774	1	4.000	3.250	15.00
4	802775	1	4.500	3.375	16.00
5	802776	1	5.565	3.625	24.00
6	802777	1	6.625	3.750	30.00

45° ELBOWS - Bell End ELBOWS - Bell End



Size (in)	Part Number	Unit Quantity	Diameter (D) (in)	Length (L) (in)	Radius (R) (in)
1/2	802778	50	0.840	1.500	4.00
3/4	802779	35	1.050	1.500	4.50
1	802780	50	1.315	1.875	5.75
11/4	802781	30	1.660	2.000	7.25
11/2	802782	50	1.900	2.000	8.25
2	802783	30	2.375	2.000	9.50
21/2	802784	10	2.875	3.000	10.50
3	802785	10	3.500	3.125	13.00
31/2	802786	1	4.000	3.250	15.00
4	802787	1	4.500	3.375	16.00
5	802788	1	5.565	3.625	24.00
6	802789	1	6.625	3.750	30.00

ELECTRICAL CONDUIT

JM Eagle Building essentials for a better tomorrow™

SUBMITTAL AND DATA SHEET

SCHEDULE 40 AND SCHEDULE 80 CONDUIT NSF NRTL* ANSI/UL 651 AND NEMA TC-2

RIGID NON-METALLIC CONDUIT FOR USE IN BOTH ABOVE GROUND AND UNDERGROUND INSTALLATIONS

SCHEDULE 40 CONDUIT — Rated for 90°C Conductors

SIZE	AVERAGE O.D.	NOM. I.D.	MIN. T.	APPROX. WT/100 FT
1/2	0.840	0.622	0.109	18
3/4	1.050	0.824	0.113	24
1	1.315	1.049	0.133	33
1-1/4	1.660	1.380	0.140	45
1-1/2	1.900	1.610	0.145	56
2	2.375	2.067	0.154	76
2-1/2	2.875	2.469	0.203	126
3	3.500	3.068	0.216	163
3-1/2	4.000	3.548	0.226	197
4	4.500	4.026	0.237	234
5	5.563	5.047	0.258	319
6	6.625	6.065	0.280	411
8 ::	8.625	7.942	0.322	622

Schedule 40 is furnished in standard 10' lengths with one bell end.
20' lengths are available upon request.
:: Non-UL or -NSF listed

SCHEDULE 80 CONDUIT — Rated for 90°C Conductors

SIZE	AVERAGE O.D.	NOM. I.D.	MIN. T.	APPROX. WT/100 FT
1/2	0.840	0.546	0.147	22
3/4	1.050	0.742	0.154	30
1	1.315	0.957	0.179	42
1-1/4	1.660	1.278	0.191	60
1-1/2	1.900	1.500	0.200	72
2	2.375	1.939	0.218	98
2-1/2	2.875	2.323	0.276	160
3	3.500	2.900	0.300	213
3 1/2	4.000	3.364	0.318	256
4	4.500	3.826	0.337	310
5	5.563	4.813	0.375	430
6	6.625	5.761	0.432	590

Schedule 80 is furnished in standard 10' lengths with one bell end.
20' lengths are available upon request.

* NATIONAL RECOGNIZED TESTING LABORATORY (NRTL) BY OCCUPATIONAL HEALTH AND SAFETY ADMINISTRATION (OHSA)

Allied **RIGID** Specifications

PROVIDES FULL ELECTRICAL SYSTEM PROTECTION

Allied RIGID is precision manufactured for dependable, long-lasting value and protection for the electrical raceway system.

Manufactured from high-strength steel, Allied RIGID combines damage-resistant strength with ductility to assure easy bending, cutting and joining. It also provides smooth, continuous raceways for fast wire-pulling. No need to worry about damage to the conduit system even when pulling through multiple 90° bends.

Allied RIGID is hot-dipped galvanized inside and out. It is top-coated with a compatible organic layer to inhibit white rust and increase corrosion resistance.

Allied RIGID is impact and crush resistant for maximum conductor protection.

The 3/4" taper NPT threads (ANSI B1.20.1) are full cut and hot galvanized after cutting. Color-coded end-cap thread protectors keep the threads clean and sharp and also provide instant trade size recognition. Even-inch sizes are color-coded blue, 1/2-inch sizes are black, and 1/4-inch sizes are red.

EMI SHIELDING

Allied RIGID greatly reduces electromagnetic fields, effectively shielding computers and sensitive electronic equipment from the electromagnetic interference caused by power distribution systems. For further information, visit our website for a free download of the GEMI (Grounding and Electromagnetic Interference) analysis software and related research papers.

FULL CODES AND STANDARDS COMPLIANCE

Allied RIGID is U.L. listed and is recognized by the National Electrical Code. It meets Underwriters Laboratories Safety Standard U.L. 6, and is manufactured to ANSI C80.1, both of which have been adopted as Federal Specifications in lieu of WWC 581. Allied RIGID is recognized as an equipment grounding conductor by NEC Article 250. Documentation for compliance with NEC Article 250 is available from Allied.

Installation of Rigid Metal Conduit shall be in accordance with the National Electrical Code and U.L. General Information card #DYIX.

Master bundles conform to NEMA standard RN2.

SPECIFICATION DATA

RIGID Metal Conduit shall be hot-dip galvanized steel equal to that manufactured by Allied Tube & Conduit Corporation. Threads shall be hot galvanized after cutting. RIGID shall be produced in accordance with U.L. Safety Standard #6 and ANSI C80.1 and shall be listed by a nationally recognized testing laboratory with follow-up service. Where **Kwik-Couple RIGID** is used it shall also meet U.L. Safety Standard #514-B. It is noted that these U.L. standards have been adopted by the federal government and separate military specifications no longer exist.

For more information, contact Allied at **(800) 882-5543**, or visit our website at **www.atcelectrical.com**

Weights and Dimensions for Galvanized Rigid Tubing

Trade Size Designator		Approx. Wt.* Per 100 Ft. (30.5M)		Nominal Outside Diameter[1]		Nominal Wall Thickness		Quantity in Master Bundle	
U.S.	Metric	lb.	kg	in.	mm	in.	mm	ft.	m
1/2	16	82	37.2	0.840	21.3	0.104	2.60	2500	762.5
3/4	21	109	49.4	1.050	26.7	0.107	2.70	2000	610.0
1	27	161	73.0	1.315	33.4	0.126	3.20	1250	381.3
1-1/4	35	218	98.9	1.660	42.2	0.133	3.40	900	274.5
1-1/2	41	263	119.3	1.900	48.3	0.138	3.50	800	244.0
2	53	350	158.7	2.375	60.3	0.146	3.70	600	183.0
2-1/2	63	559	253.5	2.875	73.0	0.193	4.90	370	112.9
3	78	727	329.7	3.500	88.9	0.205	5.20	300	91.5
3-1/2	91	880	399.1	4.000	101.6	0.215	5.50	250	76.3
4	103	1030	467.1	4.500	114.3	0.225	5.70	200	61.0
5	129	1400	634.9	5.563	141.3	0.245	6.20	150	45.8
6	155	1840	834.5	6.625	168.3	0.266	6.80	100	30.5

[1] For more information only; not a spec requirement.

NOTE: Length = 10 ft. (3.05m) with a tolerance of +/- .25" (6.35mm).
* NEMA Standard

Weights and Dimensions for K

Trade Size Designator		Approx. Wt. 100 Ft. (30.							ile
U.S.	Metric	lb.							
2-1/2	63	559	25						0
3	78	727	329.7	3.500	88.9	0.205	5.20	300	91.5
3-1/2	91	880	399.1	4.000	101.6	0.215	5.50	250	76.3
4	103	1030	467.1	4.500	114.3	0.225	5.70	200	61.0

[1]Outside diameter tolerances: +/- .025 in. (.64mm) [2]For more information only; not a spec requirement.

tyco Electrical & Metal Products

AFC Cable Systems® • **Allied Tube & Conduit** • Cope® Cable Tray • Power-Strut® Metal & Fiberglass Framing

Appendix C

QPL- Fiber Optic Products

CASING SPACERS - 12" Width min.

APS - Advance Products Systems Cascade
PSI - Pipeline Seal and Insulator

CONTROL CABINET FASTENERS

Stainless Steel Tapcons

FIBER OPTIC CABLE

CORNING/SIECOR – 096EU4-T4701D20 - 96 Fiber ALTOS Gel-Free Cable Non Armored SMFe 1.4/0.4/0.3 dB/km 12f/tube Print in ft

CORNING/SIECOR – 012EU4-T4701D20 - 12 Fiber ALTOS Gel-Free Cable Non Armored SMFe 1.4/0.4/0.3 dB/km 12f/tube Print in ft

FIBER OPTIC SWITCH

Ruggedcom/Siemens rs900g. RS900G-HI-D-2SC10-XX

HDPE-High Density Polyethylene Pressure Pipe-w/PE 3408 resin 2" IPS ASTM D-3305-directional bores

Dura-line Smoothwall DR 11

HUB CABINET – FIBER OPTIC

Cabinet-Transportation Control Systems- SMF605036B2TFLRD
Power Supply- Power Sonic-PG-12V103 FR 12 Volt 103 AH
Air Conditioner- Kooltronic RP33 Advantage Air-Cooled Panel Mounted Air Conditioner-KA4C4RP33R or K2A4C4RP33R

LOCATE TRACER WIRE

CME THWN -2 – 14 gauge, 19 Strand , 25 Ampacity, Orange Coated

LOCATE TRACER WIRE CONNECTORS

Copperhead Ind. DRYCONN Direct Bury Lug #CH90120

LUBRICANT – (ANTI-SEIZE)

Oxlic Never Seize

MDF-Main Distribution Frame-Indoor Facilities/Lift Station Panels-MIS

Panel & Modules: 12F Corning CCH-CP12-19T
6F Corning CCH-CP08-19T
Modular Coupler: Corning CCH-RM12-19T-P03RH
Enclosures: Inside Building- Corning CCH-04U(open)
Lift Station- Corning-SPH-01P

Outside fiber to inside fiber: Corning CSH-03U

Fan Out kits: Indoor-Corning-FAN-BT25-12

Outdoor- Corning-FAN-OD25-12

Connectors: Camera outdoor- Corning 95-000-50-Z

Lift Station Panel-Corning 95-200-51-Z

Indoor- Corning 95-050-51-Z

Splice Tray: Indoor-Corning M67-048

PIG TAILS & CONNECTORS

Corning 00610R31310mST-Fiber Optic Pig Tails (Single mode 2.9mm 1 meter length)

Corning ST/ST Simplex-Fiber Optic Patch Cord (Single mode 3mm Yellow PVC Jacket 3 meter length)

PULL BOX – FIBER OPTICS-Tier 15 (min)

For installation in concrete or grass

Box - Quazite – PG1730BB18 – 17" x 30" x 18"d
Box- Synertech--S1730B18FA- 17" x30" x 18"d

Cover – Quazite – PG1730CA00
Cover- Synertech- S1730HBBOA

PULL TAPE – FIBER OPTIC

Traceable pull tape, 1800 lbs tensile strength

Fibertek – WPT1800

PVC (Polyvinyl Chloride) PIPE -2" schedule 80

North American Pipe
Silver Liner Plastics Inc.
National American

Diamond Plastic Corporation
J-M

RIGID CONDUIT

Tyco-

SPLICE BOX – FIBER OPTIC-Tier 15 (min)

Box - Quanzite – PG3048BB – 30" x 48"x 36"d
Box- Oldcastle- 3048-36- 30" x 48" x 36"d

Cover – Quazite – PG3048HC00
Cover- Oldcastle-Uni-half 3048

SPLICE CLOSURES

Tyco FOSC-450-C6-6-NT-0-C6V-Fiber Optic Enclosure

Splice Tray- FOSC-ACC-C-Tray-24

Basket- FOSC-ACC-C-Basket

3M TELCOM 8423-EXP-Fiber Optic Expansion Modules (for 8400 series enclosure)

UNDERGROUND TAPE – FIBER OPTIC

Detectable underground tape, "caution fiber optic cable buried below" 6" wide, black on orange

Harris Ind – DU-10-6

Appendix E: St Lucie TPO Standardized Traffic Impact Studies (TIS) Methodology and Procedures for St Lucie County, City of Fort Pierce and the City of Port St Lucie



St. Lucie Transportation Planning Organization

Coco Vista Centre
466 SW Port St. Lucie Blvd, Suite 111
Port St. Lucie, Florida 34953
772-462-1593 ww.stlucietpo.org

STANDARDIZED TRAFFIC IMPACT STUDIES (TIS) METHODOLOGY AND PROCEDURES

- **ST. LUCIE COUNTY**
- **CITY OF FORT PIERCE**
- **CITY OF PORT ST. LUCIE**

January 2014

STANDARDIZED TRAFFIC IMPACT STUDIES METHODOLOGY AND PROCEDURES

Table of Contents

Appendices

1. PURPOSE AND APPLICABILITY

The purpose is to provide a generally uniform methodology for identifying potential traffic impacts of new development and redevelopment on the transportation system and developing mitigation strategies to offset those impacts. However, the need to perform a Traffic Impact Study (TIS) will be determined in accordance with the applicable local government requirements and provisions.

The TIS is to be signed and sealed by a registered professional engineer licensed to practice in Florida.

Any reference to the "Local Government" in these guidelines shall mean the City of Ft. Pierce, City of Port St. Lucie, St. Lucie County, their consultants, sub-consultants, contractors, or employees, as applicable. Any reference to the "Applicant" in these guidelines shall mean the person or party making application to the Local Government, to include the Applicant's consultants, sub-consultants, and contractors.

Unless otherwise agreed to in an approved Methodology Statement, the procedures of this unified methodology document will be followed.

2. METHODOLOGY STATEMENT

Prior to conducting any study, a Methodology Statement shall be prepared by the Applicant and submitted to the Local Government for review and approval. The purpose of the Methodology Statement is to establish agreed upon methodologies and assumptions prior to the start of the study. The methodology shall address the following minimum elements:

- Description of land uses, site location, build-out schedule, and phasing
- Preliminary site plan
- Trip Generation
- Internal Capture
- Background Traffic Growth Procedure
- Distribution and Assignment
- Committed Network

It shall be the Applicant's responsibility to ensure that a traffic study is not prepared or submitted without an approved Methodology Statement signed by the Local Government.

3. IMPACTED ROADWAYS/INTERSECTIONS

At a minimum, the following impacted roadway segments and intersections shall be analyzed in the TIS:

a. Any Road Segment to which development traffic makes its first connection to the Major Road Network, provided the development traffic consumes one percent or more of the existing or committed two-way peak-hour service capacity,

b. Major Road Segment on which the two-way peak-hour project traffic consumes 5 (five) percent or more of the existing or committed two-way peak-hour service capacity,

c. Site driveway connections to public roads. In addition, if the development has no direct connection to the Major Road Network, the intersections of the local/non-major roads (that provides access to the development) with the Major Road Network shall be analyzed, and

d. Major Intersections that are part of the impacted roadways.

To determine whether peak-hour development traffic consumes one percent or five percent or more of the existing service capacity of a road, the generalized roadway service volumes from the latest version of the Generalized Service Volumes tables of the Florida Department of Transportation (FDOT) shall be used. Roadway functional classification shall be based on the St. Lucie TPO's Federal Functional Classification Map and, for roads that are not contained on the map, it shall be based on the Local Government's Comprehensive Plan.

An alternative study network identification methodology can be followed by the Applicant; this methodology is described in Appendix B. Agreement on the use of the alternative study network methodology shall be reached during the methodology phase and its use acceptance is at the Local Government's discretion.

4. ANALYSIS SCENARIOS

The Applicant shall be required to provide an analysis of the following scenarios:

e. **Existing scenario** is defined as the analysis of existing traffic on the Existing Network.

f. **Background scenario** is defined as the analysis of existing traffic plus background traffic on the committed network.

g. **Background scenario with mitigation** is defined as the analysis of existing traffic plus background traffic on the committed network with the inclusion of any other improvements that are required to restore a facility to its adopted level of service standard.

h. **Future scenario** is defined as analysis of existing traffic, plus background traffic, plus project traffic on the committed network.

i. **Future Scenario with mitigation** is defined as analysis of existing traffic, plus background traffic, plus project traffic on the committed network with the inclusion of any other improvements (if needed) that are required to restore a facility to its adopted level of service standard.

A detailed definition of the analysis scenarios is included in Appendix A.

5. GENERAL ANALYSIS REQUIREMENTS

A Level of Service (LOS) analysis shall be undertaken for all impacted roadways and intersections (as listed in Section 3 of this document) in accordance with the procedures below:

a. For the facility on the Major Road Network to which the development has direct access:

   - Detailed capacity and turn-lane length analyses shall be undertaken for site driveway connections to that facility and/or of the local street providing site traffic access to that Major Road facility.

   - Turn-lane length analysis shall only be required for the first impacted signalized or major unsignalized intersections along the directly accessed facility.

b. For analysis of roadways outside of the area as described in Sub-section 5.a above, the latest version of FDOT's generalized tables shall be used as an initial screening tool. If failure is estimated, more detailed analysis is required using the procedures described below.

   i. Road segment limits shall be as defined in the Annual Level of Service Report prepared by the St. Lucie TPO. Adjustments, if appropriate, shall be proposed in the Methodology Statement and be developed based on acceptable engineering and planning practices as set forth in the *Highway Capacity Manual*.

   ii. All analyses undertaken shall be adjusted to the average of the peak season using FDOT's Peak Season Conversion Factors (PSCF). Other time periods or a.m. analysis may be required if requested during the methodology meeting or during the first review round.

c. All signalized intersections and major unsignalized intersections within the study area shall be analyzed.

d. When the FDOT generalized roadway service volume tables are used, the following information shall be provided for each facility in a separate table:

   - Class of roadway (interrupted or uninterrupted)
   - Maintenance jurisdiction (city, county, or state-maintained)
   - Area type
   - Posted speed
   - LOS standard

e. Other parameters that govern the roadway/intersection capacity analysis shall be based on the parameters described in the latest version of the *Highway Capacity Manual*.

f. Where driveway movements are restricted (e.g. right-in/right-out driveways), the necessary U-turn movements and project traffic added at the upstream and downstream median openings or intersections should be identified and analyzed.

