



PASCO COUNTY  
DESIGN STANDARDS MANUAL

JANUARY 2023



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## INTRODUCTION

This Design Standards Manual was developed by Pasco County for communication of uniform minimum standards and criteria for the design, construction, and maintenance of all **public** streets, roads, highways, bridges, **stormwater management systems**, sidewalks, curbs and curb ramps, crosswalks, bicycle facilities, underpasses and overpasses ~~used by the public for vehicular and pedestrian traffic~~ in accordance with Chapter 900 Development Standards of the Pasco County Land Development Code (LDC).

All design and construction plans for projects that are to become part of the county road system are required to conform with the design and construction standards established pursuant to subsection 336.045 (1) F.S. and must be certified to be in substantial conformance with design and construction standards established pursuant to 336.045 (1) F.S. that are in effect by a professional engineer who is registered in the state of Florida as directed by Section 336.045 (4), F.S.

If proposed design elements within a project cannot meet the criteria contained in the Manual, sufficient detail and justification of such deviations must be documented and submitted for approval. This submittal shall include sufficient detail and explanation to justify approval, as well as consideration for potential mitigation strategies that may reduce the adverse impacts to roadway safety and traffic operations. See LDC Section 407.5 for the Alternative Standards process. Chapter 14 of the Florida Greenbook for the Design Exception and Variations process. Upon receipt of such input, the County Administrator or designee with delegated authority to administratively approve requests, will review and determine appropriate outcome of the requested variation or exception to the specific design standard(s) for the project.

All work shall be in accordance with the latest editions of standards and requirements utilized by Pasco County and the Florida Department of Transportation, which include, but are not limited to, publications such as:

- General
  - o Title 29, Part 1910, Standard 1910.1001, Code of Federal Regulations (29 C.F.R. 1910.1001) – Asbestos Standard for Industry, U.S. Occupational Safety and Health Administration (OSHA)
  - o 29 C.F.R. 1926.1101 – Asbestos Standard for Construction, OSHA
  - o 40 C.F.R. 61, Subpart M - National Emission Standard for Hazardous Air Pollutants (NESHAP), Environmental Protection Agency (EPA)
  - o 40 C.F.R. 763, Subpart E – Asbestos-Containing Materials in Schools, EPA
  - o 40 C.F.R. 763, Subpart G – Asbestos Worker Protection, EPA
  - o Americans With Disabilities Act (ADA) Standards for Accessible Design
  - o AASHTO – Roadside Design Guide
  - o AASHTO – Roadway Lighting Design Guide
  - o AASHTO – A Policy for Geometric Design of Highways and Streets
  - o AASHTO – Highway Safety Manual
  - o Rule Chapter 5J-17, Florida Administrative Code (F.A.C.), Standards of Practice for Professional Surveyors and Mappers
  - o Chapter 469, Florida Statutes (F.S.) – Asbestos Abatement
  - o Rule Chapter 62-257, F.A.C., Asbestos Program
  - o Rule Chapter 62-302, F.A.C., Surface Water Quality Standards

- o Code of Federal Regulations (C.F.R.)
- o Florida Administrative Codes (F.A.C.)
- o Chapters 20, 120, 215, 455, Florida Statutes (F.S.) – Florida Department of Business & Professional Regulations Rules
- o Florida Department of Environmental Protection Rules
- o FDOT Basis of Estimates Manual
- o FDOT Computer Aided Design and Drafting (CADD) Manual
- o FDOT Standard Plans
- o FDOT Flexible Pavement Design Manual
- o FDOT - Florida Roundabout Guide
- o FDOT Handbook for Preparation of Specifications Package
- o FDOT Standard Plans Instructions
- o FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (“Florida Greenbook”)
- o FDOT Materials Manual
- o FDOT Pavement Type Selection Manual
- o FDOT Design Manual
- o FDOT Procedures and Policies
- o FDOT Project Development and Environmental Manual
- o FDOT Project Traffic Forecasting Handbook
- o FDOT Rigid Pavement Design Manual
- o FDOT Standard Specifications for Road and Bridge Construction
- o FDOT Utility Accommodation Manual
- o Manual on Speed Zoning for Highways, Roads, and Streets in Florida
- o Federal Highway Administration (FHWA) - Manual on Uniform Traffic Control Devices (MUTCD)
- o FHWA – National Cooperative Highway Research Program (NCHRP) Report 672, Roundabouts: An Informational Guide
- o FHWA Roadway Construction Noise Model (RCNM) and Guideline Handbook
- o Florida Fish and Wildlife Conservation Commission - Standard Manatee Construction Conditions 2005
- o Florida Statutes (F.S.)
- o Florida’s Level of Service Standards and Guidelines Manual for Planning
- o Model Guide Specifications – Asbestos Abatement and Management in Buildings, National Institute for Building Sciences (NIBS)
- o Quality Assurance Guidelines
- o Safety Standards
- o FDOT – Florida Intersection Design Guide
- o FDOT - Project Traffic Forecasting Handbook
- o FDOT - Quality/Level of Service Handbook
- o Florida’s Level of Service Standards and Highway Capacity Analysis for the SHS
- o Transportation Research Board (TRB) - Highway Capacity Manual
- Permits
  - o Chapter 373, F.S. – Water Resources
  - o US Fish and Wildlife Service Endangered Species Programs
  - o Florida Fish and Wildlife Conservation Commission Protected Wildlife Permits
  - o Bridge Permit Application Guide, COMDTPUB P16591.3C
- Drainage
  - o FDOT Drainage Design Guide
  - o FDOT Drainage Manual

- o FDOT Erosion and Sediment Control Manual
- o FDOT Bridge Scour Manual
- o Southwest Florida Water Management District Rules
- Survey and Mapping
  - o All applicable Florida Statutes and Administrative Codes
  - o Florida Department of Transportation Surveying and Mapping Handbook
  - o Florida Department of Transportation Right of Way Procedures Manual
- Traffic Engineering and Operations and ITS
  - o AASHTO - An Information Guide for Highway Lighting
  - o AASHTO - Guide for Development of Bicycle Facilities
  - o FHWA Standard Highway Signs Manual
  - o FDOT Manual on Uniform Traffic Studies (MUTS)
  - o FDOT Median Handbook
  - o FDOT Traffic Engineering Manual
  - o National Electric Safety Code
  - o National Electrical Code
- Traffic Monitoring
  - o American Institute of Steel Construction (AISC) Manual of Steel Construction, referred to as "AISC Specifications"
  - o American National Standards Institute (ANSI) RP-8-00 Recommended Practice for Roadway Lighting
  - o AASHTO AWS D1.1/ANSI Structural Welding Code – Steel
  - o AASHTO D1.5/AWS D1.5 Bridge Welding Code
  - o FHWA Traffic Detector Handbook
  - o FDOT General Interest Roadway Data Procedure
  - o FHWA Traffic Monitoring Guide
  - o FDOT's Traffic/Polling Equipment Procedures
- Structures
  - o AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications and Interims
  - o AASHTO LRFD Movable Highway Bridge Design Specifications and Interims
  - o AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, and Interims.
  - o AASHTO/-AWS-D1. 5M/D1.5: An American National Standard Bridge Welding Code
  - o AASHTO Guide Specifications for Structural Design of Sound Barriers
  - o AASHTO Manual for Condition Evaluation and Load and Resistance Factor Rating (LRFR) of Highway Bridges
  - o FDOT Bridge Load Rating Manual
  - o FDOT Structures Manual
  - o FDOT Structures Design Bulletins (available on FDOT Structures web site only)
- Geotechnical
  - o FHWA Checklist and Guidelines for Review of Geotechnical Reports and Preliminary Specifications
  - o Manual of Florida Sampling and Testing Methods
  - o Soils and Foundation Handbook

## **SECTION 1.0: TRANSPORTATION**

### **1.1 Corridor Spacing**

See Pasco County LDC Chapter 900 Development Standards, Section 901.1 for guidelines and criteria for transportation corridor spacing.

### **1.2 Corridor Management**

See Pasco County LDC Chapter 900 Development Standards, Section 901.2 for guidelines and criteria for transportation corridor management.

### **1.3 Access Management**

#### **A. Intent and Purpose**

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.A for an outline of transportation access management intent and purpose.

#### **B. Applicability**

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.B for transportation access management applicability guidelines.

#### **C. Exemptions**

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.C for criteria for transportation access management exemptions.

#### **D. Nonconforming Access/Significant Change**

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.D for transportation access management nonconforming access/significant change guidelines.

#### **E. Access Management Analysis/Traffic Impact Study**

All projects subject to this section shall complete the Access Connection Permit Application Form 901.3.A and complete any analysis required pursuant to Form 901.3.A. However, the County Engineer may require more detailed access-management information or a more detailed access- management study where the County Engineer determines:

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.E for criteria the County Engineer may use to determine if a traffic impact study is warranted.

**F. Access Order**

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.F for the order of preference for providing access to County road systems.

**G. Driveway Design Criteria**

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.G for Driveway Design Criteria.

**H. Number and Spacing of Driveways**

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.H for the number and spacing of driveway accesses to County road systems.

**I. Access Control**

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

**Table 1.3A Arterial/Collector Standards**

Facility Type	Posted Speed	Corner Clearance/ Connection Spacing (Min.)	Median Opening Spacing (Min.)		Signal Spacing (Min.)
			Directional	Full	
Arterial	>45	660	1,320	2,640	2,640
	≤45	440	660	1,320	2,640
Collector	>45	440	660	1,320	1,320
	≤45	245	330	660	1,320

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

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

NOTE 3: If access is on an FDOT controlled roadway then FDOT standards shall apply.

**J. Isolated Corner Properties**

If, due to a property's size, the County Engineer finds that corner clearance

standards cannot meet [LDC](#) Table 901.3.A, and where cross access which meets or exceeds the minimum corner clearance standards cannot be obtained with a neighboring property or is not feasible in the opinion of the County Engineer, then the following minimum corner clearance measurements can be used to permit connections:

**Table 1.3B Corner Clearance for Isolated Properties**

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

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

**K. Throat Distances**

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

>200,000 GLA	Minimum 100 feet
<200,000 GLA	75-100 feet
Other driveways	40-75 feet

Up to ten (10) percent deviations from these requirements may be permitted for good cause upon approval by the County Engineer. Deviations greater than or equal to ten (10) percent require approval in accordance with this Code, Sections 901.3.T and 407.5.

**L. Driveway Width and Radii**

The following minimum standards shall be utilized for all driveways:

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

Up to ten (10) percent deviations from these requirements may be permitted for good cause upon approval by the County Engineer. Deviations greater than or equal to ten (10) percent require approval in accordance with [LDC this Code](#), Sections 901.3.T and 407.5.

## M. Cross Access/Frontage/Reverse-Frontage Roads

### 1) General Requirement

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.M.1 for general requirements for cross access/frontage/reverse-frontage roads.



## 2) Cross Access/Parking Standards

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.M.2 for cross access/parking standards.

## 3) Cross-Access/Construction Standards

- a. If the development is located within the RES-3 (Residential - 3 du/ga) or higher Land Use Classification, the cross access shall be constructed with a minimum pavement structural number of ~~2.96~~ 2.45 with a minimum two (2) inches of asphaltic- concrete structural surface course.
- b. If the development is located within the RES-1 (Residential - 1 du/ga) Land Use Classification, the cross access shall be stabilized to LBR-40.
- c. If the development is located within the AG (Agricultural) and AG/R (Agricultural/Rural) Future Land Use Classifications, a cross-access easement is only required to be reserved.

## N. Median Openings

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.N for guidelines on median openings on County roadways.

## O. Requirements for Turning Lanes

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.0 for general requirements for turn lanes on County roadways.

All required turning lanes shall be designed and constructed in accordance with FDOT Design Manual, Chapter 212, latest edition ~~Indexes 301 and 526~~.

## P. Drainage

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.P for general drainage requirements for access to private property abutting County right-of-way.

- 1) Each access shall be constructed in a manner that shall not cause water to enter onto the roadway and shall not interfere with the existing drainage system on the right-of-way (FDOT Indices 330 – 001 and 522-003 ~~Index 515~~).

## Q. Other Design Elements

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.Q for other design elements.

## R. Maintenance

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.R guidelines for maintenance requirements.

## S. Controlled Access Roadways

Notwithstanding anything in these regulations to the contrary, direct access to the following roadways shall be restricted to specific locations approved by all governmental entities with jurisdiction over such roadways:

- 1) The Suncoast Parkway and the impacted portion of collector/arterial roadways forming the interchanges with the Suncoast Parkway as determined by applicable Florida Turnpike Enterprise (FTE) and FDOT regulations, where access is restricted to those locations approved by the FTE and FDOT, in consultation with the County.
- 2) I-75 and the impacted portion of collector/arterial roadways forming the interchanges with I-75 as determined by applicable Federal Highway Administration (FHA) and FDOT regulations, where direct access is restricted to those locations approved by the FHA and FDOT, in consultation with the County.

## T. Alternate Standard Procedures

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.T guidelines for Alternate Standards requests.

## U. Access Violations

See Pasco County LDC Chapter 900 Development Standards, Section 901.3.U regarding access violations.

# 1.4 Substandard Roadway Analysis and Mitigation

## A. Intent and Purpose

The intent and purpose of this section is to ensure that deficiencies on substandard roads impacted by new development are corrected or mitigated.

## B. Applicability

See Pasco County LDC Chapter 900 Development Standards, Section 901.4.B for applicability.

## C. Exemptions

See Pasco County LDC Chapter 900 Development Standards, Section 901.4.C for exemptions guidelines.

## D. Analysis

1. See Pasco County LDC Chapter 900 Development Standards, Section 901.4.D.1 for analysis applicability guidelines.
2. See Pasco County LDC Chapter 900 Development Standards, Section 901.4.D.2 for analysis procedural requirements.

## E. Submittal Information

1. See Pasco County LDC Chapter 900 Development Standards, Section 901.4.E.1 for general submittal information guidelines for substandard roadway analysis.
2. Lane Width and Shoulders
  - a. Data Collection: The lane and shoulder widths that represent a typical lane and shoulder width of the impacted roadways shall be field measured and reported. Extreme variations from the existing typical widths shall also be reported.
  - b. Standards: The minimum lane and shoulder widths allowed are provided below. The design year and speed as stated in the below referenced tables shall mean the build-out year of the project and posted speed limit, respectively.

**Table 1.4A Lane and Shoulder Widths—Rural Multilane**

<b>Design Year AADT</b>	<b>Design Speed (mph)</b>	<b>Minimum Lane Width (Feet)</b>	<b>Minimum Shoulder Width (Feet)</b>
ALL	ALL	12	6

**Table 1.4B Lane and Shoulder Widths, Two Lane Rural and Urban—Without Curb and Gutter**

Design Year AADT	Design Speed (mph)	Minimum Lane Width (Feet)	Minimum Shoulder Width (Feet)
1-750	ALL	10 <sup>1</sup>	6 <sup>3</sup>
751-2000	<50	11 <sup>1-2</sup>	6 <sup>3</sup>
	≥50	12 <sup>2</sup>	6 <sup>3</sup>
>2000	ALL	12 <sup>2</sup>	6 <sup>3</sup>

<sup>1</sup> For rural and urban projects without curb or gutter (regardless of traffic volume), when widening is required, a minimum lane width of eleven (11) feet is required. A minimum lane width of twelve (12) feet is required if heavy vehicles are ten (10) percent or more of the total daily driveway trips.

<sup>2</sup> May be reduced by one (1) foot if heavy vehicles are less than ten (10) percent of design year traffic and are less than ten (10) percent of the total daily driveway trips.

<sup>3</sup> The required width is eight (8) feet if heavy vehicles are ten (10) percent or more of the total daily driveway trips.

**Table 1.4C Urban Multilane or Two Lane with Curb and Gutter**

Design Year AADT	Design Speed (mph)	Minimum Thru-Lane (Feet)	Minimum Turn Lane (Feet)	Minimum Parking Lane (Feet)
ALL	ALL	10 <sup>1</sup>	9 <sup>2</sup>	7 <sup>3</sup>

<sup>1</sup> For rural and urban projects without curb or gutter (regardless of traffic volume), when widening is required, a minimum lane width of eleven (11) feet is required. A minimum lane width of twelve (12) feet is required if heavy vehicles are ten (10) percent or more of the total daily driveway trips.

<sup>2</sup> May be reduced by one (1) foot if heavy vehicles are less than ten (10) percent of design year traffic and less than ten (10) percent of the total daily driveway trips.

<sup>3</sup> A minimum width of seven (7) feet, measured from the face of the curb, may be left in place. Otherwise provide eight (8) feet minimum, measured from the face of the curb.

3. Pavement Condition

- a. Data Collection: The thicknesses of the asphaltic concrete surface pavement layers and base and the cross-slopes that represent a typical surface and base thickness, and cross slopes of the impacted roadways shall be field measured and

reported. The thickness of the subbase need not be field measured unless practical. If the subbase is not measured, the thickness of the subbase can be assumed standard. In addition, any quarter-panel failures and wheel-rutting shall be noted and reported. Extreme variations from the existing typical conditions shall also be reported.

b. Standards: The minimum structural numbers for roadways are:

- (1) Local Streets in AG (Agricultural) and  
AG/R (Agricultural/Rural) Land Use Less Than Sixteen (16) Lots  
and RES-1 (Residential -  
1 du/ga) Land Use Less Than Ten (10) Lots: 1.89
- (2) Local Streets: 2.19
- (3) Subdivision Collector (Type I): 3.24
- (4) Major Collector: 3.42

A minimum structural number of 4.00 is required on local and collector roadways if heavy vehicles are ten (10) percent or more of the total daily driveway trips.

Layer coefficients are provided in Tables 1.4D and 1.4E below:

**Table 1.4D Structural Coefficients for Different Pavement Layers**

Specification Section	Layer Coefficient	Layer
337	0.00	FC-2 or FC-5
337	0.22	FC-3
337	0.44	FC-6
337	0.44	FC-12.5 or FC-9.5
334 334	0.44	Type S or SP
333	0.30	Type III
332	0.20	Type II
	0.30	Type I
	0.30	Binder
280	0.30	ABC-3 (Marshall - 1,000)
280	0.25	ABC-2 (Marshall - 750)
280	0.20	ABC-1 (Marshall - 500)
234	0.30	Type B-12.5
272	0.25	Econcrete (1,100 psa)
272	0.22	Econcrete (800 psi)
270	0.20	Soil Cement (500 psi)
270	0.15	Soil Cement (300 psi)
335	0.15	SAHM (Marshall - 300)
204	0.15	Graded Aggregate (LBR-100)
911 250	0.18	Cemented Coquina Shell (LBR-100)
200	0.18	Limerock (LBR-100)

Specification Section	Layer Coefficient	Layer
200	0.18	Shell Rock (LBR 100)
<del>200</del> 205	<del>0.18</del> 0.16	Bank Run Shell (LBR-100)
230	0.12	Limerock Stabilized (LBR-70)
<del>240</del>	0.12	Sand Clay (LBR-75)
<del>260</del>	0.10	Shell Stabilized (LBR-70)
160-3	0.10	Stabilized Subbase (LBR-40)
<del>180</del>	0.08	Stabilized Subbase (LBR-30)
160-2	0.08	Type B Stabilized (LBR-40)
160-2	0.06	Type B Stabilized (LBR 30)
<del>160-2</del>	0.06	Type C Stabilized
<del>170</del>	0.12	Cement Treated Subgrade (300 psi)
<del>165</del>	0.08	Lime Treated Subgrade
911	<del>0.18</del> 0.15	Recycled Concrete Aggregate (LBR 150) <del>Crushed Concrete (Reclaimed Concrete Aggregate Base, LBR-150)</del>

**Table 1.4E Reduced Structural Coefficients Asphaltic Materials**

Layer	Original Design	Pavement Condition		
		Good	Fair	Poor
FC-2 or FC-5	0			
FC-1 or FC-4	0.2	0.17	0.15	0.12
FC-6	0.44	0.34	0.25	0.15
FC-12.5 or FC-9.5	0.44	0.34	0.25	0.15
Type I	0.37	0.30	0.23	0.15
Binder	0.30	0.25	0.20	0.15
SBRM (300 M)	0.15	0.13	0.11	0.08
FC-3	0.22	0.20 0.17	0.17 0.15	0.15 0.12
Type S or SP	0.44	0.34	0.25	0.15
Type III	0.30	0.25	0.20	0.15
Type II	0.20	0.17	0.15	0.12
ABC-3 (1,000 M)	0.30	0.25	0.20	0.15
ABC-2 (750 M)	0.25	0.20	0.16	0.12
ABC-1 (500 M)	0.20	0.17	0.14	0.10
SAHM (300 M)	0.15	0.13	0.11	0.08

**NOTE:** Reduced structural coefficients for use in the AASHTO Flexible Pavement Design Equation can be obtained from this table for all asphalt layers based on pavement condition. Pavement condition for this table should be based on the surface appearance of the asphalt pavement (cracking, patching, rutting, etc.) and may be supplemented by additional testing. Structural coefficients are not reduced for existing rock base, subbase, or subgrade.

## Recommended Criteria:

Good: No cracking, minor rutting/distortion.

Fair: Crack Rating = eight (8) or higher, minor rutting/distortion. Poor: Crack Rating = less than eight (8), rutting =  $\frac{3}{8}$  inch or greater.

**NOTE:** Quarter-panel failures and wheel rutting are considered to be substandard conditions. Roadway cross slopes shall conform to Table 1.4F below:

**Table 1.4F Roadway Cross Slopes**

<b>Feature</b>	<b>Standard</b>	<b>Range</b>
Travel Lanes	0.02	0.02-0.04 <sup>1</sup>
Shoulders	0.06	0.03-0.08 <sup>2</sup>
Parking Lanes	0.05	0.03-0.05

<sup>1</sup> Existing multilane curb and gutter sections originally constructed with a parabolic crown section may be resurfaced using a series of tangents with a cross slope range from 0.015-0.05.

<sup>2</sup> When existing shoulders are to remain, the algebraic difference between the shoulder slope and adjoining roadway pavement slope shall be < 0.07.

4. Flooding

- a. Data Collection: Data collection shall include the compilation of historical flooding locations readily available from the Development Services Branch. The flooding location Geographic Information System map layer titled "Observed Flooding" shall be used to identify flooding areas.
- b. Standards: The standard is no surface ponding upon roadway.
- c. Assessment: The assessment shall include a statement as to whether impacted roadways are within the flood area, a general description of physical constraints that may prevent upgrading the substandard condition to a standard condition, and proposed alternative standards, and a detailed description of the proposed improvements and associated costs.

5. Side Slope

- a. Data Collection: The front and back slopes that represent a typical front and back slope of the impacted roads shall be field measured and reported. Extreme variations from the existing typical conditions shall also be reported.
- b. Standards: The maximum front slope shall be one to four (1:4) within the

clear zone and one to three (1:3) outside the clear zone. However, front slopes of one to three (1:3) or flatter may remain within the clear zone, but shielding may be required. Front slopes steeper than one to three (1:3) shall be shielded per *FDOT [Standard Plans, Index 530-001](#)* ~~Design Standards, Index 400~~, General Notes, as may be amended. Consideration should be given to flattening slopes of one to three (1:3) or steeper at locations where run off the road type crashes are likely to occur; e.g., on the outside of horizontal curves.

The maximum back slope shall be one to three (1:3) in the clear zone. The maximum back slope shall be one to two (1:2) outside the clear zone without shielding.

- a. Assessment: The assessment shall include a statement as to whether the existing conditions meet the standards, a general description of physical constraints that may prevent upgrading the substandard condition to standard and proposed alternative standards, and a detailed description of the proposed improvements and associated costs.
- c.

6. Clear-Zone Widths

- a. Data Collection: The clear-zone widths that represent a typical clear-zone width of the impacted roads shall be field-measured and reported. Extreme variations from the existing typical conditions shall also be reported.
- b. Standards: Minimum clear-zone widths shall be as listed below on Table 1.4G. The design speed shall mean the posted speed limit.

**Table 1.4G Clear-Zone Width (Feet)**

<b>Design Speed (mph)</b>	<b>Travel Lanes and Multilane Ramps</b>	<b>Auxiliary Lanes and Single-Lane Ramps</b>
<45	6	6
45*	14	8
>45	18	8

General Notes for Table 1.4G

When relocation is required to meet minimum clear-zone requirements, consideration should be given to providing new construction widths.

Clear-zone widths are for side slopes one to four (1:4) and flatter. For steeper slopes, provide a clear, run-out area at the toe of the fill.

When crash history indicates the need, or where specific site investigation shows definitive crash potential, clear-zone widths shall be adjusted on the outside of horizontal curves with flush shoulders.



Clear-zone width is measured from the edge of the traveled way.

\*May be reduced to < 45-mph widths if conditions more nearly approach those for low speed (40 mph or less).

**Table 1.4H Horizontal Clearance for Traffic Control Signs**

Placement	Placement shall be in accordance with the <i>FDOT Design Standards</i> . Placement within sidewalks shall be such that an unobstructed sidewalk width of four (4) feet or more (not including the width of the curb) is provided.
Supports	Supports, except overhead sign supports, shall be frangible or breakaway. When practicable, sign supports should be located behind barriers that are justified for other reasons. Overhead sign supports shall be located outside the clear zone unless shielded.

**Table 1.4I Horizontal Clearance for Light Poles**

Conventional Lighting	<p>Not in the median, except in conjunction with barriers that are justified for other reasons.</p> <p>Rural (Flush Shoulders): Twenty (20) feet from the travel lane and fourteen (14) feet from the auxiliary lane (may be clear-zone width when the clear zone is less than twenty (20) feet).</p> <p>Urban (Curb and Gutter): From the right-of-way line to four (4) feet back from the face of the curb (may be 1.5 feet back from the face of the curb when all other alternatives are deemed impractical). Placement within sidewalks shall be such that an unobstructed sidewalk width of four (4) feet or more (not including the width of the curb) is provided.</p>
High Mast Lighting	Outside the clear-zone unless shielded.

**Table 1.4J Horizontal Clearance for Utility Installations**

Shall not be located within the limited access right-of-way, except as permitted by the Telecommunications Facilities on Limited Access Rights-of-Way Policy (Topic No. 000-625-025).

Shall not be located in the median.

**Flush Shoulders:**

Not within the clear zone. Install as close as practical to the right-of-way without aerial encroachments onto private property.

**Curb or Curb and Gutter:**

At the right-of-way line or as close to the right-of-way line as practical. Must maintain 1.5 feet clear from the face of the curb. Placement within sidewalks shall be such that an unobstructed sidewalk width of four (4) feet or more (not including the width of the curb) is provided.

See the *Utility Accommodation Manual*, Topic No. 710-020-001, for additional information.

**Table 1.4K Horizontal Clearance to Signal Poles and Controller Cabinets for Signals**

Shall not be located in medians.

**Flush Shoulders:**

Outside the clear zone.

**Curb or Curb and Gutter:**

Four (4) feet from the face of outside curbs and outside the sidewalk. However, when necessary, the signal poles may be located within sidewalks such that an unobstructed sidewalk width of four (4) feet or more (not including the width of the curb) is provided. Also, when site conditions make the four (4) foot clearance impractical, clearance may be reduced to 1.5 feet.

**Table 1.4L Horizontal Clearance to Trees**

Minimum horizontal clearance for new plantings shall meet new construction criteria.

Minimum horizontal clearance to existing trees where the diameter is or is expected to be greater than four (4) inches when measured six (6) inches above the ground shall be:

Flush Shoulders:

Outside the clear zone.

Curb or Curb and Gutter:

1.5 feet from the face of outside curbs.

3.5 feet from the edge of the inside traffic lane where a median curb is present.

**Table 1.4M Horizontal Clearance to Bridge Piers and Abutments**

Minimum horizontal clearance to bridge piers and abutments:

Flush Shoulders:

Outside the clear zone.

Curb or Curb and Gutter:

Sixteen (16) feet from the edge of the travel lane.

**Table 1.4N Horizontal Clearance to Railroad Grade Crossing Traffic Control Devices**

Placement shall be in accordance with the design standards.

**Table 1.4O Horizontal Clearance to Other Roadside Obstacles**

Minimum horizontal clearance to other roadside obstacles:

Flush Shoulders:

Outside the clear zone.

Curb or Curb and Gutter:

Four (4) feet back from the face of the curb. May be 1.5 feet back from the face of the curb when all other alternatives are deemed impractical.

- a. **Assessment:** The assessment shall include a statement as to whether the existing conditions meet the standards, a general description of physical constraints that may prevent upgrading the substandard condition to standard and propose alternative standards, and a detailed description of

the proposed improvements and associated costs.

7. Railroad Crossing Traffic Control
  - a. Data Collection: See Pasco County LDC Chapter 900 Development Standards, Section 901.4.E.7.a.
  - b. Standards: As required by the following:
    - (1) Traffic Control: *Manual on Uniform Traffic Control Devices* (MUTCD), Chapter 8; Federal Highway Administration (FHWA) Report FHWA-TS-86-215 or current edition; and Florida Department of Transportation (FDOT) *Standard Plans Design Standards*, Indices 509-100 and 509-070 ~~17881 and 17882~~, as may be amended.
    - (2) Sight Distance at Passive Crossing: *AASHTO Green Book*, Case 1, latest edition; and *FDOT Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways*, latest edition.
    - (3) Road Surface Smoothness and Width Through Crossing: *FDOT Design Manual*, Chapter 220, as amended; and *FDOT Standard Plans Design Standards*, Indices 830-T01, 509-100, and 509-070 ~~560, 17881 and 17882~~, as may be amended.
  - c. Assessment: Compare existing conditions with the requirements of the MUTCD and FDOT standards, and undertake analysis to determine the need for improvements. If improvements are needed, consult with the FDOT and CSX Railroad Company for agreement or disagreement and recommend appropriate improvements.
8. Cost Estimate: See Pasco County LDC Chapter 900 Development Standards, Section 901.4.E.8.

## F. Mitigation

See Pasco County LDC Chapter 900 Development Standards, Section 901.4.F guidelines for mitigation.

## G. Relief

See Pasco County LDC Chapter 900 Development Standards, Section 901.4.G.a guidelines for relief.

## 1.5 Transportation Impact Study

See Pasco County LDC Chapter 900 Development Standards, Section 901.5 for guidelines and criteria for transportation impact studies.

## 1.6 Street Design and Dedication Requirements

### A. Intent and Purpose

The intent and purpose of this section is to provide the classification and design standards of subdivision collector and local streets and for the safety of vehicular and pedestrian traffic.

### B. Applicability

See Pasco County LDC Chapter 900 Development Standards, Section 901.6.B for applicability of street design and dedication requirements.

### C. Classification

See Pasco County LDC Chapter 900 Development Standards, Section 901.6.C for classification of street design and dedication requirements.

### D. Design and Construction

With the exception of Minor Rural Subdivisions (MRS) and Limited Family-Lot Division (LFLD) developments, all streets and/or accessways shall be designed and constructed in accordance with the applicable portion of the following:

Florida Department of Transportation (FDOT), *Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways*, latest edition (Green Book) [for roadways with posted speeds 35 MPH or less.](#)

[FDOT Standard Plans, latest edition.](#)

[FDOT Design Manual, latest edition for roadways with posted speeds greater than 35 MPH.](#)

[FDOT, Flexible Pavement Design Manual, latest edition.](#)

FDOT, *Standard Specifications for Road and Bridge Construction, Divisions II and III*, latest edition, including:

- Soil Cement as detailed in Section 270 of the FDOT, *Standard Specification for Road & Bridge Construction*, 1991 edition, [located in Appendix D, Supplemental Specifications of this manual.](#)
- Crushed concrete as detailed by the ~~Engineering Services Department~~ [in Appendix A, Recycled Concrete Aggregate Base Specifications 111-112 of this manual.](#)

However, in no instance shall the roadway standards be less than those required by this manual or the LDC.

