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**CITY OF PORT ST LUCIE**



# ***ENGINEERING STANDARDS FOR LAND DEVELOPMENT***

***COMMERCIAL, RESIDENTIAL SUBDIVISIONS AND  
CAPITAL IMPROVEMENT PROJECTS***

## **List of Revisions**

1<sup>st</sup> Edition – December 2020

2nd Edition – October 2025

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## **2025 Engineering Standards for Land Development – Revision Log**

**Varies** – Updates for latest Fusion processes, emails, typos, website addresses and procedures already in place.

### **Section 1.1 Purpose**

- Added “or his designee” for the City Manager providing written decision

### **Section 1.3 Reference Manuals –**

- Adds reference to Corridor Access Management – Intersection Proven Safety Countermeasure (FHWA)
- Adds reference to Erosion and Sediment Control Manual (FDOT and FDEP)
- Adds reference to Florida Bridge Scour Manual (FDOT)
- Removes reference to Florida Intersection Design Guide (FDOT)
- Removes reference to Florida Roundabout Guide (FDOT)
- Removes reference to Plans Preparation Manual (FDOT)
- Adds reference to Traditional Neighborhood Communities Handbook (FDOT)

### **Section 2.2 Drainage Right of Way (DROW) – Protection and Use –**

- Adds “No one may use, construct, excavate or alter the DROW or install any structure or equipment to enable the discharge of water, water withdrawal or other water use by anyone without receiving a right-of-way permit from the City.”
- Adds underground crossings of canals shall provide a minimum of ten (10) feet vertical clearance for all major canal crossings and five (5) feet for minor canal crossings. Vertical clearance shall be measured from top of pipe to the canals design bottom elevation at the crossing.
- When access to a private property crosses a DROW, the maintenance responsibility of the drainage pipe and driveway shall be the responsibility of the private property owner and shall include, but not be limited to:
  - a. Maintenance and replacement as necessary of the drainage pipe beneath any driveway crossing a swale or DROW in a manner such as not to impede or interfere with the stormwater drainage function of the swale or DROW. Provided, however, that the cost of culvert replacement as a result of a drainage improvement or driveway modification initiated by the City shall be the City’s expense.
  - b. Properly mowing the grass area to maintain a neat appearance, including the removal of grass, weeds, bushes, sand, silt, and debris at both ends of, or within, any driveway culvert pipe to effectively maintain flow through the

culvert.

### **Section 2.3 Drainage Right-of-Way – Abandonment –**

- Adds the statement “The City reserves the right to require additional requirements in a given application or may reject the request at its discretion.”

### **Section 3.4 Protection and Use of City-owned Rights-of-Way**

- Clarified Section name to specify for City-owned Rights-of-Way

#### **Section 3.4.1 Road Right-of-Way – Protection and Use of City-owned Rights-of-Way - General –**

- Clarifies all sign placements shall meet MUTCD and FDOT Standards.

#### **Section 3.4.2 Road Right-of-Way – Protection and Use of City-owned Rights-of-Way – Memorial Markers –**

- Clarifies that any items placed around a City-approved memorial marker that is deemed a distraction to motorists will be removed.

#### **Section 3.4.5 Road Right-of-Way – Protection and Use of City-owned Rights-of-Way - Utilities –**

- Clarifies private underground utilities shall be required to be located within a dedicated utility easement if provided.
- Clarifies the backfill in a bore pit shall be compacted to restore the right-of-way to its original condition or better at the expense of the right-of-way permittee.
- Clarifies missile bores shall not be permitted within the City right-of-way.

### **Section 3.5 Road Right-of-Way - Abandonment –**

- Clarifies that payment is required with the submittal of an Abandonment of Right-of-Way Application.

### **Section 4 Easements on GDC Lots**

- Clarified Section name to specify for GDC Lots

#### **Section 4.1 Easements on GDC Lots - General –**

- Adds “The City reserves the right to use and/or cross land owned by others for stormwater/drainage facilities, water, sewer and reclaim facilities, access for maintenance, or other such purposes in the form of City-owned easements.”

#### **Section 4.2 Easements on GDC Lots – Vacating Internal Easements**

- Clarifies vacating internal easements on GDC lots, where more than one lot or parts of one or more lots is intended as a building site, the outside boundaries of the building site shall carry the side easements. Abandonment of internal easements is not required when replating. This does not apply to a unity of title. All easements remain if parcel is combined through a unity of title. If a single parcel is divided into two or more parcels, then the original internal easements are returned to the original condition prior to the joining of lots.

#### **Section 4.3 Easements on GDC Lots – Use of Easements –**

- Clarifies reference in 20 foot easements for movable accessory buildings, signage, etc. to City Code Section 55.30.
- Clarifies detention area within 6 & 10 foot easement is prohibited because the setback requirements will not be met. 20 foot easements allow 10 foot encroachment into easement for commercial properties only.
- Clarifies Landscaping and Irrigation is allowed in 20 foot easements by the Revocable Encroachment permit per City Code Section 55.30.
- Clarifies Masonry/Stone Wall is per City Code Section 158.216 and permitted through the Building Department.
- Clarifies Metal/Wood/Plastic Fence is per City Code section 158.216 and not allowed within an easement that contains existing drainage culverts or infrastructure.

#### **Section 5.2 Stormwater Management – System Information Sources –**

- Updates sources for system information to add the City’s Stormwater Master Plan, and the City’s Culvert Master Plan.

#### **Section 5.4 Stormwater Management – Permitting**

- Clarifies reference for preliminary stormwater reports with conceptual designs as needed to provide requirements as stated in City Code Section 158.189 for MPUD and/or DRI requirements.

#### **Section 5.5 Stormwater Management – System Requirements –**

- Clarifies all roof drains, yard drains and the like shall be shown on the construction plans as connecting to the stormwater system.

#### **Section 5.6 Stormwater Management – Flood Protection –**

- Clarifies the perimeter elevations of the site shall meet or exceed the 25 year, 3 day design storm stage.

- Clarifies the minimum berm width at the required perimeter berm elevation shall be 5 feet and side slopes shall not exceed a 3:1 ratio.

#### **Section 5.7 Stormwater Management – Water Quality Treatment Volume -**

- Revises the TMDL and BMAP goals are in accordance with FDEP requirements.
- Clarifies the St. Lucie River Basin/Estuary includes but is not limited to the North Fork, the SFWMD C-23 canal and the SFWMD C-24 canal.
- Clarifies contributions of stormwater can be directly or indirectly to the North Fork of the St. Lucie River to require designs in accordance with SFWMD.

#### **Section 5.9 Stormwater Management – Commercial or Industrial Phased Developments –**

- Clarifies the criteria for commercial and industrial phased development shall provide at a minimum the more stringent of City's criteria or those approved by the state regulatory agencies.

#### **Section 5.11.1 Stormwater Management -Design Requirements – Design Storm**

- Clarifies that a design storm requirement indicated by an existing permit would be controlling.

#### **Section 5.11.2 Stormwater Management – Design Requirements – Exfiltration Trench -**

- Specifies maintenance shall occur at the owner's expense and according to the manufacturer's recommendation for exfiltration trenches.

#### **Section 6.5 Drainage – Manholes and Inlets –**

- Clarifies the FDOT Drainage Design guide as a reference for manholes and inlets.

#### **Section 6.6 Drainage – Roadway Underdrains –**

- Added well drained sand to the allowed filtering media.

#### **Section 6.7 Drainage – Drainage Pipes –**

- Adds the exception of lake basin balancing interconnects for requiring the minimum pipe slope.
- Clarifies the minimum slope of the drainage pipes must produce a positive flow and minimum velocity of 2 feet per second at full flow.
- Clarifies hydraulic grade calculations shall be one foot below the elevation of the structure gutter for systems only considering major losses.

- Clarifies the minimum pipe size installed within road right-of-way is also for under hardened surfaces.
- Adds a five-foot minimum clearance requirement from drainage structures and pipes to trees.
- Updates to note that use of corrugated profile wall polypropylene pipe material under roadways or within road rights-of-way is allowed as Class II, 100-year design service life.
- Clarifies the use of Polyvinyl chloride pipe conforming to FDOT Standard Specifications Section 948 under roadways or within right-of-way, requires prior approval of the Public Works Department.

#### **Section 6.8 Drainage – Roadway Culverts –**

- Clarifies use of corrugated profile wall polypropylene pipe material under roadways as a roadway culvert is allowed as Class II, 100-year design service life.
- Clarifies corrugated profile wall polyethylene pipe specifications for use within road rights-of-way.

#### **Section 6.10 Drainage – Driveway Culverts –**

- Clarifies use of Reinforced Concrete pipe per FDOT Standards, Section 449 within residential driveways or aluminum pipe.

#### **Section 6.12.1 Drainage – Open Channel Systems - Swales –**

- Updating the minimum allowable swale slope to 0.15% to align with existing requirements.
- Added the allowable for 3:1 maximum side slope on swales only with prior City Engineer approval.

#### **Section 6.12.2 Drainage – Open Channel Systems – Canals –**

- Updating the minimum allowable swale slope to 0.15% to align with existing requirements.

#### **Section 8.3 Roadways – Network Requirements –**

- Deletes the statement “The number of intersections shall be kept to a minimum but should meet land use needs and flow requirements”.
- Adds “New roads shall extend to development or parcel boundaries to allow for connection and extension of the road network by either the City or adjacent development.”

- Adds “New development shall connect to existing road connections and stub outs provided from adjacent parcels.”

#### **Section 8.4 Roadways – Subdivision Roadways –**

- Clarifies roadway cross-section requirements based on Section 8.6.

#### **Section 8.5 Roadways - Entry Gates –**

- Clarifies minimum distance from roadway to a gate for both residential development and commercial driveways.

#### **Section 8.6 – Roadways – Roadway Section -**

- Removes the reference to City Code Section for required minimum roadway section.
- Adds average daily trips as a qualifier to the roadway section requirements.
- Provides additional midblock right-of-way widths for various roadway classifications.
- Adds a roadway section multimodal requirements table to clarify travel lane width, sidewalk width, bike lane width and alternative shared-use path and multimodal way requirements.
- Updates the criteria for roadway design standards.

#### **Section 8.7 Roadways - Pavement Design –**

- Clarifies the requirements to meet the minimum structural number for flexible pavement.
- Adds a minimum structural number for Temporary, Non-required parking lots.

#### **Section 8.9 Roadways – Medians -**

- Updates the design speed requiring a median on a 4 lane roadway to 35 mph or greater.
- Updates the paver band within a landscape median to a concrete band and specifies the color and textured pattern.
- Updates the Source location for the Median Spacing Table 8-4.

#### **Section 8.10 Roadways – Intersections -**

- Updates FDOT Design manual references for Intersections.

#### **Section 8.11 Roadways – Modern Roundabouts –**

- Updates FDOT Design manual references for Roundabouts.



## **Section 8.12 Roadways – Driveways -**

- Updates the FDOT design criteria for driveway design.
- Adds street lighting requirement when a driveway is connecting to a collector or arterial roadway.
- Provides an option for light pole to be located and maintained on the private property to illuminate the driveway connection.
- Clarifies the requirement to sleeve the public irrigation main at driveway connections.

### **Section 8.12.1 Roadways – Driveways – Driveway Geometry -**

- Updates FDOT index reference for Driveway Geometry.
- Clarifies transverse concrete joints shall be tooled, not saw cut.
- Clarifies the requirement for sidewalk joints to continue through driveways.
- Clarifies the specifications for residential driveways connecting to City-owned roadways to utilize concrete forms, saw cuts, and roadway asphalt repair.
- Updates FDOT index reference for grades on driveways.
- Updates the Source location for the Driveway Throat Length Table 8-5.

### **Section 8.12.3 Roadways - Driveways – Number of Access Points for Residential Subdivisions**

- Adds reference to City Code Sections for minimum number of access points for residential subdivisions.

### **Section 8.12.7 Roadways – Right Turn Lanes –**

- Adds FDOT manuals for reference in design.
- Adds Figure 8-2 Recommended Guidelines for Exclusive Right-Turn Lanes to Unsignalized Driveway/Intersection

### **Section 8.12.8 Roadways – Left Turn Lanes –**

- Clarifies excluding single family residential lot driveways from criteria.
- Clarifies the NCHRP reference.

## **Section 8.14 Roadways – Roadside Clear Zone –**

- Clarifies utilizing FDOT Greenbook on local roads can be approved on a case by case basis.

### **Section 8.15 Roadways – Sidewalk -**

- Adjust of maximum sidewalk cross slope to two (2) percent.
- Added criteria for the six (6) inch thick sidewalk to be required at crossings for access to utilities or stormwater management facilities.
- Clarifies requirement for a 4' minimum width for curb ramps, curb ramp landings and sidewalk crossings at driveways.
- Clarifies concrete sidewalk transverse joints shall be tooled, not saw cut.
- Clarifies the procedures for installation of sidewalk and detectable warning mat.

### **Section 8.19 Roadways – Mobility Plan –**

- Adds Mobility Plan section with website address.

### **Section 9.1.1 Traffic Control Devices, Signalizations and Lighting –Pavement Markings–**

- Clarifies that all new striping on public roads shall follow all FDOT Specifications for method and material.
- Clarifies preferred method for striping removal is Mill and Overlay per FDOT Specifications and method must be pre-approved by Public Works Department.
- Specifies retro-reflectivity standards shall be in accordance with MUTCD.
- Clarifies marked crosswalk shall be Special Emphasis per FDOT Standards.

### **Section 9.1.2 Traffic Control Devices, Signalizations and Lighting - Signage –**

- Specifies all signs shall be diamond grade in City rights-of-way.
- Specifies sign blanks shall be aluminum and 0.08" thick.
- Specifies soil plates are required for all regulatory signage within City rights-of-way.

### **Section 9.1.2.1 Traffic Control Devices, Signalizations and Lighting – Signage – Driver Feedback Signs -**

- Adds radar speed display signs shall be Traffic Logix EV11EYL or latest version. Model EV 11" Digital solar including strobe, BT, Data modem with 12 month network access to cloud-4 cell backup.

### **Section 9.2.1 Traffic Control Devices, Signalizations and Lighting – Signalizations – Traffic Signals -**

- Clarifies the span wire installation approval would only be for a temporary basis.
- Clarifies specifications for traffic Signal poles.
- Clarifies specifications for controller assembly and cabinet.
- Clarifies signal head specifications.

- Adds four section Flashing Yellow Arrow signal heads for protected/permissive left turn indications.
- Clarifies illumination requirements for Street Name Signs.
- Deletes the 250 watt HPS equivalent specification from Luminaires on mast arm uprights.

### **Section 9.2.3 Traffic Control Devices, Signalizations and Lighting – Signalizations – Pedestrian Signals -**

- Clarifies installation of Accessible Pedestrian Signals with audible indications will be evaluated on a case by case basis.
- Clarifies new and modified pedestrian signals shall countdown during pedestrian change interval.
- Clarifies Signal Heads shall be poly-construction.
- Clarifies installation of Leading Pedestrian Signal shall be evaluated on a case-by-case basis.
- Adds specifications for treatment for pedestrian crosswalks at midblock and unsignalized intersections shall be in accordance with FDOT Traffic Engineering Manual.

### **Section 9.3 Traffic Control Devices, Signalizations and Lighting – Roadway and Pedestrian Lighting -**

- Clarifies specifications for roadway lighting.
- Clarifies specifications for pedestrian lighting.

### **Section 11.1 Bicycle and Pedestrian Facilities - General –**

- Adds criteria for development to provide bicycle and pedestrian access to various public facilities. Connections and Crossings must be evaluated against City's Mobility and Multimodal plans.

### **Section 12.4 Parking Areas - Stacking –**

- Clarifies requirements for Queuing Analysis

### **Section 13.1 Waste and Recycling Facilities - General –**

- Clarifies the requirements for drainage from Waste and Recycling areas must be directed towards the internal drainage system of the site.

### **Section 14.1 Submittals – General –**

- Specifies that CAD generated documents shall have revisions clouded.

#### **Section 14.2 Submittals - Plats –**

- Adds reference to the plat review checklist located in Appendix A.

#### **Section 14.3 Topographic and Boundary Surveys –**

- Removed soil type requirement for surveys.

#### **Section 14.16 Submittals – Shop Drawings –**

- Clarifies shop drawing requirements.

#### **Section 14.18 Submittals – Operation and Maintenance Manuals –**

- Clarifies requirements for operation and maintenance manuals.

#### **Section 15.2 Improvement Guarantees – Performance Guarantees –**

- Adds clarifying language to state that Performance Guarantees are required prior to any work done within a City Right-of-Way.

#### **Section 15.3 Improvement Guarantees – Maintenance Guarantees -**

- Adds clarifying language to state Maintenance Guarantees are required for off-site work done in City Right-of-Ways.

#### **Section 16.1 Project Permitting – Clearing & Mass Grading Permit -**

- Combines Clearing and Mass Grading Permit requirements.
- Clarifies the expiration time of an inactive permit from 6 months to 1 year if no inspection has occurred.

#### **Section 16.2 Project Permitting – Mass Grading Permit –**

- Deletes section and combines mass grading into section 16.1 – Clearing & Mass Grading Permit.

#### **Section 16.3 Project Permitting – Site Work Permit –**

- Clarifies what work is included with the site work permit.
- Clarifies the expiration time of an inactive site permit from 6 months to 1 year if no inspection has occurred.

#### **Section 16.4 Project Permitting- Driveway/Culvert Permit –**

- Clarifies 3<sup>rd</sup> party verification for authenticity of the signature is required for all surveys submitted electronically.

- Clarifies the requirement for 12” minimum diameter temporary pipe within the City Right-of-way and corresponding rejection fee if the pipe is not installed.
- Clarifies the expiration time of an inactive site permit from 6 months to 1 year if no inspection has occurred.

#### **Section 16.5 Project Permitting – Right-of-Way Permit –**

- Clarifies a separate Road/Lane Closure request must be submitted for any roadway or sidewalk closure a minimum of 48 hours prior to the closure. This is in addition to a Right-of-Way permit when applicable.

#### **Section 17.7 Construction Standards – Abatement of Erosion and Water Pollution -**

- Adds clarification of preferred construction entrance location

#### **Section 17.11 Construction Standards – Sidewalks –**

- Revised the maximum cross slope to be two (2) percent.

#### **Section 18.3 Project Inspection – Site Work Inspections –**

- Clarifies Right of Way Irrigation Inspector Inspections

#### **Section 18.4 Project Inspection – Traffic Signals and Lighting Inspections –**

- Clarifies personnel conducting traffic signal and lighting inspections.

#### **Section 19.3 Project Acceptance - Roadway Turnover –**

- Clarifies recommendation for submitting all documents for review/approval prior to submitting the official request for a Roadway Turnover.

#### **Standard Details – Pavement Restoration –**

- Updates the Asphalt design requirements for pavement repairs.
- Adds existing concrete valve pads within work area shall be removed and replaced during time of repair.
- Updates to Roadway Sections to align with Table 8-1 and 8-2

**Appendix A** – Updates to provide website for latest edition of forms and applications, Adds Plat Review Checklist and Survey Review Checklist

# 1. Introduction

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## 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 shall apply to all new development. Limitations imposed by existing conditions may make it infeasible to apply these standards to redevelopment projects; however, in that event, these 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 written decision of the City Manager, or his designee, 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
CDD	Community Development District
CIP	Capital Improvement Program
CO	Certificate of Completion
DR	Dimension Ratio
DRI	Development of Regional Impact

**Table 1-1     Acronyms and Abbreviations**

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
ICE	Intersection Control Evaluation
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	<i>Manual on Uniform Traffic Control Devices for Streets and Highways</i> – 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
- *Corridor Access Management* – Intersection Proven Safety Countermeasure - \_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*
- *Erosion and Sediment Control Manual (FDOT and FDEP)*
- *Flexible Pavement Design Manual – FDOT*
- *Florida Bridge Scour 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 Irrigation Society Irrigation Design Standards*
- *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*
- *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 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 Highway Signs and Markings* – FHWA
- *Traditional Neighborhood Communities Handbook (FDOT)*
- *Traffic Engineering Manual* - FDOT
- *Traffic Signing Handbook* - ITE
- *Transportation and Traffic Engineering Handbook* – ITE
- *Trip Generation Manual* – 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 fees for review, permitting, and/or inspection for commercial and residential subdivision developments are provided in City Code Section 57.01.

## 2. Drainage Right-of-Way

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### 2.1 - Purpose

The City's stormwater management system exists for the benefit of all residents. To this end, the City has designated certain land as drainage right-of-way ("DROW"). DROW 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 DROW are provided in this chapter.

### 2.2 - Protection and Use

- (a) No work within a DROW shall occur without the prior approval of the City Engineer. No one may use, construct, excavate or alter the DROW or install any structure or equipment to enable the discharge of water, water withdrawal or other water use without receiving a right-of-way permit from the City.
- (b) 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, Rights-of-Way. that details the requirements, exemptions and emergency situations. Prior to any excavation within a right-of-way, a utility locate shall be completed.
- (c) Aerial utility lines shall have a minimum clearance of forty (40) feet from the utility line to the top of a canal bank or perimeter berm, whichever is higher. Aerial utility lines shall not be located above drainage structures.
- (d) Underground crossings of canals shall provide a minimum of ten (10) feet vertical clearance for all major canal crossings and five (5) feet for minor canal crossings. Vertical clearance shall be measured from top of pipe to the canals design bottom elevation at the crossing.
- (e) When access to a private property crosses a DROW, the maintenance responsibility of the drainage culvert and driveway shall be the responsibility of the private property owner and shall include, but not be limited to:
  - a. Maintenance and replacement as necessary of the drainage pipe beneath any driveway crossing a swale or DROW in a manner such as not to impede or interfere with the stormwater drainage function of the swale or DROW. Provided, however, that the cost of culvert replacement as a result of a drainage improvement or driveway modification initiated by the City shall be the City's expense.
  - b. Properly mowing the grassed area to maintain a neat appearance, including the removal of grass, weeds, bushes, sand, silt and debris at both ends of, or within, any driveway culvert pipe to effectively maintain flow through the culvert.

### 2.3 - Abandonment

- (a) Abandonment of a DROW is rare and shall only be used for special circumstances. Requests to abandon DROW shall be submitted to the City Engineer and shall include, at a minimum, all of the following items:
  - (1) Completed Abandonment of Right-of-Way Application (Appendix A).
  - (2) Payment of review fee, as provided in City Code Section 57.01.

- (3) Letter of request which clearly demonstrates, to the reasonable satisfaction of the City, 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) Letters of no objection from utility companies (phone, electric, cable, gas, etc.).
- (b) The City Engineer will review the application, and if satisfied of its sufficiency, shall obtain the City Utility Systems Department recommendation, obtain a draft ordinance of abandonment from the City Attorney's Office, 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.
- (d) The City reserves the right to require additional requirements in a given application or may reject the request at its discretion.

### 3. Road Right-of-Way

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#### 3.1 - General

Road rights-of-way are provided for the benefit of all City residents. Road right-of-way standards are intended to create uniformity in design, engineering, and use practices to promote safety and sustainability. This chapter presents information on the classification, minimum width, protection, use, and abandonment of City-owned and maintained road rights-of-way. Requirements and standards for the design, permitting, and construction are provided in chapters 5 through 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 of City-owned Rights-of-Way

##### 3.4.1 - General

- (a) Prior to any excavation within a road 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, Rights-of-Way. 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. All placement of signage shall meet MUTCD and FDOT Standards.
- (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 or their designee in accordance with City Code Chapter 54, Article VI, Signage, Section 54.62, Memorial Markers. The markers will be made and installed by the City Public Works Department. The markers will remain in place for twelve (12) 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. Any items that are placed around City-approved Memorial Markers that are deemed a distraction to motorists will be removed.
- (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 Private, 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 road 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 of thirty-six (36) inches below grade.
  - (3) Underground utilities, with the exception of City-owned and maintained utilities shall be located, at a minimum, five (5) feet from the edge of pavement unless a dedicated utility easement is otherwise provided. If so, the private underground utility will be required to be

within the utility easement.

- (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 trench 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 (5) feet. The backfill in the bore pit shall be compacted to restore the right-of-way to its original condition or better at the expense of the right-of-way permittee. Jack and bore or directional bore casings shall be a minimum depth of thirty-six (36) inches below the subgrade of any road unless approved otherwise. Missile Bore shall not be permitted within the City right-of-way.
- (12) When considering 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, in the City's sole discretion, be permitted 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), payment of the applicable review fee, and the required supporting documentation.
- (b) The City Engineer will review the application, obtain the Utility Systems Department and Information Technology (IT) recommendation, obtain a draft ordinance of abandonment from the City Attorney's Office, 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 on GDC Lots

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### 4.1 - General

The purpose of this chapter is to provide information on the easements provided on the original or subdivided GDC lots within the City. Easements generally allow specific non-property owners to cross or otherwise use a property for a specified purpose. The property owner's use of an easement is regulated to preserve the intended use of the easement. The City has reserved the right to use and/or cross land owned by others for stormwater/drainage facilities, water, sewer and reclaim facilities, access for maintenance, or other such purposes in the form of City-owned easements. Typical uses of easements also include, but are not limited to sidewalks, access for emergency vehicles, or the preservation of land such as a conservation easement.

### 4.2 - Vacating Internal Easements

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, where more than one lot or parts of one or more lots is intended as a building site, the outside boundaries of the building site shall carry the side easements. Therefore, within the GDC areas, abandonment of the internal easements is not required when lots are combined by replating. This condition does not apply to a unity of title. All easements remain if two or more lots are combined through a unity of title. If a single parcel is divided into two or more parcels, then the original internal easements are returned to the original condition prior to the joining of lots.

### 4.3 - Use of Easements

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

<b>Table 4-1 Use of Easements</b>		
<b>Description</b>	<b>Six (6) - or Ten (10) - Foot Easement</b>	<b>Twenty (20) - Foot Easement</b>
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 – In Section 16.6 and City Code Section. 55.30.
Detention Area	Prohibited because the setback requirement will not be met.	Allowed for commercial properties only, ten (10) foot encroachment into easement allowed.
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 and City Code Section. 55.30.

<b>Table 4-1 Use of Easements</b>		
Description	Six (6) - or Ten (10) - Foot Easement	Twenty (20) - Foot Easement
Masonry/Stone Wall	As allowed by City Code Section 158.216 Masonry/stone walls are permitted through the Building Department.	As allowed by the Revocable Encroachment Permit – Section 16.6 and City Code Section 158.216. Masonry/stone walls are permitted through the Building Department.
Metal/Wood/Plastic Fence	As allowed by City Code Section 158.216. <b>Not Allowed within an easement that contains existing drainage culverts or infrastructure.</b> 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 (20) 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 of abandonment from the City Attorney's Office, 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

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### 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. These combined systems protect, maintain, and enhance the safety and general welfare of the residents and provide a benefit to all properties within the City. This chapter addresses design requirements for all stormwater management systems within the City.

### 5.2 - System Information Sources

The following sources include information regarding the stormwater management system within the City:

- (a) City's Infrastructure Map – This map indicates 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 – This system includes the identifications, locations, sizes, inverts of the control structures located within the City.
- (c) City's Stormwater Master Plan
- (d) City's Culvert Master Plan
- (e) SFWMD - permit database.

### 5.3 - Stormwater Fee

The City's stormwater fee provides funding for the operation, maintenance and construction of the stormwater management system. The annual stormwater fee rate 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

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.

- (a) Preliminary stormwater reports with conceptual designs as needed to provide requirements as stated in City Code Section 158.189 for MPUD and/or DRI requirements.
- (b) Except as 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, such a 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 403.814(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;
  - 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. All roof drains, yard drains and the like shall be shown on construction plans as connecting to the stormwater 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 (100) feet of a public drinking water well (62-555.312(3), F.A.C.).
- (h) Stormwater treatment facilities shall not be located within seventy-five (75) feet of a private drinking water well (62-555.312(3), F.A.C.).
- (i) Stormwater management areas and swales shall be a minimum of fifteen (15) feet from a septic system (64E-6.005(1)(f), FAC).
- (j) Stormwater pipes shall be a minimum of ten (10) feet from septic systems (64E-6.005(1)(e), F.A.C.).

- (k) A dry retention/detention area shall not be located within one-hundred (100) 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 (200) 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 (75) feet from septic stabilization facilities (64E-6.005, 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 (FFE)

- 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 (24) 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 (+3) inches; in no circumstance shall the FFE be less. A deviation greater than plus three (+3) 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 twenty-five-year, three-day design storm stage.
  - b. Berms shall be a minimum of five (5) feet wide at the required perimeter berm elevation, with side slopes not to exceed a three:one (3:1) ratio.
- (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 (12) 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 (75%) of the wet detention volume.
  - (3) Retention (if approved) – Volume shall be equal to fifty percent (50%) of the amount computed for a wet detention system.
  - (4) The following items apply to stormwater management systems that are within and contribute stormwater to the St. Lucie River Basin/Estuary, including but not limited to the North Fork, the SFWMD C-23 canal, and the SFWMD C-24 canal.
    - 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 FDEP 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 (40%) impervious area.

- (4) Systems that contribute stormwater either directly or indirectly to the North Fork of the 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 prior to development.
  - (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, the more stringent of the criteria below or those approved by state regulatory agencies:

- (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* 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 (10) 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 Sections 5.11.1 through 5.11.6.

### 5.11.1 - Design Storm

Unless indicated otherwise by an existing permit, the twenty-five (25)-year, three (3)-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 (between five (5) to ten (10) years). Sediment accumulation and clogging of exfiltration system by particles 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 if the trench system deteriorates or fails.



(d) Exfiltration trenches 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) Maintenance shall occur at the owner's expense and according to the manufacturer's recommendation.

#### 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 imperative that retention systems are 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 it allows percolation and returns the basin to a dry condition within twelve (12) 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 in Sections 5.11.4.1 and 5.11.4.2.

##### 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 site 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 (20) 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 starting at the control elevation. These easements shall be legally reserved to the operating 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 (100) feet minimum for linear areas in excess of two-hundred (200) feet length. Irregular shaped areas may have narrower reaches but shall average at least one-hundred (100) 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 (40%) 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; and
- (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.
- (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 (2 fps).

#### 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 (24) hours.
- (b) Projects shall have the ability to recover the system to the pond bottom or control elevation within twelve (12) 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) 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 (3") 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 (6) 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 it can be easily accessed during the peak stage of the design storm event by pedestrian or service 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) If 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 (30) days of the date of the notice 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

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### 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 foot 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 520-001. Slopes shall not be less than 0.003 feet per foot or 0.3 percent.

### 6.4 - Roadway Spread

The allowable stormwater spread from a rainfall intensity of four (4) 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.

<b>Table 6-1 Roadway Spread</b>	
Road Classification	Allowable Spread
Local	Below the crown of the road
Collector	1/2 travel lane width of outside travel lane
Arterial	Leaves eight (8) feet of outside travel lane clear
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, FDOT Standard Plans Index Series 425-XXX and FDOT Drainage Design Guide. 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.

<b>Table 6-2 Structure Spacing</b>	
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 (100%) of the design flow without exceeding the allowable spread of water onto the travel lanes as provided in Section 6.40. 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 lime rock 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 well drained sand, 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

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

- (a) Design shall be based upon a three (3) year frequency for new work.
- (b) Design for a pipe that is replacing a swale shall be based upon a ten (10) 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 (10) 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, and lake basin balancing interconnects, etc., the minimum physical slope of the pipe must produce positive flow and a

minimum velocity of two feet per second (2 fps) at full flow unless approved otherwise by the City Engineer.

(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 (2,000) 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 major 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, or under hardened surfaces shall be fifteen (15) inch round or equivalent.
- (e) A minimum of five (5) feet clearance shall be provided from City-owned and maintained drainage structures and pipes to trees.
- (f) Pipes installed under roadways or within road rights-of-way shall be reinforced concrete pipe (Class III) with rubber gaskets or corrugated profile wall polypropylene pipe (Class II, 100-year design service life).
- (g) 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.
- (h) 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 generally acceptable:
  - (1) Reinforced concrete pipe conforming to FDOT Standard Specifications Section 430, 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 948-7.2 (Class II, 100-year design service life) within road rights-of-way
  - (5) Polyvinyl chloride pipe conforming to FDOT Standard Specifications Section 948 (but note that use of this material for installation under roadways or within road rights-of-way requires prior approval of the Public Works Department).
- (i) 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 corrugated profile wall polypropylene pipe (Class II, 100-year design service life).
- (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 948-7.2 (Class II, 100-year design service life).
- (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. The design of these facilities shall be completed and documented in a permanent record file. The file shall address all design standards in sufficient detail so that an independent engineer with expertise in bridge hydraulics can fully interpret and understand the 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 cross a roadside swale shall have a driveway culvert. The following shall apply to driveway culverts located within the City road right-of-way:
  - (1) Driveway culverts for commercial driveways shall be reinforced concrete pipe (RCP) conforming to FDOT Standard Specifications Section 430.
  - (2) Driveway culverts for residential driveways shall be corrugated aluminum pipe conforming to FDOT Standard Specifications Section 945, reinforced concrete pipe conforming to FDOT Standard Specifications Section 449 or, with prior 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 mitered end sections or end walls.
  - (3) Shall extend a minimum of four (4) 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 (10) 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 (10)-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 (5) feet.
- (d) Vertical clearance of eighteen (18) 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 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 (600) 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 rights-of-way shall comply with the following standards. Variations in the requirements may be approved by the City Engineer if 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 (10)-year one(1)-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 0.15 percent (0.0015 feet per foot) with positive slope or as approved by the City Engineer.

- (e) Maximum side slope will be 4:1 (horizontal to vertical). 3:1 maximum side slope will only be allowed in isolated areas with prior approval by the City Engineer.
- (f) Shall be sodded.
- (g) The rework of roadway swales within the GDC platted City lots shall include the installation of a plastic swale liner in accordance with the Standard Swale Liner Detail provided 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 depend 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 with jurisdiction. 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 (25)-year storm frequency.
- (b) The minimum allowable grade shall be 0.15 percent (0.0015 feet per foot) or as approved by the City Engineer.
- (c) Except for 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 four:one (4:1) (horizontal to vertical) from the top of bank out to a minimum depth of two (2) feet below the control elevation.
- (g) Side slopes stabilized with sod or plantings extending from two (2) feet below to one (1) foot above the control elevation.
- (h) The minimum canal bottom width shall be five (5) 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 (1) foot of freeboard above the design stage shall be provided in the canal.
- (l) Shall be accessible for maintenance.

## 7. Erosion and Sediment Control

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### 7.1 - General

- (a) Land clearing activities, including the construction of stormwater management systems, shall be designed, constructed, and always maintained 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 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 issuance 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

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### 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 (*e.g.*, 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 FHWA 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 additional development guidelines based on location designation within the City.
  - (1) Suburban Areas:
    - a. Locate driveways upstream of the vehicle queue blocked 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 make 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 motorists 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 (25) to thirty-five (35) feet are more sensitive to pedestrian movements because motorists must 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 to provide access to each of the adjacent properties.
- d. Paved shoulders that are at least four (4) feet wide can provide benefits to bicyclists 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) 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.
- (g) New roads shall extend to development or parcel boundaries, perpendicular to the adjacent right-of-way, to allow for connection and extension of the road network by either the City or adjacent development.
- (h) New development shall connect to existing road connections and stub outs provided from adjacent parcels.

### 8.4 - Subdivision Roadways

In the development of a subdivision, roadway cross-section requirements shall be based on Section 8.6. Roadway layout shall meet the requirements of Chapter 156, Article VI, of the City Code, including, but are not limited to, the allowed length of residential blocks, maximum length of dead-end streets, requirements for temporary turnarounds, 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 (100) feet for residential development. For commercial driveways, the minimum distance shall be no less than one and one-half (1 ½) times the length of the typical vehicle/truck that is expected to access the property during regular business hours. 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 roadways is detailed in Table 8-1 and 8-2, based on existing or projected average daily traffic. The sections are 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 (2) lanes of a four (4)-lane roadway) shall be subject to the approval of the City Engineer.

<b>Table 8-1 Roadway Section Requirements</b>						
Road Type/ Ultimate Number of Lanes	Daily Traffic (ADT)	Design Speed (MPH)	Curb and Gutter <sup>1</sup>	Access Management <sup>2</sup>	Median Width (feet) <sup>3</sup>	Midblock ROW Width (feet) <sup>4,5</sup>
Arterial 6 Lanes	>25,000	30 to 50	required	restricted	22 to 48	160
Arterial or Major Collector 4 Lanes	12,500 to 25,000	30 to 50	required	restricted	22 to 32	135
Arterial or Major Collector 2 to 4 Lane <sup>6</sup>	7,500 to 12,499	30 to 40	required	restricted	22 to 32	130
Minor Collector 4 Lanes	5,000 to 7,499	30 to 40	required	restricted	22 to 30	120
Minor Collector 2 Lane	2,500 to 4,999	25 to 40	required	restricted	22 to 30	100
Subdivision Collector 2 Lane	1,500 to 2,499	25 to 35	required	shared <14 DU	16 to 22	100



<b>Table 8-1 Roadway Section Requirements</b>						
Road Type/ Ultimate Number of Lanes	Daily Traffic (ADT)	Design Speed (MPH)	Curb and Gutter <sup>1</sup>	Access Management <sup>2</sup>	Median Width (feet) <sup>3</sup>	Midblock ROW Width (feet) <sup>4,5</sup>
Major Local 2 Lane	1,000 to 1,499	20 to 30	optional	shared <7 DU	10 to 16 (optional)	80
Local	500 to 999	15 to 25	optional	direct	none	70
Local	<500	15 to 25	optional	direct	none	60
Local	<250	15 to 25	optional	direct	none	50

<sup>1</sup> Curb and gutter required along outside edge of pavement for all new arterial and collector roads and the widening of existing roads to multi-lane roads.

<sup>2</sup> Direct access from an individual residential lot is prohibited for all new arterial and collector roads. Access connections shall be per access management requirements. New subdivision collector and major local roads shall have shared access driveways serving multiple residential parcels with no more than one connection for four lots and no more than two connections total.

<sup>3</sup> Median width includes curb and gutters (two feet each side), except along median dividers less than six (6) feet in width.

<sup>4</sup> Midblock ROW to increase by twenty (20) feet for rural (swale) sections and an additional 10 feet when adjacent to a canal.

<sup>5</sup> Ten (10) foot-wide utility easements are required along both sides of the right-of-way of a collector or arterial road and along one side of local road that are owned and maintained by the City.

<sup>6</sup> The configuration of the intermediate phasing of roadways are to be designed as divided roadways (for example, the construction of the first two (2) lanes of a four (4)-lane roadway), unless otherwise approved by the City Engineer.

<b>Table 8-2 Roadway Section Multimodal Requirements</b>						
Road Type/ Ultimate Number of Lanes	Travel Lane Width (feet) <sup>1</sup>	Sidewalk Width (feet) <sup>2</sup>	Bike Lane Width (feet) <sup>3</sup>	Alternative Shared-Use Path Width (feet) <sup>4</sup>	Alternative Multimodal Way Width (feet) <sup>5</sup>	Buffers, Landscape and Street Lights <sup>6</sup>
Arterial 6 Lanes	11 to 12	8 to 10 Both Sides	7 to 8 Both Sides	10-12	12-14	required
Arterial or Major Collector 4 Lanes	11 to 12	8 to 10 Both Sides	7 to 8 Both Sides	10-12	12-14	required

<b>Table 8-2 Roadway Section Multimodal Requirements</b>						
Road Type/ Ultimate Number of Lanes	Travel Lane Width (feet) <sup>1</sup>	Sidewalk Width (feet) <sup>2</sup>	Bike Lane Width (feet) <sup>3</sup>	Alternative Shared-Use Path Width (feet) <sup>4</sup>	Alternative Multimodal Way Width (feet) <sup>5</sup>	Buffers, Landscape and Street Lights <sup>6</sup>
Minor Collector 4 Lanes	11	8 to 10 Both Sides	6 to 7 Both Sides	8-12	10-12	required
Arterial or Major Collector 2 to 4 Lane <sup>6</sup>	11 to 12	8 to 10 Both Sides	7 to 8 Both Sides	8-12	12-14	required
Minor Collector 2 Lane	11	6 to 8 Both Sides	5 to 6 Both Sides	8	10-12	required
Subdivision Collector 2 Lane	11	6 to 8 Both Sides	4 to 5 Both Sides	8 to 10	10-12	required
Major Local 2 Lane	11	5 to 6 Both Sides	none	8 to 10 One Side	none	required
Local	10	5 to 6 Both Sides	none	8 to 10 One Side	none	required
Local	18 to 20	5 to 6 One Side	none	none	none	required
Local	18 to 20	5 to 6 One Side	none	none	none	required

<sup>1</sup> Travel Lane widths shall reflect roadway design speed. Approval of travel lane widths above or below the minimum shall be based on cross-section design and subject to approval by City Engineer.

<sup>2</sup> Sidewalks shall be placed a minimum of five (5) feet behind the back of curb or edge of pavement. The City engineer may approve sidewalks adjacent to curb or edge of pavement where a buffer cannot be provided due to physical constraints. Sidewalks shall be at least six (6) feet in width when adjacent to back of curb or edge of pavement, or the minimum allowable width per Table 8-2 where sidewalks greater than six (6) feet are required.

<sup>3</sup> Bicycle lanes six (6) feet in width shall include a buffer at least one (1) foot in width. Where bicycle lanes are seven (7) or more feet in width, a buffer at least two (2) feet in width shall be provided. Protected bicycle lanes may require additional width. Protected or separated bicycle lanes are permitted and shall be designed on a case-by-case basis, subject to City Engineer Approval.

<sup>4</sup> Shared-use paths may be provided as alternatives to sidewalks and/or on-street bicycle lanes so long as an equivalent total width of multimodal facilities is being provided. Any proposal for a shared-use path

on one side of a ROW and a sidewalk and on-street bicycle lane on the other side of the ROW is subject to approval by the City Engineer.

<sup>5</sup> Multimodal Ways may be provided in-lieu of sidewalks and/or on-street bicycle lanes so long as an equivalent total width of multimodal facilities is being provided. Any proposal for a shared-use path on one side of a ROW and a sidewalk and on-street bicycle lane on the other side of the ROW is subject to approval by the City Engineer.

<sup>6</sup> Buffers, landscape, including street trees, and street lighting are subject to the requirements of City Code.

- (a) The widening of existing roadway shall be based on existing traffic and projected traffic based on historic growth rates or travel demand model growth rates, along with design traffic analysis, where appropriate, subject to approval by the City Engineer.
- (b) Construction of new streets by the City shall be based on projected average daily traffic volumes (ADT) utilizing the latest ITE Trip Generation Manual rates from adjacent development, travel demand volumes, or corridor studies conducted to validate the need for the new roadways.
- (c) Roadway designs for development shall be based on projected average daily traffic volumes (ADT) utilizing the latest ITE Trip Generation Manual rates or trip generation rates subject to approval by the City Engineer.
  - (1) An internal site related trip generation analysis shall be provided with development order applications where street design approvals are requested or required street.
  - (2) The trip generation shall be calculated per street, cul-de-sac, or drive aisle based on adjacent land uses with access to the street, cul-de-sac, or drive aisle. The trip generation rates shall be provided cumulatively along streets from the furthest most development boundary to the closest access connection with an existing external arterial road access connection.
  - (3) The trip generation analysis is to address internal site related circulation. Thus, there shall be no adjustments for factors such as internal capture, pass-by trips, or mode share. Further, credits shall not be provided for existing or previous development.
  - (4) The development trip generation analysis is not required to address future traffic from adjacent development as part of the internal trip generation analysis.
  - (5) The trip generation for non-residential land uses shall be based on the most intensive land use permitted and the maximum square footage allowed, unless the development agrees to development order conditions that limit the amount and type of development to reflect its intended market. The development order conditions shall include requirements to address site-related improvements by the development should future amendments to the amount and type of development result in an increase in trip generation.
  - (6) If development is relying on existing collector or local roads to provide direct access to the development to such an extent that the roads function as site related access, then the trip generation analysis will need to include existing ADT on those roads.
  - (7) If the City is to consider land use or zoning approvals for development applications intending to utilize an existing arterial or collector road that is either adjacent to the development boundary or traverses the development to such an extent that the arterial or collector will function as site related access to the development, then the City will evaluate needed improvements for the arterial or collector and determine what share of those

improvements is related to providing site access and what share of travel would accommodate community level travel beyond the development.

- (d) Traffic calming or neotraditional street designs may be incorporated into developments with approval of the City Council. Developments shall base design on City approved technical reports and FDOT guides and manuals related to traffic calming and traditional neighborhood development. Applicants may propose innovate street designs, site circulations, and dynamic parking management where travel by people walking, bicycling, and where applicable, transit, are prioritized over motor vehicle travel.
- (e) Roadway Cross Sections are provided in Chapter 20.

## 8.7 - Pavement Design

- (a) The minimum roadway pavement design standards are presented in Table 8-3. 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.

<b>Table 8-3 Flexible Pavement Design Standards</b>				
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) (minimum)	3.0	2.5	1.5	1
Optional Base Group (FDOT Standard Spec. Section 285)	9	6	6	4
Subgrade Thickness (inches) (minimum)	12	12	12	12
Subgrade Compacted or Stabilized	LBR 40	LBR 40	LBR 40	LBR 40

\*To meet required minimum Structural Number – Asphalt, Base and Subgrade thickness may be adjusted.

\*\*For Temporary, Non-required Parking Lots, in which its removal is bonded, the Minimum Structural shall =1.6 (i.e.1" Asphalt +6.5" Rock +Compacted Subgrade = 1.61)

## 8.8 - Geometric Elements of Roadway Design

The geometric design shall provide the simplest geometry and promote interconnectivity and facilitate the movement of all vehicles, 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 and design speed of 35 mph or greater shall require a median.
- (b) Median design shall be in accordance with the FDOT Greenbook.
- (c) Landscaped medians shall have a two-foot concrete band, adjacent to the back of curb, for all public rights-of-way with a width of eighty (80) feet or more. Concrete band shall be brick red in color with Herringbone pattern unless approved in writing by the Public Works Director.
- (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 8-4. 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 (45) mph is used.

<b>Table 8-4 Median Spacing<sup>1</sup></b>	
Median Type	Minimum Spacing (feet)
Full Access	660
Restricted Access	330

<sup>1</sup>Source: Florida Administrative Code, Section 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 (90) degrees. Angles less than seventy-five (75) degrees are not acceptable.
- (d) Provide centerline offsets of three-hundred (300) feet or more with adjacent intersections.
- (e) Provide a minimum radius of thirty (30) feet for a local or collector road and forty (40) feet for an arterial.
- (f) Include appropriate turn lanes per Sections 8.12.7 and 8.12.8 of this document.
- (g) Design criteria and guidance for alternative intersection and intersection control evaluation (ICE) must follow FDOT Design Manual Chapter 212.

## 8.11 - Modern 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 evaluated using the Intersection Control Evaluation (ICE) Manual per FDOT Design Manual Chapter 213. Lane widths, turning radii, super elevation, grades, horizontal clearance, clear zone, border width shall follow the FDOT *Design Manual* and NCHRP Report 672, Roundabouts: An Informational Guide (TRB 2010).

## 8.12 – Driveways

Driveway design shall follow FDOT Standard Plans Index 522-003, and the *Access Management Guidebook*. 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.
- (f) Street lighting is required when a driveway is connecting to a collector or arterial roadway. Pole could be located and maintained on the private property to illuminate the driveway connection.
- (g) All driveways with public right-of-way irrigation crossings shall provide a sleeve for the irrigation main that meets the City of Port St. Lucie Irrigation Standards. See Appendix F.

### 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 (90) degrees with the roadway. In accordance with FDOT Standard Plans Index 330-001 and 522-003, angles ranging from ninety (90)- to sixty (60) -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) Transverse joints shall be tooled, not saw cut.
- (h) Sidewalk joints shall continue through driveways.



- (i) For residential driveways connecting to City-owned roadways, concrete shall be formed ½ inch higher than the existing roadway asphalt pavement. Saw cut the existing edge of asphalt at a minimum of twelve (12) inches into the roadway for the entire width of the driveway. Form boards must be used for the entire width of the driveway when pouring the front face of the driveway and in line with the existing roadway edge of pavement. A minimum twelve (12) inch wide strip of hot mix asphalt shall be used to replace the asphalt removed from forming the driveway.
- (j) Grades shall follow the guidelines of FDOT Standard Plans Index 522-003 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 recommended 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).
- (k) 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.
- (l) 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.
- (m) Recommended minimum throat lengths are provided in Table 8-5. 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 8-5. In these cases, the driveway and site layout shall maximize the available length.

<b>Table 8-5 Driveway Throat Length</b>	
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: FDOT Multimodal Access Management  
Guidebook- Recommended Minimum Driveway  
Length for Major Entrances,

**Figure 8-1 Driveway Throat Length**



### 8.12.2 - Number of Driveways

Driveways shall be limited to the number provided 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. See City Code Sections 156.094, 158.172, 158.187, and 158.222 for the minimum requirements.

### 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 8-6, 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 FDOT Access Management Guidebook 2019 and Multimodal Access Management Guidebook 2023. Where requirements are in conflict, the more restrictive of FDOT Guidebooks will govern.



<b>Table 8-6 Unsignalized Driveway Right Turn Lanes</b>	
<b>Roadway Posted Speed Limit</b>	<b>Number of Right Turns Per Hour</b>
45 mph or less	80-125 <sup>1</sup>
Over 45 mph	35-55 <sup>2</sup>

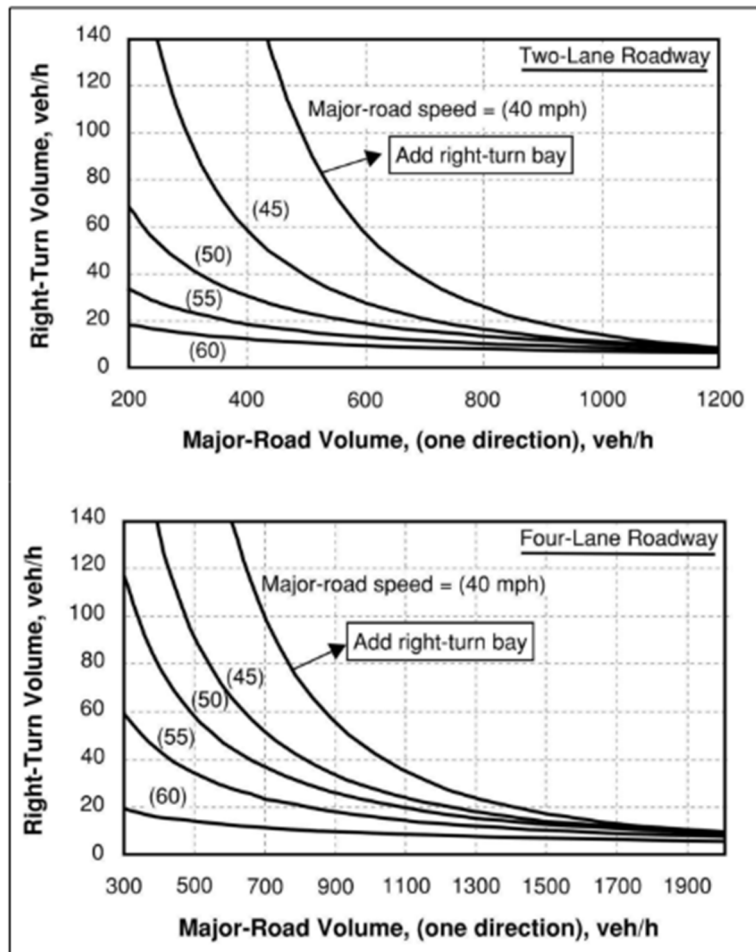
Source: FDOT Access Management Guidebook 2019, Table 27

Note: A posted speed limit of over forty-five (45) mph may be used if the operating speeds are known to be over forty-five (45) mph during the time of peak right turn demand.