In addition to the requirements of Sub-sections (a) through (f) above, the Local Government may require the inclusion of proposed or anticipated traffic signals in the future year condition that may not exist in the "existing condition", including signals at development entrances.

6. SOFTWARE

Use of analysis software shall be discussed and agreed to during the Methodology phase. The Applicant shall provide an electronic copy of the analysis files as well as a hard copy of the summary sheets, unless an electronic from is requested by the Local Government. Preferred analysis softwares are listed below:

a. For unsignalized intersections, the Highway Capacity Software (HCS) is the preferred software for analyzing delay and LOS.

b. For signalized intersections, the use of the Highway Capacity Software is considered acceptable; however, the latest version of Synchro software using the latest HCM methodology is preferred.

c. For interrupted flow road segment (i.e. signalized roadways) analysis, the preferred software is the latest version of Synchro.

d. For uninterrupted flow roads (those with more than two-mile signal spacing) the latest version of the FDOT's HighPlan software is recommended.

e. Other analysis software may be required by the Local Government to address situations not addressed by the above provisions, or if requested by the Applicant and approved by the Local Government during the Methodology Statement in Section 2 of this guideline.

For additional information regarding analysis requirements and software please refer to Appendix C.

7. TRIP GENERATION

Trips from/to the site shall be estimated using the latest Institute of Transportation Engineers (ITE) *Trip Generation Manual*, including separate trip generation estimates for interim traffic-generating uses. Other trip rates may be required by the Local Government or may be used if requested by the Applicant and approved by the Local Government during the Methodology Statement process (Section 2 of this document).

To encourage redevelopment of previously developed sites, a credit for any previously existing land uses may be given for the replacement of any traffic-generating building or structure that previously existed on the site. The applicability and/or magnitude of the credit shall be discussed with the Local Government during the Methodology Statement process. If the site was dormant during the time when collection of the traffic count data was conducted, then the "prior vested" portion of the development traffic must be added as "background" traffic. For purposes of access management analysis, the total trips (prior vested plus additional, new trips) should be analyzed at site access and connection points to the Major Road network.

8. INTERNAL CAPTURE

Internal capture estimates shall be based on acceptable methodologies contained in the most current *ITE Handbook*, or, where the ITE data is not applicable, professional judgment should be applied.

9. PASSER-BY CAPTURE

The total gross external trips of the project traffic may be reduced by a passer-by factor to account for traffic that is already traveling on the adjacent roadway and once the project is constructed it will stop by the project on their way from an origin to a primary destination. Such factor shall be based on ITE acceptable methodologies and percentages.

In no event shall the total number of passer-by trips (i.e. entering plus exiting the site) exceed 10 percent of the total background traffic on the adjacent roadway. In analysis of the site-access intersections with major roads, the passer-by trips shall be included and separately identified.

In cases where median controls limit left-in/left-out access to the site, traffic on the "far side" of the road can be considered in assessing the upper limit of captured trips; however, the effects of that traffic in the associated necessary U-turns and added flow at the upstream and downstream median openings or intersections should be identified as development traffic at those locations.

In accordance with the Florida Traffic Impact Handbook, the passer-by capture percentage shall be computed as the total number of trips entering and exiting the site that is claimed as captured divided by the number of background trips passing by the site on major roads directly abutting or passing through the site. An example of this computation is provided in Appendix D.

10. DISTRIBUTION AND ASSIGNMENT

Manual trip distribution and assignment is acceptable for use as long as they are reviewed and accepted by the Local Government and logically replicates the existing and future travel patterns.

The latest adopted Greater Treasure Coast Regional Planning Model (GTCRPM) is also acceptable in determining the trip distribution percentages and trip assignments, especially when TIS is being performed for sizable developments and for multi-land use developments. The results of the model will be reviewed by the Local Government for reasonableness and to ensure that existing and future travel patterns are correctly simulated.

11. TRAFFIC COUNTS

All counts shall be conducted based on acceptable professional engineering standards. Raw-turning movement counts (minimum 2 hours) and daily tube counts (minimum 48 hours) shall be provided for all the intersections and road segments that are being analyzed. The raw counts shall be adjusted to the average of the peak season using FDOT's Peak Season Conversion Factors. The Local Government may request other peak-season adjustment factors or adjustment methodologies that may result in different peak-season adjustment factors; however, this request shall be evaluated during the development of the Methodology Statement. Please refer to Appendix E for additional information regarding traffic counts requirements.

12. BACKGROUND TRAFFIC GROWTH/FUTURE TRAFFIC

Existing traffic counts shall be increased by a growth factor up to the project's build-out date, which shall be reasonably specified, to account for increases in existing traffic due to other approved or Pending Developments. The development build-out date shall be no less than three years and no more than ten years from the date of the initial transportation methodology submittal.

For acceptable techniques to estimate annual traffic growth rates please refer to Appendix F.

13. LEVEL OF SERVICE STANDARDS

a. The adopted LOS standards for all major road segments shall be consistent with the standards per the Local Government's latest adopted Comprehensive Plan.

b. The overall intersection LOS standard shall be the same standard as that of the segment (facility) within which the intersection is located. Where different LOS standards apply to different legs of an intersection, the overall intersection LOS standard will be the same as the leg with the least restrictive LOS (e.g. one road LOS Standard "D" and the other road LOS Standard "E", then intersection LOS Standard is "E").

c. The delay for individual turning-movements and through-movements may exceed the segment standard by one letter grade provided that the volume/capacity (V/C) ratio for the subject movement remains less than or equal to one. Average delays of up to 100 seconds are acceptable for individual turning movements where the V/C ratio is less than 0.8.

d. For site access driveways and local street connections serving site access traffic, delays of up to 100 seconds will be considered acceptable.

14. INVENTORY OF EXISTING AND FUTURE CONDITIONS

At minimum, the following additional information shall be provided:

a. The geometry, speed limit, and the adopted LOS standard of all the existing roadways and intersections, based on the Local Government's adopted Comprehensive Plan, and committed intersection and roadway improvement projects within the impacted area,

b. Existing vehicle counts and data supporting heavy vehicle factors for capacity analysis,

c. Graphic representation (stick diagrams) of the project's proposed access locations, types, and internal roads with connections to public roadways. The graphic shall also cover the area immediately adjacent to the project and this graphic should include:
   - All external, major roadways,
   - Existing or future access points, and
   - Types of developments surrounding the project,

d. Pavement marking plans/concept plans of roadways that provide direct access to the project and that have been completed or are undergoing design or route study phase, if available,

e. Graphic representation of project traffic (volume and percent distribution), existing traffic volumes, future background volumes, and future total volumes, and

f. Inventory of existing or committed traffic-control devices (i.e. traffic signals and stop signs).

15. SITE ACCESS

Driveway location(s) shall meet the Local Government's and/or FDOT's minimum standards regarding location, corner clearance, minimum distance between driveways, number of driveways serving a site, minimum sight distances, median openings, and U-turn restrictions, as or where applicable. Appendix G documents the procedures to determine the need for turn lanes and corresponding turn lane lengths.

16. MULTIMODAL CONSIDERATIONS

When designing the site, the following multimodal recommendations should be taken into consideration, and their applicability should be discussed with the Local Government during the Methodology Statement process in Section 2 of this document.

a. For pedestrians:

1) Provide connectivity from the building structures to existing sidewalks adjacent to the site,
2) Internal circulation and connections to existing sidewalks should be provided so that pedestrians do not need to walk significantly "out of the way". In other words, pedestrian connections should be direct and reasonable, minimizing the distance that pedestrians need to walk to go from one place to another,
3) New external and internal crosswalks and any associated traffic control devices (if required),
4) To the extent possible, minimize pedestrian-vehicle conflicts,
5) Specify minimum cross-walk widths, and
6) Depending on the hours of operation of the site, consideration should be given to the need for illuminated sidewalks and crosswalks.

b. For transit vehicles/users:

1) If there is a transit stop adjacent to the site or within walking distance of the site, adequate pedestrian connections need to be provided not only between the site and the bus stop but also between the main entrance of the building and the bus stop,
2) Relocation of an existing bus stop or creation of a new stop, in coordination with the Local Government Transit Manager and/or Community Transit, as applicable, to provide for safe or better access to the building and site, and
3) Appropriate design of relocated or a new bus stop to address amenities (bench, shelter, etc.).

c. For bicycles:

1) If internal bike facilities are proposed, adequate connections to existing bike lanes should be provided, and
2) Provision of bike racks.

17. MITIGATION OF IMPACTS

Acceptable mitigation options are:

1) **Restore to adopted standard**

2) **Proportionate Share Mitigation**

For general guidance about mitigation and further detail about identification of adequate mitigation, please refer to Appendix H.

APPENDICES

APPENDIX A

DEFINITIONS

For purposes of this document, the following definitions shall apply:

a. **Committed Network** – Existing Network plus transportation system improvements included in the adopted work programs of the County, the FDOT, or other agencies with authority and responsibility for providing transportation system capacity, or other improvements that are guaranteed by a security instrument acceptable to the Local Government that ensures construction will begin in the current fiscal year of such work programs.

b. **Background Traffic:** Existing traffic plus growth in existing traffic between the existing conditions and the future conditions. Please refer to Appendix F for acceptable techniques to estimate future background traffic volumes.

c. **Existing Network** – Major Roads which are currently in use by the public.

d. **Existing Scenario** - Analysis of existing traffic on the Existing Network.

e. **Background Scenario** – Analysis of existing traffic, plus background traffic on the committed network.

f. **Background Scenario with Mitigation** – Analysis of existing traffic, plus background traffic on the committed network. For locations which are estimated to fail under background conditions, the Applicant shall identify improvements need to restore the adopted level of service standard.

g. **Future Scenario** – Analysis of existing traffic, plus background traffic, plus the project's traffic on the committed network. For locations which are estimated to fail, the Applicant shall identify when each failure is expected to occur as a fraction of the development trips, associated on-site land use quantities, and estimated year. These parameters may be estimated by interpolating between the "Existing Scenario" analysis and the "Future Scenario" (without mitigation) analysis. If new corridors that shift travel patterns are proposed as the solution, the interpolation should be based on an analysis that does not consider the new corridor. In the case of large Mixed Use Planned Unit Developments (MPUDs), the Local Government reserves the right to modify timing of failure estimates to reflect or incorporate other pending or approved developments that are presented or become effective between the time the methodology is approved and the time when the list of improvements to cure identified deficiencies at build-out are finalized by the Local Government.

h. **Future Scenario with Mitigation** – Analysis of existing traffic, plus background traffic, plus project traffic on the committed network with the inclusion of any other improvements that are required to restore the adopted level of service standard. This analysis scenario will be required only if mitigation is required as the result of the future scenario analysis. For purposes of analyzing site access requirements

only, the Local Government may allow consideration of improvements scheduled in the first five years of the Capital Improvement Program. For large MPUDs, the Local Government may require an additional five, ten, and/or fifteen year analysis of the financial feasibility of the improvements that are required to restore the adopted level of service standard.

i. **Heavy Vehicle** – Vehicles that have more than four tires touching the pavement, including trucks, buses, and recreational vehicles (RVs). Trucks cover a wide range of vehicles, from lightly loaded vans and panel trucks to the most heavily loaded coal, timber and gravel haulers. RVs also include a broad range, including campers, both self-propelled and towed; motor homes; and passenger cars or small trucks towing a variety of recreational equipment, such as boats, snowmobiles, and motorcycle trailers.

j. **Major Intersections** - All signalized intersections and/or unsignalized intersections with other major roadways.

k. **Major Roadway, Major Road Network, or Regulated Road** – Shall include all collector and above-classified roadways per the latest St. Lucie TPO's Federal Functional Classification Map.

l. **Pending Development** – Is a development for which a complete application has been filed for (a) a Traffic Impact Study, (b) an Initial or Final Certificate of Capacity, or (c) an Initial or Final Certificate of Capacity Development Order.

m. **Road Segment** – In an interrupted flow facility, a road segment is the piece of road from one traffic signal to the next traffic signal and is usually considered to include the traffic signal at the "downstream" end of the segment. "Road Facilities" are usually composed of several contiguous road segments.

APPENDIX B

ALTERNATIVE STUDY NETWORK IDENTIFICATION METHODOLOGY

Area of Influence Based

a. The area to be studied will be based on the New External Trip Generation of the proposed development. The table below shall determine the development's area of influence.

New External Daily Trip Generation	Radius of Area of Influence
0 – 200	Only segments directly accessed by the proposed development
201 – 500	0.5 miles
501 – 1,000	1.0 miles
1,001 – 5,000	2.0 miles
5,001 – 10,000	3.0 miles
10,001 – 20,000	4.0 miles
Over 20,000	5.0 miles

b. The radius of influence shall be measured from each connection of the project to the Major Road Network.

c. All major signalized and unsignalized intersections on the roadway segments within the area of influence shall be studied.

d. If the study radius ends between intersections identified in c above, the study area shall extend to the next major intersection.

APPENDIX C

ANALYSIS REQUIREMENTS

(1) If any analysis software is used as an alternative to the FDOT's generalized tables, a detailed LOS analysis of all Major Intersections within the facility is required.

(2) The input data to the software shall be field verified and provided in the report including, but not limited to:

- Geometry, including lane widths and turn-lane lengths
- Heavy vehicle factor
- Directional factor (D Factor, not to be less than 0.52 for the future conditions analysis)
- Peak-hour factor (PHF, not to exceed 0.95 for the future conditions analysis)
- Values of the above parameters should be estimated in the future conditions analysis to reflect unconstrained demand conditions
- Existing signal timing and phasing can be obtained from the traffic signal maintaining agency. The existing signal timing, including its maximum and minimum settings, shall be used for the initial analysis of future conditions. Any timing change outside of the existing minimum and maximum setting may be presented for Local Government approval as part of the mitigation strategy
- Segment lengths

(3) If the FDOT generalized roadway service volume tables are used, the following information shall be provided in a separate table:

- Class of roadway (interrupted or uninterrupted)
- Maintenance jurisdiction (city, county, or state-maintained)
- Area type
- Posted speed
- LOS standard

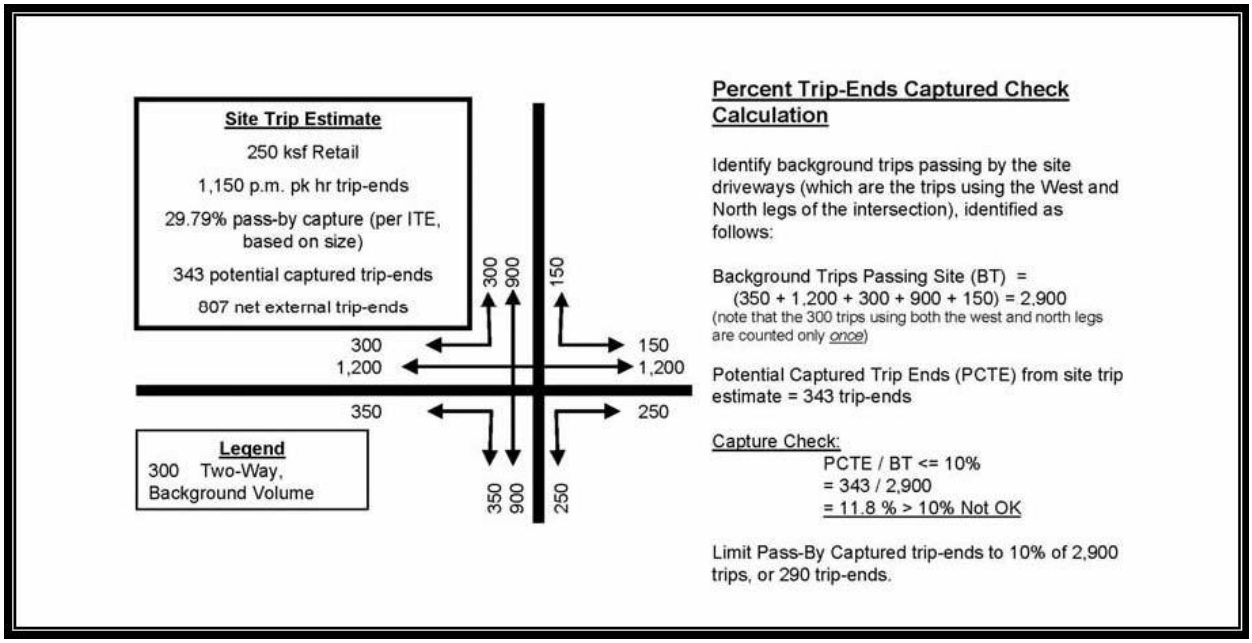
(4) Other parameters that govern the roadway/intersection capacity analysis shall be based on the parameters described in the latest version of the Highway Capacity Manual.

(5) The Local Government may require the inclusion of proposed or anticipated traffic signals in the future year condition that may not exist in the "existing condition", including signals at development entrances.

APPENDIX D

EXAMPLE OF PASSER-BY CAPTURE

The graphic below depicts an example of how passer-by capture may be computed.



APPENDIX E

TRAFFIC COUNTS

a. Weekday traffic counts shall be collected during typical weekdays (Tuesdays, Wednesdays, or Thursdays) and not immediately before, during, or immediately after a holiday or special event.

b. For saturated intersections, the FDOT methodology shall be followed to estimate the turning movement counts by multiplying the average annual daily traffic (AADT) tube count at appropriate locations by field verified "D" and minimum K100 factors and by applying the percentage turns obtained from the field turning-movement counts.

c. In no event, however, shall the estimated, turning-movement counts be less than the existing field counts.

d. Tube counts at appropriate locations shall be provided for segment analysis using the FDOT procedures. The segment tube counts at mid-block locations shall be checked against turning-movement counts at near intersections. In general, the mid-block counts and turning-movement counts shall not be significantly different unless the difference can logically be explained.

e. Approved FDOT or St. Lucie TPO maintained counts may be used if they are less than two years old. However, new counts may be requested if there are recent impacts or improvements to the transportation system that cause significant changes in traffic patterns. Counts more than two years old will not be acceptable unless otherwise approved by the Local Government during the Methodology Statement.