1. Right-of-Way

See Pasco County LDC Chapter 900 Development Standards, Section 901.6.D.1 for requirements of right-of-way widths based on roadway classification.

2. Pavement Width

See Pasco County LDC Chapter 900 Development Standards, Section 901.6.D.2 for requirements of roadway width.

3. Pavement Cross-Slope. If approved by the County Engineer, the selection of pavement cross-slope may be a compromise between meeting the drainage requirements and providing for smooth vehicle operation.

The recommended pavement cross-slope for a crowned pavement is 0.02 feet per foot. The pavement cross-slope shall not be less than 0.015 foot per foot or greater than 0.04 feet per foot. The change in cross-slope between adjacent through-travel lanes shall not exceed 0.04 feet per foot.

Inverted crown may only be used for Type 5 [3](#) streets.

Where inverted crown is used, the centerline of the invert shall contain a minimum two (2) foot modified valley gutter.

4. Pavement Structure and Road Design. The pavement structure required shall be based on the street classification and the number of lots proposed, cumulative with the number of lots that can reasonably be anticipated to use the street. The pavement structure required shall be based on a structural number obtained by multiplying the structural layer coefficient by the thickness of each type of material, then adding the resultant in accordance with the FDOT, *Flexible Pavement Design Manual, Latest Edition*. Each layer shall adhere to the minimum thickness required by the FDOT. Friction Course shall be applied in accordance with Chapter 4 of the FDOT, *Flexible Pavement Design Manual, latest Edition*. FC-12.5 and FC-9.5 are considered part of the structural layer and may be considered as both a structural and friction course.

The minimum pavement structure required for residential subdivisions (Note: this does not include Limited Family Lot Divisions) and for subdivision collectors, shall be as follows:

Land Use Classification	Number of Proposed Lots	Structural Number
AG (Agricultural)	Less than 16	2.04
AG (Agricultural)	16 or greater	<del>2.34</del> 2.45

AG/R (Agricultural/Rural)	Less than 16	2.04
AG/R (Agricultural/Rural)	16 or greater	<del>2.34</del> 2.45
RES-1 (Residential - 1 du/ga)	Less than or equal to 10	2.04
RES-1 (Residential - 1 du/ga)	Greater than 10	<del>2.34</del> 2.45
RES-3 (Residential - 3 du/ga)	N/A	<del>2.34</del> 2.45

Where minimum structural numbers of 2.04 or ~~2.34~~ 2.45 are required, the pavement structure shall contain a minimum of one and one-half (1½) inch of Type SP asphaltic-concrete structural surface course.

Emergency Access Roads connections shall be a minimum 20-foot paved width and meet or exceed the interior roadway connection's structural number (SN). However, in no case shall the SN be less than 2.45. As an alternative to a paved road connection, Geogrid stabilizing materials that support AASHTO H-20 vehicles with a gross weight of up to 65,000 lbs, as certified by the Manufacturer's Specifications, may be utilized outside the County ROW. An entity other than Pasco County shall own and maintain each Emergency Access road. Each Emergency Access shall be marked with regulatory signage to identify the entrance and exit for the Emergency Access road. Each Emergency Access road shall be kept free of vegetation other than grass and obstructions that prevent vehicular passage. Gates for security are permitted subject to compliance with local fire marshal requirements. The Emergency Access Road within the County right-of-way and 5 feet beyond must be constructed with concrete or asphaltic pavement meeting the structural number (SN) requirements stated above and designed in accordance with the Pasco County LDC, Section 901.3.G.

Where a Type 1A or 1B subdivision collector is required, a pavement design shall be submitted with the construction plans to determine the minimum pavement structure required. However, in no case, shall a structural number less than 3.5 with a minimum of three (3) inches of Type SP asphaltic-concrete structural surface course be provided.

Construction of a Type 1A or 1B subdivision collector may be completed in stages with 2 2¼ inches of SP 12.5 ~~or S-4~~ asphaltic-concrete structural surface course along with the required pavement markings installed at the time of the initial construction and 1 ¾ inch inches of SP 9.5 ~~or S-3~~ asphaltic-concrete structural surface course installed along with any required thermoplastic stripes, prior to release of the assurance of maintenance of improvements surety.

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

- a. Major Collector: 3.70 with a minimum of three (3) inches of structural course Type SP asphaltic-concrete surface course.
- b. Arterial: 4.00 with a minimum of three (3) inches of structural course Type SP asphaltic-concrete surface course.

A minimum structural number of 4.00 is required on local, major collector, and subdivision collector roadways if heavy vehicles are ten (10) percent or more of the total daily driveway trips.

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

For all roads below the stabilized subgrade, a minimum of two (2) feet of select material consisting of A-3 (SP) soil and/or A-2-4 with a maximum fifteen (15) percent passing number 200 sieve, shall be provided. The minimum thickness below the stabilized subgrade may be reduced to eighteen (18) inches for roadways with a required structural number of 2.45 or less. The project engineer responsible for the project shall certify to the County Engineer that the select material meets these standards prior to installation of the base. Certification shall strictly comply with the subgrade certification form available in the Engineering Services Department's *A Procedural Guide for the Preparation of Assurances of Completion and Maintenance*.

For major collector, arterial, and subdivision collector roads, a minimum of twelve (12) inch stabilized subgrade (Type B) LBR 40 minimum shall be provided under all bases except for soil cement, which shall be constructed on a stable, nonyielding subgrade of LBR 20. The layer coefficient for LBR 20 shall be 0.04 and shall be limited to a maximum depth of twelve (12) inches.

The minimum separation between the bottom of the base to the design existing seasonal high-water table (SHWT) shall be no less than two (2) feet where a limerock base is provided. Where soil cement, Type B-12.5 ABC-3 asphaltic concrete, or crushed concrete base material is used, the minimum separation between the bottom of the base to the design SHWT shall be no less than one (1) foot.

~~Design~~ Existing SHWT is the elevation to which the ground or surface water can be expected to rise due to the worst wet season within a ten (10) year period. The project engineer shall make a recommendation as to the SHWT elevation based on the assessment of historical records or other available data. This recommendation shall be reviewed for approval by the County Engineer or designee.

When required, either by the geotechnical report or as determined by the County Engineer, underdrains shall be Type II and consist of aggregate, pipe, and filter fabric as indicated in the FDOT Standard Plans Index Drawing No. 443-001 ~~286~~ and as referenced in any other FDOT index drawings and standard specifications.



Underdrain inverts shall be located a minimum of two (2) feet below the bottom of the base. The engineer responsible for the project shall certify to the County Engineer that the underdrains have been properly installed prior to the installation of any asphalt. Certification shall strictly comply with the underdrain certification form available in the Engineering Services Department's *A Procedural Guide for the Preparation of Assurances of Completion and Maintenance*. An inspection and maintenance program shall be established by the design engineer designating an entity on the design drawings that shall be responsible for maintenance.

5. Shoulders.

Shoulders shall be provided on all streets incorporating open drainage (rural sections) or mountable curbs. The minimum shoulder widths, measured from the edge of pavement, shall be as follows:

Street Type	Minimum Shoulder Width (Feet)
1A	8
1B	8
2	6
3	6
4	6
5-3	N/A
MRS and LFLD Accessway	1½

The shoulder serves as a continuation of the drainage system; therefore, the shoulder cross-slope shall be somewhat greater than the adjacent travel lane. The cross-slope of the shoulders shall not be steeper than .06 feet per foot.

6. Roadside Clear Zone:

The roadside clear zone is that area outside the traveled way, available for use by vehicles that have left the traveled way during avoidance maneuvers due to loss of control or due to collisions with other vehicles. The primary function of the roadside clear zone is to allow space and time for the driver of a vehicle to retain control and avoid or reduce the consequences of collision with roadside objects. This area also serves as an emergency refuge location for disabled vehicles.

The width of the roadside clear zone should be as wide as possible. The minimum widths, measured from the face of the barrier curb or edge of pavement where a barrier curb is not provided, shall be as follows:

Street Type	FDOT Type F and D Curb	FDOT Type A, E, and Miami Curb
1A	4' <sup>*</sup>	10'
1B	4' <sup>*</sup>	10'
2	4' <sup>*</sup>	6'
<del>3</del>	<del>4'<sup>*</sup></del>	<del>6'</del>
4	1½'	6'
<del>5</del> 3	1½'	6'
MRS and LFLD Accessways	N/A	6'

\*If private streets are allowed, then any entrance and exit gate equipment, guardhouse, or other like structure may be setback 1½ feet from the FDOT Type F and D curb.

On those roads where the minimum required clear zone is four (4) feet, the minimum cannot be reasonably obtained, and other alternatives are impractical, the minimum may be reduced to no less than 1½ feet pursuant to the alternative standards provisions set forth in this Code, Section 407.5. The County Engineer shall make a determination on the alternative standards application.

The slopes within the roadside clear zone shall be as flat as possible to allow for safe travel of a vehicle which has left the traveled way. The slope of the area within the roadside clear zone shall not be steeper than six (6) feet horizontal to one (1) foot vertical (6:1).

Outside of the roadside clear zone, where roadside swales or cuts require slopes, the slopes shall not be steeper than four (4) feet horizontal to one (1) foot vertical (4:1). Ditch bottoms shall be at least two (2) feet wide and may be flat or gently rounded.

If space constraints are severe, the County Engineer may permit the use of guardrails in lieu of the requirements for width and slope of the roadside clear zone. Guardrails shall also be considered for protection of pedestrian pathways or protection of immovable roadside hazards.

Where the maximum slope or roadside clear zone requirement cannot be met, guardrails in conformance with applicable FDOT standards shall be installed.

#### 7. Vertical Clearances:

Vertical clearance of 16.6 feet shall be provided above all streets.

#### 8. Medians:

Where medians are proposed or required by this Code or the County Engineer, the minimum widths shall be as follows:

a. Type 1A & 1B ~~4 and 2~~ Streets

- (1) Twenty-two (22) feet where no curb or mountable curbs are used.
- (2) 15½ feet where barrier curbs are used.

b. Types ~~2-3 and 4~~ Streets: The minimum median width shall be twice the roadside clear zone minimum width, plus the width of the existing or proposed obstruction. The pavement lane width around each side of the median shall be the total street width prior to encountering the median, divided by two (2), plus two (2) feet of additional pavement.

c. Type ~~5-3~~ Streets: Medians shall not be allowed.

Paved medians with a minimum width of twelve (12) feet may be used for two (2) way turn lanes and painted medians.

The unpaved median cross-slope shall not be steeper than six (6) feet horizontal to one (1) foot vertical (6:1). The depth of depressed medians may be controlled by drainage requirements. Increasing the median width, rather than increasing the cross-slope, is the acceptable method for developing the required median depth.

Structures, permanent materials, or plantings within the median shall not obscure the visibility of vehicles in accordance with the clear-sight requirements of the Green Book.

9. Horizontal and Vertical Alignment. The following minimum and maximum posted/design speeds are established:

Street Type	Minimum	Maximum
1	30	40 <u>35</u>
<u>2</u>	<u>25</u>	<u>35</u>
<u>3</u>	<u>20</u>	<u>30</u>
<u>4</u> <u>2</u>	15	30
<u>5-3</u>	15	20

Horizontal and vertical alignment shall be designed in accordance with the established speeds in accordance with the applicable sections of the latest edition of the FDOT *Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways*, latest edition (Green Book).

10. Cul-de-sacs: Unless otherwise approved at the time of the preliminary plan approval, cul-de-sacs shall be provided on all dead-end streets, except those planned for future extension. Cul-de-sacs shall have a minimum paved radius of fifty (50) feet and a minimum right-of-way of a sixty (60) foot radius, unless the Fire Code requires a greater radius.

Cul-de-sacs shall not exceed 1,760 feet in length.

11. Continuation of Existing Street Pattern and Street Access to Adjoining Property: See Pasco County LDC Chapter 900 Development Standards, Section 901.6.D.11 for requirements.
12. Intersection Design and Separation: See Pasco County LDC Chapter 900 Development Standards, Section 901.6.D.12 for requirements.
13. Acceptance of County Roads: See Pasco County LDC Chapter 900 Development Standards, Section 901.6.D.13 for stipulations on the County accepting/maintaining a complete road or street.

## E. Roadside Design

1. Vegetation. Grass or other low growing vegetation that is easily maintained shall be used on medians and roadside clear zones. To aid in erosion control, a sixteen (16) inch strip of sod shall be placed adjacent to the street pavement/back of the curb. The placement of the sod shall not unreasonably impede drainage of the pavement.

The remainder of the roadside shall be vegetated as follows:

- a. On slopes of four (4) feet horizontal to one (1) foot vertical (4:1) and flatter, seed and mulch or sod may be used.
- b. On slopes steeper than four (4) feet horizontal to one (1) foot vertical (4:1), sod shall be used.

All vegetation shall be carefully maintained by an entity other than the County.

Landscaping in excess of the requirements of this [Manual](#) may be installed within the right-of-way provided that the plantings are located outside of the roadside clear zone and do not obstruct the clear site triangle. In addition, the maintenance shall be provided by an entity other than the County and shall comply with [LDC](#) Section 406.5 relating to Right-of-Way Use Permits and License and Maintenance Agreements.

2. Drainage. Drainage swales shall be protected from scouring by the appropriate vegetation and, if required due to velocity of flow, erosion control measures shall be provided.

Drainage inlets shall not be placed in the travel lane of a Type 1, 2, 3, or 4 street. Drainage inlets placed within the median or roadside clear zone shall be flush with the ground surface. An area around the inlet shall be paved or concreted to improve drainage and to reduce erosion per the applicable FDOT standards.

Drainage swales perpendicular to the roadway shall not be used within the median or roadside clear zone. Drainage swales within the median or roadside clear zone shall meet the requirements for slope and changes in grade given in this Manual.

3. Culverts. Where culverts are provided, the ends of pipes shall be flush with the adjacent ground or located outside the roadside clear zone. The slope and changes in grade at the structure shall conform to the minimum requirements for roadside clear zones. Unless otherwise approved at the time of preliminary plan approval, all culverts, with the exception of those under residential driveways, shall be reinforced concrete pipe with a minimum diameter of eighteen (18) inches. Residential driveway culverts may be made of other materials acceptable to the County Engineer with a minimum diameter of fifteen (15) inches.

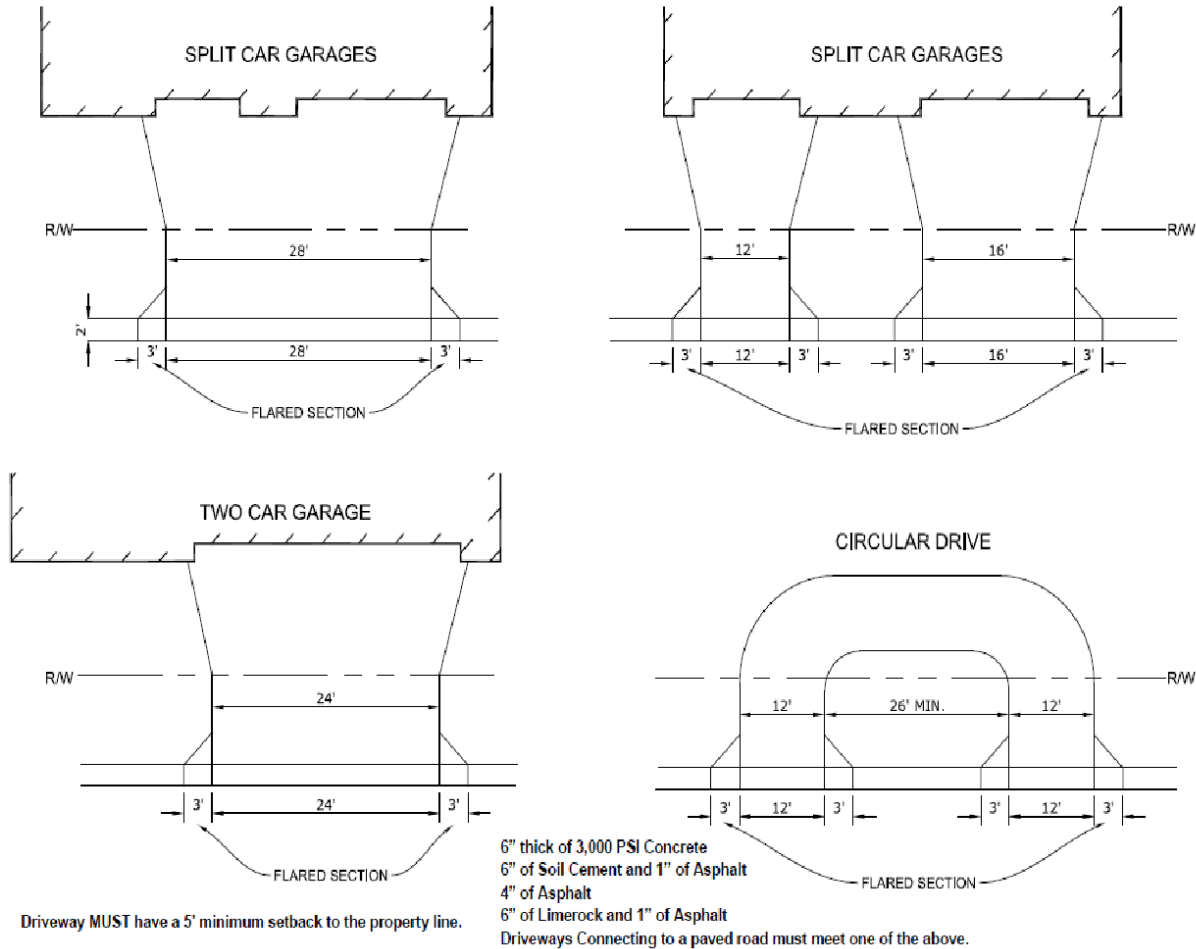
Headwalls and mitered end sections shall be designed and constructed in accordance with the applicable standards referenced in this [Manual Code](#) .

4. Curbs. Curbs may be used to provide drainage control and to improve delineation of the street pavement. The two (2) general classes of curbs are barrier curbs and mountable curbs. Both types of curbs shall be designed with a gutter to form a combination curb and gutter section. Barrier curbs shall be relatively high and steep-faced and designed to discourage vehicles from leaving the roadway. Mountable curbs shall be low with a flat-sloping surfaced designed so that vehicles can mount them when required. Where mountable curbs are used, the width may be included in the calculation of the required shoulder width.
5. Standards for driveways for residential construction ([See figure 1.6E](#)). All new or reconstructed driveways within right-of-ways shall be designed to conform to all of the following criteria as applicable:
  - a. Two-car Garages. Minimum width, twelve (12) feet, Maximum width, twenty-four (24) feet.
  - b. Split Car Garages. Maximum width, twenty-eight (28) feet, a combined total width for multiple driveway(s) within the Right- of-Way.
  - c. Townhome Garages. Minimum width, nine (9) feet.
  - d. Three (3) foot flared section at each end of the driveway(s).
  - e. Fifteen feet minimum radii required for rural section.
  - f. Florida Department of Transportation standard flares required for a road that has urban curb and gutter section. (No curbs for driveway permitted within right-of-way; wheelchair access to be provided).
  - g. Unless otherwise approved by the County Administrator or Designee, driveways across roadside swales will require the placement of a drainage culvert (side drain) under the driveway in order not to impede flow in the swale resulting in an increase of backwater onto upstream property.
  - h. Consistent with LDC [Section 2.2 I 902.2.1](#), culverts in residential areas may

- be asphalt coated corrugated metal pipe (CMP) or reinforced concrete pipe (RCP) with a minimum diameter of fifteen (15) inches. Culverts in commercial areas shall be RCP with a minimum diameter of eighteen (18) inches.
- i. Consistent with LDC [Section 2.2 I 902-2.1](#), all storm sewer pipes and culverts shall have a minimum of six (6) inches of cover from outside crown of pipe to bottom of roadway base course. The minimum cover of pipe in swale areas shall be one (1) foot, unless otherwise approved by the County.
  - j. Mitered end sections are required on all culvert installation, as per Florida Department of Transportation Standard [Plans Detail Index 430-022 273](#).
  - k. Driveway construction from edge of pavement to the property line shall consist of one of the following:
    - (1) Six (6) inches thick, three thousand (3,000) psi reinforced concrete (existing sidewalk to be replaced where it does not meet this criteria);
    - (2) Six (6) inches lime rock with one (1) inch asphalt;
    - (3) Six (6) inches soil cement with one (1) inch asphalt; or
    - (4) Four (4) inches asphalt
  - l. Driveway construction where mountable curb exists must tie to the back of the curb.
6. Standards for Paver Driveways and Sidewalks. See Pasco County LDC Chapter 900 Development Standards, Section 901.6.E.6 for guidelines and requirements of the use of pavers within County Right-of-Way.

**Figure 1.6E**

RESIDENTIAL DRIVEWAY CONNECTIONS



Driveway MUST have a 5' minimum setback to the property line.

**F. Pedestrian and Bicycle Facilities**

See Design Manual, Section 1.7 and 1.8 for information regarding Pedestrian and Bicycle facilities.

**G. Traffic Control Devices**

See Pasco County LDC Chapter 900 Development Standards, Section 901.6.G and Design Manual Section 1.10 for information regarding Traffic Control Devices.

**H. Street Names**

See Pasco County LDC Chapter 900 Development Standards, Section 901.6.H for

information regarding street naming.

## I. Street Lighting

See Pasco County LDC Chapter 900 Development Standards, Section 901.6.I and 901.11 and Design Standards Section 1.11 for information regarding subdivision street lighting. [For Collectors, Arterials, Signalized Intersections, Mid-block crossings and roundabouts see FDOT Design Manual, Chapter 231, latest edition.](#)

## 1.7 Bicycle Facilities

### A. Intent and Purpose

The intent and purpose of this section is to provide for the safe and efficient accommodation of bicyclists.

### B. Applicability

See Pasco County LDC Chapter 900 Development Standards, Section 901.7.B for criteria for applicability of bicycle facilities.

### C. Continuity

Bicycle facilities shall align with abutting bicycle facilities. Bicycle facilities shall not be installed in such a manner that they conflict with or are obstructed by power lines, telephone poles, fire hydrants, traffic/street signs, mailboxes, trees, buildings, barriers, light poles, or any other structure. When there is an existing or anticipated obstruction, the bicycle facilities shall be installed around the object while maintaining the required bicycle facilities width.

### D. Construction

1. Bicycle facilities shall be provided in one (1) of the following ways:

a. Bicycle Lane

A continuous, minimum four (4) foot widening of both sides of the street pavement (bicycle lanes); or

b. Bicycle Path

A minimum eight (8) foot wide bicycle path not contiguous to the street pavement and separate from the sidewalk. If a part of a multiuse path, the multiuse path shall be a minimum of twelve (12) feet wide.



2. Bicycle lanes shall be constructed at the same time as the adjacent vehicular travel lane is constructed and shall meet the same design standards as the travel lane.
3. Bicycle paths shall be constructed of:
  - a. Natural or colored fiber-reinforced concrete, finished to a light broom finish, at least 3,000 psi in strength and a minimum of four (4) inches in thickness on a compacted and non-yielding subgrade; or
  - b. One (1) inch thick SP-9.5 asphaltic-concrete **structural course surface** placed on a four (4) inch thick limerock base over an LBR 100 compacted to a 98 percent modified proctor subgrade; or
  - c. Other cross section as approved by the County Engineer.
  - d. Shall comply with the Americans with Disabilities Act requirements for ramps at intersections.
4. Where a separate bicycle path is provided, it shall be constructed prior to the issuance of a Certificate of Occupancy for the abutting dwelling unit. Along non-lot areas, bike paths shall be constructed with the abutting infrastructure improvements or common areas, such as roads, utilities, drainage areas, landscape tracts, and neighborhood parks.

## E. Obstructions

The bicycle lane or bicycle path shall be constructed to provide clearance from trees, poles, walls, fences, guardrails, or other lateral and/or vertical obstructions. Street conditions should be favorable for bicycling, including safe drainage grates, smooth pavements, and signals responsive to bicycles.

## F. Maintenance

See Pasco County LDC Chapter 900 Development Standards, Section 901.7.F for maintenance criteria of bicycle facilities.

# 1.8 Pedestrian Facilities

## A. Intent and Purpose

The intent and purpose of this section is to provide for the safe and efficient accommodation of pedestrians.

## B. Applicability

See Pasco County LDC Chapter 900 Development Standards, Section 901.8.B for applicability of pedestrian facilities.

## C. Continuity

Sidewalks shall align vertically and horizontally with abutting sidewalks. Sidewalks shall not be installed in such a manner that they conflict with or are obstructed by power lines, telephone poles, fire hydrants, traffic/street signs, mailboxes, trees, buildings, barriers, light poles, or any other structure.

## D. Construction

Unless an alternative standard is approved at the time of preliminary development plan approval, sidewalks shall be constructed of pavers, in accordance compliance with [Section 1.6.E.5](#) ~~901.6.E.5~~, natural or colored concrete at least 3,000 psi in strength, fiber reinforced, a minimum of five (5) feet in width along Type 1 collector or arterial streets and four (4) feet in width along all other streets, and a minimum of four (4) inches in thickness, except at driveway approaches. (Note: ADA requires that anything less than sixty (60) inches must have passing spaces at least 60" X 60" at intervals not to exceed 200 feet.) Where a sidewalk is crossed by a driveway, the sidewalk shall be constructed of fiber-reinforced concrete at least 3,000 psi in strength and a minimum of six (6) inches in thickness. The grades of sidewalks shall be such that changes of grades greater than ten (10) percent are not encountered within blocks. When there is an existing or anticipated obstruction, the sidewalk shall be installed around the object while maintaining the required sidewalk width.

Sidewalks shall be constructed prior to the issuance of a Certificate of Occupancy for the abutting dwelling unit. Along non lot areas, sidewalks shall be constructed with the abutting infrastructure improvements or common areas, such as roads, utilities, drainage areas, landscape tracts, and neighborhood parks.

## E. Curb Ramps

Permanent curb ramps meeting the requirements of the Americans with Disabilities Act shall be provided at crosswalks at all intersections where sidewalks are constructed.

Curb ramps shall be a minimum of four (4) feet in width with a twelve (12) foot horizontal to one (1) foot vertical (12:1) curb transition on each side when pedestrians must walk across the ramp. The ramp slope shall not exceed twelve (12) feet horizontal to one (1) foot vertical (12:1) and shall have a slip- resistant surface texture.

## F. Obstructions

The pedestrian facilities shall be constructed to provide clearance from trees, poles, walls, fences, guardrails, or other lateral and/or vertical obstructions.

## G. Maintenance

See Pasco County LDC Chapter 900 Development Standards, Section 901.8.G for maintenance criteria of pedestrian facilities.

# 1.9 Street Naming and Addressing

See Pasco County LDC Chapter 900 Development Standards, Section 901.9 for guidelines for street naming and addressing.

## 1.10 Traffic Control Devices

### A. Compliance with State Law

See Pasco County LDC Chapter 900 Development Standards, Section 901.10.A for compliance of traffic control devices.

### B. Responsible Party

See Pasco County LDC Chapter 900 Development Standards, Section 901.10.B for responsible parties of traffic control devices.

### C. Street Name Signage

The color and size of all street name signs shall be in accordance with current County standards and the Federal Manual on Uniform Traffic Control Devices, current edition, at Section 2D.43, as may be amended. On streets to be maintained by the County, all signs other than street name signs shall be date coded with a reflective label affixed to the back of the sign. It shall be punched to show month, day, and year of installation as follows:

Sample Label: Size 2" X 4"

PASCO COUNTY
WARNING:
REMOVAL OF OR
DEFACING ANY
TRAFFIC CONTROL
DEVICE IS
PUNISHABLE BY
FINE AND/OR
IMPRISONMENT
REPORT DAMAGE
BY CALLING (727)
847-2411
INSTALLED J F M A
M J J A S O N D 10's
20's 30's - 1 2 3 4 5 6
7 8 9 90 91 92 93 94

## D. Construction Materials

All post systems, mounting brackets, and hardware shall be of a type currently in use by the County. Alternative systems shall only be used if approved by the County Administrator or designee. All traffic control devices and materials shall be on the current Florida Department of Transportation approved products list. Proof of certification shall be required prior to installation.

## E. Maintenance

See Pasco County LDC Chapter 900 Development Standards, Section 901.10.E for maintenance criteria of traffic control devices.

### 1.11 Street Lighting

See Pasco County LDC Chapter 900 Development Standards, Section 901.11 for guidelines of street lighting. [Street lighting shall be in accordance with FDOT Design Manual, Chapter 231 latest edition.](#)

### 1.12 Transportation Analysis

See Pasco County LDC Chapter 900 Development Standards, Section 901.12 for guidelines and criteria for transportation analysis.

### 1.13 Mixed-Use Trip Reduction Measures (MUTRM)

See Pasco County LDC Chapter 900 Development Standards, Section 901.13 for guidelines and criteria for Mixed-Use Trip Reduction Measures (MUTRM).

## SECTION 2.0: STORMWATER

### 2.1 Stormwater Quality

See Pasco County LDC Chapter 900 Development Standards, Section 902.1 for guidelines and criteria for Stormwater Quality.

### 2.2 Stormwater Management Requirements

#### A. Intent and Purpose

It is the intent and purpose of this section to reduce existing and future flooding problems, improve surface water quality in the County, and protect the functions of natural features and surficial aquifer recharge.

#### B. Applicability

This section shall apply to all development where any portion of the development is within the jurisdiction of unincorporated Pasco County.

#### C. General Standards and Alternative Approaches

See Pasco County LDC Chapter 900 Development Standards, Section 902.2.C for General Standards and Alternative Approaches.

#### D. Performance and Design Standards

To ensure attainment of the intent and purpose of this section and to ensure that standards will be met, the design, performance, construction, and maintenance of the drainage system shall be consistent with the following:

1. All new developments shall be required to provide a detention/retention system in order to detain/retain increased runoff caused by the development. Where public or private lakes, ponds, borrow pits, or similar type water detention/retention areas are incorporated in a comprehensive drainage plan, drainage calculations shall demonstrate that the facilities have sufficient capacity for the design storm. In the design of detention/retention facilities, the effective volume shall be based on the pond bottom or the seasonal high groundwater level, whichever is higher, as a minimum starting elevation of the stage/storage computations.

2. The rate of stormwater discharge from new developments shall be limited to amounts which are equal to or less than the rate of discharge which existed prior to development in accordance with Chapters 40D-4 and 40D-40, Florida Administrative Code (F.A.C.), in effect on December 29, 2011; provided, however, that Drainage Basins of Special Concern shall be subject to the requirements of ~~this Code, Section 2.2.J~~ 902.2.N.
3. The volume of stormwater discharge shall be in accordance with Chapters 40D-4 and 40D-40, F.A.C., in effect on December 29, 2011; provided, however, that Drainage Basins of Special Concern shall also be subject to the requirements of this ~~Manual Code, Section 2.2.J~~ 902.2.N.
4. Protect or improve the quality of ground and surface water.
5. Maintain groundwater levels and enhance groundwater recharge where applicable.
6. Protect the wetlands for the storage of surface waters and the biological and physical reduction and assimilation of pollutants.
7. Prevent saltwater intrusion, where applicable, by adhering to Best Management Practices.
8. Prevent damages due to increased flooding.
9. Encourage the maintenance of the natural levels of salinity in estuarine areas.
10. Minimize adverse impacts to flora, fauna, fish, and wildlife habitats.
11. To otherwise further the objectives of this ~~Manual Code~~.
12. Channeling runoff directly into natural water bodies shall be prohibited, unless permitted by appropriate regulatory agencies. Runoff shall be routed through swales and other systems designed to increase time of concentration, decrease velocity, increase infiltration, allow suspended solids to settle, and otherwise remove pollutants.
13. Natural water courses shall not be dredged, cleared of vegetation, deepened, widened, straightened, stabilized, or otherwise altered without specific approval of the appropriate regulatory agencies. Water shall be retained or detained before it enters any natural water course in order to preserve the natural flow characteristics of the water course and to decrease siltation and other pollutants.
14. The area of land disturbed by development shall be as small as practicable. Those areas which are not to be disturbed shall be

protected by an adequate barrier from construction activity. Whenever possible, natural vegetation shall be retained and protected.