Note on Traffic Projections: 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.

<sup>1</sup>The lower threshold of eighty (80) right turn vehicles per hour would be most used for higher volume (greater than six hundred (600) vehicles per hour, per lane in one direction on the major roadway) or two (2)-lane roads where lateral movement is restricted. The one hundred twenty five (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 (50) feet or greater).

<sup>2</sup>The lower threshold of thirty-five (35) right turn vehicles per hour would be most appropriately used on higher volume two lane roadways where lateral movement is restricted. The fifty-five (55) right turn vehicles per hour upper threshold would be most appropriate on lower volume roadways, multilane highways, or driveways with large entry radius (fifty (50) feet or greater).



**Figure 8-2 Recommended Guidelines for Exclusive Right-Turn Lanes to Unsignalized Driveway/Intersection**

Source: FDOT Multimodal Access Management Guidebook

- (a) 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

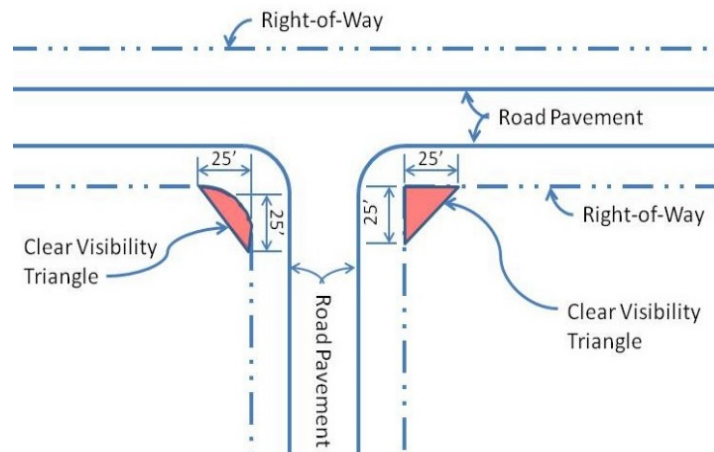
A left turn lane for driveways (except for a single family residential lot) shall be provided:

- (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 on the adjacent roadway is degraded by the proposed traffic.
- (d) When warranted by NCHRP Report 745 *Development of Left Turn Lane Warrants for Unsignalized Intersections* and NCHRP Report 279 *Intersection Channelization Design Guide*.

### 8.13 - Clear Visibility Triangle

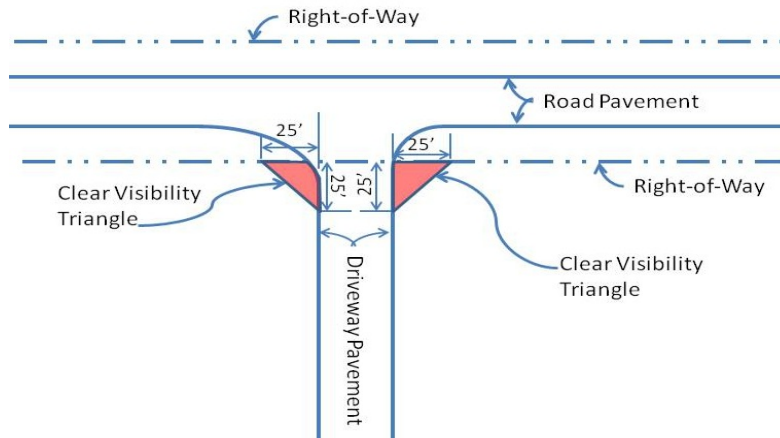
In order to provide a clear view of intersecting streets and driveway entrances, a triangular area of clear visibility shall meet the following standards.

- (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 (25) 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 8-3.



**Figure 8-3 Clear Visibility Triangle at Intersection**

- (c) Driveways: A clear visibility triangle shall be formed as shown in Figure 8-4. 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 (25) feet, then in a straight line across the property to a point on the edge of the driveway twenty-five (25) 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 8-4 Clear Visibility Triangle at Driveway**

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

#### 8.14 - 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. Consideration will be given to utilize the FDOT Greenbook for local roadways on a case by case basis.

#### 8.15 - Sidewalks

Sidewalks shall meet the following requirements. Should there be any conflicts between the two documents, the more stringent will apply:

- (a) Designed and constructed in accordance with the FDOT Greenbook and ADA standards.
- (b) Minimum width of five (5) feet when separated from the back of curb.
- (c) Minimum width of six (6) feet when located adjacent to the back of curb or edge of pavement.
- (d) Maximum cross slope of two (2) percent.
- (e) Grades less than 8.33 percent.
- (f) Curb ramps at all intersections.
- (g) Sidewalks shall be constructed with three-thousand (3000) psi concrete.
- (h) A minimum sidewalk thickness of six (6) inches is required for the following cases:
  - (1) Located within a concrete driveway;
  - (2) Within five (5) feet of an intersection or driveway;
  - (3) Within easements and drainage rights-of-way;
  - (4) Crossings for access to utilities or stormwater management facilities;
  - (5) Areas of special concern as requested by the City Engineer.

- (i) If a sidewalk thickness of six (6) inches is not required, a four (4) inch-thick sidewalk is acceptable.
- (j) A 4' minimum width for curb ramps, curb ramp landings, and sidewalk crossings at driveways.
- (k) Transverse joints shall be tooled, not saw cut. Prior to sidewalk and detectable warning mat installation the existing asphalt must be saw cut at a minimum 12 inches in width by a minimum width of the sidewalk. A form board, the width of the sidewalk, must be used at the front face of sidewalk between the asphalt radius. A minimum 12 inch wide strip of hot mix asphalt must be used to replace the asphalt removed for sidewalk tie in installation.

#### 8.16 - 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. On-street parking shall be designed on a case-by-case basis and subject to approval by the City Engineer.

#### 8.17 - Traffic Calming

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

#### 8.18 - Beautification Policy

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

#### 8.19 - Mobility Plan

The City's Mobility Plan is found on City of Port St Lucie website under Planning & Zoning Department: <https://www.cityofpsl.com/Government/Your-City-Government/Departments/Planning-Zoning/Mobility-Plan>

## 9. Traffic Control Devices, Signalizations and Lighting

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### 9.1 - Traffic Control Devices

- (a) Traffic control devices include pavement markings, signs, and other devices used to regulate, warn, or guide traffic, which are placed on, over, or adjacent to a street, highway, pedestrian facility, bikeway, or private road open to public travel. The purpose of traffic control device 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 control devices shall be as determined by the design documents or as revised later due to a systematic engineering judgment and/or study. Traffic control devices 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 control devices shall be in accordance with the 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 an interim measure prior to the placement of thermoplastic on the final lift of asphalt at the discretion of the City's project manager.
- (b) All new striping on public roads shall follow all FDOT Specifications for method and material.
- (c) The final lift of asphalt shall be provided with thermoplastic pavement markings after an acceptable curing time. Curing time is typically thirty (30) days.
- (d) Contrasting color, permanent tape shall be applied to all concrete surfaces, specifically bridge decks.
- (e) Striping removal shall follow FDOT specifications. Preferred Method is Mill and Overlay per FDOT Specifications. Method must be pre-approved by Public Works Department for each project.
- (f) Hydroblasting to remove pavement markings from the final lift is prohibited.
- (g) Black paint to remove or cover up pavement markings is prohibited.
- (h) Retro-reflectivity standards shall be in accordance with MUTCD
- (i) Marked crosswalks shall be Special Emphasis per FDOT Standard Plans.

#### 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

- a) All signs within City rights-of-way shall be diamond grade.
- b) Sign blanks shall be aluminum and 0.08" thickness.
- c) Soil plates are required for all regulatory signage within City rights-of-way.

### 9.1.2.1 Driver Feedback Signs

Radar speed display signs shall be Traffic Logix EV11EYL-SOL or latest version as approved by the City. Model EV 11" Digital Solar including Strobe, BT, Data-modem with 12-month network access to cloud-4 cell backup.

## 9.2 - Signalization

All traffic signal installations or modifications shall require a signalization plan that is signed and sealed by a professional engineer licensed to practice in the state of 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 following: MUTCD; *FDOT Standard Plans, Standard Specifications for Road and Bridge Construction, Traffic Engineering Manual, Minimum Specifications for Traffic Control Signals and Devices, 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.
- (2) The City shall be supplied with one Honda EU 3000i portable inverter 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 for temporary installations.
- (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. Pre-stressed concrete or steel poles shall be used.
- (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, internally illuminated 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 prior to installation.
- (8) For projects that will be owned and maintained by the City, warranty information and transfers shall be submitted to the City prior to 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 an Econolite Colbalt ATC or most recent version of controller approved by the City.
- (2) The top of the foundation shall be twelve (12) 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 the controller cabinet corner.
- (4) The 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) Cabinet shall be FDOT State contract Econolite TS2T1 77" with generator panel.
- (6) 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.
- (7) A concrete pad that measures forty-eight- by thirty (48 x 30) inches, 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 (6) 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.

(e) Luminaires

- (1) Luminaires on mast arm uprights shall be 120 Volt, LED.
- (2) Luminaires shall be wired on a separate breaker in the disconnect box.

(f) Street Name Signs

- (1) Internally 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.



(g) 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 or most recent version of optical detector approved by the City.
- (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.

(h) Signal Heads

- (1) Five (5) 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 be poly-construction and have back plates with retroreflective borders 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.
- (6) Four (4) -section Flashing Yellow Arrow signal heads shall be used for protected/permissive left turn indications.

(i) 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 or most recent version of PTZ camera approved by the City
- (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.

(j) 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, watertight 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.

(k) 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 (minimum)
  - 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 (minimum)

- 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

- i. 101-1 Mobilization and Documentation – Lump Sum
- ii. 633-TW Tracer Wire w/ Radio Detection System Balancing for Citywide Locate System (Furnish & Install) – Linear Feet
- iii. 633-113-123 FO Cable 96F, SM, LT, UG (Furnish & Install) - Linear Feet
- iv. 633-113-DM ROW Delineator Marker Post Orange 6-feet (Furnish & Install) - 1 Each
- v. 633-1-121 FO Cable 12F, SM, Drop Cable (Furnish & Install) - Linear Feet LF

- vi. 633-2-31 FO Connection (Install) Splice - 1 Each
- vii. 633-2-31 FO Connection (Install) Termination - 1 Each
- viii. 633-7-12 FO Splice-Term. Cabinet, 12F, Wall/Rack (Furnish & Install) - 1 Each
- ix. 633-9-A FO Jumper, Duplex ST-ST, SM, 10-Feet (Furnish & Install) - 1 Each
- x. 633-9-B FO Jumper, Duplex SC-ST, SM, 10-Feet (Furnish & Install) - 1 Each
- xi. 633-9-C FO Jumper, Duplex LC-ST, SM, 10-Feet (Furnish & Install) - 1 Each
- xii. 633-9-12 FO Splice Closure 12F, Aerial/UG (Furnish & Install) - 1 Each
- xiii. 633-9-96 FO Splice Closure 96F, Aerial/UG (Furnish & Install) - 1 Each
- xiv. 635-1-15 FO Pullbox (Furnish & Install) - 1 Each
- xv. 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 9.2.1, Traffic 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) Accessible pedestrian signals (APS) type with audible indications will be evaluated on a case-by-case basis.
- (d) All new and modified Pedestrian Signals shall count down 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.
- (f) All signal heads shall be poly-construction.
- (g) Leading Pedestrian Interval (LPI) will be evaluated on a case-by-case basis.
- (h) Treatments for pedestrian crosswalks at midblock and unsignalized intersections shall be in accordance with Section 5.2 of the FDOT Traffic Engineering Manual.

## 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 licensed to practice in the state of 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 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 Design Manual, Part 2.

(c) Pull Boxes

- (1) Armorcast Products #A6001946TAPXX12 polymer concrete box or equivalent.
- (2) Box dimensions are 13W x 24L x 12H (inches) with an open bottom.
- (3) Load rating of box shall be a minimum of twenty thousand (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 a two(2)-inch schedule forty (40) conduit.
- (2) One spare conduit shall be provided for conduit runs, 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 (3) 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 and FDOT Specifications for Road and Bridge Construction.
- (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.

(6) Specifications for Roadway Lighting

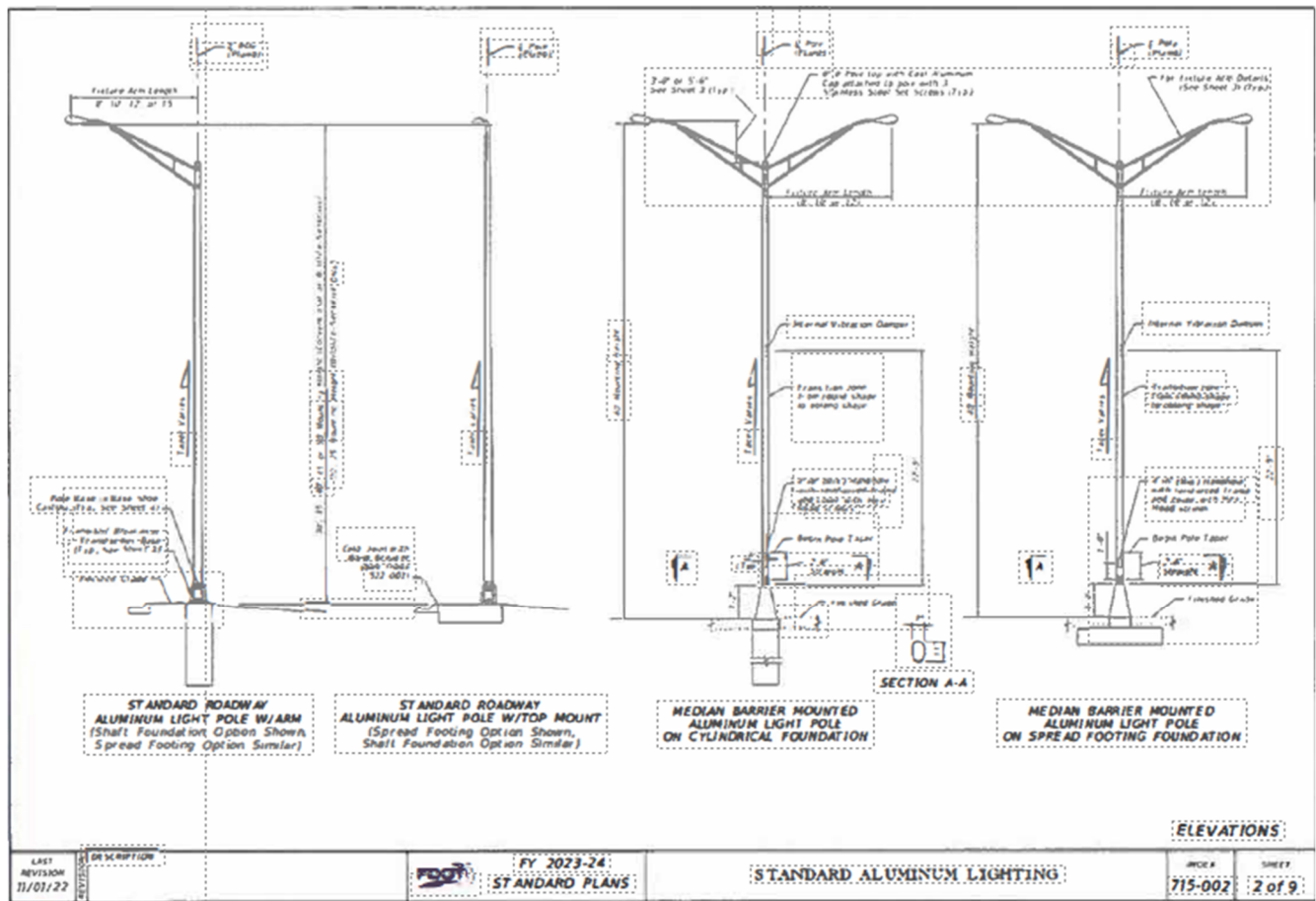
- a. Roadway lighting is required for all newly constructed roadways that are intended to be owned and maintained by the City.
- b. Roadway illumination shall be provided for all midblock (uncontrolled) pedestrian crossings.
- c. All roundabouts and traffic circles must be designed with roadway illumination and meet applicable illumination standards.
- d. All fixtures shall be light emitting diode (LED) technology with the light-cone and lumen output able to meet FDOT standards for roadway illumination and be on the FDOT APL.

- e. LED fixtures shall have the ability to be shielded to prevent light intrusion into adjacent properties, should this become necessary.
- f. All light poles shall be equipped with a festoon box including GFCI 110v outlet and in-use cover.
- g. Height of pole, length of arm and pole spacing shall be determined by a qualified engineer and meet FDOT illumination standards.
- h. Photometric plans, Lighting Plans and Shop Drawings shall be approved by the City's Public Works Traffic Operations Division prior to construction.
- i. The City's Roadway and Pedestrian Lighting General Notes shall be provided with all lighting design plans. Please contact 772-344-4360 to obtain the most recent version of these notes.

(7) Specifications for Pedestrian Lighting

- a. Pedestrian illumination, if provided, shall meet the most current FDOT Design manual.
- b. Light pole wiring and installation shall meet FDOT standard plans.
- c. Poles shall be ornamental flute tapered aluminum monotube with a maximum of height of sixteen (16) feet including luminaire.
- d. Poles shall meet current wind speed requirements and have a twenty (25) year design life.
- e. Poles shall be mounted to a concrete foundation utilizing breakaway couplings and a modified cast aluminum base with twin doors separated one hundred eighty (180) degrees.
- f. Pole color is specific to project and subject to City approval.
- g. All fixtures shall be light emitting diode (LED) technology with the light-cone and lumen output able to meet FDOT standards for pedestrian facility illumination.
- h. LED color temperature shall be no greater than three thousand (3000) K.
- i. LED fixtures shall have the ability to be shielded to prevent light intrusion into adjacent properties, should this become necessary.
- j. All light poles shall be equipped with a festoon box including GFCI 110v outlet and in-use cover.
- k. Height of pole and pole spacing shall be determined by a qualified engineer and meet FDOT illumination standards.
- l. Photometric plans, Lighting Plans and Shop Drawings shall be approved by the City's Public Works Traffic Operations Division prior to construction.
- m. The City's Roadway and Pedestrian Lighting General Notes shall be provided with all lighting design plans. Please contact 772-344-4360 to obtain the most recent version of these notes.
- n. See reference sketch next page (FDOT Index 715-002 pg. 2 of 9) .







## 10. Landscaping and Irrigation

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### 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, the Beautification Policy Guidelines set forth in Appendix C, and the Irrigation Standards set forth in Appendix F.

### 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 (5) feet to City-owned or maintained curbs, pavement, or sidewalks shall have a root barrier that is at least twenty-four (24) inches deep and fifteen (15) feet long (centered) parallel to the pavement, curb or sidewalk. Larger trees may require deeper and/or longer barriers.

## 11. Bicycle and Pedestrian Facilities

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### 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 using 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.
- (h) Safe bicycle and pedestrian access to bus stops, parks, public facilities, shared use paths, sidewalks and trails. Connections and crossings at intersections and midblock locations must be evaluated to provide safety and mobility per the City's adopted Mobility and Multimodal Plans.

### 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

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### 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 for the safe movement of pedestrians, and create obvious and simple circulation patterns.
- (b) Driveways for parking areas are 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 (22) feet
  - (2) Stall Width – twelve (12) feet
  - (3) Allowable distance of the space to an intersection - Per FDOT Standard Plans Index 711-001.
- (c) Accessible parking spaces shall be dimensioned, striped 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 in accordance with standards that promote the general safety and welfare of the public.
- (b) Stacking shall meet the 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.
- (c) A queuing analysis shall be submitted to confirm the proposed site has sufficient on-site vehicle stacking that complies with City Code Section 158.221(I). The queuing analysis shall be prepared by observing and documenting the peak hour queuing of at least three (3) similar existing uses, sizes and urban locations.

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 cross access and an 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) The cross access connection shall consist of a paved connection at least twenty (20) feet wide between 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 potholes, 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

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### 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, the design ensures sheet flow drainage is directed internal to the site, 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 for all documents not generated by CAD, CAD generated documents shall have their revisions clouded.
- (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

<b>Table 14-1 Electronic Submittal File Names</b>	
Document	File Name
Irrigation Plan	Irrigation.pdf
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.)	PermitAgency.pdf <sup>1</sup>
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	ResponseToCommentsX.pdf <sup>2</sup>
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

<sup>1</sup>Name should include the permitting agency, for example the SFWMD permit would be named PermitSFWMD.pdf.

<sup>2</sup>X is the response number: first response=1, second response=2, etc.

## 14.2 - Plats

Plats submitted for review shall meet the requirements of City Code Section 156.056. All applicable items shall be provided as listed on the Plat Review Checklist included in Appendix A.

### 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 professional surveyor and mapper registered in the State of Florida.
- (b) Be of the form and format specified by Chapter 5J-17, F.A.C.
- (c) Formatted for standardized sheet size of 24-inch by 36-inch.
- (d) Scale greater than or equal to one (1) inch equals fifty (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, , wooded areas, specimen trees, contours or spot elevations, structures, finished floor elevations, etc.) within two hundred (200) feet of the site.
  - (3) Features of the subject property (*e.g.*, lakes, marshes, wetlands, canals, waterways, , 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 (25) year, three (3) 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 licensed to practice in the State of 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 licensed to practice in the State of 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 applicable, must 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 two hundred (200) feet of the site.

#### 14.10 - Opinion of Probable Cost

- (a) An opinion of probable cost shall be 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 licensed to practice in the State of 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 to practice 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 to practice 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 process, 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 and for private development projects that will be turned over to the City for ownership and maintenance responsibilities. 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 letterhead 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

Developer and/or contractor shall provide the City with operation and maintenance manuals for any mechanical, electrical, or specialized components of systems that will be owned and/or maintained by the City. These documents will be requested through contract documents and/or requested by the City at the preconstruction meeting. Failure of the City to request the documents does not eliminate the developer's/contractor's obligation to provide the documentation.

#### 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), F.A.C. 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

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### 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.

Performance Guarantees shall be required for all work that will be performed within the City right-of-way and shall be provided in accordance with City Code Chapter 156, Article VII, Improvement Guarantees. In the event a surety has already been approved and provided for a final plat that includes the proposed work, the existing surety will satisfy this requirement, provided the value of the surety is sufficient to cover the required amount of the plat infrastructure and the work that is proposed within the City right-of-way.

### 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 (1) year, minimum, warranty period. This would also apply to construction by an owner/developer within the City right-of-way as off-site improvements to support site development. 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

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### 16.1 - Clearing & Mass Grading 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 is as follows:

- (a) Submit the following information via upload to Fusion at <https://fusion.cityofpsl.com/> for review and sign off by all departments:
  - (1) A completed online application for Clearing Plan.
  - (2) The approved land clearing and mass grading plan with SWPPP that is signed and sealed by an engineer licensed to practice in the State of Florida.
  - (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 notify the applicant and other reviewing departments when the item is scheduled for a Site Plan Review Committee (SPRC) meeting.
- (c) Submit the following items, electronically, to the Public Works Department. Please upload to Fusion at <https://fusion.cityofpsl.com/> or via email send to the Public Works Department at [engpw@cityofpsl.com](mailto:engpw@cityofpsl.com) in PDF format and include “Clearing Plan” along with the project name and City’s project number in the subject line. If files are larger than ten (10) MB please contact the Public Works Department via email at [engpw@cityofpsl.com](mailto:engpw@cityofpsl.com) for access to our Sharepoint site.
  - (1) A completed Construction Permit Application found on the Public Works Website.
  - (2) Documentation of plan approval from the Community Development District, if applicable.
  - (3) A copy of the approved SFWMD permit, if applicable.
  - (4) For projects that disturb one acre or more, submit a copy of the NOI submitted to the FDEP.
  - (5) A copy of the approved USACE permit, if applicable.
- (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](mailto: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), satisfactory onsite meeting, and review of the complete application package, a construction permit will be issued to the applicant by the Public Works Department for the proposed clearing.



- (g) Once issued, the applicant must 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.
- (h) A clearing permit is void if inspections have not occurred within one (1) year of the permit issuance or inspections have not occurred within a period of one (1) year. A new permit and payment of the review fee is required if a permit is voided.

## 16.2 - 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, sidewalks, etc. and all work underneath these facilities for the project. The process for completing a site work permit application follows:

- (a) Submit the following information to the Planning and Zoning Department via upload to Fusion at <https://fusion.cityofpsl.com/>:
  - (1) A completed Planning and Zoning Department compliance review requesting a site work permit.
  - (2) One set 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.
- (b) The Planning and Zoning Department will review the compliance submittal through Fusion and once it is found to be sufficient and in compliance with the approved plans, the Planning and Zoning Department will notify the Utility Department that it is ready to be reviewed. The Utility Department will then notify the Public Works Department when they are complete with their review.
- (c) Submit the following items, as one package, to the Public Works Department. If submitted electronically, please upload to Fusion at <https://fusion.cityofpsl.com/> or via email sent to [engpw@cityofpsl.com](mailto: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 (10) MB please email the Public Works Department for access to the City's Sharepoint site.
  - (1) Two 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 (1) acre or more, a copy of the NOI submitted to the FDEP.
  - (8) For projects that disturb one (1) 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 (Public Works Website) and submitting to [engpw@cityofpsl.com](mailto: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 review/inspection fees for culverts, traffic signals, pedestrian lights, or streetlights as provided in the fee schedule found in City Code Section 57.01.
- (g) The applicant shall provide payment of the site work permit fee. The fee may be paid with 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), satisfactory onsite meeting, review of the complete application package, and payment of the fee, the Public Works Department will issue the site work permit.
- (i) Once issued, the applicant must 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.
- (j) A site work permit is void if inspections have not occurred within one (1) year of the permit issuance or inspections have not occurred within a period of one (1) year. A new permit and payment of the review fee is required if a permit is voided.

### 16.3 - 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 is as follows:

- (a) Submit the following information to the Public Works Department online through Cobra Public at [www.CobraPublicWeb.cityofpsl.com](http://www.CobraPublicWeb.cityofpsl.com). If you are unable to submit online, you may deliver in person to the Public Works Department.
  - (1) A driveway/culvert permit application filled out on above website under Residential > My Permits > Create New Lot Permit or utilize a hard copy on the Public Works Website.
  - (2) One 11- by 17-inch signed and sealed Civil/Site plans. All surveys uploaded are required to have a 3<sup>rd</sup> party verification for authenticity of the signature.
- (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 (credit card only online). 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 (5) 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 must be available at the location of the work during working hours. The work shall be completed in accordance with the approved construction plans.
- (f) A minimum twelve (12) inch diameter temporary pipe must be installed in the City right-of-way. A rejection fee will be incurred if the pipe is not installed.
- (g) Satisfactory form board and final inspections are required to close out the permit.
- (h) A driveway permit is void if inspections have not occurred within one (1) year of the permit issuance or inspections have not occurred within a period of one (1) year. A new permit and payment of the review fee is required if a permit is voided.

#### 16.4 - 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 a right-of-way permit. The process to complete a right-of-way permit application is as follows:

- (a) Submit the application to the Public Works Department electronically via Cobra Public at <https://cobrapublicweb.cityofpsl.com/>. Upload the following items with the application submittal:
  - (1) Excavation plan.
  - (2) Certificate of insurance in accordance with City Code Chapter 54 Rights-of-Way, Article II. - Right-of-Way Permit.
  - (3) Construction Surety in accordance with City Code Chapter 54 Rights-of-Way, Article II. - Right-of-Way Permit.
  - (4) Maintenance of traffic plan in accordance with FDOT guidelines if traffic is interrupted or if any roads or sidewalks will be closed. A separate Road/Lane Closure Request (Section 16.7) must be submitted for any roadway or sidewalk closure a minimum of forty-eight (48) hours prior to the closure.
- (b) After a satisfactory review of the complete application package, the Public Works Department will issue a right-of-way permit via email.
- (c) A right-of-way permit is void if inspections have not occurred within one (1) year.

#### 16.5 - Revocable Encroachment Permit

The Revocable Encroachment Permit allows encroachments into the twenty (20) 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 (Public Works Department Website) 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](mailto: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 (10) MB please contact the Public Works Department for access to the City’s Sharepoint site.
- (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 at the applicants cost.

#### 16.6 - 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](mailto: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 (10) MB please contact the Public Works department to receive access to our Sharepoint site.
  - (1) A completed road/lane closure request form found at <https://www.cityofpsl.com/Government/Your-City-Government/Departments/Public-Works/Commercial-Residential-Review-Permitting/Public-Works-Forms-Documents>
  - (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

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### 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 way which minimizes 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 the 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 maintain traffic as specified in this chapter at all times. 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 be 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 (14) 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 (1) acre or more, or is part of the larger common plan of development or sale which disturbs one (1) 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. The construction entrance must be located on the most minor roadway when options are available.
  - 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 (7) 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 release into the environment.
- (10) Control the release or discharge from stockpile areas.
- (11) Inspections as per the SWPPP, shall be once every seven (7) days and within twenty-four (24) 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 (29) 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 the start of the 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 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 rules, regulations, ordinances, and laws.

### 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 *Standard Specifications for Road and Bridge Construction*.
- (b) Except in 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 two (2) percent.
- (c) Shall meet FDOT Specifications which call for three thousand (3,000) psi. with a minimum thickness of four (4) inches, except across driveways, maintenance areas, curb ramps or within five (5) feet of roadways where the minimum thickness is six (6) inches.
- (d) Sidewalks and accessible pathways shall not be constructed using brick.
- (e) Sidewalk repairs shall be a minimum of four (4) 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 public rights-of-way.
  - (3) Areas with slopes steeper than four:one (4:1) (horizontal: vertical).
  - (4) A three (3) foot wide strip of sod (three (3) rows), unless otherwise approved, shall be placed adjacent to all curbs, walks and pavements.
  - (5) A ten (10) 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

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### 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 (500) foot interval (maximum) for density or one thousand (1000) feet per LBRs along the length of the roadway or every six-thousand (6000) 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 (500) foot interval (maximum) along the length of the roadway or every six thousand (6000) 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 (94) 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 (300) foot interval (maximum) along the length of the roadway or every six thousand (6000) 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 must 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) Right-of-Way Irrigation: driveway sleeves, irrigation components, and final testing will be inspected by the City Irrigation Inspector.
- (c) 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.
- (d) 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.
- (e) 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.

- (f) Asphalt: The City Inspector will observe paving operations and may test the temperature of the asphalt mix.
- (g) Final: The site work will be inspected for overall condition and conformance to the construction plans. The following items, will be inspected, including but not limited to: 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 Traffic Operations staff and/or CEI representatives contracted 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 (3) inspections. They are as follows:

- (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 will determine whether 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/are 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 their original condition or better.

#### 18.6 - NPDES Inspections

Inspections are performed on commercial projects to verify that the project complies 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

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### 19.1 - Privately Owned Development Projects

The EOR shall provide the following information prior to the Public Works Department accepting the project and recommending Certification of Occupancy (CO) issuance to the Building Department. The following documents shall be submitted via email in PDF format to [engpw@cityofpsl.com](mailto:engpw@cityofpsl.com) and the email shall include the Project Name and Project # in the subject line. If files are larger than ten (10) MB, please contact the Public Works department for access to our Sharefile site.

- (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

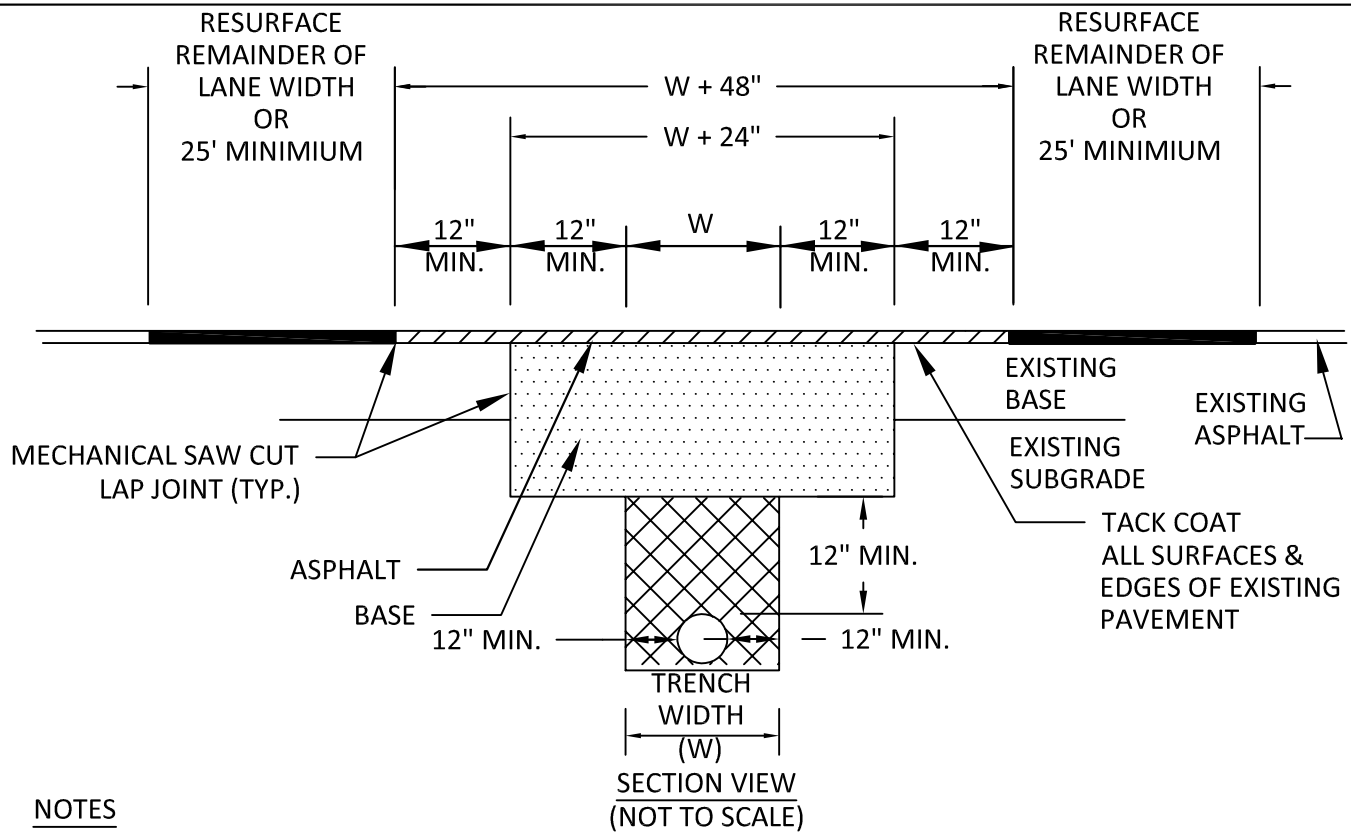
- (a) A request to turn over the ownership and maintenance responsibilities of a roadway that were previously owned and maintained by others may be submitted to the City Engineer. The City Engineer will review the request and prepare a recommendation memo that identifies the reasons for the acceptance, 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. Submitting all documents for review/approval prior to submitting the official request for Roadway Turnover is highly recommended.

## 20. Standard Details

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- Pavement Restoration
- Swale Liner
- Roadway Section - Arterial 6 Lane
- Roadway Section - Arterial or Major Collector 2 and 4 Lane – Minor Collector 4 Lane
- Roadway Section - Minor Collector – Subdivision Collector – Major Local 2 Lane
- Roadway Section – Local 2 Lane
- Road Construction Plan Notes



#### NOTES

1. OPEN CUTTING OF EXISTING PAVEMENT MUST BE APPROVED BY THE PUBLIC WORKS DIRECTOR OR DESIGNEE
2. ASPHALT: (UNLESS OTHERWISE DIRECTED BY PUBLIC WORKS INSPECTION STAFF)  
MIN. 1.5" SP-9.5 ON LOCAL STREETS (LESS THAN 30 MPH)  
MIN. 2.5" (1.5" SP-12.5, 1.0" FC-9.5)  
MIN 3.0" (1.5" SP-12.5, 1.5" FC-9.5)
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 MARKERS 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.
11. EXISTING CONCRETE VALVE PADS WITHIN THE WORK AREA SHALL BE REMOVED AND REPLACED WITH ASPHALT PAVEMENT AT TIME OF REPAIR.

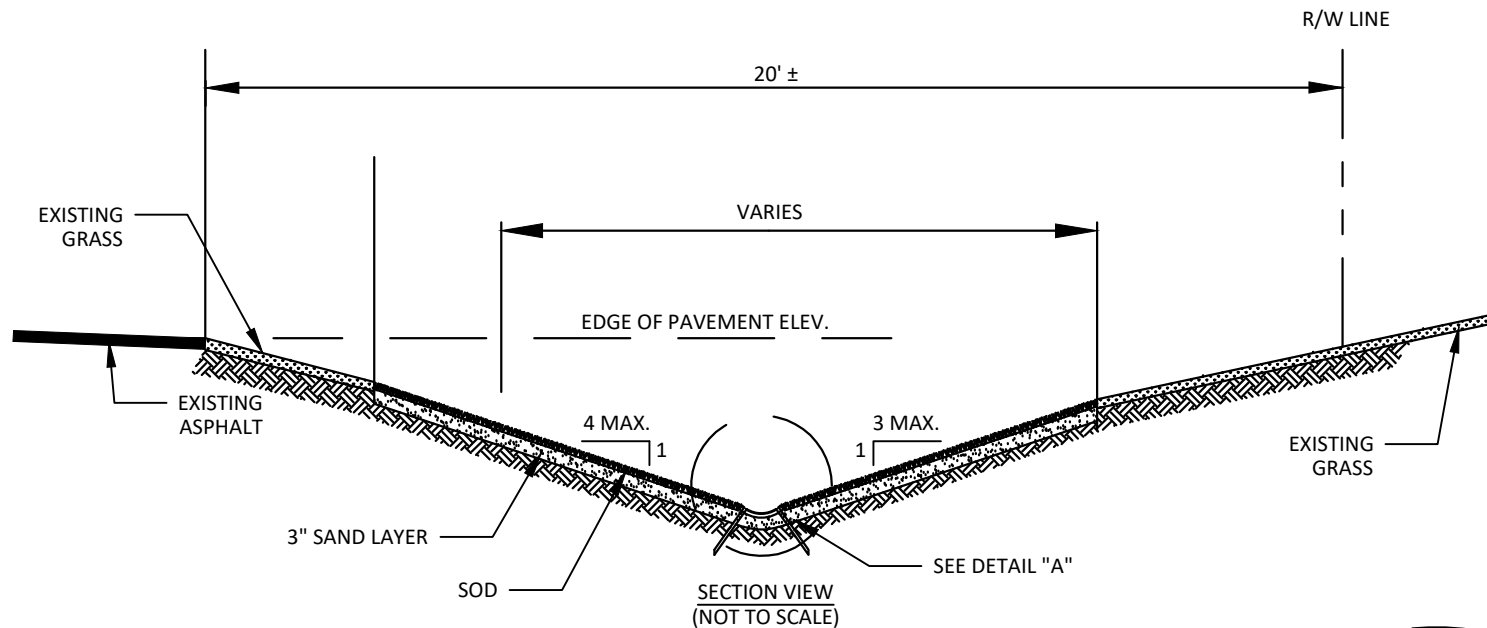


**ENGINEERING STANDARDS FOR LAND DEVELOPMENT**  
**COMMERCIAL, RESIDENTIAL SUBDIVISION, AND CAPITAL IMPROVEMENT PROJECTS**

## UTILITY / ROAD OPEN CUT PAVEMENT RESTORATION

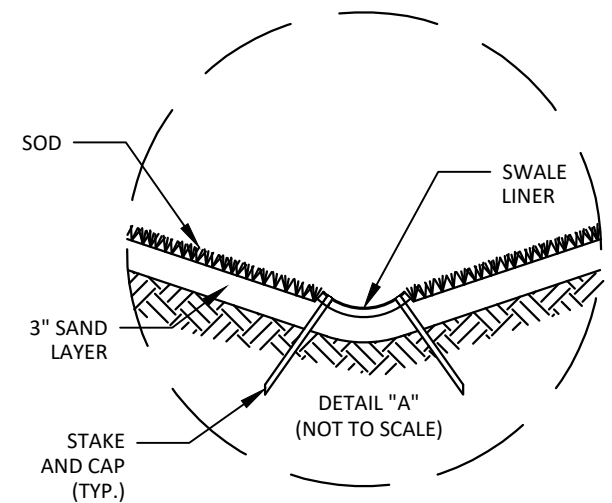
DATE: 10/01/2025

SHEET: 1 OF 1



#### 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 4' 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.
5. BEFORE SOD IS LAID, THE SOIL SURFACE SHALL BE CLEAR OF TRASH, DEBRIS, ROOTS, BRANCHES, STONES, AND CLODS MORE THAN 2 INCHES IN LENGTH OR DIAMETER. SOD SHALL NOT BE APPLIED TO GRAVEL OR OTHER NON-SOIL SURFACES
6. SOD SHALL BE INSTALLED 1-INCH BELOW THE EDGE OF PAVEMENT.
7. SOD STRIPS IN SWALES SHALL BE LAID PERPENDICULAR TO THE DIRECTION OF FLOW. CARE SHOULD BE TAKEN TO BUTT THE ENDS OF THE STRIPS TIGHTLY.
8. THE SWALE GRADE SHALL BE DETERMINED BY THE CITY.
9. ALTERATIONS TO THE SWALE TYPICAL SECTIONS SHALL BE APPROVED BY THE CITY ENGINEER OR THEIR DESIGNEE.



#### ENGINEERING STANDARDS FOR LAND DEVELOPMENT

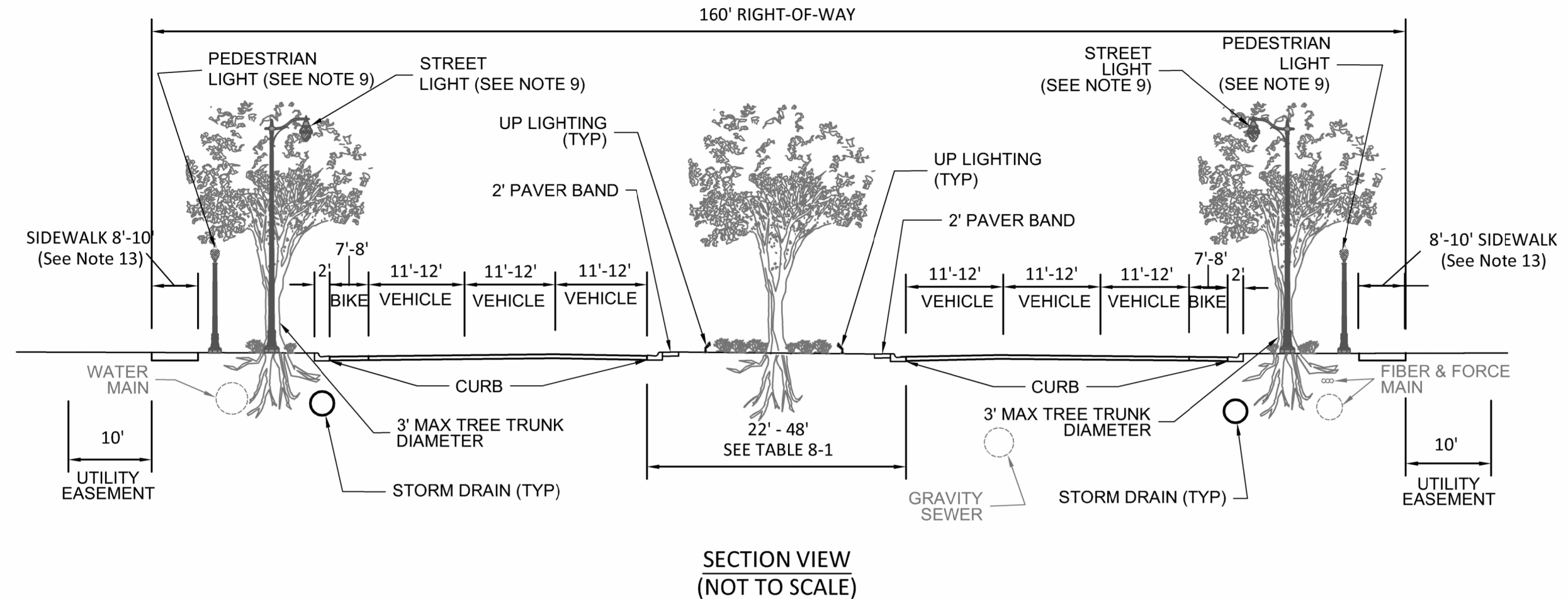
**COMMERCIAL, RESIDENTIAL SUBDIVISION,  
AND CAPITAL IMPROVEMENT PROJECTS**

### SWALE LINER

**DATE: 9/17/2025**

**SHEET: 1 of 1**





**NOTES:**

1. MINIMUM REQUIREMENTS ARE SHOWN.
2. ADDITIONAL RIGHT-OF-WAY MAY BE REQUIRED AT INTERSECTIONS.
3. ALTERNATIVE SECTIONS WILL BE PROCESSED AS A VARIANCE TO THE CITY CODE.
4. ADDITIONAL RIGHT-OF-WAY WILL BE REQUIRED FOR RECLAIM WATER LINES.
5. TREES, WHERE APPLICABLE, SHALL HAVE NON-INVASIVE ROOT SYSTEMS AND A CANOPY THAT HAS A VERTICAL CLEARANCE OF 13'6" AT MATURITY.
6. TREES LOCATED LESS THAN FIVE FEET TO CITY OWNED OR MAINTAINED CURB, PAVEMENT, OR SIDEWALK SHALL HAVE A ROOT BARRIER.
7. F.D.O.T. CLEAR ZONE AND SIGHT DISTANCE REQUIREMENTS SHALL BE MAINTAINED.
8. IRRIGATION FACILITIES ARE NOT SHOWN.
9. PEDESTRIAN LIGHTS OR STREET LIGHTS SHALL BE PROVIDED - SECTION SHOWS BOTH LOCATION FOR GUIDANCE.
10. 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.
12. REFER TO THE CITY OF PORT ST. LUCIE UTILITY SERVICE MANUAL, UTILITY STANDARDS, FOR THE PLACEMENT OF ALL UTILITIES.
13. ALTERNATIVE SHARED USE PATH WIDTH 10' - 12' FEET. ALTERNATIVE MULTIMODAL WAY WIDTH 12' - 14'.



**ENGINEERING STANDARDS FOR LAND  
DEVELOPMENT**

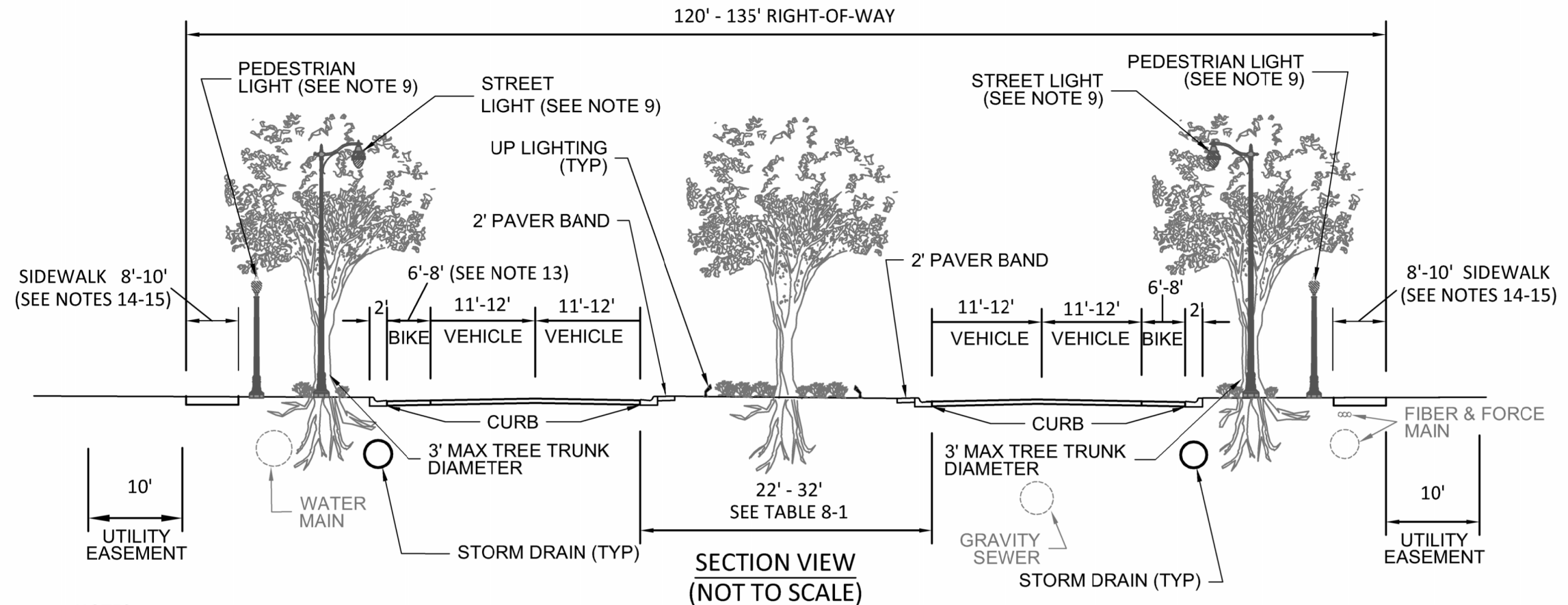
**COMMERCIAL, RESIDENTIAL SUBDIVISION,  
AND CAPITAL IMPROVEMENT PROJECTS**

**ARTERIAL 6 LANE  
ROADWAY SECTION**

**DATE: 09/16/25**

**SHEET: 1 of 1**





**NOTES:**

1. MINIMUM REQUIREMENTS ARE SHOWN.
2. ADDITIONAL RIGHT-OF-WAY MAY BE REQUIRED AT INTERSECTIONS.
3. ALTERNATIVE SECTIONS WILL BE PROCESSED AS A VARIANCE TO THE CITY CODE.
4. ADDITIONAL RIGHT-OF-WAY WILL BE REQUIRED FOR RECLAIM WATER LINES.
5. TREES, WHERE APPLICABLE, SHALL HAVE NON-INVASIVE ROOT SYSTEMS AND A CANOPY THAT HAS A VERTICAL CLEARANCE OF 13'6" AT MATURITY.
6. TREES LOCATED LESS THAN FIVE FEET TO CITY OWNED OR MAINTAINED CURB, PAVEMENT, OR SIDEWALK SHALL HAVE A ROOT BARRIER.
7. F.D.O.T. CLEAR ZONE AND SIGHT DISTANCE REQUIREMENTS SHALL BE MAINTAINED.
8. IRRIGATION FACILITIES ARE NOT SHOWN.
9. PEDESTRIAN LIGHTS OR STREET LIGHTS SHALL BE PROVIDED - SECTION SHOWS BOTH LOCATIONS FOR GUIDANCE.
10. 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.
11. REFER TO THE CITY OF PORT ST. LUCIE UTILITY SERVICE MANUAL, UTILITY STANDARDS, FOR THE PLACEMENT OF ALL UTILITIES.
12. VEHICLE LANE WIDTHS FOR THE FOLLOWING:
  - ARTERIAL OR MAJOR COLLECTOR 4 LANES = 11' - 12'.
  - MINOR COLLECTOR 4 LANES = 11'
  - ARTERIAL OR MAJOR COLLECTOR 2 TO 4 LANES = 11' - 12'.
13. BIKE LANE WIDTH FOR THE FOLLOWING
  - ARTERIAL OR MAJOR COLLECTOR 4 LANES = 7' - 8'.
  - MINOR COLLECTOR 4 LANES = 6' - 7'.
  - ARTERIAL OR MAJOR COLLECTOR 2 TO 4 LANES = 7' - 8'.
14. ALTERNATIVE SHARED USE PATH WIDTH FOR THE FOLLOWING:
  - ARTERIAL OR MAJOR COLLECTOR 4 LANES = 10' - 12'.
  - MINOR COLLECTOR 4 LANES = 8' - 12'.
  - ARTERIAL OR MAJOR COLLECTOR 2 TO 4 LANES = 8' - 12'.
15. ALTERNATIVE MULTIMODAL WAY WIDTH FOR THE FOLLOWING:
  - ARTERIAL OR MAJOR COLLECTOR 4 LANES = 12' - 14'.
  - MINOR COLLECTOR 4 LANES = 10' - 12'.
  - ARTERIAL OR MAJOR COLLECTOR 2 TO 4 LANES = 12' - 14'.