APPENDIX F

ANNUAL TRAFFIC GROWTH RATE DETERMINATION

Background traffic growth rates and background traffic volume estimates to be used in the TIS shall be based on techniques approved in the Methodology Statement (Section 2 of this document). Any combination of the following techniques is considered acceptable:

a. Historical growth rates (minimum of the past three years) may be used in areas where the expected growth is representative of the past growth.

b. Traffic from approved and pending developments may be required in areas where the historical trend is determined by the Local Government to be inappropriate. This may be accomplished through application of the latest adopted GTCRPM.

c. To determine future traffic on roads that currently do not exist, the use of the GTCRPM (the latest, adopted model) is recommended.

   The socioeconomic data shall reasonably represent, if appropriate, the approved or pending developments in the vicinity of the project as approved in the Methodology Statement. Minimum annual growth rates in all cases shall be one percent, unless otherwise approved in the Methodology Statement.

   The assumed growth rate for each impacted roadway segment analyzed shall be presented in tabular form. The background traffic growth estimates will be reviewed by the Local Government to ensure growth reasonably reflects recent and expected growth trends. The connections of surrounding traffic analysis zones in the model should be reviewed to reflect other approved and pending developments and to ensure appropriate network loading.

APPENDIX G

TURN LANE NEED AND LENGTH DETERMINATION

a. Right Turn Lanes

The potential need for right-turn lanes at the site access connections shall be evaluated based on guidelines provided in the Florida Department of Transportation's Driveway Handbook (March 2005). These guidelines are essentially based on roadway speed and type.

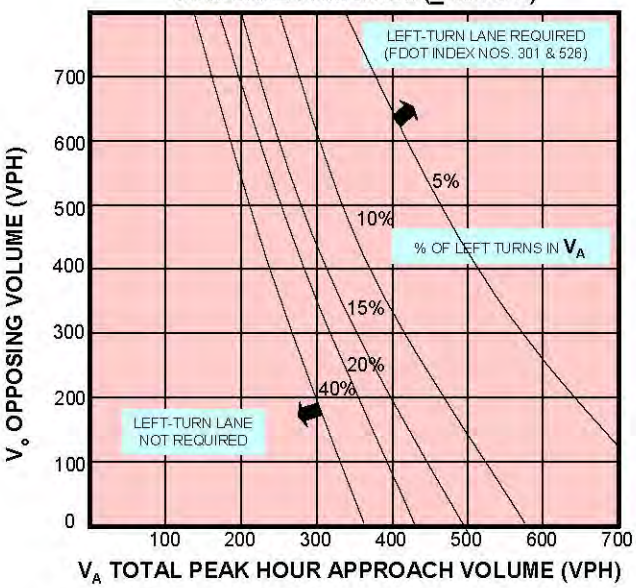
b. Left Turn Lanes

The need for left-turn lanes is typically evaluated based on research documented in National Cooperative Highway Research Program (NCHRP) Report 279 Intersection Channelization Design Guide. The curves included in this report are included below.

c. Deceleration and Storage Lengths

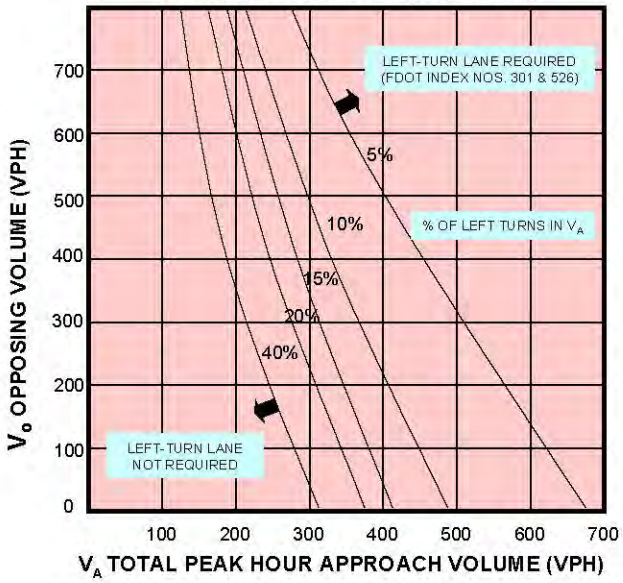
1) Deceleration length shall be based on Index 301 of FDOT's *Design Standards*.
2) Storage Length shall be based on 95th percentile queue estimates provided by the software used in the level of service computation.
3) The provision of deceleration and storage lengths may be modified or waived by the Local Government's Engineer or his/her designee if it is determined that due to site specific constraints, the implementation will not be feasible or practical.

GRAPH 2A. LEFT-TURN LANE WARRANTS – TWO-LANE FACILITIES (≤ 40 MPH)



Note: Left-turn lane not required when intersection of V_A and V_O is below the curve corresponding to the % of left turns in V_A.

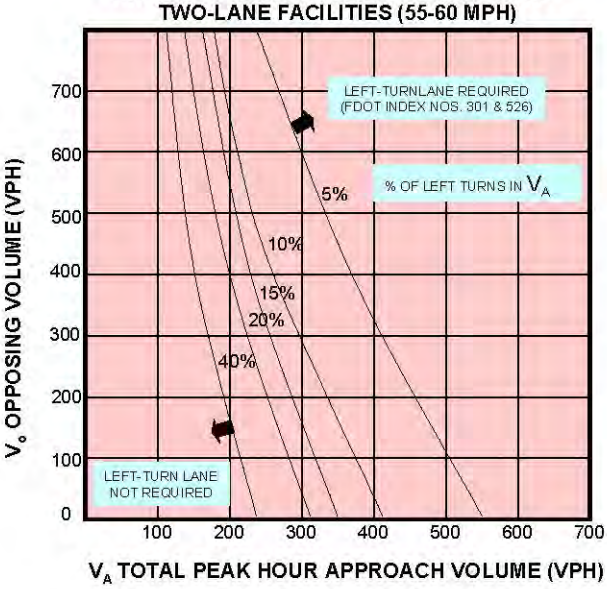
GRAPH 2B. LEFT-TURN LANE WARRANTS – TWO-LANE FACILITIES (45-50 MPH)



Note: Left-turn lane not required when intersection of V_A and V_O is below the curve corresponding to the % of left turns in V_A.

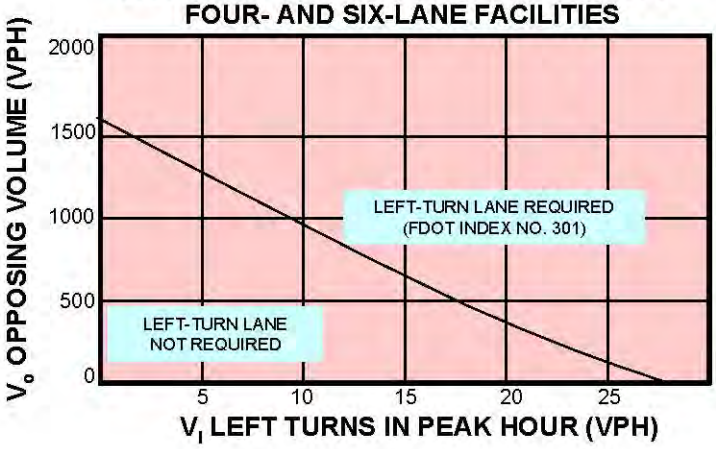
Graph 2A & 2B – Source: Derived from National Cooperative Highway Research Program Report #279.

GRAPH 2C. LEFT-TURN LANE WARRANTS – TWO-LANE FACILITIES (55-60 MPH)



Note: Left-turn lane not required when intersection of V_A and V_O is below the curve corresponding to the % of left turns in V_A.

GRAPH 2D. LEFT-TURN LANE WARRANTS – FOUR- AND SIX-LANE FACILITIES



Note: When V_O < 400 VPH, a left-turn lane is not normally warranted unless the advancing volume (V_A) in the same direction as left-turning traffic exceeds 400 VPH. (V_A > 400 VPH).

Graph 2C & 2D – Source: Derived from National Cooperative Highway Research Program Report #279.

APPENDIX H
MITIGATION OF IMPACTS

This Appendix provides guidance on how the adequacy of mitigation will be technically determined and reviewed by the Local Government.

a. General Guidance

1) Improvements for mitigation of impacts at an individual location must work effectively and flow efficiently and safely relative to upstream and downstream roadway conditions. As examples:
   - A proposed improvement that relies upon dual lefts, three thru lanes, and a right turn lane to provide adequate capacity to serve the traffic demand at an intersection approach where only one lane feeds traffic might not be considered an effective, efficient or safe improvement because (for example) one lane can only feed traffic at a rate of 1,850 vehicles per hour but the intersection capacity analysis relies upon approach lane capacity in excess of the 1,850 vehicles per hour.
   - A proposed improvement that cannot achieve effective lane utilization due to downstream conditions would not be considered an effective improvement. For example, provision of a second through lane with a receiving lane on the far side of an intersection of only 300 feet in length would not be effective
   - Analyses of improvements to closely-spaced intersections should include evaluations of the traffic flow interaction and signal timings of the two intersections to ensure that the proposed improvements will achieve the intended result.
2) For unsignalized intersections, below-standard conditions should be mitigated by first considering the addition of auxiliary lanes, then consideration of signalization. If development traffic contributes to side-street volumes but the deficient delay is not mitigated through auxiliary lane addition, warrants for signalization are not met, and signalization is shown to be a viable solution when warranting conditions are met, then a financial contribution to future signalization may be considered as mitigation. See the "Proportionate Share Mitigation" section below for share computation methodology for adding a traffic signal at a previously unsignalized location.
3) Widening of the major road may also be necessary.

b. Mitigation Options

1. Restore to adopted standard – Identify an improvement at an impacted location that restores level of service to the adopted standard for the "future year with development traffic" condition, as defined in the Analysis Scenarios section of these Guidelines.

2. Proportionate Share Mitigation – The proportionate share payment shall be calculated as follows:

a. Identify all the needed improvements to bring all deficient locations in the study network back to the adopted LOS standard,
b. Submit a cost estimate of the required improvements.
c. Calculate the proportionate-share cost of those improvements per the following formula:
   i) For road segments:
      Proportionate share cost = Total cost of improvement triggered by the project x Project traffic / Increase in capacity created by the improvement. The increase in facility capacity shall be based on the generalized service volume table provided in the "Impacted Roadways/Intersections" section of this document. The above values shall be in units of peak hour, two-way values.
   ii) For signalized and unsignalized intersections (where signalization is not needed):
      Proportionate share cost = Total cost of improvement triggered by the project x Project traffic / Increase in capacity created by the improvement.
      Where: Project traffic is the development traffic in all movements at the intersection increase in capacity is the sum of the changes in physical capacity of all of the movements at the intersection
   iii) For installation of signals at unsignalized locations:
      Proportionate share cost = Total cost of improvement x Project traffic / Increase in capacity created by the improvement,
      Where: Project traffic is the development traffic in ***all*** movements at the intersection Increase in capacity is the sum of the changes in physical capacity for the ***minor-street movements only*** at the intersection

   If other unforeseen situations arise, they will be dealt with on a case-by--case basis.
d. Cost values shall include route study costs, design, right-of-way, construction, construction engineering/inspection costs, and contingency costs.
e. Where an improvement to an alternate road (which draws background traffic away from an existing road that has been estimated to fail) is identified as a solution to congestion and where development traffic is assigned to both the existing road as well as the alternate road, the proportionate share computation will include the total development traffic on the existing road and the new road.

Appendix F: Irrigation System Standards

October 24, 2019

CITY OF PORT ST. LUCIE
PUBLIC WORKS
IRRIGATION STANDARDS
328400

TABLE OF CONTENTS

INTRODUCTION

The attached irrigation system specifications and details were developed to promote water conservation and minimize long term operational and ownership costs of city owned and/or maintained properties requiring irrigation. In addition, they ensure the City of Port St. Lucie delivers on their commitment to South Florida Water Management District as a multiple Consumptive Use Permit (CUP) holder, recipient of a WaterSIP Grant program, and an Order Granting a 'variance' per Rule 40E-24.207(7) of the Florida Administrative Code.

The City of Port St. Lucie, by adopting these specifications and details, will take a giant step forward in water conservation leadership. This direction provides thoughtful stewardship of the tax payer's investment in keeping the City at the forefront of the prevailing direction and trends within the irrigation industry in Florida.

The required use of these specifications will inform landscape irrigation system designers, installation contractors, maintenance contractors and management personnel of the standards to which their irrigation designs, installations, maintenance and management practices and components must conform to, for any and all projects which are or will be owned and/or managed by the City of Port St. Lucie Public Works Department, St. Lucie County, Florida.

Included in this document are design concepts, an approved product list, installation requirements and details, maintenance requirements, and management protocols that shall be strictly adhered to for all irrigation systems. Approved equals will only be permitted if a formal request is made to the Public Works Department and approved in writing on Public Works letterhead.

In all cases these specifications shall govern. In instances or situations not specifically addressed by these specifications, the designer, installer, maintenance contractor and management personnel shall ensure the design meets or exceeds the Florida Building Code, Plumbing, Appendix 'F', Florida Irrigation Society Irrigation Design Standards, Irrigation Association Best Management Practices, and the American Society of Irrigation Consultants electrical grounding requirements and design standards. In the event there is a conflict among these standards, the most conservative and restrictive shall govern, without exception.

This Irrigation specification document is broken into four parts:

Part One –**Design** – Specifications and Installation Details
Part Two – **Construction** – Standards and requirements
Part Three – **Maintenance** – Standards and requirements
Part Four – **Water Management** – Standards, Protocols and requirements.

PART ONE

Design – Specifications

These design specifications and details have been carefully developed and are time tested by the City of Port St. Lucie. Therefore, all irrigation system designs must strictly follow the requirements outlined in this design section, without exception.

If a designer believes theses irrigation specifications should be modified, due to unique issues for the site they are designing an irrigation system for, they must submit a written request for a meeting with the City of Port St. Lucie for the purpose of reviewing these issues. In the meeting, the designer will be required to layout their proposed changes, and their justification for them. A determination of the designers requested changes will be considered by the City and the City will, at its sole discretion, make a determination to allow or reject the proposed change(s).

All irrigation designs shall be submitted to PSL for review and approval prior to commencement of construction. Only irrigation plans which are stamped, approved and dated by Port St. Lucie may be utilized to construct an irrigation system in the City of Port St. Lucie.

All irrigation systems installed shall be inspected for strict compliance with the approved irrigation design plan. The minimum number and types of inspections will be noted on the approved irrigation system design. All inspections noted and required shall be 'open trench' and shall be completed by a City of Port St. Lucie employee and/or its assigned representative, without exception.

All irrigation systems shall be maintained and managed by City of Port St. Lucie staff or approved vendors. Irrespective of who is maintaining and managing the irrigation systems, all materials, practices, and requirements outlined in these specifications shall be strictly followed, without exception.

CAD Standards

- Irrigation Designs shall be created using the latest version of AutoCAD at time of design submittal.
- Designs to be submitted in both hard copy and digital format, as follows:
    a. Three hard designs sets
    b. Three jump drives each with a complete design set
- All irrigation design components shall be on separate design layers using the headings in these specifications. (Example – Mainlines shall be on the Mainline

layer and mainline isolation valves shall be placed on a mainline isolation valve layer). Irrigation head coverage arcs shall be on a separate layer.

- All irrigation plan sheets shall have all utilities shown 'in the background' using a 50% shading.
- All irrigation plans sheets shall have the landscape plans on separate design layers to allow a reviewer to turn on the landscape plan while reviewing the irrigation plan and then shut the landscape plan back off while leaving the irrigation plan on.
- All roadway station points must be shown.
- Drawings must be to scale using 1:30 or 1:20 scale with 24"x36" sheets.
- Drawings must be signed and sealed by one of the following:
    a. Registered Landscape Architect
    b. Professional Engineer
    c. Irrigation Association CID – Commercial specialty
- All irrigation plans shall consist of one or more of the following:
    a. Cover sheet with site map and sheet layout map
    b. Design sheet(s)
    c. Detail sheet(s)
    d. Note Sheet(s)
- All street names shall be noted on each plan sheet
- North Arrow on all plan sheets
- Title block for each sheet to include:
    a. Project title
    b. Sheet number
    c. Design date
    d. Revision date(s)
    e. Design company and designer(s) name
    f. Location for, and placement of, designers seal, signature and date

Control System

Central Control

- The irrigation control system shall be a Rain Bird Maxicom system utilizing either two-wire, radio, or a SITE SAT for communication between field controllers and the C.C.U. The site shall communicate with the central computer via a cell modem, Ethernet, WIFI or fiber optic cable; POTS lines are not allowed.

Notes:

1. All Maxicom components shall be installed in strict accordance with current Rain Bird Maxicom II design and installation manuals, without exception.
2. The City has a central monitoring computer and weather station so these components are not required to be a part of any design.