15. No grading, cutting, or filling shall be commenced until erosion and sedimentation control devices have been installed between the disturbed area and water bodies, water courses, and wetlands.
16. Land which has been cleared for development and upon which construction has not been commenced shall be protected from erosion by appropriate techniques designed to revegetate the area.
17. The drainage system shall be designed so that sediment shall be retained on the site of the development.
18. Wetlands and other water bodies shall not be used as sediment traps.
19. Erosion and sedimentation facilities shall be regularly maintained to ensure proper function.
20. Artificial water courses shall be designed, considering soil type and side bank stabilization, so that the velocity flow does not cause erosion.
21. Vegetated buffer strips shall be provided or, where practicable, retained in their natural state along the banks of all water courses, water bodies, and/or wetlands.
22. Intermittent water courses, such as swales, shall be vegetated, except where flows exceed five (5) feet per second (fps), then they shall be concreted or otherwise sufficiently stabilized.
23. Although the use of wetlands for storing and purifying water is encouraged, care must be taken not to overload their capacity, thereby harming the wetlands and transitional vegetation. Wetlands should not be damaged by the construction of detention ponds.
24. Runoff shall be retained or detained on site, in accordance with the applicable SWFWMD Rules in effect on December 29, 2011.
25. Runoff from streets and parking lots shall be treated to reduce the quantity of oil and sediment entering receiving waters.
26. The banks of detention and retention areas shall slope at a gentle grade into the waters in accordance with the applicable County and SWFWMD Rules as a safeguard against drowning, personal injury, or other accidents, to encourage the growth of vegetation, and to allow the alternate flooding and exposure of areas along the shore as water levels periodically rise and fall.

27. The use of drainage detention and retention facilities and vegetated buffer zones as open space, recreation, and conservation areas shall be encouraged except where this Manual Code is more stringent.
28. Development, including grading, shall take place in a manner that protects the roots and stability of trees.
29. General stormwater conveyance facilities include swales, ditches, channels, culverts, storm sewers, inlets, and weirs. The collection of stormwater runoff should be by positive gravity means without the use of siphons, pumps, or similar devices, unless specific approval is obtained.
30. Unless otherwise approved by the County, standard details and specifications for the construction of storm drainage systems shall conform to applicable sections of the latest editions of the following:
  - a. Florida Department of Transportation (FDOT), Standard Plans, latest edition.
  - b. FDOT, Standard Specifications for Road and Bridge Construction, latest edition.

## E. System Designs (Frequency of Design Storms)

The drainage systems shall be designed for "design storms" resulting from rainfall of the following minimum frequencies:

1. Ten (10) Year: All storm sewers and culverts, except those crossing arterial roads. A minimum time of concentration of fifteen (15) minutes to the first inlet may be utilized in determining design flows.
2. Twenty-Five (25) Year/Twenty-Four (24) Hour: All floodways, ditches, channels, and detention/retention areas with outfalls (open drainage basin).
3. Fifty (50) Year: All storm sewers and culverts crossing arterial roads.
4. 100-Year/Twenty-Four (24) Hour: All retention areas without outfalls (closed drainage basin).

Rainfall intensity factors shall come from accepted meteorological and rainfall sources applicable to the County.

## F. Runoff

Runoff and routing analysis shall be based on current hydrological design procedures. Computations shall include a tabulation of inflow, discharge, storage capacity, minimum and maximum water elevations, and retention/detention time to peak.



Basic hydrological calculations shall be based on commonly accepted procedures, such as those of:

1. Natural Resources Conservation Service
  - a. A Method for Estimating Volume and Rate of Runoff in Small Watersheds, U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), Technical Paper No. 149.
  - b. Urban Hydrology for Small Watersheds, USDA, NRCS Technical Release No. 55.
  - c. National Engineering Handbook, Section 4, Hydrology, U.S. Department of Agriculture, NRCS, latest edition.

The NRCS, Type II, Florida Modified Rainfall Distribution, with antecedent moisture Condition II will be used. Other rainfall distributions may be utilized for design with prior approval of the County. The same shape factor shall be used for predevelopment and post development calculations unless otherwise approved by the County.

2. Rational Method:
  - a. Drainage Manual, FDOT, latest edition.
  - b. Standard Engineering Texts: The rational method of routing analysis may be used for systems serving projects with less than five (5) acres total contributing area.

The rational method of routing analysis may be used for systems serving projects with less than five (5) acres total contributing area.

3. Others Alternatives as Approved by the County:

Ultimate land usage shall be assumed for the selection of proper runoff coefficients or curve numbers within the basins involved. Weighted runoff coefficients or curve numbers shall be utilized where different coefficients or curve numbers exist within the areas comprising the basin.

## G. Standards for Detention/Retention, Stormwater Runoff Storage/Discharge, and Floodplain Encroachment

1. The detention/retention of cumulative stormwater runoff in excess of predevelopment release rates shall be provided by sufficient storage

capacity constructed on the property to be developed or within approved off-site drainage areas. Detention/retention storage capacity shall be based on a twenty-five (25) year/twenty-four (24) hour design for open basins. Design high water elevations shall be established in consideration of adjacent properties and facilities such that off-site drainage impacts are minimized.

2. The detention/retention facilities designed for the storage of stormwater to control runoff rates shall:
  - a. Be designed in accordance with requirements of the SWFWMD Rules, the FDOT, or other agencies with jurisdiction.
  - b. Be identified as a drainage easement on the final plat of a subdivision or duly recorded as such in other developments.
  - c. Have bank slope grades not steeper than four (4) feet horizontal to one (1) foot vertical which shall be sodded to the seasonal high water elevation. Slopes steeper than 4:1 may be submitted for review and may be approved by the County. Wet ponds with slopes steeper than 4:1 may require the installation of a security fence.
  - d. Include an outlet structure in detention facilities sized to release, as a maximum, the predevelopment runoff rate, and designed to provide water quality treatment of the runoff from the contributing area, in accordance with applicable standards of the respective agencies (the SWFWMD Rules, the Florida Department of Environmental Protection, and the FDOT) having jurisdiction.
  - e. Be constructed to provide a minimum of six (6) inches of freeboard between the design high water elevation and the lowest berm elevation surrounding the detention/retention area.
  - f. Where practicable, include in detention areas an emergency overflow spillway or other structure acceptably protected from erosion with the invert no lower than the design high water level.
  - g. Have the discharge of controlling and overflow structures flow through an abutting drainage easement or public right-of-way in order to convey stormwater runoff away from the detention area.
  - h. Include special engineering features, such as skimmers, designed to remove oils and other objectionable materials, in accordance with criteria established by the SWFWMD Rules.
3. Off-site discharge is limited to amounts which will not cause adverse off-site impacts.
  - a. For a project or portion of a project located within an open drainage

basin, the allowable discharge shall not exceed the historic discharge, which is the peak rate at which runoff leaves a parcel of land under existing site conditions. These criteria shall not apply to projects which have been discharging stormwater runoff directly to the Gulf of Mexico.

- b. For a project or portion of a project located within a closed drainage basin, the required retention volume shall be the post development runoff volume, less the predevelopment runoff volume, computed using the SWFWMD's twenty-four (24) hour/100-year rainfall map, and the SCS, Type II, Florida modified twenty-four (24) hour rainfall distribution with an antecedent moisture Condition II. The total post development volume leaving the site shall be no more than the total predevelopment volume leaving the site for the design 100- year storm, unless otherwise approved by the County.
4. Maintenance of predevelopment, off-site low flow may be required in hydrologically sensitive areas.
  5. Floodplain Encroachment

See Pasco County LDC Chapter 900 Development Standards, Section 902.2.G.4 for General Standards regarding flood plain encroachment.

6. Off-Site Lands

Adequate provisions shall be made to allow drainage from off-site, upstream areas to downstream areas without adversely affecting the upstream or downstream areas.

7. Exfiltration systems and percolation designed in conjunction with detention/retention systems:
  - a. The detention/retention facilities must have the capacity to retain the volume required for water quality treatment without considering discharges.
  - b. The seasonal high water level must be at least one (1) foot below the bottom of the exfiltration pipe.
  - c. Exfiltration should not be proposed for systems to be operated and maintained by the County, unless otherwise approved by the BCC.
  - d. Double ring infiltrometer tests shall be performed at each detention/retention facility. The said test shall be performed at the approximate elevation of infiltration.
  - e. A safety factor of 2.0 or more shall be applied in the exfiltration

design to allow for geological uncertainties by dividing the percolation rate by the safety factor.

## H. Storm Sewer Systems

The capacity of inlets, with the allowable head conditions, should equal or exceed the runoff from their individual drainage areas. The size, type, and location of storm sewer inlets, gratings, or other openings into an enclosed storm drainage system shall be in accordance with the FDOT Drainage Manual, latest edition, unless otherwise approved by the County.

### 1. Drainage Structures

a. Roadway Inlets: Roadway inlets in curb and gutter construction shall be designed and constructed to:

- (1) Avoid abrupt changes in hydraulic slope and velocity.
- (2) Limit the quantity of stormwater flowing in a street to a depth not to exceed two (2) inches below the crown of collector streets and arterial streets, unless otherwise approved in writing by the County, but in no case shall more than one-half the width of the outside lane be flooded at design flow. Limit the quantity of stormwater flowing in local residential streets to a depth not to exceed six (6) inches deep at the inlet at the design flow.
- (3) Prevent design flows across street intersections unless concrete valley gutters are approved by the County.
- (4) Have formed inverts a minimum of six (6) inches above the flow line to properly drain inlet bottoms.
- (5) Have pipes cut flush with the inside wall.
- (6) Provide for ease of maintenance.

b. Commercial Parking Lot Inlets: Commercial parking lot inlets shall be designed and constructed to:

- (1) Accommodate a ten (10) year/twenty-four (24) hour storm.
- (2) Have the hydraulic gradient at or below the inlet elevation.

## I. Pipe Standards

1. The piping and appurtenances used in the stormwater collection system shall be designed to convey the runoff of a ten (10) year storm with a minimum time of concentration of not less than fifteen (15)

minutes to the first inlet.

2. Unless otherwise approved by the County, reinforced concrete pipe (RCP) shall be used in all easements and street rights-of-way with the exception of residential driveways. All storm sewer pipes and culverts shall have a minimum of six (6) inches of cover from outside crown of pipe to bottom of roadway base course. The minimum cover of pipe in swale areas shall be one (1) foot, unless otherwise approved by the County.
3. Minimum pipe sizes, not including driveway culverts, shall be as follows:

<u>Type</u>	<u>Minimum Size</u>
Under Drains	6"
Pipe Culvert	18"
Box Culvert	3' X 3'

Application of these values to oval or elliptical pipe shall be based on equivalent round diameter.

4. Roughness coefficients for use in Manning's Formula for storm pipe and box culverts shall be as follows:

a. Concrete Pipe and Box Culverts	<u>N</u>
18"-30," inclusive	0.013
36"-48," inclusive	0.012
54" and up, including smooth concrete boxes of 15 square feet and up	0.011
b. Corrugated Metal Pipe (CMP) or Aluminum Pipe	0.023
Asphalt Coated	0.018

Applications of these values to oval or elliptical pipe shall be based on equivalent round diameter.

5. The slopes for culverts used as storm sewers shall produce a velocity within the following limits, unless otherwise approved by the County:

<u>Maximum</u>	<u>Minimum</u>
RCP 12 fps	2 fps
CMP 10 fps	3 fps

6. The maximum length of pipe without an access structure shall be:
  - a. 18"-36" pipes: 400'

- b. 42" and over, and all box culverts: 500'
7. The minimum and maximum allowable hydraulic slopes shall be those that produce the aforementioned minimum and maximum velocities. Manholes may be used as drop structures where necessary to lessen slopes in storm sewers.
8. Culvert capacity shall be based on sound engineering practice. Detailed analysis and design shall be based on either inlet or outlet control, whichever is applicable, using appropriate entrance loss coefficients and culvert nomographs. Backwater curve data, flood profiles, and other hydraulic information along a watershed reach shall be used to establish design water elevations and set the culvert crown elevations.
9. When required to control high groundwater conditions, underdrains shall be designed to maintain the groundwater table elevation at least twenty-four (24) inches below the edge of the pavement.
10. Unless otherwise approved by the County, driveways across roadside swales will require the placement of a drainage culvert (side drain) under the driveway in order not to impede flow in the swale resulting in an increase of backwater onto upstream property. Culverts in residential areas may be CMP or RCP with a minimum diameter of fifteen (15) inches. Culverts in commercial areas shall be RCP with a minimum diameter of eighteen (18) inches.

## J. Scour and Erosion

It shall be the responsibility of the developer to control soil erosion by wind or water from the date of ground breaking until such time as the responsibility is transferred to an acceptable entity in accordance with this [Manual Code](#).

The developer's engineer must provide for use of sediment basins, straw bale dams, velocity checks, hydroseeding applications, etc., to minimize erosion within the limits of the site being developed and prevent damage to wetland systems which are to remain in the development.

The design of canals, streams, ditches, and other waterways shall be based on current open channel design procedures using the Chezy, Talbot, and/or Manning's Formula. Design velocities without erosion protection shall not exceed the maximums for soil types as shown below. Where design levels exceed the top of banks for the required design storm; i.e., twenty-five (25) year for major waterways and berms are not provided, the extent of flooding in the flood plain shall be shown. Runoff and roughness coefficients, safe velocities, nomographs, erosion control, and practical limitations on use of design formulas shall be based on current practice in the field of hydraulics, notwithstanding any requirements of this section.

Conditions such as alignment and presence of sever irregularities in smoothness will alter the allowable velocities. Maximum flow velocities for various soil types without erosion protection are as follows:

<u>Type of Soil</u>	<u>Allowable Velocity</u>
Fine Sand	1.50 fps
Sandy Loam	1.75 fps
Silt Loam	2.00 fps
Firm Loam	2.50 fps
Fine Gravel	2.50 fps

The above allowable velocities may be increased if appropriate erosion protection devices are provided and approved.

Where erosion protection structures are constructed in floodway banks and bottoms, the design section shall be selected to provide a maximum velocity of ten (10) fps with energy dissipation structures at flow discharges to unprotected floodways. Check dams designed to control velocities in open channels shall be detailed in the plans of the proposed development to provide acceptable erosion protection.

## K. Lot Drainage

### 1. Drainage Plan

The finished grade of individual lots shall be shown on the construction plans. Generally, lots shall be graded in accordance with Types A, B, or C Typical Grading Plans as shown in details SD 5, SD 6, and SD 7. When topography or other features make such lot grading impractical, alternate standards may be presented for the County Administrator's or designee's review and approval.

The proposed minimum, finished floor elevation of all structures which may be constructed shall be included on the construction plans. As a minimum, the finished floor elevation shall be at least sixteen (16) inches above the highest crown line of the street lying between the projection of the side-building lines, unless otherwise approved by the County Administrator or designee. In no case shall finished floor elevations be specified below the 100-year flood plain as designated by the Federal Insurance Administration Flood Hazard Boundary Maps. When a detailed study from the Federal Emergency Management Agency (FEMA) has not been provided, the engineer shall submit the best available data for the 100-year base flood elevation for review and approval by the County Administrator or designee.

The Engineer of Record shall provide to Pasco County, signed and sealed design calculations for each typical lot demonstrating

compliance with Pasco County's drainage criteria. The typical site-grading plan shall identify elevations, grades, ground cover, allowable tolerances, and quality-control plans addressing construction and post-construction phases. In addition, the Engineer of Record shall inspect the lot upon completion and complete the "as-built" certification prior to issuance of the Certificate of Occupancy (CO) for the associated unit.

2. Conditions

a. The following conditions may be modified as approved by the County Engineer and Public Works Director or designees.

(1) Prior to any construction on the lot, proper erosion and sedimentation controls shall be installed.

(2) Lots that back up to drainage-retention areas and/or wetland areas designed and permitted to receive discharge shall be "Type B" or "Type C" graded. A minimum fifteen (15) foot-wide drainage and access easement shall be provided along all rear lot-lines where there is a pipe or swale. Drainage and access easements shall extend to the road right-of-way at block ends. Side-yard, cross-access easements shall be provided connecting the rear-yard easement to the front right-of-way.

(3) Lots graded as "Type A," which back up to other lots, shall comply with detail SD 5. These lots do not require a drainage easement at the rear of the lots.

(4) Lots graded as "Type B" or "Type C," which back up to other lots or adjacent property, shall require that traffic-bearing grates be installed upon a Florida Department of Transportation (FDOT) inlet placed within each rear lot-line easement. Culverts connecting rear-yard inlets to acceptable outfalls shall be installed and shall be reinforced concrete pipe with premium sealed joints designed to sustain an H-20 loading. A minimum 7.5-foot-wide drainage and access easement shall be provided along all rear lot-lines for a total of fifteen (15) feet. Drainage and access easements shall extend to the road right-of-way at block ends. Side-yard cross-access easements shall be provided connecting the rear-yard easement to the front right-of-way.

(5) Side-yard swales shall be sloped to create positive outfall to the front and/or rear of each lot with velocities no greater than allowable for grassed stabilization, as in the FDOT Drainage Manual.

(6) A maintenance entity, other than an acceptable to the



County, shall be designated to provide perpetual maintenance to all drainage and access easements. The approved maintenance entity shall provide annual inspections of side- and rear-yard easements and drainage facilities to verify that no modifications have been made to the grading and ground cover and to inspect any inlets and pipes to verify that no flow restrictions exist. Any modification or flow restriction observed at any time shall be corrected. Additional inspections shall be performed if requested by an adjoining resident or the County. The maintenance entity

shall have the right to file a lien to charge property owners for corrections or modifications and collect sufficient funds to perform required maintenance.

- (7) Roof structures shall not discharge to side lot-lines.
- b. For those approvals with a side-yard setback of less than 7.5 feet, the following additional criteria shall apply:
- (1) A minimum five (5) foot wide drainage/access easement shall be provided on all side lot-lines for a minimum total of ten (10) feet.
  - (2) No obstructions shall be permitted in the side-yard easements. This includes, but is not limited to, air conditioning systems, water softeners, pumps, fences, etc.
  - (3) Refer to [LDC](#) Section 601.6.F.1, External Compatibility Setbacks.
  - (4) Height ranges are explained in [LDC](#) Section 601.7.E.
- c. The following exceptions that do not impede drainage may be allowed in setbacks:
- (1) Within Drainage Easements:
    - (a) Fences are removed and/or replaced at the owner's expense for any required maintenance within the Drainage Easement;
    - (b) Fences do not impede positive drainage flow;
    - (c) Fences do not impede access to drainage facility.
- d. Within Setbacks:

- (1) Fences do not impede positive drainage flows;
- (2) Fences are removed and/or replaced at the owner's expense for any required maintenance and/or regrading to provide positive drainage flow.

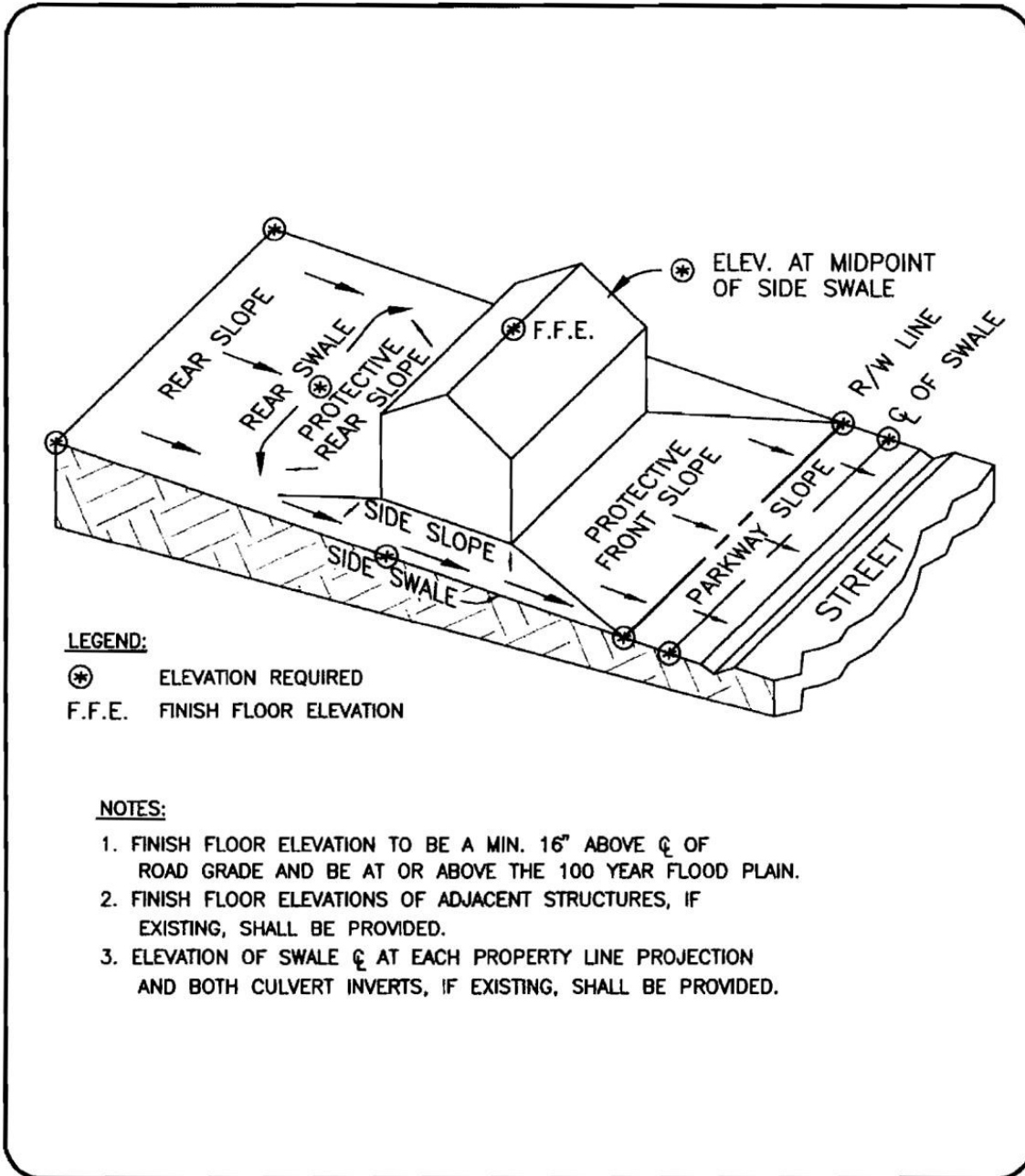
3. Drainage Plan Requirements for Individual Lots

See Pasco County LDC Chapter 900 Development Standards, Section 902.2.K.3 for Drainage Plan requirements for individual lots.

4. Lot Drainage Enforcement

See Pasco County LDC Chapter 900 Development Standards, Section 902.2.K.4 for information on lot drainage enforcement.

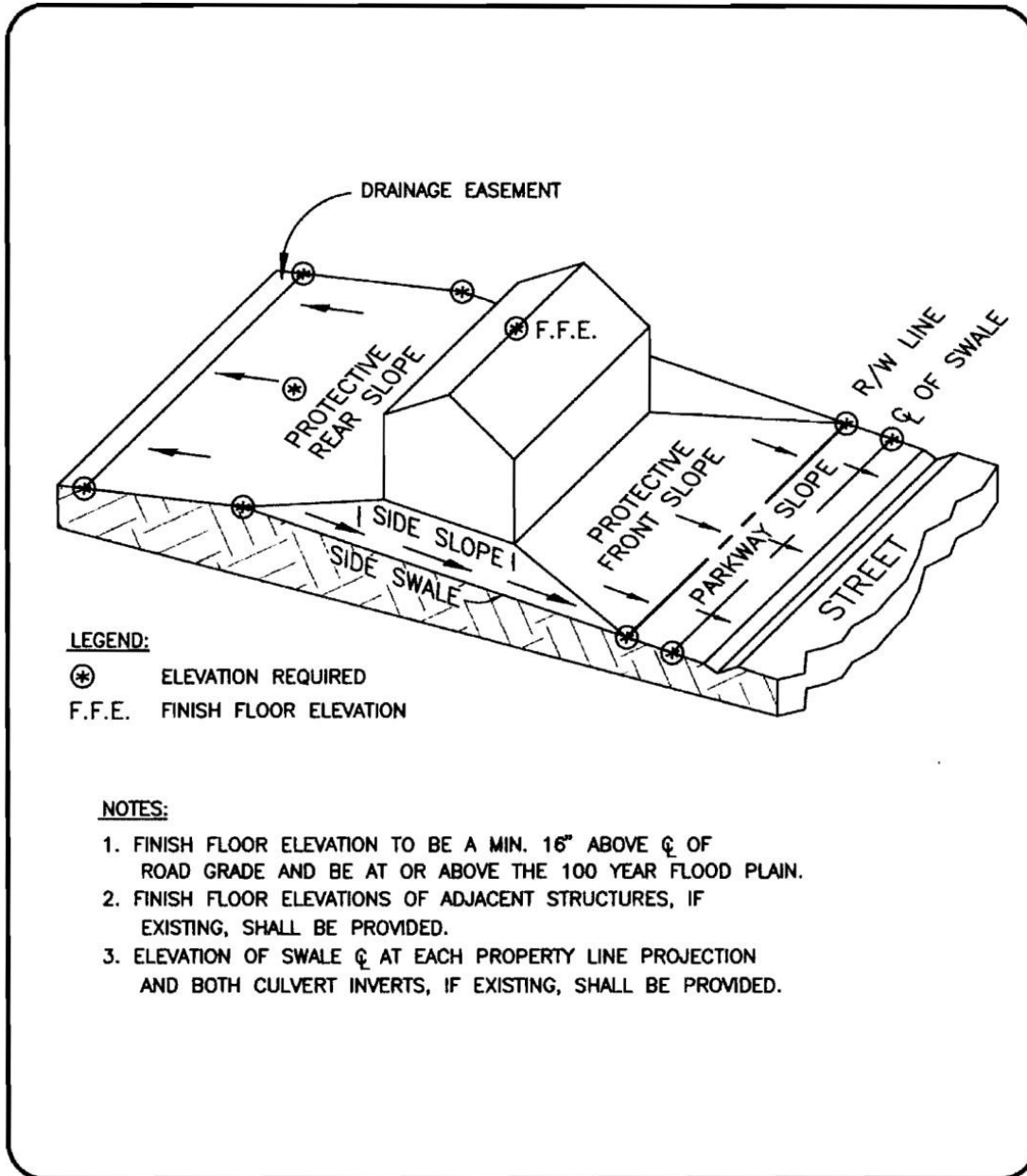
**FIGURE 2.2A TYPE A TYPICAL GRADING PLAN**



**PASCO COUNTY**  
 DEVELOPMENT SERVICES

STORM DRAINAGE DETAIL	SD 5
TYPICAL LOT GRADING TYPE "A"	SHEET 1 OF 3
	DATE: JAN 1998 TYPE: ADWG C. JOLLY/RFP

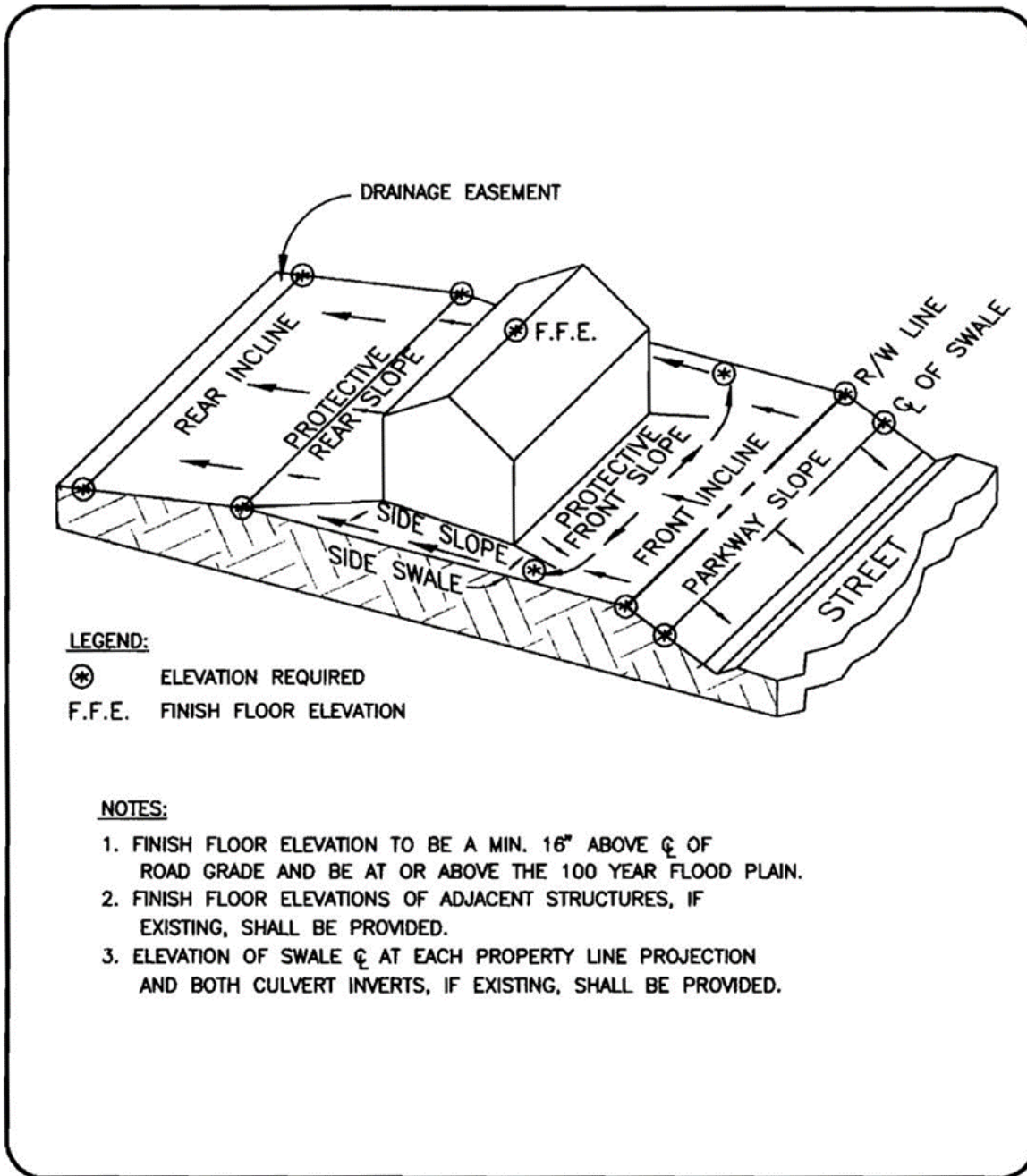
**FIGURE 2.2B TYPE B TYPICAL GRADING PLAN**



**PASCO COUNTY**  
 DEVELOPMENT SERVICES

STORM DRAINAGE DETAIL	SD 6
TYPICAL LOT GRADING TYPE "B"	SHEET 2 OF 3
	DATE: JAN 1998 TYPE: DWG C: JOLLY/RFP

**FIGURE 2.2C TYPE C TYPICAL GRADING PLAN**



**LEGEND:**

- (\*) ELEVATION REQUIRED
- F.F.E. FINISH FLOOR ELEVATION

**NOTES:**

1. FINISH FLOOR ELEVATION TO BE A MIN. 16" ABOVE C OF ROAD GRADE AND BE AT OR ABOVE THE 100 YEAR FLOOD PLAIN.
2. FINISH FLOOR ELEVATIONS OF ADJACENT STRUCTURES, IF EXISTING, SHALL BE PROVIDED.
3. ELEVATION OF SWALE C AT EACH PROPERTY LINE PROJECTION AND BOTH CULVERT INVERTS, IF EXISTING, SHALL BE PROVIDED.