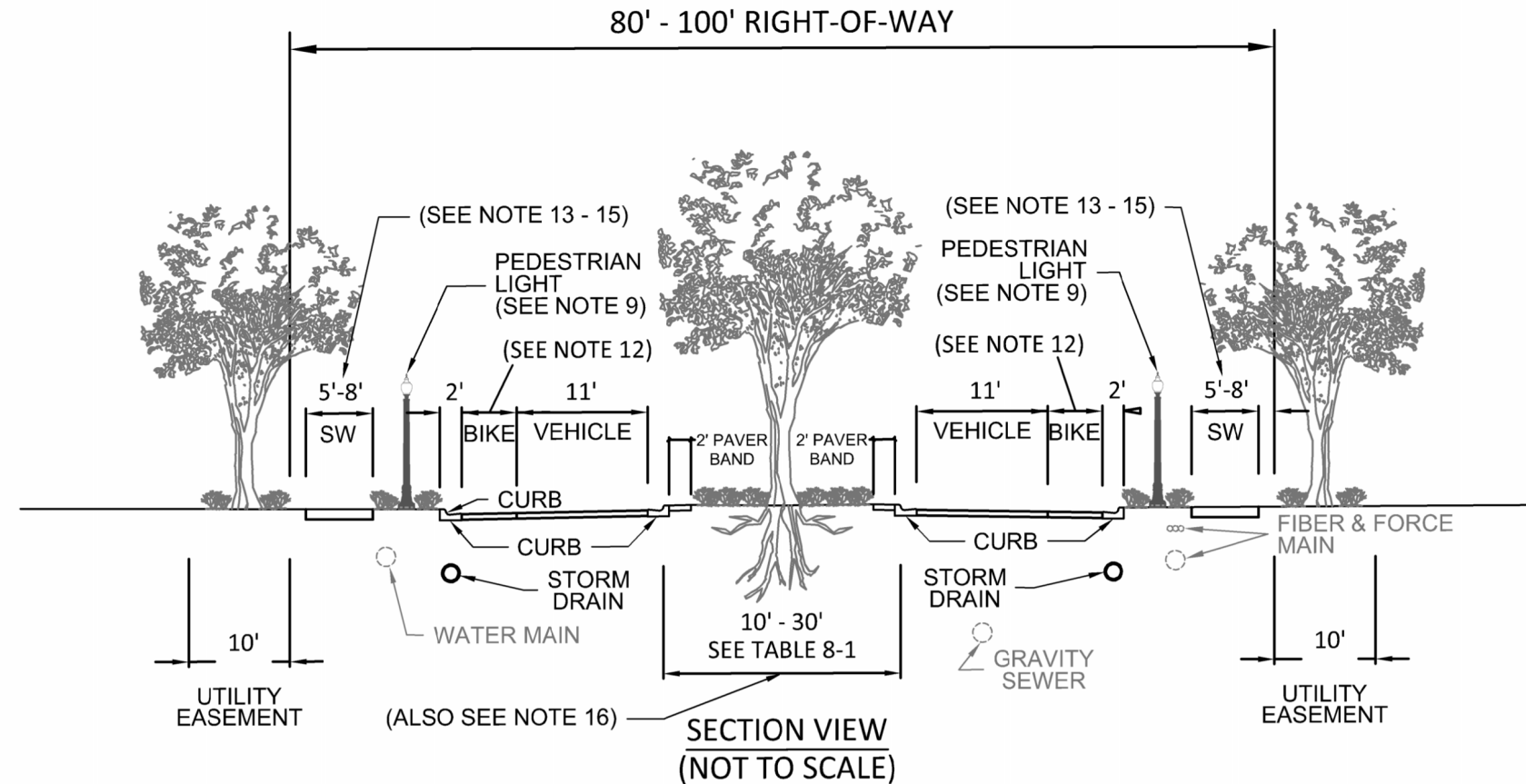
**ENGINEERING STANDARDS FOR LAND DEVELOPMENT**

**COMMERCIAL, RESIDENTIAL SUBDIVISION, AND CAPITAL IMPROVEMENT PROJECTS**

**ARTERIAL OR MAJOR COLLECTOR 4 LANE  
ARTERIAL OR MAJOR COLLECTOR 2 TO 4 LANE  
MINOR COLLECTOR 4 LANE**

**DATE: 09/16/25**

**SHEET: 1 of 1**



**NOTES:**

1. MINIMUM REQUIREMENTS ARE SHOWN.
2. ADDITIONAL RIGHT-OF-WAY MAY BE REQUIRED AT INTERSECTIONS.
3. ALTERNATIVE SECTIONS WILL BE PROCESSED AS A VARIANCE TO THE CITY CODE.
4. ADDITIONAL RIGHT-OF-WAY WILL BE REQUIRED FOR RECLAIM WATER LINES.
5. TREES, WHERE APPLICABLE, SHALL HAVE NON-INVASIVE ROOT SYSTEMS AND A CANOPY THAT HAS A VERTICAL CLEARANCE OF 13'6" AT MATURITY.
6. TREES LOCATED LESS THAN FIVE FEET TO CITY OWNED OR MAINTAINED CURB, PAVEMENT, OR SIDEWALK SHALL HAVE A ROOT BARRIER.
7. F.D.O.T. CLEAR ZONE AND SIGHT DISTANCE REQUIREMENTS SHALL BE MAINTAINED.
8. IRRIGATION FACILITIES ARE NOT SHOWN.
9. PEDESTRIAN LIGHTS OR STREET LIGHTS SHALL BE PROVIDED - SECTION SHOWS BOTH LOCATIONS FOR GUIDANCE.
10. 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.
11. REFER TO THE CITY OF PORT ST. LUCIE UTILITY SERVICE MANUAL, UTILITY STANDARDS, FOR THE PLACEMENT OF ALL UTILITIES.
12. BIKE LANE WIDTH ARE AS FOLLOWS:
  - MINOR COLLECTOR 2 LANE = 5' - 6' (BOTH SIDES).
  - SUBDIVISION COLLECTOR 2 LANE = 4' - 5' (BOTH SIDES).
  - MAJOR LOCAL 2 LANE = NONE
13. SIDEWALK WIDTH ARE AS FOLLOWS.
  - MINOR COLLECTOR 2 LANE = 6' - 8' (BOTH SIDES).
  - SUBDIVISION COLLECTOR 2 LANE = 6' - 8' (BOTH SIDES).
  - MAJOR LOCAL 2 LANE = 5' - 6' (BOTH SIDES).
14. ALTERNATIVE SHARED USE PATH WIDTH FOR THE FOLLOWING:
  - MINOR COLLECTOR 2 LANE = 8'.
  - SUBDIVISION COLLECTOR 2 LANE = 8' - 10'.
  - MAJOR LOCAL 2 LANE = 8' - 10'
15. ALTERNATIVE MULTIMODAL WAY WIDTH FOR THE FOLLOWING:
  - MINOR COLLECTOR 2 LANE = 10' - 12'.
  - SUBDIVISION COLLECTOR 2 LANE = 10' - 12'.
  - MAJOR LOCAL 2 LANE = NONE
16. MAJOR LOCAL 2 LANE MEDIAN WIDTH = 10' - 16' (OPTIONAL)



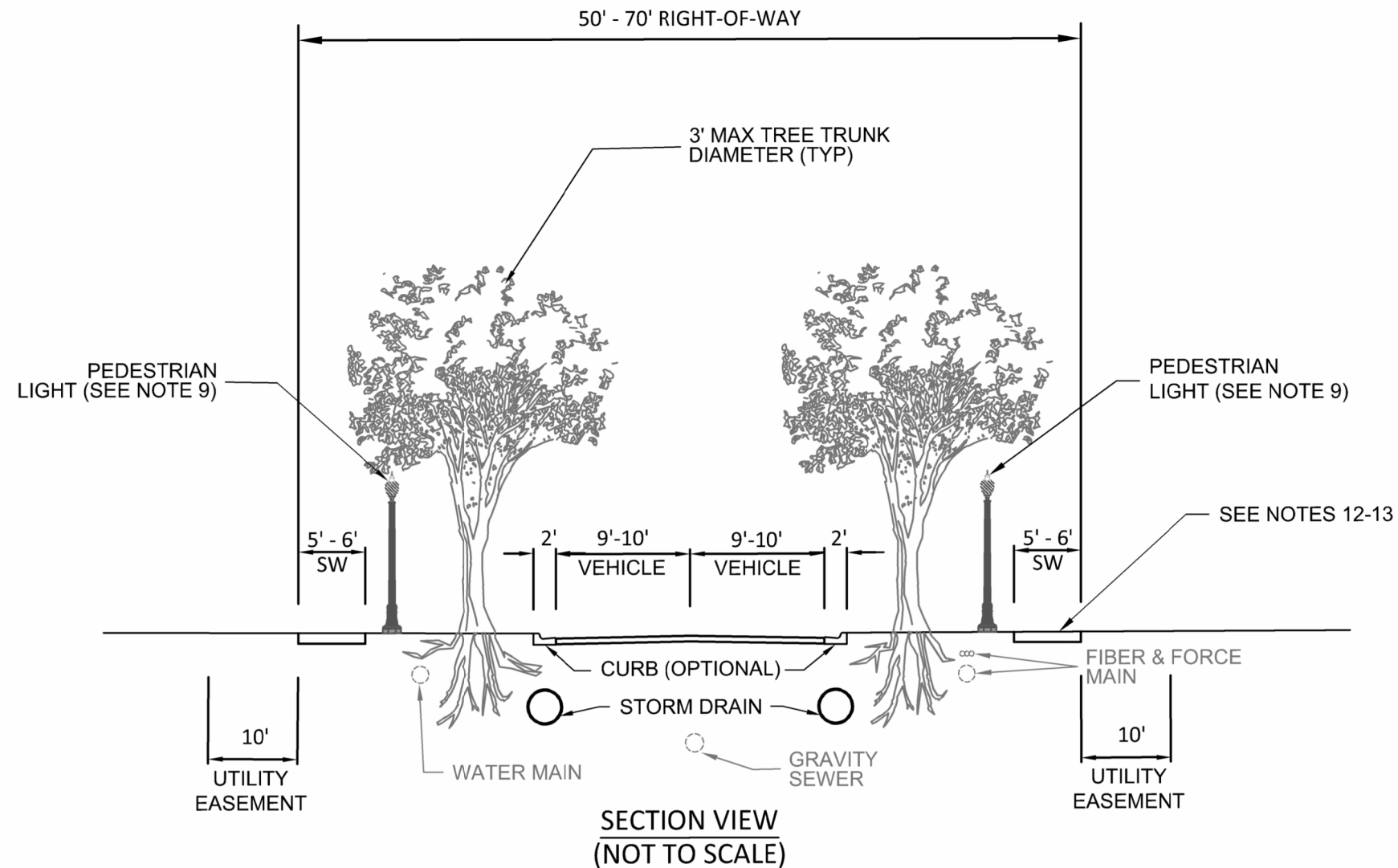
**ENGINEERING STANDARDS FOR LAND  
DEVELOPMENT**

**COMMERCIAL, RESIDENTIAL SUBDIVISION,  
AND CAPITAL IMPROVEMENT PROJECTS**

**MINOR COLLECTOR 2 LANE  
SUBDIVISION COLLECTOR 2 LANE  
MAJOR LOCAL 2 LANE**

**DATE: 09/15/25**

**SHEET: 1 of 1**



**NOTES:**

1. MINIMUM REQUIREMENTS ARE SHOWN.
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3. ALTERNATIVE SECTIONS WILL BE PROCESSED AS A VARIANCE TO THE CITY CODE.
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5. TREES, WHERE APPLICABLE, SHALL HAVE NON-INVASIVE ROOT SYSTEMS AND A CANOPY THAT HAS A VERTICAL CLEARANCE OF 13'6" AT MATURITY.
6. TREES LOCATED LESS THAN FIVE FEET TO CITY OWNED OR MAINTAINED CURB, PAVEMENT, OR SIDEWALK SHALL HAVE A ROOT BARRIER.
7. F.D.O.T. CLEAR ZONE AND SIGHT DISTANCE REQUIREMENTS SHALL BE MAINTAINED.
8. IRRIGATION FACILITIES ARE NOT SHOWN.
9. PEDESTRIAN LIGHTS OR STREET LIGHTS SHALL BE PROVIDED - SECTION SHOWS BOTH LOCATIONS FOR GUIDANCE.
10. 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.
11. REFER TO THE CITY OF PORT ST. LUCIE UTILITY SERVICE MANUAL, UTILITY STANDARDS, FOR THE PLACEMENT OF ALL UTILITIES.
12. LOCAL (70' R/W) STANDARDS:
  - LANE WIDTH = 10'
  - SIDEWALK = 5' - 6' (BOTH SIDES).
  - ALTERNATIVE SHARED USE PATH WIDTH (ONE SIDE) = 8' - 10'
13. LOCAL (50' AND 60' R/W) STANDARDS:
  - LANE WIDTH = 9' - 10'
  - SIDEWALK = 5' - 6' (ONE SIDE).



**ENGINEERING STANDARDS FOR LAND  
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**COMMERCIAL, RESIDENTIAL SUBDIVISION,  
AND CAPITAL IMPROVEMENT PROJECTS**

**LOCAL (50' - 70' R/W) 2 LANE**

**DATE: 09/15/25**

**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.

(NOTES ARE TO BE INCLUDED ON CONSTRUCTION PLANS FOR ALL ROADWAY PROJECTS)



**ENGINEERING STANDARDS FOR LAND  
DEVELOPMENT**

**COMMERCIAL, RESIDENTIAL SUBDIVISION,  
AND CAPITAL IMPROVEMENT PROJECTS**

## **ROAD CONSTRUCTION PLAN NOTES**

**DATE: 11/1/2019**

**SHEET: 1 OF 1**



## Appendix A: Applications, Forms, Worksheets

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- Plat Review Checklist
- Survey Review Checklist
- 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 VISIT THE BELOW WEBSITE FOR THE ABOVE FORMS AND APPLICATIONS TO ENSURE YOU HAVE THE MOST RECENT VERSION***

<https://www.cityofpsl.com/Government/Your-City-Government/Departments/Public-Works/Commercial-Residential-Review-Permitting/Public-Works-Forms-Documents>

## Plat Review Checklist

Applicant,

The City Surveyor's Office reviews and approves preliminary and final plats submitted through the development application process. Our goal is to make the plat review process an efficient and professional experience. We encourage the professionals preparing these plats for recording into the official records to take advantage of the same checklist we use to review the plats for compliance with Florida Statute 177. This checklist was compiled from rules contained within the Florida Statute 177 Part 1 and 3, as of 2024. In addition to the rules contained within Florida Statute 177, those additional rules required by the City of Port St. Lucie under the authority of the said statute, have been included. **This checklist should be used in the preparation of the plat by the Florida Professional Surveyor and Mapper in responsible charge.**

***The review of submitted documents by the City should not be viewed as a quality assurance/quality control service or guarantee of completeness/accuracy by the City. The review is intended to assist with protecting the public's interest with the ultimate responsibility for the content falling to the Professional Surveyor and Mapper who prepared the documents. Any plat submitted with substantial errors and omissions, that make it apparent to the City Surveyor that there was no quality control performed prior to submission, may be rejected from initial review.***

Following the City Surveyor's first review, any errors and omissions will be detailed in a letter and/or markups sent to the Florida Professional Surveyor and Mapper in responsible charge. At the discretion of the City surveyor, a field inspection is performed to verify the correct placement of the permanent reference monuments. If the field inspection does not pass, the surveyor in responsible charge must correct the deficiency and contact the City Surveyor and arrange to be onsite during the re-inspection.

Note: There may be additional City requirements beyond the City Surveyor's office review of compliance with F.S. 177.

Should you have any questions regarding the Surveying plat review process please feel free to contact the City Surveyor office directly.

[illegible]



		number of the legal entity, if any. A professional surveyor and mapper practicing independently of a legal entity must include his or her address.
<b>177.071 Approval of Plat by Governing Bodies</b>	<input type="checkbox"/>	(1) Before a plat is offered for recording, it must be approved by the appropriate governing body, and evidence of such approval must be placed on the plat. If not approved, the governing body must return the plat to the professional surveyor and mapper or the legal entity offering the plat for recordation. For the purposes of this part: (a) When the plat to be submitted for approval is located wholly within the boundaries of a municipality, the governing body of the municipality has exclusive jurisdiction to approve the plat. (b) When a plat lies wholly within the unincorporated areas of a county, the governing body of the county has exclusive jurisdiction to approve the plat. (c) When a plat lies within the boundaries of more than one governing body, two plats must be prepared and each governing body has exclusive jurisdiction to approve the plat within its boundaries, unless the governing bodies having said jurisdiction agree that one plat is mutually acceptable.
	<input type="checkbox"/>	(2) Any provision in a county charter, or in an ordinance of any charter county or consolidated government chartered under s. 6(e), Art. VIII of the State Constitution, which provision is inconsistent with anything contained in this section shall prevail in such charter county or consolidated government to the extent of any such inconsistency.
<b>177.081 Dedication and Approval</b>	<input type="checkbox"/>	(1) Prior to approval by the appropriate governing body, the plat shall be reviewed for conformity to this chapter by a professional surveyor and mapper either employed by or under contract to the local governing body, the costs of which shall be borne by the legal entity offering the plat for recordation, and evidence of such review must be placed on such plat.
	<input type="checkbox"/>	(2) Every plat of a subdivision filed for record must contain a dedication by the owner or owners of record. The dedication must be executed by all persons, corporations, or entities whose signature would be required to convey record fee simple title to the lands being dedicated in the same manner in which deeds are required to be executed. All mortgagees having a record interest in the lands subdivided shall execute, in the same manner in which deeds are required to be executed, either the dedication contained on the plat or a separate instrument joining in and ratifying the plat and all dedications and reservations thereon.
	<input type="checkbox"/>	(3) When a tract or parcel of land has been subdivided and a plat thereof bearing the dedication executed by the owners of record and mortgagees having a record interest in the lands subdivided, and when the approval of the governing body has been secured and recorded in compliance with this part, all streets, alleys, easements, rights-of-way, and public areas shown on such plat, unless otherwise stated, shall be deemed to have been dedicated to the public for the uses and purposes thereon stated. However, nothing herein shall be construed as creating an obligation upon any governing body to perform any act of construction or maintenance within such dedicated areas except when the obligation is voluntarily assumed by the governing body.



## Plat Review Checklist

<p><b>177.091</b> <b>Plats Made for Recording</b></p>	<p><input type="checkbox"/> Every plat of a subdivision offered for recording shall conform to the following:</p> <ol style="list-style-type: none"> <li>(1) It must be: <ol style="list-style-type: none"> <li>(a) An original drawing made with black permanent drawing ink; or</li> <li>(b) A nonadhered scaled print on a stable base film made by photographic processes from a film scribing tested for residual hypo testing solution to assure permanency.</li> </ol> </li> </ol> <p>Marginal lines, standard certificates and approval forms shall be printed on the plat with a permanent black drawing ink. A print or photographic copy of the original drawing must be submitted with the original drawing.</p> <p>(2) The size of each sheet shall be determined by the local governing body and shall be drawn with a marginal line, or printed when permitted by local ordinance, completely around each sheet and placed so as to leave at least a 1/2-inch margin on each of three sides and a 3-inch margin on the left side of the plat for binding purposes.</p> <p>(3) When more than one sheet must be used to accurately portray the lands subdivided, an index or key map must be included and each sheet must show the particular number of that sheet and the total number of sheets included, as well as clearly labeled match lines to show where other sheets match or adjoin.</p> <p>(4) In all cases, the letter size and scale used shall be of sufficient size to show all detail. The scale shall be both stated and graphically illustrated by a graphic scale drawn on every sheet showing any portion of the lands subdivided.</p> <p>(5) The name of the plat shall be shown in bold legible letters, as stated in s. 177.051. The name of the subdivision shall be shown on each sheet included. The name of the professional surveyor and mapper or legal entity, along with the street and mailing address, must be shown on each sheet included.</p> <p>(6) A prominent “north arrow” shall be drawn on every sheet included showing any portion of the lands subdivided. The bearing or azimuth reference shall be clearly stated on the face of the plat in the notes or legend, and, in all cases, the bearings used shall be referenced to some well established and monumented line.</p> <p>(7) Permanent reference monuments must be placed at each corner or change in direction on the boundary of the lands being platted and may not be more than 1,400 feet apart. Where such corners are in an inaccessible place, “P.R.M.s” shall be set on a nearby offset within the boundary of the plat and such offset shall be so noted on the plat. Where corners are found to coincide with a previously set “P.R.M.,” the Florida registration number of the professional surveyor and mapper in responsible charge or the certificate of authorization number of the legal entity on the previously set “P.R.M.” shall be shown on the new plat or, if unnumbered, shall so state. Permanent reference monuments shall be set before the recording of the plat. The “P.R.M.s” shall be shown on the plat by an appropriate symbol or designation.</p> <p>(8) Permanent control points shall be set on the centerline of the right-of-way at the intersection and terminus of all streets, at each change of direction, and no more than</p>
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## Plat Review Checklist

<p><b>177.091</b> <b>Plats Made for Recording</b> <i>(continued)</i></p>	<p>1,000 feet apart. Such “P.C.P.s” shall be shown on the plat by an appropriate symbol or designation. In those counties or municipalities that do not require subdivision improvements and do not accept bonds or escrow accounts to construct improvements, “P.C.P.s” may be set prior to the recording of the plat and must be set within 1 year of the date the plat was recorded. In the counties or municipalities that require subdivision improvements and have the means of insuring the construction of said improvements, such as bonding requirements, “P.C.P.s” must be set prior to the expiration of the bond or other surety. If the professional surveyor and mapper or legal entity of record is no longer in practice or is not available due to relocation, or when the contractual relationship between the subdivider and professional surveyor and mapper or legal entity has been terminated, the subdivider shall contract with a professional surveyor and mapper or legal entity in good standing to place the “P.C.P.s” within the time allotted.</p> <p><input type="checkbox"/> (9) Monuments shall be set at all lot corners, points of intersection, and changes of direction of lines within the subdivision which do not require a “P.R.M.” or a “P.C.P.”; however, a monument need not be set if a monument already exists at such corner, point, or change of direction or when a monument cannot be set due to a physical obstruction. In those counties or municipalities that do not require subdivision improvements and do not accept bonds or escrow accounts to construct improvements, monuments may be set prior to the recording of the plat and must be set at the lot corners before the transfer of the lot. In those counties or municipalities that require subdivision improvements and have the means of ensuring the construction of those improvements, such as bonding requirements, monuments shall be set prior to the expiration of the bond or other surety. If the professional surveyor and mapper or legal entity of record is no longer in practice or is not available due to relocation, or when the contractual relationship between the subdivider and professional surveyor and mapper or legal entity has been terminated, the subdivider shall contract with a professional surveyor and mapper or legal entity in good standing who shall be allowed to place the monuments within the time allotted.</p> <p><input type="checkbox"/> (10) The section, township, and range shall appear immediately under the name of the plat on each sheet included, along with the name of the city, town, village, county, and state in which the land being platted is situated.</p> <p><input type="checkbox"/> (11) Each plat shall show a description of the lands subdivided, and the description shall be the same in the title certification. The description must be so complete that from it, without reference to the plat, the starting point and boundary can be determined.</p> <p><input type="checkbox"/> (12) The dedications and approvals required by ss. 177.071 and 177.081 must be shown.</p> <p><input type="checkbox"/> (13) The circuit court clerk’s certificate and the professional surveyor and mapper’s seal and statement required by s. 177.061 shall be shown.</p> <p><input type="checkbox"/> (14) All section lines and quarter section lines occurring within the subdivision shall be indicated by lines drawn upon the map or plat, with appropriate words and figures. If the description is by metes and bounds, all information called for, such as the point of commencement, course bearings and distances, and the point of beginning, shall be</p>
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## Plat Review Checklist

		indicated. If the platted lands are in a land grant or are not included in the subdivision of government surveys, then the boundaries are to be defined by metes and bounds and courses.
<b>177.091</b> <b>Plats Made for</b> <b>Recording (continued)</b>	<input type="checkbox"/>	(15) Location, width, and names of all streets, waterways, or other rights-of-way shall be shown, as applicable.
	<input type="checkbox"/>	(16) Location and width of proposed easements and existing easements identified in the title opinion or property information report required by s. 177.041(2) must be shown on the plat or in the notes or legend, and their intended use shall be clearly stated. Where easements are not coincident with property lines, they must be labeled with bearings and distances and tied to the principal lot, tract, or right-of-way.
	<input type="checkbox"/>	(17) All contiguous properties shall be identified by subdivision title, plat book, and page, or, if unplatted, land shall be so designated. If the subdivision platted is a part or the whole of a previously recorded subdivision, sufficient ties shall be shown to controlling lines appearing on the earlier plat to permit an overlay to be made; the fact of its being a replat shall be stated as a subtitle under the name of the plat on each sheet included. The subtitle must state the name of the subdivision being replatted and the appropriate recording reference.
	<input type="checkbox"/>	(18) All lots shall be numbered either by progressive numbers or, if in blocks, progressively numbered in each block, and the blocks progressively numbered or lettered, except that blocks in numbered additions bearing the same name may be numbered consecutively throughout the several additions.
	<input type="checkbox"/>	(19) Sufficient survey data shall be shown to positively describe the bounds of every lot, block, street easement, and all other areas shown on the plat. When any lot or portion of the subdivision is bounded by an irregular line, the major portion of that lot or subdivision shall be enclosed by a witness line showing complete data, with distances along all lines extended beyond the enclosure to the irregular boundary shown with as much certainty as can be determined or as "more or less," if variable. Lot, block, street, and all other dimensions except to irregular boundaries, shall be shown to a minimum of hundredths of feet. All measurements shall refer to horizontal plane and in accordance with the definition of the U.S. Survey foot or meter adopted by the National Institute of Standards and Technology. All measurements shall use the $39.37 \div 12 = 3.2808333333$ equation for conversion from a U.S. foot to meters.
	<input type="checkbox"/>	(20) Curvilinear lot lines shall show the radii, arc distances, and central angles. Radial lines will be so designated. Direction of nonradial lines shall be indicated.
	<input type="checkbox"/>	(21) Sufficient angles, bearings, or azimuth to show direction of all lines shall be shown, and all bearings, angles, or azimuth shall be shown to the nearest second of arc.
	<input type="checkbox"/>	(22) The centerlines of all streets shall be shown as follows: noncurved lines: distances together with either angles, bearings, or azimuths; curved lines: arc distances, central angles, and radii, together with chord and chord bearing or azimuths.
	<input type="checkbox"/>	(23) Park and recreation parcels as applicable shall be so designated.

## Plat Review Checklist

	<input type="checkbox"/> (24) All interior excepted parcels as described in the description of the lands being subdivided shall be clearly indicated and labeled “Not a part of this plat.” <input type="checkbox"/> (25) The purpose of all areas dedicated must be clearly indicated or stated on the plat.
<b>177.091</b> <b>Plats Made for Recording</b> <i>(continued)</i>	<input type="checkbox"/> (26) When it is not possible to show line or curve data information on the map, a tabular form may be used. The tabular data must appear on the sheet to which it applies. <input type="checkbox"/> (27) The plat shall include in a prominent place the following statements: “NOTICE: This plat, as recorded in its graphic form, is the official depiction of the subdivided lands described herein and will in no circumstances be supplanted in authority by any other graphic or digital form of the plat. There may be additional restrictions that are not recorded on this plat that may be found in the public records of this county.” <input type="checkbox"/> (28) All platted utility easements shall provide that such easements shall also be easements for the construction, installation, maintenance, and operation of cable television services; provided, however, no such construction, installation, maintenance, and operation of cable television services shall interfere with the facilities and services of an electric, telephone, gas, or other public utility. In the event a cable television company damages the facilities of a public utility, it shall be solely responsible for the damages. This section shall not apply to those private easements granted to or obtained by a particular electric, telephone, gas, or other public utility. Such construction, installation, maintenance, and operation shall comply with the National Electrical Safety Code as adopted by the Florida Public Service Commission. <input type="checkbox"/> (29) A legend of all symbols and abbreviations shall be shown.
<b>177.507</b> <b>Certification of Corners</b>	<input type="checkbox"/> Every surveyor and mapper not under contract to the department for the execution of this act who, in any survey or resurvey made under his or her direction, identifies, recovers, reestablishes, remonuments, restores, or uses as control a public land survey corner or corner accessory must, within 90 days after completion of the survey, file with the department a certified corner record for each such corner or corner accessory, unless the corner or its accessories are substantially as described in a previously filed corner record. The record shall be signed, embossed with the official seal of the surveyor and mapper, and produced on material suitable for reproduction or microfilming. The 90-day limitation may be extended with permission of the department.

## Plat Review Checklist

<p><b>Additional City Requirements</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The supporting boundary survey shall reference and show the disposition of all encumbrances listed within the title opinion of an attorney at law licensed in Florida or a property information report.</li> <li><input type="checkbox"/> Copies of a closure report for the parent boundary are required for all boundary and subdivision plat submissions. At the discretion of the City Surveyor, closure reports for all interior parcels and newly created easements may be required.</li> <li><input type="checkbox"/> All text shall be a minimum size of one-tenth inch in height.</li> <li><input type="checkbox"/> The sheet size must be 24-inch by 36-inch with no less than one-inch margins on the top, bottom and right sides and three-inch margin on the left side for binding purposes.</li> <li><input type="checkbox"/> The scale of the plat is greater than or equal to 1"= 50'. An alternate scale, if previously approved by the City Surveyor, may be used if the lots or parcels are large.</li> <li><input type="checkbox"/> The first sheet of the plat must contain a vicinity map illustrating the subdivision location in reference to major roadways and adjoining properties.</li> <li><input type="checkbox"/> All Tracts, Parcels, Lots, etc, must have area values labeled by either acreage or square feet.</li> <li><input type="checkbox"/> Tangent line tables shall not be permitted unless the city surveyor issues prior written approval.</li> <li><input type="checkbox"/> Prior to recordation, a CAD file, (.dwg or .dgn format) that is compatible with AutoCAD version 12 or later must be provided to the city, showing all final plat info. The coordinate positions within this file are to be rotated and translated to state plane coordinates in the Florida East Zone, North American Datum 1983 – Adjustment of 1999 (NAD 83/90) or later.</li> <li><input type="checkbox"/> Applicant must submit a response memo, detailing each comment has been addressed, with the resubmission of all boundary surveys and plats.</li> </ul>
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## Survey Review Checklist

Applicant,

The City Surveyor's office reviews and approves boundary surveys and sketch & legal descriptions submitted through the development application process and for various other purposes. Our goal is to make the survey review process an efficient and professional experience. We encourage the professionals preparing these surveys to take advantage of the same checklist we use to review the surveys for compliance with Florida Administrative Code 5J-17. This checklist was compiled from rules contained within the F.A.C. 5J-17, as of 2024. **This checklist should be used in the preparation of the boundary surveys by the Florida Professional Surveyor and Mapper in responsible charge.**

***The review of submitted documents by the City should not be viewed as a quality assurance/quality control service or guarantee of completeness/accuracy by the City. The review is intended to assist with protecting the public's interest with the ultimate responsibility for the content falling to the Professional Surveyor and Mapper who prepared the documents.***

Following the City Surveyor's first review, any errors and omissions will be detailed in a letter and/or markups sent to the Florida Professional Surveyor and Mapper in responsible charge.

Note: There may be additional City requirements beyond the Surveyor's review of compliance with F.A.C. 5J-17

Should you have any questions regarding the Surveying review process please feel free to contact the City Surveyors office directly.



## Survey Review Checklist

F.A.C.	Comply	
<b>5J-17.051 Standards of Practice – General Survey, Map, and Report Content Requirements</b>		<p>The following rules shall apply to all work products regardless of the method of data acquisition:</p> <p>(1) Surveyors and mappers must achieve the following standards of accuracy, completeness, and quality:</p> <p>(2) The accuracy of the survey measurements shall be premised upon the type of survey and the expected use of the survey and map. The accuracy of data shall be independently verified.</p> <p>(a) Vertical Accuracy:</p> <p>All surveying and mapping products with elevation data shall state the datum and a description of the control upon which the surveying and mapping products are based. The data shall be supported with documentation describing the vertical accuracy and the methodology used to determine accuracy. Elevation data may be obtained on an assumed datum provided the base elevation of the assumed datum is obviously different than a publicly published datum and clearly noted.</p> <p>(b) Horizontal Accuracy:</p> <p>All surveying and mapping products expressing or displaying mapped features shall state the datum and a detailed description of the control upon which the surveying and mapping products are based. The data shall be supported with documentation describing the horizontal accuracy and the methodology used to determine accuracy. Mapped features may be obtained on an assumed datum provided the numerical basis of the datum is obviously different than a publicly published datum.</p> <p>(c) Assumed datum:</p> <p>If data is collected on an assumed datum, then adequate control points shall be established and communicated in the surveying and mapping product in order that the survey may be independently reproduced and verified.</p> <p>(d) Measurement and computation records shall be dated as of the date of acquisition and must contain sufficient data to substantiate the surveying and mapping products.</p> <p>(3) Surveys, Maps, and/or Survey Products Content.</p> <p>(a) The licensee must adequately communicate the survey results to the public through a map or report with an attached map.</p> <p>(b) Each survey map and report shall state the type and/or purpose of the survey it depicts.</p> <p>(c) All survey maps and reports must bear the name, certificate of authorization number, and street and mailing address of the business entity issuing the map and report, along with the name and license number of the surveyor and mapper in responsible charge. The name, license number, and street and mailing address of a surveyor and mapper practicing independent of any business entity must be shown on each survey map and report.</p> <p>(d) All survey maps must reflect a survey date, which is the last date of data acquisition. When the graphics of a map are revised, but the survey date stays the same, the map must list dates for all revisions.</p>

## Survey Review Checklist

		<p>(e) The survey map and report and the copies of the survey map and report, except those with electronic signature and electronic seal, must contain a statement indicating that the survey map and report or the copies thereof are not valid without the original signature and seal of a Florida licensed surveyor and mapper.</p> <p>(f) Abbreviations related to surveying matters shall be defined on the work product.</p> <p>(g) A reference to all bearings shown on a survey map or report must be clearly stated, i.e., whether to “True North”; “Grid North as established by the NOS”; “Assumed North based on a bearing for a well defined line, such as the center line of a road or right of way, etc.”; “a Deed Call for a particular line”; or “the bearing of a particular line shown upon a plat.” References to Magnetic North should be avoided except in the cases where a comparison is necessitated by a Deed Call. In all cases, the bearings used shall be referenced to some well-established and monumented line.</p> <p>(h) A designated “north arrow” and either a stated scale or graphic scale of the map shall be prominently shown upon the survey map.</p> <p>(i) The responsibility for all mapped features must be clearly stated on any map or report signed by a Florida licensed surveyor and mapper. When mapped features surveyed by the signing surveyor and mapper have been integrated with mapped features surveyed by others, then the map or report shall clearly state the individual primarily responsible for the map or report.</p>
<b>5J-17.052 Standards of Practice – Boundary Survey Requirements</b>		<p>(1) Boundaries of Real Property:</p> <p>(a) The surveyor and mapper shall make a determination of the position of the boundary of real property in complete accord with the real property description shown on the survey map or report and map. In order to ensure adequate and defensible real property boundary locations:</p> <ol style="list-style-type: none"> <li>1. Every parcel of land whose boundaries are surveyed shall be made to conform with the record boundaries of such land, taking into account relevant requirements of law concerning whether the survey is original or a resurvey.</li> <li>2. Prior to making the survey, the licensee shall perform research of records with sufficient scope and depth to identify with reasonable certainty: <ol style="list-style-type: none"> <li>a. The location of the record boundaries,</li> <li>b. Conflicting record and ownership boundary locations within, abutting or affecting the property or access to same,</li> <li>c. None of the above is intended to require the surveyor to perform a title search.</li> </ol> </li> <li>3. A field survey shall be made locating monuments and evidence of occupation, appropriate or necessary and coordinate the facts of said survey with the analysis of the record boundaries.</li> </ol>



## Survey Review Checklist

		<p>(b) Monuments shall be set or held as marking the corners after a well-reasoned analysis by the licensee.</p> <p>(c) All boundary surveys shall result in a map (hardcopy and/or digital) and it shall be stated on the map that the survey is a "Boundary Survey."</p> <p>(d) Any discrepancies between the survey map and the real property description shall be shown.</p> <p>(e) Survey data shall be shown to positively describe the boundaries of the surveyed property. For portions of the property bounded by an irregular line, distances and directions to the irregular boundary shall be shown with as much certainty as can be determined or as "more or less," if variable.</p> <p>(f) Surveys of all or part of a lot(s) which is part of a recorded subdivision shall show the lot(s) and block numbers or other designations, including those of adjoining lots.</p> <p>(g) Surveys of parcels described by metes and bounds shall show all information called for in the property description, including point of commencement, course bearings and distances, and point of beginning.</p> <p>(h) When the results of the survey differ significantly from the record, or if a fundamental decision related to the boundary resolution is not clearly reflected on the plat or map, the surveyor shall explain this information with notes on the face of the plat or map.</p> <p>(i) Surveys of parcels with water boundaries shall describe the feature located including, top of bank, edge of water, mean high water line, ordinary high water line and the method used to locate the water boundary. Water boundaries may be located in their approximate position as long as this is adequately depicted and explained with notes on the face of the plat or map.</p> <p>(2) Boundary Monuments:</p> <p>(a) The surveyor and mapper shall set monuments as defined herein, unless monuments already exist or cannot be set due to physical obstructions at corners.</p> <p>(b) Every boundary monument set shall:</p> <ol style="list-style-type: none"> <li>1. Be composed of a durable material,</li> <li>2. Have a minimal length of 18 inches,</li> <li>3. Have a minimum cross-section area of material of 0.20 square inches,</li> <li>4. Be identified with a durable marker or cap bearing either the Florida license number of the surveyor and mapper in responsible charge, the certificate of authorization number of the business entity; or name of the business entity,</li> <li>5. Be detectable with conventional instruments for finding ferrous or magnetic objects,</li> <li>6. When a corner falls in a hard surface such as asphalt or concrete, alternate monumentation may be used that is durable and identifiable,</li> <li>7. When conditions require setting a monument on an offset, whenever possible, the location should be selected so the monument lies on a boundary line.</li> </ol> <p>(c) All monuments, found or placed, must be described on the survey map. The corner descriptions shall state the size, material, and cap identification of the monument as well as whether the monument was found or set. Offset monuments shall be noted as such on the</p>
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## Survey Review Checklist

	<p>survey map along with the offset distance to the true corner. Building corners are acceptable as monuments so long as use of the building corners as monumentation is clearly noted on the map.</p> <p>(d) For irregular boundaries such as a water body or maintained right of way, a dimensioned meander or survey closure line shall be used and monuments shall be set at the meander or survey closure line's terminus points on real property boundary lines.</p> <p>(e) A boundary survey updating a previous survey made by the same surveyor and mapper or business entity, and which is performed for the purpose of locating non-completed new improvements by measurements to the property lines or related offset lines placed on the property since the previous survey, need not have the property corners reset.</p> <p>(f) Side ties to locate or set monuments shall be substantiated by multiple measurements.</p> <p>(3) Boundary Inconsistencies:</p> <p>(a) Potential boundary inconsistencies shall be addressed and shall be clearly indicated and explained on the survey map or in the report. Where evidence of inconsistency is found, the nature of the inconsistency shall be shown upon the survey map, such as:</p> <ol style="list-style-type: none"> <li>1. Overlapping descriptions or hiatuses,</li> <li>2. Excess or deficiency,</li> <li>3. Conflicting boundary lines or monuments, or</li> <li>4. Doubt as to the location on the ground of survey lines or property rights.</li> </ol> <p>(b) Open and notorious evidence of boundary lines, such as fences, walls, buildings, monuments or otherwise, shall be shown upon the map, together with dimensions sufficient to show their relationship to the boundary line(s).</p> <p>(c) All apparent physical use onto or from adjoining property must be indicated, with the extent of such use shown or noted upon the map.</p> <p>(d) In all cases where foundations may violate deed or easement lines and are beneath the surface, failure to determine their location shall be noted upon the map or report.</p> <p>(4) Rights-of-Way, Easements, and Other Real Property Concerns:</p> <p>(a) All recorded public and private rights-of-way shown on applicable recorded plats adjoining or across the land being surveyed shall be located and shown upon the map.</p> <p>(b) Easements shown on applicable record plats or open and notorious evidence of easements or rights-of-way on or across the land being surveyed shall be located and shown upon the map.</p> <p>(c) When streets or street rights-of-way abutting the land surveyed are physically closed to travel, a note to this effect shall be shown upon the map.</p> <p>(d) When location of easements or rights-of-way of record, other than those on record plats, is required, this information must be furnished to the surveyor and mapper.</p> <p>(e) Human cemeteries and burial grounds located within the premises shall be located and shown upon the map when open and notorious, or when knowledge of their existence and location is furnished to the surveyor and mapper.</p> <p>(5) Real Property Improvements:</p> <p>(a) Location of fixed improvements pertinent to the survey shall be graphically shown</p>
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## Survey Review Checklist

		<p>upon the map and their positions shall be dimensioned in reference to the boundaries, either directly or by offset lines.</p> <p>(b) When fixed improvements are not located or do not exist, a note to this effect shall be shown upon the map.</p> <p>(c) When a boundary survey updating a previous boundary survey is made by the same surveyor or survey firm for purpose of locating non-completed new improvements, then property corners need not be reset; however, when a boundary survey is updating a previous survey made by the same surveyor or survey firm and is performed for purpose of locating completed new improvements then property corners must be recovered or reset. When a boundary survey updates a previous boundary survey made by a different surveyor or survey firm for the purpose of locating either non-completed or completed new improvements, then property corners must be recovered or reset.</p> <p>(6) Descriptions/Sketch to Accompany Description:</p> <p>(a) Descriptions written by a surveyor and mapper to describe land boundaries by metes and bounds shall provide definitive identification of boundary lines.</p> <p>(b) When a sketch accompanies the property description, it shall show all information referenced in the description and shall state that such sketch is not a survey. The initial point in the description shall be tied to either a government corner, a recorded corner, or some other well-established survey point.</p>
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## **Appendix B: Traffic Calming Policy and Guidelines**

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**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<sup>1</sup> are self-enforcing. Traffic calming measures generally serve one of the following three functions<sup>2</sup>:

- 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<sup>3</sup> 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;

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<sup>1</sup> Traffic Calming Measure - an element of a traffic calming plan selected from among those devices authorized herein for use within the city.

<sup>2</sup> Federal Highway Administration “*Traffic Calming State of the Practice*” (FHWA-RD-99-135)

<sup>3</sup> “*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<sup>4</sup> and collector streets<sup>5</sup> are eligible to be considered for traffic calming measures following this policy, guidelines, and criteria.
- City-owned arterial roads<sup>6</sup> 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<sup>7</sup> 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

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<sup>4</sup> As defined by the “Port St. Lucie Functional Classification” provided in the Transportation Element of the City’s Comprehensive Plan.

<sup>5</sup> As defined by the “Port St. Lucie Functional Classification” provided in the Transportation Element of the City’s Comprehensive Plan.

<sup>6</sup> As defined by the “Port St. Lucie Functional Classification” provided in the Transportation Element of the City’s Comprehensive Plan.

<sup>7</sup> 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<sup>8</sup>, speed study<sup>9</sup>, 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:

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<sup>8</sup> Traffic Count - a manual or automated count of the number of vehicles traversing a street.

<sup>9</sup> Speed Study - a study using equipment to measure, collect, and statistically analyze the speeds of vehicles.

- The measured 85<sup>th</sup> percentile speed<sup>10</sup> 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 85<sup>th</sup> 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.

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<sup>10</sup> 85<sup>th</sup> Percentile Speed - speed at which 85% of the vehicles are traveling at or below. For the purposes of this Policy, the 85<sup>th</sup> Percentile Speed considered will be the average 85<sup>th</sup> 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<sup>11</sup> 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.

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<sup>11</sup> 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:

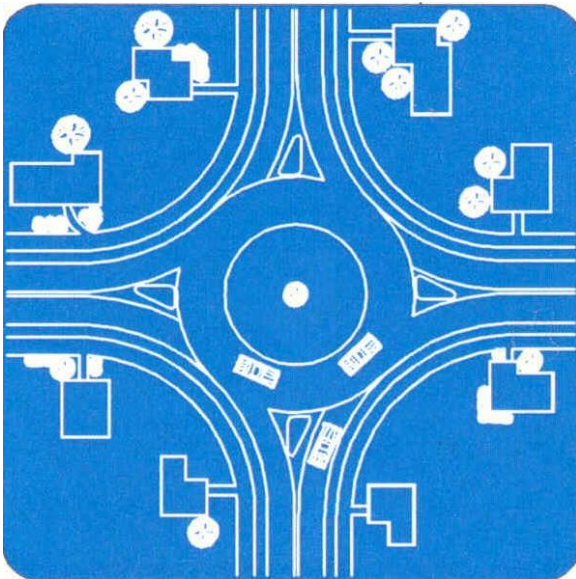
- Emergency response is significantly impacted.
- The traffic count for the street exceeds 5,000 vehicles per day.
- Determination by the Public Works Director that it is in the best interest of public safety.

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:

- 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.

### Disadvantages:

- 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

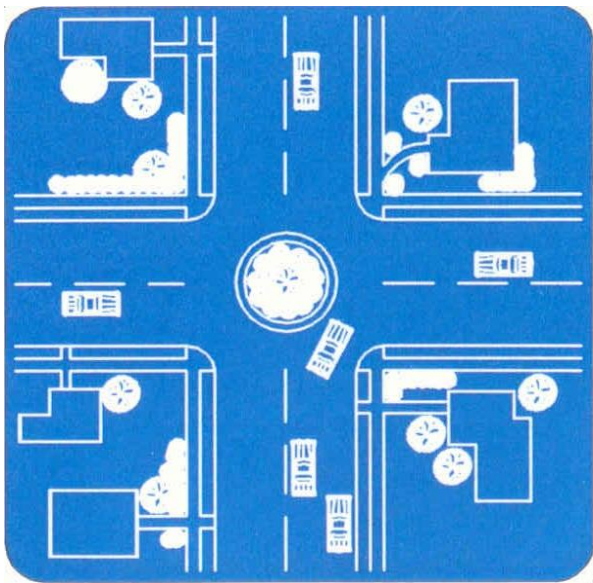
### Effectiveness:

- 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*)

### Similar Measures:

- 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.

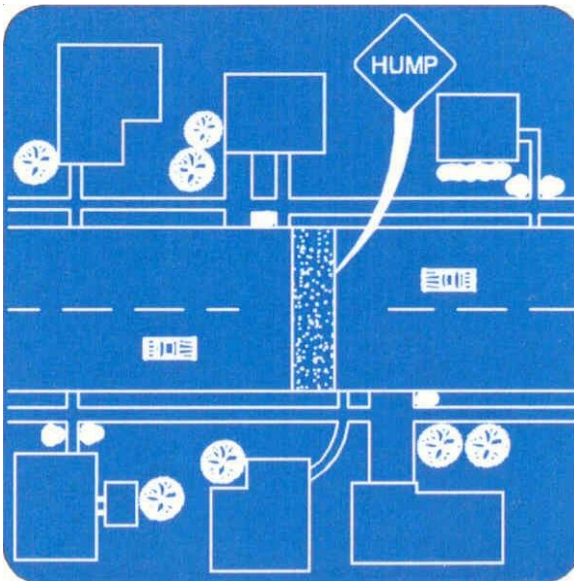
**Good for:** Calming intersections, especially within neighborhoods, where large vehicle traffic is not a major concern but speeds, volumes, and safety are problems.