3. Each C.C.U. requires its own rain can.

- All electrical control components including C.C.U.'s, controllers, SITE SAT's, and pump station control panels must be grounded, bonded and shielded according to the grounding specifications and details in this document.
- All satellite controllers must be installed inside Rain Bird stainless steel pedestals bolted to an appropriately sized concrete pad (per details). Each concrete pad must have the requisite number of separate conduits installed as indicated in the irrigation design details. At minimum, each pedestal should have the following appropriately sized SCH 40 PVC gray electrical conduits with long radii sweeps:
    a. One for primary side electrical power and grounding (3/4")
    b. One for field zone wiring (1.5" or 2" as required)
    c. One for field 'secondary side' grounding (3/4")
    d. One for soil moisture sensor wire (3/4")
- Control Wire - Use UF, 600 Volt, solid copper, irrigation control wire, sized as required, with 3MDBY or DBR connecters at all splices. Install all splices inside a NDS rectangular valve box model # 216BCB.
- Install all control wire in 1.5" gray PVC electrical conduit with long radii sweeps and using 12" NDS rectangular splice boxes (model # 216CD) as pull boxes, placed a maximum of 300' on center as follows:
    - Install one common wire in each direction from the controller.
    - Install one hot wire for each remote control valve.
    - Install one spare common and four spare hot wires in each direction, from controller, to all ends of the mainline.
- Communication cable - Paige Electric PE-39-19-three pair (more pairs if required). Install inside a separate 1.5"gray PVC electrical conduit. When runs exceed 300' use NDS rectangular valve boxes, model # 216BCB, as pull boxes installed at 300' on center. Make all splices using the SUPER SER V1-SEAL as required by Rain Bird Maxicom specifications.
- Baseline Soil Moisture sensor, model S100, shall be installed on each project (one per controller).
- The control system must be installed by a company whose on-site foreman is an employee of the installing company and who has successfully completed both Rain Bird Level two hardware and software classes, at a minimum. The contractor must have successfully installed a minimum of three Maxicom systems within the past five years. Contractor must submit, prior to being awarded the installation contract, three references for such projects including job name, contact person, contact phone number, and a brief description of the project. They shall also submit proof of completion of the required Rain Bird training classes.

Stand Alone Control Systems

- The irrigation controller must be a Rain Bird ESP series controller compatible with the Rain Bird Maxicom control system. These controllers can be either pedestal or wall mount controllers.
- All controllers must be grounded and bonded using the City of PSL approved grounding and bonding methods.
- Control Wire - Use UF, direct bury 600 Volt, solid copper, irrigation control wire, sized as required, with 3MDBY or DBR connecters at all splices. Install all splices inside a NDS rectangular valve box model # 216BCB.
- Install control wire as follows:
    - Install one common wire in each direction from the controller.
    - Install one hot wire for each remote control valve.
    - Install one spare common and four spare hot wires in each direction, from controller, to all ends of the mainline.

Electrical Supply for control components and pump stations

- All irrigation system designs shall show existing or proposed power infrastructure to be utilized to provide power to the irrigation system components. This is a requirement for irrigation permitting and must meet the City of PSL Building department requirements as well as all National Electrical Code (NEC) requirements.
- Electrical services for controllers, CCU's, pump stations, etc. are required.

Grounding

- All electrical components must be grounded utilizing two copper grounding plates (4" wide x 8' long), a 10' copper grounding rod, and # 6 insulated copper wire. All connections shall be made using 'one strike' CAD welds; clamps are not allowed. See details and American Society of Irrigation Consultants (ASIC) grounding guidelines for additional information.

Point of Connection (POC)

There are three types of POC's available for irrigation projects in the City of Port St. Lucie: pump stations, reuse water connections and potable water connections. The determination of which water supply to use must go through the following process, in the order noted.

1. Contact City of PSL Utilities Department to determine if appropriate reuse water is available to the site. If not, you will need to obtain a letter from PSL utilities so stating and provide it, along with the irrigation design plans for plan approval

2. If reuse water is not available, a pump station using surface water would be the second option for a POC.
3. If surface water is not allowed, a pump and well may be utilized.
4. If none of the above is available, a potable water connection using a PSL utilities water meter and approved backflow would be allowed.

Note: the above order must be followed in determining the POC to be utilized. Justification (acceptable to the City of Port St. Lucie at their sole discretion) must be provided, fully explaining why the prior options were not selected.

Once a POC/Water source is determined, the following requirements must be followed:

Reuse

- Systems must fully comply with the City of PSL Reuse metering facility water supply requirements.
- All reuse designs must be reviewed and approved by the City of Port St. Lucie utilities department.
- Reuse connection must have a master valve / magnetic flow meter run assembly installed and connected to the control system the same as described for pump stations.
- Reuse design must meet Florida D.E.P. requirements including the use of Pantone purple pipe, valve box lids, spray head and rotor head caps, and signage. .

Pumps

- All pump stations must be manufactured by Hoover Pumping Systems, Flowtronex, or Watertronics and shall be UL listed packaged pump stations and control panels.
- All pump stations shall be placed inside a six (6) foot high, black vinyl, 9 gauge chain link fence with a 3' man gate. Fencing shall ensure a minimum of 4' of access space around the entire perimeter of the pump station and electrical panel. The entire enclosed area shall have a 6" layer of ¾"minus gravel installed and compacted with a vibratory plate. The electrical meter box and uni-strut rack must be installed on the outside of the fenced in area to allow FPL ready access to the meter.
- Pumps must be pressure demand activated
- Pump stations shall be controlled by a variable frequency drive.
- Each pump station shall have an electric, normally closed, master valve (MV), or pump shut off circuit, with a magnetic flow meter on the discharge header. MV (or circuit) shall be connected to an adjacent controller on the highest zone number for the controller but never to stations #24 or #40. The magnetic flow meter must have an output signal compatible with Maxicom. The exact signal and routing requirements shall be coordinated between the pump manufacturer and the installation contractor.
- Pump and Surface water systems

1. A separate submersible pump and well system shall be installed to 'recharge' a lake draw system; no recharge system is required on canal draw systems.
2. When a recharge pump and well system is required, the on/off of this pump and well system must be controlled by a lake level float system.
3. A recharge pump and well system must be capable of recharging water volume equal to one day of peak irrigation water demand, within sixteen (16) hours. This water must be metered using a Maxicom compatible flow meter connected to the on-site CCU via PE-39 two wire.
4. Water quality analysis – All lake water must be tested by an approved laboratory for 'landscape suitability'. The test results must be submitted to the City for approval.
5. Water 'particle size' analysis – All lake water must be tested for a particle size analysis, by a reputable lab experienced in conducting such tests. The results shall be provided to the City of PSL for review and approval.

- Well Requirements
  1. All wells must be gravel packed utilizing galvanized or black steel casings that are made via an extrusion process. No piping made from flat steel stock and then welded will be allowed.
  2. When submersible pumps are utilized they must be installed inside wells with casings one pipe size larger than the pump and motor diameter (example - 6" motor must be installed inside an 8"well casing).
  3. Step Test- All wells, whether for irrigation withdraw or lake recharge shall have a six hour step test performed and the results submitted to the City for approval. This test shall be conducted as follows: Well driller shall pump the well for 30 minutes at 50% maximum system design flow, the next 30 minutes shall be at 75% maximum flow, next 60 minutes at 100% of maximum design flow. Then for the next four hours the well shall be pumped at 125% of maximum design flow. The well driller shall record the time the test starts, the water level in the well at the start of the test (before pumping begins) and then every 15 minutes thereafter until the test is complete. This report must be submitted to the City for approval prior to purchasing and installing the pump station.
- Filtration requirements
  1. If filtration is required, Netafim 'Apollo' disc filter technology shall be utilized with 140 mesh disc and automated 'pressure differential' flushing.
  2. Utilize the Netafim sizing chart below, to determine which model to utilize.

140 MESH WATER SOURCE MAXIMUM FLOW RATE (GPM)

WATER QUALITY	FLOW PER SPINE	4 UNIT ANGLE	3 UNIT TWIN	4 UNIT TWIN	5 UNIT TWIN	6 UNIT TWIN	7 UNIT TWIN	8 UNIT TWIN
Good	200	800	1,200	1,600	2,000	2,400	2,800	3,200
Average	175	700	1,050	1,400	1,750	2,100	2,450	2,800
Poor	125	500	750	1,000	1,250	1,500	1,750	2,000
Very Poor	85	340	510	690	850	1,020	1,200	1,380

3. All flushing must return to the surface water body from which it came but must be discharged a minimum of 300' from the suction line of any pump station pulling from that surface water body.

Potable Water – The use of potable water for irrigation is to be used as a last resort (no other water source is available for the site). Written justification establishing this requirement has been met must be submitted with the plans for review and approval.

- Potable meters to utilize approved backflow prevention immediately downstream of the potable water meter.
- Water use shall be metered using a Maxicom compatible water meter connected via PE-39 wire to the sites CCU.

Mainline

- Mainlines shall be designed and sized to ensure a maximum velocity of five (5) feet per second (f.p.s.) while ensuring a maximum of 10% variation in pressures within the mainline piping network using the 'friction factor' limiting method.
- Metallic marking tape shall be placed one (1) foot above the entire length of all mainline piping.
- All mainlines shall be backfilled with a 6" thick layer of coarse sand above, below, and on both sides of the pipe. The remainder of the backfill material can be native material but nothing larger than 1" in diameter.
- Mainlines shall have 36" of cover.
- Mainlines shall be DR11-4710 IPS H.D.P.E. with fusion welded fittings (or approved equal). All mainlines shall be installed by trained HDPE fusion weld technicians in strict accordance with the manufacturers specifications and recommendations, including quality control 'random sampling' of fusion joints. Note: The use of CL 200 PVC mainline pipe with Leemco ductile iron fittings and appropriate joint restraints may be utilized if approved in writing by public works.
- Pressure Testing HDPE - Pressure testing shall be conducted in accordance with ASTM F2164, Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure. The HDPE pipe shall be filled with water, raised to test pressure and allowed to stabilize. The test pressure shall be 1.5 times the operating pressure at the lowest point in the system. In accordance with section 9.8, the pipe shall pass if the final pressure is within 5% of the test pressure for 1 hour. For safety reasons only hydrostatic testing only may be used.
- Pressure Testing CL 200 PVC - Remove all remote control valves and cap using a threaded cap. Fill mainline with water and pressurize the system to 125 PSI. Monitor the system pressure at two gauge locations; the gauge locations must be at opposite ends of the mainline being tested. With the same respective pressures, monitor the gauges for two hours. Gasketed piping shall lose no more water than allowed

per the Florida State Building Code, Volume II Plumbing, Part VI Appendix 'F'. Refer to this section for the formula to be used to calculate the maximum allowable water loss during the testing time. If these parameters are exceeded, locate the problem; repair it; wait 24 hours and retry the test. This procedure must be followed until the mainline passes the test.

- **Story Poles** – When installing irrigation mainlines, they must be inspected for type, size, trenching, backfill, workmanship and depth. To properly inspect for these parameters, 'open trench' inspections are required (see PART II). However, it is recognized, in RARE OCCASSIONS, it may be necessary to backfill a section of mainline before it can be inspected (safety reasons). In such occasions, the mainline may be backfill provided the following is approved and completed as follows:
  1. Install story poles (1.5" SCH 40 PVC pipes which are cut long enough to sit on top of the mainline and extend to at least 1.0' above finished grade. Story poles must be set every 50' along the entire mainline run plus at all changes of direction and end points of piping.
  2. Photos of the installation which clearly show the required inspection parameters noted above, which are time/date stamped must be provided to the City of PSL.

Mainline Isolation Valves

- Shall be installed at all mainline tees and other areas in the mainline to facilitate maintenance and repair.
- Shall be installed inside NDS rectangular valve box model # 216BCB with overlapping bolt down lids and 6" SCH box extensions.
- HDPE mainlines shall utilize Aquafuse Ductile Iron ' control flow' gate CL 200 PVC mainlines shall use Harco Ductile Iron resilient wedge gate valves, model P619-RW and sized per mainline

Lateral Line

- Lateral line shall be designed and sized to ensure a maximum velocity of five (5) feet per second (f.p.s.) while ensuring a maximum of 10% variation in pressures within the piping network using the 'friction factor' limiting method.
- All lateral lines shall be backfilled with a 6" thick layer of course sand above, below, and on both sides of the pipe. The remainder of the backfill material can be native material but nothing larger than 1" in diameter.
- Lateral pipe shall have the following depths of coverage:
  1. 24" for pipes 4" and larger
  2. 18" for pipes 3" and smaller

- Lateral lines shall be CL 200 PVC solvent weld with SCH 40 PVC solvent weld fittings - must be ¾" or larger; no ½' lateral is allowed. Pressure Testing – Lateral lines must be filled and visually checked for leaks. Any leaks detected must be repaired. No pressure test of the lateral lines is required.
- All solvent welded pipe and fittings from 2-1/2" and above shall be welded together utilizing Weld-On purple ECO primer and 711 ECO Gray glue. Pipes 2" and smaller may be welded together using Weld-On purple ECO primer with 705 ECO gray glue.

Sleeving

- All sleeving shall be Class 200 PVC with SCH 40 PVC fittings.
- All solvent weld sleeving pipe and fittings from 2-1/2" and above shall be welded together utilizing Weld-On purple ECO primer and 711 ECO Gray glue. Pipes 2" and smaller may be welded together using Weld-On purple ECO primer with 705 ECO gray glue.
- All roadway sleeving must have 36" of cover.
- All other sleeving must have the depth of coverage required for the pipe type and size it is carrying.
- Sleeves shall be a minimum of 2X the size of the pipe it is carrying.
- Only one pipe shall be included per irrigation sleeve.
- Metallic marking tape shall be placed one (1) foot above all irrigation sleeves, for the entire length of each sleeve.
- Sleeves shall extend a minimum of 3' back for curb or beyond edge of hardscape and terminate in an easily accessible green space.
- 2"x 2" Wooden stakes shall be placed at the end of each sleeve, from the bottom of the trench extending 2' above grade. The entire wood stake, above grade, shall be painted fluorescent orange. After the orange paint has dried, installation contractor shall use a black indelible marker and note the size of the sleeve and size of the pipe it carries.
- HDPE mainlines do not need to be sleeved but they shall have a 2" HDPE 'wire sleeve' run alongside the mainline at hardscape crossings.
- All CL 200 PVC mainline shall have one 2" wire sleeve run alongside the mainline at all hardscape crossings.

Remote Control Valves

- Remote Control Valves (RCV)
    1. Shall be sized as listed below
        a. 0-25 gpm – 1"
        b. 25-50- gpm – 1.5"
        c. 51-100 gpm – 2"
        d. No 3" are permitted

2. Shall be installed inside a NDS Jumbo Rectangular Valve Box model #218BCB with an overlapping bolt-down lid (or approved equal).
3. All remote control zone valves shall be Rain Bird PESB valves with a Nibco T113 gate valve immediately upstream (one gate valve per remote control valve) for isolation purposes to facilitate installation and service work.

Zoning and head type requirements

- Valve sequencing at the controller shall ensure a clockwise, logical, and sequential order from 1 thru x starting at the POC and working around the site.
- Lateral piping shall ensure, as much as possible, the 'equal' splitting of flows at each tee, in both directions. Starting at the first tee from the remote control valve and continuing throughout the zone at each tee in the piping.
- One RCV shall be installed per controller station – two or more RCV's connected to a single station is not allowed.
- All RCV's shall be connected to the controller using UF direct burial wire, 600 Volt, solid copper wire with PVC insulation, sized as required. Waterproof wire connectors shall be 3MDBY or 3MDBR.
- Controller station 24 must be left unused on any controller connected to a POC master valve. In addition, each controller must have a minimum of two 'non-utilized' stations (in addition to station 24 where applicable).
- Using an electric branding iron, brand the valve I.D. letters/number on the lid of each valve, splice box or junction box. This brand must be a minimum of 2" tall and easily legible. Label lids as follows:
    - Remote Control Valves - Two digits for the valve number (example station one on the controller would have the lid branded 01
    - Gate Valves – GV for gate valve plus a two digit number of the valve size (example GV-04).
    - Splice Box – SPL
    - Junction Box – JUNC
    - Soil Moisture Sensor – SMS

  Note: use similar labeling for other types of lids no noted above.
- Install a large Christy Tag on each remote control valve or gate valve stem with the numbers/letters which match the branded numbers on the valve box lid.
- All spray heads shall be Rain Bird 1806 series SAM-PRS utilizing Hunter MP rotator nozzles
- All rotor heads shall be Hunter institutional 6" pop up with check valve
- All inline drip tubing shall be Netafim Techline CV.

- Spray and rotor heads to be used in turf areas only.
- All shrub beds shall be irrigated using Netafim inline drip tubing.
- All bubbler shall be on Rain Bird 1804 SAM bodies using Rain Bird 1400 series bubblers.

Coverage/head layout requirements

- Irrigation coverage (for spray or rotor heads) shall be head to head with 100% overlap with the following design distribution uniformity (D.U.) requirements.
  1. sprays 70%
  2. rotors 75%
  3. rotaries on spray bodies – 75%
  4. drip - 90%
- Irrigation coverage (drip beds) shall be emitter to emitter with triangular space emitters between rows with a minimum design emission uniformity (E.U.) of .90
- Drip emitter spacing both within the row and between rows shall be as recommended by Netafim for the soil type and precipitation rate required for the site.
- All Oak, Mahogany, and Royal palms (and other trees as required by City of PSL) shall have a minimum of two bubblers/tree (one on each side of the tree at the tree drip line). The quantity and flow of the bubblers must be able to deliver a minimum of 10 gallons of water per 1" of tree caliper per irrigation event. If more than two bubblers are required (larger trees) bubblers must be spaced uniformly around the tree. Actual tree watering requirements shall be as noted by the International Society of Arboriculture.
- Turf, shrubs, trees and annual color shall be zoned separately.
- Spray, rotor, rotaries, drip and bubbler zones shall be zoned separately.

Watering Window requirements

All projects shall be designed to ensure the system can deliver .25" of net irrigation water, to each zone, within one ten (10) hour day, or less. This means the entire site/system must be able to be watered in one ten (10) hour day, or less.

Required Submittals

As-builts

Shall be provided by utilizing a sub-meter Global Positioning System (GPS) to accurately locate all mainlines, sleeves, remote control valves, gate valves, wire splice boxes, controllers, and P.O.C.'s. These as-builts shall be incorporated into the City of Port St. Lucie's as-built database. The actual format and criteria shall be as required by the City of Port St. Lucie.

Grounding Certification letter

All grounding must be checked and certified to have 10 ohms or less of earth ground resistance, all connections are solid, and the grounding detail is installed as detailed and required. This system check must be completed by a licensed master electrician and a letter of compliance shall be issued by the electrician, on their letter head, at project completion as a condition of final acceptance.