**PASCO COUNTY**  
DEVELOPMENT SERVICES

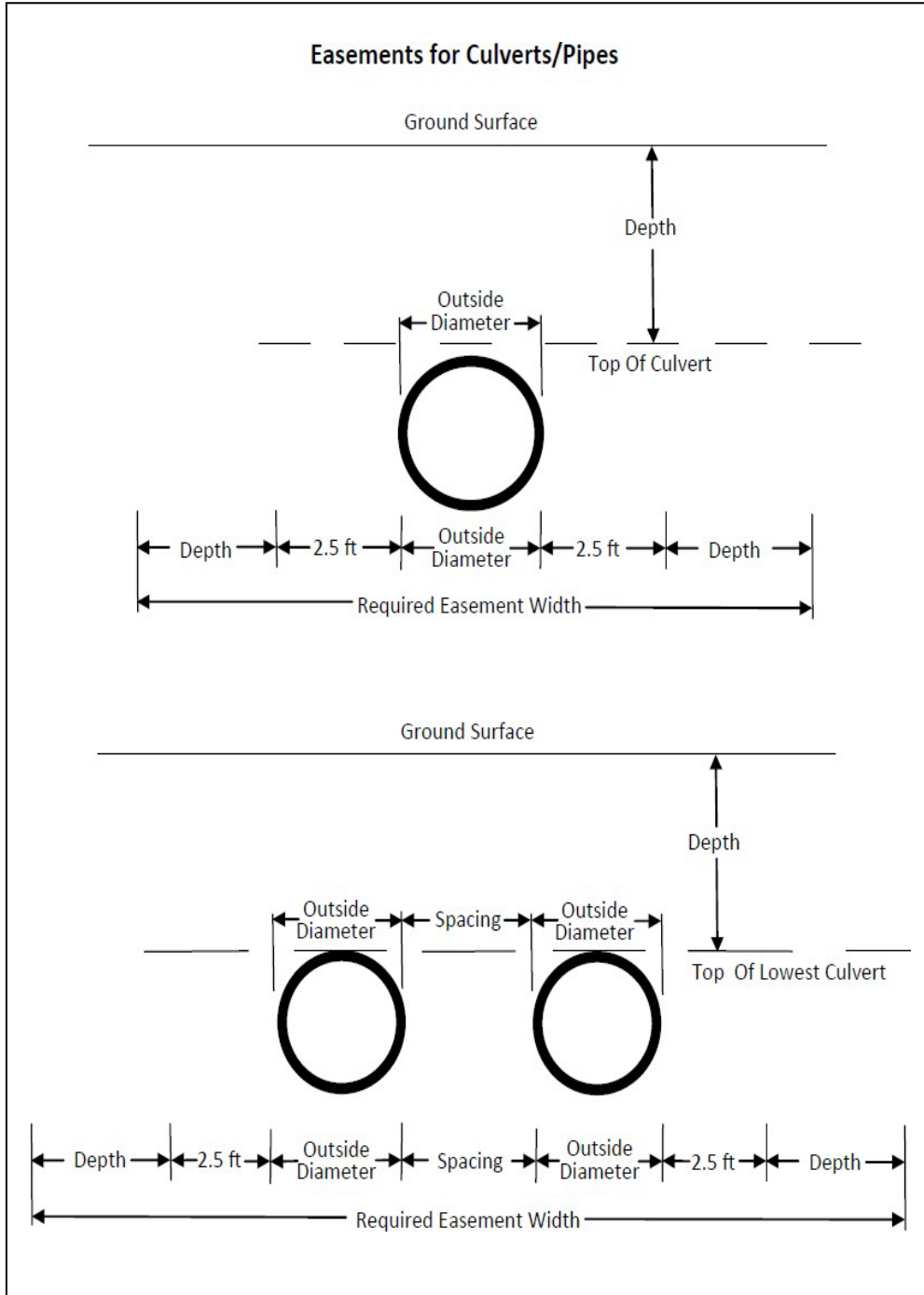
STORM DRAINAGE DETAIL	SD 7
<b>TYPICAL LOT GRADING TYPE "C"</b>	SHEET 3 OF 3
	DATE: JAN 1998 TYPE: DWG C. JOLLY/RFP

## L. Swales, Culverts and Pipes

All swales, ditches, channels, and closed storm-drainage conduits within subdivisions shall be within an easement or dedicated right-of-way. Right-of-way or maintenance easements by instrument or plat dedication shall be provided for all facilities used to convey stormwater. The minimum width of said rights-of-way or easements shall conform to the widths shown in the following table:

	<u>Minimum Controlled Width</u>
Swales (except in right-of-way)	
• Rear Yard	5'
• Side Yard	10' (5' each side of swale centerline)
Pipes and Culverts	20' (10' each side of pipe centerline)
See Figure	The easement required shall be the greater of twenty (20) feet or the combination of: <ul style="list-style-type: none"> <li>• the outside diameter(s) of the culvert(s), plus</li> <li>• all spacings between culverts, plus</li> <li>• two and one-half (2.5) feet on both sides of the culvert(s), plus</li> <li>• the depth of the top of the lowest culvert.</li> </ul>

From the outer edge of any culvert, the easement must be at least two and one-half (2.5) feet plus the depth of the culvert.



A right-of-way or easement of twenty (20) feet shall be provided for access to any stormwater detention/retention facility from a dedicated road or street. In addition, a continuous perimeter maintenance and operation easement, with a minimum width of twenty (20) feet and slopes no steeper than 4:1 (horizontal/vertical), shall be provided landward of the control elevation water line.

## M. Dedication and Maintenance

See Pasco County LDC Chapter 900 Development Standards, Section 902.2.M for Dedication and Maintenance.

## N. Drainage Basins of Special Concern

1. See Pasco County LDC Chapter 900 Development Standards, Section 902.2.N.1 for general BCC designations of drainage basins or subbasins of special concern.
2. See Pasco County LDC Chapter 900 Development Standards, Section 902.2.N.2 for exemptions to drainage basins of special concern.
3. Existing Designated Drainage Basins of Special Concern
  - a. Effective July 18, 2005, Tank Lake (west of the old railroad berm) and East Zephyrhills (excluding Lake Pasadena, but including Lake Dorothea, Lost Lake, and Silver Oaks) are designated as closed Drainage Basins of Special Concern as delineated on the maps attached as Maps 902.2.A and 902.2.B.
  - b. Effective September 27, 2005, Timber Oaks is designated as a closed Drainage Basin of Special Concern as delineated on the map attached as Map 902.2.C.
4. Basin Specific Design Standards: The BCC may establish special design standards applicable to new development activity within a specific Drainage Basin of Special Concern. Special design standards may include, but are not limited to, the following:
  - a. Maximum allowable peak rate of discharge per acre.
  - b. Minimum required retention volume required per acre.
5. Standard Design Regulations for Drainage Basins of Special Concern: Unless the BCC adopts a more stringent special design standard within any Drainage Basin of Special Concern, the following standard regulations shall be applicable to Drainage Basins of Special Concern:
  - a. Open Drainage Basin
    - (1) The maximum peak rate of stormwater runoff discharge from any development activity shall not exceed the prior existing maximum peak rate of stormwater runoff discharge for a two (2), ten (10), twenty-five (25), and 100-year return frequency storm event for a duration of twenty-four (24) hours.



- (2) There shall be no net loss of storage volume from the most restrictive of:
    - (a) FEMA established floodplain storage volume.
    - (b) Storage volume below the elevation of a recorded County observed flooding.
    - (c) Calculated ponding based upon a 100-year return frequency, twenty-four (24) hour storm event.
    - (d) A more critical event standard, including a 100-year return frequency, ten (10) day storm event, defined in a County or SWFWMD approved study for the applicable drainage basin.
  - (3) The minimum habitable finished floor elevation shall be above the highest elevation established by the following criteria:
    - (a) This Code, Section 1103, Flood Damage Prevention.
    - (b) Recorded, County observed high water elevation, plus one (1) foot.
    - (c) Calculated ponding elevation based upon a 100-year return frequency, twenty-four (24) hour duration storm event, plus one (1) foot. A more critical event standard, including a 100-year return frequency, ten (10) day storm event, defined in a County- or SWFWMD- approved study for the applicable drainage basin, plus one (1) foot.
  - (4) Permit applicants may present for consideration off-site mitigation plans that demonstrate that the mitigation will be viable and sustainable in perpetuity.
- b. Closed Drainage Basin
- (1) The maximum peak rate of stormwater runoff discharge from any development activity shall not exceed the prior existing, maximum, peak rate of stormwater runoff discharge for a two (2), ten (10), twenty-five (25), and 100-year return frequency storm event for a duration of twenty-four (24) hours.
  - (2) Runoff volume shall be limited to predevelopment conditions such that there shall be no increase in the volume of runoff resulting from development activity for a 100-year return frequency, ten (10) day duration storm event.

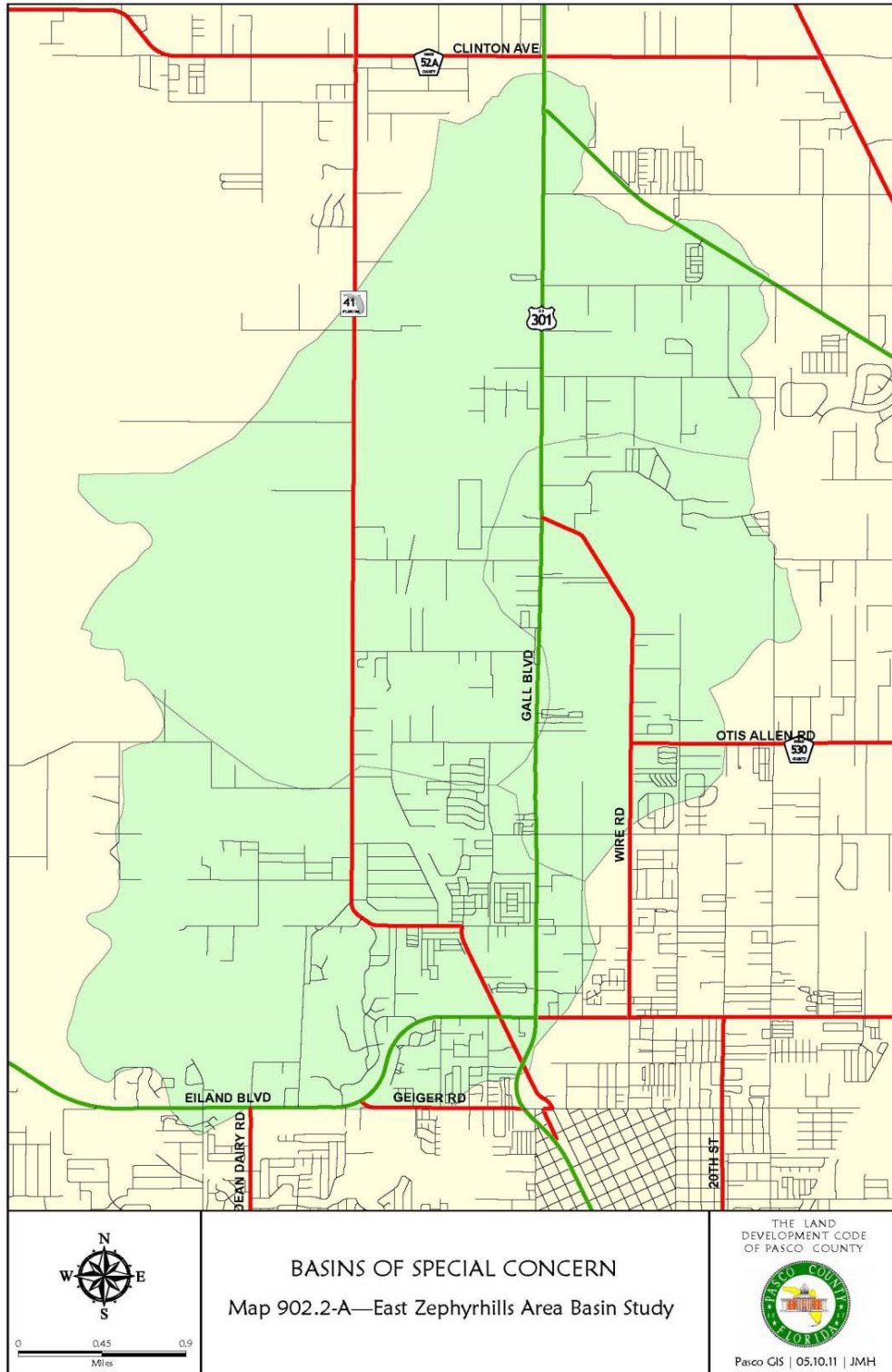
- (3) There shall be no net loss of storage volume from the most restrictive of:
  - (a) FEMA established floodplain storage volume.
  - (b) Storage volume below the elevation of a recorded, County observed flooding.
  - (c) Calculated ponding based upon a 100-year return frequency, ten (10) day storm event.
  - (d) A more critical event standard, including a 100-year return frequency, ten (10) day storm event, defined in a County or SWFWMD approved study for the applicable drainage basin.
- (4) The minimum habitable finished floor elevation shall be above the highest elevation established by the following criteria:
  - (a) This Code, Section 1103, Flood Damage Prevention.
  - (b) Recorded, County observed flooding elevation, plus one (1) foot.
  - (c) Calculated elevation based upon a 100-year return frequency, ten (10) day duration storm event, plus one (1) foot.
  - (d) A more critical event standard, including a 100-year return frequency, ten (10) day storm event, defined in a County or SWFWMD approved study for the applicable drainage basin, plus one (1) foot.
- (5) Permit applicants may present for consideration, off- site mitigation plans demonstrating that the mitigation will be viable and sustainable in perpetuity.

## O. False Information

See Pasco County LDC Chapter 900 Development Standards, Section 902.2.O for False Information.

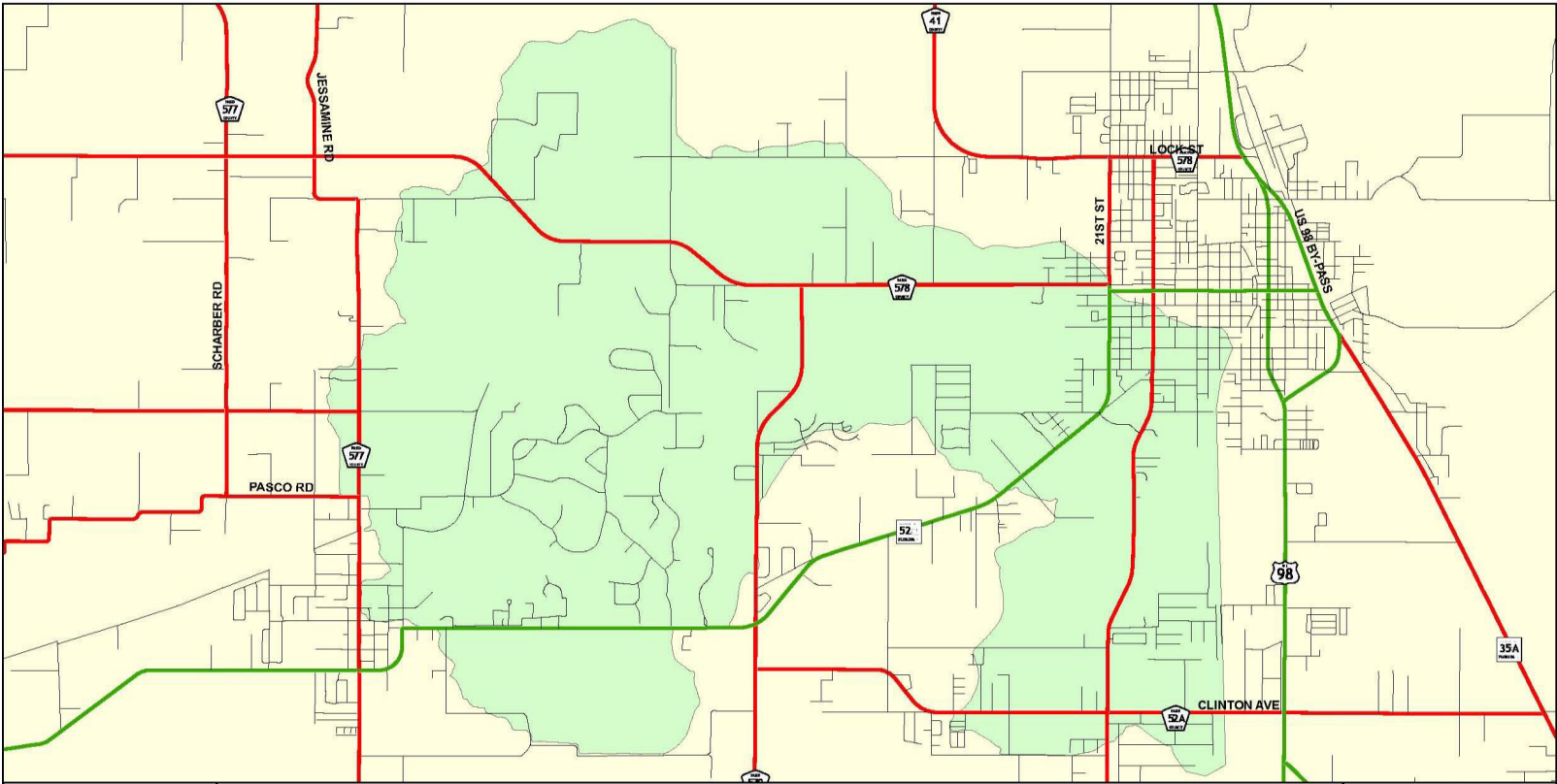
### BASINS OF SPECIAL CONCERN

### MAP 2.2-A - EAST ZEPHYRHILLS AREA BASIN STUDY



# BASINS OF SPECIAL CONCERN

## MAP 2.2-B - TANK LAKE AREA BASIN STUDY



0 0.53 1.06  
Miles

BASINS OF SPECIAL CONCERN  
Map 902.2-B—Tank Lake Area Basin Study

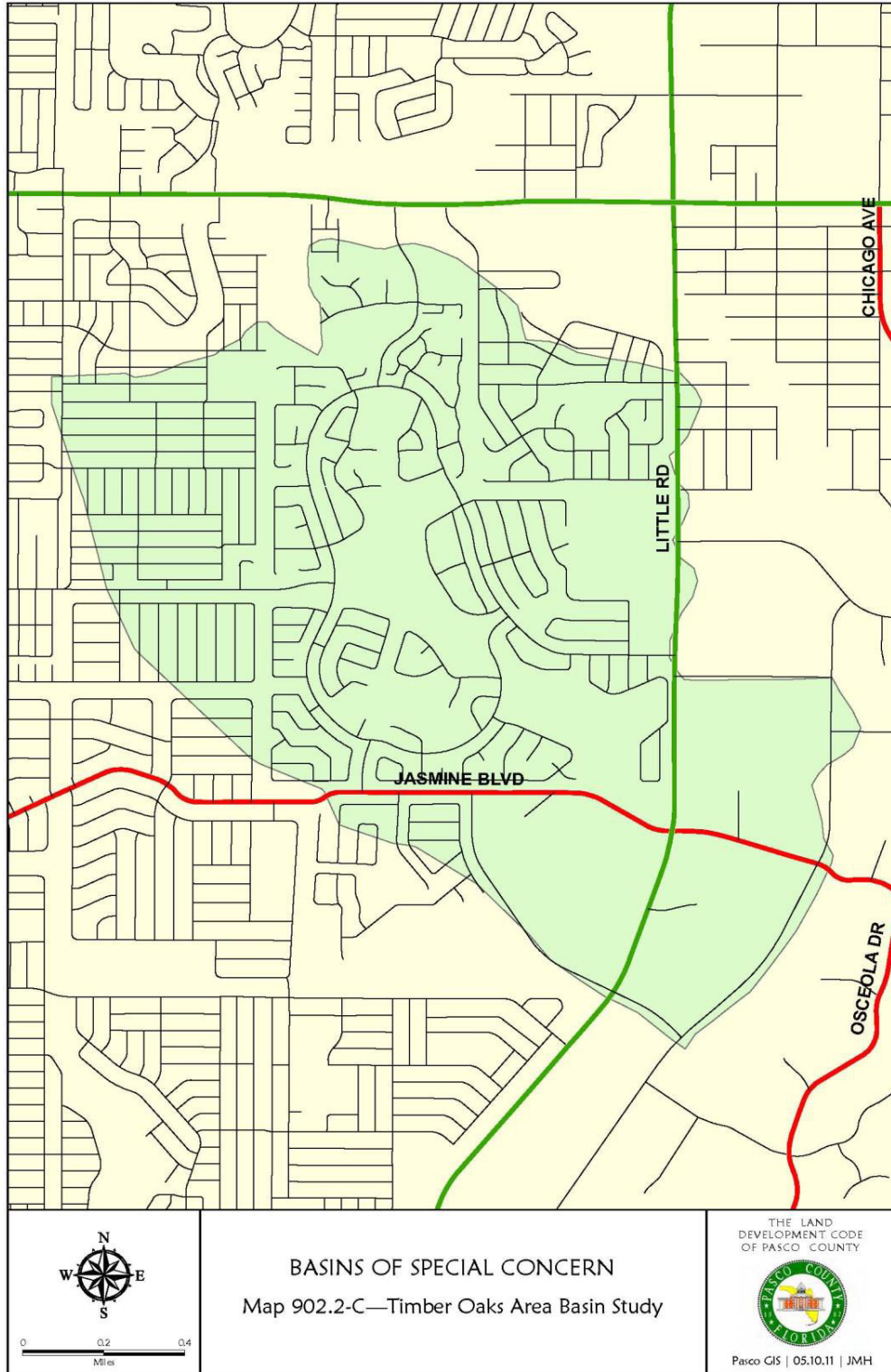
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DEVELOPMENT CODE  
OF PASCO COUNTY



Pasco GIS | 05.10.11 | JMH

### BASINS OF SPECIAL CONCERN

### MAP 2.2-C - TIMBER OAKS AREA BASIN STUDY



# APPENDIX A

## Design Standards

- 101 ROW PRESERVATION WIDTH STANDARDS NOTES
- 102 ROW PRESERVATION WIDTH STANDARD - TWO LANE UNDIVIDED IN RURAL AREA
- 103 ROW PRESERVATION WIDTH STANDARD - FOUR LANE DIVIDED IN RURAL AREA
- 104 ROW PRESERVATION WIDTH STANDARD - SIX LANE DIVIDED IN RURAL AREA
- 105 ROW PRESERVATION WIDTH STANDARD - TWO LANE UNDIVIDED IN URBAN/SUBURBAN AREA
- 106 ROW PRESERVATION WIDTH STANDARD - FOUR LANE DIVIDED IN URBAN/SUBURBAN AREA
- 107 ROW PRESERVATION WIDTH STANDARD - SIX LANE DIVIDED IN URBAN/SUBURBAN AREA
- 108 ROADWAY UNDERDRAIN DESIGN CRITERIA
- 109 PAVEMENT WIDENING JOINT DETAIL
- 110 OPEN CUT RESTORATION
- 111-1 RECYCLED CONCRETE AGGREGATE (1)
- 111-2 RECYCLED CONCRETE AGGREGATE (2)
- 112 SIDEWALK HORIZONTAL AND VERTICAL CLEARANCE DETAIL
- 113 TYPICAL CONCRETE SIDEWALK - DETAIL
- 114 MULTI-USE PATH - TYPICAL DETAIL
- 115 SIDEWALK CLEARANCE - UTILITY POLE GUY WIRE ASSEMBLY DETAIL
- 116 RIGHT OF WAY NO-ACTIVITY ZONE LOCATIONS
- 117 SINGLE POINT SHOULDER EXCAVATION DETAIL
- 118 TYPICAL UTILITY PLACEMENT DETAIL
- 119 UTILITY INSTALLATION DETAIL RURAL ROADWAY TYPICAL SECTION
- 120-1 LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH RULE 62-555.314, F.A.C. (1)
- 120-2 LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH RULE 62-555.314, F.A.C. (2)

## Notes for ROW Preservation Width Standards

- The offset area is reserved for slopes and utilities.
- The 2 feet indicated as sod level is for the purpose of structural stability of the sidewalk/multi-use path.
- In the ROW Preservation Width Standards for rural areas, the 1 foot between the swale and the sidewalk/multi-use path is for ADA compliance.
- The minimum distance between a multi-use path and the face of curb or edge of traveled way should be 5 feet, per 2016 Florida Greenbook.

## Notes for application of the ROW Preservation Width Standards

- These ROW Preservation Width Standards are applicable for ROW preservation only. Detail design elements will be determined on a case by case basis based on the surrounding land use context.
- The ROW Preservation Width Standards apply to non-state County arterial and collector roadways unless otherwise approved by FDOT.
- Additional ROW may be required for turn lanes or roundabouts associated with intersections or driveways (660 ft from edge of pavement in all directions).
- Additional ROW may be required for PCPT Bus Pad/shelters.
- Urban ROW Preservation Width Standards apply to roadways in the urban and suburban mobility fee assessment districts and rural ROW Preservation Width Standards apply to roadways in the rural mobility fee assessment district. If a roadway forms the boundary between different assessment districts the lesser (more narrow) ROW width will apply to both sides of the road.
- Additional ROW may be needed for ponds and swales associated with storm drainage system, or for wetland or floodplain mitigation.
- The ROW Preservation Width Standards don't apply to roads with existing approved route studies or PD&E studies unless approved otherwise by the County Engineer. The ROW Preservation Width Standards also don't apply to unexpired MPUD's with a different ROW width approved unless the MPUD is amended.

The ROW Preservation Width Standards do not supersede the transportation corridor preservation ROW widths in the Comprehensive Plan Transportation Element; however, they may be used as a basis for County staff, the Planning Commission and/or Board of County Commissioners (as applicable) to grant variances, alternative standards, or deviations from the transportation corridor preservation ROW widths in the Comprehensive Plan Transportation Element. The ROW Preservation Width Standards may also serve as a basis for future amendments to the transportation corridor preservation ROW widths in the Comprehensive Plan Transportation Element.



PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

### ROW PRESERVATION WIDTH STANDARDS NOTES

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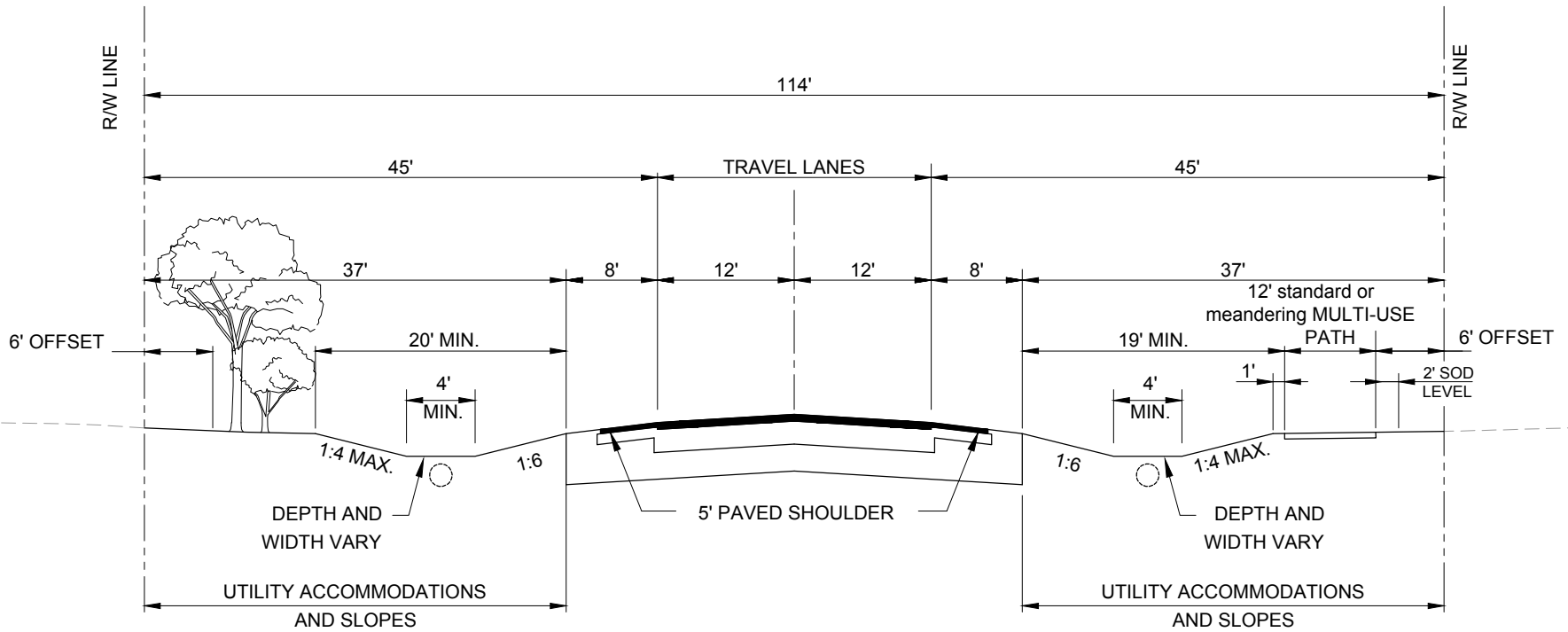
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**TWO LANE UNDIVIDED IN RURAL AREA**

NTS  
114' R/W

NOTE:  
SEE ROW PRESERVATION WIDTH STANDARD NOTES IN A SEPARATE PAGE.  
NO DEVIATIONS TO THIS DETAIL WILL BE PERMITTED UNLESS APPROVED BY THE COUNTY ENGINEER.  
ANY PROPOSED ALTERATIONS SHALL BE CLEARLY IDENTIFIED AND HIGHLIGHTED ON DETAIL.



PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

**RIGHT OF WAY PRESERVATION WIDTH STANDARD**

APPROVED BY \_\_\_\_\_

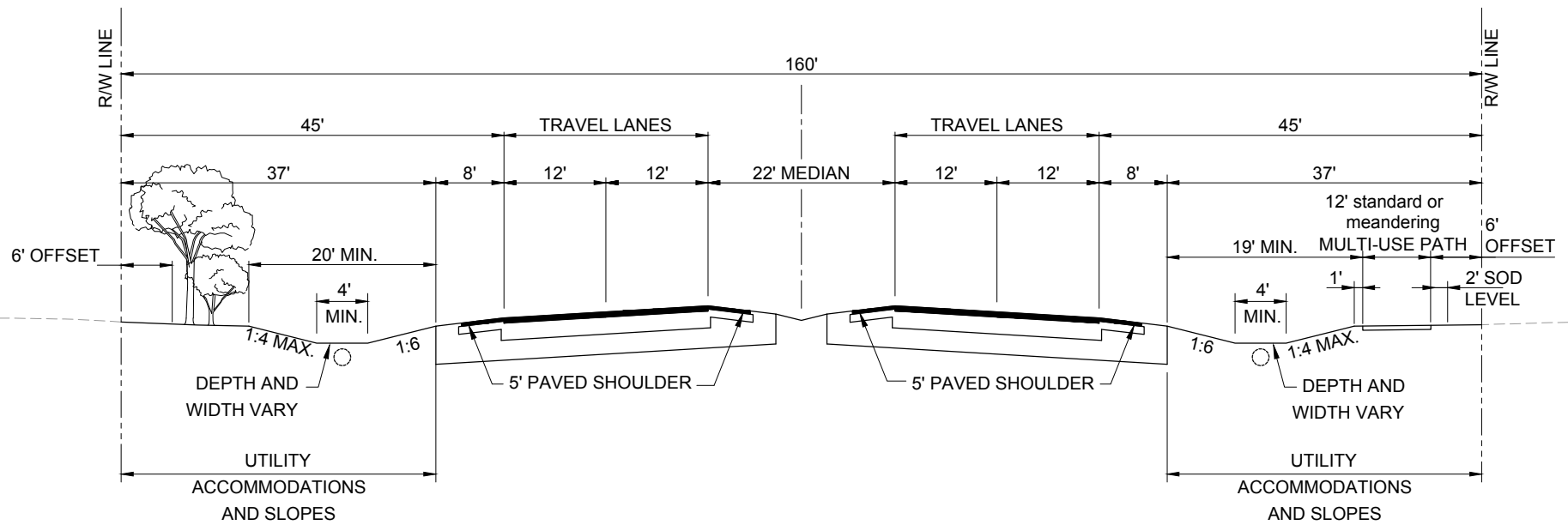
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**FOUR LANE DIVIDED IN RURAL AREA**

NTS  
160' R/W

NOTE:  
SEE ROW PRESERVATION WIDTH STANDARD NOTES IN A SEPARATE PAGE.  
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PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

**RIGHT OF WAY PRESERVATION WIDTH STANDARD**

APPROVED BY \_\_\_\_\_

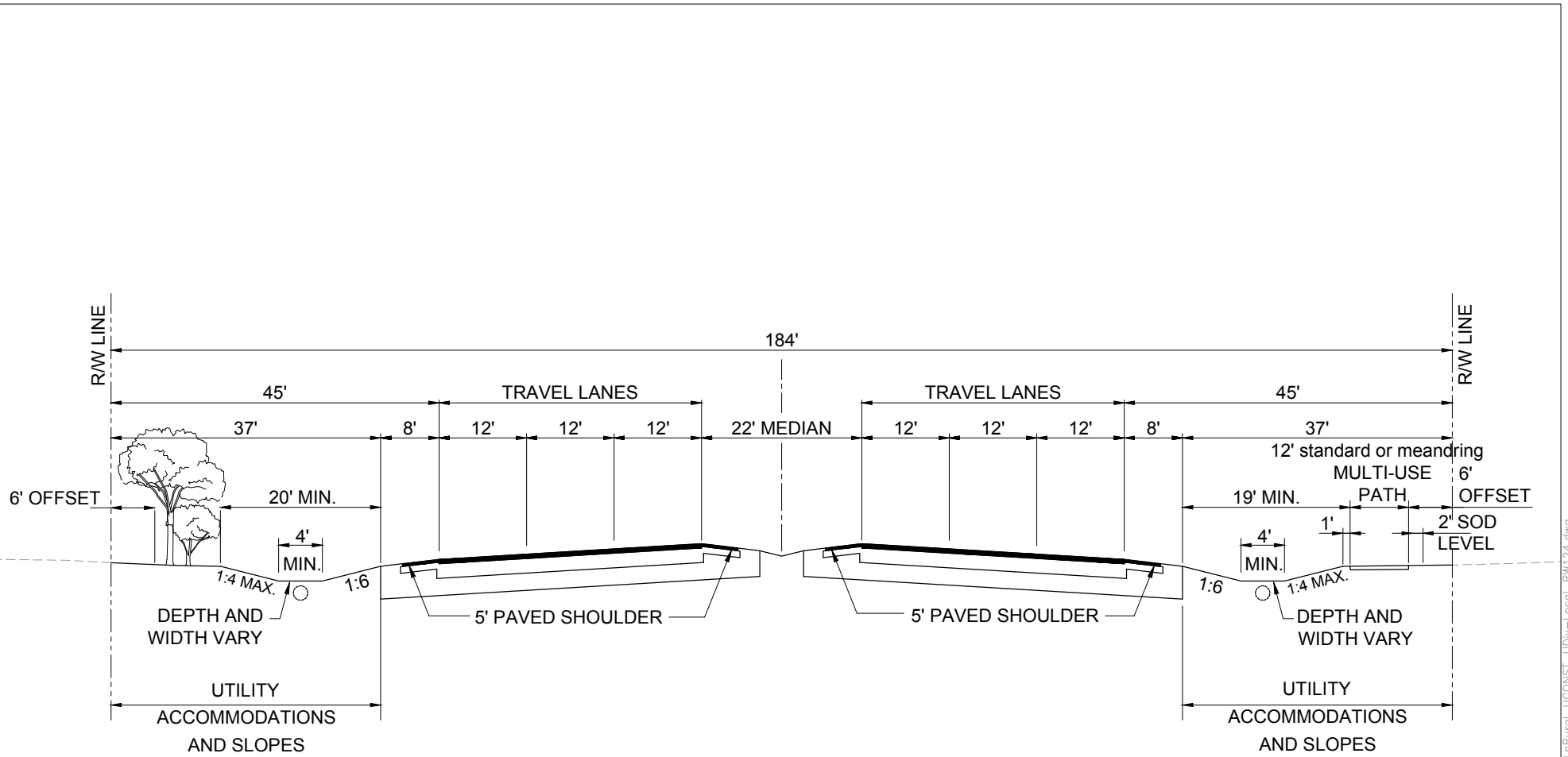
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**SIX LANE DIVIDED IN RURAL AREA**

NTS  
184' R/W

NOTE:  
SEE ROW PRESERVATION WIDTH STANDARD NOTES IN A SEPARATE PAGE.  
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PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

**RIGHT OF WAY PRESERVATION WIDTH STANDARD**

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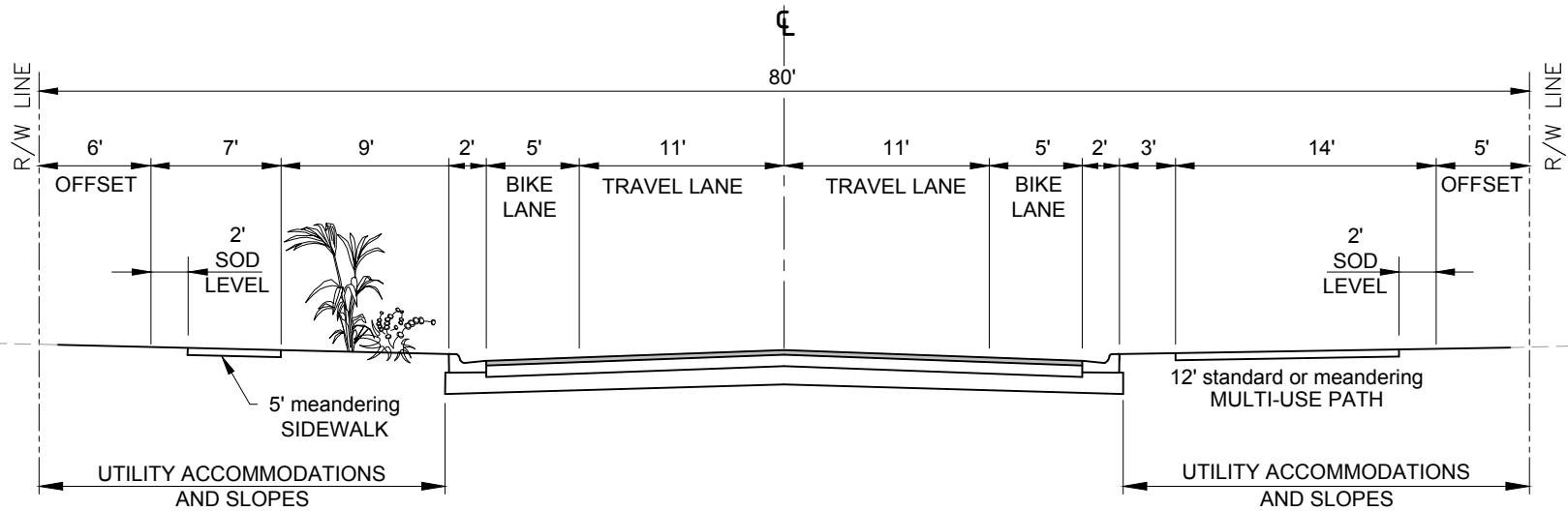
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**TWO LANE UNDIVIDED  
IN URBAN/SUBURBAN AREA**

NTS

80' R/W

NOTE:  
SEE ROW PRESERVATION WIDTH STANDARD NOTES IN A SEPARATE PAGE.  
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PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

**RIGHT OF WAY PRESERVATION WIDTH STANDARD**

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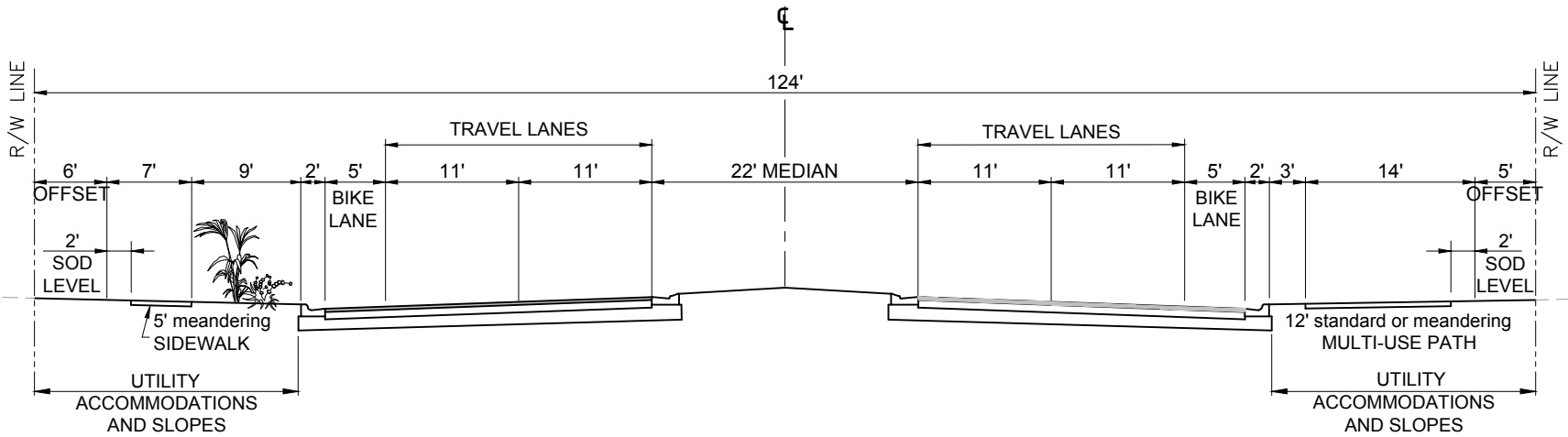
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**FOUR LANE DIVIDED  
IN URBAN/SUBURBAN AREA**

NTS  
124' R/W

NOTE:  
SEE ROW PRESERVATION WIDTH STANDARD NOTES IN A SEPARATE PAGE.  
NO DEVIATIONS TO THIS DETAIL WILL BE PERMITTED UNLESS APPROVED BY THE COUNTY ENGINEER.  
ANY PROPOSED ALTERATIONS SHALL BE CLEARLY IDENTIFIED AND HIGHLIGHTED ON DETAIL.



PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

**RIGHT OF WAY PRESERVATION WIDTH STANDARD**

APPROVED BY \_\_\_\_\_

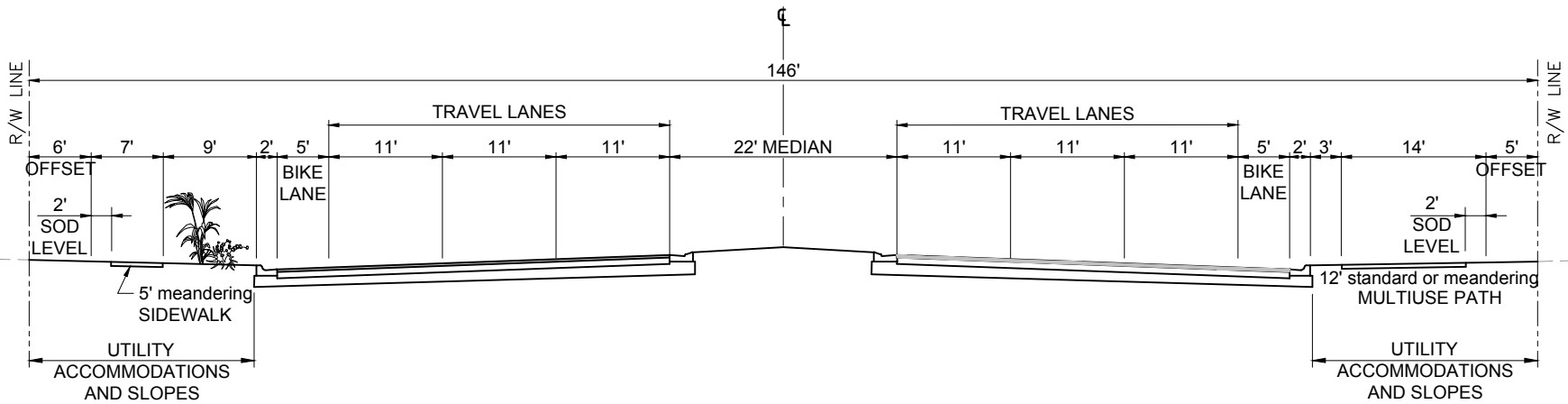
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**SIX LANE DIVIDED  
IN URBAN/SUBURBAN AREA**

NTS  
146' R/W

NOTE:  
SEE ROW PRESERVATION WIDTH STANDARD NOTES IN A SEPARATE PAGE  
NO DEVIATIONS TO THIS DETAIL WILL BE PERMITTED UNLESS APPROVED BY THE COUNTY ENGINEER.  
ANY PROPOSED ALTERATIONS SHALL BE CLEARLY IDENTIFIED AND HIGHLIGHTED ON DETAIL.



PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

**RIGHT OF WAY PRESERVATION WIDTH STANDARD**

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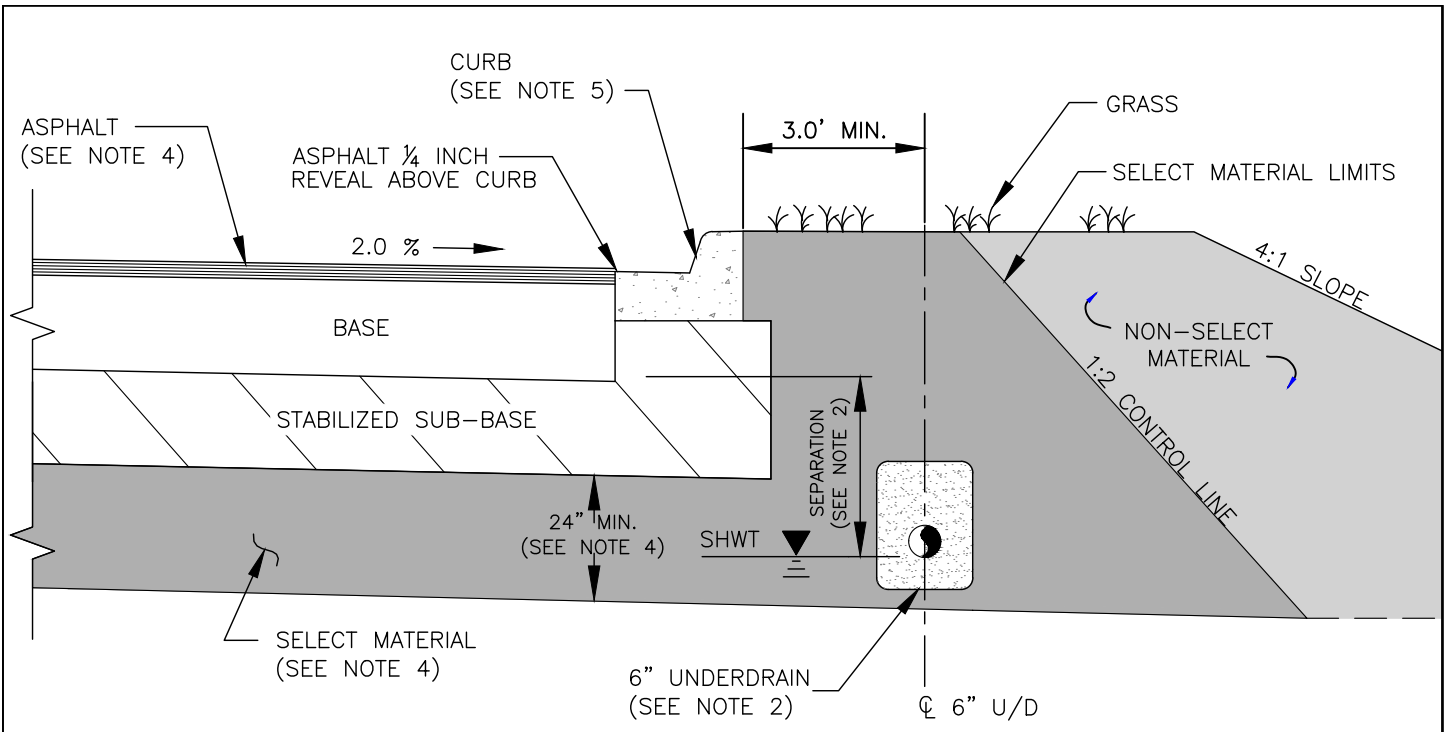
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**SECTIONAL VIEW**  
NTS

**NOTES:**

1. THE MINIMUM VERTICAL SEPARATION BETWEEN THE EXISTING SEASONAL HIGH WATER TABLE (SHWT) AND THE BOTTOM OF THE BASE AT THE LOWEST EDGE OF PAVEMENT SHALL BE AS FOLLOWS:
 

A. LIMEROCK BASE	24 INCH
B. SOIL CEMENT BASE	12 INCH
C. CRUSHED CONCRETE BASE	12 INCH
D. ASPHALT BASE COURSE (TYPE B-12.5)	12 INCH
2. ~~IN ADDITION, IF THE VERTICAL SEPARATION BETWEEN SHWT AND BOTTOM OF BASE IS LESS THAN 3 FEET, UNDERDRAINS SHALL BE CONSTRUCTED ALONG BOTH SIDES OF THE ROAD.~~
3. THE ROAD DESIGN DRAWINGS SHALL CONTAIN SOIL BORING LOCATIONS WITH EXISTING SOIL DATA, OBSERVED WATER LEVEL AND SHWT SURFACE. UNDERDRAIN OUTFALL POND DATA AND APPROXIMATE WETLAND "HYDRO" PERIOD ELEVATIONS SHALL ALSO BE IDENTIFIED.
4. SELECT MATERIAL SHALL BE PLACED PER FDOT STANDARD PLANS INDEX 120-001 & 120-002.
5. CURB DESIGN IS SITE SPECIFIC AND SHALL BE IDENTIFIED ON PLANS.
6. UNDERDRAINS SHALL NOT BE UTILIZED TO ARTIFICIALLY LOWER THE EXISTING SHWT.

The minimum thickness below the stabilized sub-base may be reduced to 18" for roadways with a required structural number of 2.45 or less.

2. IN ADDITION, IF THE VERTICAL SEPARATION BETWEEN SHWT AND THE BOTTOM OF BASE IS LESS THAN 3 FEET FOR LIMEROCK, AND 2 FEET FOR SOIL CEMENT, CRUSHED CONCRETE AND ASPHALT BASE COURSE (TYPE B-12.5), UNDERDRAINS SHALL BE CONSTRUCTED ALONG BOTH SIDES OF THE ROAD.

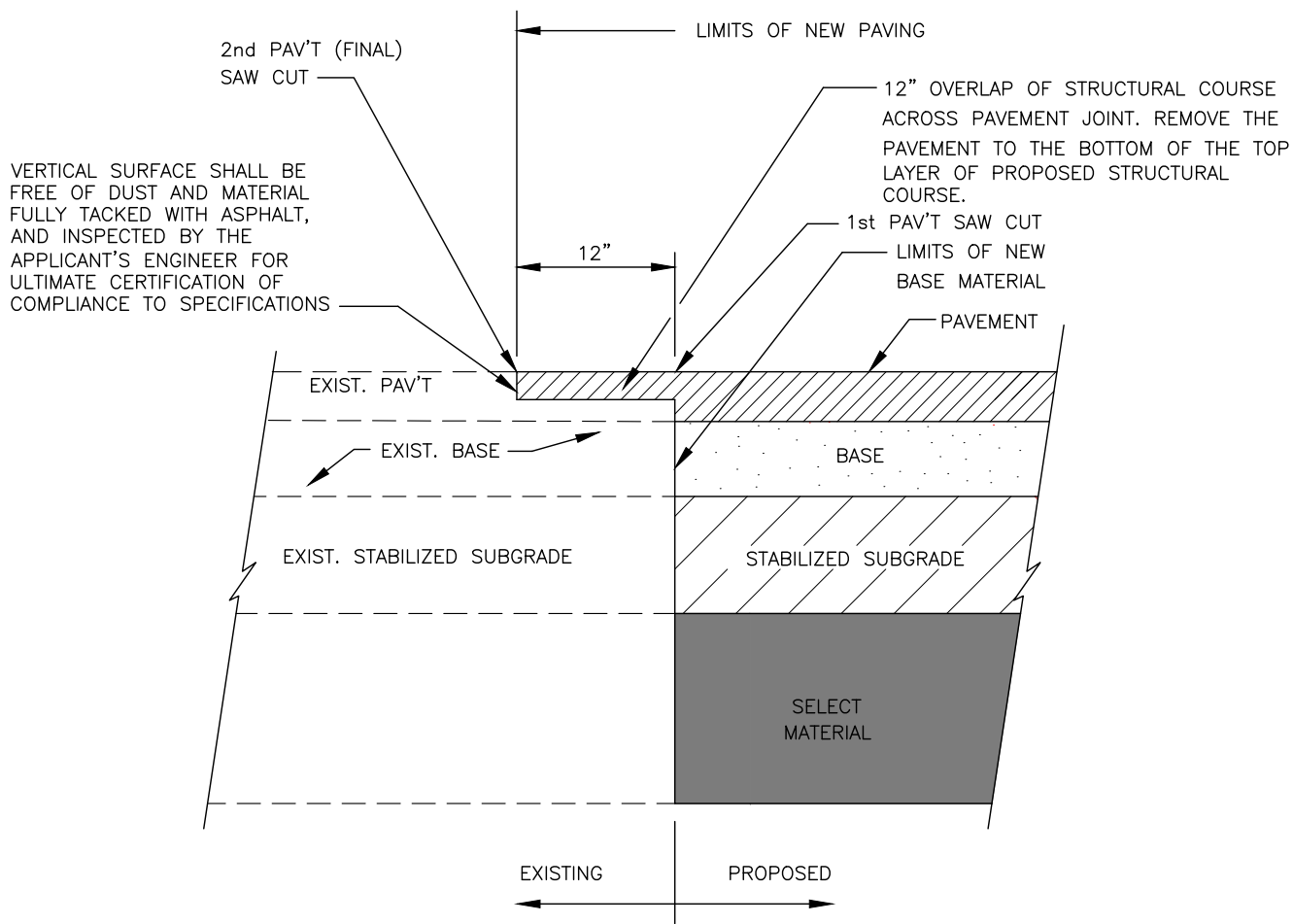
7. Underdrains shall be Type II per FDOT Standard Plans Index 440-001.

NOTE:  
NO DEVIATIONS TO THIS DETAIL WILL BE PERMITTED UNLESS APPROVED BY THE COUNTY ENGINEER OR DESIGNEE.  
ANY PROPOSED ALTERATIONS SHALL BE CLEARLY IDENTIFIED AND HIGHLIGHTED ON DETAIL.

<p>PASCO COUNTY ENGINEERING SERVICES</p> <p><b>DESIGN STANDARDS</b></p>	<b>ROADWAY UNDERDRAIN DESIGN CRITERIA</b>	
	APPROVED BY _____	BCC APPROVAL _____ REVISED _____

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**SECTIONAL VIEW**  
NTS

THE DEVELOPER'S ENGINEER SHALL INVESTIGATE THE EXISTING PAVEMENT LAYER TYPES AND DEPTHS BY RESEARCHING "RECORD/AS-BUILT DRAWINGS", PERFORM GEOTECHNICAL BORINGS AND PROVIDING A SIGNED AND SEALED GEOTECHNICAL REPORT IN ACCORDANCE WITH FDOT STANDARDS.

NOTE:  
NO DEVIATIONS TO THIS DETAIL WILL BE PERMITTED UNLESS APPROVED BY THE COUNTY ENGINEER OR DESIGNEE. ANY PROPOSED ALTERATIONS SHALL BE CLEARLY IDENTIFIED AND HIGHLIGHTED ON DETAIL.



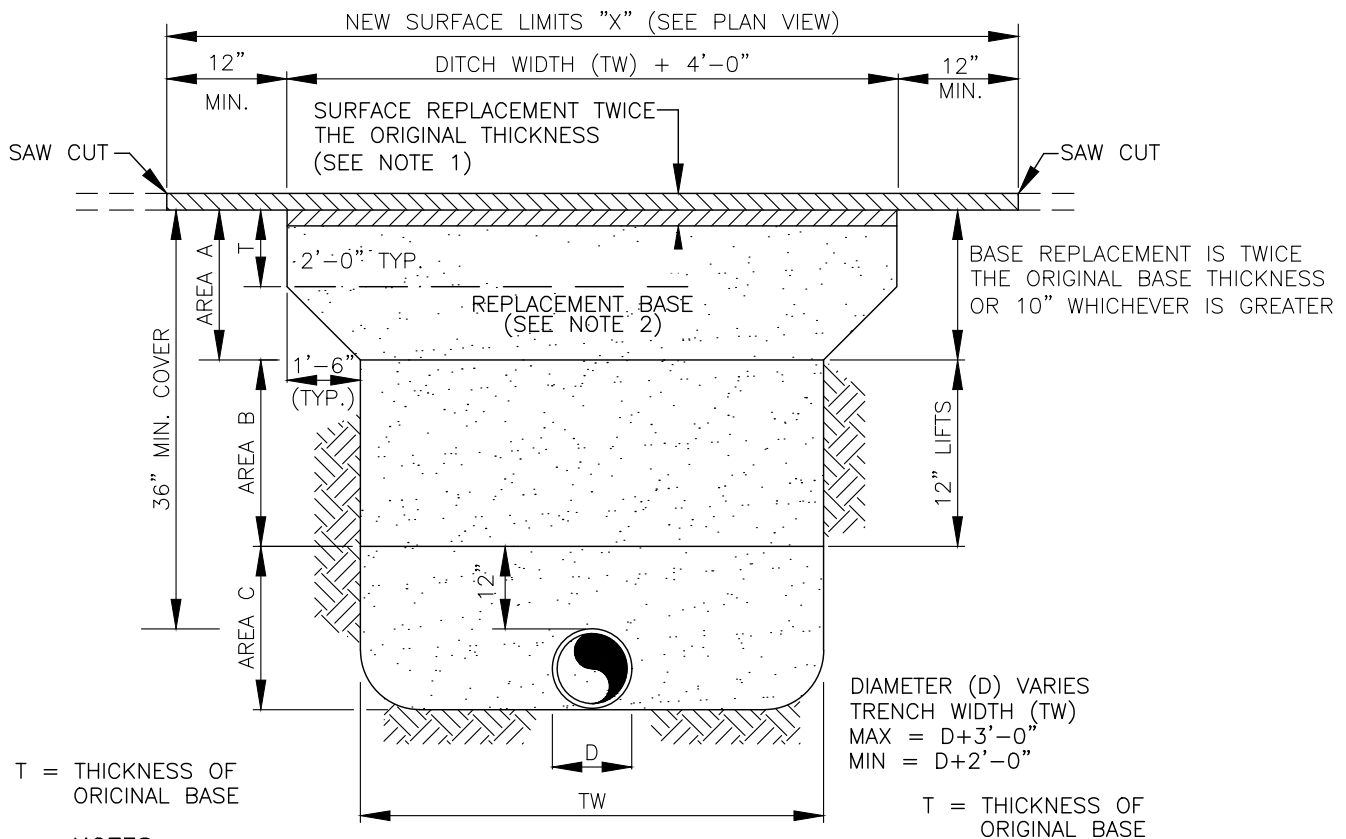
PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

**PAVEMENT WIDENING JOINT DETAIL**

APPROVED BY \_\_\_\_\_

BCC APPROVAL \_\_\_\_\_  
REVISED \_\_\_\_\_

DWG. NO. 109



**NOTES**

**PAVEMENT OPEN CUTS, EXCAVATION AND RESTORATION**

1. MILLING AND RESURFACING LIMITS ARE AS FOLLOWS:

ROADWAY TYPE:	DIMENSION "X"
RESIDENTIAL	5 FT.
ARTERIAL OR COLLECTOR	25 FT.

2. REPLACEMENT OF ASPHALT TO BE TWICE THE ORIGINAL PAVEMENT THICKNESS OR PLACED AT A MINIMUM OF TWO 1-INCH LIFTS AS APPROVED ON THE PLANS. ASPHALTIC CONCRETE TO BE SUPER PAVE (SP) AND PLACED WITHIN LIFTS ADHERING TO THE FDOT FLEXIBLE PAVEMENT MANUAL (LATEST EDITION).
3. BASE MATERIAL TO BE NEW AND FROM AN APPROVED FDOT SOURCE WITH MATERIAL CERTIFICATION PER PASCO COUNTY SPECIFICATION NO. 200.
4. EXCAVATION OF EXISTING BASE MATERIALS TO BE DISPOSED OF OFFSITE BY THE CONTRACTOR AND NOT REUSED FOR THE EXCAVATED AREA.
5. CONTRACTOR TO BACKFILL IN ACCORDANCE WITH THE FOLLOWING:
  - a. AREA A - BACKFILL EXCAVATED AREA USING LIME ROCK (LBR 100) OR CRUSHED CONCRETE (LBR 150) PLACED IN MAXIMUM 6-INCH LIFTS AND A DENSITY EQUAL TO 98% OF FM5-521. EACH LIFT TO BE COMPACTED TO 100% OF MAXIMUM DENSITY AS DETERMINED BY FM 1-T099.
  - b. AREA B - BACKFILL EXCAVATED AREA IN MAXIMUM 12-INCH LIFTS. EACH LIFT TO BE COMPACTED TO 98% OF FM5-521.
6. AREA C - BACKFILL EXCAVATED AREA WITH 6-INCH MAXIMUM LIFTS. EACH LIFT TO BE COMPACTED TO 98% OF FM5-521. IN LIEU OF COMPACTED BASE MATERIAL THE CONTRACTOR CAN UTILIZE LEVEL C ASPHALTIC CONCRETE (SP 12.5) PLACED AT 2-INCH MAXIMUM LIFTS. SP12.5 ASPHALTIC CONCRETE TO MATCH THE THICKNESS OF THE EXISTING BASE AND MUST NOT BE PLACED BELOW SPRING LINE OF THE PIPE.
7. TESTING AND COMPACTION RATES MUST BE SUBMITTED TO PASCO COUNTY ENGINEERING INSPECTION VERIFYING OPEN CUT RESTORATION IS IN ACCORDANCE WITH FDOT AND COUNTY SPECIFICATIONS.

NOTE:  
 NO DEVIATIONS TO THIS DETAIL WILL BE PERMITTED UNLESS APPROVED BY THE COUNTY ENGINEER OR DESIGNEE  
 ANY PROPOSED ALTERATIONS SHALL BE CLEARLY IDENTIFIED AND HIGHLIGHTED ON DETAIL.