Advantages:	Disadvantages:
<ul style="list-style-type: none"><li>• Very effective in moderating speeds and improving safety</li><li>• If designed well, they can have positive aesthetic value</li><li>• Placed at an intersection, they can calm two streets at once</li></ul>	<ul style="list-style-type: none"><li>• Difficult for large vehicles (such as fire trucks) to circumnavigate</li><li>• May require the elimination of some on-street parking</li><li>• Landscaping must be maintained by the property owners or by the municipality</li></ul>

**Cost Estimate:** \$25,000 - \$150,000

Effectiveness:	Similar Measures:
<ul style="list-style-type: none"><li>• 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)</li><li>• 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)</li></ul>	<ul style="list-style-type: none"><li>• By placing a raised island in a midblock location, you have a Center Island Narrowing</li><li>• 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</li></ul>

## 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:

- Relatively inexpensive
- Relatively easy for bicycles to cross if designed appropriately
- Very effective in slowing travel speeds

### Disadvantages:

- 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):

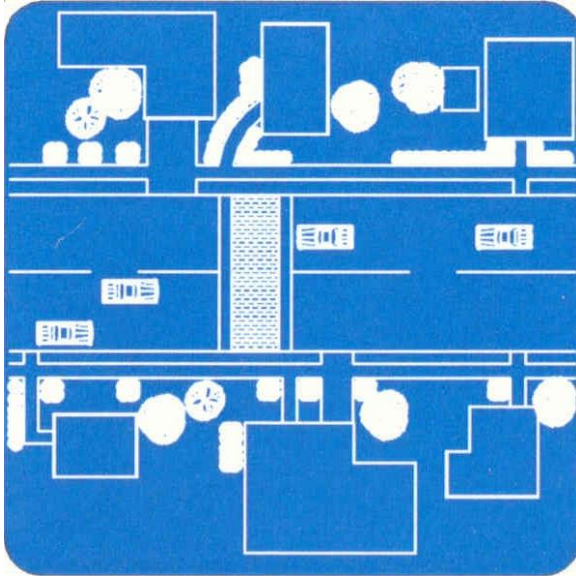
- Average of 22% decrease in the 85th percentile travel speeds, or from an average of 35.0 to 27.4 miles per hour; (from a sample of 179 sites)
- Average of 11% decrease in accidents, or from an average of 2.7 to 2.4 accidents per year (from a sample of 49 sites)

### Similar Measures:

- 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:

- Smoother on large vehicles (such as fire trucks) than speed humps
- Effective in reducing speeds, though not to the extent of speed humps

### Disadvantages:

- 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

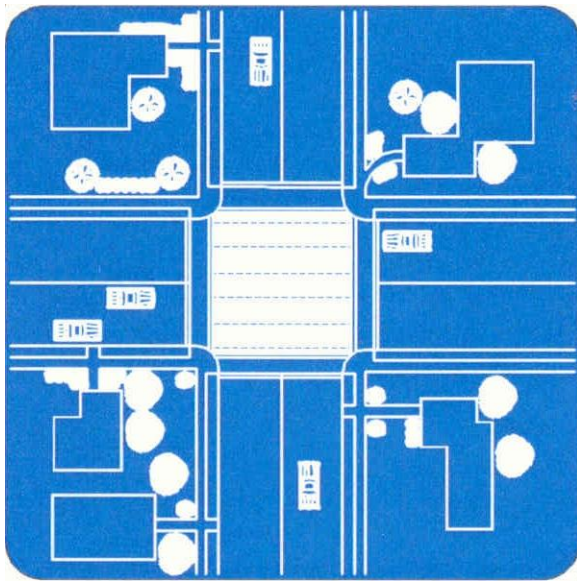
### Effectiveness (22' Table):

- 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 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:

- Improves safety for both pedestrians and vehicles
- Can have positive aesthetic value
- Calms two streets at once

### Disadvantages:

- 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

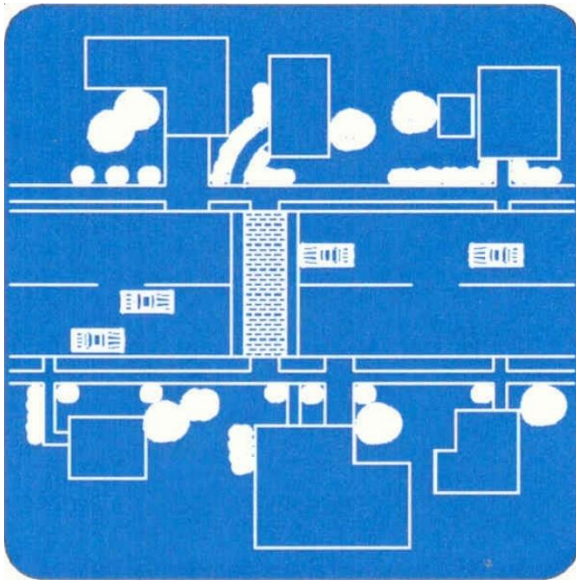
### Effectiveness:

- 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)

### Similar Measures:

- 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:

- |   |  |
|---|--|
| <input type="checkbox"/> Speed of automobile traffic  | <input type="checkbox"/> Cut-through traffic                             |
| <input type="checkbox"/> Volume of automobile traffic | <input type="checkbox"/> High pedestrian volume                          |
| <input type="checkbox"/> Number of accidents          | <input type="checkbox"/> Lack of amenities (sidewalks, crosswalks, etc.) |

Please elaborate on the specific problems on your street or in your neighborhood:

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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
Airosa 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
	Village Parkway	Savona Blvd	Urban Collector	Urban Principal Arterial
Becker Road	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
	Del Rio Boulevard	Savona Blvd	Urban Collector	NDA
California Boulevard	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
	Del Rio Boulevard	Crosstown Parkway	Urban Collector	Urban Minor Arterial
Cashmere Boulevard	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
			Urban Minor Arterial	
			Urban Minor Arterial	
			FIHS	
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
LTC Parkway	Walton Road	North City Limit	NDA	Urban Minor Arterial
Lyngate Drive	Midway Road	Glades Cut-Off Road	NDA	NDA
Manville Drive	Veteran's Memorial Parkway	U.S. 1	Urban Collector	Urban Minor Arterial
Mariposa Avenue	Selvitiz Road	St. James Drive	NDA	Urban Collector
Melaleuca Boulevard	Lennard Road	Calais Street	Urban Collector	Urban Collector
Midway Road <sup>(1)</sup>	Lennard Road	Green River Parkway	Urban Collector	Urban Principal Arterial
	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	Selvitiz 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 <sup>(1)</sup>	South City Limit	Midway Road	Urban Minor Arterial	Urban Minor Arterial
Rosser Boulevard	Gatin Boulevard	Paar Drive	Urban Collector	Urban Collector
Savage Boulevard	Import Drive	Gatin 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
Selvitiz 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

<sup>(1)</sup> Not maintained by City of Port St. Lucie.

## Appendix C: Beautification Policy Guidelines

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# 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



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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.



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# PORT ST. LUCIE BEAUTIFICATION POLICY GUIDELINES

Port St. Lucie, Florida



CULPEPPER & TERPENING, INC  
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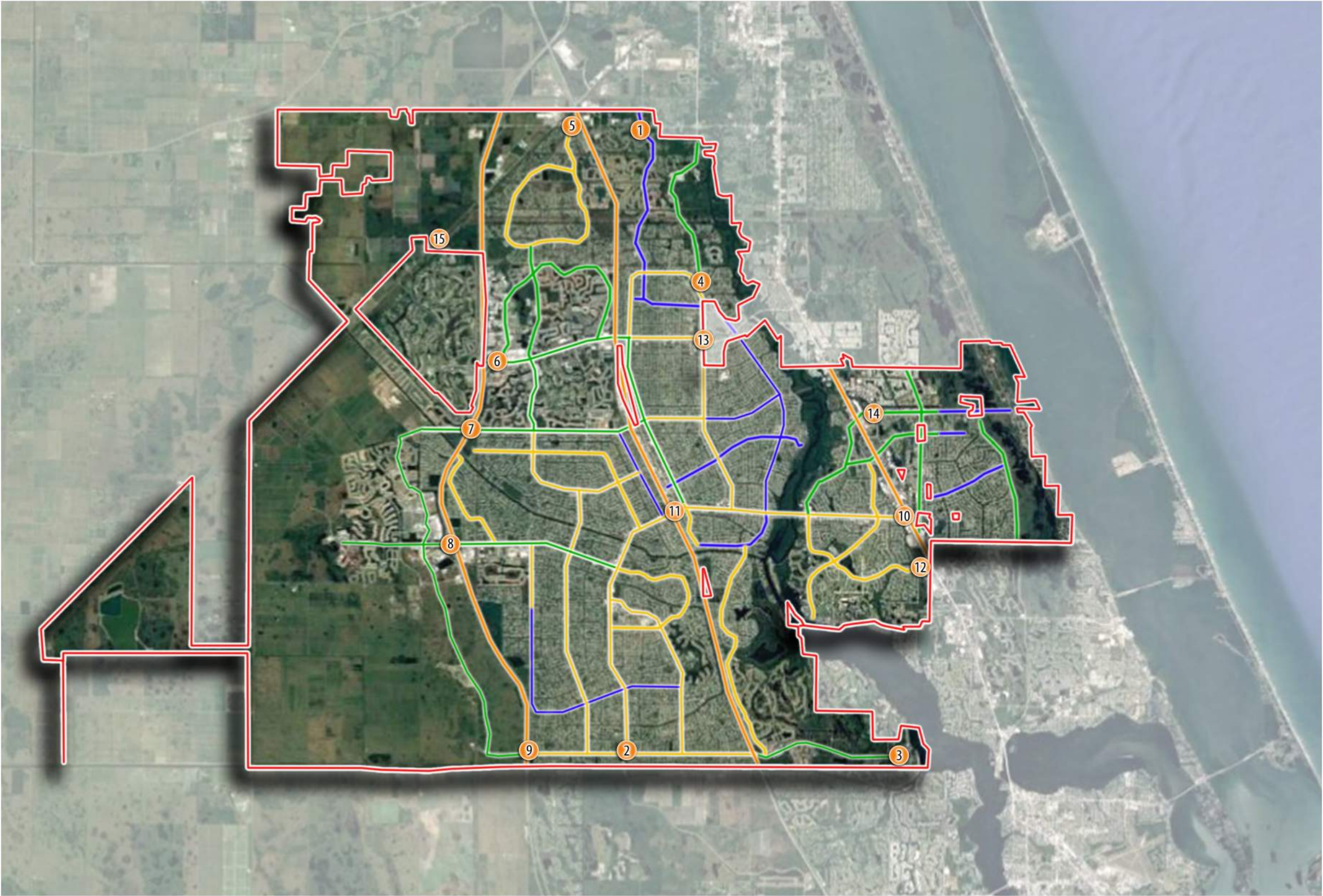
Cotleur & Hearing

## 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





## 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

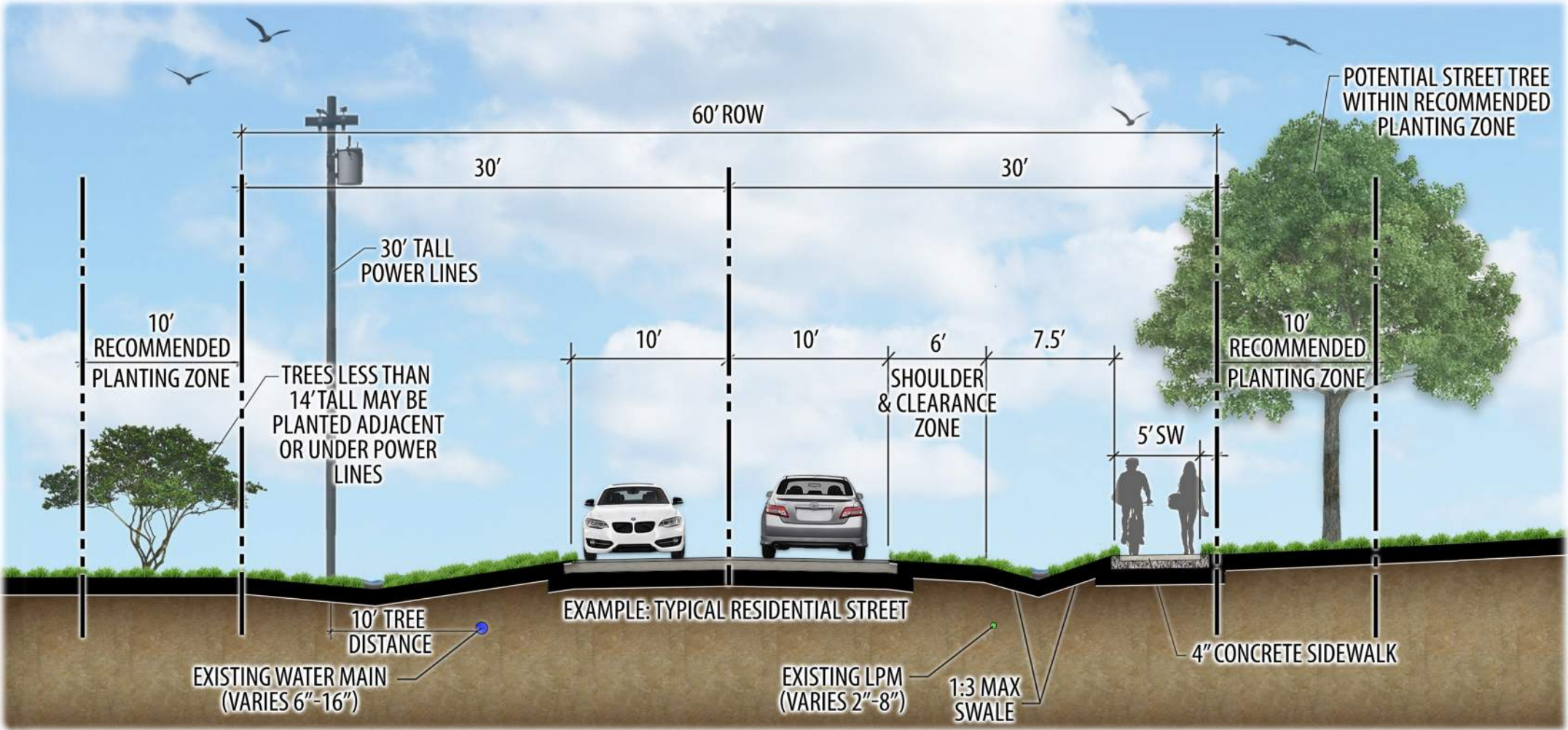
Restoring the City of Port St. Lucie's canopy loss due to clearing activities and development in general is a major priority for the City. Out of this concern the City's tree giveaway program was born. The City has begun to give trees to residents in an effort to increase the canopy tree coverage lost 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.

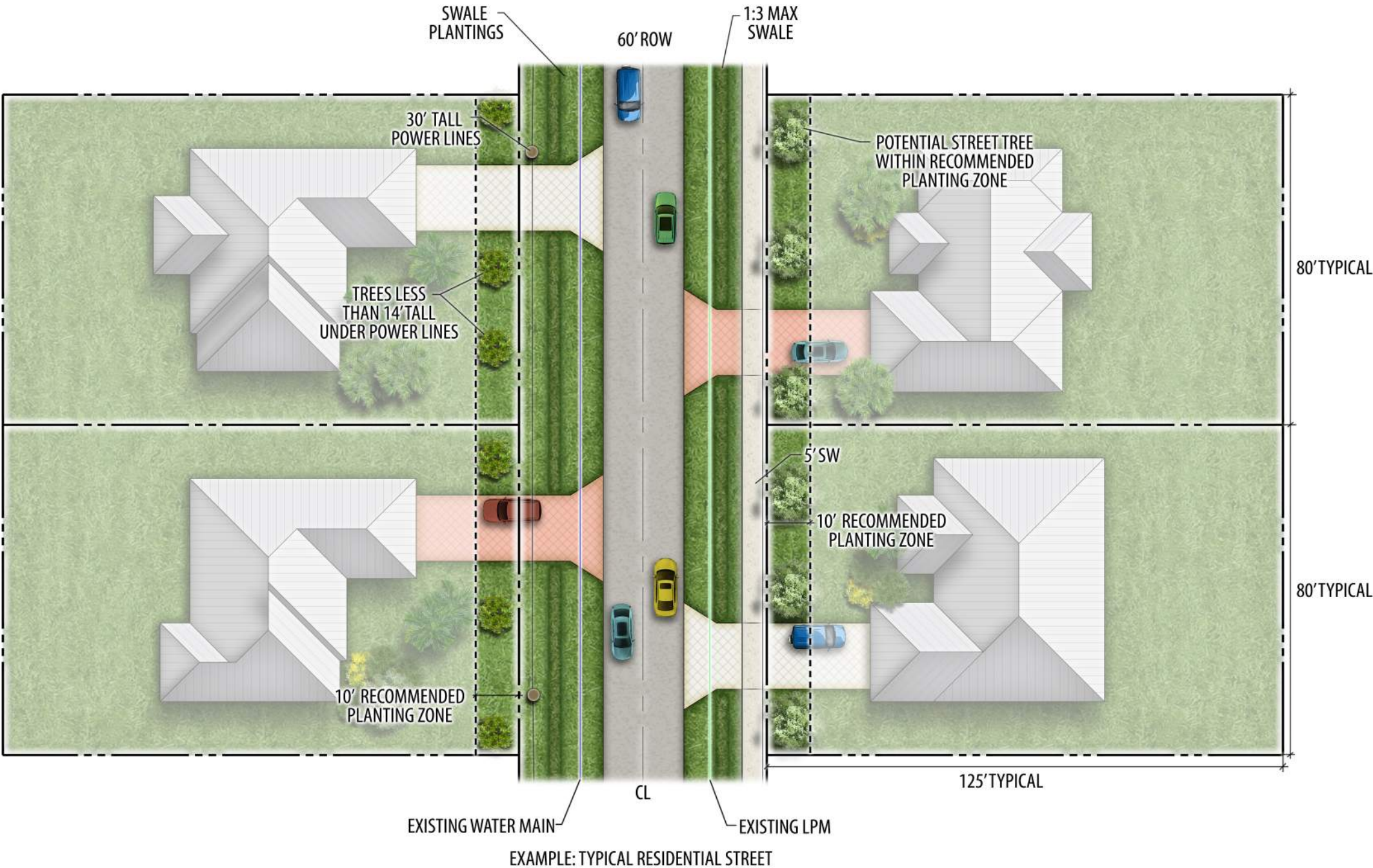


FPL LANDSCAPE REQUIREMENTS	
TREE SIZE (HT')	SETBACK FROM POWERLINES
LARGE (40'+)	50' MINIMUM
MEDIUM (21'-40')	30' MINIMUM
SMALL (14' AND LESS)	CAN BE ADJACENT TO OR UNDER POLES
LARGE PALMS	MAXIMUM PALM FROND LENGTH PLUS 20'

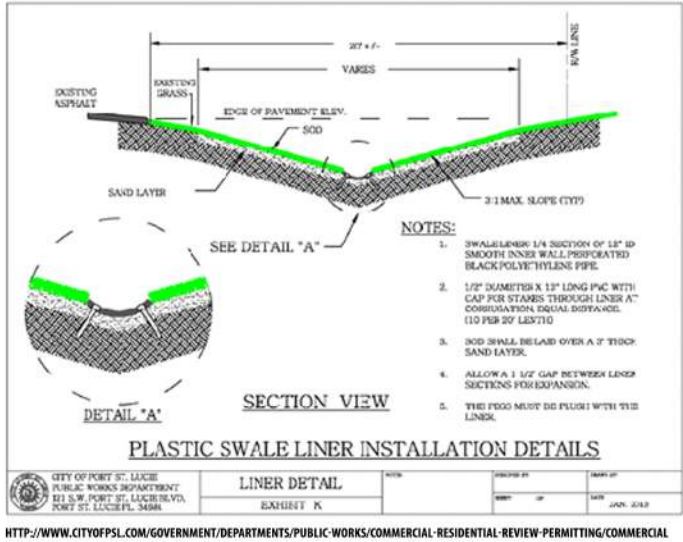
PSL LANDSCAPE/UTILITIES/PUBLIC WORKS/ SLC FIRE REQUIREMENTS	
TREES LESS THAN 20', PLANTED UNDER POWERLINES, CAN COUNT AS SHADE TREE 1:1	
TREES SHALL NOT BE PLANTED WITHIN 10' OF ANY PSL UNDERGROUND UTILITY	
TREES PLANTED CLOSER THAN 5' TO SIDEWALK OR STRUCTURE SHALL HAVE A ROOT BARRIER	
TREES OVERHANGING ROADWAYS MUST HAVE A CLEARANCE OF 13'6" AT MATURITY	



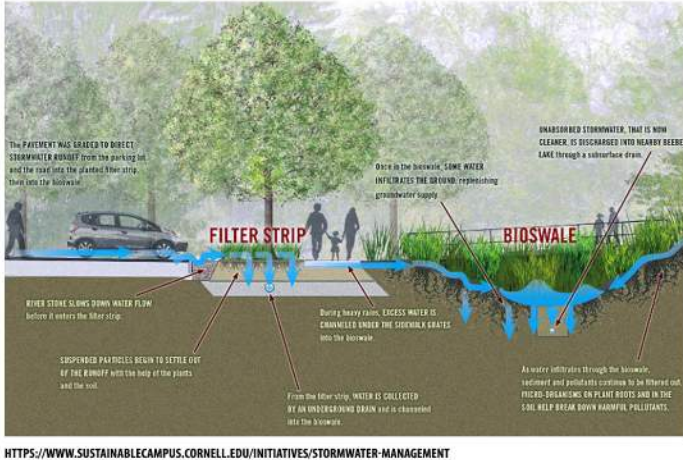




CURRENT SWALE APPLICATION



CITY PILOT PROGRAM BIOSWALE APPLICATION



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
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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





## 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

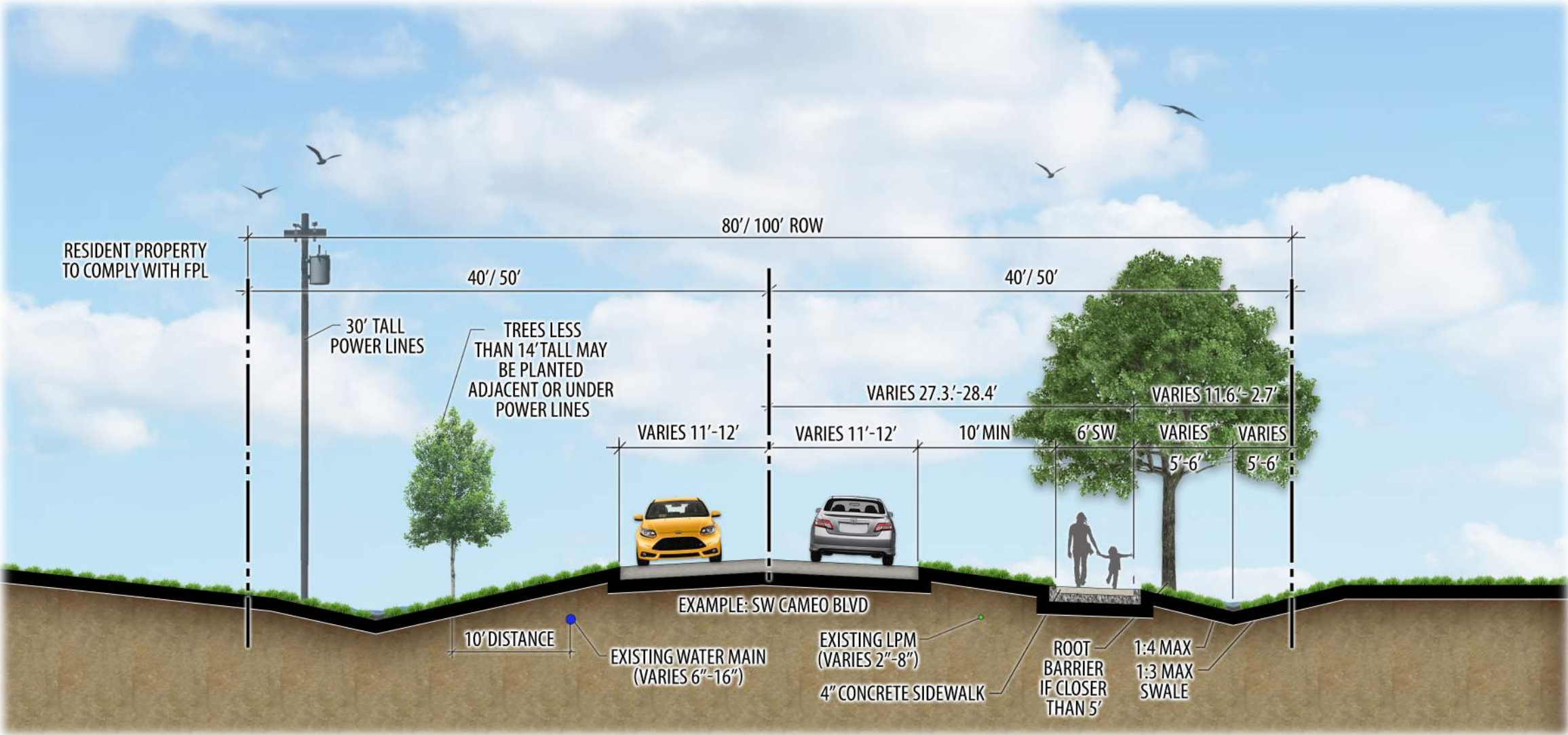
For existing 80 and 100-foot rights-of-way within the City, there are two different landscape sections to show the options for enhancement. The difference in the two sections are the quantity of plantings provided. A 100 linear foot section of the basic 80-foot right-of-way planting plan will include 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'

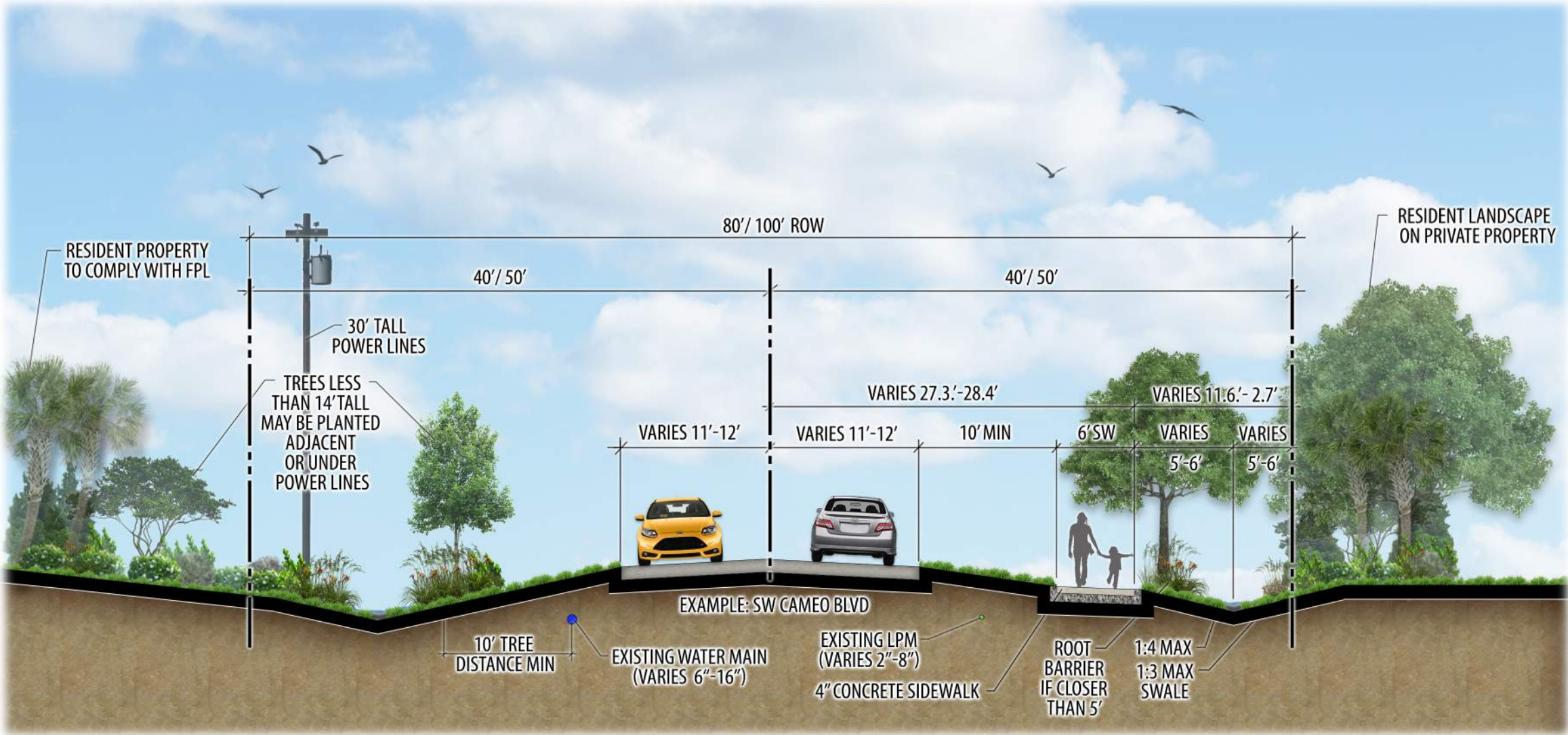
TYPICAL PEDESTRIAN SIDEWALK AMENITIES



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







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



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TREES OVERHANGING ROADWAYS MUST HAVE A CLEARANCE OF 13'6" AT MATURITY

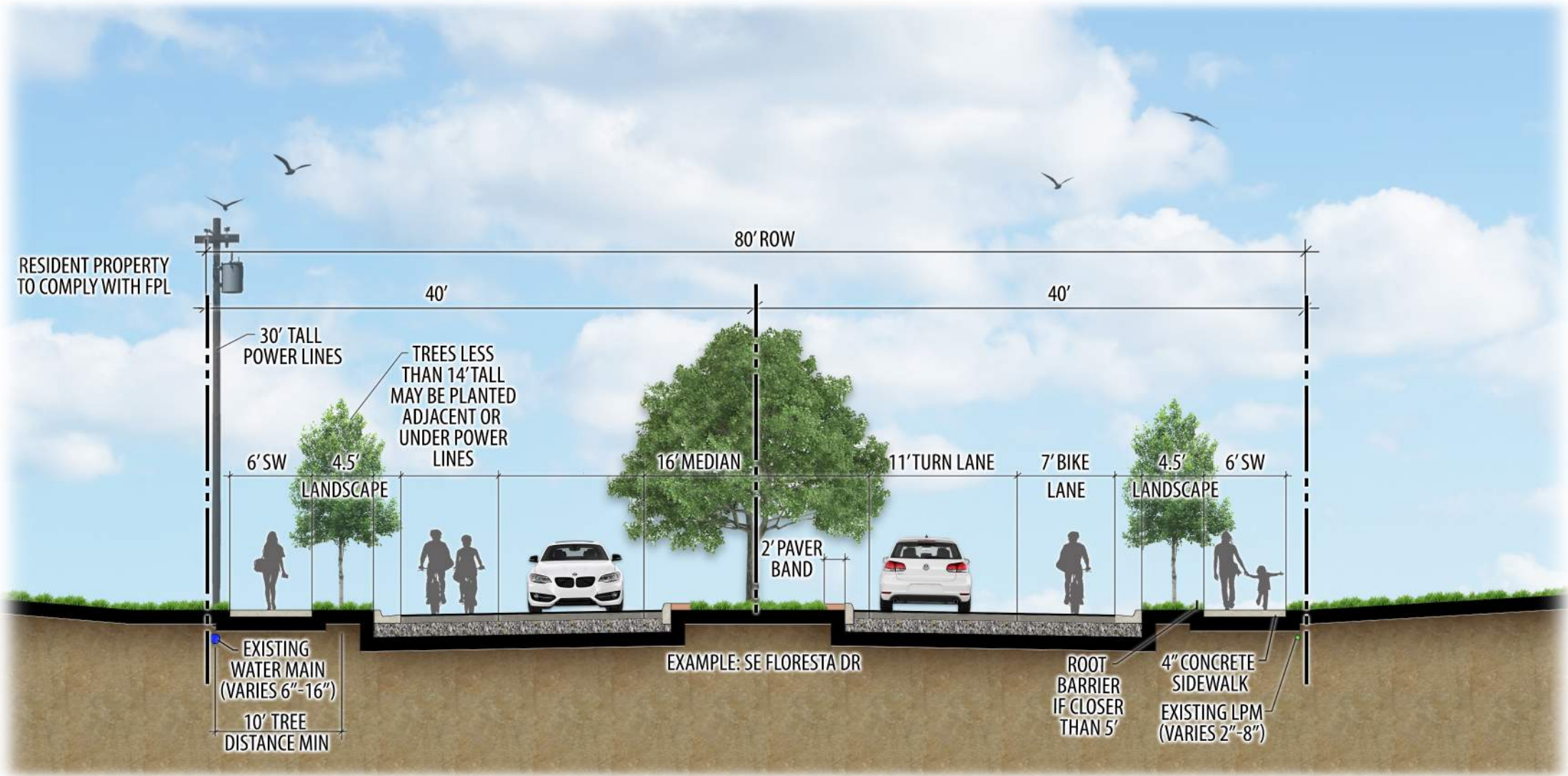


## 2.3 Right-Of-Way Improvements

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'

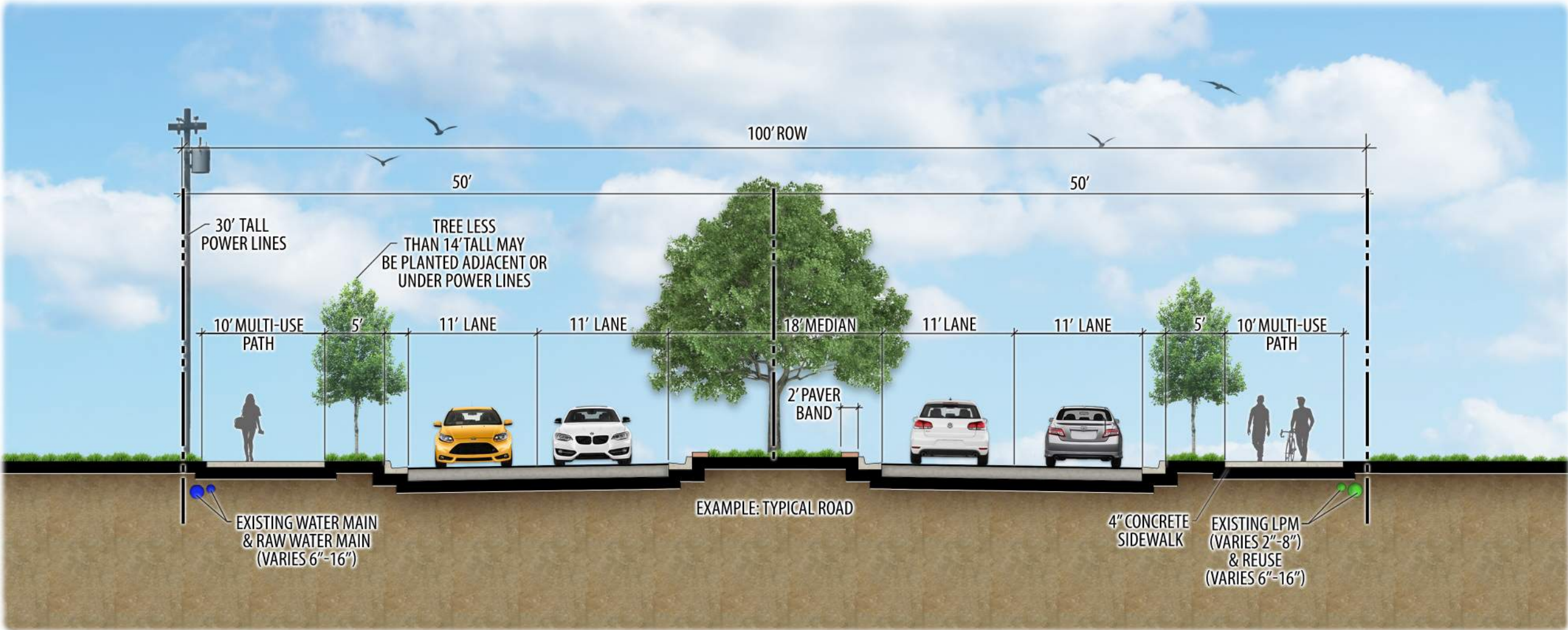
TYPICAL PEDESTRIAN SIDEWALK AMENITIES



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	







FPL LANDSCAPE REQUIREMENTS	
TREE SIZE (HT')	SETBACK FROM POWERLINES
LARGE (40'+)	50' MINIMUM
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LARGE PALMS	MAXIMUM PALM FROND LENGTH PLUS 20'

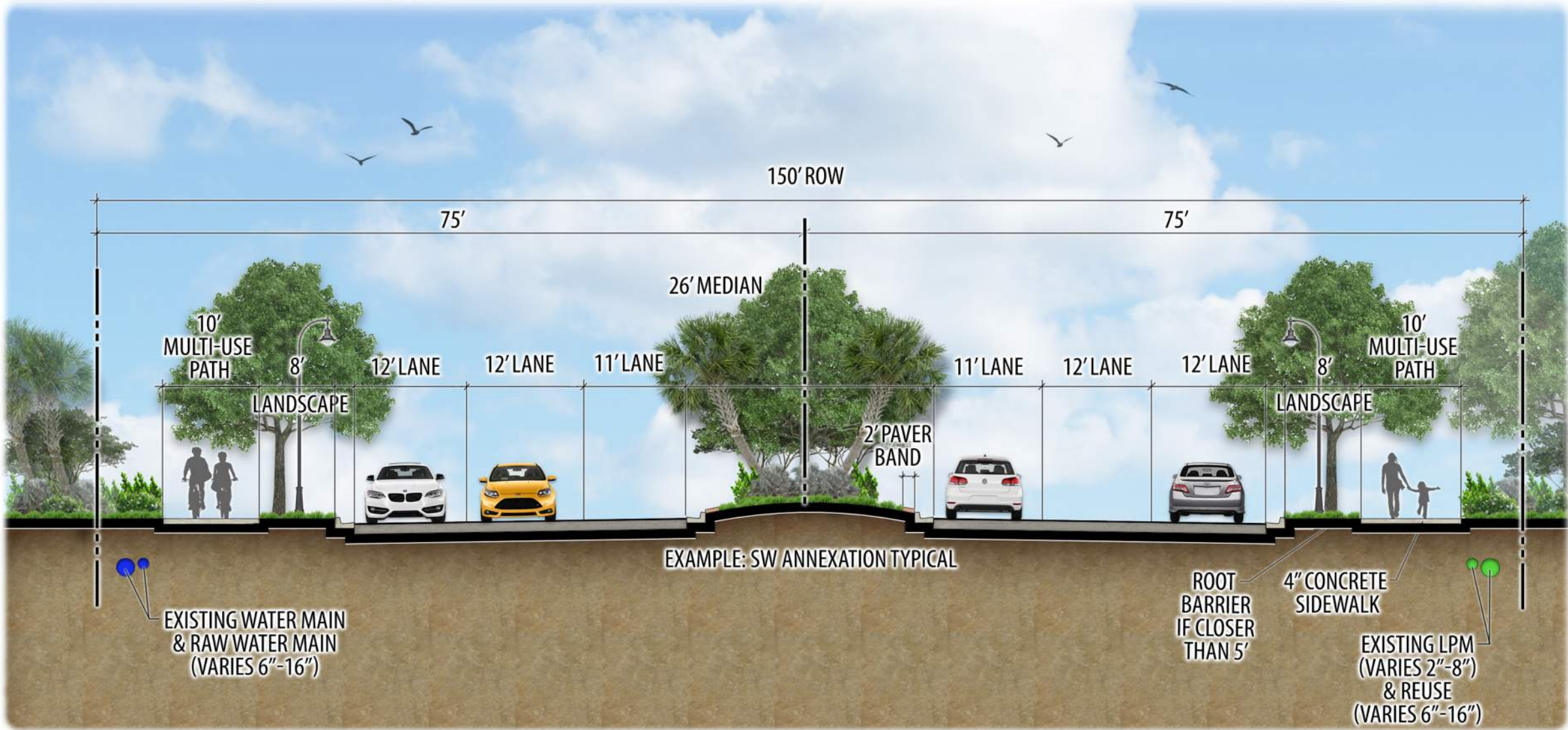
TYPICAL PEDESTRIAN SIDEWALK AMENITIES



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







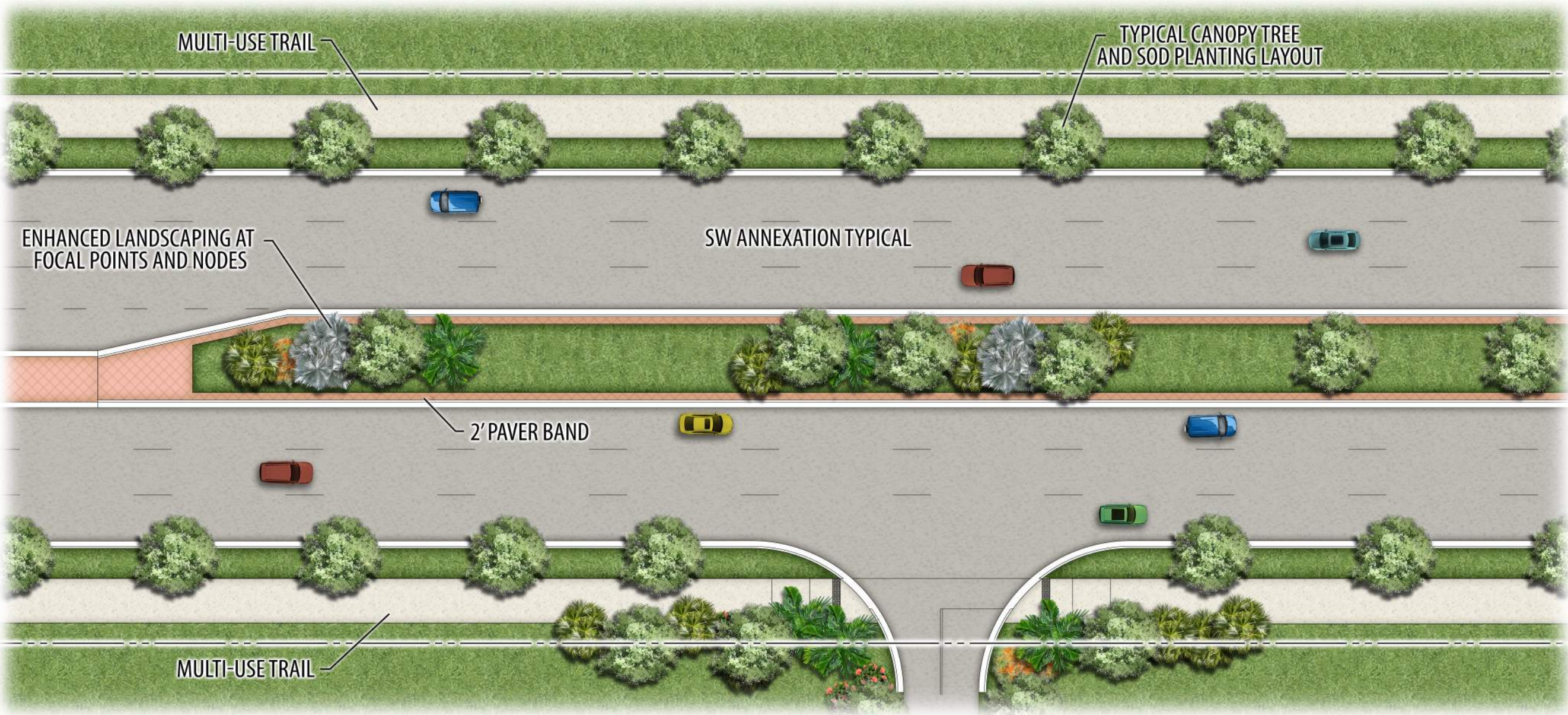
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150' EXISTING PLATTED AND CITY-OWNED RIGHT-OF-WAY PLAN ENHANCED (PLAN VIEW)





## 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).

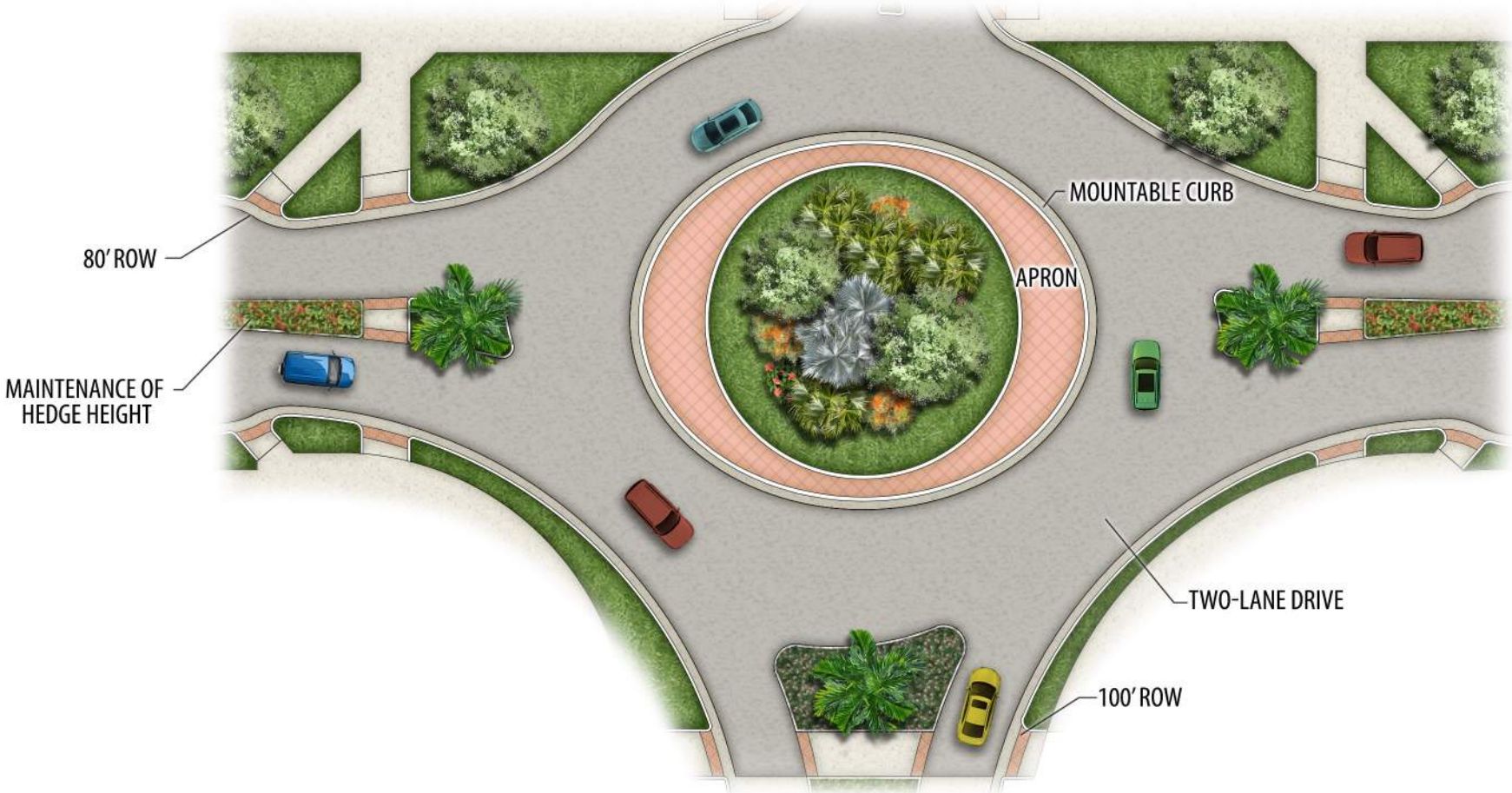
### Round-a-bout Construction

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.









- NOTES:
- \*LANDSCAPE SHALL BE INSTALLED CONCURRENT WITH THE CONSTRUCTION OF THE ROUNDABOUT
  - \*ROUNDABOUT PLANT MASSINGS ENHANCED TO REDUCE MOWING REQUIREMENTS



NTS

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.

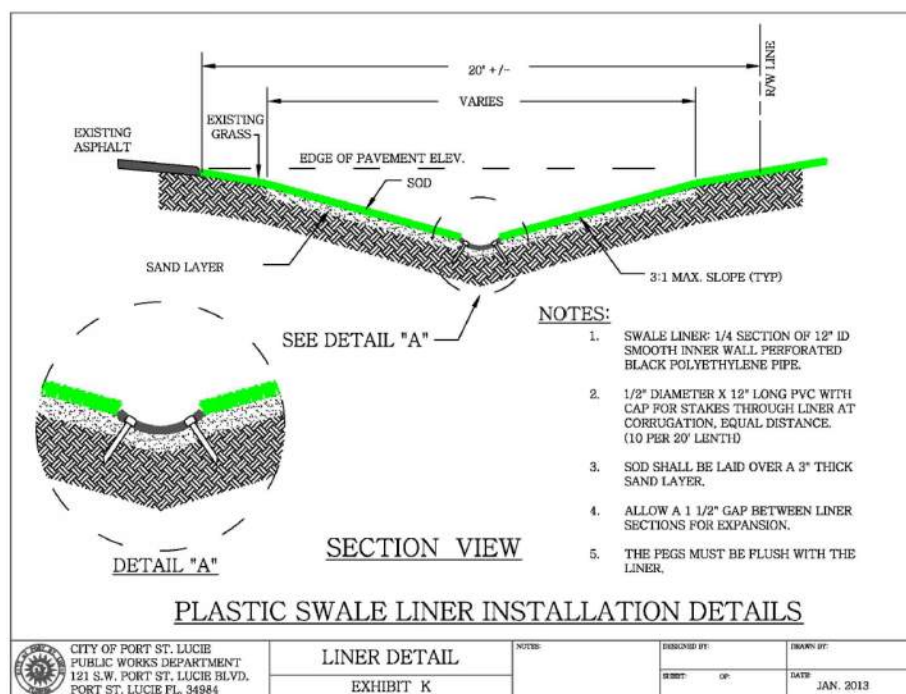


Image 2: Port St. Lucie Standard Swale Liner Detail





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)

<b>OVERHEAD POWERLINE LANDSCAPE SETBACK REQUIREMENTS</b>	
TREE SIZE (Ht)	SETBACK FROM POWERLINES
LARGE (40'+)	50' MINIMUM
MEDIUM (21'-40')	30' MINIMUM
SMALL (14' AND LESS)	10' MINIMUM FROM <u>POLE</u>
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.