Controller charts

Contractor shall supply color coded, by zone, controller charts showing all zones/areas controlled by its respective controller. These charts shall be clearly legible, covered by 10 mil plastic and hermetically sealed and then placed inside the controller.

Warranty letter

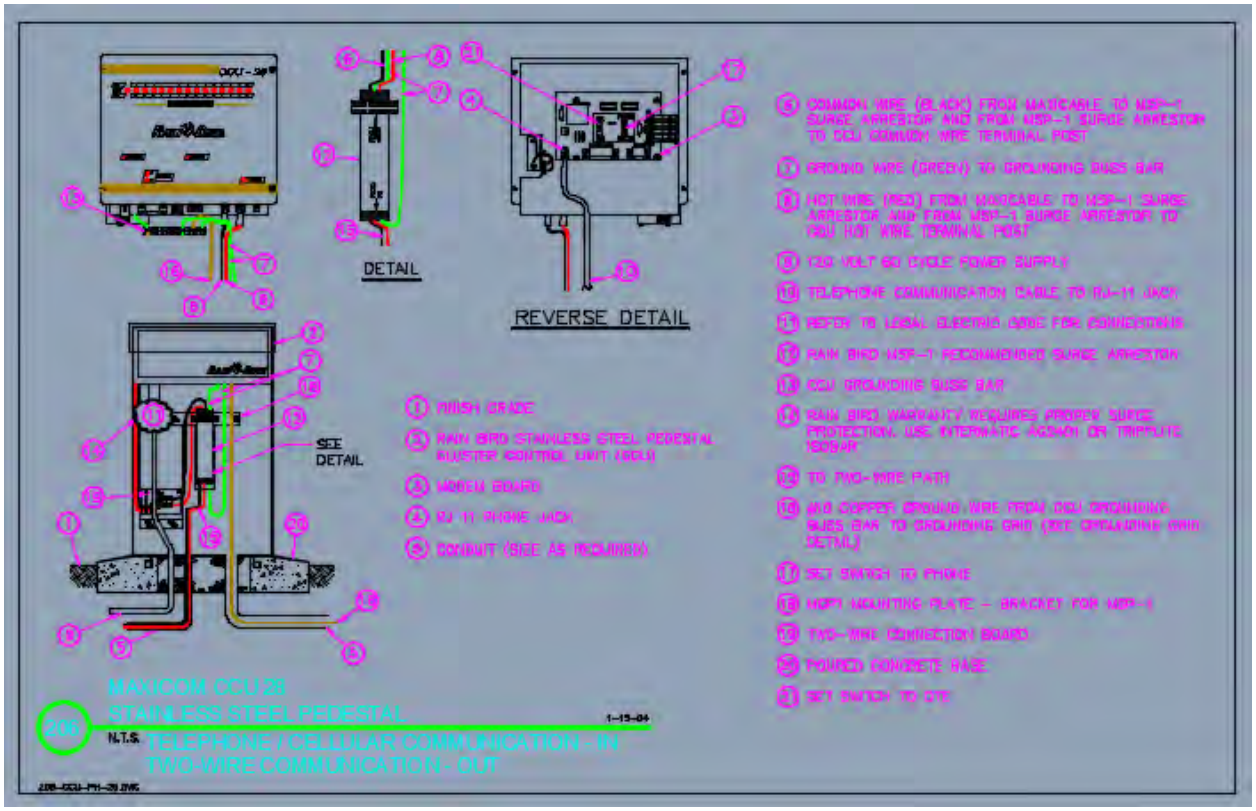
The contractor shall provide, on the installation contractor's letterhead, a written one year warranty covering the entire irrigation system installation (parts and labor) or a period of one year from acceptance of the project by the City of Port St. Lucie.

Design – Details

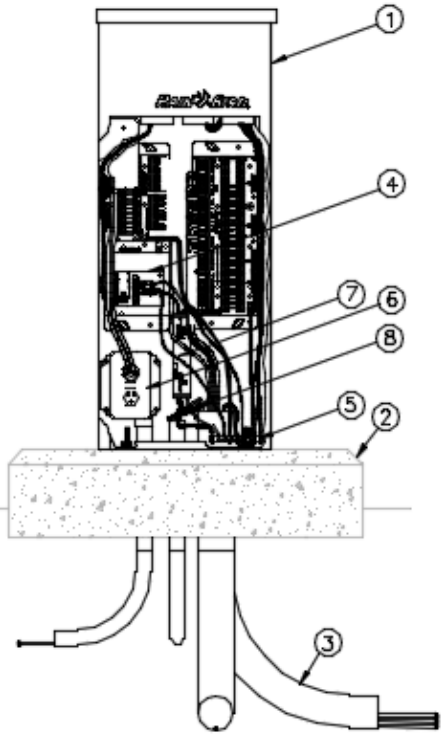
The following set of details is intended to be utilized in the creation of all City of Port St. Lucie Public Works irrigation system designs. In utilizing these details, and the previous sections specifications, all future irrigation system designs should be consistent in their design and requirements, regardless of who actually designs the irrigation system. For this goal to be achieved, the above specifications and the below details must be strictly adhered to, without exception.

Control System

28 Channel CCU – Pedestal Mounted – Cell Phone Communication



Rain Bird ESP-SAT w/Stainless Steel Pedestal



1. RAIN BIRD STAINLESS STEEL PEDESTAL WITH RAIN BIRD ESP–SAT–2S CONTROLLER (UL LISTED–OUTDOOR LAWN SPRINKLER CONTROL.)
2. MINIMUM 3,000 PSI CONCRETE BASE WITH VARIOUS CONDUIT PENETRATIONS AND SWEEP ELLS AS SHOWN. (2' X 2' X 6" SIZE)
3. SCHEDULE 40 PVC "GRAY" CONDUIT WITH SWEEP EL SIZED IN ACCORDANCE WITH NEC FOR VARIOUS WIRE SIZE AND COUNTS. (MIN. 600–VOLT INSULATION REQUIRED.)
4. ESP–SAT–TW CONNECTION BOARD – MB1200.
5. GROUND BONDING LUG PROPERLY ATTACHED TO ELECTRICAL ENCLOSURE AND SIZED TO ACCOMMODATE ALL GROUND WIRING WITH A SINGLE CONDUCTOR INSTALLED IN EACH SCREW TERMINAL.
6. SURGE SUPPRESSION RECEPTACLE. INSTALL IN A PROPERLY SIZED ENCLOSURE WITH COVER. ALL CONNECTED EQUIPMENT SHALL UTILIZE A PROPERLY SIZED "3 PRONG" POWER CORD WITH MINIMUM 600–VOLT INSULATION.
7. MSP–1 SURGE PIPE KIT–MB1300 (USE SINGLE HOLE 3/4" PIPE STRAP ON WALL MOUNT APPLICATIONS.)
8. REA # PE 39 DIRECT BURIAL (#19–3) PHONE EXCHANGE CABLE (3 PAIR MINIMUM). CONNECT GROUND BONDING CLAMP FROM COMMUNICATION WIRE SHIELD TO MULTI–LUG TERMINAL.

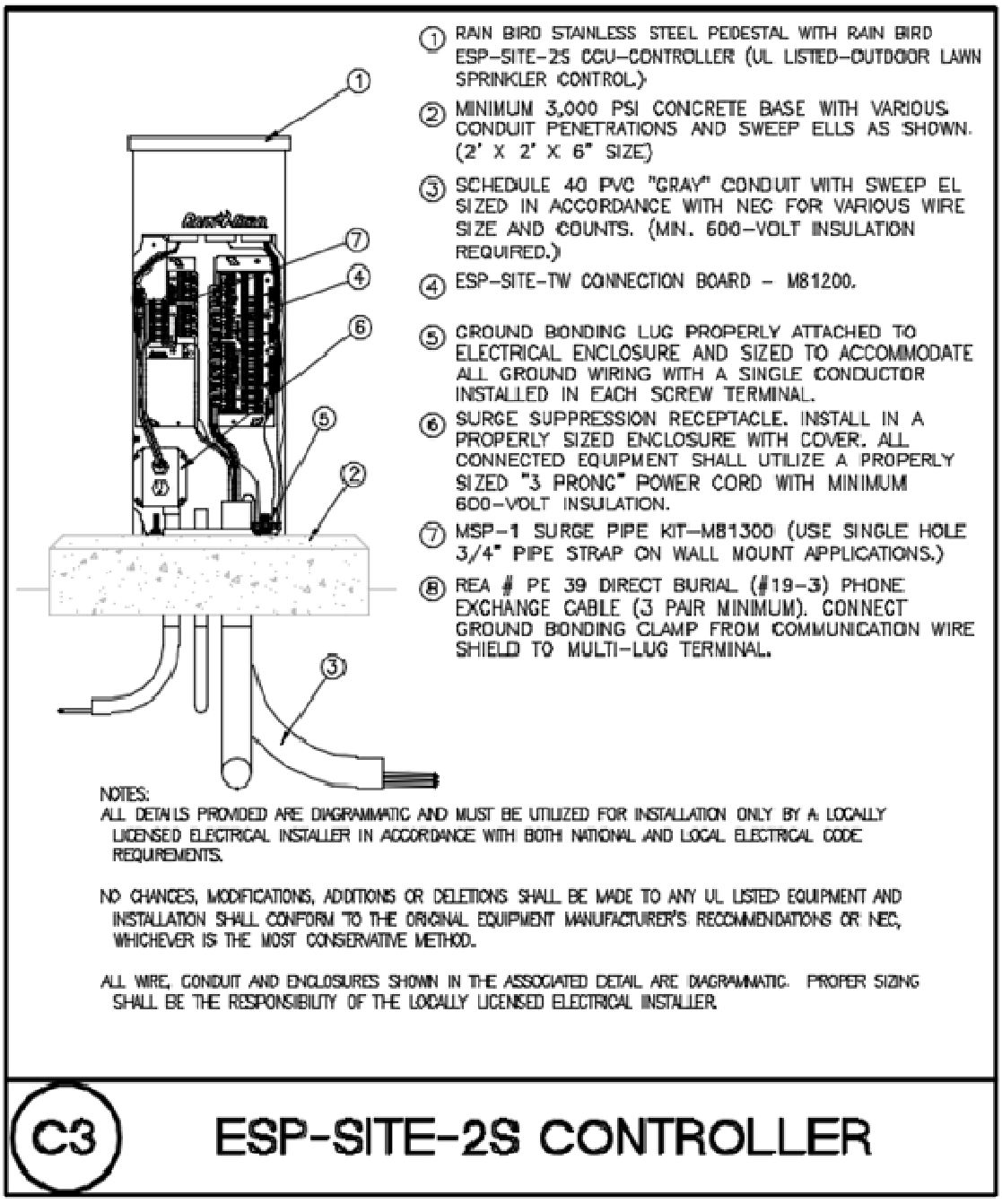
NOTES:
ALL DETAILS PROVIDED ARE DIAGRAMMATIC AND MUST BE UTILIZED FOR INSTALLATION ONLY BY A LOCALLY LICENSED ELECTRICAL INSTALLER IN ACCORDANCE WITH BOTH NATIONAL AND LOCAL ELECTRICAL CODE REQUIREMENTS.

NO CHANGES, MODIFICATIONS, ADDITIONS OR DELETIONS SHALL BE MADE TO ANY UL LISTED EQUIPMENT AND INSTALLATION SHALL CONFORM TO THE ORIGINAL EQUIPMENT MANUFACTURER'S RECOMMENDATIONS OR NEC, WHICHEVER IS THE MOST CONSERVATIVE METHOD.

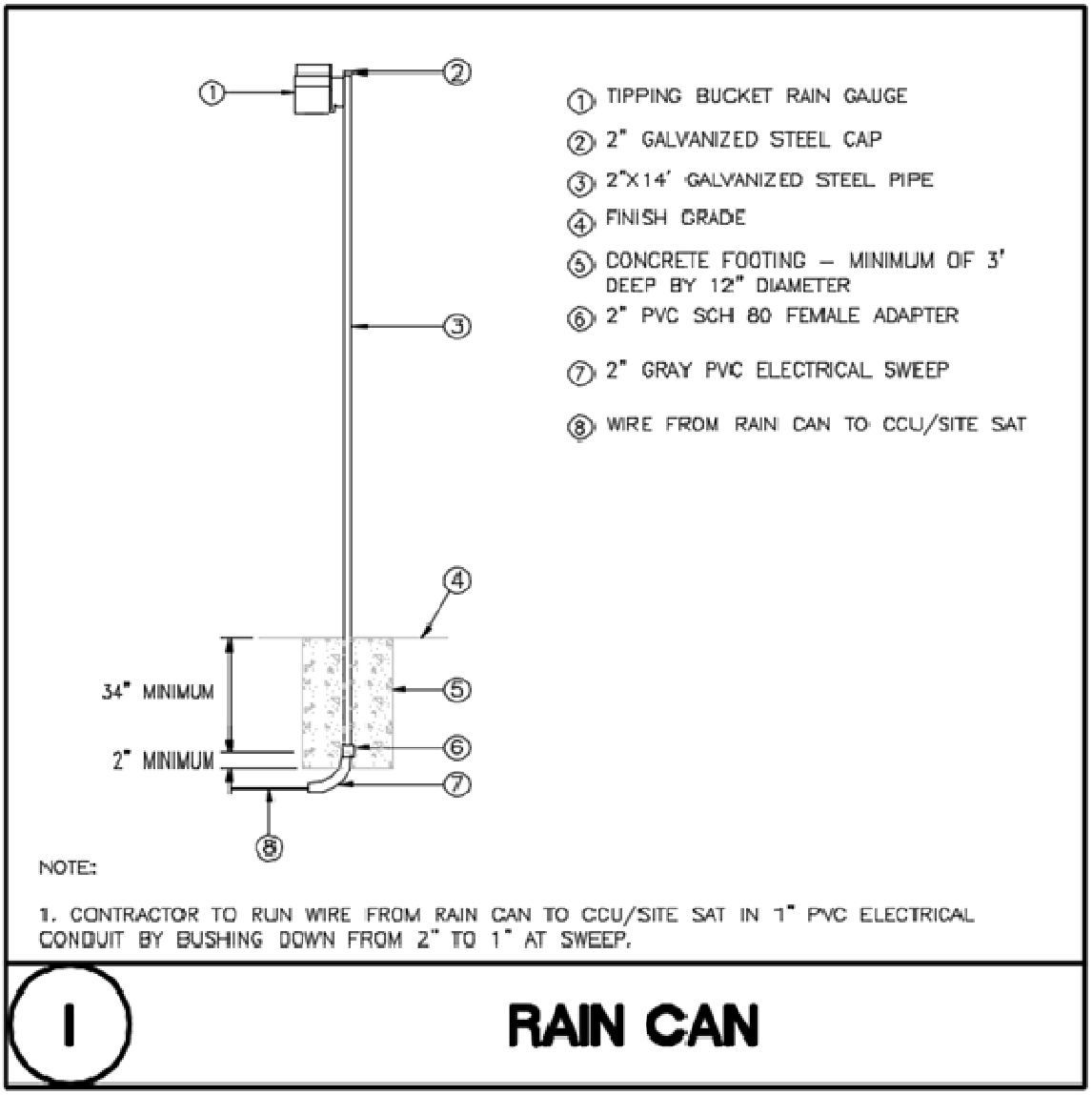
ALL WIRE, CONDUIT AND ENCLOSURES SHOWN IN THE ASSOCIATED DETAIL ARE DIAGRAMMATIC. PROPER SIZING SHALL BE THE RESPONSIBILITY OF THE LOCALLY LICENSED ELECTRICAL INSTALLER.