PASCO COUNTY  
 ENGINEERING SERVICES  
**DESIGN  
 STANDARDS**

**OPEN CUT RESTORATION**

APPROVED BY \_\_\_\_\_

BCC APPROVAL \_\_\_\_\_  
 REVISED \_\_\_\_\_

DWG. NO. \_\_\_\_\_



## RECYCLED CONCRETE AGGREGATE BASE SPECIFICATIONS

THE WORK SPECIFIED UNDER THIS SECTION CONSISTS OF THE CONSTRUCTION OF ROADWAY BASE UTILIZING CRUSHED CONCRETE (RECLAIMED CONCRETE AGGREGATE BASE MATERIAL) ON A PREPARED STABILIZED SUBGRADE OF LBR 40 WITH A DENSITY OF 98% OF THE MODIFIED PROCTOR MAXIMUM DENSITY AS DETERMINED BY FM 1-T 180, METHOD D, IN CONFORMITY WITH THE LINES, GRADES NOTES AND TYPICAL CROSS SECTIONS SHOWN IN THE PLANS, AND AS DIRECTED BY THE COUNTY ENGINEER.

THE CONSTRUCTION OF CRUSHED CONCRETE BASE SHALL CONFORM TO THE REQUIREMENTS OF THIS SECTION, OR, IN LIEU THEREOF, SUCH REQUIREMENTS AS MAY BE ESTABLISHED BY THE COUNTY ENGINEER DURING CONSTRUCTION. THE COUNTY ENGINEER SHALL HAVE FULL AUTHORITY TO MODIFY THE PROVISIONS OF THIS SECTION AS DEEMED NECESSARY, IN HIS OPINION, TO MEET FIELD CONDITIONS AND REQUIREMENTS.

### MATERIALS

CRUSHED CONCRETE MUST BE PRODUCED FROM A SOURCE APPROVED BY FLORIDA DEPARTMENT OF TRANSPORTATION OR THE COUNTY ENGINEER. THE SUPPLIER SHALL HAVE DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) PERMIT REQUIREMENTS SECTION 62-701.730 OR BE QUALIFIED AS A CLEAN DEBRIS SOURCE UNDER DEP RULES. THE RECLAIMED CONCRETE AGGREGATE BASE SHALL CONSIST OF CRUSHED CONCRETE MATERIAL DERIVED FROM THE CRUSHING OF HARD PORTLAND CEMENT CONCRETE.

### COMPOSITION

BASE MATERIAL SHALL CONFORM TO THE FOLLOWING **GRADATION REQUIREMENTS**:

SIEVE SIZE	PERCENT BY WEIGHT PASSING
2 INCH	100
3/4 INCH	65 to 95
3/8 INCH	40 to 85
No. 4	25 to 65
No. 10	20 to 50
No. 50	5 to 25
No. 200	0 to 10

BASE MATERIAL SHALL CONFORM TO THE FOLLOWING **PLASTICITY REQUIREMENTS**:

CRUSHED CONCRETE BASE SHALL NOT CONTAIN PLASTIC SOILS SUCH THAT THE No. 40 SIEVE MATERIAL SHALL BE NON-PLASTIC.

LIQUID LIMIT (AS DETERMINED BY AASHTO T80) (LESS THAN 25) PER MATERIAL TYPE

THE FINISHED IN-PLACE CRUSHED CONCRETE BASE **LIMEROCK BEARING RATIO** SHALL HAVE A MINIMUM (LBR) OF 150.

CRUSHED CONCRETE BASE SHALL BE FREE OF ALL MATERIALS THAT FALL UNDER THE CATEGORY OF SOLID WASTE OR HAZARD MATERIALS AS DEFINED BY THE STATE OR LOCAL JURISDICTION AND SHALL MEET ALL DEP PERMIT REQUIREMENTS WHICH PERTAIN TO CONSTRUCTION, DEMOLITION AND RECYCLING OF THESE MATERIALS. CRUSHED CONCRETE BASE SHALL BE ASBESTOS FREE. THE FOLLOWING LIMITS SHALL NOT BE EXCEEDED:

- BITUMINOUS CONCRETE.....1% BY WEIGHT
- BRICKS.....1% BY WEIGHT
- WOOD AND OTHER ORGANIC SUBSTANCES.....0.5% BY WEIGHT
- HEAVY METALS (EXCEPT LEAD).....0.1% BY WEIGHT
- LEAD......5 PARTS PER MILLION
- REINFORCED STEEL AND WELDED WIRE FABRIC.....0.1% BY WEIGHT
- PLASTER AND GYPSUM BOARD.....0.1% BY WEIGHT

THE MATERIAL FOR CRUSHED CONCRETE BASE SHALL CONSIST ONLY OF CRUSHED CONCRETE PAVEMENT AND SUCH ADDITIVE MATERIAL AS MAY BE APPROVED BY THE COUNTY ENGINEER FOR THE PURPOSE OF FACILITATING CONSTRUCTION AND ACHIEVING THE DESIRED CHARACTERISTICS OF THE FINISHED IN-PLACED PRODUCT. APPROVAL FROM THE COUNTY ENGINEER IS REQUIRED BEFORE PLACING MATERIAL FROM MORE THAN ONE SOURCE. ONCE APPROVED, A CHANGE IN THE SOURCE OF BASE MATERIAL SHALL REQUIRE ADDITIONAL ACCEPTANCE TESTING. THE MATERIAL SHALL NOT CONTAIN LUMPS, BALLS OR POCKETS OF SAND OR CLAY MATERIAL IN SIZE OR QUANTITY SUFFICIENT TO BE DETRIMENTAL TO THE PROPER BONDING, FINISHING, STRENGTH OF THE CONCRETE BASE. EXISTING BASE IS TO BE REMOVED TO CONSTRUCT THE NEW BASE.

### INSPECTION

SUBGRADE AND BASE INSPECTIONS SHALL BE CONDUCTED BY THE ENGINEER OF RECORD AND THE COUNTY INSPECTOR PRIOR TO SURFACE COURSE CONSTRUCTION.

**NOTE:**

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## RECYCLED CONCRETE AGGREGATE BASE SPECIFICATIONS (1)

APPROVED BY _____	BCC APPROVAL _____ REVISED _____	DWG. NO. 111-1
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**EQUIPMENT, PLACEMENT AND SPREADING OF MATERIAL**

USE MECHANICAL ROCK SPREADERS, EQUIPPED WITH A DEVICE THAT STRIKES OFF THE ROCK UNIFORMLY TO LAYING THICKNESS AND CAPABLE OF PRODUCING EVEN DISTRIBUTION. FOR ROADWAY WIDTHS OF 20 FEET OR LESS, CROSSOVERS, INTERSECTIONS, RAMP AREAS OR WHERE THE USE OF A MECHANICAL SPREADER IS NOT PRACTICABLE; THE CONTRACTOR MAY SPREAD THE CRUSHED CONCRETE BASE USING BULLDOZERS OR BLADE GRADERS.

TRANSPORT CRUSHED CONCRETE TO THE POINT OF USE, OVER THE BASE PREVIOUSLY PLACED, AND DUMP IT ON THE END OF THE PRECEDING SPREAD. HAULING ON SUBGRADE TO DUMP CRUSHED CONCRETE BASE WILL BE PERMITTED ONLY WHEN, IN THE ENGINEER'S OPINION, THESE OPERATIONS WILL NOT BE DETRIMENTAL TO THE BASE AND SUBGRADE.

CRUSHED CONCRETE SHALL BE SPREAD UNIFORMLY WITHOUT SEGREGATION OF FINE OR COURSE MATERIALS. SEGREGATED AREAS SHALL BE REPLACED WITH PROPERLY GRADED CRUSHED CONCRETE AFTER REMOVAL.

THE MINIMUM THICKNESS OF THE CRUSHED CONCRETE BASE SHALL BE INDICATED ON THE PLANS. WHEN THE SPECIFIED COMPACTED THICKNESS OF THE CRUSHED CONCRETE BASE IS **GREATER THAN SIX INCHES, CONSTRUCT THE BASE IN MULTIPLE COURSES OF EQUAL THICKNESS. INDIVIDUAL COURSES SHALL NOT BE LESS THAN THREE INCHES.** PLACE CRUSHED CONCRETE MATERIAL TO ENSURE THE TOTAL THICKNESS SINGLE SOURCE INTEGRITY AT ANY STATION LOCATION OF THE BASE.

**COMPACTING, FINISHING AND TESTING REQUIREMENTS**

AFTER SPREADING IS COMPLETED THE CRUSHED CONCRETE SHALL BE UNIFORMLY COMPACTED, WITH WATER BEING ADDED AS REQUIRED TO A **DENSITY OF NOT LESS THAN ONE HUNDRED PERCENT (100%) OF THE MAXIMUM DENSITY AS DETERMINED BY AASHTO T-180.** DURING FINAL COMPACTION OPERATIONS, IF THE BLADING OF ANY AREAS IS NECESSARY TO OBTAIN THE TRUE GRADE AND CROSS SECTION, FREE OF SCABS AND LAMINATIONS, THE COMPACTING OPERATIONS FOR SUCH AREAS SHALL BE COMPLETED PRIOR TO THE PERFORMANCE OF DENSITY TESTS ON THE FINISHED BASE.

MULTIPLE COURSE BASE: CLEAN THE FIRST COURSE OF FOREIGN MATERIAL, THEN BLADE AND BRING IT TO A SURFACE CROSS-SECTION APPROXIMATELY PARALLEL TO THE FINISHED BASE. BEFORE SPREADING ANY MATERIAL FOR THE UPPER COURSES, **OBTAIN DENSITY TESTS FOR THE LOWER COURSES** TO DETERMINE THAT THE REQUIRED COMPACTION [NOT LESS THAN ONE HUNDRED PERCENT (100%) OF THE MAXIMUM DENSITY AS DETERMINED BY AASHTO T-180] HAS BEEN OBTAINED. AFTER SPREADING THE CRUSHED CONCRETE FOR THE TOP COURSE, FINISH AND SHAPE IT'S SURFACE TO PRODUCE THE REQUIRED GRADE AND CROSS-SECTION, FREE OF SCABS AND LAMINATIONS, AFTER COMPACTION.

THE MINIMUM DENSITY THAT WILL BE ACCEPTED AT ANY LOCATION OUTSIDE THE TRAVELED ROADWAY (SUCH AS INTERSECTIONS, CROSSOVERS, TURNOUTS, ETC.) SHALL BE 98% OF THE MAXIMUM DENSITY AS DETERMINED BY AASHTO T-180.

**TESTING OF BASE COURSE**

THE MINIMUM **FREQUENCY** OF SAMPLING AND TESTING OF CRUSHED CONCRETE MATERIAL, LAB DENSITY, FIELD DENSITY AND THICKNESS SHALL ADHERE TO THE FREQUENCY OF TESTING FOR LIMEROCK BASE IN THE MOST CURRENT EDITION OF "PASCO COUNTY ENGINEERING SERVICES DEPARTMENT TESTING SPECIFICATIONS FOR CONSTRUCTION OF ROADS, STORM DRAINAGE AND UTILITIES". ONE PLANT MIX DESIGN, ONE PLANT GRADATION TEST FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES (AASHTO T-27) (FM1-T027) INCLUDING A PLASTICITY INDEX (FM-T090) (AASHTO T-90) FROM THE APPROVED SOURCE SHALL BE SUBMITTED AT ONE PER DAY OR CHANGE OF MATERIAL. ONE ROADWAY FIELD TEST FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES (ASTM C-136) SHALL BE SUBMITTED PER 500 FEET OF ROAD PER DAY PER MIX DESIGN; MINIMUM ONE PER ROAD.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TESTING PERFORMED IN CONNECTION WITH CONSTRUCTION OF THE BASE.

**CORRECTION OF DEFECTS**

ALL SEGREGATED AREAS OF FINE OR COURSE CRUSHED CONCRETE SHALL BE REMOVED AND REPLACED WITH PROPERLY GRADED RECLAIMED CONCRETE AGGREGATE BASE MATERIAL. ALL DEFECTS IN MATERIALS AND CONSTRUCTION SHALL BE CORRECTED BY THE CONTRACTOR, AT HIS EXPENSE, AND TO THE SATISFACTION OF THE COUNTY ENGINEER.

**PRIMING AND MAINTENANCE**

APPLY THE PRIME COAT ONLY WHEN THE BASE MEETS THE SPECIFIED DENSITY REQUIREMENTS AND WHEN THE MOISTURE CONTENT. AT THE TIME OF PRIMING, ENSURE THAT THE BASE IS FIRM, UNYIELDING AND IN SUCH CONDITION THAT NO UNDUE DISTORTION WILL OCCUR. MAINTAIN THE TRUE CROWN AND TEMPLATE, WITH NO RUTTING OR DISTORTION, WHILE APPLYING THE SURFACE COURSE.

EMBANKMENT MATERIAL UNDER CONCRETE PAVEMENT SHALL BE PER FDOT STANDARD PLANS INDEX 120-001, LATEST EDITION.

**PASCO COUNTY TESTING SPECIFICATIONS ON CRUSHED CONCRETE BASE**

TESTS FOR BASE THICKNESS, AND DENSITY SHALL BE LOCATED NO MORE THAN THREE HUNDRED (300) FEET APART AND SHALL BE STAGGERED TO THE LEFT, RIGHT, AND ON THE CENTERLINE OF ROADWAY. THERE SHALL BE NO LESS THAN ONE (1) TEST PER STREET. BEARING VALUE, GRADATION AND FIELD TEST FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES (ASTM C-136) SHALL BE NO MORE THAN FIVE HUNDRED (500) FEET.

EXAMPLE: A SEVEN HUNDRED FEET ROAD WOULD REQUIRE TWO FIELD LBR AND GRADATION TESTS, THREE FIELD DENSITY AND THICKNESS TESTS ALONG WITH THE APPROPRIATE LAB TESTING.

NOTE:  
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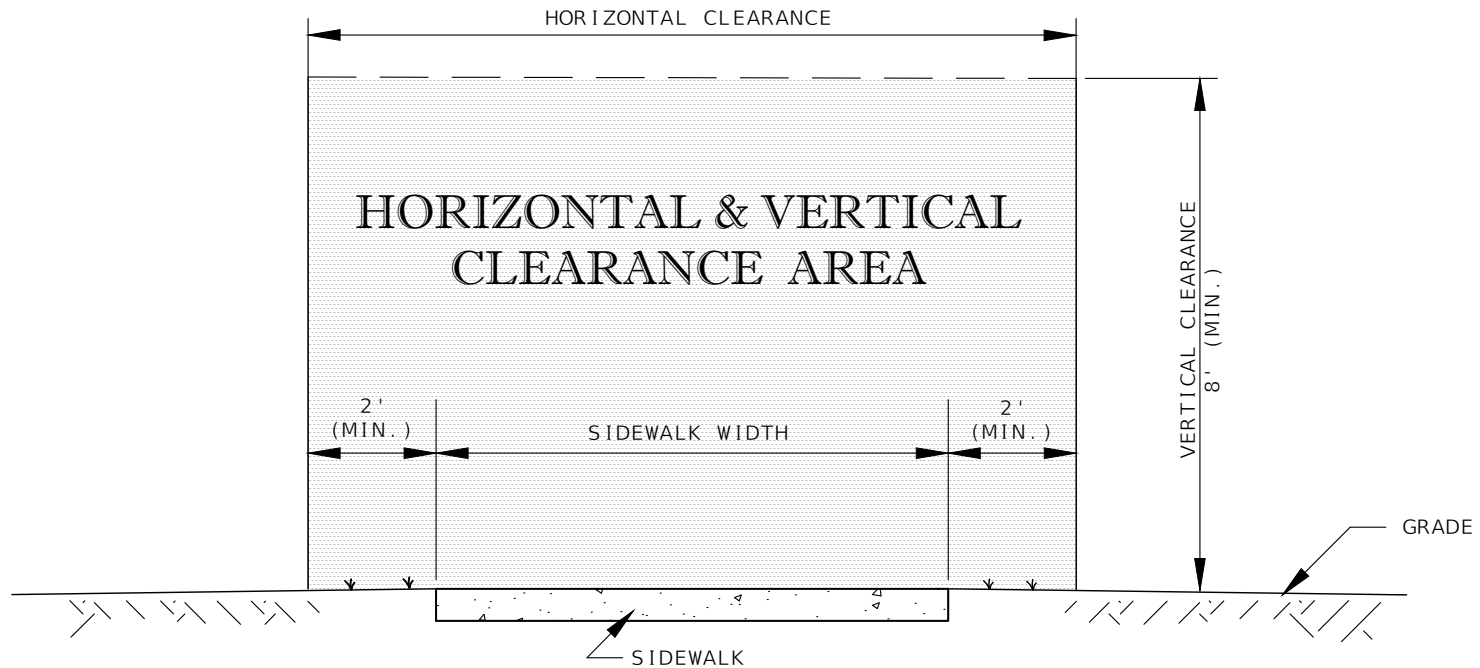


PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

**RECYCLED CONCRETE AGGREGATE  
BASE SPECIFICATIONS (2)**

APPROVED BY _____	BCC APPROVAL _____ REVISED _____	DWG. NO. 111-2
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**SIDEWALK CLEARANCE AREA SECTION**  
NTS

**NOTES:**

1. THIS DETAIL APPLIES TO THE SIDEWALK ONLY. IT IS NOT INTENDED FOR ROADWAY PLACEMENT SET BACKS.
2. THE SIDEWALK CLEARANCE AREA SHALL BE AN OPEN WINDOW FREE OF OBSTACLES. THIS INCLUDES SHRUBS, TREES, FENCES, ABOVE GROUND UTILITIES, I.E., POWER POLES, STREET LIGHTS, GUY ANCHORS, FIRE HYDRANTS, BLOW-OFFS, MAIL BOXES, STREET SIGNS, UTILITY MARKERS, ETC.
3. THE SIDEWALK HORIZONTAL CLEARANCE IS MEASURED FROM THE SIDEWALK EDGE AND SHALL BE A MINIMUM OF 2 FEET.
4. THE SIDEWALK VERTICAL CLEARANCE IS MEASURED FROM THE FINISHED GROUND SURFACE AND SHALL BE A MINIMUM OF 8 FEET, 12' RECOMMENDED.

NOTE:  
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PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

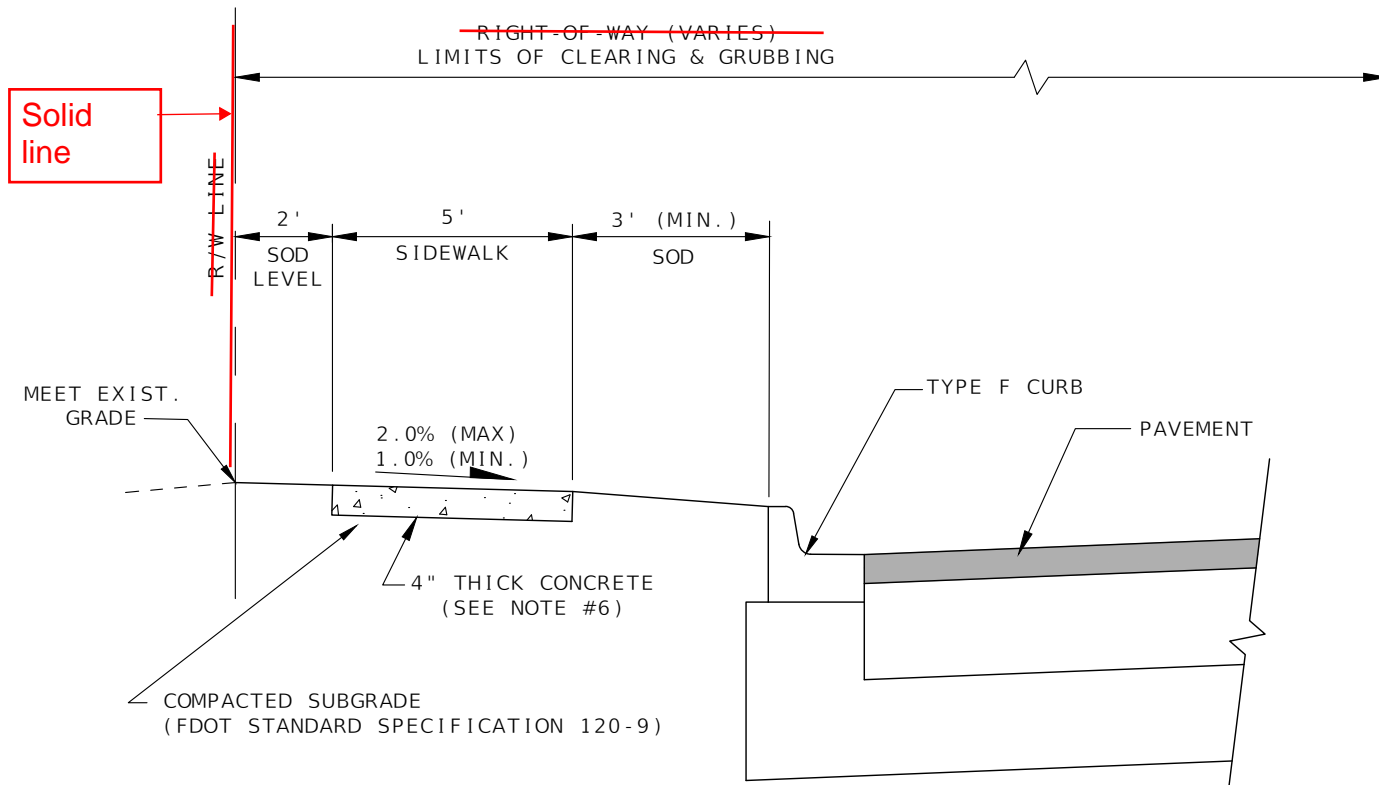
**SIDEWALK HORIZONTAL & VERTICAL CLEARANCE DETAIL**

APPROVED BY \_\_\_\_\_

BCC APPROVAL \_\_\_\_\_  
REVISED \_\_\_\_\_

DWG. NO. 112

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**CONCRETE SIDEWALK - TYPICAL SECTION**

NTS

**SIDEWALK NOTES:**

1. ALL CONCRETE SHALL BE 3,000 P.S.I. FIBER-REINFORCED PER ASTM C1116/C1116M.
2. TOOL RADIUS ALL EXPOSED EDGES.
3. CONSTRUCTION JOINTS @ 5 FT. INTERVALS.
4. 1/2" EXPANSION JOINTS @ 100 FT. INTERVALS.
5. SURFACE SHALL BE SANDY TEXTURE BROOM FINISH.
6. ALL SIDEWALKS SUBJECT TO LIGHT VEHICULAR TRAFFIC SHALL BE A MINIMUM OF 6" THICK, I.E., DRIVEWAYS. COMMERCIAL ENTRANCES SHALL BE A MINIMUM OF 8" THICK.
7. 1/2" EXPANSION JOINT AT DRIVEWAYS.
8. Sidewalks shall meet the requirements of the Americans with Disabilities Act.

NOTE:  
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PASCO COUNTY  
 ENGINEERING SERVICES  
**DESIGN  
 STANDARDS**

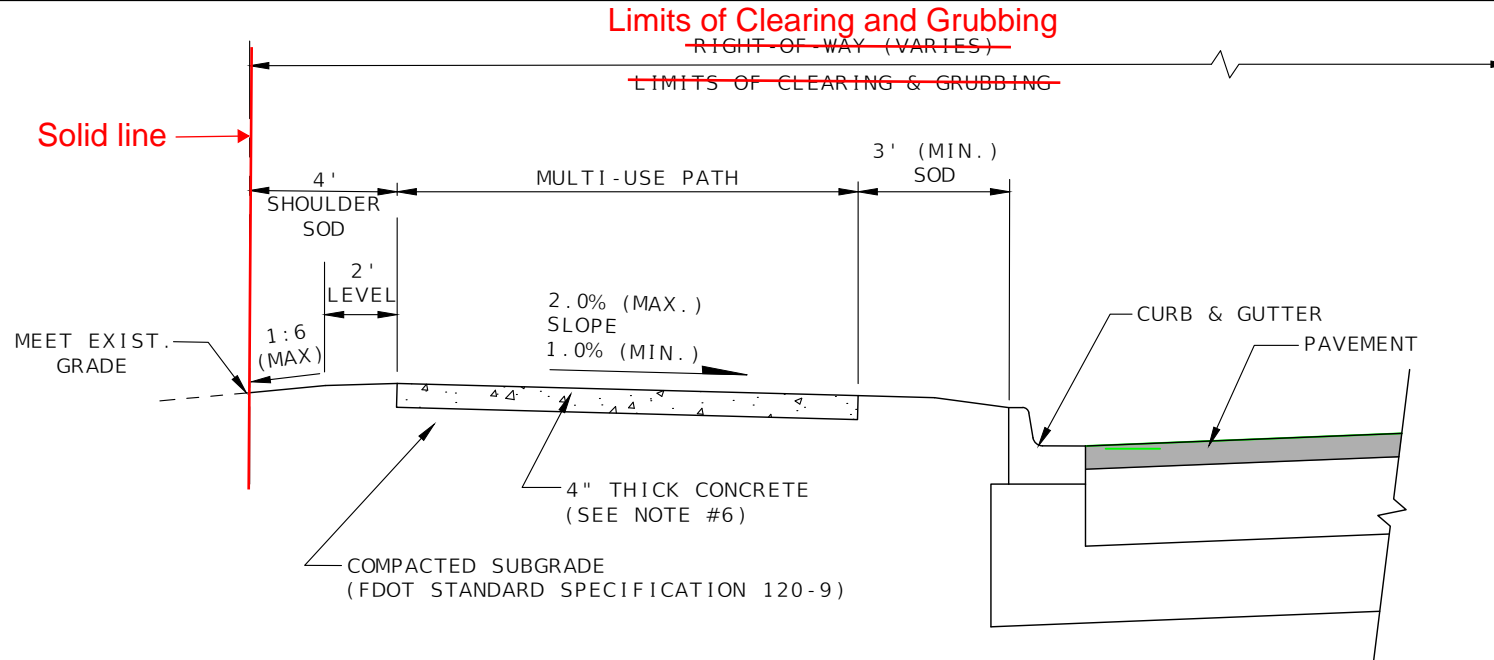
**TYPICAL CONCRETE SIDEWALK - DETAIL**

APPROVED BY \_\_\_\_\_

BCC APPROVAL \_\_\_\_\_  
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DWG. NO. 113

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**CONCRETE MULTI-USE PATH - TYPICAL SECTION**

NTS

DESIGN PARAMETERS:

- DESIGN SPEED 18 MPH. (30 MPH DOWNHILL GRADE > 4%)
- MIN. RADIUS 74' FOR 2% CROSS SLOPE, 86' FOR -2% CROSS SLOPE
- PATH WIDTH 2 WAY - ~~MIN.~~ 8' (MIN.) 12' STANDARD
- VERTICAL CLEARANCE - 8' MIN. (12' RECOMMENDED) (12' MIN. FOR EQUESTRAIN USE)
- HORIZONTAL CLEARANCE 4' MIN. (2' UNDER CONSTRAINTS)
- ALTERNATE WIDTH - A MINIMUM 8' WIDE BICYCLE PATH NOT CONTIGUOUS TO THE STREET PAVEMENT AND SEPARATE FROM THE SIDEWALK.

SIDEWALK NOTES:

1. ALL CONCRETE SHALL BE 3,000 P.S.I. FIBER-REINFORCED PER ASTM C1116/C1116M.
2. TOOL RADIUS ALL EXPOSED EDGES.
3. CONSTRUCTION JOINTS @ 8 FT. INTERVALS.
4. 1/2" EXPANSION JOINTS @ 100 FT. INTERVALS.
5. SURFACE SHALL BE SANDY TEXTURE BROOM FINISH.
6. ALL PATHS SUBJECT TO LIGHT VEHICULAR TRAFFIC SHALL BE A MINIMUM OF 6" THICK, I.E., DRIVEWAYS. COMMERCIAL ENTRANCES SHALL BE A MINIMUM OF 8" THICK
7. IF AREA BETWEEN CURB AND MULTI-USE PATH IS NOT ASPHALT OR CONCRETE, SOD SHALL BE UTILIZED.
8. 1/2" EXPANSION JOINT A DRIVEWAYS.
9. DESIGN ALTERNATE: 1" THICK SP-9.5 ASPHALTIC- CONCRETE SURFACE COURSE PLACED ON A 4" THICK LIMEROCK BASE OVER A LBR 100 COMPACTED TO A 98% MODIFIED PROCTOR SUBGRADE.

**10. Multi-use paths shall meet the requirements of the Americans with Disabilities Act.**

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**PASCO COUNTY FLORIDA**  
OPEN SPACES. VIBRANT PLACES.

PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

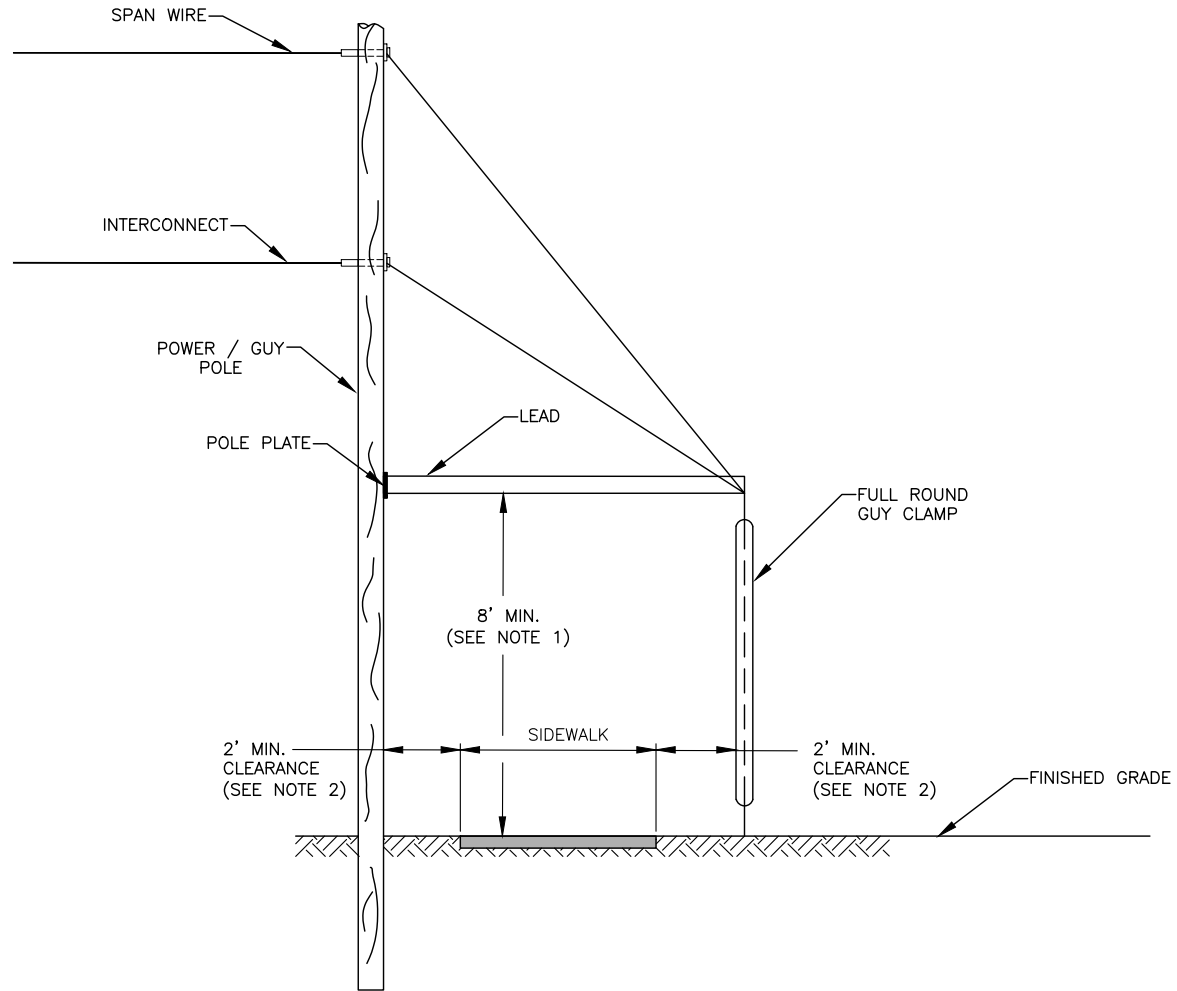
**MULTI-USE PATH - TYPICAL DETAIL**

APPROVED BY \_\_\_\_\_

BCC APPROVAL \_\_\_\_\_  
REVISED \_\_\_\_\_

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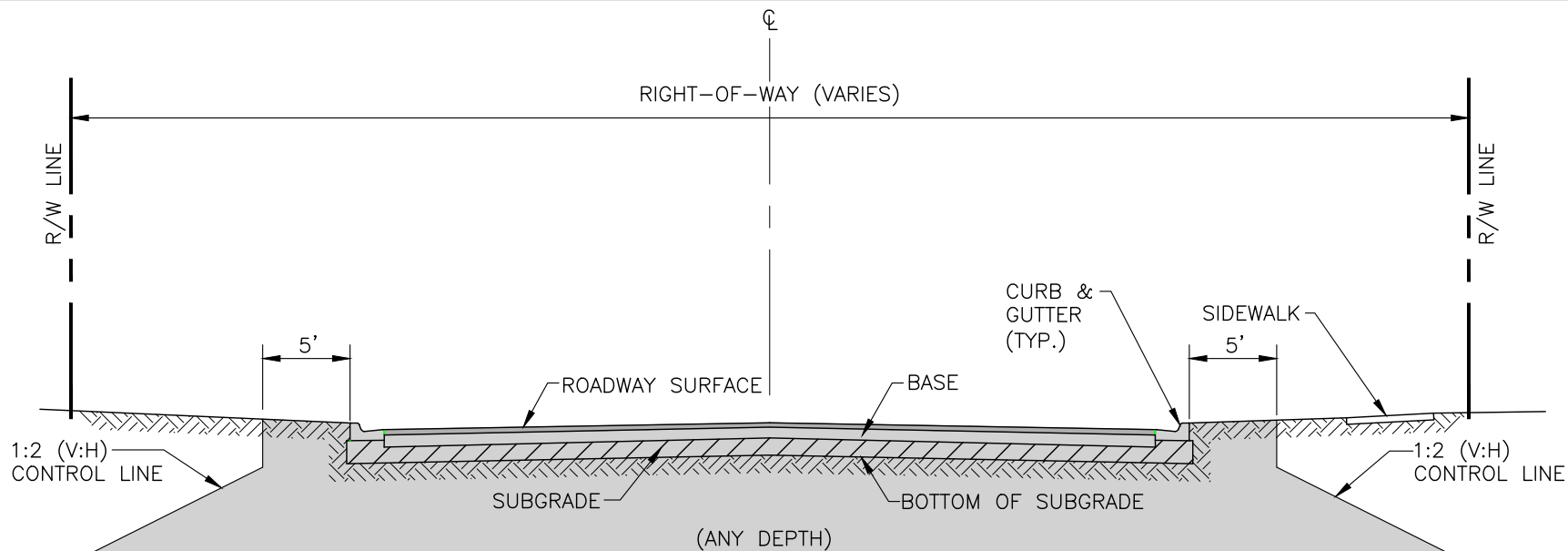
**NOTES:**

1. VERTICAL CLEARANCE TO OBSTRUCTIONS SHOULD BE A MINIMUM OF 8 FEET, 12' RECOMMENDED.
2. HORIZONTAL CLEARANCE TO OBSTRUCTIONS SHOULD BE A MINIMUM OF 2 FEET,

**SIDEWALK CLEARANCE - POWER POLE ANCHOR SECTION**

NTS

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SHADED AREA DENOTES AREA REQUIRING INDIVIDUAL PERMIT

- \*WITHIN FIVE FEET (5') HORIZONTAL TO AN EDGE OF PAVEMENT;
- \*WITHIN A 1:2 (V:H) CONTROL LINE MEASURED FROM THE SURFACE AT EDGE OF PAVEMENT.

**NOTE:**

DIRECTIONAL BORE OR JACK AND BORE SHALL BE A MINIMUM 36 INCHES (36") FROM BOTTOM OF SUBGRADE.

TRENCHING IN SHADED AREA REQUIRES BACK FILLING EACH 12 INCH (12") LIFT TO AASHTO FM1-T 180 METHOD D, AS PER FDOT SECTION 290 GRANULAR BASE SPECIFICATIONS.

TRENCHING OUTSIDE THE 1:2 CONTROL LINE SHALL BE CONSTRUCTED TO FDOT STANDARD SPECIFICATIONS SECTION 120-9.

**RIGHT OF WAY NO-ACTIVITY ZONE LOCATIONS**

NTS

NOTE:  
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PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

**RIGHT OF WAY NO-ACTIVITY ZONE LOCATIONS**

APPROVED BY \_\_\_\_\_

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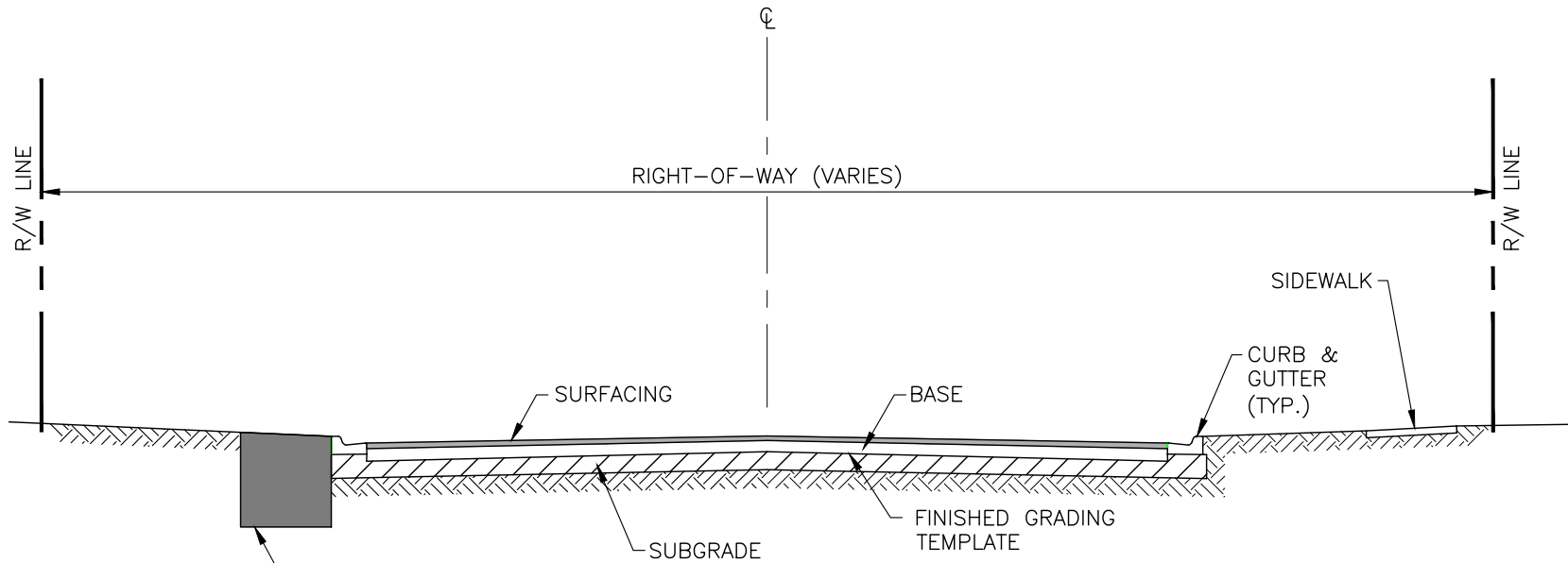
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SINGLE POINT SHOULDER EXCAVATION AREA SHALL BE COMPACTED PER PASCO COUNTY TESTING SPECIFICATIONS FOR CONSTRUCTION OF ROADS, STORM DRAINAGE AND UTILITIES. THIS AREA SHALL BE MAINTAINED FOR ONE YEAR AFTER EXCAVATION IN ACCORDANCE WITH THE RIGHT OF WAY USE PERMIT.

MAXIMUM AREA EXCAVATED SHALL BE FIVE FEET BY FIVE FEET BY FIVE FEET (5'x5'x5').

### SINGLE POINT SHOULDER EXCAVATION

NTS

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PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

### SINGLE POINT SHOULDER EXCAVATION DETAIL

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REVISED \_\_\_\_\_

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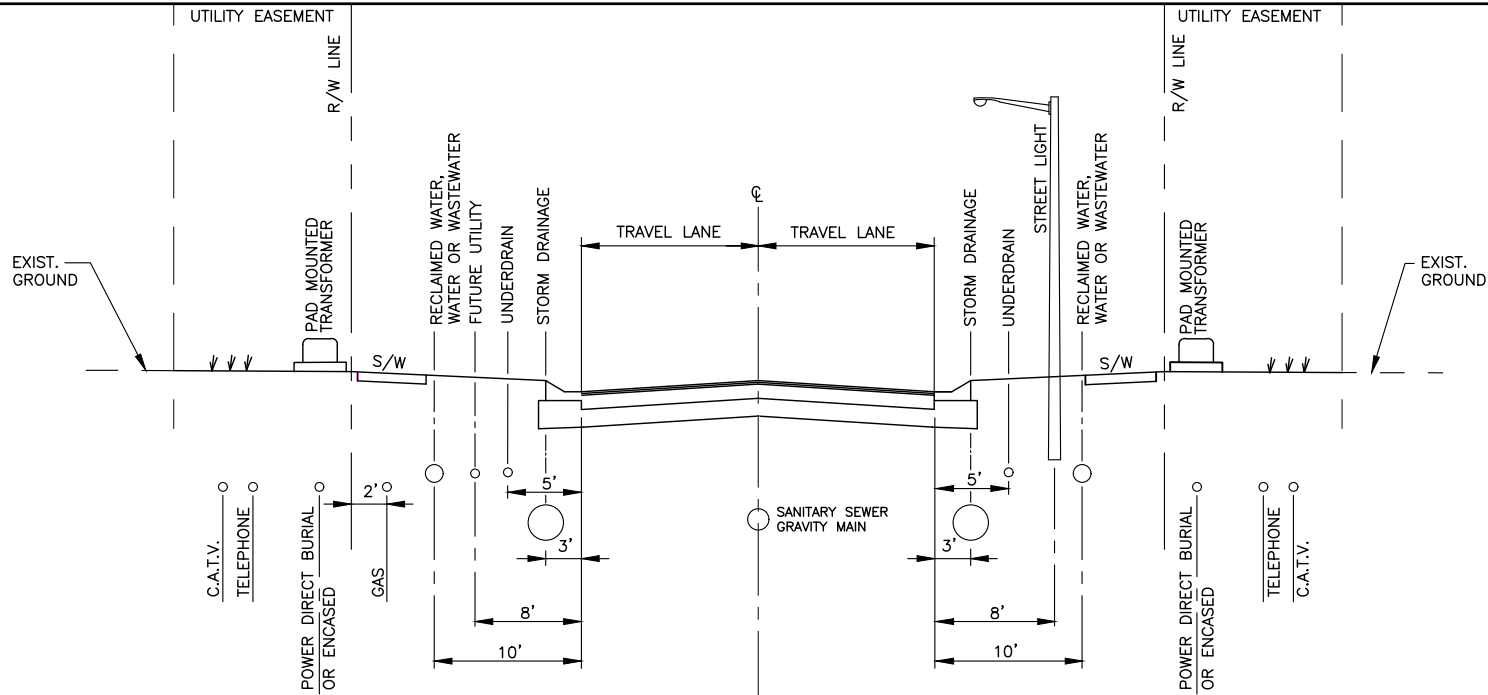
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### TYPICAL ROADWAY SECTION - URBAN

N. T. S.

#### NOTES:

1. COVER DEPTH AND SEPARATION FORM OTHER UTILITIES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE RESPECTIVE UTILITIES.
2. RECLAIMED WATER LINE TO BE PLACED ON OPPOSITE SIDE OF ROAD OF THE POTABLE WATER LINE.
3. OTHER CONFIGURATIONS MAY BE REQUIRED BY COUNTY ENGINEER.

NOTE:  
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PASCO COUNTY  
ENGINEERING SERVICES  
**DESIGN  
STANDARDS**

### TYPICAL UTILITY PLACEMENT DETAIL

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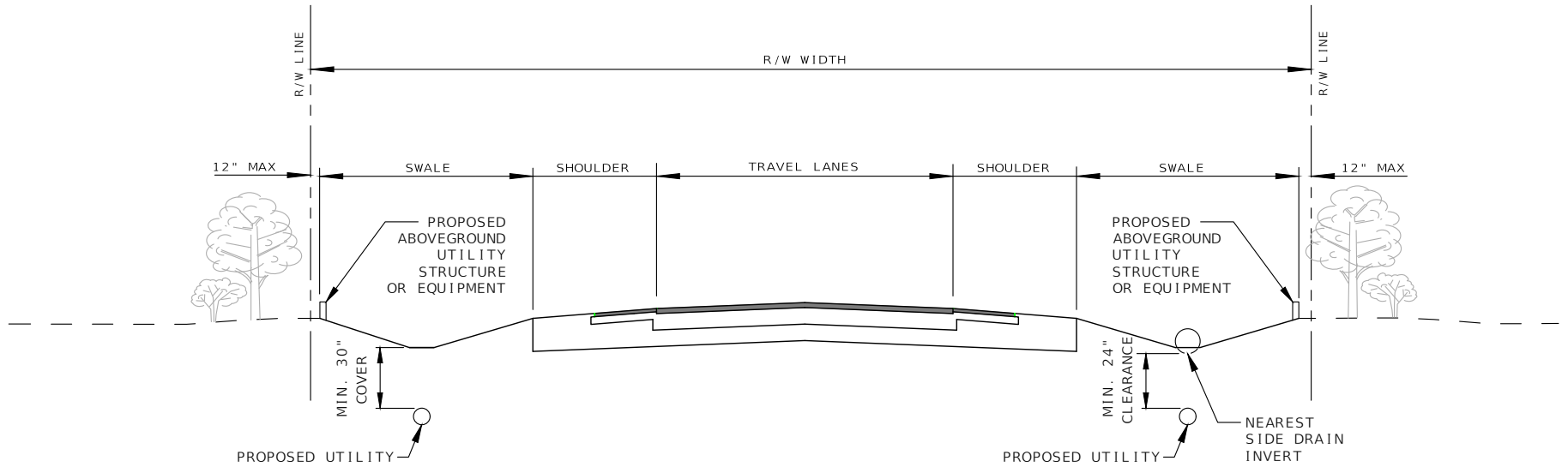
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**UTILITY INSTALLATION IN SWALE NEAR CULVERT**  
**NTS**

NOTE:  
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PASCO COUNTY  
 ENGINEERING SERVICES  
**DESIGN  
 STANDARDS**

**UTILITY INSTALLATION DETAIL  
 RURAL ROADWAY TYPICAL SECTION**

APPROVED BY \_\_\_\_\_

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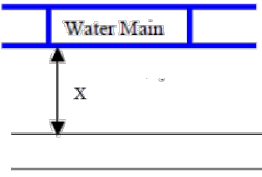
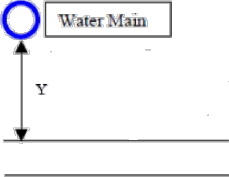
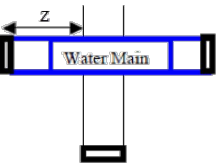
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**LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH RULE 62-555.314, F.A.C.**

The following table summarizes the required separation distances from public water mains to other pipes as provided in Rule 62-62-555.314, F.A.C. Exceptions to these required distances are addressed on the second page.


**Separation Requirements for Public Water System Mains:**

Other Pipe	Horizontal Separation (X) 	Crossings Vertical Separation (Y) 	Joint Spacing (Z) @ Crossings (Full Joint Centered) 
<ul style="list-style-type: none"> <li>Storm Sewers</li> <li>Stormwater Force Mains</li> <li>Reclaimed Water Pipelines regulated under Part III of Chapter 62-610, F.A.C.</li> </ul>	3 ft. minimum	For water main installed above other pipe (preferred), 12 inches is the minimum except for storm sewer, then 6 inches is the minimum and 12 inches is preferred  12 inches minimum if water main is below other pipe	Alternate 3 ft. minimum
<ul style="list-style-type: none"> <li>Vacuum Sanitary Sewer</li> </ul>	10 ft. preferred 3 ft. minimum	For water main installed above other pipe, 12 inches preferred and 6 inches minimum  12 inches minimum if water main is below other pipe	Alternate 3 ft. minimum
<ul style="list-style-type: none"> <li>Gravity or Pressure Sanitary Sewer</li> <li>Sanitary Sewer Force Main</li> <li>Reclaimed Water Pipelines not regulated under Part III of Chapter 62-610, F.A.C.</li> </ul>	10 ft. preferred 6 ft. minimum (note - 3 ft. minimum for gravity sanitary sewer where the bottom of the water main is laid at least 6 inches above the top of the gravity sanitary sewer)	For water main installed above other pipe (preferred), 12 inches is the minimum except for gravity sewer, then 6 inches is the minimum and 12 inches is preferred  12 inches minimum if water main is below other pipe	Alternate 6 ft. minimum
<ul style="list-style-type: none"> <li>On-Site Sewage Treatment &amp; Disposal System</li> </ul>	10 ft. minimum	NA	NA

Refer to the next page for exceptions to the minimum separation requirements provided above.

**Disclaimer – This document is provided for your convenience only. Please refer to Rule 62-555.314, F.A.C., for additional construction requirements.**

NOTE:  
NO DEVIATIONS TO THIS DETAIL WILL BE PERMITTED UNLESS APPROVED BY THE COUNTY ENGINEER OR DESIGNEE.  
ANY PROPOSED ALTERATIONS SHALL BE CLEARLY IDENTIFIED AND HIGHLIGHTED ON DETAIL.

	PASCO COUNTY ENGINEERING SERVICES <b>DESIGN STANDARDS</b>	<b>LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH 62-555.314 (5) (a), F.A.C. (1)</b>		DWG. NO. 120-1
APPROVED BY _____		BCC APPROVAL _____ REVISED _____		

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**EXCEPTIONS TO MINIMUM SEPARATION REQUIREMENTS**

Where it is not technically feasible or economically sensible to comply with the requirements of 62-555.314(1) or (2), F.A.C., **the Department shall allow exceptions to these requirements if suppliers of water or construction permit applicants provide technical or economic justification for each exception and provide alternative construction features that afford a similar level of reliability and public health protection.**

Acceptable alternative construction features include the following:

**LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH 62-555.314(5)(a), F.A.C.**

Figure 1. Horizontal separation distance X less than required but not less than 3 feet

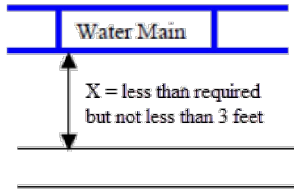
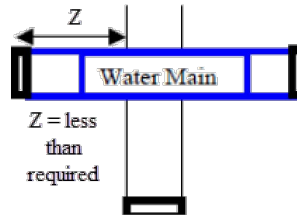


Figure 2. Joint spacing distance Z less than required



Where an underground water main is being laid **less than the required minimum horizontal distance** from another pipeline and where an underground water main is **crossing another pipeline and joints in the water main are being located less than the required minimum distance from joints in the other pipeline:**

1. Use of pressure-rated pipe conforming to the American Water Works Association standards incorporated into Rule 62-555.330, F.A.C., for the other pipeline if it is a gravity- or vacuum-type pipeline;
2. Use of welded, fused, or otherwise restrained joints for either the water main or the other pipeline; **or**
3. Use of watertight casing pipe or concrete encasement at least four inches thick for either the water main or the other pipeline.

**LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH 62-555.314(5)(b), F.A.C.**

Figure 3. Horizontal separation distance X less than 3 feet

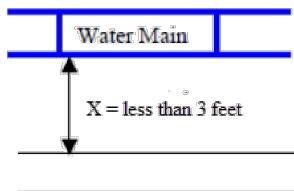
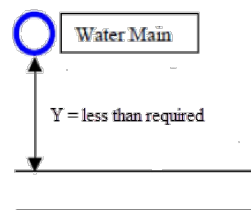


Figure 4. Crossing vertical separation distance Y less than required




Where an underground water main is being laid **less than three feet horizontally** from another pipeline and where an underground water main is **crossing another pipeline and is being laid less than the required minimum vertical distance from the other pipeline:**

Use of pipe, or casing pipe, having high impact strength (i.e., having an impact strength at least equal to that of 0.25-inch-thick ductile iron pipe) or concrete encasement at least four inches thick for both the water main **and** for the other pipeline if it is new and is conveying wastewater or reclaimed water.

**Disclaimer – This document is provided for your convenience only. Please refer to Rule 62-555.314, F.A.C., for additional construction requirements.**

NOTE:  
NO DEVIATIONS TO THIS DETAIL WILL BE PERMITTED UNLESS APPROVED BY THE COUNTY ENGINEER OR DESIGNEE.  
ANY PROPOSED ALTERATIONS SHALL BE CLEARLY IDENTIFIED AND HIGHLIGHTED ON DETAIL.

 <p>PASCO COUNTY ENGINEERING SERVICES <b>DESIGN STANDARDS</b></p>	<p><b>LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH 62-555.314 (5) (a), F.A.C. (1)</b></p>	
	<p>APPROVED BY _____</p>	<p>BCC APPROVAL _____ REVISED _____</p>

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## **APPENDIX B**

### **Form 901.3.A Access Connection Permit Application**

**FORM 901.3.A  
PASCO COUNTY  
ACCESS CONNECTION PERMIT APPLICATION**

The following information is required from all applicants directly or indirectly accessing any collector or arterial road or as otherwise directed by the County Engineer:

**Basic Information:**

Step 1. Name of Project: \_\_\_\_\_ County  
Assigned Project No.: \_\_\_\_\_ Project  
Location (road name/vicinity): \_\_\_\_\_  
\_\_\_\_\_  
Speed Limit: \_\_\_\_\_

Step 2. Existing Property Use (size in square feet and/or the number of units, etc.):  
\_\_\_\_\_  
\_\_\_\_\_

Step 3. Proposed property use, including any interim traffic generating uses such as heavy vehicles in brackets [ ] (size in square feet and the number of units):  
\_\_\_\_\_  
\_\_\_\_\_

Step 4. Provide the location of all existing and proposed connections to the property. This will include a location map and site plan of any physical features (existing and/or proposed) that will have an impact on traffic circulation and sight distance on the County road system and may include an aerial photograph. Examples of such physical features are walls, fences, trees, gates, utility poles, etc.:  
\_\_\_\_\_  
\_\_\_\_\_

Step 5. Describe any unique traffic-safety issues with the access; i.e., sight-distance problems:  
\_\_\_\_\_  
\_\_\_\_\_

Step 6. Trip Generation Data and Total Trip Generation: The *Institute of Transportation Engineers (ITE) Handbook*, latest edition, is acceptable as a source. Other sources may be required by and/or authorized of the County Engineer. Land excavation and mining (as defined in Appendix A) and removal of more than 30,000 cubic yards, even as an interim use, is presumed to be a separate and distinct land use requiring separate trip-generation estimates. Such land use is also presumed to generate more than ten (10) percent heavy vehicles. Heavy vehicles adversely affect traffic, because they occupy more roadway space and have poorer operating capabilities than passenger cars, particularly with regard to acceleration, deceleration, and the ability to maintain speed on upgrades. Accordingly, for trip-generation purposes, if heavy vehicles are ten (10) percent or more of the trips generated by the proposed land use, the total estimated trips for heavy vehicles shall be multiplied by two (2) unless ITE heavy vehicle data or other County-approved, heavy vehicle, trip- generation data for the land use support a different multiplier; however, in no event shall the multiplier be less than one (1). Provide trip generation from interim traffic generating uses in brackets [ ].

Source: \_\_\_\_\_

ITE code (if used): \_\_\_\_\_

Existing maximum peak hour trip generation: \_\_\_\_\_(1)

Net increase in maximum peak hour trip generation: \_\_\_\_\_(2)

Total maximum peak hour trip generation: \_\_\_\_\_(Add 1 & 2)

Estimated peak hour trips from heavy vehicles\* included in the total maximum:

\_\_\_\_\_ (a)

Heavy vehicle multiplier \_\_\_\_\_(b)

Additional heavy vehicle trips (multiply a X b-1) \_\_\_\_\_(c)

If (c) is  $\geq$  ten (10) percent of total maximum peak hour trip generation, list additional heavy vehicle trips from (c) \_\_\_\_\_(3).

Total maximum peak hour trip generation with heavy vehicles \_\_\_\_\_(Add 1, 2, & 3)

If the total maximum peak hour trip generation from Step 6 above does not exceed the thresholds set forth in [Appendix C, Exhibit 1.4A](#) 901.4-A, "Size of Development that Generates 50 Peak Hour Trips," no further information is required. However, a substandard road fair-share payment pursuant to [LDC](#) this Code, Section 901.4, as it may be amended from time-to-time, may still be required.

If the total maximum peak hour trip generation from Step 6 above exceeds the thresholds set forth in [Appendix C, Exhibit 1.4A](#) 901.4-A, "Size of Development that Generates 50 Peak Hour Trips," then Steps 7 and 8 are required to be completed. Step 7 is required

prior to proceeding with "Turn Lane Warrants and Design Criteria," and Step 8 is required to address any substandard road issues.

The County Engineer may require more detailed access-management information or a more detailed access management study where the County Engineer determines (1) that the information on this form is inadequate to determine compliance with the access-management regulations or (2) that the information or study is necessary to ensure the safety of the traveling public. In such circumstances, the standards of LDC Section 901.3.E.3 shall apply.

Additional traffic data is required for projects exceeding 100 driveway trips per day.

Step 7. Existing counts on the public roadway ([www.pascocountyfl.net](http://www.pascocountyfl.net). Recent data, if available on this website, may be acceptable):

a. P.M. peak	NB	SB	EB	WB
A.M. peak	NB	SB	EB	WB

Date and source of the count: \_\_\_\_\_

b. Using the ITE *Trip Generation Handbook* or trip rates as approved by the County, provide trip generation of the proposed site during a.m. and p.m. peak periods of the adjacent public road. Provide trip generation from interim traffic generating uses in brackets [ ].

P.M. peak hour trips: \_\_\_\_\_

A.M. peak hour trips: \_\_\_\_\_

If additional heavy vehicle trips from Step 6 are  $\geq$  ten (10) percent of the total maximum

Heavy Vehicle Trip Generation: Provide additional a.m. and p.m. peak hour trips for heavy vehicles utilizing the same multiplier and formula from Step 6:

Additional heavy vehicle p.m. peak hour trips: \_\_\_\_\_

Additional heavy vehicle a.m. peak hour trips: \_\_\_\_\_

Total p.m. peak hour trips with heavy vehicle trips: \_\_\_\_\_

Total a.m. peak hour trips with heavy vehicle trips: \_\_\_\_\_



- c. Provide a sketch illustrating the distribution of the project traffic during the a.m. and p.m. peak periods of the adjacent public road.



Proceed with Warrants and Turn-Lane Design Criteria.

- Step 8. Perform a Substandard Roadway Analysis in accordance with ~~this Code~~, LDC Section 901.4.

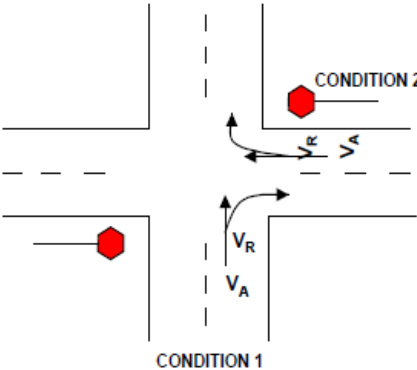
### TURN-LANE WARRANTS AND DESIGN CRITERIA DEFINITIONS OF TERMS

Access Road	Driveways or roads connecting developments, such as shopping centers or office parks, to major roads and do not serve major road through traffic.
Vehicles Per Hour (VPH)	The design hourly volume during the peak fifteen (15) minutes of the highest peak hour expressed in terms of VPH (peak fifteen [15] minute volume times four [4]).
$V_A$ —Approaching Volume (VPH)	Total volume approaching the intersection from the subject direction includes right- and left-turning and through vehicles.
$V_O$ —Opposing Volume (VPH)	Total volume approaching the intersection from the opposite direction.
$V_L$ —Left Turning Volume (VPH)	Volume of vehicles turning left at the subject intersection.
$V_R$ —Right Turning Volume (VPH)	Volume of vehicles turning right at the subject intersection.
% of Left Turns in $V_A$	Volume of left-turning vehicles divided by the approaching volume at the subject intersection.

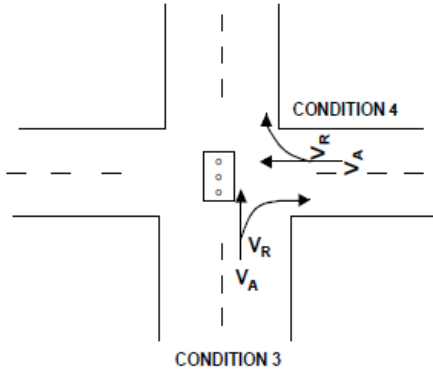
**Table 1.1 Right-Turn Warrants**

<b>Unsignalized</b>		
Condition 1	On major roads without stop control (approach).	See Graph Nos. 1A and 1B
Condition 2	Access roads or major through roads with stop control (approach).	$V_R \geq 150$ <b>OR</b> There are 5 or more related accidents in 1 year.
<b>Signalized</b>		
Condition 3	On major roads (approach).	$V_R \geq 150$ <b>AND</b> The total outside lane approach volume ( $V_A$ ) is at least 200 VPH (including right turn). <b>OR</b> There are 5 or more related accidents in 1 year.
Condition 4	On access roads approach.	$V_R \geq 150$ <b>OR</b> There are 5 or more related accidents in 1 year.



CONDITION 1  
UNSIGNALIZED



CONDITION 3  
SIGNALIZED

**NOTES:**

1. When public safety so requires due to site-specific conditions, such as limited sight distance, high-traveling speed, or the presence of a significant percentage of heavy vehicles, a turn lane may be required by the County Engineer even though the criteria in Graphs 1A and 1B are not met.
2. The provisions of the right-turn warrants may be modified by the County Engineer if it is determined that due to site-specific constraints, the implementation will not be feasible or practical.
3. At high speed (forty-five [45] mph or greater), unsignalized/signalized intersections, a separate right turn lane may be required by the County Engineer for safe operations. A high speed shall be the greater of the posted or operating speed where an operating speed study has been conducted.

**Table 1.2 Left-Turn Warrants**

<b>Unsignalized</b>		
Condition 1	On major roads without stop control (approach).	See Graph Nos. 2A through 2D
Condition 2	On access roads or through roads (approach).	$V_L \geq 100$ OR There are 4 or more related accidents in 1 year.
<b>Signalized</b>		
Condition 3	On major roads (approach).	$V_L \geq 100$ OR 20 percent or more of the total approach volume in the inside lane is left turn. OR There are 5 or more related accidents in 1 year.
Condition 4	On access roads or through roads approach.	$V_L \geq 100$ OR There are 5 or more related accidents in 1 year.