<b>PSL PLANNING AND ZONING/ UTILITIES/ PUBLIC WORKS/ FIRE DEPARTMENT REQUIREMENTS</b>
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)

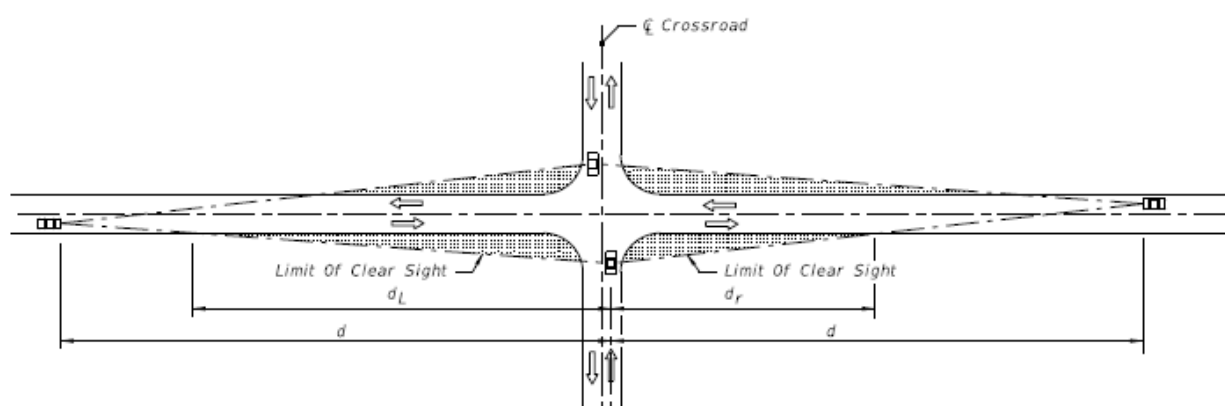


Image 5: FDOT Sight Distance Triangles



PASSENGER VEHICLE SIGHT TRIANGLE DIMENSION	
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	
	DIAMETER AT BREAT HEIGHT(INCHES)													
	>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 ****
<p>* From Face of Curb</p> <p>** 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'</p> <p>*** Use rural for urban facilities when no curb and gutter is present. Measured from the edge of through travel lane on rural section.</p> <p>**** Curb and gutter not to be used on facilities with design speed &gt; 45 mph</p> <p>Note: ADT in Table refers to Design Year ADT</p>								

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

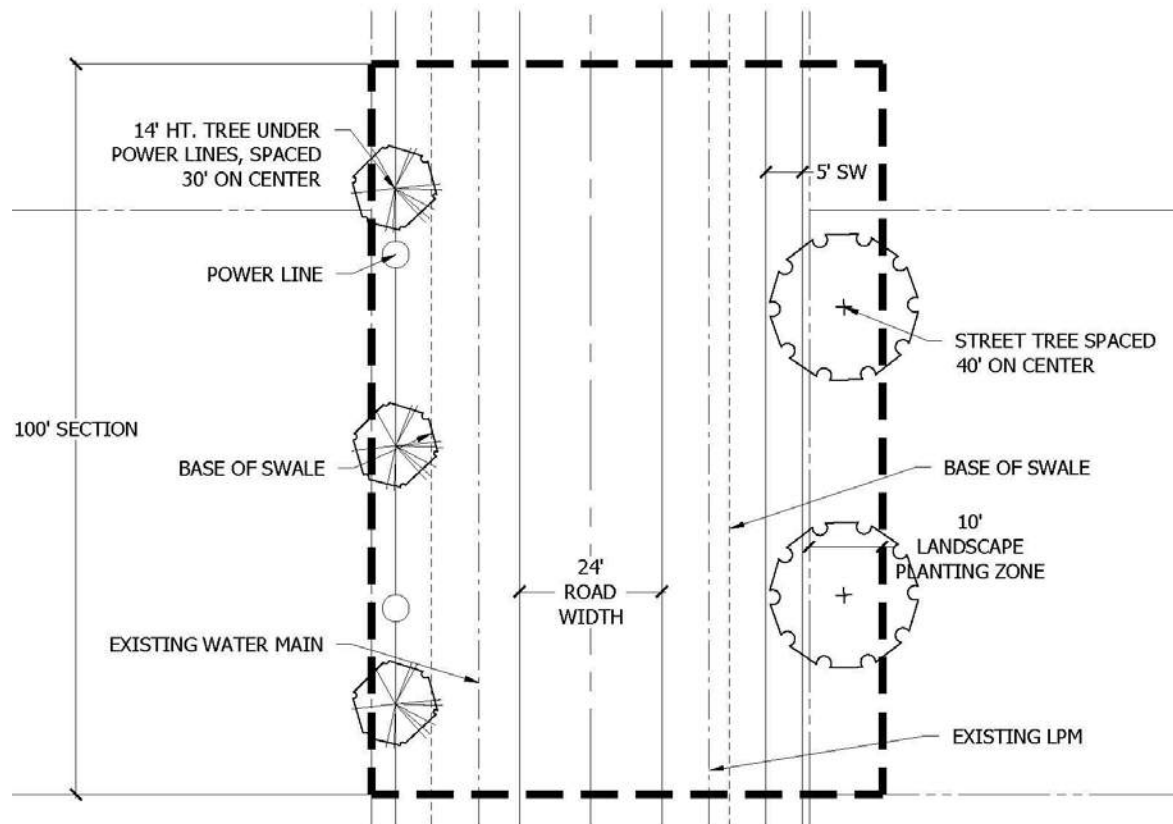


Image 6: Typical 100-foot Plan View Section of 60-foot Right-Of-Way

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
		<b>TOTAL PER 100'</b>	<b>\$1,600.00</b>
		<b>TOTAL PER MILE</b>	<b>\$84,480.00</b>

Table 6: Landscape Cost for 60-foot Right-Of-Way with Sidewalk

#### 4.2 Landscape Estimate for 80-foot/100-foot Right-Of-Way

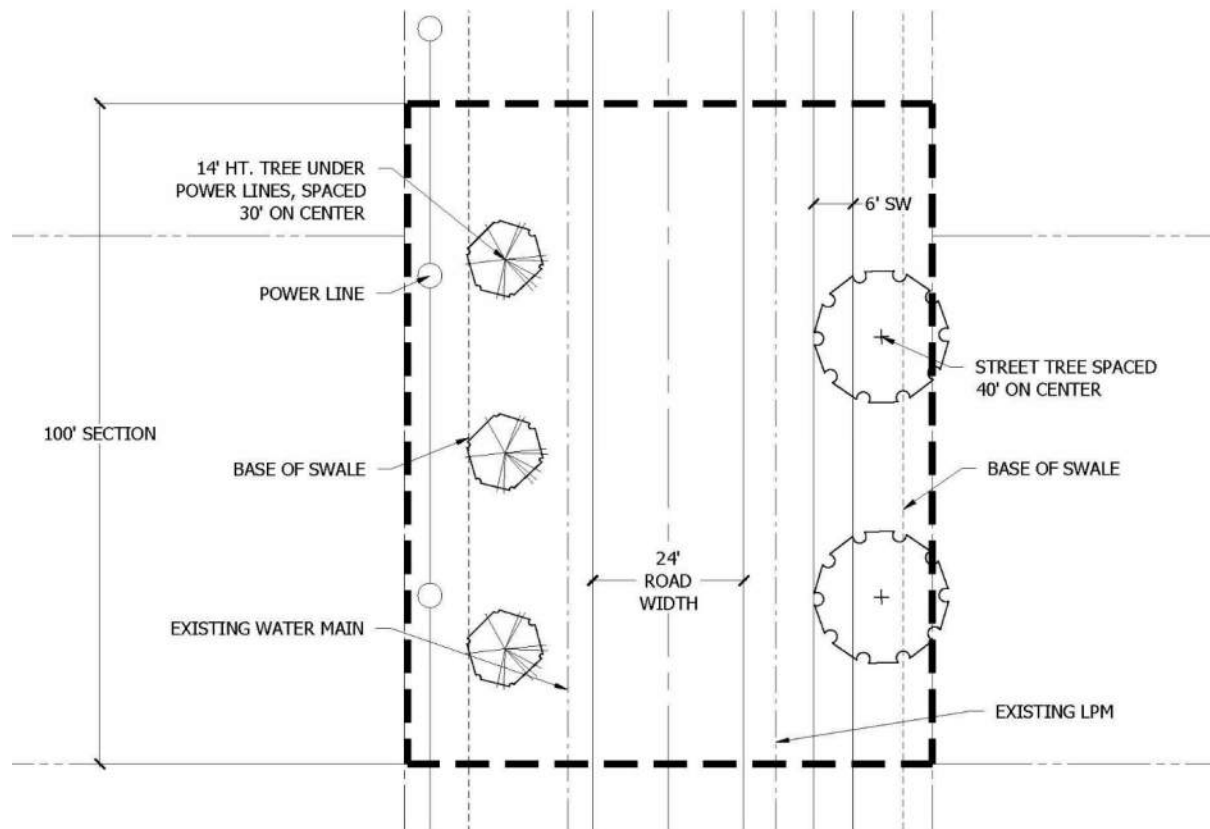


Image 7: Typical 100-foot Plan View Section of 80-foot/100-foot Right-Of-Way

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
		<b>TOTAL PER 100'</b>	<b>\$1,600.00</b>
		<b>TOTAL PER MILE</b>	<b>\$84,480.00</b>

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

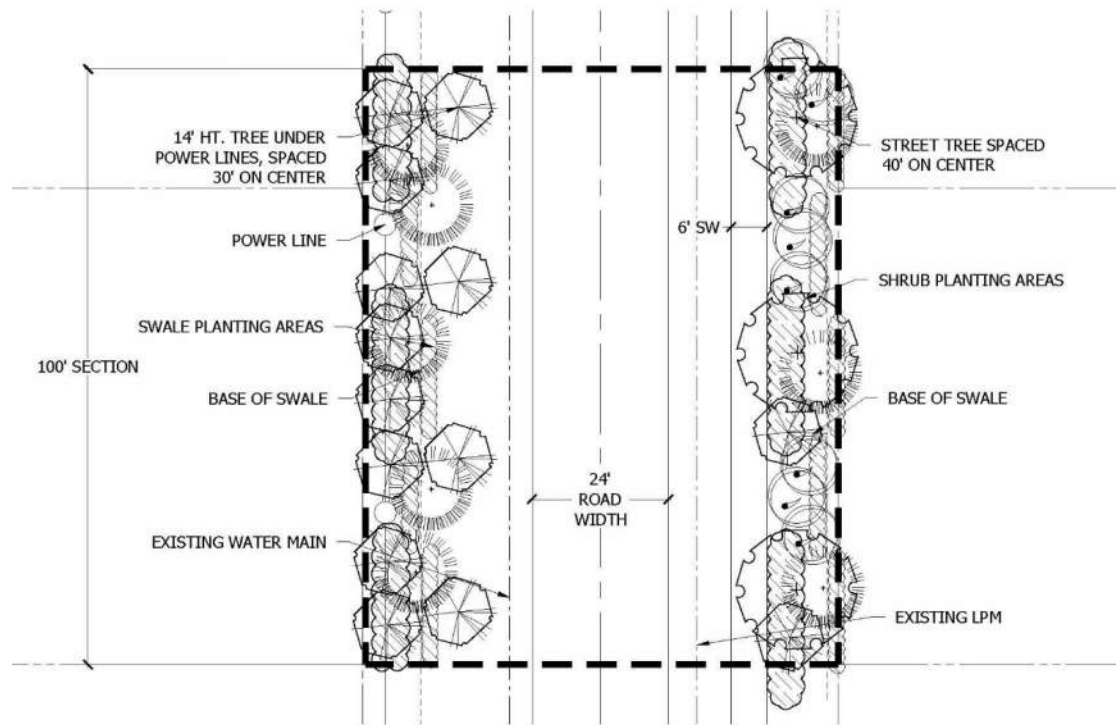


Image 8: Typical 100-foot Plan View Section of Enhanced 80-foot Right-Of-Way

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
		<b>TOTAL PER 100'</b>	<b>\$7,868.00</b>
		<b>TOTAL PER MILE</b>	<b>\$415,430.40</b>

Table 8: Landscape Cost for Enhanced 80-foot Right-Of-Way



#### 4.4 Landscape Estimate for 150-foot Right-Of-Way

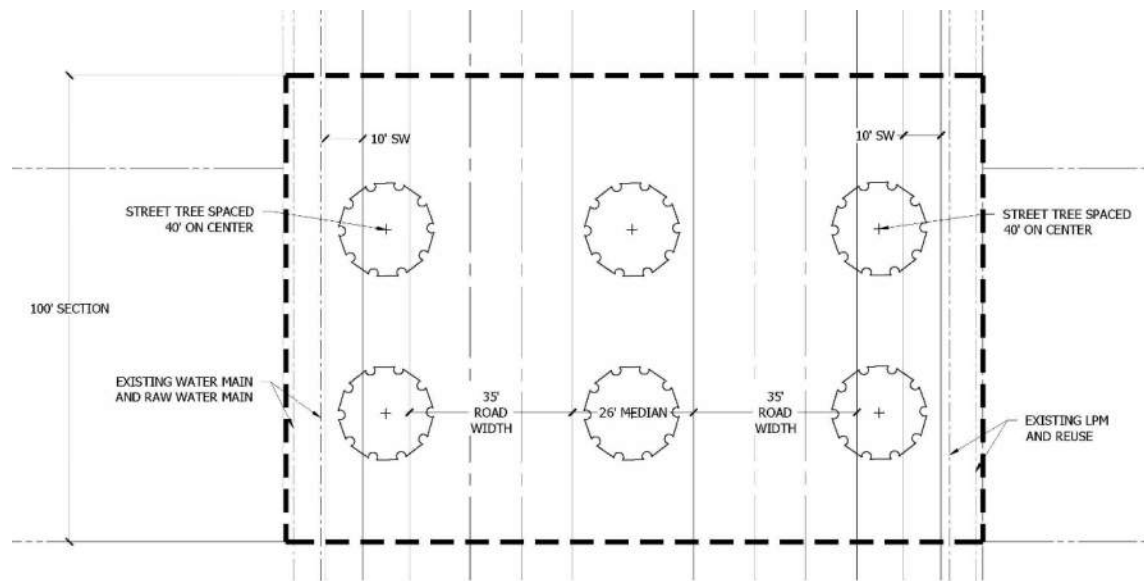


Image 9: Typical 100-foot Plan View Section of 150-foot Right-Of-Way

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
		<b>TOTAL PER 100'</b>	<b>\$3,000.00</b>
		<b>TOTAL PER MILE</b>	<b>\$158,400.00</b>

Table 9: Landscape Cost for 150-foot Right-Of-Way

#### 4.5 Landscape Estimate for Enhanced 150-foot Right-Of-Way

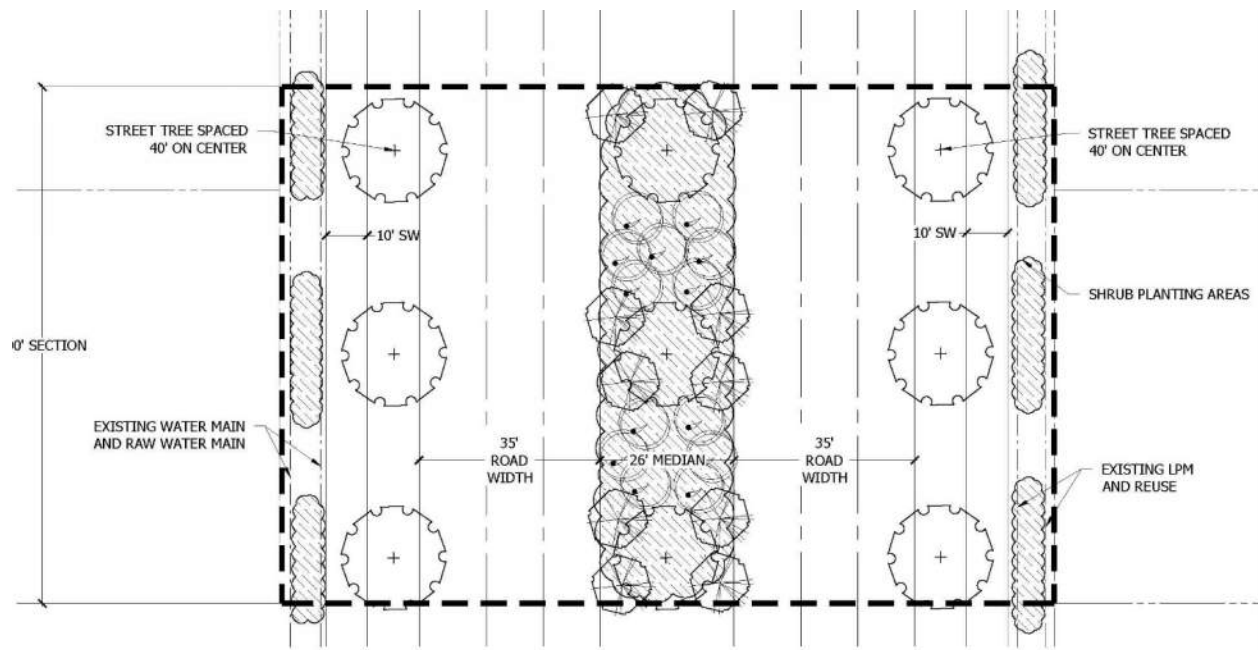


Image 10: Typical 100-foot Plan View Section of Enhanced 150-foot Right-Of-Way

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
		<b>TOTAL PER 100'</b>	<b>\$11,800.00</b>
		<b>TOTAL PER MILE</b>	<b>\$623,040.00</b>

Table 10: Landscape Cost for Enhanced 150-foot Right-Of-Way

#### 4.6 Long Term Funding

A major hurdle 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

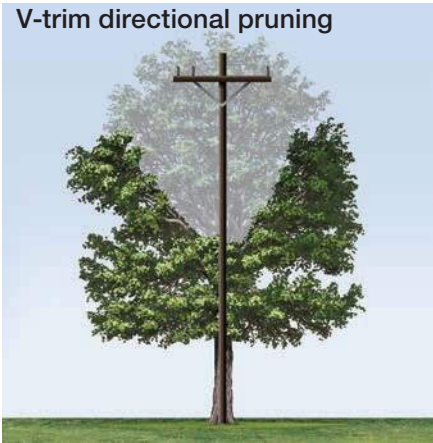
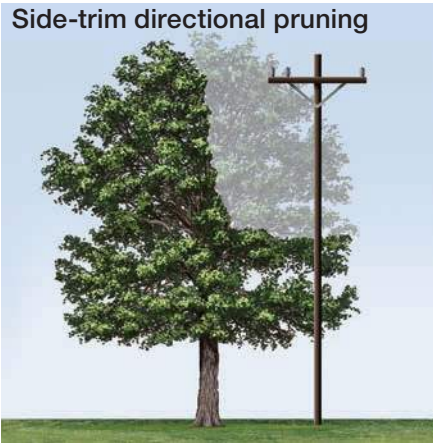
Caring for trees and your service

# Line clearing helps prevent outages

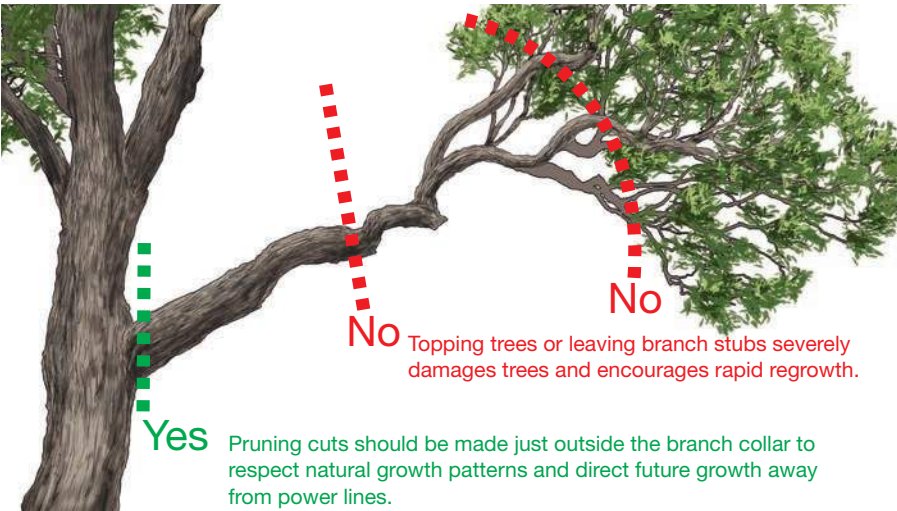
FPL is committed to delivering safe, reliable electric service to our customers. Trees, especially palm trees, can interfere with power lines and are one of the most common causes of power outages and flickers.

FPL's preventative maintenance 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.



## 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](http://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

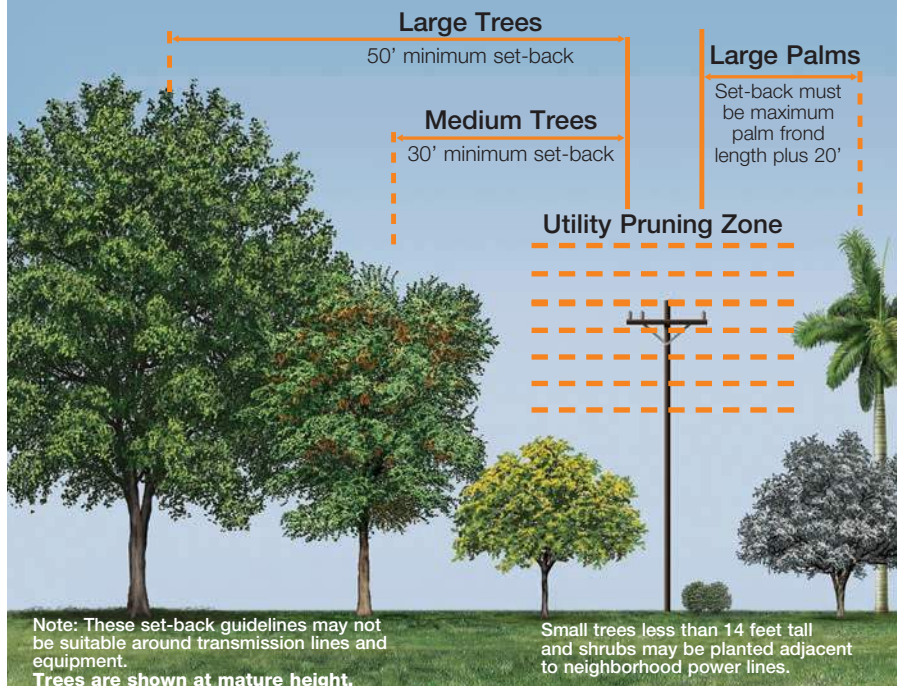
When landscaping your home or business, remember to:

- » 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.





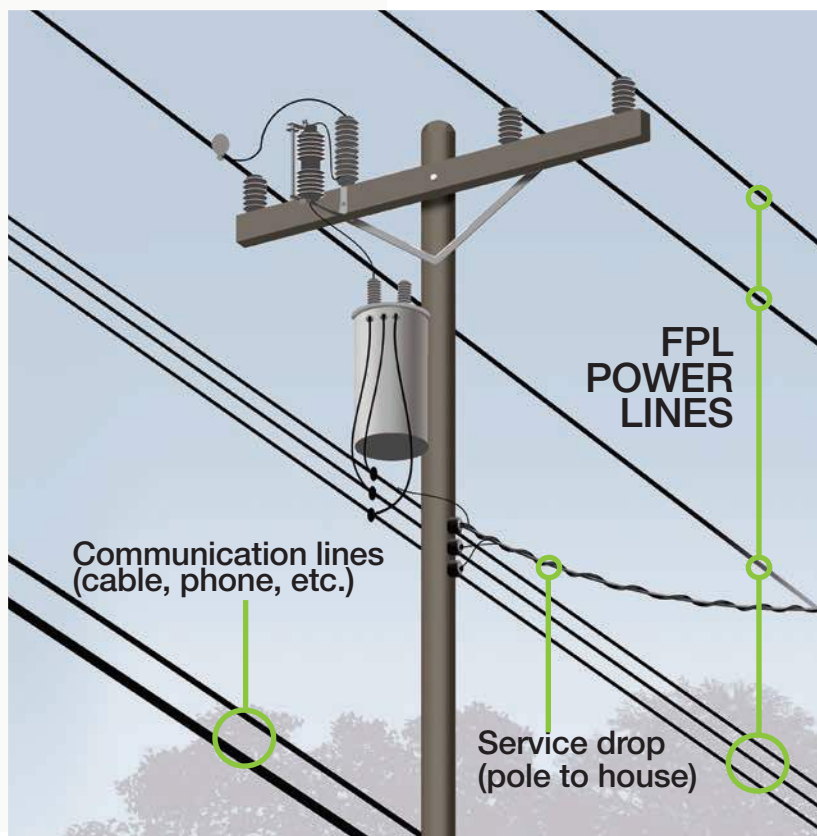


# Smart landscaping starts with a plan

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.

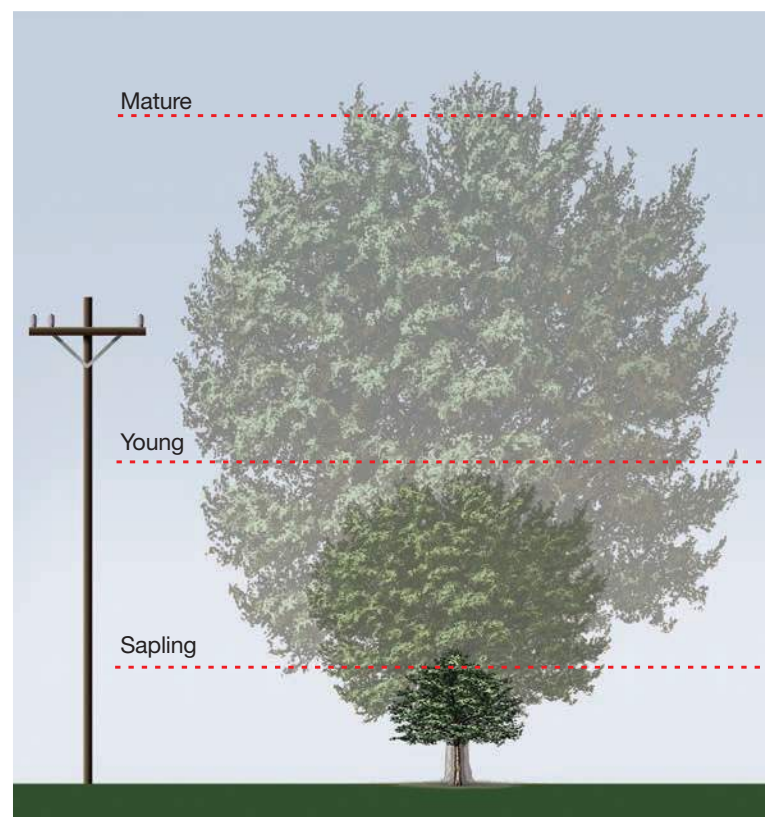


## 2 Find the right tree, choose the right place

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**



 **Arbor Day Foundation**

Florida Power & Light Company has been named a Tree Line USA utility by The National Arbor Day Foundation.



[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 ** <i>Persea americana</i>	No	X	T(28)	30'X25'	S	E	Large edible fruit.
Bald Cypress <i>Taxodium distichum</i>	Yes	XX	H	80'X25'	M	D	Long lived tree.
Elm, Chinese (Drake) <i>Ulmus parvifolia</i>	No	XX *	H	35'X35'	M	E	Weeping form
Golden Rain Tree <i>Koelreuteria elegans</i>	No	X	H	30'X20'	M	D	Yellow fall flowers, followed by attractive orange seed pods.
Golden Shower <i>Cassia fistula</i>	No	X	T	40'X35'	M	D	Yellow flowers in summer.
Gumbo Limbo <i>Bursera simaruba</i>	Yes	XX *	T	40'X35'	F	D	Use closer to coast, smooth reddish bark.
Holly, American <i>Ilex opaca</i>	Yes	XX	H	40'X20	M	E	Prefers acidic soils
Holly, East Palatka <i>Ilex attenuata</i>	Yes	X	H	30'X15'	S	E	Requires acid soil.

Hong Kong Orchid Tree <i>Bauhinia x blakeana</i>	No	XX *	H	30'X25'	S	E	Pink-purple flowers all year.
Jacaranda <i>Jacaranda acutifolia</i>	No	XX *	T	40'X50'	M	D	Extensive roots, flowers in spring and summer.
Magnolia, Southern <i>Magnolia grandiflora</i>	Yes	XX *	H	80'X40'	M	E	Flowering shade tree, requires acid soil.
Mango ** <i>Mangifera indica</i>	No	X	T(25-30)	115'X33'	F	E	Large edible fruit.
Maple, Red <i>Acer rubrum</i>	Yes	/	H	50'X30'	F	D	Prefers wet soils.
Oak, Laurel <i>Quercus laurifolia</i>	Yes	XX *	H	80'X45'	F	E	Wildlife value, short lived tree.
Oak, Live <i>Quercus virginiana</i>	Yes	XX *	H	60'X40'	M	E	Long lived tree.
Palm, Bismark <i>Bismarckia nobilis</i>	No	XX *	H	30' to 60'	S	P	Massive fan palm
Palm, Canary Island Date <i>Phoenix canariensis</i>	No	XX *	H	40'	S	P	Nutrient deficiencies, needs extra magnesium.
Palm Edible date <i>Phoenix dactylifera</i>	No	XX *	H	70'	S	P	
Palm, Florida Royal	Yes	XX *	H	80'	M	P	Prefer rich, moist soils

<i>Roystonea regia</i> = <i>R. elata</i>							
Pine, Slash <i>Pinus elliotii</i> var. <i>densa</i>	Yes	XX *	H	100'X30'	F	E	Very sensitive to soil grade changes or compaction.
Palm, Wild Date <i>Phoenix sylvestris</i>	No	XX	H	40'	M	P	Also known as Toddy Palm or India date Palm.
Queens Crape Myrtle <i>Lagerstroemia speciosa</i>	No	XX	T	40'X30'	F	D	Pink to lavender flowering tree May to June
Red Bay <i>Persea borbonia</i>	Yes	XX	H	40'X30'	M	E	Dark purple fruit attracts birds.
Red Cedar <i>Juniperus silicicola</i>	Yes	XX *	H	35'X25'	F	E	Wildlife value.
Royal Poinciana <i>Delonix regia</i>	No	XX *	T(28)	40'X40'	M	D	Red-orange flowers in summer
Sweet Bay Magnolia <i>Magnolia virginiana</i>	Yes	XX	H	30X15	M	E	Dark green leaves. White flowers summer. Colorful red fruit in fall.
Sweetgum <i>Liquidambar styraciflua</i>	Yes	XX *	H	70'X40'	F	D	Glossy star-shaped leaves, prickly fruit balls in fall.
Sycamore (Buttonwood) <i>Plantinus occidentalis</i>	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 <i>Conocarpus erectus</i>	Yes	XX *	T(28)	35'X25'	M	E	Variety 'sericea' — Silver Buttonwood — 25'X20'
Cherry Laurel <i>Prunus caroliniana</i>	Yes	X	H	25'X15'	M	E	Poisonous to humans.
Crape Myrtle <i>Lagerstroemia indica</i>	No	XX *	H	25'X15'	M	D	Flowering Tree May to June.
Holly, Dahoon <i>Ilex cassine</i>	Yes	XX *	H	25'X15'	M	E	Requires acid soil.
<b>Holly, Yaupon</b> <i>Ilex vomitoria</i>	Yes	XX *	H	20'X15'	S	E	
Japanese Privet <i>Ligustrum japonicum</i>	N	XX *	H	15'X20'	M	E	
Jerusalem Thorn <i>Parkinsonia aculeata</i>	No	XX *	H	20'X25'	F	D	Yellow flowering tree March to May, thorns.
Loquat <i>Eriobotrya japonica</i>	No	XX *	H	20'X15'	F	E	Edible fruit.
Palm, Cabbage <i>Sabal palmetto</i>	Yes	XX *	H	40'	S	P	Long-lived tree. Florida state tree.
Palm, Chinese Fan <i>Livistona chenensis</i>	No	X	H	25'	S	P	

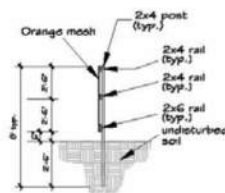
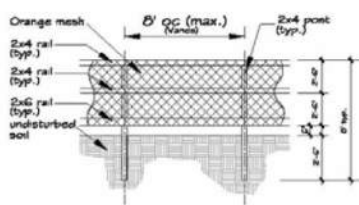
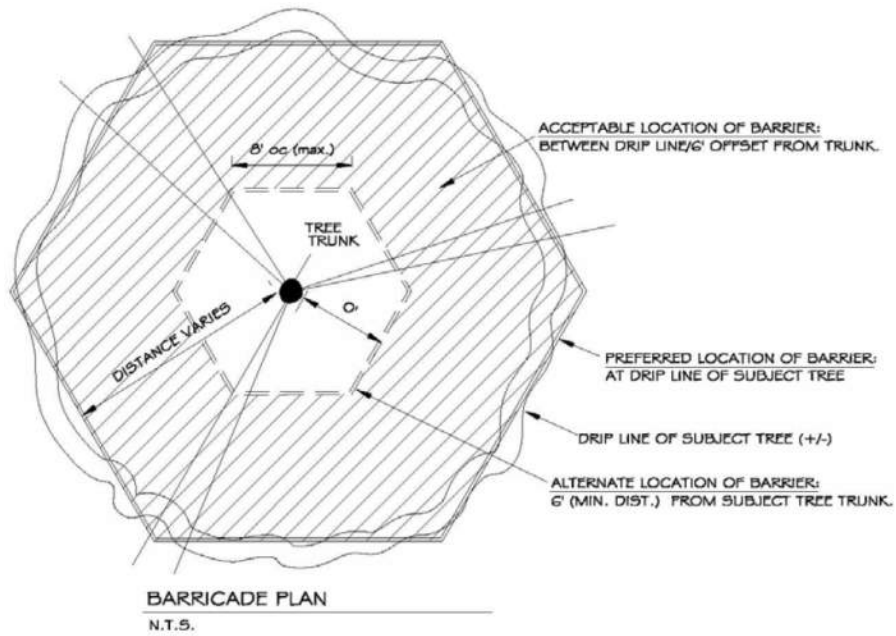
Palm, Cliff Date <i>Phoenix rupicola</i>	No	XX *	H	25'	S	P	
Palm, Foxtail <i>Wodyetia bifurcata</i>	No	XX *	T(27)	30'	F	P	Tolerate a variety of well-drained soils
Palm, Pindo <i>Butia capitata</i>	No	XX *	H	15'	S	P	Wildlife value.
Palm, Washingtonia <i>Washingtonia robusta</i>	No	XX *	H	80'	F	P	Becomes very tall.
Palm, Windmill (Chusan) <i>Trachycarpus fortunei</i>	No	XX *	H	25'	S	P	
Pink Trumpet Tree <i>Tabebuia heterophylla</i>	No	XX	T(25)	25'X20'	F	D	Requires pruning to develop strong structure
Simpson's Stopper <i>Myrcianthes fragrans</i>	Yes	XX	H	20X15	S	E	
Silver Trumpet Tree <i>Tabebuia aurea</i> = <i>T. caraiba</i>	No	XX *	T(28)	25'X15'	M	D	Yellow flowers in Spring.
Wax Myrtle (Bayberry) <i>Myrica cerifera</i>	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.	
<b>LEGEND</b>	
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 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**

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2023

City of PSL

PSL US, PW, TE, IT



# CITY OF PORT ST LUCIE

## FIBER OPTIC NETWORK

Minimum Design Standards and Details

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## **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**

Contractor may utilize products on the City of Port St Lucie (CPSL) Qualified Product List (QPL 2023) without requirement to provide individual project submittals. For each work order or contract with the City, the Contractor shall submit a QPL cover sheet noting the items to be implemented on the project. In the event the Contractor wishes to utilize a product not on the CPSL QPL, the Contractor must submit complete manufacturer cut sheets, shop drawings or schematics of proposed alternate items.

Contractor to include on product submittal cover sheet, a complete listing of pathway, closure and fiber optic infrastructure intended for use on the project to include the following:

- Conduit
- Pull Boxes, Splices Boxes, Splice Vaults, Splice Enclosures, Splice Cabinets
- Locate Tracer Wire, Wire Ground Units, Side Leg/Liner Terminators or Switch Boxes
- Marking Tape
- Pull Tape
- Cable Route Markers
- Fiber Optic Cable
- Splice Closures – Trays
- Termination Housings - Components
- Fiber Optic Test Procedures
- IP Network Devices
- Communication Devices

QPL cover sheet or shop drawings shall be approved prior to construction. Any work conducted prior to approval may result in Contractor expense for approved replacement items.

## **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. Designer and Contractor to follow Building Industry Consulting Service International (BICSI) Outside Plant Design Manual (OSP) which follows and implements standards set forth in the American National Standards Institute/Telecommunications Industry Association/ Electronics Industry Association (ANSI/TIA/EIA-758) for "telecommunication infrastructure designed for installation exterior to buildings."

For each CPSL work order, project or contract, Engineer or Contractor shall provide schematics or drawings including proposed locations of pull and splice boxes with provisions for maximum pull box spacing.

Desired spacing for fiber optic backbone route interim pull box (17" x 30"), interim run single drop splice pull boxes (24" x 36") and splice pull boxes (30" x 48") shall be used at every divided boulevard intersection to allow for multidirectional conduit and cable routing as well as additional splice access. Standard depth of each pull box size is 24" unless existing utilities limit to 18" minimum.

The maximum spacing for backbone routes is 750 linear feet between interim pull boxes and no greater than 2,500 feet between a splice box (24" x 36") or an intersection splice box (30" x 48"). This establishes a pattern of one splice box after every four pull boxes (i.e., intersection box, pull box, pull box, pull box, splice box, pull box, pull box, pull box, intersection box, etc.).

Any pull box designed to be placed in sidewalks, must be a minimum of 24" x 36" x 24". All pull boxes that are not in concrete or asphalt sidewalks, shall have a concrete collar placed for protection that shall be a minimum of 12" length and width outside the pull box dimension with 6" depth of concrete with wire mesh or rebar for strength.

The Project Design Engineer shall review these default distances which need to be modified for more frequent splice box placement to facilitate backbone cable connection for certain parcels or routes with more frequent project connections.

Designs should follow the OSP manual and accommodate ducts entering pull and splice boxes by multiple means of deployment. The contractor shall provide 45-degree conduit sweeps with long radius consistent with site conditions or sweep HDPE ducts in gradual bend attempting to avoid 90 degree bends. Conduit sweeps should be referenced on the construction plans and Contractor must follow must be approved prior to construction.

## **SPlicing REQUIREMENTS**

The Contractor shall follow approved Project Splice Plans or submit splice diagrams for review and approval prior to splicing unless responding to an emergency damage restoration. Once the splice diagram is approved, the CPSL requests the Contractor give three (3) business days' notice to CPSL for circuit preparation. No splicing of the fiber optic cable system will be permitted without appropriately qualified City Information Technology staff approval, by onsite direction or written approval.

All splicing shall be by fusion splice method. Although CPSL staff may not be present for Contractor splice activity, Contractor to follow manufacturers' recommended procedures and provide test reports confirming adherence to ANSI/TIA/EIA and CPSL splice standards where no splice shall exceed .15dB on a bidirectional average of the OTDR traces or .05 as reflected on a core alignment fusion splice machine.

If Contractor experiences mismatched fiber optic core alignment that may causing excessive losses, Contractor to follow ANSI/TIA/EIA requiring re-splicing 3 times before acceptance.

## **AS-BUILT DRAWINGS**

As-built drawings shall be provided by means of a secure file transfer method. If included by specific item inclusion on any CPSL contract, work order or project, all fiber optic pathways and cables are to be as-built in FiberTrak® inclusive of individual fiber allocations in Bentley Communications, GPS recording in ESRI GIS format inclusive of MySQL GIS referenced datasets of CPSL infrastructure attributes. All GPS points shall be sub-meter accuracy. All fiber optic as-builts shall be turned in to the Department who issued the contract and the CPSL Information Technologies Department for update to the CPSL Master Fiber Optic Network records.

## **QUALIFIED 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.

Contractor to submit product cut sheets, technical data, calculations for materials intended for project use that are not found in the CPSL QPL to the Project Engineer 30 days before use to allow for review and approval by the City IT Dept.

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, covenantor, 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.

**CITY ONLINE SPECIFICATIONS ACCESS:** "Online Access" is available for City of Port St. Lucie performance specifications and Qualified Products Listing for fiber optics supporting the Public Works, Traffic Engineering/Operations, Utility Systems, Parks & Recreation and Information Technologies Department's available through online City webpage for review at:

<https://utility.cityofpsl.com/media/1590/appendix-c-fiber-optic-standards-and-details.pdf>

**ENGINEER OF RECORD:** The terms "Engineer" and "Engineer of Record" shall be a duly licensed and registered engineer in the State of Florida.

**BACKBONE Fiber Optic cable:** The term used for any fiber optic cable in City of PSL rights of way the traverses the entire City in multiple pathways, routes and network architectures supporting multiple City Departments or other entities for Core Site to Core Site and Core Site to Device Site connections. This shall be no less than 96F and is to be called out in project plans by any Project EOR for proper route capacity.

All Backbone Fiber Optic cables shall be taken into Tier 1 and Tier 2 facilities for full (100%) terminations.

**LATERAL (Drop) Fiber Optic Cable:** The term used for the fiber optic cable making a single communication node connection where specific, select numbers of fibers are intercepted off the CPSL backbone cable for device/site connectivity into the overall City of PSL Optical Network by specific User Departments.



The drop cables are to be identified on ever plan set by the EOR, but shall be no less than the following size for Department and Connection Type:

Utility Systems:	12F cable for Field Sites (Pump, Repump, Well Site SCADA) 48F cable for Core Facilities (Admin, Water Treatment)
Public Works:	12F cable for CPSL tier 3-4 sites 48F cable for CPSL tier 2 sites 96F or 144F cable for CPSL tier 1 sites
Traffic Engineering:	12F cable for Public Safety site connections (Police, Fire Facilities) 12F cable for Traffic Signals, ITS Device Sites 96F or 144F cable for designated Traffic/ITS Hub Aggregation Sites
Parks & Rec Services:	12F cable for City Parks & Constitutional Offices 48F cable for multiple Department facilities 96F or 144F cable for designated City Core Ring Sites

TIER Site Classifications: Refers to the criticality of services provided to a site.

Tier 4: Low priority field device sites that do not affect the overall functioning of the system if offline. Site response required within 48 hours for any remediation required.

Tier 3: High priority field device sites that are connected into a system that affects the functionality of another site in the system. Site response required within 48 hours for any required remediation.

Tier 2: Critical Network Hub/Aggregation Facility where system applications are initiated, monitored, and managed and are connected to both Tier 3 & 4 for systems operations and Tier 1 sites for network operations. Sites are 24x7x365 operational requiring response within 8 hours and remain engaged until restored.

Tier 1: Critical Network Data Center where Intra & Inter Networking is created, connected, routed and data is stored and exchanged between other servers and applications and broadband internet providers is made. Sites are 24x7x365 operational requiring response within 4 hours and remain engaged until restored. These sites are those with redundant entrance facilities and backup power from external generators.

## 1.0 FIBER OPTIC CABLE SYSTEM for OUTSIDE PLANT CITYWIDE DISTRIBUTED NETWORK

### 1.1 FIBER OPTIC CABLE

Furnish fiber optic cable that shall be 100% compatible with the City of PSL QPL & 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 CONSTRUCTION:

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 must have labels of "Fiber Optic Cable", Year of Mfg, Cable Count and length marking

#### 1.1.4 RIPCORDER or FAST ACCESS RIDGE: The cable may contain a ripcord under the sheath (outer jacket) or have FastAccess™ Ridge for accessing cable 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 standard 12 buffer tubes in a reverse oscillation stranding structure.

#### 1.1.7 STRENGTH MEMBER:

The central strength member shall consist of a dielectric central element.

#### 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
- Standard is 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  $\mu\text{m}$
- Cladding Diameter: 125  $\mu\text{m}$  +/- 0.7  $\mu\text{m}$
- Core-to-Cladding Concentricity:  $\leq 0.5 \mu\text{m}$
- Cladding Non-Circularity:  $\leq 0.7\%$
- Coating Diameter: 245  $\mu\text{m}$  +/- 5  $\mu\text{m}$
- Attenuation @ 1310 nm:  $\leq 0.35 \text{ dB/km}$
- Attenuation @ 1550 nm:  $\leq 0.25 \text{ dB/km}$
- Cutoff Wavelength:  $\leq 1260 \text{ nm}$

#### 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 =  $\Delta$  Attenuation  $\leq 0.15 \text{ dB @ } 1550 \text{ nm}$ )
- FOTP-37 (Result =  $\Delta$  Attenuation  $\leq 0.3 \text{ dB @ } 1550 \text{ nm}$ )
- 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.

Cables included in the Corning 2021 Local Area Networks and Data Center Core Products Catalog will be considered when submitted for approval by specific project or work order application from standard outside plant interconnections.

<https://www.corning.com/catalog/coc/documents/selection-guides/LAN-1273-AEN.pdf>

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)

INTERNAL PROPERTIES

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:

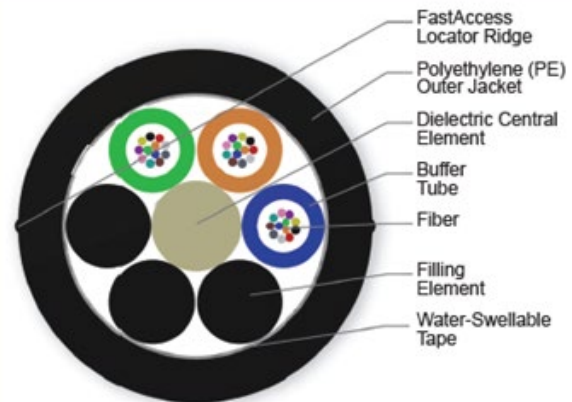
Dispersion-Unshifted Step-Index Single-Mode Fibers  
Germania-Doped Silica Core surrounded by a Concentric Glass Cladding  
Matched Clad Design  
Dual Layer Acrylate  
CoatingsUltraviolet (UV)  
Curable Inks  
EIA/TIA -598-B Color Code

CompliantGEOMETRY & 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:	≤ 0.35 dB/km
Attenuation @1550nm:	≤ 0.25 dB/km
Cut-Off Wavelength:	1260nm

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



ALTOS All-Dielectric Cable with FastAccess Technology, Gel-Free, 36 Fibers | Photo PIM2326



## 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 4 or 6 cable entry ports. 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.

Splice closure shall be used as directed by the City:

SMALL CLOSURES: ≤ 22”L x 9”W x 7”D (Accommodates 6 trays/144 splices)

- Through splices of 2 x ≤96 fiber trunk cables
- Drop/Midspan splice sites for 1 x 12 fiber drop cable into ≥96 fiber backbone cable
- 

LARGE CLOSURES: ≤ 28”L x 10.5”W x 10.5”D (Accommodates 8 trays/>288 splices)

- Splices of 2 or more 96 to 144 fiber cables with 1 or more 12-48 fiber drop 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 minimum of 12 splices for drop site small closures and minimum 24 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.

## 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 LC SM coupler ports with ceramic inserts on its front-facing panel unless restoring a legacy site with ST or SC splice on pigtail connectors.

- 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.

## 1.4    PIGTAILS

### 1.4.1    MANUFACTURER:

The manufacturer shall be ISO 9001 certified compliant.

### 1.4.2    PIGTAIL CONSTRUCTION:

Pigtails shall consist of a standard 250µm fiber single-mode fiber enveloped with a 900µm tight buffer. The fiber shall be constructed with a Dual-Acrylate Slip Layer between the 250µm fiber and 900µm tight buffer. Stripping the 900µm tight buffer off 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 unless campus project specifically calls for multi-mode cable.

Pigtails shall be LC, 12 or 24-fiber capacities 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 the following specifications:

### CONNECTOR:

- Connector Type: LC (Non-Keyed/No Security)
- Polish/Contact Type: UPC (Ultra Polish/Physical Contact)
- Boot: Blue, Fungus Resistant material
- Body: Composite
- Ferrule: 2.5mm Zirconia Ceramic
- Max. Typical Loss 0.15dB
- Reflectance/Back Reflection:  $\leq -58\text{dB}$
- Operating Temperature:  $-40^{\circ}\text{F}$  to  $185^{\circ}\text{F}$
- Intermateability Standard: TIA/EIA-604-2
- Durability Testing:  $\leq 0.2\text{ dB loss}/1000\text{ re-matings, FOTP-21}$

### CABLE:

- Type: Simplex (1F) or 12F, Single-Mode
- Jacket: 0.9mm, color coded OFNR rated
- Length: 2 meters
- Minimum Bend Radius: 30mm

### GENERAL:

- Material Compliance: ITU-T G.652.D and ITU-T G.657.A1
- Substance Restrictions: RoHS Compliant construction

## 1.5 PIGTAIL MODULE

### 1.5.1 MANUFACTURER:

The manufacturer shall be ISO 9001 certified compliant.

### 1.5.2 PIGTAIL MODULE CONSTRUCTION:

Pigtail Modules are allowed for use when terminating backbone cables. Pigtail Modules shall be LC, 12 or 24-fiber capacities. For use in Corning CCH housings.

Each module provides strain-relief for the pigtail and offers the advantage of greater protection to the cables and connectors being installed when the pigtails will be routed and spliced in a separate housing. Available with both ribbon and 900  $\mu\text{m}$  tight-buffer MIC<sup>®</sup> Cable types, each CCH pigtail module is factory terminated and tested.

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 protected with dust caps on the connector ferrules until connected to a port.

The optical specification of the hardware is a typical module insertion loss, typical 0.15 dB and maximum of 0.40 dB.

## **1.6 PIGTAIL SPLICE CASSETTE**

### **1.6.1 MANUFACTURER:**

The manufacturer shall be ISO 9001 certified compliant.

### **1.6.2 PIGTAIL SPLICE CASSETTE CONSTRUCTION:**

Pigtail Splice Cassette are allowed for use when terminating backbone cables. Pigtail Splice Cassettes shall be LC, 12 or 24-fiber capacities.

Each cassette provides strain-relief for the pigtail and offers the advantage of greater protection to the cables and connectors being installed when the pigtails will be routed and spliced in a separate housing. Available with both ribbon and 900 µm tight-buffer MIC® Cable types, each CCH pigtail module is factory terminated and tested.

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 protected with dust caps on the connector ferrules until connected to a port.

The optical specification of the hardware is a typical module insertion loss, typical 0.15 dB and maximum of 0.40 dB.

For use in Corning CCH housings.

## **1.7 PATCH CORDS/CABLES**

### **1.7.1 MANUFACTURER:**

The manufacturer shall be ISO 9001 certified.