C2 ESP-SAT CONTROLLER-2S

Rain Bird ESP-SITE w/Stainless Steel Pedestal

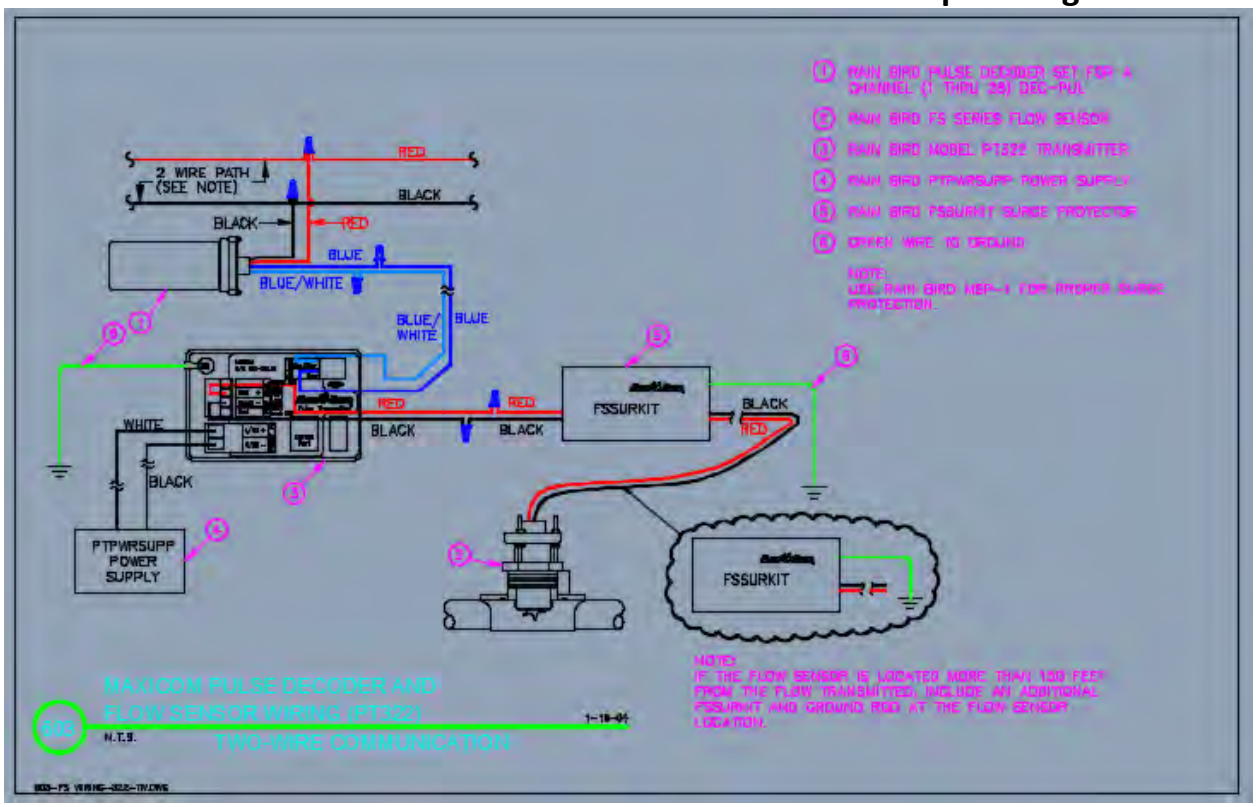


Rain Can on Galvanized Pole

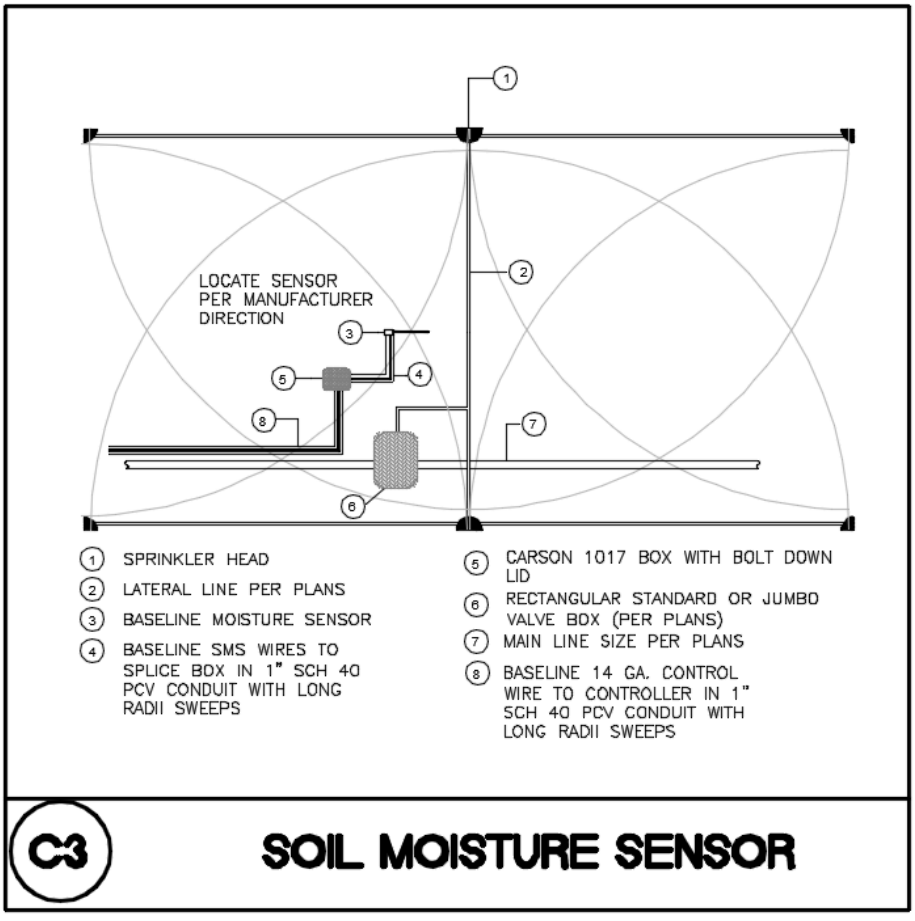


10-24-2019

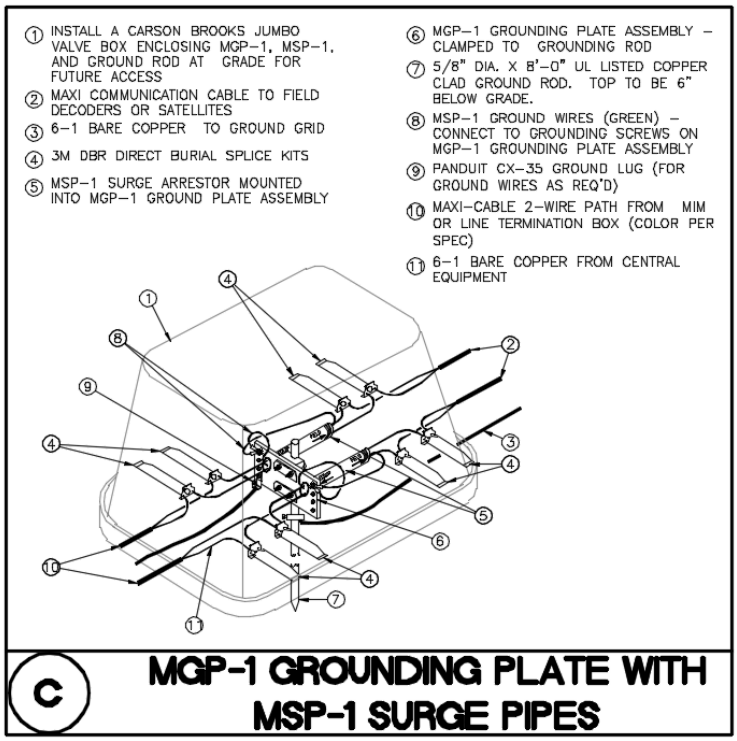
Maxicom Flow Sensor and PT322 Pulse Transmitter – Concept wiring



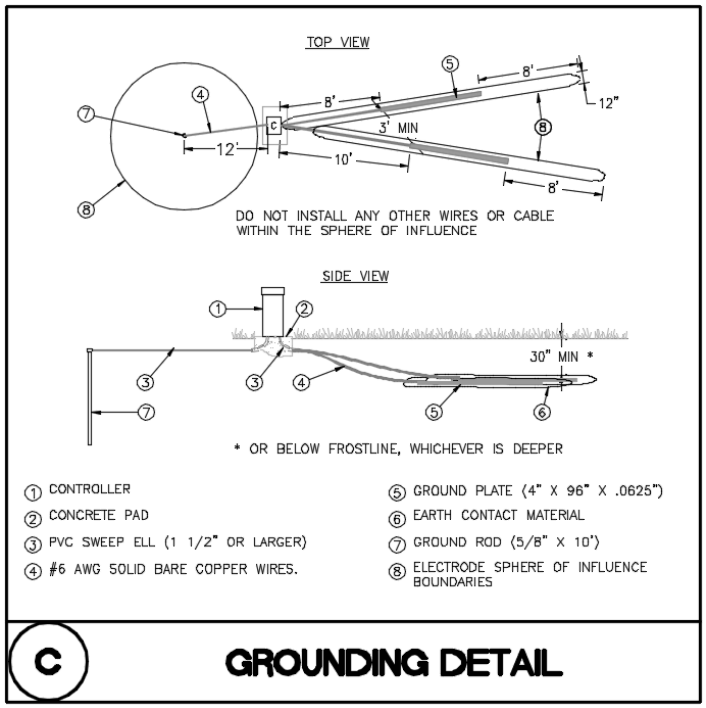
Soil Moisture Sensor



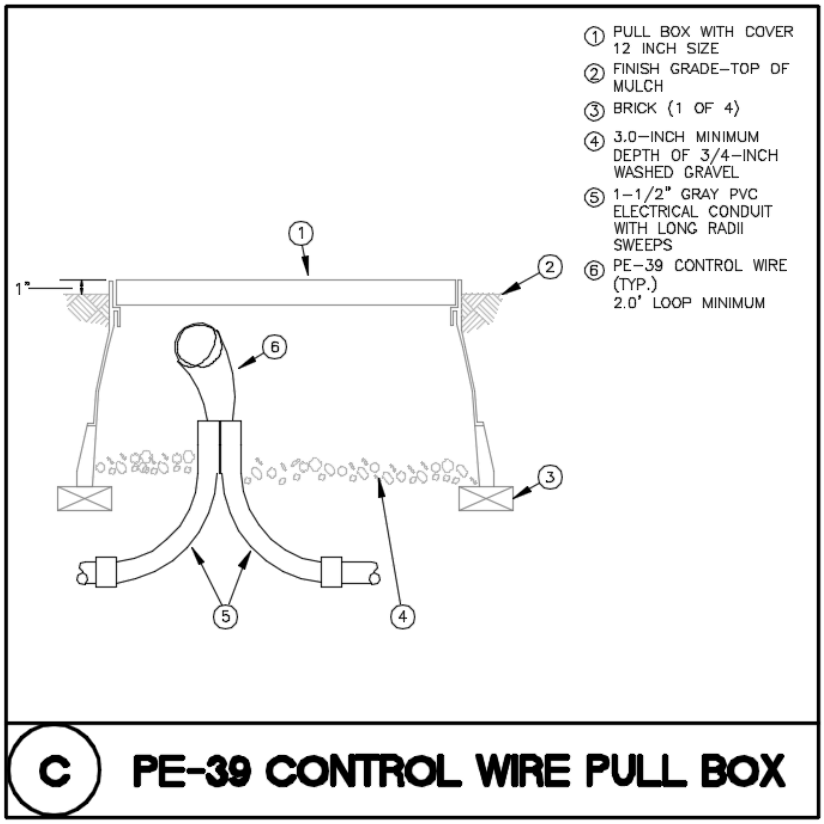
Two wire surge protection



Controller, CCU and pump panel grounding



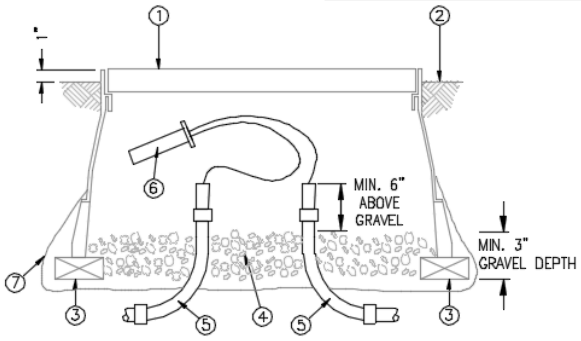
PE 39 Wire Pull Boxes



Control Wire and Waterproof connector

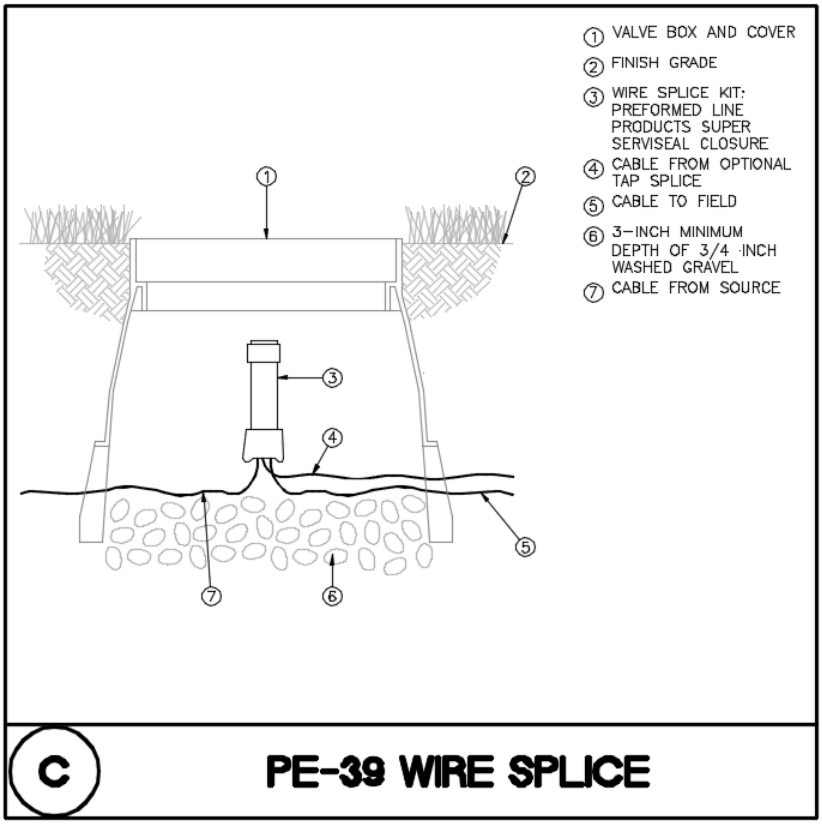
NOTES:
1. FILTER FABRIC SHOULD SPAN BASE OF VALVE BOX AND BE SECURED A MINIMUM OF 6" UP FROM BASE VIA DUCT TAPE AROUND SIDES OF VALVE BOX. FABRIC SHOULD CONTAIN NO HOLES EXCEPT FOR WIRE AND PIPES (IF APPLICABLE) AS SHOWN.
2. CONDUIT ENDS SHALL BE A MINIMUM OF 6" ABOVE GRAVEL TO PREVENT DEBRIS ENTERING CONDUITS
3. CONDUIT ENDS SHALL BE 2" BELOW UNDERSIDE OF LID

①	CARSON 1017 BOX WITH BOLT DOWN LID
②	FINISH GRADE/TOP OF MULCH
③	BRICK (1 OF 4)
④	3.0–INCH MINIMUM DEPTH OF 3/4–INCH WASHED GRAVEL
⑤	LOW VOLTAGE CONTROL WIRE (TYP.) IN 1–1/2" GREY PVC ELECTRICAL CONDUIT WITH LONG RADII SWEEPS
⑥	3M DBR/Y–6 WATER PROOF CONNECTOR (TYP.)
⑦	SB3 LANDSCAPE FABRIC TO BE DUCT TAPED TO VALVE BOX EXTERIOR.



C **WIRE SPLICE**

PE-39 Two Wire Waterproof splice



Point of Connection (POC)

Reuse Water

The following links are to the City of Port St. Lucie standards manual which contains direction on designing irrigation systems which will receive reuse water from the City of Port St. Lucie Utilities department.

The second link is to the reuse details developed by PSL which are to be utilized in designing reuse irrigation projects in the city.

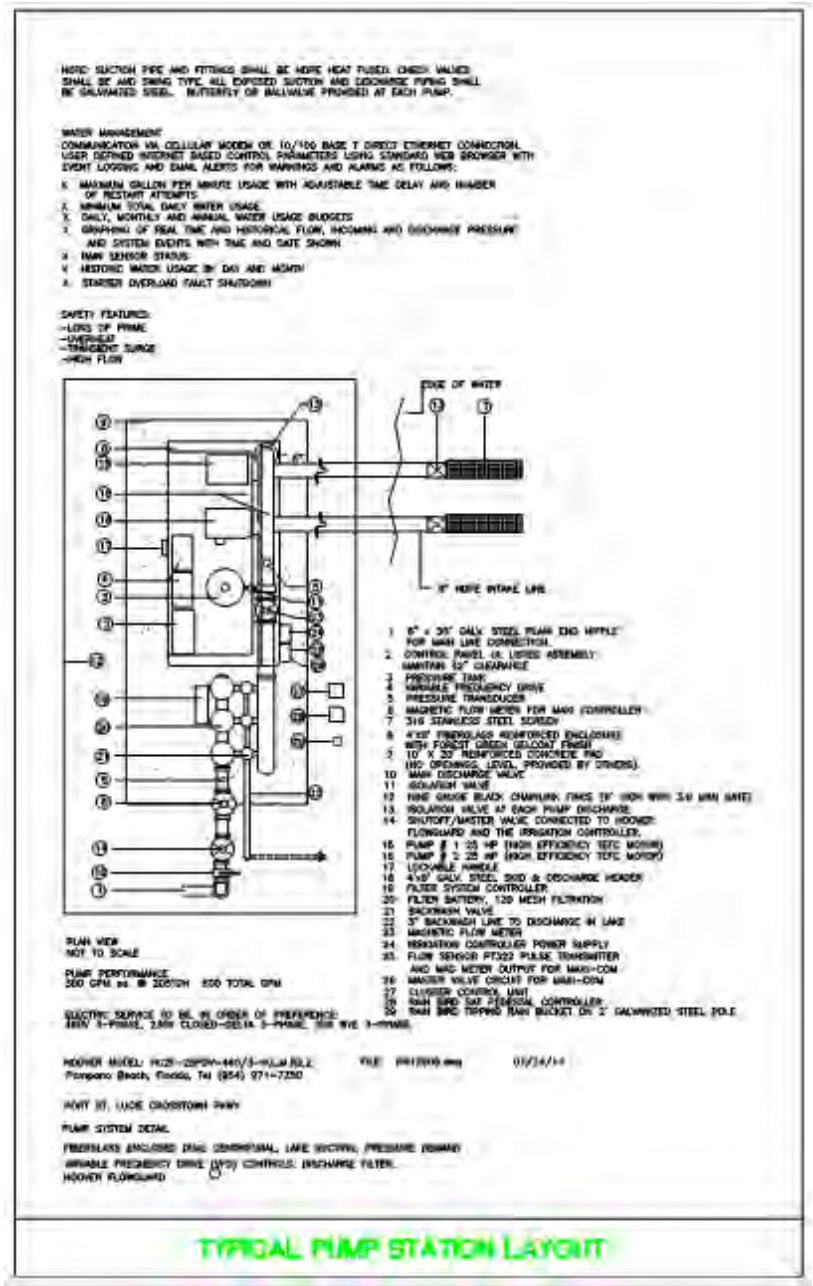
https://utility.cityofpsl.com/media/1143/utility-standards-manual.pdf

https://utility.cityofpsl.com/media/1129/qualified-products-list-qpl.pdf

Pumps – Surface Water

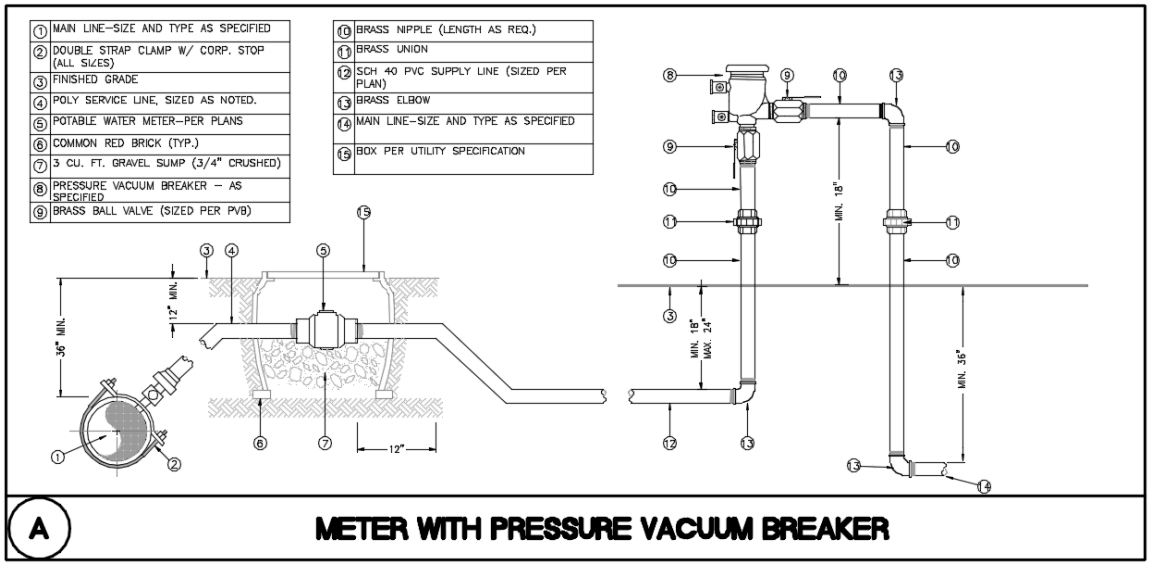
Below is a typical pump station layout which complies with the City of Port St. Lucie requirements outlined in the above irrigation design section. Actual pump station details and specifications would be developed for each design utilizing one of the three approved pump station manufacturers listed above.