### **1.7.2 PATCH CORD CONSTRUCTION:**

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.

### 1.7.3 SPECIFICATIONS:

Patch cords and their connectors shall also meet or exceed all of the following specifications:

#### CONNECTOR:

- Connector Type: LC (preferred by the City), ST, SC (Legacy)
- Polish/Contact Type: UPC (Ultra Polish / Physical Contact)
- Connector Body: Composite, Blue (Typical)
- Connector Boot: White (Typical)
- Connector Ferrule: 2.5mm Zirconia Ceramic
- Max. Typical Loss:  $\leq 0.15\text{dB}$  (UPC)
- Reflectance/Back Reflection:  $\leq -59\text{dB}$  (UPC)
- Operating Temperature:  $-40^{\circ}\text{F}$  to  $185^{\circ}\text{F}$
- Intermateability Standard: TIA/EIA-604-2
- Durability Testing:  $\leq 0.2\text{ dB loss per 1000 re-matings, FOTP-21}$

#### CABLE:

- Type: Duplex, Single-Mode
- Jacket: 3mm, Yellow, OFNR rated
- Length: Varies 1 to 3 meters
- Minimum Bend Radius: 30mm
- Crush Resistance: 1000 N/10cm
- Tensile Strength: 200 N

#### GENERAL:

- Materials/Construction: LSZH, FRNC
- Substance Restrictions: RoHS Compliant construction

## 1.8 SPlicing EQUIPMENT

### 1.8.1 MANUFACTURER:

The fusion splicer manufacturer shall be ISO9001 certified and TL9000 registered.

### 1.8.2 FUSION SPLICER FEATURES:

The fusion splicer shall be designed to splice standard single-mode fibers with a cladding diameter of  $125\mu\text{m}$  and coating diameters from  $250\mu\text{m}$  to  $900\mu\text{m}$ . The fusion splicer shall be equipped with a heat shrink oven compatible with 60mm splice sleeves.

The fusion splicer shall be equipped with a light injection detection (LID) 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.



### 1.8.3 SPECIFICATIONS:

The fusion splice shall also meet or exceed all of the following specifications:

- Typical Splice Loss (Standard Single-Mode): < 0.05 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 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 fusion splicer used shall have yearly calibration and provide the yearly certification certificate prior to splicing procedure.

## 1.9 OTDR TEST EQUIPMENT

The OTDR shall be used for testing purposes shall be compatible with the installed fiber optic cable (single-mode 8/125 fiber) to be tested. Contractor may be required to test at different wavelengths for coarse or dense wave division multiplexed deployments.

### 1.9.1 MANUFACTURER:

The manufacturer shall be ISO9001 certified and TL9000 registered.

### 1.9.2 SPECIFICATIONS:

- Test Wavelengths: 850nm / 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

### 1.9.3 FILE FORMAT:

The OTDR shall be capable of saving all traces and data in analysis mode so electronic file formats for both uni-directional and bi-directional traces may be developed with Manufacturer software for analysis and compliance verification.

The Contractor shall provide at no cost to the CPSL, OTDR viewing software licenses to be able to view each trace provided.

### 1.9.4 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.

## **1.10    INSTALLATION**

### **1.10.1    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).

### **1.10.2    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.

### **1.10.3    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.

### **1.10.4    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.

### **1.10.5    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. Contractor to follow Manufacturer recommended cable installation procedures for hand pulling, machine pulling or air assisted jetting or blowing.

### **1.10.6    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 back fed. Pulling and reel locations should be set near the sharpest conduit bend locations (i.e. corner vaults, etc.) where possible.

## 1.10.7 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. 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 fiberoptic 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 within 750lf segment.

The cable shall be installed in continuous lengths from splice point to splice point, as indicated in the plans.

## 1.10.8 Air Assisted Cable Installation

Placing optical fiber cables in duct systems using air-assisted installation techniques presents different installation requirements than traditional pulling. In return, these techniques enable installation of much longer cable lengths to take advantage of long manufactured lengths (up to 12 kilometers or approximately 7.5 miles). Installing long cable lengths often reduces labor and material expenses.

Jetting and blowing are two common air-assisted cable installation techniques. Both methods require pushing the cable with a tractor mechanism while blowing compressed air into a preinstalled duct around the cable being installed. Both rely on air flow to help "float" the cable inside the duct, minimizing sidewall pressures to reduce friction between the cable and the duct.

Jetting and blowing differ, though, in how pulling force is applied to the cable. Jetting uses a reaction head (or parachute) attached to the cable. A differential pressure across the reaction head creates a pulling force on the cable. Blowing does not use a reaction head. Instead, the pulling force on the cable is due to fluid drag of air rushing along the cable. This pulling force is distributed along the cable length.

#### 1.10.9 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 (17"x30"):	50 ft.
Fiber Splice Box (24"x36" or 30" x48"):	220 ft.
(100' each side of any splice closure and allotting 20lf for inside the splice closure)	
Bridge Barrier Wall:	5 ft.
(Contractor must maintain the minimum bend radius inside bridge box)	
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.

#### 1.10.10 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 colored tape within 3 foot of exiting the conduit. The color of the "tape" placed on each cable shall identify which direction the cable is "headed" from this pullbox. The color standard to be utilized is:

Yellow – East  
Green – West  
Blue – North  
Red - South

Each cable that enters/exists inside a pullbox shall have a tag/label attached to indicate: the cable type, fiber count, direction, and date. The tag shall provide enough space for all info to be written clearly and legibly on its front in permanent marker.

#### 1.10.11 INSPECTION:

Prior to splicing and/or termination, the City shall be notified when cable installation

(pulling) is complete so that they may inspect the cable prior to any splice or termination activity. The cable may 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/or approved by the City representative, then the contractor may proceed with completion of the installation (splicing, termination, testing, etc.).

#### 1.10.12 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 breaks, 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 prior to any splicing or termination activity.

The Contractor may present a repair plan, consistent with above specified restoration periods, inclusive of the procedure to be implemented, the beginning or end point of any such repair, the location of any additional proposed splice points.

Once inspected, the City will choose the repair method and direct all repair operations, including but not limited to placing a new fiber segment from two (2) existing original reel end splice points, sealing the cable, required emergency temporary or permanent splicing -or re-splicing of damaged cable at approved vaults, etc.

The City reserves the right to perform any repairs itself wherever to maintain critical operations and/or it deems necessary and seek compensation for damage restoration from any party damaging the City's Fiber Optic Network Infrastructure (cable, conduit or pull boxes).

When making repairs to damaged cable segments, the existing damaged fiber optic cable must be removed from the restored pathways so no damaged or un useable fiber optic cable is left in any City conduit.

Any Contractor, Owner or Third Party who damages the City of Port St. Lucie fiber optic infrastructure, including conduits, fiber optic cables, tracer wires, handholes and locate system assets, without having previously sought locates from 811 Sunshine One Call, or who damages the infrastructure that is clearly marked within eighteen (18") inches of a locate flag or mark, shall bear the full financial responsibility for the remediation costs



including any emergency or temporary repair activity which may include duct repairs, cable replacement, splicing and termination; and, permanent cable segment replacement with associated cabling, splicing, terminations and testing.

## **1.11    FIBER OPTIC SPLICING REQUIREMENTS**

All fibers in the fiber optic cable shall be spliced and/or terminated.

### **1.11.1    SPLICE PLAN:**

CPSL is to provide a fiber allocation and/or splice plan showing the location and splices to be performed at any location to ensure maintaining proper allocation within Departments and/or Networks.

Contractor may be asked to provide splice schematic for large fiber cross splice sites or sites where >3 cables are splices between cables, buffers and fibers as a plan to follow for field personnel.

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.

Contractor to asbuild every splice closure and termination housing to ensure compliance with optical allocation, routing and assignment.

### **1.11.2    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.

### **1.11.3    PERSONNEL:**

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 Corning, FIS, Light Brigade, ETA or other recognized industry resource.

### **1.11.4    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.

### **1.11.5    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.

#### 1.11.6 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 24” 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.

#### 1.11.7 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.

#### 1.11.8 SPLICE LOSS:

Individual splice loss shall not exceed 0.05 dB loss as measured by the fusion splicer and 0.15dB on a bi-directional average of an OTDR.

#### 1.11.9 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.

#### 1.11.10 STORAGE:

A maintenance loop at each Pull Box or Fiber Splice Box shall be per Section 1.10.

#### 1.11.11 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 initials, 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.

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## 1.12 FIBER OPTIC TERMINATION REQUIREMENTS

All fiber optic cables shall be terminated by means of fusion splicing onto factory pre-terminated assemblies (pigtails) with LC 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 the patch panel.

## 1.12.1 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 LC or SC coupler ports according to their position within the fiber or cable. Pigtails shall be arranged 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 noted on the qualified product cut sheet.

## 1.12.2 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 and shall include labeling which indicates the "To" and "From" connection end points.

## 1.13 ACCEPTANCE TESTING

The Fiber Optic Cable Network shall be tested as follows:

1.13.1 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.

1.13.2 PRE-INSTALLATION TESTS (REEL TEST):

The Contractor is to reel test the fiber optic cable prior to its 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 electronic format. If the tested loss per Km exceeds the loss from the manufacturer's test data the City will reject the cable.

1.13.3 POST INSTALLATION TESTS (FINAL TEST):

1. Contractor to attempt to notify the City 3 business days via email or test in advance of the Final Testing so that the City may elect to be present for the testing.
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 using an Optical Time Domain Reflectometer (OTDR) (See Section 1.9).
3. Any fibers in a *"building or device cabinet or other horizontal drop cable"* that remain un-terminated or un-spliced at one end on the project and therefore are "left bare at one end" shall be protected for future use at the "bare end" and shall be tested from the terminated end in a uni-directional OTDR test to prove termination attenuation and fiber continuity.
4. All Singlemode Fibers shall be tested at 1310nm and 1550nm. All Multimode fibers shall be tested at 850nm and 1300nm. There may be instances where Contractor(s) are required to test additional wavelengths for CPSL course or dense wave division multiplexed deployment projects which will be shown in plans for project by the EOR.
5. If the OTDR does not have internal fiber to eliminate any dead zone effects on the test, the Contractor shall use a factory assembled patch cord, 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.
6. 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;
  - e. Beginning Testing Location;
  - f. End of Fiber Testing Location;
  - g. Operator/Technician Name or Initials;
  - h. Date and Time test was performed;
  - i. Test Wavelength;
  - j. Test Pulse Width;
  - k. Refractory Index
7. All installation test data shall be submitted in electronic format both PDF summary reports as well as native OTDR trace files (.trc file format unidirectional traces & .bdr file format for bidirectional traces) to the City as basis for acceptance. The Contractor shall provide to the City of PSL Department at no charge a “viewer” license of any OTDR software.

**1.14 TRAFFIC & UTILITIES OSP MULTI-PAIR CABLES (COPPER DATA CABLES):**

For department specific device connections, the Contractor shall supply manufacturer specified multi-conductor composite cables to support SCADA, serial or ethernet communications and/or power for such devices.

For ethernet connected devices, the Contractor shall furnish and install multi-pair data cable (CAT6) that will support full-duplex Fast Ethernet operations up to 10GB 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 (CAT6).

For all City of PSL ISP applications refer to specifications on the city website at:  
<https://www.cityofpsl.com/Home/ShowDocument?id=8075>

**1.14.1 MANUFACTURER:**

The manufacturer shall be ISO9001 certified and TL9000 registered.

**1.14.2 SPECIFICATIONS:**

Multi-pair data cable, CAT6 shall meet the minimum specifications as published on city website in table 27 10 11.01.B.

**1.14.3 CONNECTORS:**

CAT6 cabling shall be terminated with Connectors shall be RJ-45 (8P8C) type connectors and 110 style IDC pair terminations.

**1.14.4 TESTING:**



Category 6A performance testing shall be done according to the requirements of ANSI/TIA-568.2-D-2018 and ANSI/TIA-1152-A-2016.

## 2 NETWORK DEVICES

Provide hardened, Managed Field Ethernet Switches (MFES) for drop termination connections supporting field devices for Traffic Engineering, Utility Systems, Parks and Recreation, Public Works, and Information Technologies. The MFES shall be 100% compatible and interoperable with the existing Ethernet networks.

The Contractor shall follow project plans for determining the number of POE+ connected devices and shall size the power supply to support the required power draw over POE ports.

### 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:  $\leq 8''H \times \leq 8''W \times \leq 5.5''D$

Mounting: DIN rail mounted

### 2.4 ELECTRICAL:

All wiring shall meet NEC requirements and standards.

- Power Consumption:  $\leq 42W$
- Input Voltage: 9.6-60 VDC; 110/220 VAC

### 2.5 ENVIRONMENTAL:

- Operating Temperature Range:  $-40^{\circ}C$  to  $+75^{\circ}C$
- Humidity:  $\leq 95\%$  non-condensing
- Ingress protection: IP40 rated (1mm objects)
- Compliance: NEMA TS 2 Standard (Traffic Control Equipment)

### 2.6 ETHERNET PORTS:

The Contractor is to review the project plans in order to determine the required number of ports.

“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.

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  $\geq 15$  dB

2.7      WARRANTY: 5 years manufacturer warranty from the date of purchase.

2.8      PERFORMANCE:

- Switching Bandwidth:                     $\geq 20$  Gbps non-blocking
- VLANs:                                        1,000
- IGMP Groups:                                1,000
- Minimum 32KB MAC address table (16,000 MAC addresses)
- Minimum Mean Time Before Failures (MTBF) of 10 years ( $\geq 519,190$  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:

- Fast Boot Express setup
- Web Device Manager, Industrial Network Director (IND)
- MIB, Smartport, SNMP, Syslog, storm control, unicast, multicast, broadcast
- SPAN sessions, RSPAN
- DHCP server, customized DOM (digital optical management)
- Embedded Event Manager (EEM), Plug-n-Play Agent

2.11     CYBER SECURITY FEATURES:

The MFES shall support the following standard and advanced cyber security features:

- SCP, SSH, SNMPv3, TACACS+
- RADIUS Server/Client
- MAC Address Notification, BPDU Guard
- Port-Security, Private VLAN
- DHCP Snooping, Dynamic ARP Inspection, IP Source Guard
- 802.1x, Guest VLAN, MAC, Authentication Bypass
- 802.1x Multi-Domain Authentication, Storm Control, Trust Boundary
- FIPS 140-2, Netflow Lite

2.12     NETWORKING FEATURES:

Standard and advanced (layer 2+) networking features shall include, but are not limited to:

- Layer 2 IPv6 - IPv6 Host support, HTTP over IPv6, SNMP over IPv6
- Layer 3 Routing -
- Internet Group Messaging Protocol (IGMP) IGMPv1, v2, v3 Snooping, IGMP filtering, IGMP Querier
- Quality of Service (QoS) priority classify by port, Ingress Policing, Rate-Limit, Egress Queueing/shaping, AutoQoS, QoS

#### 2.13 NETWORKING STANDARDS / IEEE COMPLIANCE:

The MFES shall comply with all applicable IEEE networking standards for Ethernet communications, including but not limited to:

- IEEE 802.1D MAC Bridges, STP
- IEEE 802.1p Layer2 COS prioritization
- IEEE 802.1q VLAN
- IEEE 802.1s Multiple Spanning-Trees
- IEEE 802.1w Rapid Spanning-Tree
- IEEE 802.1x Port Access Authentication
- IEEE 802.1AB LLDP
- IEEE 802.3ad Link Aggregation (LACP)
- IEEE 802.3af Power over Ethernet provides up to 15.4W DC power to each end device
- IEEE 802.3at Power over Ethernet provides up to 25.5W DC power to each end device
- IEEE 802.3af Power over Ethernet
- IEEE 802.3at Power over Ethernet Plus
- IEEE 802.3ah 100BASE-X SMF/MMF only
- IEEE 802.3x full duplex on 10BASE-T
- IEEE 802.3 10BASE-T specification
- IEEE 802.3u 100BASE-TX specification
- IEEE 802.3ab 1000BASE-T specification
- IEEE 802.3z 1000BASE-X specification
- IEEE 1588v2 PTP Precision Time Protocol
- IEEE 802.1AS PTP
- IEEE 802.1Qbv TSN

#### 2.14 IETF RFC COMPLIANCE:

- RFC 768: UDP
- RFC 783: TFTP
- RFC 791: IPv4 protocol
- RFC 792: ICMP
- RFC 793: TCP
- RFC 826: ARP
- RFC 854: Telnet
- RFC 951: BOOTP
- RFC 959: FTP
- RFC 1157: SNMPv1
- RFC 1901,1902-1907 SNMPv2
- RFC 2273-2275: SNMPv3
- RFC 2571: SNMP Mgmt
- RFC 1166: IP Addresses
- RFC 1256: ICMP Router Discovery
- RFC 1305: NTP
- RFC 1492: TACACS+
- RFC 1493: Bridge MIB Objects
- RFC 1534: DHCP and BOOTP interoperation
- RFC 1542: Bootstrap Protocol
- RFC 1643: Ethernet Interface MIB
- RFC 1757: RMON
- RFC 2068: HTTP
- RFC 2131, 2132: DHCP
- RFC 2236: IGMP v2
- RFC 3376: IGMP v3
- RFC 2474: DiffServ Precedence
- RFC 3046: DHCP Relay Agent Information Option
- RFC 3580: 802.1x RADIUS
- RFC 4250-4252 SSH Protocol

## 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 / VERIFICATION 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 when applicable.
9. Call the City to verify that all field devices are reachable over the network.



**3 CCTV Cameras**

Furnish and install a closed-circuit television (CCTV) camera at the locations shown in the Plans. The installed equipment must provide unobstructed video images and other current conditions of City roadways, traffic, facilities around a CCTV field site; respond to camera control signals from an operator; and transmit video images to remote locations for observation by department.

Provide a CCTV camera that is compatible with the current software application used by the City for monitoring and control.

**3.1 MANUFACTURER:**

The manufacturer shall be Bosch or Axis, determined by the applicable department.

**3.2 PERFORMANCE:**

- Day (color)/night (monochrome) switchover and iris control, with user-selectable manual and automatic control capabilities.
- CCTV cameras must provide titling and masking features including, but not limited to, programmable camera title, programmable preset titles for each preset position, and programmable privacy zones. Programmable titles must allow a minimum of 18 characters per line.
- Lenses shall be suited for the application and have minimum 22x motorized optical zoom and varifocal lenses
- All Traffic CCTV cameras must support the National Transportation Communications for ITS Protocol (NTCIP) 1205 v1.08.
- IP cameras must also support the Open Network Video Interface Forum (ONVIF) Core, Streaming, and Media Service specifications.
- CCTV cameras must perform all required functions during and after being subjected to the environmental testing procedures described in NEMA TS2, Sections 2.2.7, 2.2.8, and 2.2.9.
- All CCTV cameras, mounting hardware, and any other camera-related material that is exposed to the environment must withstand 150 mph wind speeds.

**3.3 ELECTRICAL:**

The Contractor should provide appropriate power supply consistent with specified camera per department defined camera, which may require providing a POE Injector.

**3.4 INSTALLATION:**

When installing cameras for CPSL Traffic Dept., the Contractor shall procure and place a neoprene gasket to be placed between any metallic attachment point such as a mast arm and the mast-o-bracket and pole banding or strapping to eliminate inductance potential.

When installing cameras all CPSL Departments, the Contractor must review with Project Manager desired field of view and any masking of that view that is required by project.

3.5 VERIFICATION REQUIREMENTS:

Post installation the Contractor shall schedule an inspection with the City for final installation approval and acceptance.

## 4 GUARANTY PROVISIONS:

The manufacturers' warranties for the MFES and Cameras shall be fully transferrable from the Contractor to the City. 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 City within 10 calendar days.

## REFERENCES:

City of PSL IT Specifications Web Access

Copper - <https://www.cityofpsl.com/Home/ShowDocument?id=8075>

Fiber – <https://utility.cityofpsl.com/media/1590/appendix-c-fiber-optic-standards-and-details.pdf>

Corning 2021 Local Area Networks and Data Center Core Products Catalog

<https://www.corning.com/catalog/coc/documents/selection-guides/LAN-1273-AEN.pdf>

Corning Cable Systems - SRP-005-011 "Duct Installation of Fiber Optic Cable"

[005-011.pdf \(corning.com\)](#)

[SRP-005-011.iss8 \(wordpress.com\)](#)

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

The City of PSL standard for backbone fiber optic communication pathways along City roadway rights of way are for a minimum of two (2), two (2") inch conduits to be placed in every project for City communications. The City of PSL standard connections to the backbone fiber optic communications pathways from City Buildings will be a minimum of two (2), two (2") inch conduits but may be more depending on project plans.

The City of PSL standard for horizontal/drop fiber optic communication pathways from the backbone splice vault to an "field endpoint cabinet" (ex: traffic signal, water pump/meter site, Park interface cabinet, ...) shall be one (1), two (2") inch conduits for placement of a smaller distribution cable.

Contractor(s) shall not be allowed to place directional bores diagonally across a roadway or intersection unless previously approved by the CPSL Information Technology Dept. and will only be allowed after field inspection of existing conditions identifies limited right of way for perpendicular deployment.

Engineer(s) and/or Contractor(s) must relocate any existing CPSL infrastructure (conduit, pathways, pullboxes and/or fiber optic cables) where expansion, extension or other modification to roadways (turn lanes, round-a-bouts) encroach over existing CPSL infrastructure. The Engineer(s) or Contractor(s) shall relocate CPSL infrastructure out from proposed hard scape cover within the project limits.

#### 5.1.1 TYPE APPLICATION

HDPE SDR 11 conduit shall be used for all directional bores greater than 600lf.

HDPE SDR 11 or 13.5 is allowed for directional bores of 600LF or less.

HDPE SDR 11, SDR 13.5 or PVC Schedule 40 (communications only), Schedule 80 (electrical) may be used for open trench.

##### 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  $\leq 2"$  in diameter (unless required by special projects) and shall conform to industry standards and minimum requirements:

- Nominal outer diameter - 2.375"
- Average inner diameter -  $\leq 1.926"$

- Minimum Wall thickness -  $\leq 0.216''$
- Tensile Strength –  $\leq 0.64$  lb per ft.
- 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" (conduit type dependent on project/application) 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
- Other methods approved by PSL and EOR

The top of the conduit shall be no less than 30" below grade and shall have a minimum slope of 3" away from any buildings, cabinet or other facility entrance point toward pull boxes to allow for necessary drainage away from interior facilities.

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 HDPE casing of the larger size as depicted on the plans may be required as an outer sleeve/casing as specified by the EOR and approved by the PSL.

The conduit shall be run in straight lines as practical with deflection around existing utility or change of direction is necessary. Where trenching is employed, the Contractor shall remove any unsuitable soils (multiple rocks greater than 4" in

diameter) and replace with clean fine soils and tamper compacted in 12" levels to restore to existing conditions. .

For all new duct placed by open trench method, a continuous marking tape shall be direct buried at 12" below grade and a minimum of 12" above the duct

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 compression push-on (E-LOC), hydraulic press-on or electro-fusion coupling methods. The E-Loc Coupling is a compression coupling that provides a watertight/airtight connection in buried or restrained applications and is allowed for ducts 4" and smaller.

Press-on couplings of for joining ducts up to 8" in diameter are allowed. . Contractor to follow manufacturer's installation procedures 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 and shall be used on any directional bore casing pipe greater than 2,500lf in a single continuous segment.

## 5.1.1.2 INNER-DUCT

Where specified in plans, the Contractor shall 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 orange or and approved by EOR and/or CPSL project representative.

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 offiber 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.

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, Schedule 80 PVC in accordance with ASTM D 1785 or HDPE SDR 11. 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 or approved couplers. 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 or a duct plug with appropriate number and size of cable ports to allow for a water tight seal around the cable and conduit without damaging the cable; this material shall be inserted between the cable and the conduit.

## 5.4    TESTING OF CONDUIT

After installation of the conduit and completion of any required restoration process, a mandrel or wire brush with an outer diameter of at least 95% of the internal diameter of the conduit shall be passed through the conduit to clear ducts of any partial obstruction. If the mandrel/brush fails to pass through the conduit, use a mandrel, wire brush or plastic ball that is 80% of the inside diameter of the duct to clear any obstruction. If the defect remains, the defect shall be exposed and the conduit path corrected. The mandrel test would then 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 PROCEDURES

### 6.1      CALL BEFORE YOU DIG

The federally mandated, national phone number, 811, helps prevent you from unintentionally hitting underground utilities lines.

Before you begin projects that involve digging, dial 811 to locate underground fiber optic, electric, gas or other utility lines. Digging without this information can cause communication outages, power outages, and it's extremely dangerous.

Simply tell the 811 Operator where you're planning to dig and what type of work you will be doing, and your local utility companies will be notified immediately. After calling 811, utilities have 48 standard work day (Monday thru Friday) hours to come out and mark their lines with a color-coded paint or flagging system.

Before going to the site, confirm you've received responses from all member companies. They may be waiting for additional information or actions from you, including white lining, providing a gate code, unlocking a gate, etc., before locating.

At the site before digging, make sure to confirm the marks match the positive response codes. All utilities are required to respond to your ticket with a response code letting you know if its marked, no conflict or there may be some additional instructions or notes about the locate. If a utility has the locate ticket stated at "Marked" but there are no locates you should always contact the utility member whose marks are in question before digging.

### 6.2      CITY LOCATE – CABLE MANAGEMENT SYSTEM (CMS)

All contractors awarded underground work for the City of Port Saint Lucie (CPSL) should always include trace wire when placing new communication conduits and/or fiber optic lines.

The CPSL employs a Norscan electronic locate Cable Management System (CMS) with the CMS segmented into four (4) distinct geographic sections of the City. The CMS should always be used and maintained to preserve the continuity while placing new communication conduits and/or fiber optic lines within the City.

All contractors deploying tracer wire within the City shall be required to verify with the CPSL Fiber Optic Project Manager if any necessary "fixed current" "Line Terminating Units (LTU)" are to be required to maintain the low impedance path to ground between the CMS transmitter at the CPSL City Hall and the section endpoint. There should not be more than 25 LTUs in a section of the City unless previously approved for expansion up to a maximum of 35 LTUs/section.

The CMS ensures the AC voltage supplied into the locate wire plant from the Multi-Tone Module provides the low impedance path to ground for AC voltage locate frequencies over 250 Hz.

Prior to any project connection into the CMS, the Contractor shall call the project designated CPSL Utility or Fiber Network Technician, 24 hours prior to proceeding with any new connection into the existing CMS, to verify the CMS is not showing any faults on the CMS Controller Unit for the specific section of the City where the Contractor is required to make the interconnection.

If there is an existing fault, the CPSL shall remediate the condition precedent to the

Contractor interconnection, or the contractor shall be allowed to continue with their segment interconnection after a 24-hour period.

Any Contractor adding a new locate segment or branch of locate wire into the existing locate system, must demonstrate an easily locatable tone to the end of the branch by a locate wand in the presence of CPSL Utility Locate or Consulting Inspector after complete installation and splicing of their entire project limit modification.

If the Contractor has introduced a fault, the Contractor shall identify and remediate any fault to ground by accessing the nearest line terminating unit to the segment added the segment, isolating the resistive fault and performing remediation of locate wire.

The CPSL may have additional CMS monitoring capabilities deliver -48VDC potential between the conductor and the ground to clean up additional resistive faults that can be manually or remotely switched to a given section of the City with 24 hour locate advance notice.

Additional "Splitters" may be required where multiple directions of trace wire plant converge at a single point to properly extend the electronic locate system in all multiple directions within a single section. Splitters and Liner Terminating Units must be compliant with CPSL QPL for use in the CPSL Cable Management System.

This will ensure City of Port St. Lucie fiber optic lines will be properly located when contractors call 811.

## **7      LOCATE TRACER WIRE**

Tracer wire shall be placed inside conduits, terminating on a properly placed Line Terminating Units at the nearest pull box, cabinet, closure, or facility. Tracer wire endpoint shall be identified on project plans to confirm if tracer is to be run into any Traffic, Utility or other Department device cabinet or facility.

Tracer Wire shall be a minimum of 14 gauge and may be either Orange or Green in color. The tracer wire shall be continuous and un-spliced between pull boxes, except in places where a directional drill occurs with an approved waterproof splice.

A continuity test shall be performed after new trace wire placement before connection into the existing LMS system to confirm no damage or separation of the tracer wire has occurred during the installation of wire.

## **8      MARKING TAPE**

Marking tape shall be bright orange color, minimum 6" wide.

Marking tape shall be per the QPL, as specified, with "CAUTION FIBER OPTIC CABLE" 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, 6-12" 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.

## 9 PULL TAPE, MULE TAPE, POLY LINE (Jetline)

Mule tape listed on the CPSL QPL shall only be utilized if fiber optic cable is to be installed by the pull method. In the case of conduit without fiber being pulled, a pull tape or poly line shall be pulled and left in the duct/s.

Pull or Mule tape shall have the following properties:

- Tensile strength of 1200 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.

Poly (Jet) Line shall have the following properties:

- Tensile strength of 200 lbs
- Spiral wrap twine construction
- No Printed foot markings

Rot & Mildew resistant.

## 10 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 ft 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 750-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.

## 11 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-H3.
- 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 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 found in section 1.4 of this document. Each pigtail shall be terminated into a 12-port adapter plate. Individual 12-port adapter plates shall be used per each row of the patch panel for a total of 24 accessible connector ports per row of the patch panel. Expansion kits shall be used to increase the storage capacity of the patch panel to provide accessible 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 or the Black buffer) in the lower right-most port.

## 12 MDF (Main Distribution Frame) Indoor Facilities/Lift Station Panels

The following items are to be used in indoor facilities such as server rooms and at Lift Station Panels as described.

### 12.1 Panels & Modules



The modular coupler that would be required for Lift Station panel work depends on required number of connections.

Typically a duplex, 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, LC Compatible, and ceramic.

#### 12.2 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 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. The design hardware shall include the connector configuration LC, fiber count 12, module type CCH, with 12 splice protector single fiber heat-shrink. The number of splice protectors is 12. The connector type is LC, 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 0.40dB. The design adapter shall be LC.

#### 12.3 Enclosures

There are several types of enclosures that would be required for various applications. Typically:

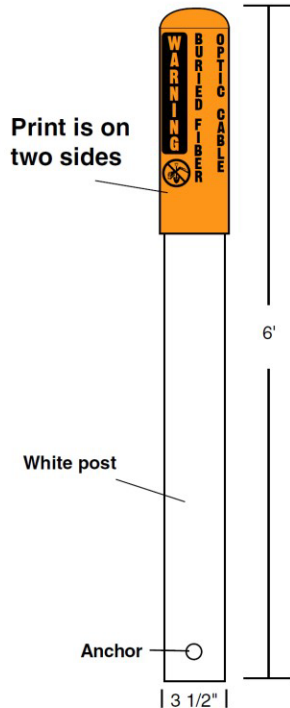
- (1) For inside a building, Closet Connector Housing (CCH) provide interconnect and cross-connect capabilities between the outside plant, riser or distribution cables and optoelectronics. The housing must accept CCH connector panels CCH cassettes and CCH modules. The unit must be able to mount a rack 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.
- (2) 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 12-slot, 0.4-in splice holder which will accommodate 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).

#### 12.4 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 tightbuffered 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 compatible to fit into the rack.

## Appendix A




18"  
high

Print  
Area  
15"


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:**

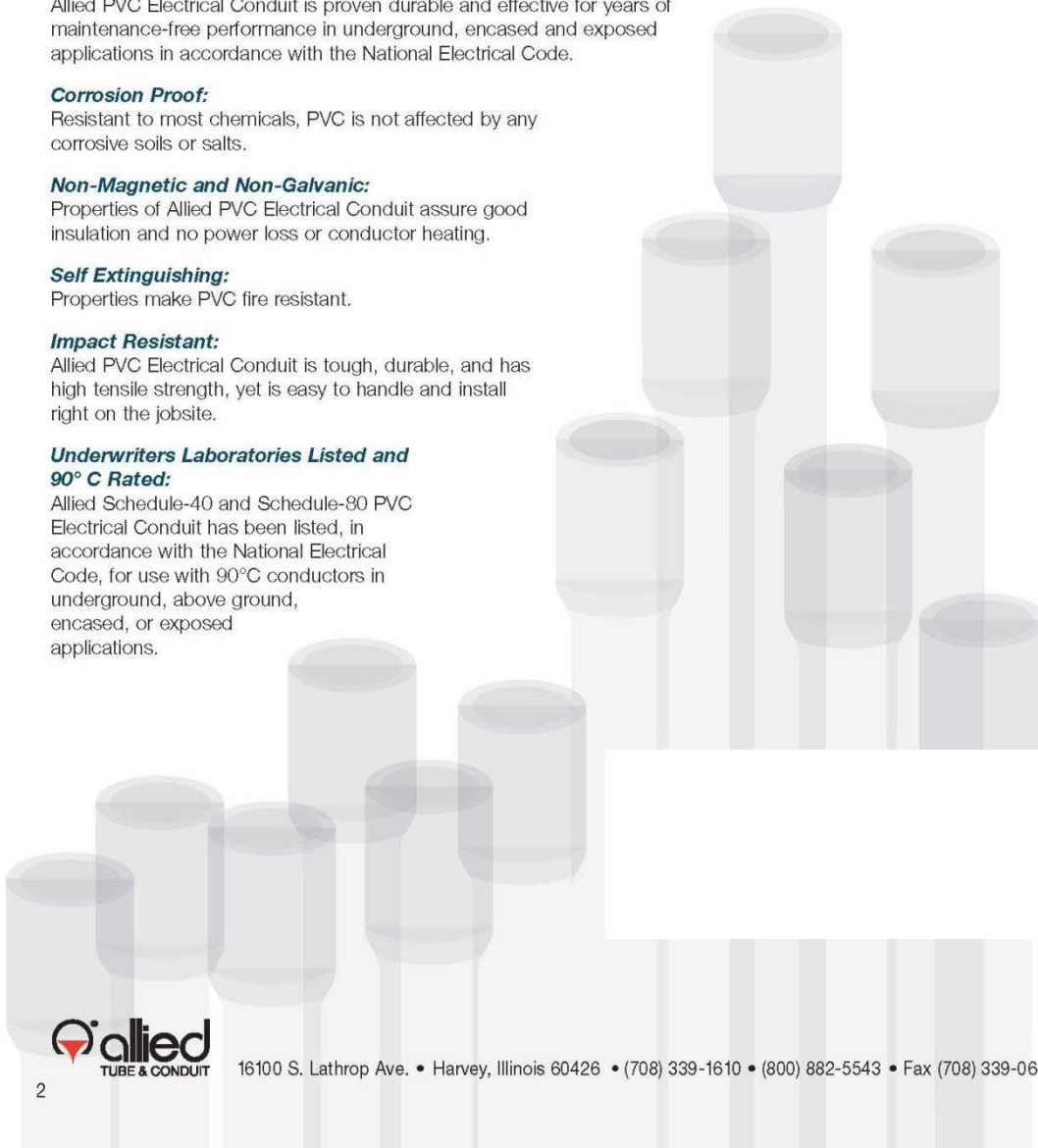
Properties make PVC fire resistant.

#### **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.



2

16100 S. Lathrop Ave. • Harvey, Illinois 60426 • (708) 339-1610 • (800) 882-5543 • Fax (708) 339-0615



## 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

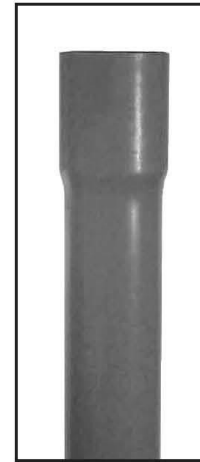
TC-2



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
1/2	8102	.840	.622	.109	.164	6000
3/4	8103	1.050	.824	.113	.218	4400
1	8104	1.315	1.049	.133	.321	3600
1 1/4	8105	1.660	1.380	.140	.434	3300
1 1/2	8106	1.900	1.610	.145	.518	2250
2	8108	2.375	2.067	.154	.695	1400
2 1/2	8110	2.875	2.469	.203	1.096	930
3	8112	3.500	3.068	.216	1.435	880
3 1/2	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

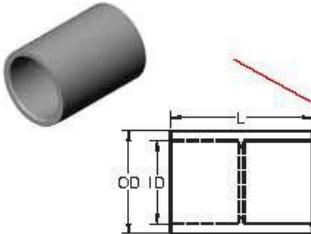
1. 20' lengths available on special request.
2. Minimum shipment: full pallet quantity per size.

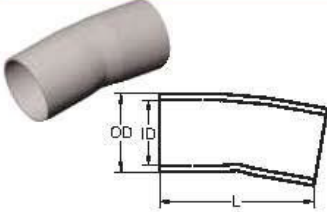
16100 S. Lathrop Ave. • Harvey, Illinois 60426 • (708) 339-1610 • (800) 882-5543 • Fax (708) 339-0615

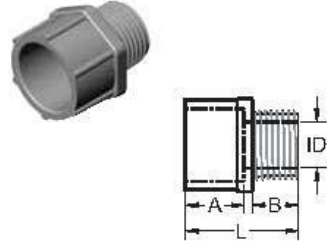
**allied**  
TUBE & CONDUIT

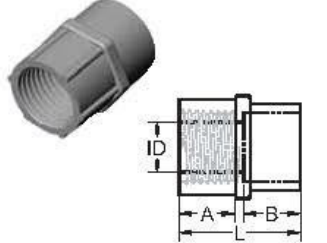
3

## 2 FITTINGS - 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
	1 1/4	59604	50	2.000	1.680	2.156
	1 1/2	59605	25	2.230	1.900	2.281
	2	59606	40	2.720	2.375	2.406
	2 1/2	59607	20	3.320	2.875	3.187
	3	59608	30	4.000	3.500	3.437
	3 1/2	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
	2 1/2	802732	12	2.875	2.445	5.5
	3	802733	10	3.500	3.042	6.0
	3 1/2	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
	1 1/4	59618	50	1.300	0.640	1.311	2.125
	1 1/2	59619	30	1.425	0.725	1.530	2.250
	2	59620	50	1.150	0.800	1.970	2.100
	2 1/2	59621	25	1.900	0.800	2.346	2.930
	3	59622	50	2.000	0.815	2.915	3.055
	3 1/2	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

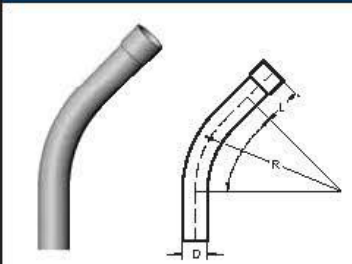
FEMALE ADAPTERS (NPT Tapered Thread)							
	Size (in)	Part Number	Unit Quantity	A (in)	B (in)	Inside Diameter (ID) (in)	Length (L) (in)
	1/2	59630	150	0.800	0.825	0.620	1.725
	3/4	59631	100	0.800	1.000	0.820	1.900
	1	59632	50	1.000	1.200	1.065	2.300
	1 1/4	59633	30	1.015	1.300	1.395	2.425
	1 1/2	59634	25	1.050	1.290	1.575	2.440
	2	59635	30	1.075	1.375	2.050	2.550
	2 1/2	59636	20	1.675	1.985	2.470	3.780
	3	59637	25	1.630	2.150	3.090	4.100
	3 1/2	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

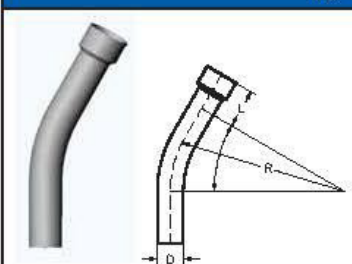
RIGID PVC CONDUIT FITTINGS

[www.tycoelectrical.com](http://www.tycoelectrical.com)

## 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
	1 1/4	802755	20	1.680	2.000	7.25
	1 1/2	802756	15	1.900	2.000	8.25
	2	802757	10	2.375	2.000	9.50
	2 1/2	802758	100	2.875	3.000	10.50
	3	802759	50	3.500	3.125	13.00
	3 1/2	802761	50	4.000	3.250	15.00
	4	802762	50	4.500	3.375	16.00
	5	802763	25	5.565	3.625	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
	1 1/4	802769	30	1.680	2.000	7.25
	1 1/2	802770	15	1.900	2.000	8.25
	2	802771	10	2.375	2.000	9.50
	2 1/2	802772	12	2.875	3.000	10.50
	3	802773	10	3.500	3.125	13.00
	3 1/2	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
	1 1/4	802781	30	1.680	2.000	7.25
	1 1/2	802782	50	1.900	2.000	8.25
	2	802783	30	2.375	2.000	9.50
	2 1/2	802784	10	2.875	3.000	10.50
	3	802785	10	3.500	3.125	13.00
	3 1/2	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



## 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](http://www.atcelectrical.com)

## Weights and Dimensions for Galvanized Rigid Tubing

Trade Size Designator		Approx. Wt.* Per 100 Ft. (30.5M)		Nominal Outside Diameter <sup>1</sup>		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

<sup>1</sup> 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. (30.5M)							
U.S.	Metric	lb.	kg	in.	mm	in.	mm	ft.	m
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

<sup>1</sup>Outside diameter tolerances: +/- .025 in. (64mm) <sup>2</sup>For more information only; not a spec requirement.

**tyco**

Electrical & Metal Products

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AFC Cable Systems® • Allied Tube & Conduit • Cope® Cable Tray • Power-Strut® Metal & Fiberglass Framing



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## Appendix C



### **QPL- Fiber Optic Products**

Contractor to select products from Qualified Products List for submission for “project approval” based on specific project scope, intended utilization and requirements.

#### **A. CASING SPACERS -12" Width min.**

- APS - Advance Products Systems PSI - Pipeline Seal and Insulator
- Cascade

#### **B. CONTROL CABINET FASTENERS**

- Stainless Steel Tapcons
  - TCHSXXXXXX(;P)
    - “xxxxx” = size (i.e. 3/16” x 1-1/4” would be TCHS316114
    - “;P” = power (is power is N/A leave blank)

#### **C. HDPE (High Density Polyethylene Pressure Pipe) & PVC (Polyvinyl Chloride) PIPE**

- Directional Bore – Size by Project Spec from 1”, 1.25”, 2”, 3” or 4”
  - HDPE SDR 11 or equal, Smoothwall
- Open Trench – Size by Project Spec from 1”, 1.25”, 2”, 3” or 4”
  - HDPE SDR 11 or equal, Smoothwall
  - HDPE SDR 13.5 or equal, Smoothwall
  - PVC Schedule 40 (Communications Only) or 80 (electrical)

##### **Couplers**

- Clear Lock, ELOC, Double ELOC
- Manufacturers
  - Dura-line, Blue Diamond, Carlon, Endot or FDOT APL product

#### **D. RIGID CONDUIT**

- Galvanized Rigid Steel, 2” or various Tyco, NEC certified or FDOT APL product

#### **E. LOCATE/TRACER WIRE, CONNECTORS & LINE MANAGEMENT MODULES**

- Wire #14 THHN/THWN, 600V, Green/Orange
- Manufacturers
  - Southwire, General Cable, Encore or equal
- Water Proof Connector: Dryconn CH90120 or equal
- Ground Conductor Connector: 3M DBR/Y-6 or equal
- LMS Switch Box 4-way: ACT 4456-150
- LMS Side Leg Terminator: ACT 444-150-352
- LMS Pedestal Protector: ACT 442-150-300
- Head Unit, CMS c/w AUIC, MTM: Norscan 4200
- Transmitter Protection Assembly: Norscan 51200
- Line Termination Unit: Norscan 2310
- Wire Grounding Unit: Norscan 2745-6
- Wire Grounding Unit: Norscan 2755-6

#### F. MULE TAPE - FIBER OPTIC

- Pull tape, Polyester, 3/8", 1200lbs tensile strength, traceable, for ALL SPARE Ducts only
- Pull tape, Polyester, 3/8", 1200lbs tensile strength – allowed for Installation processes
- Poly Line, 200lb tensile strength– allowed for Installation processes

#### G. Underground Marking Tape – Open Trench Only

- Detectable Tape, 6", Black on Orange
- Harris Industries - DU-10-6 or equal
  - Marked: "caution fiber optic cable buried below"

#### H. LUBRICANT - ANTI-SEIZE

- Cable Pulling Lubricants Polywater or equal
- Bolt Anti-seize Oxlic Never Seize or equal
- Employ Fiber Optic, LZ Universal or Cable Blowing consistent with installation process

#### I. PULL & SPLICE BOX - FIBER OPTICS

- Pull & Splice boxes must be concrete polymer meeting (ANSI/SCTE) 77 2013 Specification for Underground Enclosures with loading integrity:
  - Tier 22 Lids for all areas within 6' of travel lane with occasional heavy traffic
  - Tier 15 Lids for all areas within limited heavy traffic
- Minimum Sizes
  - Signalization and lighting applications 13" x 24" x 12"
  - Fiber optic cable applications
    - Mid run slack points 17" x 30" x 24"
    - Splice points, Midspan Single Drop 24" x 36" x 24"
    - Multi-backbone 4 way Backbone 30" x 48" x 36" two piece lid
    - Multi-backbone 4 way Backbone 48" x 48" or larger all two piece lid
- Manufacturers
  - Quazite, Old Castle, American Polymer Company or FDOT APL product

#### J. FIBER OPTIC (FO) CABLE – Singlemode (SMF)

- *Corning "current year" Local Area Networks and Data Center Core Products Catalog may be approved based on specific project requirement*
- All FO Cable to be Corning all-dielectric, dry-filled, loose-tube, dispersion-unshifted, with low water peak, gel free, and suitable for underground and aerial outside plant installation meeting ITUT G.652.D requirements
- Cable glass attenuation must be
  - Corning SMF28e 0.4/0.35/0.3 dB/km (limited to maintenance)
  - Corning SMF28e+ 0.35/0.35/0.25 dB/km or approved equivalent (new projects)
  - Corning Binderless SMF28e+ 0.35/0.35/0.25 dB/km or approved equivalent (new projects)
  - Corning Ultra Low Loss 0.34/0.34/0.22 dB/km (new projects)
- Cables shall employ Corning FastAccess® or Microduct Sensing Cable with FastAccess® Technology
- Cables shall be 12fiber/buffer tube and be marked with sequential markings every foot
- Cable Counts are to be established by Department and project requirement as identified by cable part #s reflecting Cable Count. Example 96count - 096EU4-T4700D20

- Corning Cable Part number examples:
- ALTOS Gel-Free Cable Non-Armored SMF28e+ 0.35/0.35/0.25 dB/km
  - xxxEU4-T4700D20 – where xxx is the # of fibers in the cable
- ALTOS Gel-Free Cable Non-Armored Binderless SMF28e+ 0.35/0.35/0.25 dB/km
  - xxxEU4-T4700D20 – where xxx is the # of fibers in the cable
- ALTOS Gel-Free Cable Non-Armored Ultra Low Loss 0.34/0.34/0.22 dB/km
  - xxxZU4-T4722D20 - where xxx is the # of fibers in the cable
- STANDARD Backbone is either 96F or 144F Count (to be noted in project plans)
- STANDARD Drop Cable is reflected in the chart in above specifications for ALL Traffic & Utilities Projects

**K. FIBER OPTIC (FO) CABLE – Multimode (MM) – OM4 50/125µm 10G Multimode (ISP Projects ONLY)**

- Corning “current year” Local Area Networks and Data Center Core Products Catalog may be approved based on specific project requirement
- For loose-tube applications: FO Cable to be Corning all-dielectric, dry-filled, loose-tube, laser-optimized, gel free, and suitable for outside plant installation meeting ISO/IEC 11801 requirements
  - Cable glass attenuation must be Corning ClearCurve® OM4 2.3dB/km (@ 850nm) /0.6 dB/km (@ 1300nm)
  - Cables shall employ Corning FastAccess® or Binderless FastAccess®,
  - Cables shall be 12fiber/buffer tube and be marked with sequential markings every foot
  - Cable Counts are to be established by Department and project requirement as identified by cable part #s reflecting Cable Count. Example 48count - 048TU4-T4790D20
- For tight buffer applications: FO Cable to be Corning all-dielectric, dry-filled, tight buffer, laser-optimized, gel free, and suitable for indoor installation meeting NEC Article 770 and OFNP & FT-6 listed.
  - Cable glass attenuation must be Corning OM4 2.8dB/km (@ 850nm) /1.0 dB/km (@ 1300nm)
  - Cables shall be marked with sequential markings every foot
  - Cable Counts are to be established by Department and project requirement as identified by cable part #s reflecting Cable Count. Example 12count - 012T88-31190-29
- Corning Cable Part number examples:
  - Loose-tube Application: ALTOS LT, Gel-Free, All-Dielectric Cable with FastAccess® 50 µm multimode (OM4)
    - xxxTU4-T4790D20 - where xxx is the # of fibers in the cable
  - Tight-buffer Application: MIC Tight-Buffered, Plenum, All-Dielectric Cable 50 µm multimode (OM4)
    - xxxT88-3x190-29 - where xxx is the # of fibers in the cable

**L. FO TERMINATION CABINETS**

- Provide termination housings to accommodate connector panels fusion splice trays, factory terminated pigtail connectors or field fanouts and optical connectors for mechanical connections in a wall or rack mount patch panel for these sites:
  - Main Distribution Frame (MDF) – Indoor Facilities (Rack Mount)
  - Lift Station SCADA Panels (OSP Wall Mount)
  - Traffic Cabinets (OSP Wall or Shelf Mount)
- FO Termination Housings - Corning
  - Lift Station Cabinets: SPH-01P
  - Signal Cabinets: CCS-01U, CCH-01U or SPH-01P
  - Signal Hub Cabinets: PCH-02U to PCH-04U (FO count dependent)
  - Parks & Recreation: CCS, PCH or CCH model (FO count dependent)
  - Inside Building: CCH-01U to CCH-04U (FO count dependent) or WIC-02P

- Outside FOC to Inside FOC Splice Housing: Corning CSH-03U
- FO Splice Trays - Corning
  - SCF-ST-099, SCF-ST-112, SCF-ST-116
- Cabinet configuration uses may change as directed or approved by City personnel

#### M. FO TERMINATION CONNECTOR PANELS

- Provide connector panels for coupling of mechanical connectors of a cable terminated on one side of the panel to patch cables on the other side.
- Provide LC connectors and coupler panels in termination housings but accommodate legacy ST and SC connector types as appropriate.
- Provide connector panels matching connector type (SC, LC) and cable mode (SM, MM) consistent with Department or project.
- *Fusion Spliced Factory Terminated Pigtailed / Splice On-Connectors ONLY are allowed for Traffic, Utility SCADA, IT WAN & Parks Dept. (No Unicams or Hot Melts allowed)*
- Coupler Panels Corning
  - 12-24F LC, SM: CCH-CP12-A9, CCH-CP24-A9
  - 12F SC, SM: CCH-CP12-59
  - 12-24F LC, SM Angled: CCH-CP24-B3, CCH-CP12-B3
  - 12F ST, OM4: CCH-CP12-H3
  - 12F SC, OM4: CCH-CP12-E7
  - 12F LC, OM4: CCH-CP12-E4
- Modular Coupler Pigtailed Including Coupler Panel, Pigtail Connector and Splice Tray
  - 12-24F Module SM, LC, UPC: CCH-RM12-A9-P03RH; CCH-RM24-A9-P03RH
  - 12F Module SM,SC: CCH-RM12-59-P03RH
  - 12-24F Module SM, LC, APC: CCH-RM12-B3-P03RH; CCH-RM24-B3-P03RH
  - 12-24F Module OM4, LC: CCH-RM12-E4-P03SH; CCH-RM24-E4-P03SH
  - 12F Module OM4, SC: CCH-RM12-E7-P03SH
  - 12F Module OM4, ST: CCH-RM12-H3-P03SH
- Coupler Cassettes Including Coupler Panel, Pigtail Connector and Splice Tray
  - 12-24F Cassette SM, LC, UPC: CCH-CS12-A9-P00RE; CCH-CS24-A9-P00RE
  - 12F Cassette SM,SC: CCH-CS12-59-P00RE
  - 12-24F Cassette SM, LC, APC: CCH-CS12-B3-P00RE; CCH-CS24-B3-P00RE
- Fan Out kits
  - Indoor: Corning-FAN-BT25-12
  - Outdoor: Corning-FAN-OD25-12

#### N. FO PIGTAILS & JUMPERS

- Pigtailed Corning OS2 Singlemode
  - SC UPC, 900um, SM, xx' (length TBD): CH-900-12KIT
  - LC UPC, 900um, SM, xx' (length TBD): CH-LC900-12KIT
- Jumpers, Corning OS2 Singlemode
  - SC-SC, 2F Zipcord, SM, UPC, xxx' (length TBD): 727202G5120xxxM
  - LC-LC, 2F Zipcord, SM, UPC, xxx' (length TBD): 040402G5120xxxM
  - LC-LC, 2F Zipcord, SM, APC, xxx' (length TBD): 222202G5120xxxM
  - ST-LC, 2F Zipcord, SM, UPC, xxx' (length TBD): 610402G5120xxxM
  - ST-SC, 2F Zipcord, SM, UPC, xxx' (length TBD): 617202G5120xxxM
  - SC-LC, 2F Zipcord, SM, UPC, xxx' (length TBD): 720402G5120xxxM

- Pigtails Corning OM4 Multimode
  - 06F, ST, 50um, MM, xxx' (length TBD): 005006B81NFxxxM
  - 12F, ST, 50um, MM, xxx' (length TBD): 005012B81NFxxxM
  - 06F, LC, 50um, MM, xxx' (length TBD): 000506B81NFxxxM
  - 12F, LC, 50um, MM, xxx' (length TBD): 000512B81NFxxxM
- Jumpers Corning OM4 Multimode
  - LC-LC, 2F Zipcord, MM, xxx' (length TBD): 050502B81NFxxxM
  - LC-ST, 2F Zipcord, MM, xxx' (length TBD): 055002B81NFxxxM

#### **O. FIBER OPTIC SPLICE CLOSURES (FOSC)**

- FOSC enclosures shall provide housing to restore the mechanical and environmental integrity of the fiber optic cable during a sheath opening or joining; provide splice slack organizers and splice trays; and accommodate pressurization
- FOSC enclosures are to meet Telcordia Technologies' GR-711-CORE standards
- Manufacturers
  - Tyco FOSC                      FOSC-450 Series FOSC-450- C, D both 4 & 6 Port
    - Splice Tray:              FOSC-ACC-C-Tray-24
    - Slack Basket:            FOSC-ACC-C-Basket
  - Corning FOSC                SCF-6C22-01, SCF6C28-01, SCF8C28-01
    - Splice Tray:              SCF-ST-099, SCF-ST-112, SCF-ST-116

#### **P. HUB CABINET - FIBER OPTIC (Parks & Recreation)**

- Use NEMA cabinets and accessories that are listed on the Department's Approved Product List (APL). Cabinets must be permanently marked with a label including the manufacturer's name or trademark, model/part number, and the year and month of manufacture
- Manufacturers
  - Southern Mfg or FDOT APL approved equal
  - WE332DED-00 with KVM
  - Keyboard Video Mouse (KVM) – rack mount
    - KVM (B021-000-17) with Dell Part A0594186 or KVM (DKMMLED185-G01) with Dell Part A7546778 or approved equal
    - Tripp Lite's NetDirector 1U Rackmount Console with 17-inch LCD panel, full 88-key keyboard, and touchpad, all in 1U rack mountable housing or approved.

#### **Q. RHUB CABINET - FIBER OPTIC (Parks & Recreation)**

- Remote Hub Cabinet with associated devices
  - Southern Manufacturing: Cabinet - WE2488-022
  - Calnex: DC Converter 24-48VDC - 48S24.6HCM
  - Konnect-IT:                      KN-D10-GRY, KN-ECDGRY, KN-2J10, KN-EB3
  - ComNet: Media Converter -    CNFESFPMCPOE30/M
  - ComNet: Terminal Server -    CNFE3DOE2/M

#### **R. Uninterruptible Power Supply & UPS CABINET - (Traffic)**

- Local Cabinet housing Uninterruptible Power Supply
  - Alpha Mfg: Cabinet – SE48-1616
- Additional Power & Surge Components
- Asco, Surge Protective Device-(SPD) Low Voltage                      Catalog #160 & 185
- Alpha Technologies, UPS (all ITS Cabinets) w/ Batteries              FXM 1100 Series

- Alpha Technologies, UPS (all New Signals) w/ Batteries FXM 2000 Series

#### S. HUB CABINET - FIBER OPTIC (Traffic)

- Use NEMA cabinets and accessories that are listed on the Florida Department of Transportation's Approved Product List (APL). Cabinets must be permanently marked with a label including the manufacturer's name or trademark, model/part number, and the year and month of manufacture
  - Manufacturers
    - Transportation Control Systems, Southern Mfg or FDOT APL approved equal
- Power Supply-
  - Power Sonic or equivalent PG-12V103 FR 12 Volt 103 AH
- Air Conditioner, Advantage Air-Cooled Panel Mounted Air Conditioner
  - Kooltronic RP33 KA4C4RP33R or K2A4C4RP33R

#### T. Managed Field Ethernet Switch (MFES) – Outdoor (OSP) Networks

Contractor to furnish & install hardened MFES consistent with planned port configurations and above specifications. Typical department MFES parts are listed below and should be Cisco products or equal.

- Utility Systems
  - Cisco IE4000-4TC4G-E
- Traffic Engineering
  - New Projects: Cisco IE4000-8GT8GP4G-E Series per project plans.
  - Maintenance Only: Siemens RS900, RX1500, RSG2200
    - Siemens RS900G-RS900G-HI-D-2SC10-XX or RS900G-HI-D-25SP-XX
- Information Technologies
  - Cisco IE4000-4S8P4G-E
- Parks & Recreation
  - Cisco IE4000-4T4P4G-E

Product Number	Total Ports	GE Combo Uplinks (4G) <sup>1</sup>	Additional Combo Ports	RJ-45 Copper Ports (T)	SFP Fiber Ports (S)	PoE/PoE+ Ports (P, GP)	Default Software
IE-4000-4TC4G-E	8	All models have 4 GE combo uplink ports	4 (FE)				All models ship with LAN Base image <sup>2</sup>
IE-4000-8T4G-E	12			8 (FE)			
IE-4000-8S4G-E	12				8 (FE)		
IE-4000-4T4P4G-E	12			4 (FE)		4 (FE)	
IE-4000-16T4G-E	20			16 (FE)			
IE-4000-4S8P4G-E	16				4 (FE)	8 (FE)	
IE-4000-8GT4G-E	12			8 (GE)			
IE-4000-8GS4G-E	12				8 (GE)		
IE-4000-4GC4GP4G-E	12		4 (GE)			4 (GE)	
IE-4000-16GT4G-E	20			16 (GE)			
IE-4000-8GT8GP4G-E	20			8 (GE)		8 (GE)	
IE-4000-4GS8GP4G-E	16				4 (GE)	8 (GE)	



#### U. Managed Field Ethernet Switch (MFES) – Indoor (ISP) Networks

Contractor to furnish & install NON-hardened MFES consistent with planned port configurations and above specifications. Typical department MFES parts are listed below and should be Trendnet products or equal.

- Information Technologies (ISP Only) – Web Smart Switch for internal Bldg Network
  - Trendnet TI-PG102 with Trendnet TI-S24048 power supply
  - Trendnet TL2-FG142
  - Trendnet TPE-082WS
  - Trendnet TPE-1620WSF
  - Trendnet TPE-2840WS
  - Trendnet TPE-5028WS
  - Trendnet TPE-5240WS
  - Trendnet TEG-MGBS20 (SM optics 1.25Gb – 20km)
  - Trendnet TEG-MGBSX (MM optics 1.25GB - 550m)

#### V. ITS Cameras

- Utility Systems
  - **Axis P1447-LE** (5MP with zoom capability)
  - **Axis M2026-LE-MkII** (130 degree wide field of view bullet camera)
  - **Axis M3116-LVE** (130 degree wide field of view flat face dome)
  - **Axis P3818-PVE** (180 panoramic camera \*\*\*new\*\*\*)
  - **Axis Q3819-PVE** (180 panoramic camera \*\*\*new\*\*\*)
  - **Axis Q3708-PVE** (180 panoramic camera \*\*\*outdated, end of life\*\*\*)
- Traffic Engineering
  - New Projects: **Bosch VG5-ITS1080P-30X6**
- Parks & Recreation
  - New Projects: **Axis Q3708-PVE**
  - Camera Mount and Accessories:
    - Pole Mount: **Axis T91B57**
    - Wall Mount: **Axis T91G61**
    - Cabinet Series: **Axis T98A-VE**
    - Network I/O **Axis A9188-VE**

#### W. Traffic Control Video Detection

- Video Detection Equipment - Above Ground
  - Iteris Video Detection Camera **RZ-4 ModeWDR**
  - Iteris Vehicle Detector Vantage SmartSpan **Vantage SmartSpan**
  - Pelco Mast Arm Camera Mount **SP-1106-FL**
- Video Detection - Cabinet Equipment
  - Iteris Video Processor **Vantage Edge 2**
  - Iteris Video Communication Module **Vantage EdgeConnect**
  - Iteris Video TS2 Input/Output Module **Vantage TS2-IO Pak**
  - Iteris DIN Rail Mounted Surge Panel



## **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**

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**St. Lucie** Transportation  
Planning  
Organization

Coco Vista Centre  
466 SW Port St. Lucie Blvd, Suite 111  
Port St. Lucie, Florida 34953  
772-462-1593 [www.stlucietpo.org](http://www.stlucietpo.org)

# **STANDARDIZED TRANSPORTATION IMPACT STUDIES (TIS) METHODOLOGY AND PROCEDURES**

**ST. LUCIE COUNTY  
CITY OF FORT PIERCE  
CITY OF PORT ST. LUCIE**

Adopted  
January 2014

Updated  
June 2016  
August 2023

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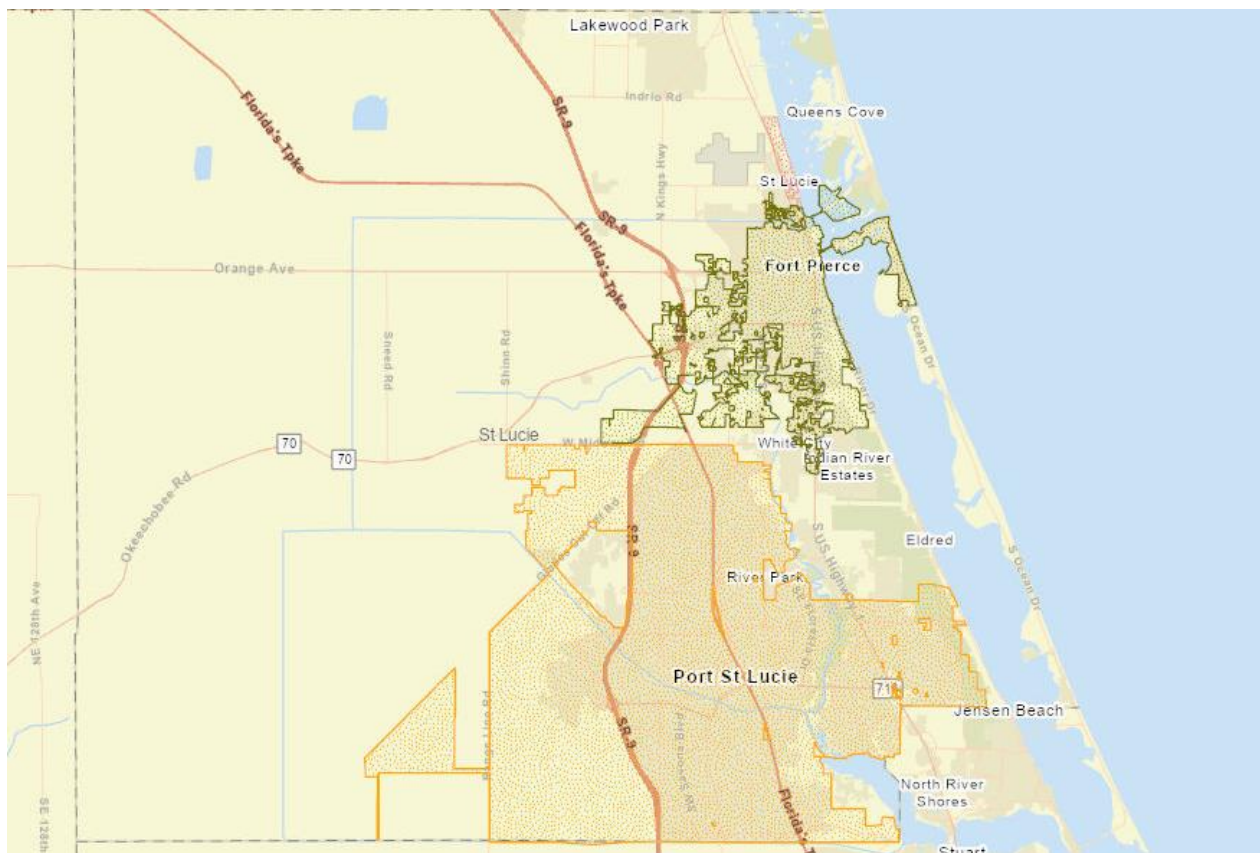
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## 1.0 PURPOSE AND APPLICABILITY

The purpose of the Standardized Transportation Impact Studies (TIS) Methodology and Procedures is to provide a generally uniform methodology for identifying potential transportation impacts of new development and redevelopment on the multimodal transportation system, including roads, transit, bicycle, and pedestrian facilities, and developing mitigation strategies to offset those impacts. However, the need to perform a TIS, the timing for its completion, and the type of submittal (i.e. hard copy, digital, etc.) will be determined in accordance with the applicable local government requirements and provisions.

Any reference to the "Local Government" in these guidelines shall mean the City of Ft. Pierce, City of Port St. Lucie, St. Lucie County, the St. Lucie Transportation Planning Organization (TPO), their consultants, sub-consultants, contractors, or employees, as applicable. The boundaries of the Local Governments are depicted in the following map:



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. The TIS shall be signed and sealed by a professional engineer licensed to practice in Florida.

Unless otherwise agreed to in an approved Methodology Statement, the procedures of this unified methodology document shall be followed.



A project impact is de minimis for transportation concurrency purposes if it would not affect more than 1 percent of the maximum volume at the adopted level of service of the affected transportation facility.

A Glossary of the terms used in the TIS is provided in Appendix A.

## **2.0 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 transportation study is not prepared or submitted without a Methodology Statement approved by the Local Government.

## **3.0 IMPACTED ROADWAYS/INTERSECTIONS**

At a minimum, all transportation facilities within the area of influence as defined by Appendix B shall be analyzed in the TIS. In addition, the following impacted roadway segments and intersections shall be analyzed in the TIS:

- A. Any 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,
- B. 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,
- C. 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 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 or the peak hour service capacity as indicated on the latest version of the TPO's level of service report, whichever is lower. 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 and any other roadways identified by the local governments.

## 4.0 ANALYSIS SCENARIOS

The Applicant shall be required to provide an analysis of the following scenarios:

- A. **Existing scenario** is defined as the analysis of existing traffic on the Existing Network.
- B. **Future background scenario** is defined as the analysis of existing traffic plus background traffic on the committed network which includes the projects programmed for construction in the Capital Improvements Program (CIP) of the local governments and Transportation Improvement Program (TIP) of the TPO.
- C. **Future background scenario with mitigation** is defined as the analysis of existing traffic plus background traffic on the committed network with the inclusion of the minimum improvements that are required to restore a facility to its adopted level of service standard.
- D. **Future buildout scenario** is defined as analysis of existing traffic, plus background traffic, plus project traffic on the committed network. This includes any mitigation improvements identified in Analysis Scenario 4c.
- E. **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.

Detailed definitions of the analysis scenarios are included in the Glossary of Terms in Appendix A.

## 5.0 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. 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.
- B. Turn-lane length analysis shall be required for all turn lanes where project traffic exists at each of the intersections within the study area.
- C. All signalized intersections and major unsignalized intersections within the study area shall be analyzed according to the following:
  1. Peak-hour factor (PHF), not to exceed 0.95 for the future conditions analysis
  2. The existing signal timing, including its maximum and minimum settings, shall be used for the initial analysis of future conditions. Any signal timing changes outside of the existing minimum and maximum setting may be presented for local agency approval as part of the mitigation strategy.
  3. Truck factors for each lane group should reflect existing conditions. If a portion of the proposed development includes industrial uses, then truck factors shall be recalculated for movements where project trips are present.
- 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.

## 6.0 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 software is listed below:

- A. For unsignalized intersections, the Highway Capacity Software (HCS) or Synchro utilizing HCM methodologies 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, and for roundabout analysis, the preferred software is the latest version of SIDRA.
- D. For uninterrupted flow roads (those with more than two-mile signal spacing) the latest version of FDOT's HighPlan software may be used.
- 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.

Additional information regarding analysis requirements and software is provided in Appendix C.

## 7.0 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).

The use of any prior vested trips is subject to the approval of the Local Governments within the Study Area. The use of committed trips shall be subject to the approval of the Local Governments.

## **8.0 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. In no case will an internal capture of more than 20 percent (20%) of the gross project trip ends be allowed, unless the Local Governments within the Study Area accepts a higher internal-capture percentage based on verifiable documentation (e.g. field studies of comparable sites).

## **9.0 PASS-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 shall be identified as development traffic at those locations.

In accordance with the FDOT Transportation Site 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.

## **10.0 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 or when the buildout year is anticipated to be greater than five years. 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. Any changes to the GTCRPM made by the Applicant in determining the trip distribution percentages and trip assignments must be reviewed and approved by the St. Lucie TPO.

## **11.0 TRAFFIC COUNTS**

All traffic counts shall be obtained from the most recent TPO Traffic Counts and Level of Service Report. If bicycle and pedestrian counts within the study area are requested by the Local Government, such counts shall be collected in accordance with general industry standards approved by the Local Government except for intersection turning movement counts and other traffic counts requested by the Local Governments which shall be conducted in accordance with Appendix E.

## **12.0 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. The minimum annual growth rates in all cases shall be the higher of 2.5 percent or the results of a historical trend analysis which shall be completed for all roadways within the study area. Acceptable techniques to estimate annual traffic growth rates are provided in Appendix F.

## **13.0 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.



## **14.0 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).

## **15.0 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. Secondary access shall be required based on the threshold for trips as determined by the Local Government and when secondary emergency access is needed in cases when the primary access may be blocked by a disabled vehicle. Appendix G documents the procedures to determine the need for turn lanes and corresponding turn lane lengths.

## **16.0 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. At a minimum, the TIS should demonstrate how the project will maintain or improve upon the existing operations and safety for pedestrians, bicyclists, and transit riders. The TIS shall include a section for Multimodal Considerations and address each of the following modes separately.

### **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.
6. Depending on the hours of operation of the site, consideration should be given to the need for illuminated sidewalks and crosswalks.
7. For any proposed project with a residential component, identify any schools or colleges within 2 miles of the site and provide an inventory of available sidewalks, sidewalk conditions, missing sidewalk links, and pedestrian-actuated crossings.

### **B. For transit vehicles/users:**

1. Provide an inventory of any transit stops or rail stations within 1/4-mile of the nearest access to the site with information on available sidewalks and crosswalks, the route number, hours of transit operation, headways, and existing transit amenities (i.e., shelter, concrete pad, trash receptacle, etc).
2. 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.

3. 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.
4. 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 and shared-use paths shall be provided as determined by the Local Government.
2. Provision of bike racks and secured bike lockers as determined by the Local Government.

## **17.0 MITIGATION OF IMPACTS**

Acceptable mitigation options are:

1. Restore to adopted standard
2. Proportionate Share Mitigation

General guidance and further detail regarding the mitigation of impacts are provided in Appendix H.

## **APPENDICES**

## **APPENDIX A**

### **GLOSSARY OF TERMS**

For purposes of this document, the following definitions shall apply:

**Arterial Road:** As classified by the local governments, a high-capacity urban road that sits below freeways/motorways on the road hierarchy in terms of traffic flow and speed. The primary function of an arterial road is to deliver traffic from collector roads to freeways or expressways, and between urban centers at the highest level of service possible.

**Average Annul Daily Traffic (AADT):** The total volume of vehicle traffic of a highway or road for a year divided by 365 days.

**Background Scenario:** Analysis of existing traffic, plus background traffic on the committed network.

**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.

**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.

**Capacity:** The maximum service volume adopted by the local governments.

**Collector Road:** As classified by the local governments, major and minor roads that connect local roads and streets with arterials. Collectors provide less mobility than arterials at lower speeds and for shorter distances.

**Committed Network:** Existing Network plus transportation system improvements included in the adopted work programs of the County, TPO, 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 - such work programs.

**Concurrency:** The timely provision of public facilities and services relative to the demand for them.

**Existing Network:** Major Roads which are currently in use by the public.

**Existing Scenario:** Analysis of existing traffic on the Existing Network.

**Functional Classification:** The classification of roadways as interstate, arterial, collector, and local roadways based on the character of the service they provide in relation to the total roadway network.

**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.

**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.

**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.

**Internal Capture:** The portion of trips generated by a mixed-use development that both begin and end within the development without the need to access the external roadway network. The percentage of trips that are considered internal capture are subject to approval by the local governments.

**Level of Service:** A qualitative description of how well vehicle traffic flows along a roadway due to the operating conditions of the roadway based on factors such as speed, travel time, maneuverability, delay, and safety.

**Major Intersections:** All signalized intersections and/or unsignalized intersections with other major roadways.

**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 and any other roadways identified by the local governments.



**Pass-By Trip:** A trip is present on a roadway adjacent to a development for a reason other than accessing the development but end up accessing the development. The percentage of trips that are pass-by trips are subject to approval by the local governments.

**Peak-Hour:** Traffic volumes during the one-hour period during which the greatest volume of traffic uses the road system, as identified separately for each segment of a transportation facility.

**Peak-Hour Factor:** Compares the traffic volume during the busiest 15-minutes of the peak hour with the total volume during the peak hour.

**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.

**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.

**Strategic Intermodal System (SIS):** The statewide network designated by the Florida Department of Transportation of high priority transportation facilities that seamlessly flows from one mode to the next with the goal of providing the highest degree of mobility for people and goods traveling throughout Florida.

**Study Area:** The geographic radius from the boundaries of the development that is analyzed for the transportation impacts caused by the development and consists of the area of influence defined in Appendix B plus any roadways beyond that area of influence that will receive 5 percent or more of traffic volume from the development compared to the capacity of that roadway.

**Vested Trips:** Trips from an approved development that are distributed on the roadway network and treated as existing trips.

## **APPENDIX B**

### **AREA OF INFLUENCE**

- 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.

<b>New External Daily Trip Generation</b>	<b>Radius of Area of Influence</b>
0 – 200	All site driveway connections and 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 the intersections identified in 'C' above, the study area shall extend to the next major intersection.

## **APPENDIX C**

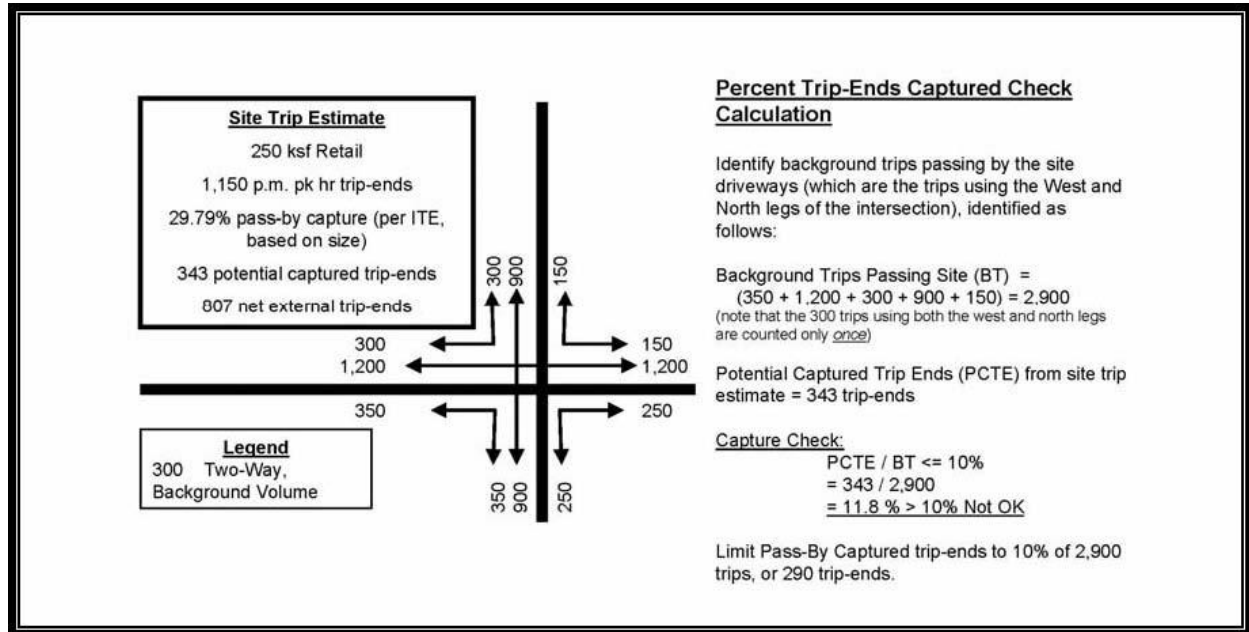
### **ANALYSIS REQUIREMENTS**

- A. 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.
- B. 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
- C. 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
- D. 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.
- E. 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 PASS-BY CAPTURE**

The graphic below depicts an example of how passer-by capture may be computed.



## **APPENDIX E**

### **TRAFFIC COUNTS**

- A. Approved FDOT or St. Lucie TPO maintained counts shall 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.
- B. 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.
- C. 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.
- D. 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.
- E. In no event, however, shall the estimated, turning-movement counts be less than the existing field counts.
- F. 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.

## **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 five 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.
- D. 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.
- E. 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**

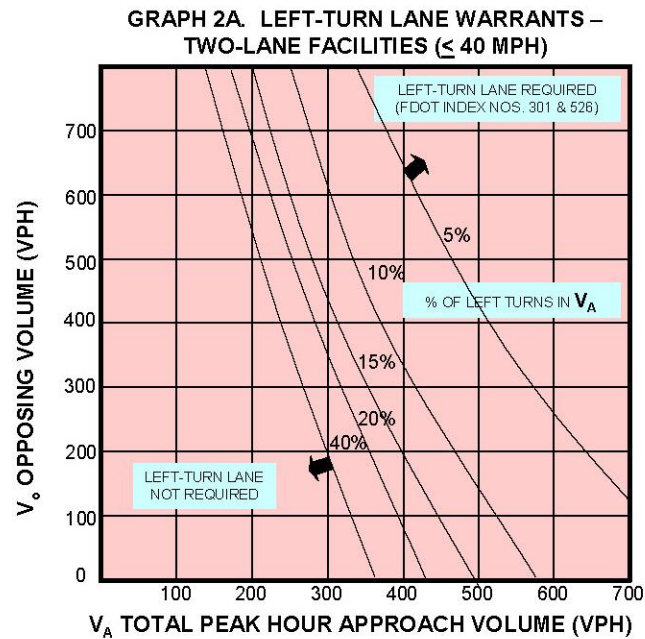
The potential need for right-turn lanes at the site access connections shall be evaluated based on guidelines provided in the National Cooperative Highway Research Program (NCHRP) 457 and Florida Design Manual (FDM) 212.

#### **B. Left Turn Lanes**

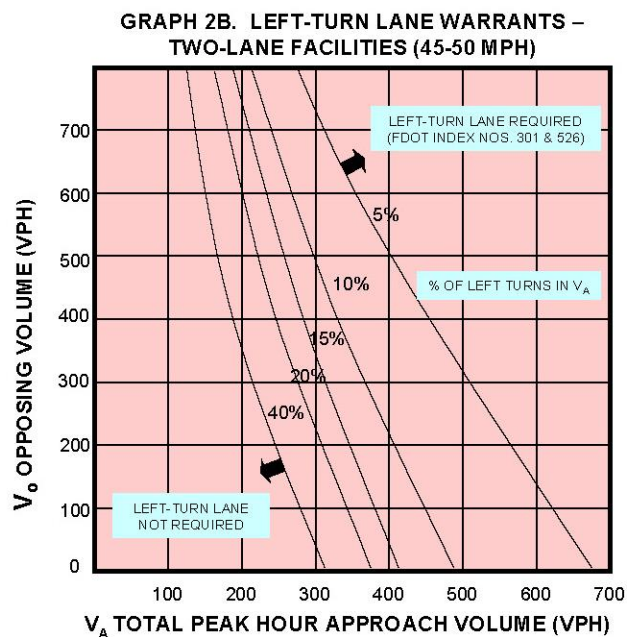
The need for left-turn lanes is typically evaluated based on research documented in NCHRP Report 457 Intersection Channelization Design Guide. The curves included in this report are included below.

#### **C. Deceleration and Storage Lengths**

1. Deceleration length shall be based on FDM index 212.
2. Storage Length shall be based on 95<sup>th</sup> 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.

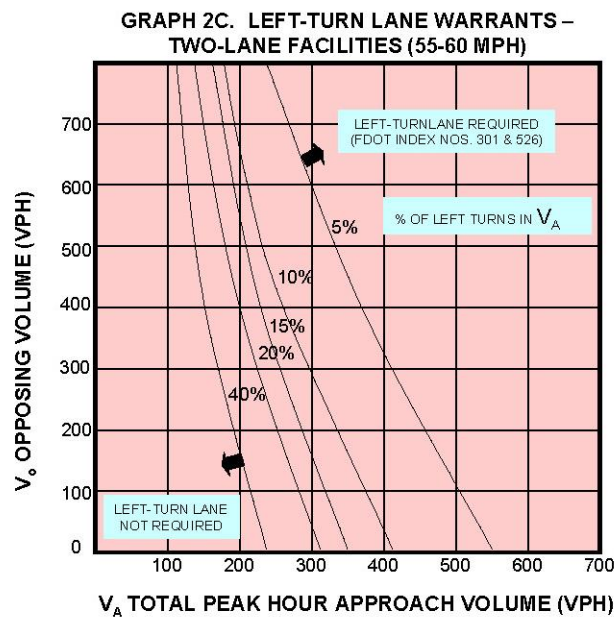


**Note:** Left-turn lane not required when intersection of  $V_A$  and  $V_O$  is below the curve corresponding to the % of left turns in  $V_A$ .

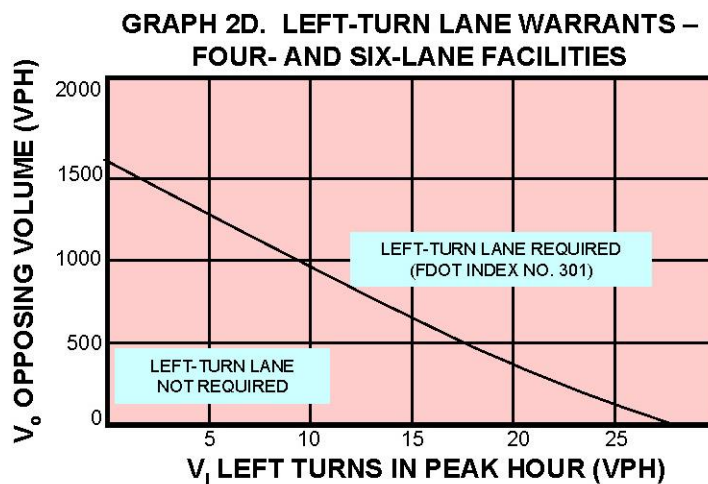


**Note:** Left-turn lane not required when intersection of  $V_A$  and  $V_O$  is below the curve corresponding to the % of left turns in  $V_A$ .

Graph 2A & 2B – Source: Derived from National Cooperative Highway Research Program Report #279.



**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  $V_A$ .



**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

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CITY OF PORT ST. LUCIE  
PUBLIC WORKS  
IRRIGATION STANDARDS  
328400



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## 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 payers' 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 these 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 designer's 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 a "MAINLINE" layer, mainline isolation valves shall be placed on a "MAINLINE-ISO-VALVE" layer, etc.). 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 utilize a Baseline 3200 controller with cell modems, two-wire and/or conventional irrigation control wire for communication, as follows:

- Communication between irrigation controllers and the remote base unit shall utilize Baseline cell modems.
- Communication between irrigation controllers and sensors shall utilize Rain Bird Maxi-wire.
- Communication between controllers and remote control valves shall use Rain Bird Maxi-wire.

**Control Notes:**

1. All Baseline components shall be installed in strict accordance with current Baseline design and installation manuals, without exception.
  2. The city has a remote Baseline unit account and a weather station; these components are not required to be a part of any design.
  3. Each Baseline 3200 should include a Baseline tipping rain bucket.
- All electrical control components, including pump station control panels, Baseline controllers, Baseline flow stations, etc. must be grounded, bonded and shielded according to the grounding specifications and details in this document.
  - All Baseline controllers shall use Baseline stainless steel pedestals. The pedestals shall be mounted on a concrete pad with power, control, and other required conduits installed as detailed in these specifications and in the Baseline installation manuals.
  - 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 wire (1.5")
    - c. One for field 'secondary side' grounding (3/4")
    - d. One for soil moisture sensor wire (3/4")
  - Control Wire – Use Rain Bird Maxi-wire 14 or 12 gauge as required.
  - Install all control wire in 1.5" gray PVC electrical conduit with long radii sweeps using Carson rectangular splice boxes model # 1017 as pull boxes, placed a maximum of 300' on center.
  - Make all wire splices using 3M DBR/Y-6 water-proof connectors.
  - Baseline Soil Moisture sensor, model BL-5311 shall be installed on each project (minimum 2 per controller – at least one for turf and one for shrubs for each 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 a baseline instructed installation classes, at a minimum. The contractor must have successfully installed a minimum of three Baseline 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 Baseline training class.

**Stand Alone Control Systems**

- None permitted without written approval and justification by City of Port St. Lucie Public Works staff.

### **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, pump stations, etc. are required.

### **Grounding**

- All irrigation controllers, flow stations and pump control panels must be grounded utilizing two copper grounding plates (4" wide x 8' long x 1/8" thick), a 10' copper clad 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.
- All decoders shall utilize 4" wide x 4' long x 1/8" thick) copper grounding plates at all locations as required by Baseline installation manual).

### **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, Watertronics, or Sullivan Electric & Pump, 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" deep layer of Ø3/4" washed gravel installed and compacted with a vibratory plate. The electrical meter box and uni-strut rack shall be installed:
  - outside of the fenced in area when the electrical meter is to be manually read, or
  - inside of the fenced in area when the electrical meter is to be remotely read.
- No pump stations shall be placed inside medians.
- 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. The magnetic flow meter must have an output signal compatible with Baseline controllers. 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 Baseline compatible flow meter connected to the Baseline control system.
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.
    4. Water quality analysis – All well 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 well 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.
  - Filtration requirements – Any water test deemed to require filtration (at the sole discretion of the City of PSL) will require primary filtration at the point of connection (POC).
    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 (lake draw) or into a nearby storm drain (well draw). On lake draw filtration, discharged/filtrate water must be discharged a minimum of 300' from the suction line of any pump station pulling from that surface water body.
4. All drip zones and MP rotator zones require Netafim disc filters be installed immediately downstream of each remote control valve, regardless if the water quality testing indicates primary filtration at the pump station is needed or not.

**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 Baseline compatible water meter connected via 'two wire' to the Baseline control system.
- Potable connections must have a master valve / flow meter run assembly installed and connected to the control system. Badger paddle wheel flow sensors are allowed on potable systems and they must be placed in a Carson 1419 valve box.

### 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 manufacturer's specifications and recommendations, including quality control 'random sampling' of fusion joints.
  - Notes:
    - The use of gasketed CL 200 PVC mainline pipe with Leemco ductile iron fittings and appropriate joint restraints may be utilized if approved in writing by Public Works. To receive approval from Public Works significant hardship or other issues of significance shall be conveyed to the City (the final decision to approve is at the sole discretion of Public Works).
    - All butt and electrofusion HDPE processes shall be recorded and documented, on site as the welds are being conducted, using a compatible data logger (such as a McElroy data logger model #DL 6303 or 6304 or JEA approved equal). This information shall be displayable in textual and graphical format. All data shall be provided to the projects owner/owner representative on the day the fusion processes are completed.
- 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 pipe material type, pipe size, trenching

depth/width/pipe spacing, backfill and workmanship. To properly inspect for these parameters, 'open trench' inspections are required (see PART II). However, it is recognized, on RARE OCCASIONS, 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 Carson rectangular valve box model # 1419 with bolt down lids and box extensions (as required).
- HDPE mainlines shall utilize Aquafuse Ductile Iron 'ControlFlo' isolation valves, sized per mainline.
- Gasketed CL 200 PVC mainlines shall use Nibco Ductile Iron resilient wedge isolation valves, model P-619-RW and sized per mainline.

#### **Lateral Line**

- Lateral line shall be designed and sized to ensure a maximum water 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" deep 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 (native material to be sifted as necessary).
- 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 3/4" or larger; no 1/2" 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 cement. 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/tracing tape shall be placed one (1) foot above all irrigation sleeves, for the entire length of each sleeve.
- Sleeves shall extend a minimum of 18" back-of-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 24" above grade. The entire wood stake, above grade, shall be painted fluorescent orange. After the orange paint has dried the installing 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 Carson Jumbo Rectangular Valve Box Model # 1220 with 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 Rainbird Maxi-wire (14 or 12 gauge, as require by Baseline specifications). Waterproof wire connectors shall be 3MDBY or 3MDBR.
- 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 not 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 Netafim drip tubing shall be buried, below grade, a minimum of 4" in shrub beds and 6" in turf (or deeper, as needed, if aeration is to be used).

- All bubblers shall be Rain Bird 1400 series. In traffic areas (pedestrian and vehicle) they shall be on Rain Bird 1804 SAM bodies. In all other areas they may be on a ½" poly.

### **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 spaced 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 0.25" of net irrigation water, to each zone, within one ten (10) hour watering window. This means the entire site/system must be able to be watered in one ten (10) hour (or less) watering window.

## **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 (1) year warranty covering the entire irrigation system installation (parts and labor) for a period of one year from acceptance of the project by the City of Port St. Lucie.

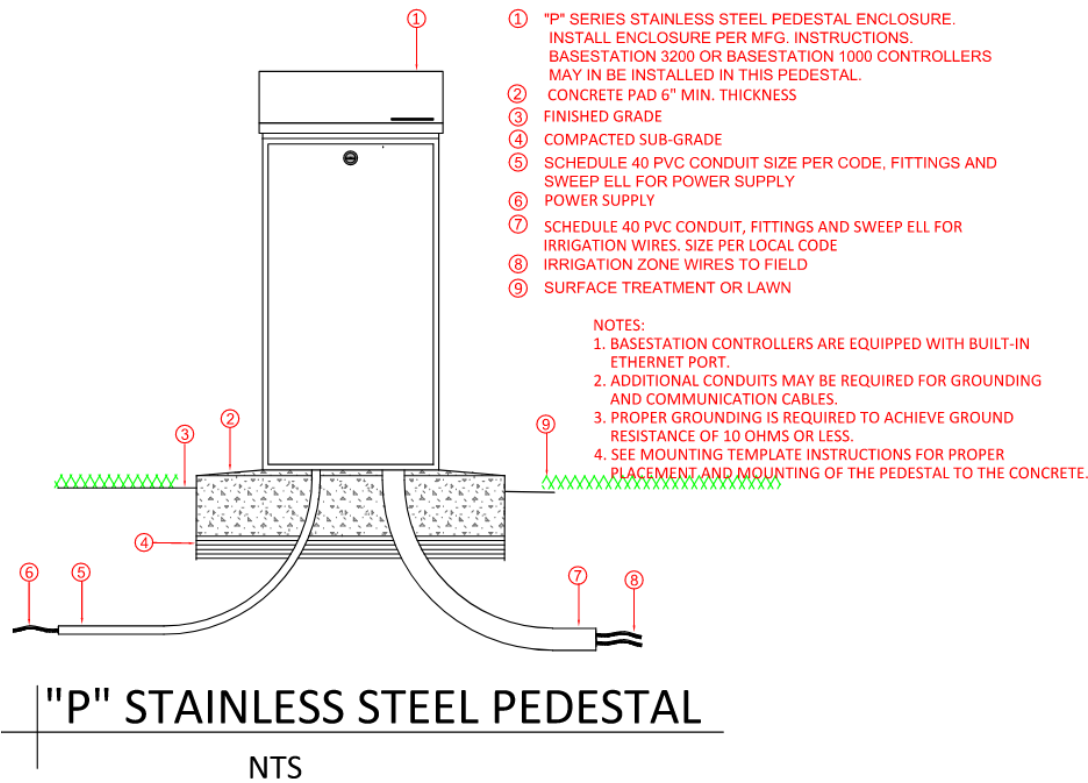
## ***Design – Details***

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 designs the irrigation system. For this goal to be achieved, the above specifications and the below details must be strictly adhered to without exception.

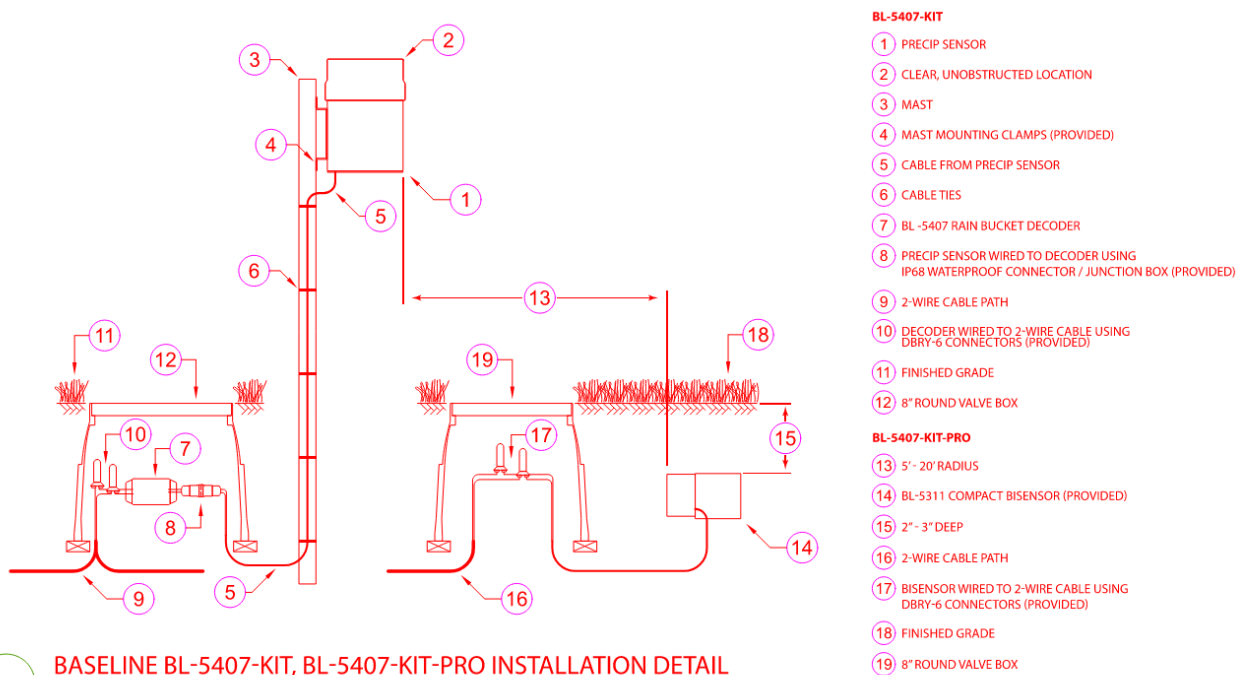


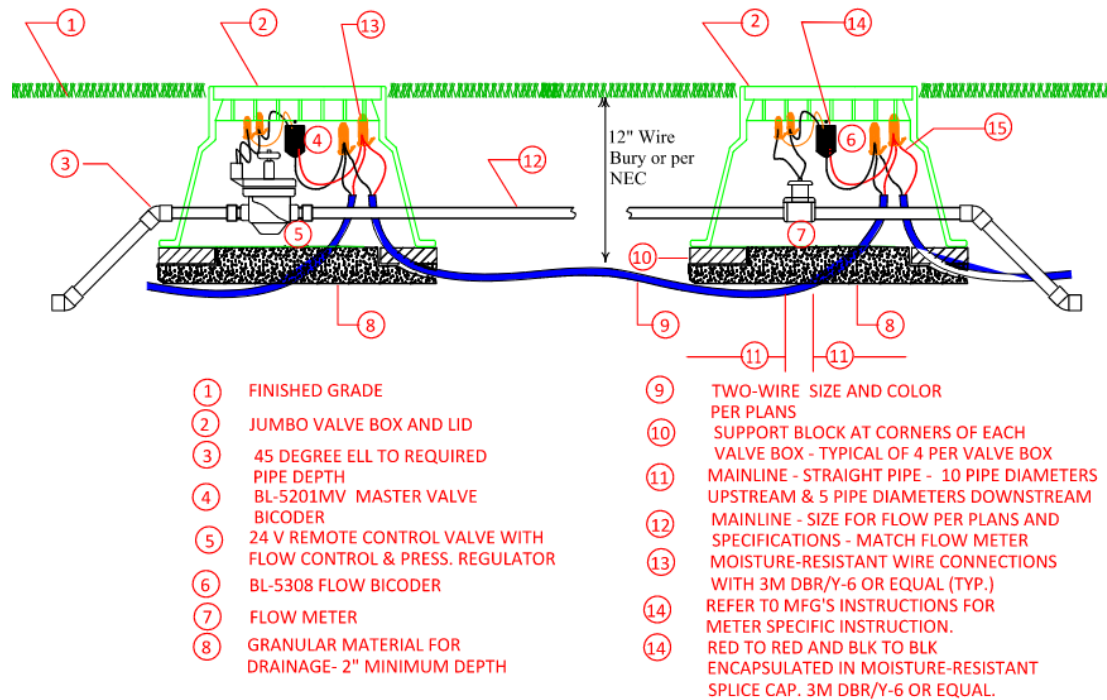
Control System

Baseline 3200 w/Stainless Steel Pedestal and BL-CM-P Cell Modem Communication

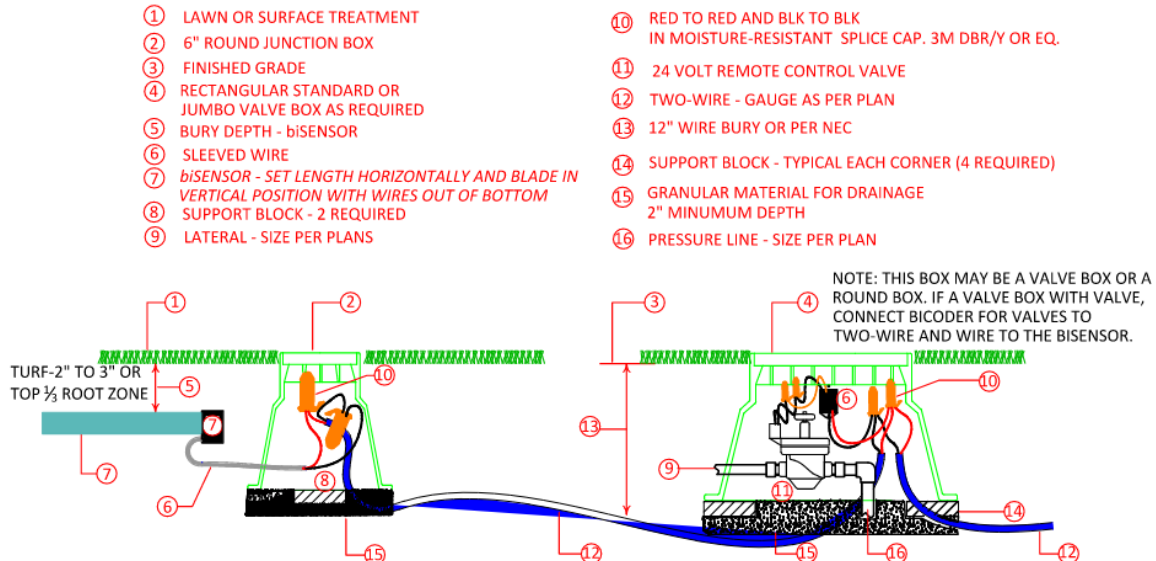


Baseline BL-5407 Rain Can on Galvanized Pole



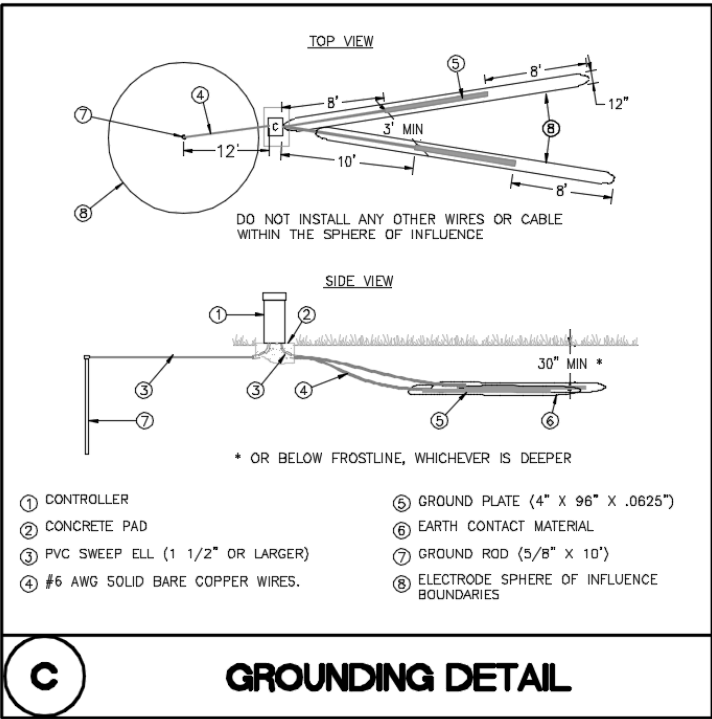
**Baseline BL-5308 Flow Sensor w/Bicoder**