Typical Pump Station Layout

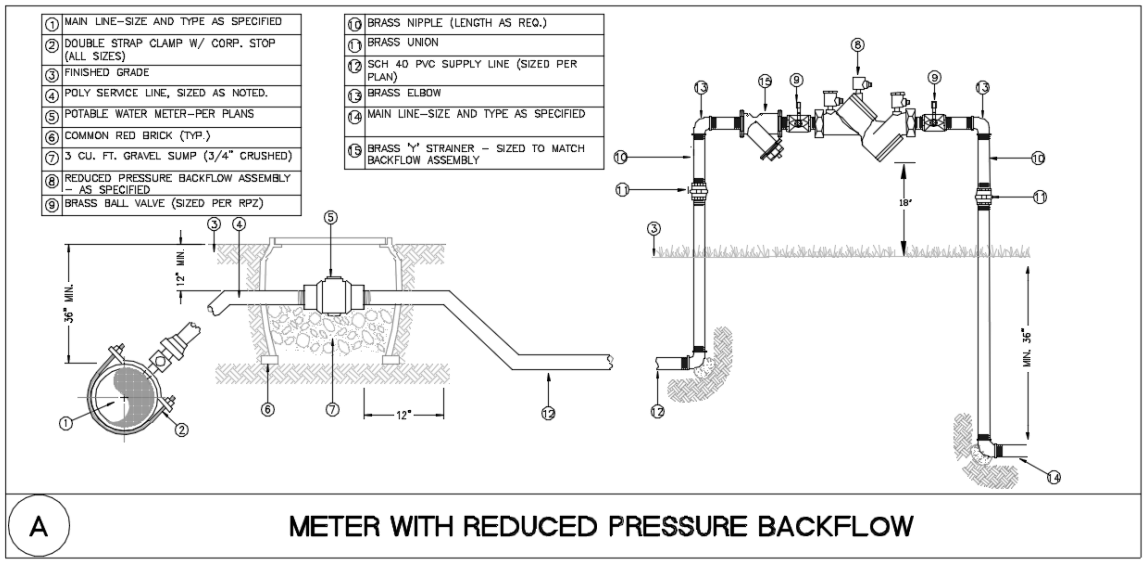


Potable Water

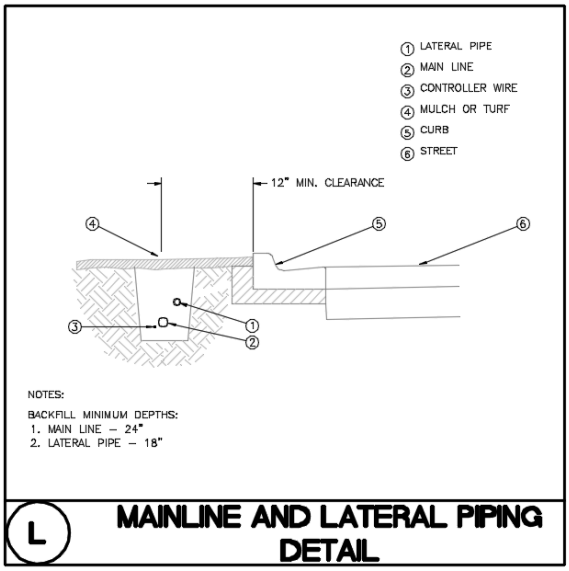
Potable Water meter with Pressure Vacuum Breaker

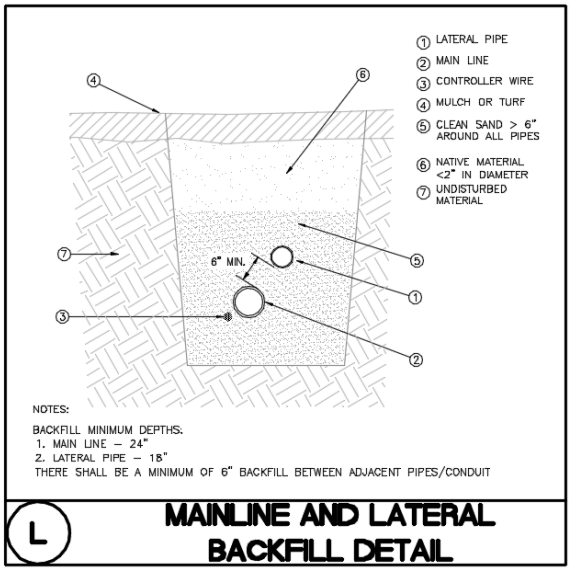


Potable Water meter with Reduce Pressure Backflow

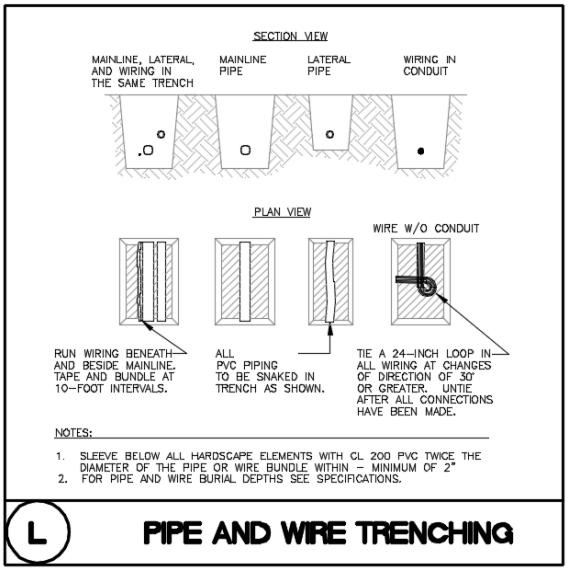


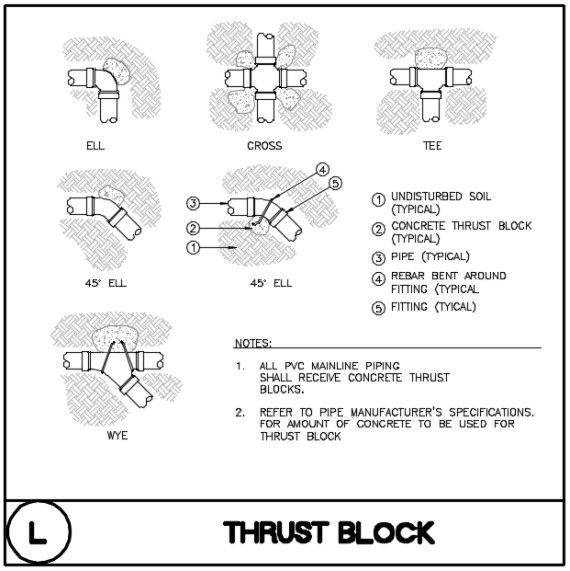
Mainline and Lateral Line Piping



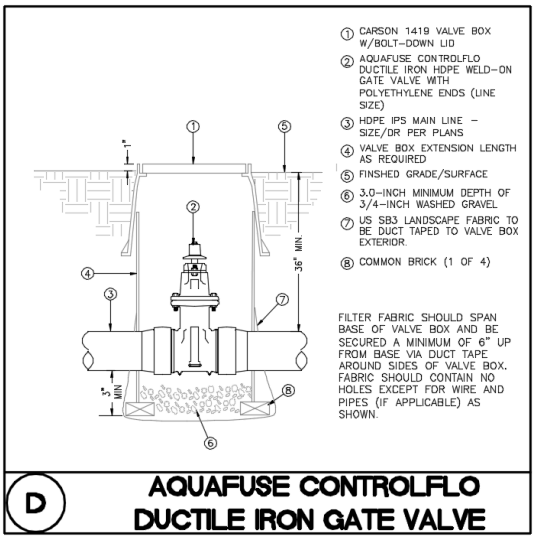


Pipe-wire trenching and thrust blocking

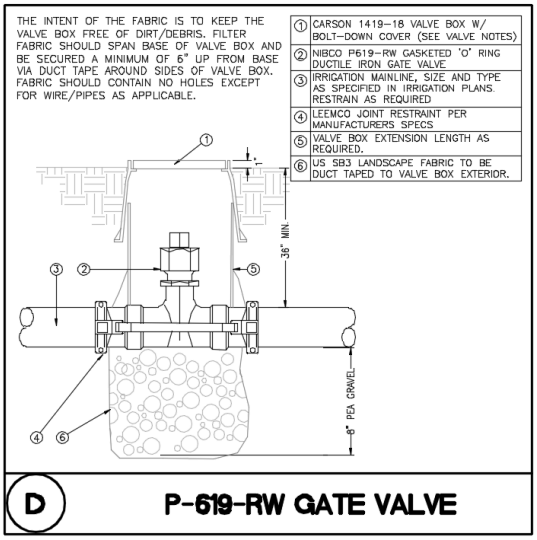




Isolation Valves

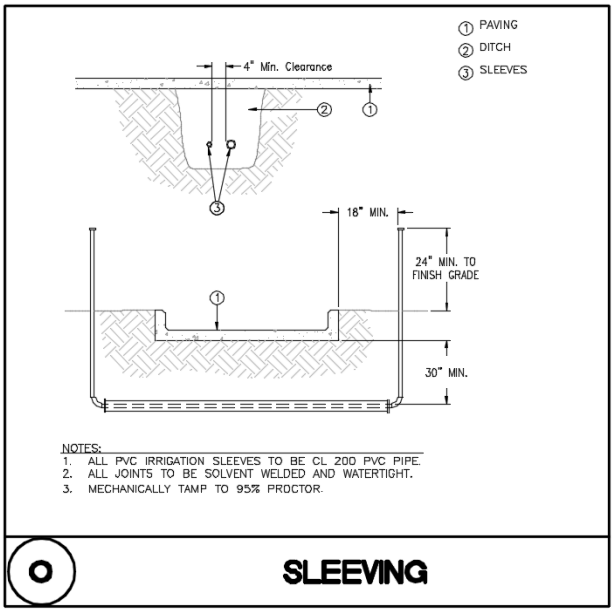


Aquafuse Ductile Iron Gate Valve



Nibco Ductile Iron Gate Valve

Sleeving

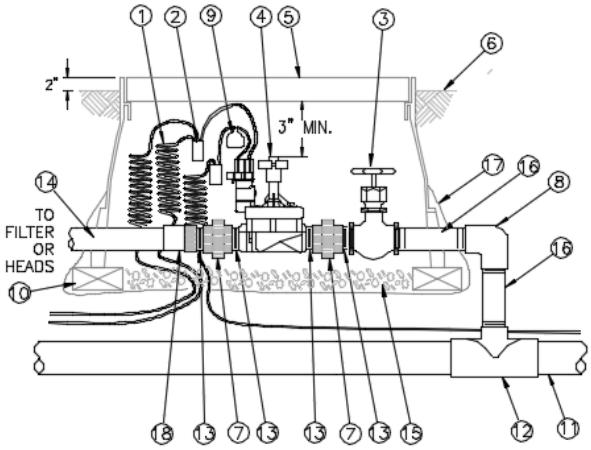


Remote Control Valve

NOTE:
REFER TO PRODUCT LITERATURE FOR ADDITIONAL INSTALLATION AND ADJUSTMENT INFORMATION.

ALL SCH 80 NIPPLES ARE TO BE CONTINUOUS AND THREADED ON BOTH SIDES

THE INTENT OF THE FABRIC IS TO KEEP THE VALVE BOX FREE OF DIRT/DEBRIS. FILTER FABRIC SHOULD SPAN BASE OF VALVE BOX AND BE SECURED A MINIMUM OF 6" UP FROM BASE VIA DUCT TAPE AROUND SIDES OF VALVE BOX. FABRIC SHOULD CONTAIN NO HOLES EXCEPT FOR WIRE/PIPES AS APPLICABLE.

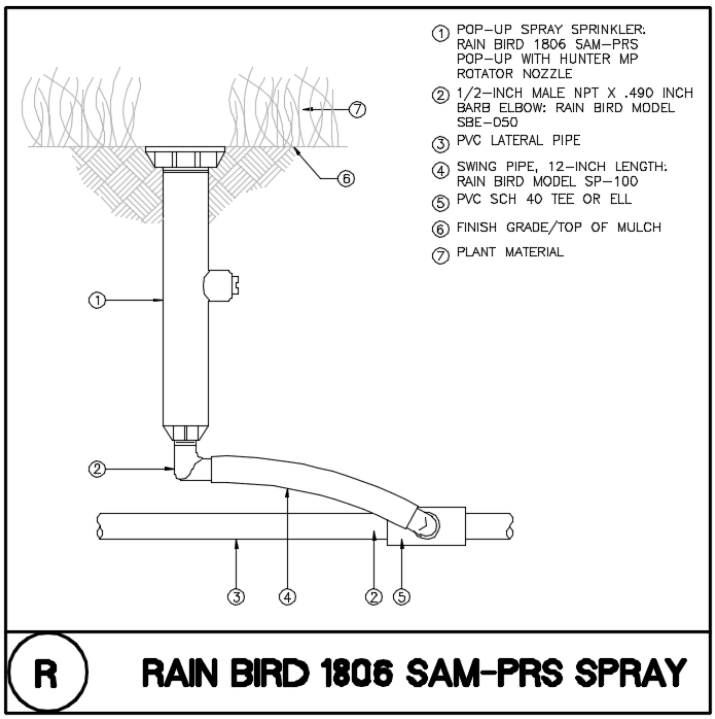


①	30-INCH LINEAR LENGTH OF WIRE, COILED.
②	3M DBR/Y-6 CONNECTORS PER MANUFACTURER SPEC
③	NIBCO T-113 BRONZE GATE VALVE
④	REMOTE CONTROL VALVE: RAINBIRD PEB OR PEB-PRS-D (AS DENOTED IN LEGEND)
⑤	CARSON 1220 JUMBO VALVE BOX W/ BOLT DOWN LID
⑥	FINISH GRADE/TOP OF MULCH
⑦	SCH 80 PVC UNION
⑧	PVC SCH 80 ELL
⑨	CHRISTY I.D. TAG (STATION/CONTROLLER)
⑩	COMMON BRICK (1 OF 4)
⑪	IRRIGATION MAINLINE - SIZE AND TYPE AS SPECIFIED
⑫	SERVICE TEE - SIZE, TYPE AND MAKE PER MAINLINE SPEC.
⑬	PVC SCH 80 CLOSE NIPPLE
⑭	SOLVENT WELDED PVC LATERAL PIPE
⑮	3.0-INCH MINIMUM DEPTH OF 3/4-INCH WASHED GRAVEL
⑯	PVC SCH 80 NIPPLE (SIZE AS REQUIRED)
⑰	SB3 LANDSCAPE FABRIC TO BE DUCT TAPED TO VALVE BOX EXTERIOR.
⑱	PVC SCH 80 THREADED X SLIP FEMALE ADAPTER