## BASELINE BL-5308 FLOW BICODER & BL-5201MV MASTER VALVE BICODER NTS

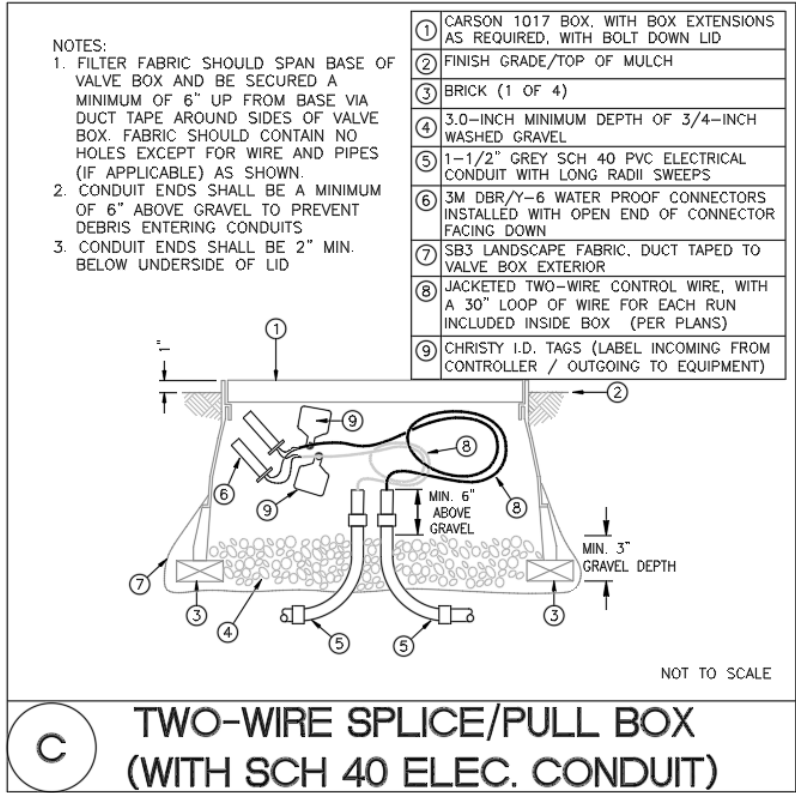
**Baseline BL-5315 Soil Moisture Sensor**

## BL-5315B biSENSOR SOIL MOISTURE SENSOR TWO-WIRE INSTALLATION & WIRING DETAIL NTS

**Controller and Pump Panel Grounding**



**Control Wire Pull/Junction/Splice Boxes w/ Waterproof Connector**



## **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.

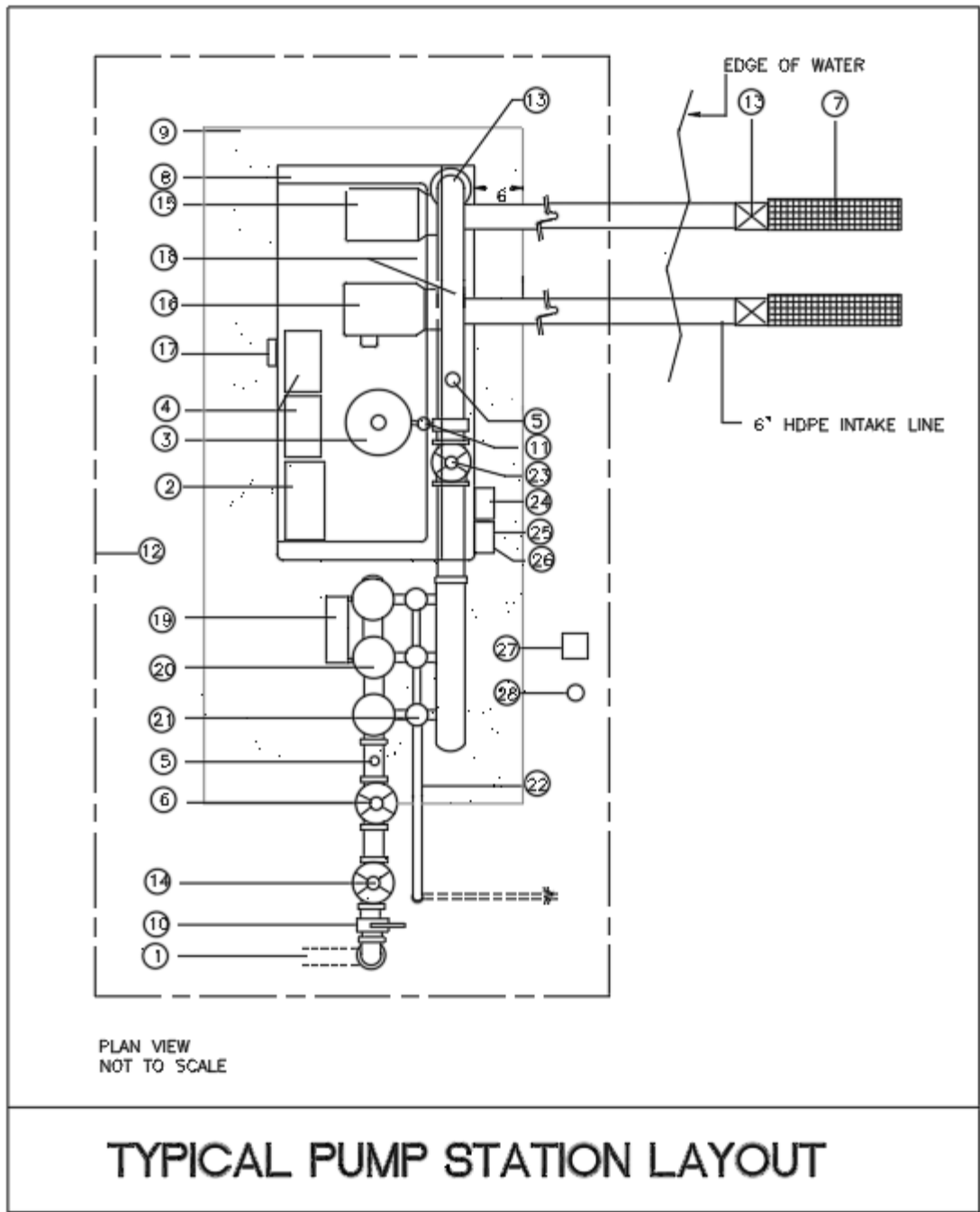
<https://utility.cityofpsl.com/media/1143/utility-standards-manual.pdf>

<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**



06-17-2024

- 1 6" x 30" GALV. STEEL PLAIN END NIPPLE  
FOR MAIN LINE CONNECTION.
- 2 CONTROL PANEL UL LISTED ASSEMBLY  
MAINTAIN 42" CLEARANCE
- 3 PRESSURE TANK
- 4 VARIABLE FREQUENCY DRIVE
- 5 PRESSURE TRANSDUCER
- 6 MAGNETIC FLOW METER FOR MAXI CONTROLLER
- 7 316 STAINLESS STEEL SCREEN
- 8 4'x8' FIBERGLASS REINFORCED ENCLOSURE  
WITH FOREST GREEN GELCOAT FINISH
- 9 10' X 20' REINFORCED CONCRETE PAD  
(NO OPENINGS, LEVEL, PROVIDED BY OTHERS).
- 10 MAIN DISCHARGE VALVE
- 11 ISOLATION VALVE
- 12 NINE GAUGE BLACK CHAINLINK FINCE (6' HIGH WITH 3.0 MAN GATE)
- 13 ISOLATION VALVE AT EACH PUMP DISCHARGE
- 14 SHUTOFF/MASTER VALVE CONNECTED TO HOOVER  
FLOWGUARD AND THE IRRIGATION CONTROLLER.
- 15 PUMP # 1 25 HP (HIGH EFFICIENCY TEFC MOTOR)
- 16 PUMP # 2 25 HP (HIGH EFFICIENCY TEFC MOTOR)
- 17 LOCKABLE HANDLE
- 18 4'x8' GALV. STEEL SKID & DISCHARGE HEADER
- 19 FILTER SYSTEM CONTROLLER
- 20 FILTER BATTERY, 120 MESH FILTRATION
- 21 BACKWASH VALVE
- 22 3" BACKWASH LINE TO DISCHARGE IN LAKE
- 23 MAGNETIC FLOW METER
- 24 IRRIGATION CONTROLLER POWER SUPPLY
- 25 FLOW METER AND BL-5308 FLOW BiCODER
- 26 MASTER VALVE CIRCUIT FOR BASELINE
- 27 BASELINE 3200 PEDESTAL CONTROLLER
- 28 BASELINE BL-5407 TIPPING RAIN BUCKET ON Ø2" GALVANIZED STEEL POLE

NOTE: SUCTION PIPE AND FITTINGS SHALL BE HDPE HEAT FUSED. CHECK VALVES SHALL BE AND SWING TYPE. ALL EXPOSED SUCTION AND DISCHARGE PIPING SHALL BE GALVANIZED STEEL. BUTTERFLY OR BALLVALVE PROVIDED AT EACH PUMP.

#### WATER MANAGEMENT

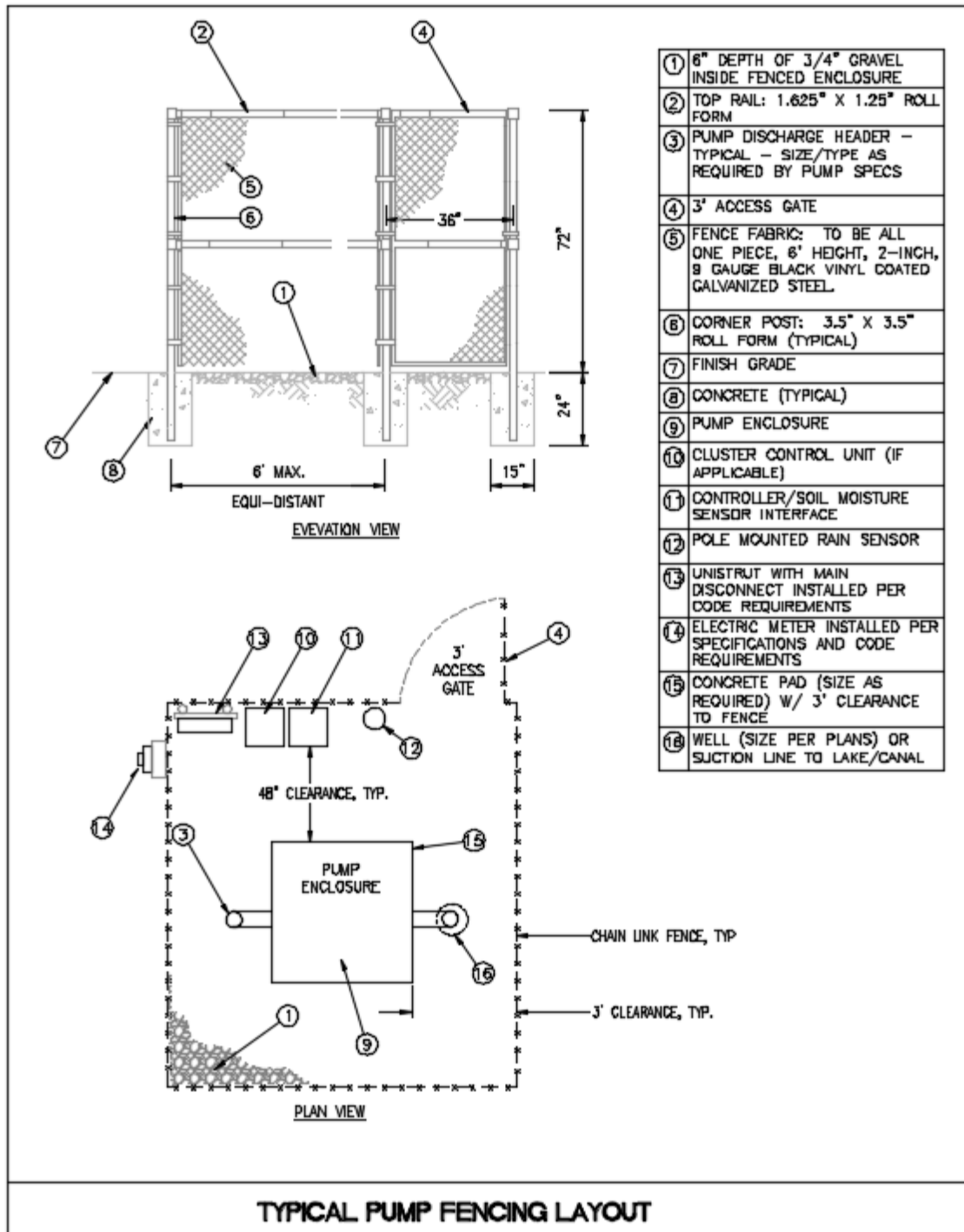
COMMUNICATION VIA CELLULAR MODEM OR 10/100 BASE T DIRECT ETHERNET CONNECTION.  
USER DEFINED INTERNET BASED CONTROL PARAMETERS USING STANDARD WEB BROWSER WITH  
EVENT LOGGING AND EMAIL ALERTS FOR WARNINGS AND ALARMS AS FOLLOWS:

- X MAXIMUM GALLON PER MINUTE USAGE WITH ADJUSTABLE TIME DELAY AND NUMBER  
OF RESTART ATTEMPTS
- X MINIMUM TOTAL DAILY WATER USAGE
- X DAILY, MONTHLY AND ANNUAL WATER USAGE BUDGETS
- X GRAPHING OF REAL TIME AND HISTORICAL FLOW, INCOMING AND DISCHARGE PRESSURE  
AND SYSTEM EVENTS WITH TIME AND DATE SHOWN
- X RAIN SENSOR STATUS
- X HISTORIC WATER USAGE BY DAY AND MONTH
- X STARTER OVERLOAD FAULT SHUTDOWN

#### SAFETY FEATURES:

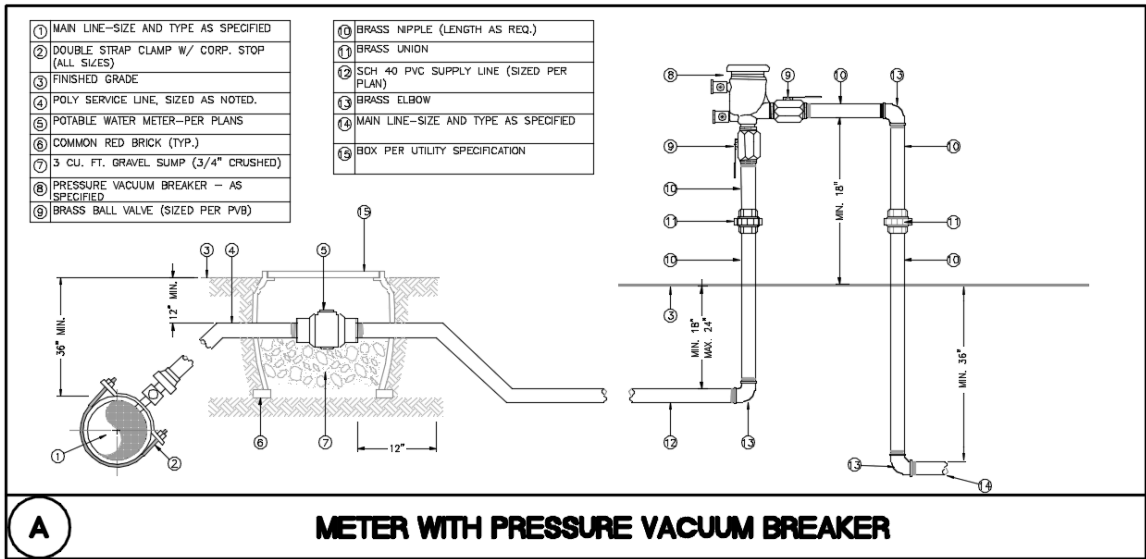
- LOSS OF PRIME
- OVERHEAT
- TRANSIENT SURGE
- HIGH FLOW



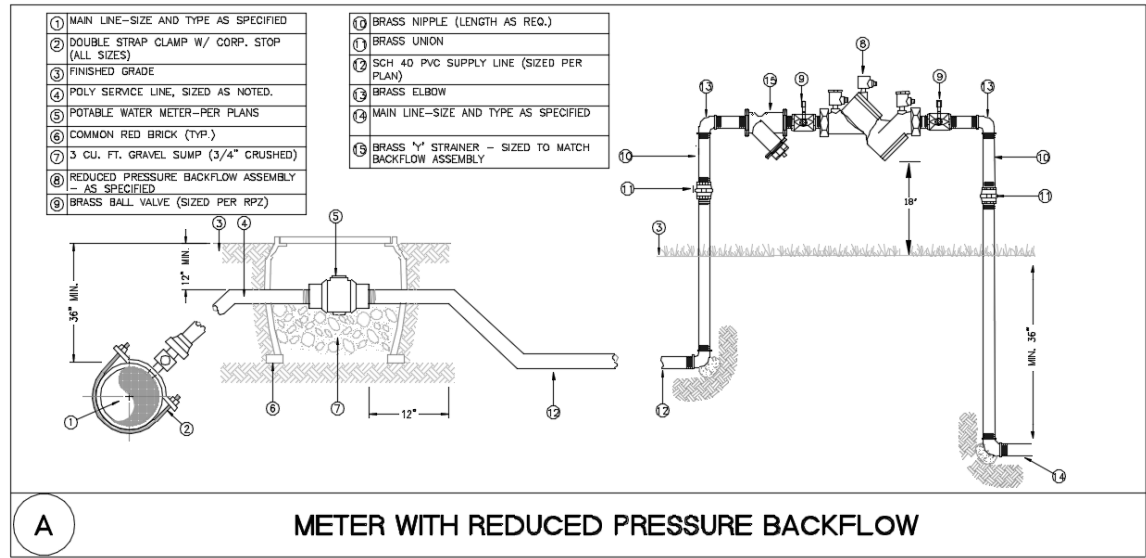
**Typical Pump Station Fencing Layout**

Potable Water

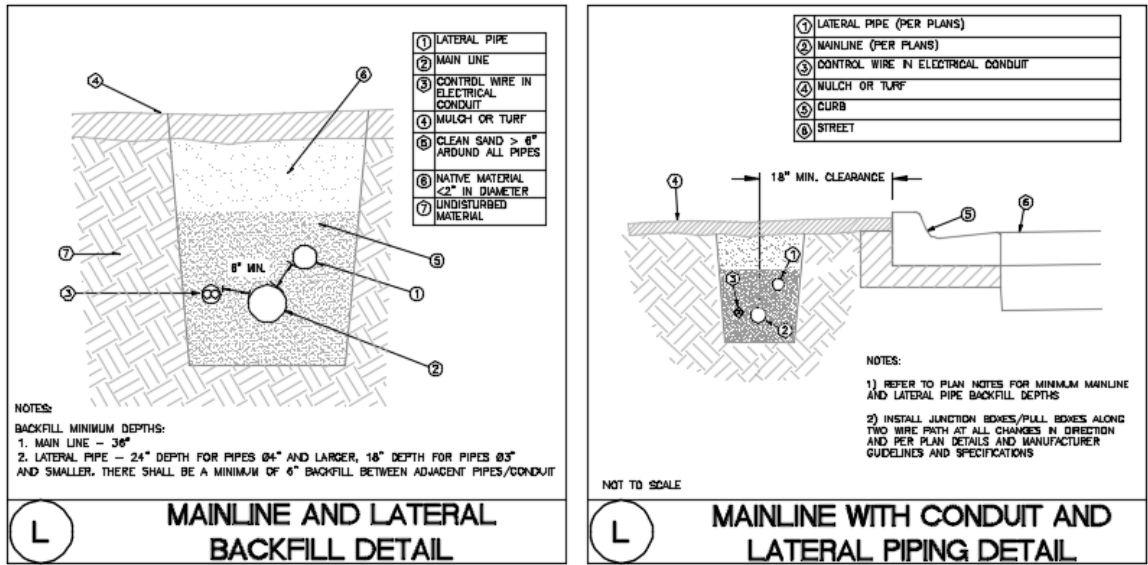
Potable Water Meter with Pressure Vacuum Breaker Assembly



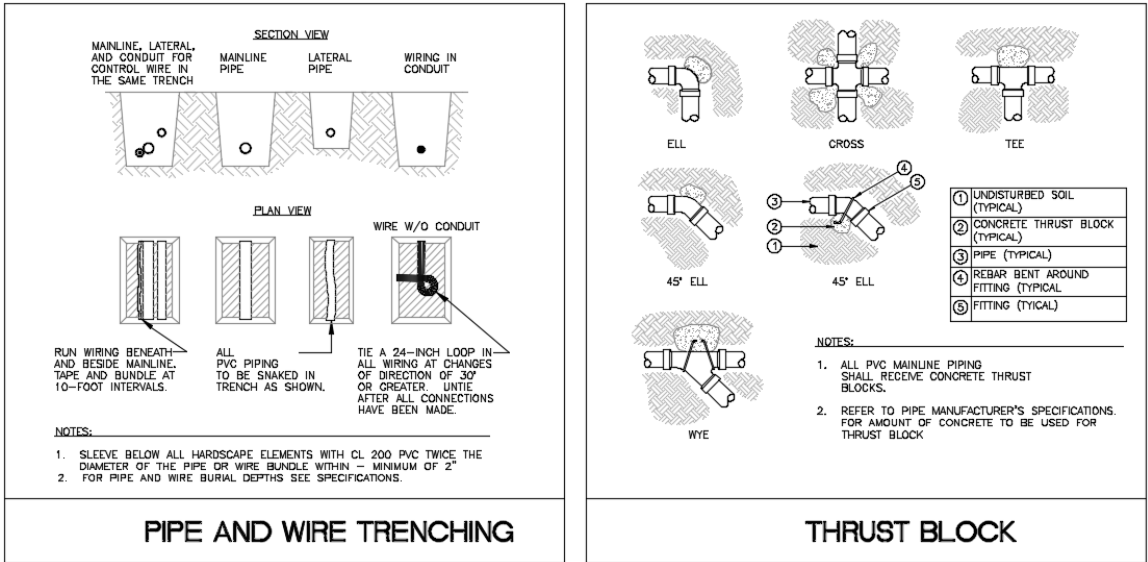
Potable Water meter with Reduce Pressure Zone Backflow Assembly w/ Y-strainer



Mainline and Lateral Line Piping

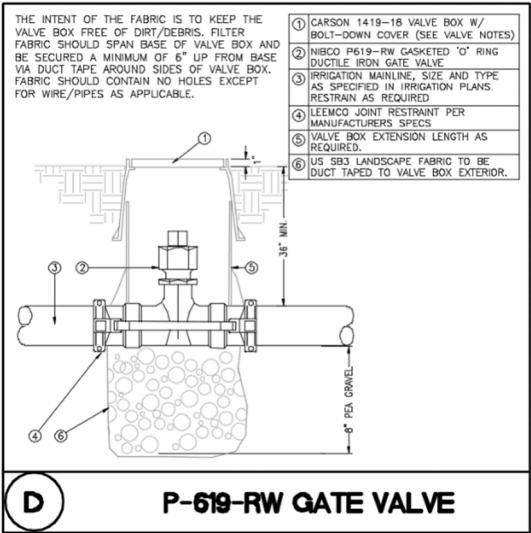
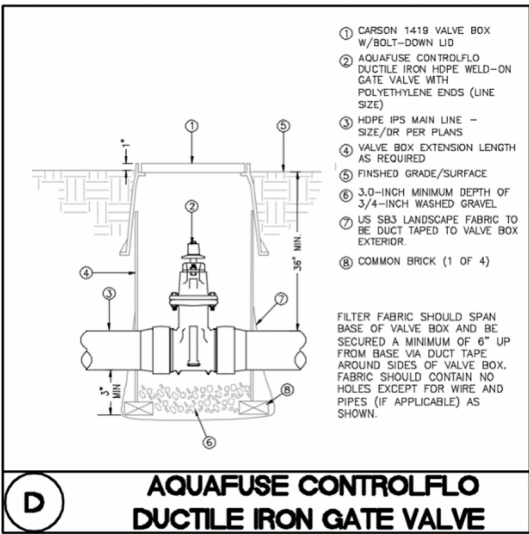


Pipe-Wire Trenching and Thrust Block Placement/Installation



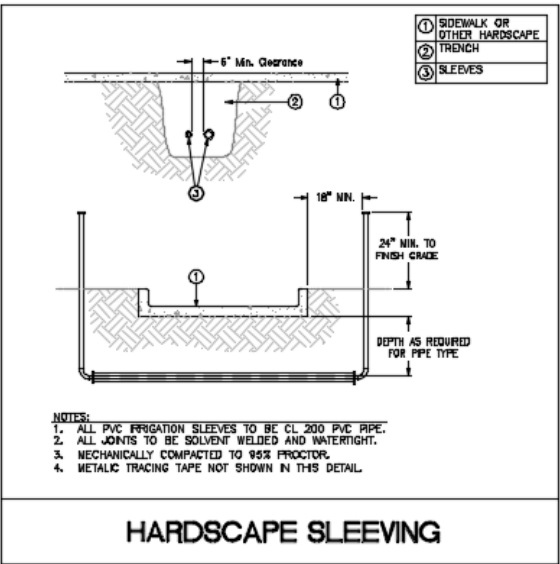
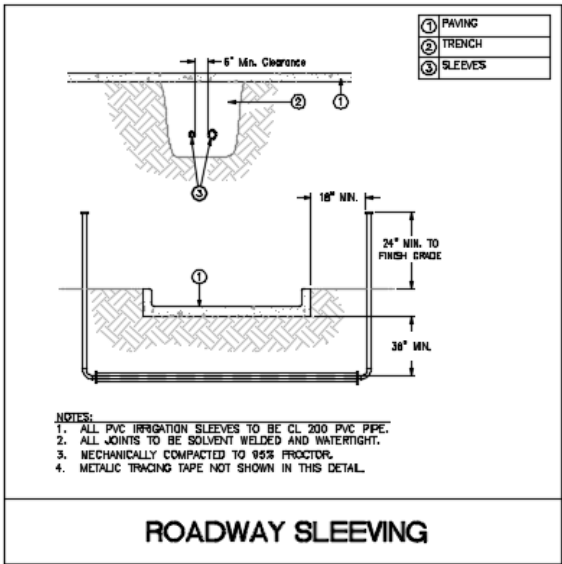
Isolation Valves

Aquafuse Ductile Iron Gate Valve

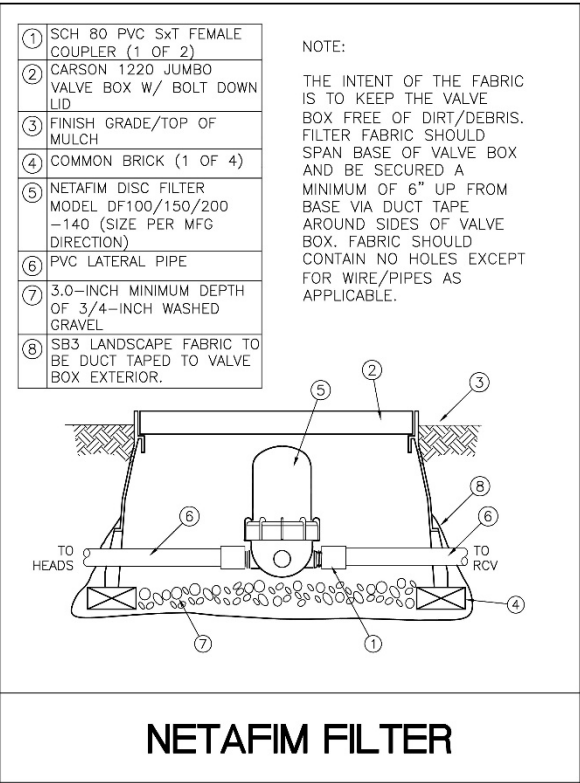
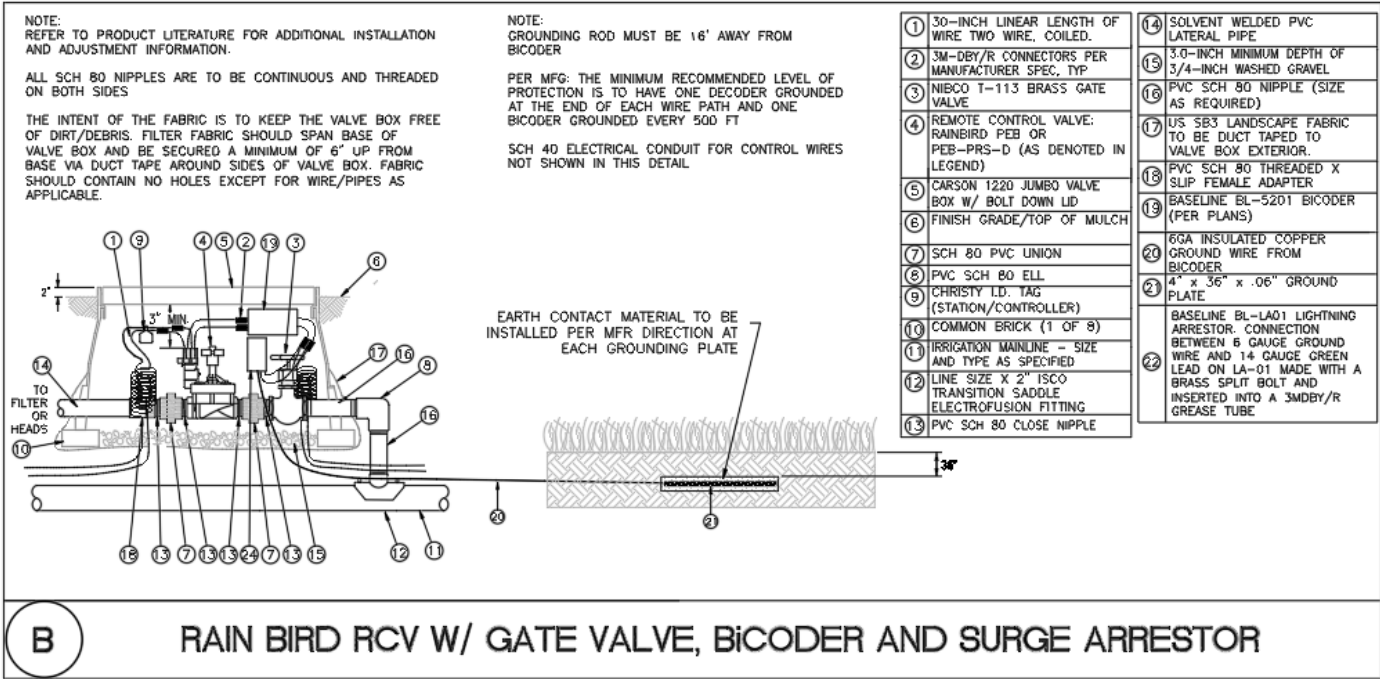


Nibco Ductile Iron Gate Valve

Sleeving

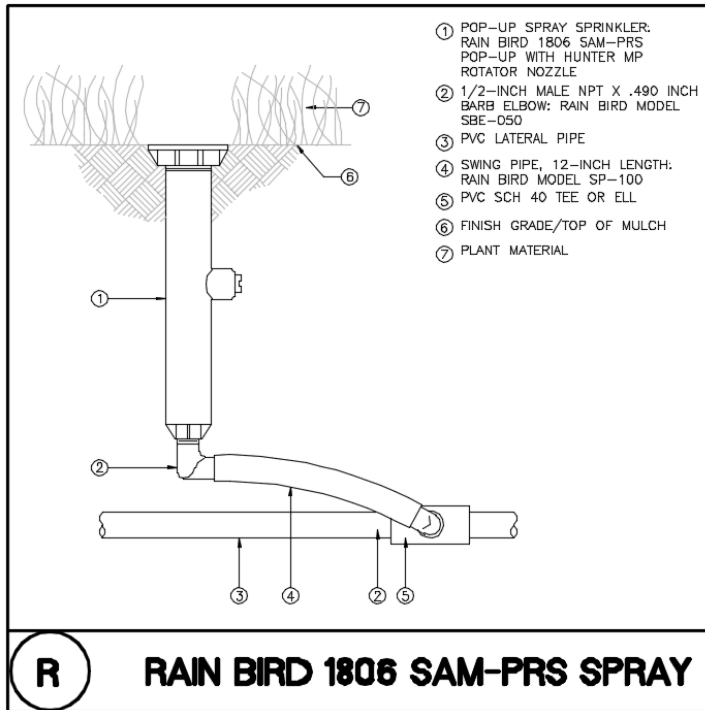


Remote Control Valve

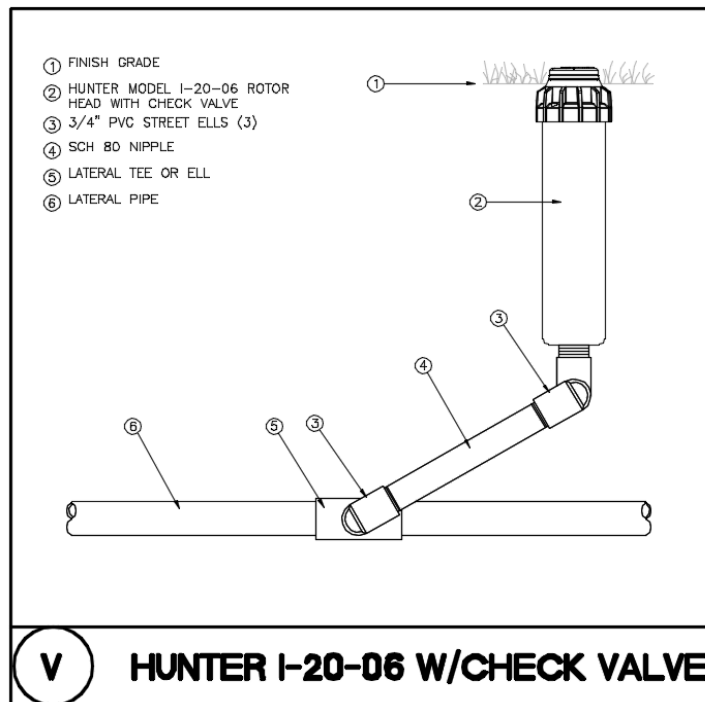


## Emission Devices

### Spray Heads

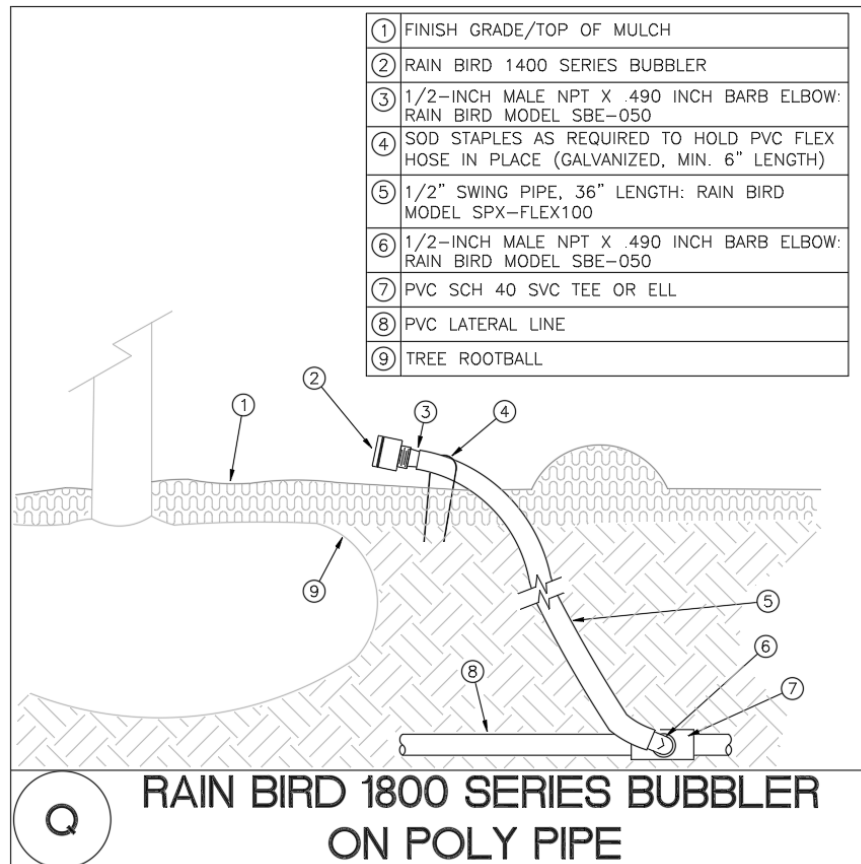
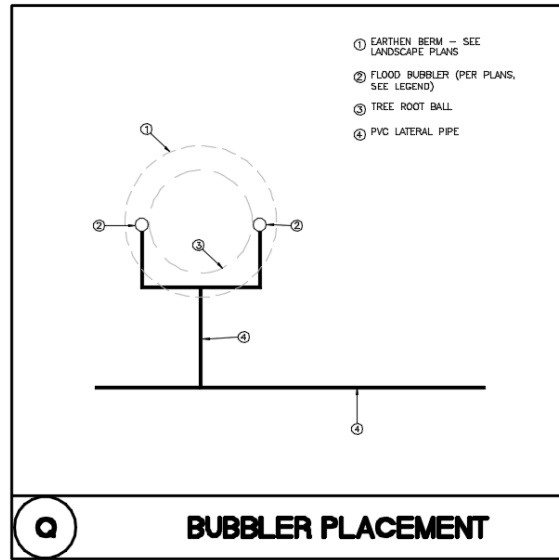
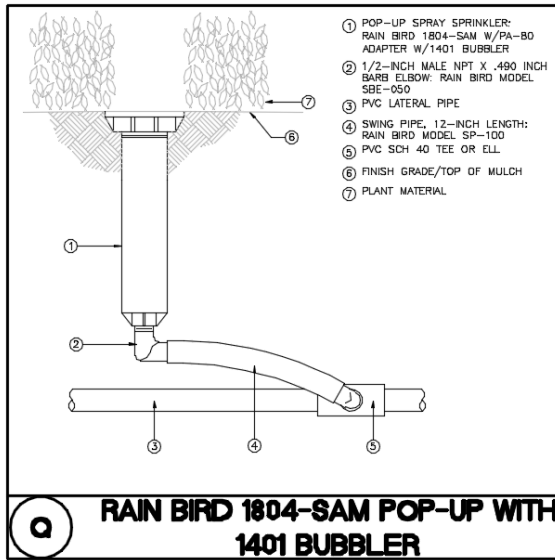


### Rotor Heads

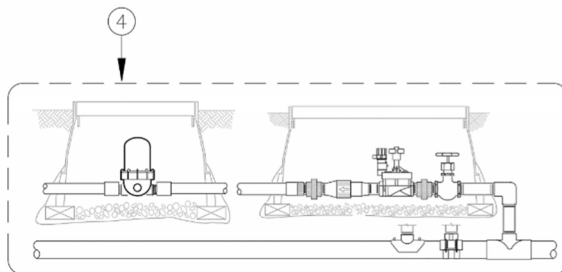
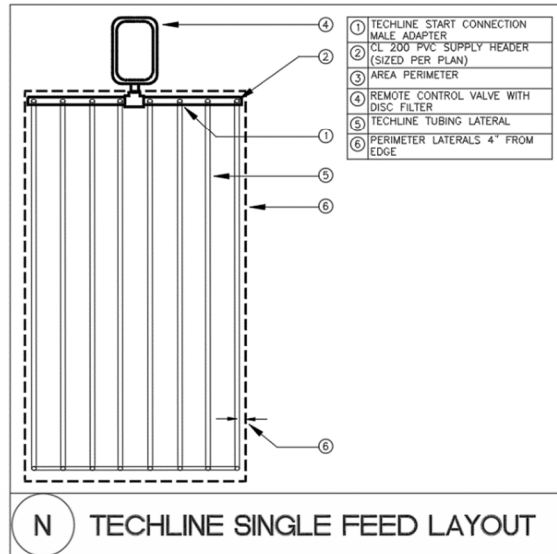
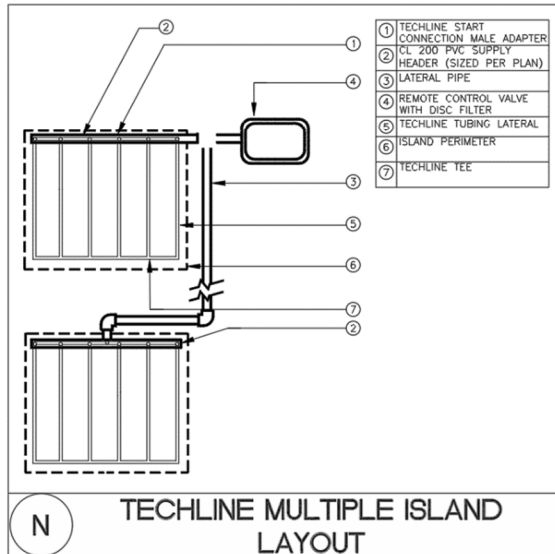
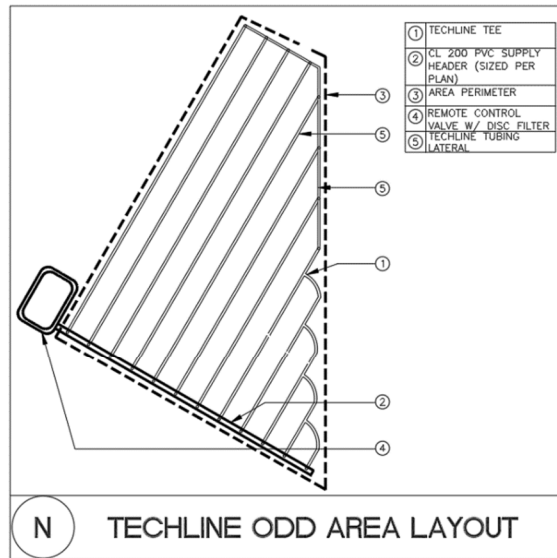
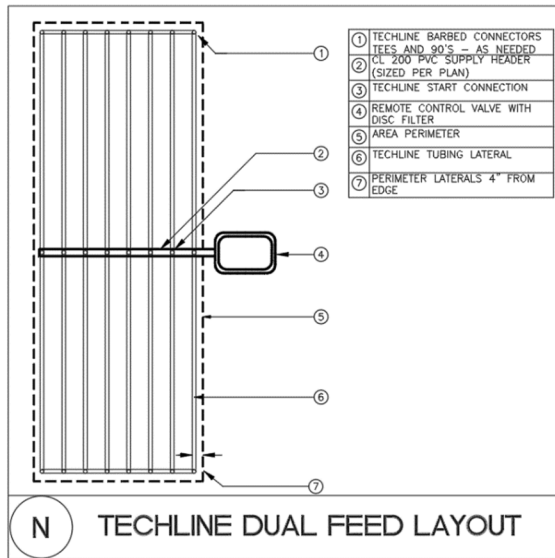




## Tree Bubbler



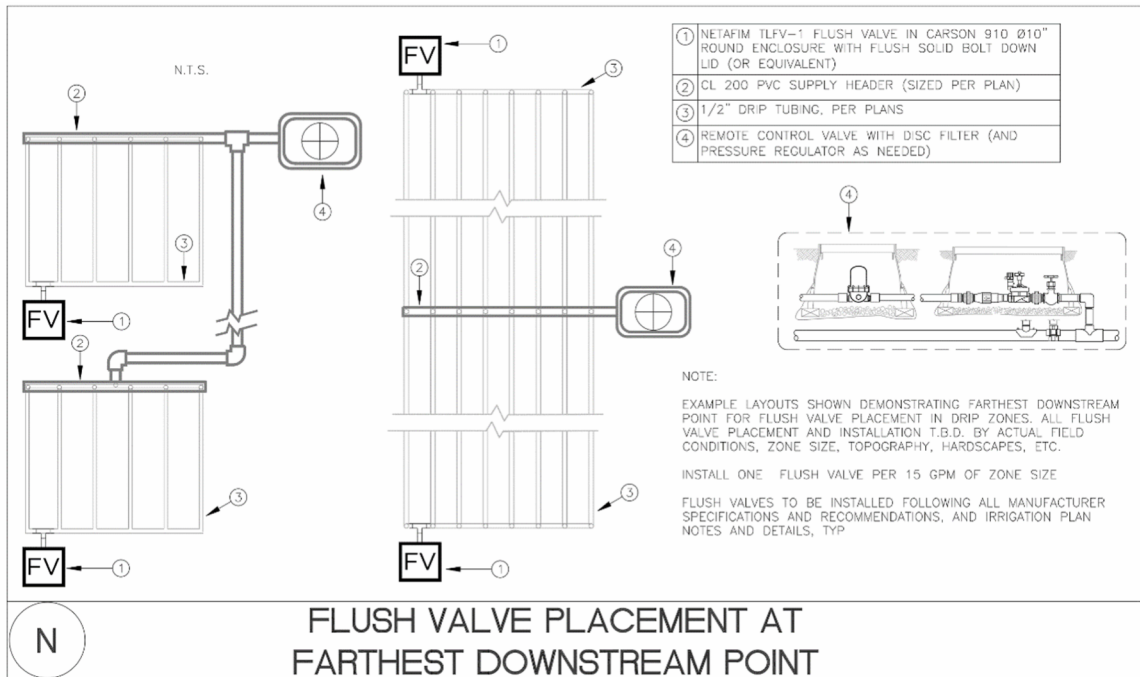
## Drip



## Drip – Flush Valves

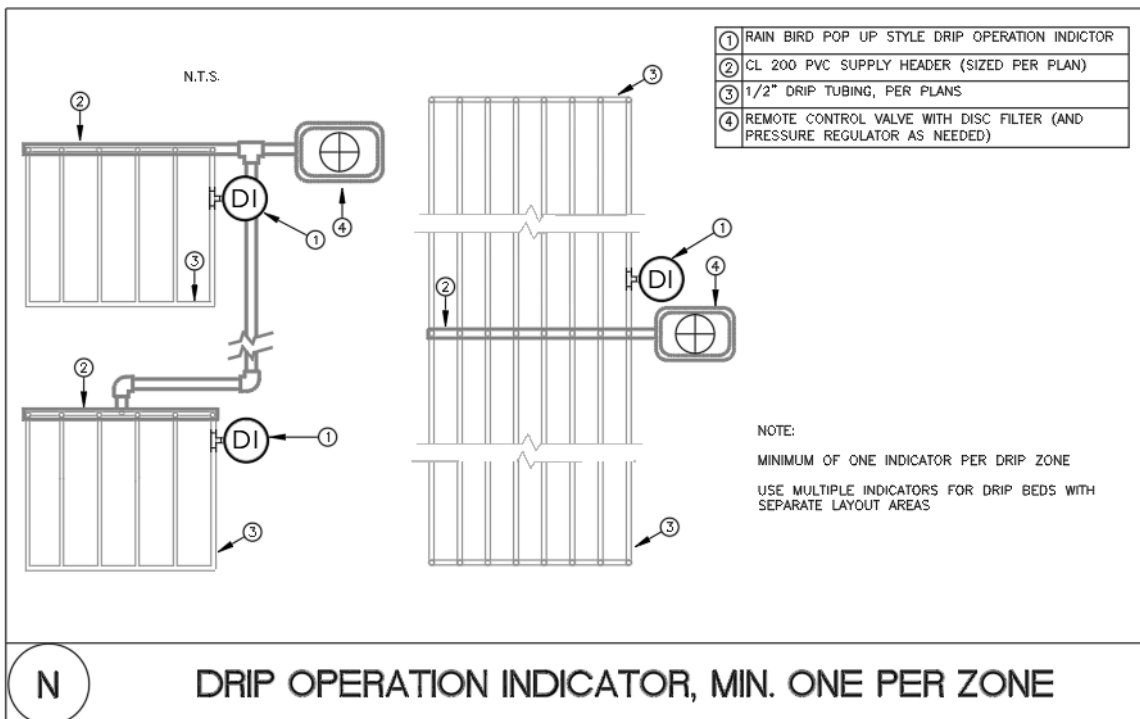
- A drip zone will have one flush valve installed for every 15 GPM of design flow. (zone that is up to 15 GPM, one flush valve, up to 30 GPM two flush valves, up to 45 gpm three FV, etc.)
- The flush valve will be installed in a Carson 910, 10" diameter round box.

- The remote-control valve, and disc filter, are to be installed in Carson 1220 boxes.



#### ***Drip – Operation Indicators***

- Pop-up style indicator
- Minimum of one indicator per drip zone
- Install multiple indicators for drip zones with separate layout areas.



## **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 Baseline 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, 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 Baseline controllers must have ‘native’ irrigation schedules programmed into them which will ensure sufficient irrigation occurs during times when the controller loses cell communication with 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 or 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 Baseline 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 Baseline 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 31<sup>st</sup>, 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 10<sup>th</sup> 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 10<sup>th</sup> 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-m). All components not listed are to be serviced and maintained by the irrigation maintenance contractor.
  - a. Baseline 3200 Controllers
  - b. Baseline Flow Station
  - c. Master Valves

- d. Flow sensors
- e. Rain Cans
- f. Weather Station
- g. Cell modems
- h. Soil moisture sensors
- i. Data loggers at smart sites
- j. Pulse decoders
- k. Sensor decoders
- l. Pulse Transmitters
- m. Associated wiring with the above components

## 12. Monthly Management requirements

- a. Weather Station to be maintained according to manufacturer as outlined below:

Tasks	Tasks	Tasks
Call WM- Determine if everything is reading properly	Replace	Calibrate solar radiation sensors
Dessicant Bag	Anemometer	
Pyranometer	Sensor	
Wind Sensors	Calibrate Rain	Calibrate temperature sensor
Rain Gage	Gage	Replace wind vane potentiometer and bearing
Anemometer	Calibrate	Replace sensor cables as required
Check Sensors	HMP45C/HMP	
Check for Damages	35C probe	
Humidity Sensor	Check	
Clean Entire Weather Station	Calibration of	
Call WM again and determine if everything is working properly	CS500 RH Probe	
	Check Internal RH Chip	
MONTHLY	ANNUALLY	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.

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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.