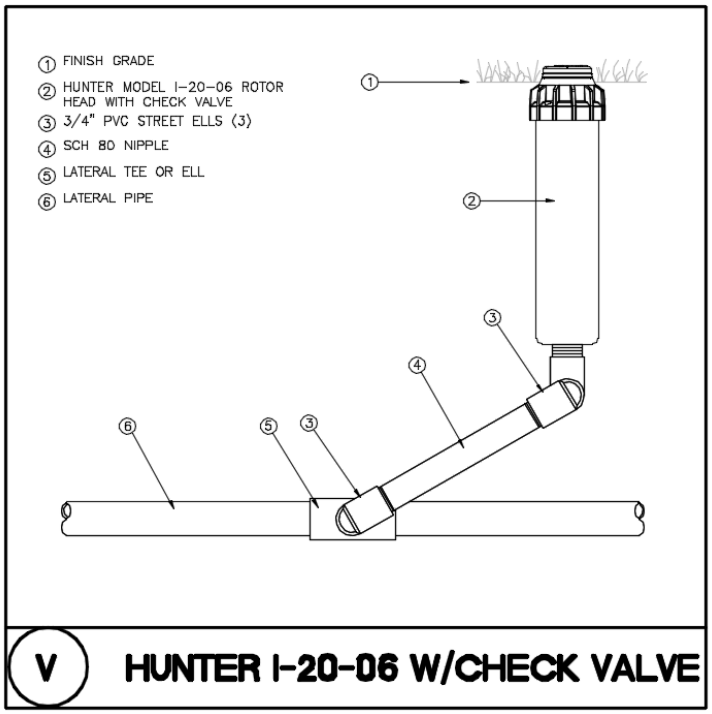
B **RAIN BIRD RCV W/GATE VALVE**

Emission Devices

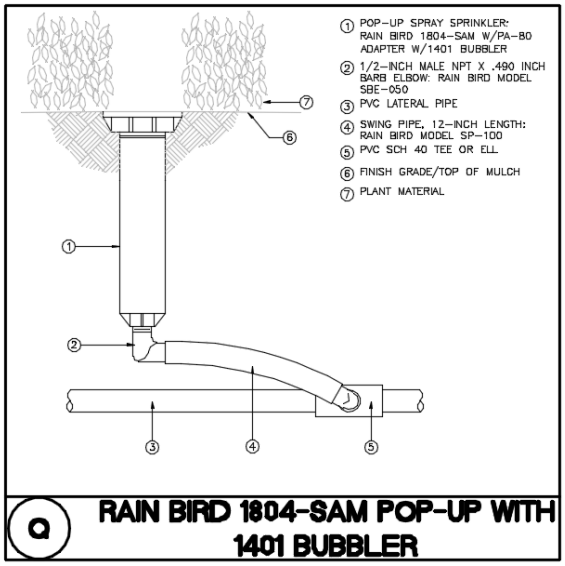
Spray heads

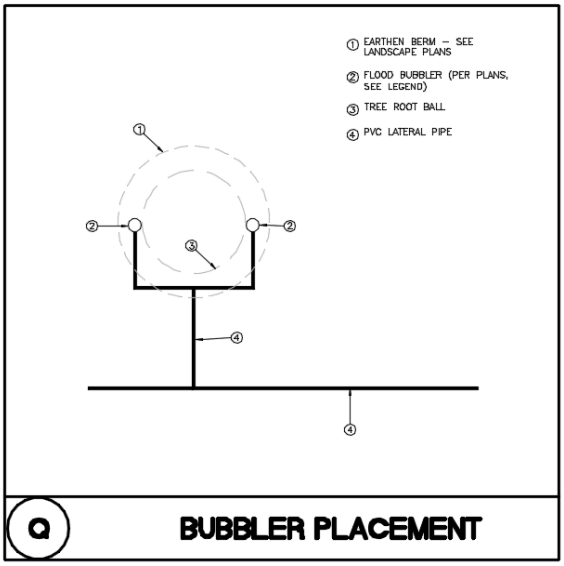


Rotor Heads



***Pop up bubb*ler**





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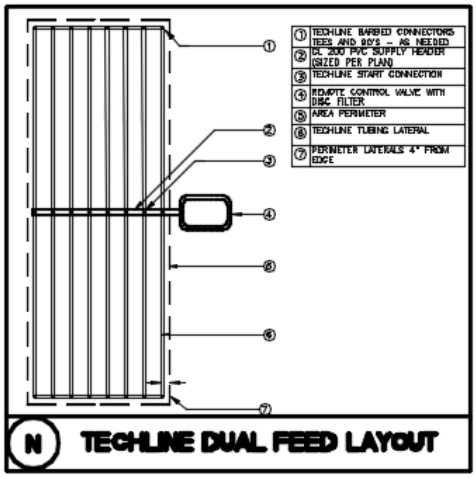

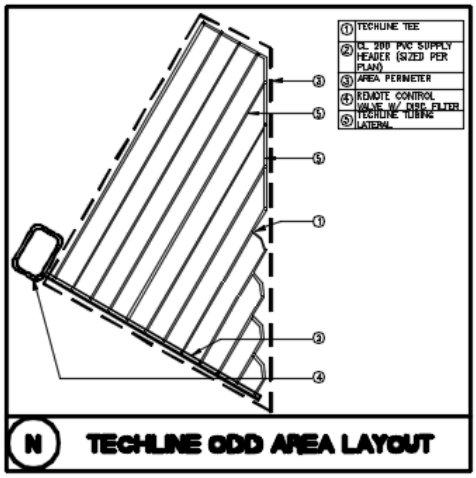

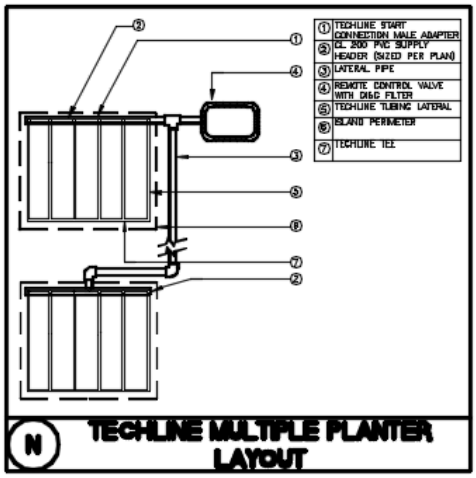

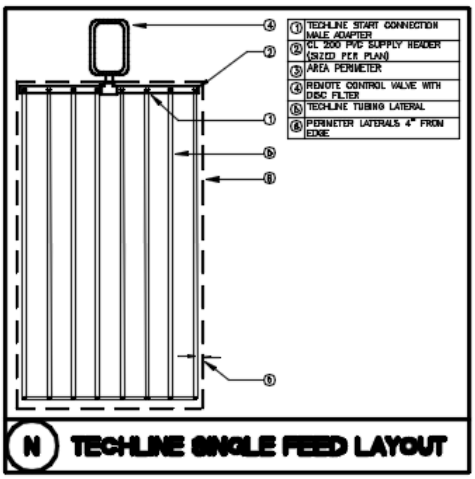

PART TWO

Construction – Standards and requirements

This section outlines what is required once the irrigation design plans have been created, submitted to the City of Port St. Lucie for approval, have received approval and the installation contractor is ready to install the irrigation system.

Pre-Construction Submittals

- Installing contractor shall submit to the City of PSL five (5) copies of manufacturer cut sheets for all components to be installed. This submittal process is intended to verify compliance with components in the approved plans.
    - Proof the installing contractor meets the Maxicom training and experience requirements.
    - All irrigation installations must completely and fully comply with the approved irrigation plans. Compliance is at the sole and complete discretion of the City of Port St. Lucie.

Pre-Construction meeting

Before any work can begin on the project, a pre-construction meeting must be conducted. The process for conducting this meeting and the contents of it, are as follows"

- Installing contractor shall contact the City of Port St. Lucie and request a pre-construction meeting. Contractor to allow one week from request to actual date of meeting.
- The following parties are required to attend the pre-construction meeting:
    1. Installing licensed irrigation contractor
    2. General contractor
    3. Installing landscape contractor
    4. Representative of the City of Port St. Lucie
- The pre- construction meeting shall be conducted on site and by the City of Port St. Lucie representative.
- The contents of the meeting shall include:
    1. A sign in sheet for all participants to sign in on.
    2. Introductions of all parties.
    3. Confirmation the 'approved' irrigation plans are the plans all parties are working from. Confirming most current dates on plans.
    4. PSL representative will go over the approved irrigation plans and give a general review of the requirements of the plans and highlight key items. A comprehensive review is not intended as it is the installing contractors responsibility (and ultimately the general contractor, if different) to know and comply with all requirements of the approved irrigation plans.

5. A review the irrigation inspection protocol required by the City of Port St. Lucie, covering the time from the pre-construction meeting to the final punch list inspection and eventual approval of the installed irrigation system by the City of Port St. Lucie.
6. The general contractor will offer any comments and/or concerns they have.
7. The irrigation contractor will offer any comments and/or concerns they have.
8. The landscape contractor will offer any comments and/or concerns they have.
9. All issues raised shall be resolved and/or a resolution pathway assigned to the pertinent parties with dates the issues are to be resolved by.

Progress Inspections

Each project will have a minimum of three progress inspections; more can be required as directed by the PSL inspector. Each progress inspection shall be conducted by a City of Port St. Lucie representative. They must be scheduled a minimum of one week in advance and shall be coordinated by the installing contractor. Each progress inspection shall include a representative from the companies:

1. Irrigation contractor
2. General contractor
3. Landscape contractor
4. PSL representative

Progress inspections shall be 'open trench' inspections to allow the inspector to see the following:

1. All mainline and lateral line piping to include
    a. Pipe material and fittings
    b. Bedding sand
    c. Depth of coverage
    d. Restraints, if required
2. Sleeving is correct for material, size, depth and assembly.
3. All remote control valves for proper material and assembly.
4. All remote control and sensor wiring for proper material and assembly.
5. Controller, CCU, Sensors and grounding.
6. Proper emission device materials, installation, operation and coverage.
7. Proper POC components are installed.

Final Inspection

The final inspection is to be requested at substantial completion but only after all previous issues noted on each progress inspection report, has been correctly addressed. The installing contractor shall request a final inspection by contacting the City of Port St. Lucie. Allow one week for the scheduling of the final inspection.

- This inspection will be a comprehensive inspection requiring every zone to be operated from the controller(s) and checking for proper operation and coverage.

- All sensors shall be tested to verify proper operation.
- The contact of the site from a remote location shall be verified.
- All POC's are operating correctly.
- All 'project completion' submittals are to be turned in. These include, at a minimum, the following:
    1. GPS as-builts
    2. Color coded controller charts
    3. Grounding certification by licensed electrician
    4. Backflow certification – if applicable
    5. Flow meter calibration certification
    6. USDA soil test results
    7. Warranty letter to include name, address, phone number of installing contracting company along with verbiage warranting the installed system for a period of one year from date of final acceptance
- A 'punch list' of issues observed by the City of Port St. Lucie, during the final inspection, which are deemed to not comply with the requirements of the approved irrigation plans will be created. The contractor shall satisfactorily address all punch list items within thirty days. Once all items are completed and verified by the installing contractor, the installing contractor shall request a 'punch list' inspection by contacting the City of Port St. Lucie. Contractor to allow one week for the scheduling of the punch list inspection.

Punch List Inspection

A punch list inspection is limited to verifying all noted 'punch list' items developed at the final inspection have been satisfactorily addressed.

Reports

A written report shall be generated by the City of Port St. Lucie inspector after each progress, final and punch list inspection. These reports shall be submitted to the installing contractor within two business days of an inspection. The reports shall include:

1. Date, times of inspection.
2. Map showing the areas of the project inspected.
3. Names of all attendees.
4. Itemized list of components inspected noting whether they are in compliance with the approved plans or not. Notes to include what page of the plans the noted issue(s) are related to.
5. A comprehensive list of issues noted shall conclude the report. These items must be addressed prior the next scheduled inspection.

Turn over protocol to PSL Maintenance and Management

Once the installation of the entire system has been accepted by the City of Port St. Lucie, the installing contractor shall submit a form, on their company letterhead title PROJECT COMPLETION AND TURNOVER NOTIFICATION stating the following:

- The project name, location, plans date, and contractor name.

- Date final acceptance was received and name of PSL inspector.
- Landscape maintenance contractor/installation contractor name and contact information for warranty issues.
- Irrigation maintenance/installation contractor name and contact information for warranty issues.
- A note stating the irrigation system has been installed in compliance with the approved irrigation plans and all applicable local, state and federal laws.
- Sign and date and submit, with the warranty and other end of project submittals, to the City of Port St. Lucie.

PART THREE

Maintenance – Standards and requirements

Once the City of Port St. Lucie receives the signed PROJECT COMPLETION AND TURNOVER NOTIFICATION form from the irrigation system installation company, the irrigation maintenance will be handed over to the City of Port St. Lucie, unless the installation contractor has a contractual obligation to continue maintenance for the duration of their warranty period.

Regardless of who is maintaining the irrigation system, the following concepts and requirements are to be strictly adhered to:

- All maintenance shall follow the original irrigation system design intent, without exception. This includes, but is not limited to"
    1. Materials – when items are replaced, for whatever reason, they shall be replaced with the same materials as in the original design
    2. If the irrigation system is modified or added onto, the materials, concepts and practices of the original design must be strictly adhered to.
- Irrigation maintenance is a dynamic process as the irrigation system must be modified as the landscape changes due to plant growth, landscape changes, use changes, law changes, etc.. All such modifications must comply with the original design intent. These requirements should be addressed in all maintenance contracts between the City of Port St. Lucie and the maintaining entity.
- Any time the materials, concepts, or flows for an irrigation zone (or entire system) are modified, due to changes 'approved' by PSL, the PSL water manager must be contacted and informed of any/all such changes.
- Irrigation systems shall maintain a minimum of a 95% uptime operational capability as determined on a 'percentage of zones operational each month vs total zone count.
- All Maxicom controllers must remain 'in Maxicom' at all times, no exceptions

- All Maxicom controllers must have 'native' irrigation schedules programmed into them which will ensure sufficient irrigation occurs during times when the controller loses communication with the CCU or Monitoring computer
- Whenever an irrigation maintenance company wishes to turn on an irrigation zone, they must contact the City of Port St. Lucie's water management personnel. It is highly recommended such coordination occur one hour before it is required as water management personnel have one hour to respond to any request for service. This is a very convenient and effective operational practice if properly managed and coordinated.
- Daily Maintenance Requirements
    1. Wet check requisite zones as required by monthly wet check requirement 'all zones must be wet checked monthly'
    2. Repair all issues found during the wet check or arrange for future repair, as required, by PSL contract.
- Annual Maintenance Requirements

1. Insure all backflows are tested and certified
2. Verify all grounding grids test to 10 ohms or less

PART FOUR

Water Management – Standards, Protocols and requirements

The City of Port St. Lucie employs a professional water management firm to control all Public Works irrigation systems. Regardless of whether city staff our an outside professional water management firm is responsible for managing the irrigation system, the following protocols and concepts should be utilized.

- Whenever the City receives notification a new site is being turned over to the City (via a PROJECT COMPLETION AND TURNOVER NOTIFICATION form), the City shall notify the water management consultant they have 30 days to set up the site and begin daily monitoring.

Below is an outline of the daily, weekly, monthly and annual water management services.

1. Irrigation Water Management must be performed using the Rain Bird Maxicom central control system in conjunction with the 'smart' soil moisture sensing locations within the city (data loggers, soil moisture sensors, cell modems, etc.), the City's Rain Bird weather station and array of Rain Bird rain cans. These inputs must be utilized to develop all irrigation scheduling throughout the city.
2. Water management services are performed daily which includes:
    a. Reviewing all site status reports
    b. Investigating variations and differences in daily reports in order to uncover more latent issues
    c. Communicate with PSL and Others, as PSL assigns on a daily basis to address in and all issues

3. Use issue tracking work station (ITW)

a. Tickets created when issues are discovered by whoever discovers and issue with any component of the irrigation system.
b. Tickets updated when there is a change to status or more information is discovered.
c. Tickets closed when the issue is resolved

4. ASABE/ANSI 623 water budgets set for all zones and evaluated annually for compliance. This annual evaluation and a summary report shall be delivered to the City of Port St. Lucie by January 31st, each year (for the previous year).
5. All controllers should be programmed with a 'stand alone' irrigation schedule as follows:
    a. Utilize Irrigation Association BMP's to create turf, shrubs, trees, sprays, drip, rotors, rotaries, etc. schedules utilizing site specific parameters.
    b. These programs must be verified annually by conducting a site visit and checking the controller once per year.
6. Water Management agreement – A comprehensive central control operating agreement (Water management agreement) must be completed and agreed to by PSL and their water management consultant. This agreement outlines the goals, requirements and tasks both the City of Port St. Lucie and their water management consultant.
7. Monthly coordination meeting with field irrigation service personnel and Water Management Consultant at PSL offices.
8. Quarterly coordination meetings, on site, must be attended by all groups who are tasked with performing repairs on irrigation hardware in the field.
9. Monthly report on site by site issues shall be delivered to PSL by the Water Management Consultant by the 10th of each month.
10. Monthly report on repairs completed by Water Management Consultant and sent via email to the city and all irrigation maintenance contractors involved in the repairs. Shall be delivered by the 10th of each month.
11. All central control components to be serviced and repaired by the Water Management Consultant are noted in the list below (a-n). All components not listed are to be serviced and maintained by the irrigation maintenance contractor.
    a. CCU
    b. SAT controllers
    c. SITE SAT controllers
    d. Master Valves
    e. Flow sensors
    f. Rain Cans
    g. Weather Station
    h. Cell modems
    i. Soil moisture sensors
    j. Data loggers at smart sites
    k. Pulse decoders
    l. Sensor decoders
    m. Pulse Transmitters
    n. Associated wiring with the above components
12. Monthly Management requirements

a. Weather Station to be maintained according to manufacturer as outlined below:

Tasks
Call WM- Determine if everything is reading properly
Dessicant Bag
Pyranometer
Wind Sensors
Rain Gage
Anemometer
Check Sensors
Check for Damages
Humidity Sensor
Clean Entire Weather Station
Call WM again and determine if everything is working properly

MONTHLY

Tasks
Replace Anemometer Sensor
Calibrate Rain Gage
Calibrate HMP45C/HMP 35C probe
Check Calibration of CS500 RH Probe
Check Internal RH Chip

ANNUALLY

Tasks
Calibrate solar radiation sensors
Calibrate temperature sensor
Replace wind vane potentiometer and bearing
Replace sensor cables as required

EVERY TWO YEARS

b. Rain cans to be visually checked each month and cleaned as required to ensure proper operation.

13. Annual Management Requirements
    a. Smart Soil moisture inspection and compliance report to SFWMD for variance compliance
14. Provide and host issue tracking workstation software and server setup
15. All CUP irrigation meter testing, as required the appropriate water management district, shall be conducted by the water management consultant along with reports being submitted to district, as required.
16. All materials required to maintain the control system fully operational is the responsibility of the City of Port St. Lucie.