CONDITION 1  
UNSIGNALIZED

CONDITION 2

CONDITION 3  
SIGNALIZED

CONDITION 4

**NOTES:**

1. An exclusive left-turn lane at signalized intersections or on access roads and through roads with stop control are more often needed to reduce the total delay to the approaching vehicles; therefore, use of traffic engineering software, with the approval of the County Engineer, may be used.
2. When public safety so requires due to site-specific conditions, such as limited sight distance, high-traveling speed, or the presence of a significant percentage of heavy vehicles, a turn lane may be required by the County Engineer even though the criteria in Graphs 2A through 2D are not met.
3. The provisions of the left-turn warrants may be modified by the County Engineer if it is determined that due to site-specific constraints, the implementation will not be feasible or practical.
4. A dual left-turn lane may be required by the County Engineer when the left-turn volume exceeds 300 VPH.
5. At high speed (forty-five [45] mph or greater), unsignalized/signalized intersections, a separate left-turn lane may be required by the County Engineer for safe operations. A high speed shall be the greater of the posted or operating speed where an operating speed study has been conducted.

**Table 1.3 Right-Turn Lane Length (Deceleration and Storage)**

<b>Unsignalized</b>		
Condition 1	On major roads without stop control and on major through roads with stop control (approach).	Deceleration Length: FDM Chapter 212  Storage Length: 25 feet desirable unless there are site-specific conditions that require a longer storage length.
Condition 2	On access roads (approach).	Deceleration Length: Taper only  Storage Length = $V_R/2$
<b>Signalized</b>		
Condition 3	On major roads (approach).	Deceleration Length: FDM Chapter 212  Storage Length = $V_R/2$
Condition 4	On access roads (approach).	Deceleration Length: FDM Chapter 212  Storage Length = $V_R/2$

**NOTES:**

1. In many instances, the storage length of a right-turn lane at signalized intersections or access/major roads with stop control is dictated by the required storage length for left and/or through movements. Refer to the left-turn section for determining the storage length for a left turn.
2. If the right-turn flow is limited due to heavy volume of conflicting movements, then the storage length shall be based on the left-turn storage length formula.
3. The provision of storage lengths and deceleration lengths may be modified or waived by the County Engineer if it is determined that, due to site-specific constraints, the implementation will not be feasible or practical.
4. Traffic engineering software, with the approval of the County Engineer, may be used to determine the storage length for right turns.

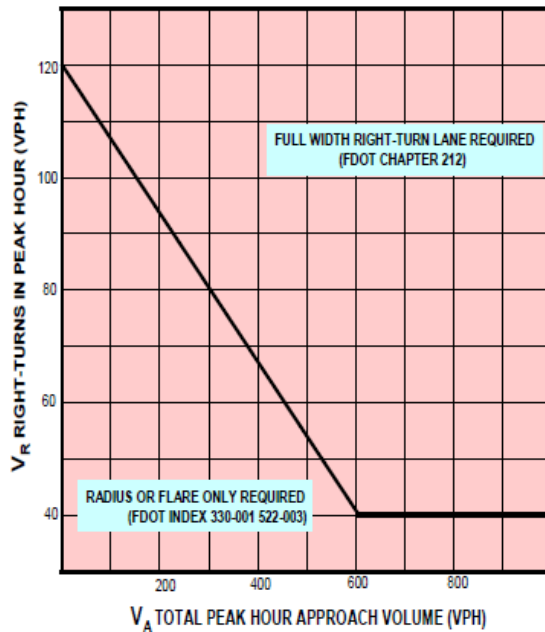
**Table 1.4 Left-Turn Lane Lengths (Deceleration and Storage)**

<b>Unsignalized</b>		
Condition 1	On major roads (approach).	Deceleration Length: FDM Chapter 212 Storage Length = $25 \times V_L/30$
Condition 2	On access roads (approach).	Deceleration Length: Taper only Storage Length = $25 \times V_L/30$
<b>Signalized</b>		
Condition 3	On major roads (approach).	Deceleration Length: FDM Chapter 212 Storage Length = $2 \times 25 \times V_L/N$
Condition 4	On access roads (approach).	Deceleration Length: FDM Chapter 212 Storage Length = $2 \times 25 \times V_L/N$

**NOTES:**

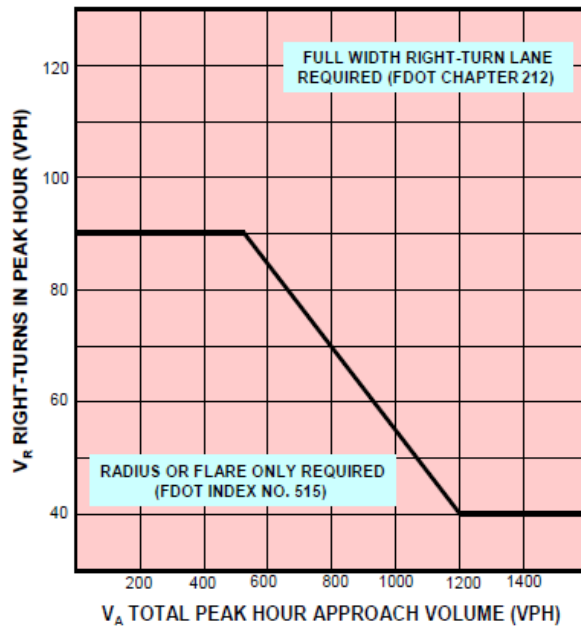
1. N = The number of traffic signal cycles per hour. Use thirty (30) as a default (assumes 120-second cycle length).
2. If the formula yields a storage length of less than fifty (50) feet for unsignalized intersections, then a minimum storage of fifty (50) feet shall be provided.
3. If the formula yields a storage length of less than 100 feet for signalized intersections, then a minimum storage of 100 feet shall be provided.
4. The provision of storage and deceleration lengths may be modified or waived by the County Engineer if it is determined that due to site-specific constraints, the implementation will not be feasible or practical.
5. In some instances at signalized intersections or on access/major roads with stop control, the storage length of the left turn is dictated by the through or right movements. Unless otherwise approved by the County Engineer, the storage length for all movements shall be calculated and the highest length shall be used. For through-storage length, the same formula as the left turn can be used. Refer to right-turn section for determining the storage length for right turns.
6. Traffic engineering software, with the approval of the County Engineer, may be used to determine the storage length for right turns.

GRAPH 1A. RIGHT-TURN LANE WARRANTS – TWO-LANE FACILITIES



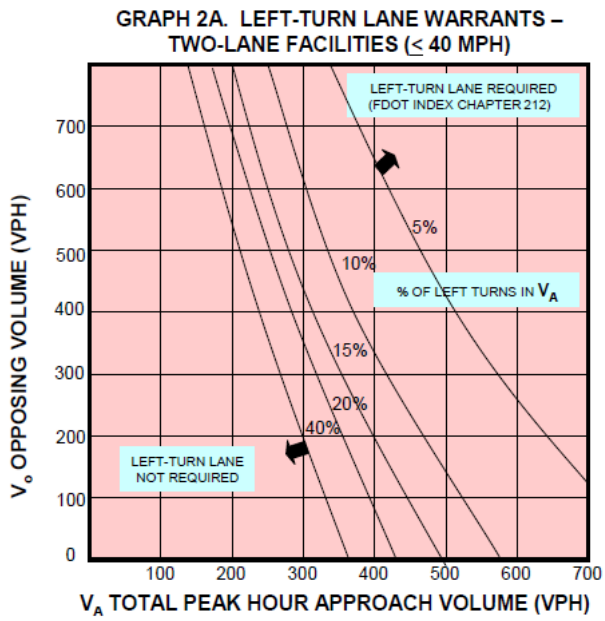
**NOTE:** For posted speeds at or under forty-five (45) mph, peak hour right turns greater than forty (40) VPH, and total peak hour approach less than 300 VPH, adjust right turn volumes. Adjust peak hour right turns = peak hour right turns-twenty (20).

GRAPH 1B. RIGHT-TURN LANE WARRANTS  
FOUR- OR SIX-LANE FACILITIES

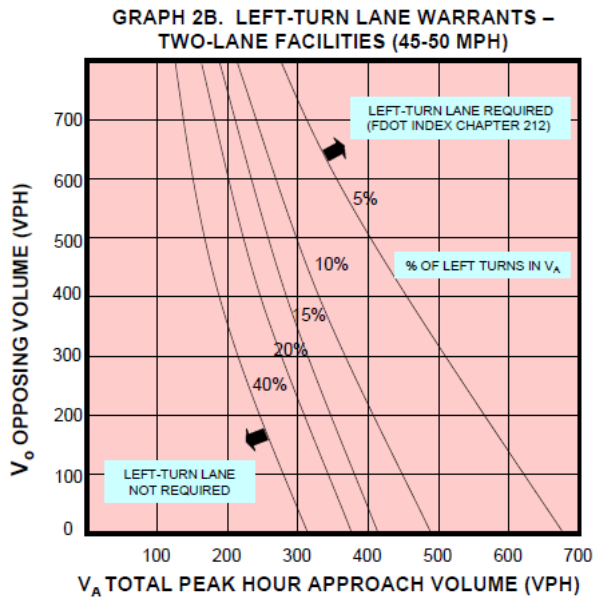


**NOTE:** For application on high speed highways.

Graphs 1A & 1B Source: National Cooperative Highway Research Program, Report No. 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  $V_A$ .

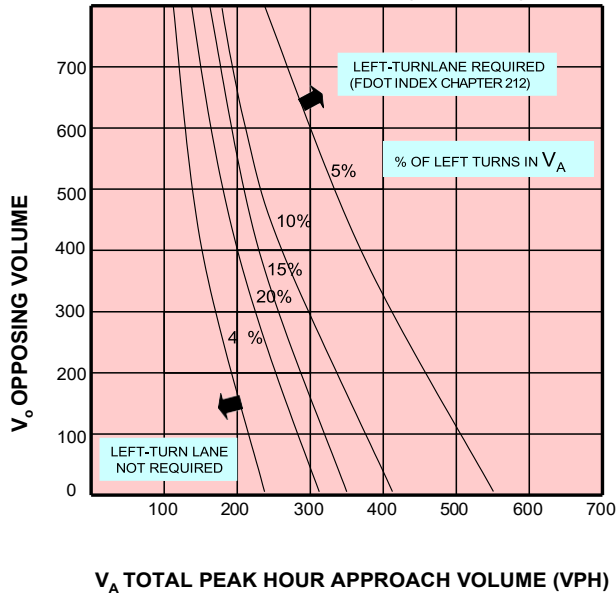


**NOTE:** Left-turn lane not required when intersection of  $V_A$  and  $V_O$  is below the curve corresponding to the % of left turns in  $V_A$ .

Graphs 2A & 2B Source: National Cooperative Highway Research Program, Report No. 279.

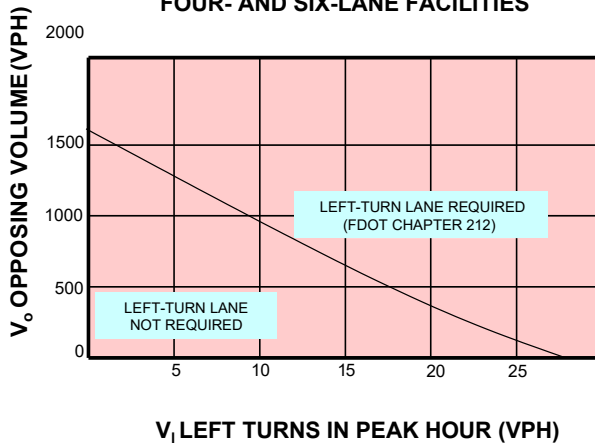


**GRAPH 2C. LEFT-TURN LANE WARRANTS – TWO-LANE FACILITIES (55-60 MPH)**



**NOTE:** Left-turn lane not required when intersection of V<sub>A</sub> and V<sub>O</sub> is below the curve corresponding to the % of left turns in V<sub>A</sub>.

**GRAPH 2D. LEFT-TURN LANE WARRANTS – FOUR- AND SIX-LANE FACILITIES**



**NOTE:** When V<sub>O</sub> < 400 VPH, a left-turn lane is not normally warranted unless the advancing volume (V<sub>A</sub>) in the same direction as left-turning traffic exceeds 400 VPH. (V<sub>A</sub> > 400 VPH).

Graphs 2C & 2D Source: National Cooperative Highway Research Program, Report No. 279.

**SAMPLE PROBLEM NO. 1**

Steps 1-6

1. Ninety-four (94) unit apartment complex. West side of Rowan Road, north of Nebraska Avenue (Main Street). Four (4) lane urban. Speed limit forty-five (45) mph.
2. Existing use—vacant.
3. Proposed use—apartments.
4. Site plan, etc., not included in sample.
5. Proposed access on Rowan Road, west side, at existing median opening, approximately 365 feet north of Indiana Avenue. No existing turn lane facilities north or southbound. No other access to this site is proposed.
6. Source: ITE, 6<sup>th</sup> Edition  
 ITE Code: 220  
 Existing Maximum Trip Generation: 0  
 Net Increase in Maximum Trip Generation: 698  
 From ITE: No. of Trips = (5.994 X 94 units) + 134.114 = 698

**Total Maximum Peak Hour Trip Generation: 698**

If the total maximum peak hour trip generation is greater than 50 and no Traffic Impact Study is required pursuant to this Code, [LDC Section](#) 1301, proceed with Step 7.

Step 7

7. From the Pasco County Traffic Operations Division, Traffic Count File for Rowan Road (C.R. 77) (Section 820.1):

P.M. Peak	<u>455</u> NB	<u>385</u> SB	<u>N/A</u> EB	<u>N/A</u> WB
-----------	------------------	------------------	------------------	------------------

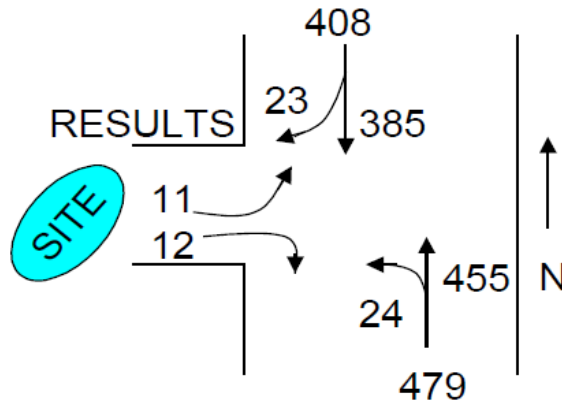
A.M. Peak Not Available

Total Daily Count: 23,624 (ADT) 10/4/01

From ITE Manual, P.M. Peak Hour Trips = (0.541 X 94 units) + 18.744 = 70 trips

A.M. Peak Hour Trips: N/A

From ITE, 67 percent (47) entering and 33 percent (23) exiting. Say 50/50 directional distribution



Proceed to Warrants and Turn-Lane Design Criteria.

**Right-Turn Warrants**

From Table 1, Condition 1, see Graph 1B to check warrants for the southbound, right-turn lane on Rowan Road.

$$V_R = 23, V_A = 385 + 23 = 408$$

From Graph 1B, a full width, right-turn lane is not warranted.

**Left-Turn Warrants**

From Table 2, Condition 1, see Graph 2D to check warrants for the northbound, left-turn lane on Rowan Road.

$$V_L = 24, V_A = 455 + 24 = 479, V_O = 385 + 23 = 408$$

From Graph 2D, the intersection of  $V_O$  and  $V_L$  is to the right of the curve; therefore, a left-turn lane is required.

**Left-Turn Lane Lengths**

From Table 4, Condition 1, the required deceleration length is determined by FDM Chapter 212. A total deceleration distance length of 185 feet is required for the forty-five (45) mph urban condition and includes the fifty (50) foot taper length.

The required storage length(queue) is calculated as follows:

$$\text{Storage Length} = 25 \times V_L / 30 = 25 \times 24 / 30 = 20 \text{ feet}$$

Per Note 1, the required minimum storage length is fifty (50) feet. This is in addition to the 185-foot deceleration, for a total deceleration and storage length of 235 feet.

## **APPENDIX C**

# **TIS Trip Generation Guidelines**

EXHIBIT 1.4A

**Size Of Development that generates Over 20, 100 and 500 Daily Trips**

LAND USE	Daily Trip Rate	Size of Development Generating over 20 Daily Trips	Size of Development Generating over 100 Daily Trips	Size of Development Generating over 500 Daily Trips	UNIT
<b>RESIDENTIAL:</b>					
Single-Family (Detached)	9.44	3	11	53	DU
Multifamily Housing (Low-Rise)	7.32	3	14	69	DU
Mobile Home Park	5.00	4	20	100	DU
Age-Restricted Single-Family	3.71	6	27	135	DU
Congregate-Care Facility (Attached)	2.25	9	45	223	DU
Multifamily Housing (Mid-Rise)	5.44	4	19	92	DU
Multifamily Housing (High-Rise)	4.45	5	23	113	DU
<b>LODGING:</b>					
Hotel	8.36	3	12	60	Room
Motel	3.35	6	30	150	Room
<b>RECREATION:</b>					
Marina	2.41	9	42	208	Berth
Golf Course	30.38	1	4	17	Hole
Movie Theaters	220.00	1	1	3	Screen
Recreational Community Center	28.82	1	4	18	1,000 SF
<b>INSTITUTIONAL:</b>					
Hospital	10.72	2	10	47	1,000 SF
Nursing Home	3.06	7	33	164	Bed
Elementary School	1.89	11	53	265	Student
Middle School	2.13	10	47	235	Student
High School	2.03	10	50	247	Student
Junior/Community College	1.15	18	87	435	Student
University	1.56	13	65	321	Student
Church	6.95	3	15	72	1,000 SF
Day Care	4.09	5	25	123	Student
Cemetery	6.02	4	17	84	Acres
<b>OFFICE:</b>					
General Office Building	9.74	3	11	52	1,000 SF
Medical Office	34.80	1	3	15	1,000 SF
Office Park	11.07	2	10	46	1,000 SF
Veterinarian Clinic	21.50	1	5	24	1,000 SF
<b>RETAIL:</b>					
Shopping Center	37.75	1	3	14	1,000 SF
Pharmacy/Drug Store with Drive-Through	109.16	1	1	5	1,000 SF
Home Improvement Superstore	30.74	1	4	17	1,000 SF
Hardware/Paint	9.14	3	11	55	1,000 SF
Quality Restaurant	83.84	1	2	6	1,000 SF
High-Turnover (Sit-Down) Restaurant	112.18	1	1	5	1,000 SF
Fast-Food Restaurant with Drive-Through	470.95	1	1	2	1,000 SF
Gasoline Station	172.01	1	1	3	Fuel Pos
Quick Lube	40.00	1	3	13	Bays
Self-Service Car Wash	108.00	1	1	5	Bays
Tire Store	28.52	1	4	18	1,000 SF
Automobile Sales (New)	27.84	1	4	18	1,000 SF
Automobile Sales (Used)	27.06	1	4	19	1,000 SF
Supermarket	106.78	1	1	5	1,000 SF
Convenience Store with Gas Pumps	624.20	1	1	1	1,000 SF
Furniture Store	6.30	4	16	80	1,000 SF
Drive-in Bank	100.03	1	1	5	1,000 SF
Super Convenience Market/Gas Station	837.58	1	1	1	1,000 SF
<b>INDUSTRY:</b>					
General Light Industrial	4.96	5	21	101	1,000 SF
Industrial Park	3.37	6	30	149	1,000 SF
Manufacturing	3.93	6	26	128	1,000 SF
Warehouse	1.74	12	58	288	1,000 SF
Mini-Warehouse	1.51	14	67	332	1,000 SF
High-Cube Warehouse	1.40	15	72	358	1,000 SF

NOTES: For land uses not listed herein, or land uses with higher weekend trip generation, either the *ITE Trip Generation Handbook*, latest edition, or other trip-generation studies as approved by the County shall be used.

To estimate total daily driveway trips for land uses listed herein with heavy vehicles that are 10 percent or more of the total daily driveway trips, the total estimated daily driveway trips for heavy vehicles shall be multiplied by 2, unless ITE heavy vehicle data or other County-approved heavy vehicle trip generation data for the land use support a different multiplier; however, in no event shall the multiplier be less than 1. The size of development thresholds listed herein may be reduced based on additional heavy vehicle trips.

Source: *ITE Trip Generation Handbook, 10<sup>th</sup> Edition.*

## **APPENDIX D**

### **SUPPLEMENTAL SPECIFICATIONS**

**SOIL-CEMENT BASE (FOR LOCAL AGENCY USE – FDOT ARCHIVE SPECIFICATION)**

**SOIL-CEMENT BASE (FOR LOCAL AGENCY USE – FDOT ARCHIVE SPECIFICATION).  
(REV 1-01-00) (1-13)**

**SECTION 270  
SOIL-CEMENT BASE**

**270-1 Description.**

Construct a base course composed of a combination of soil, portland cement, and water.

**270-2 Materials.**

Meet the following requirements:

Cement: Portland Cement, Type I, II, III, or Type IP or Type IS.....Section 921

Water: Use water that is free from substances deleterious to hardening of the soil-cement mixture.

Curing Material: ..... 916-4

Use Emulsified Asphalt Grade SS, RS, or MS as approved by the Engineer. Dilute these as recommended by the manufacturer.

Soil: For base course construction, use either the material existing in the location to be occupied by the base, a suitably friable material furnished by the Contractor, or a combination of these. If the material existing in the location to be occupied by the base does not meet the requirements specified below, remove and replace it with suitable soil.

Obtain approval of the material pits prior to use. Excavate material pits to achieve a uniformly mixed material with reasonably consistent characteristics. Blend strata or differing materials in accordance with a procedure approved by the Engineer. The Department will consider proposed recycled materials on a case by case basis.

Specific Requirements For Soil:

- Organic Material (As per FM 1-T267) .....Maximum 5%
- Total Clay and Silt Content (minus No. 200 [75µm sieve) (As per AASHTO T 88, no hydrometer test).....Maximum 25%
- Plastic Index (As per AASHTO T 90).....Maximum 10%
- Liquid Limit (As per AASHTO T 89) .....Maximum 25%
- Gradation: (As per AASHTO T 88)
  - Passing 2 inch [50 mm] sieve ..... Minimum 100%
  - Passing No. 4 [4.75 mm] sieve ..... Minimum 55%
  - Passing No. 10 [2.00 mm] sieve ..... Minimum 37%

As an exception to the above requirements, the Contractor may use any material meeting the requirements for Limerock in Section 911.

**270-3 Proportioning of Mix.**

**270-3.1 General:** Proportion the soil-cement mixture in accordance with Strength Design or Brush Loss Criteria as specified below.

Submit for approval a design mix for the soil proposed for use in soil-cement construction prepared by a testing laboratory approved by the Engineer. With the design mix submittal, include the results of tests run to verify that the soil meets the requirements specified in 270-2, results of tests used to establish the cement content, and a final design laboratory

sample. Submit the design mix to the Engineer for approval a minimum of 60 calendar days prior to beginning of soil-cement construction for Brush Loss Design Method or 15 calendar days prior to beginning of soil-cement construction for Strength Design Method.

The Engineer will perform laboratory testing for design mix evaluation using water from the same source proposed for use during construction.

Express the cement as a percentage of the dry unit weight of the soil. For mixed-in-place construction, the Engineer will use a rate of application of cement based on the maximum density of the soil, determined in accordance with AASHTO T 99 and rounded up to the nearest pound per cubic yard [kilogram per cubic meter].

**270-3.2 Strength Design:** When proportioning the soil-cement mixture in accordance with strength design, the Engineer will determine the minimum cement content using FM 5-520. Achieve the design compressive strength specified in the plans in seven days. Ensure that the cement content is not less than 5% by weight, except as noted in 270-3.4.

**270-3.3 Brush Loss Design Criteria:** When proportioning the soil-cement mixture in accordance with this criteria, the Engineer will determine the minimum cement content in accordance with AASHTO T 135. Ensure that the soil-cement loss at the completion of 12 cycles of testing conforms to the following limits:

AASHTO Soils Groups A-1, A-2-4, A-2-5, and A-3 ..not over 14%

AASHTO Soils Groups A-2-6, A-2-7, A-4, and A-5 ..not over 10%

AASHTO Soils Groups A-6 and A-7 .....not over 7%

Ensure that the cement content is not less than 5% by weight, except as noted in

270-3.4.

When proportioning of soil-cement mixture by the Brush Loss Design Criteria Method and processing by Central-Plant-Mixing where the requirements of 270-3.4 are met, the Engineer will not require strength testing of field specimens. The Engineer will verify the properties of the parent material during the processing, on a random frequency, to ensure that the final mix has not changed from the original design. Ensure that the producer furnishes a printout to the Engineer of each day's production that shows proportioning of the mixture meets the approved Brush Loss Design, including cement.

**270-3.4 Exception for Central Mixed Materials:** Do not apply the minimum 5% cement content specified in 270-3.2 and 270-3.3 if obtaining the soil material used in producing a soil-cement mixture from a commercial source (not to exclude recycled materials) where soil properties are consistently uniform, and if processing the mixture in a central mix plant that automatically weighs components and automatically records the weight of each component on a printed ticket, tape, or other digital record.

## **270-4 Construction Methods.**

**270-4.1 Equipment:** For performing the work specified in this Section, use any machine, combination of machines, or equipment that is in good, safe working condition and that will produce results meeting the requirements for cement application, soil pulverization, mixing water application, compaction, finishing, and curing, as required herein. The Department directs special attention to the necessity for utilizing compaction equipment which will produce the required density in a particular soil-cement blend.

### **270-4.2 Preparation:**

**270-4.2.1 Subgrade:** Before beginning base construction operations, complete the subgrade. Ensure that the subgrade is firm enough to support the equipment used in the soil-



cement base operations without appreciable distortion or displacement. Remove any unsuitable material, and replace it with suitable material.

When constructing the base with central-plant-mixed soil-cement, grade and shape the subgrade to the lines, grades, and typical cross-section shown in the plans. Ensure that the subgrade is moist but not ponded at the time of placing the mixed base course material.

**270-4.2.2 Base Soil for Mixed-in-Place Processing:** Grade and shape the area over which the base is to be constructed to an elevation which will provide a base in conformance with the grades, lines, thickness, and typical cross-sections shown on the plans. Remove all roots, sticks, and other deleterious matter during processing.

**270-4.3 Processing of Soil-Cement Mixture:**

**270-4.3.1 General:** Mix the soil, cement, and water either by mixed-in-place or central-plant-mix methods.

Do not allow the percentage of moisture in the soil at the time of cement application to exceed the quantity that will permit a uniform and intimate mixture of soil and cement during mixing operations. With certain types of soils, the Engineer will designate a moisture range.

During seasons of freezing temperature, do not spread any cement or soil-cement mixture unless the ambient temperature is at least 40°F [4°C] in the shade and rising.

At the completion of moist-mixing, pulverize the soil so that 100% passes a 1 1/2 inch [37.5 mm] sieve, 95 to 100% passes the 1 inch [25.0 mm] sieve and a minimum of 80% passes a No. 4 [4.75 mm] sieve, exclusive of gravel, shell, or stone.

Continue the operations specified in 270-4.3, 270-4.4, 270-4.5, and 270-4.6 and complete them within a period of four hours starting from the time mixing commences.

**270-4.3.2 Mixed-in-Place Method:** Where feasible, process the entire width of the base in a single operation. Uniformly spread the design quantity of cement on the soil at the required rate of application, by means of an approved method. Replace spread cement that becomes displaced before starting mixing. The Engineer will check the uniformity of spread rate by (a) weight of cement spread/square yards [spread/square meters] covered for a short trial section that is between 100 and 300 feet [30 and 90 m] in length or (b) use of a square yard [square meter] cloth/box.

After applying the cement, begin mixing within 60 minutes. Initially mix the soil and cement until the cement has sufficiently blended with the soil to prevent formation of cement balls when applying additional water; then add water if necessary, and re-mix the soil-cement mixture. Do not perform windrow mixing.

The Contractor may process the full depth in one course, provided the Contractor obtains a satisfactory distribution of cement and water and the specified density. If not, construct courses of such thickness to obtain satisfactory results. Make provisions to achieve adequate bonding between courses.

Immediately after mixing of the soil and cement, add any additional water that is necessary. If the moisture content exceeds that specified, manipulate the soil-cement mixture by re-mixing or blading as required to reduce the moisture content to within the specified range. Avoid excessive concentrations of water. Continue mixing during and after applying water until obtaining a uniform and intimate mixture of soil, cement, and water.

As an alternative to the above described procedure, the Contractor may use an approved machine that will blend the cement and the soil and then add and mix-in any additional water that is necessary.

**270-4.3.3 Central-Plant-Mixed Method:** Mix the soil, cement, and water in a pugmill of either the batch or continuous-flow type. Equip the plant with feeding and metering devices which will accurately proportion the soil, cement, and water in the quantities specified. Mix soil and cement sufficiently to prevent cement balls from forming when adding additional water. Continue mixing until obtaining a uniform and intimate mixture of soil, cement, and water.

Haul the mixture to the roadway in trucks equipped with protective covers. Place the mixture on the moistened subgrade in a uniform layer with suitable equipment. Do not allow more than 60 minutes to elapse between placing of soil-cement in adjacent passes of the spreader at any location, except at construction joints. Ensure that the layer of soil-cement is uniform in thickness and surface contour, and in such quantity that the completed base will conform to the required grade and cross-section. Do not perform windrow mixing.

**270-4.4 Construction Joints:** Prior to joining any previously constructed section of base, form a vertical construction joint by cutting back into the completed work to form a true vertical face of acceptable soil-cement to the full depth of the base course. Moisten the vertical face, if directed, prior to placing new material against it.

**270-4.5 Shaping and Finishing:** Prior to final compaction, shape the surface of the soil-cement to the required lines, grades, and cross-section. In all cases where adding soil-cement mixture to any portion of the surface, lightly scarify the surface with a spring tooth harrow, spike drag, or other approved device to uniformly loosen the surface prior to adding material and prior to the initial set of the soil-cement mixture. Compact the resulting surface to the specified density. Continue rolling until all rutting ceases and until the base conforms to the density requirements.

Ensure that the surface material is moist but not ponded, and maintained at not less than 2% below its specified optimum moisture content, during finishing operations. Perform surface compaction and finishing in such a manner as to produce a smooth dense surface, free of compaction planes, construction cracks, ridges, and loose material. With certain soils, the Engineer may determine that minor tire marks are acceptable.

If the time limits specified in 270-4.3.1 are exceeded, leave the base undisturbed for a period of seven days, after which, the Engineer will examine it to determine its suitability. If the Engineer determines that it is suitable, the Department will fully compensate the Contractor, providing the base meets all other requirements specified herein. If found unsuitable, remove and replace the base without additional compensation. The Contractor may remove and replace the deficient base rather than wait seven days.

**270-4.6 Compaction:** Begin compacting the soil-cement mixture immediately after mixing or placing. Do not allow more than 30 minutes to elapse between the last pass of moist-mixing or spreading and the start of compaction of the soil-cement mixture at a particular location.

The Engineer will determine the optimum moisture content and the maximum density in the field by the methods prescribed in AASHTO T 134 on representative samples of the soil-cement mixture obtained immediately after the initial mixing. The Engineer will determine the density for each day's run or change of material.

Uniformly compact the loose material to meet the density requirements specified in 270-5.1. During compaction operations, the Contractor may reshape the material to obtain required grade and cross-section.

**270-4.7 Protection Against Drying:** While finishing and correcting the surface, keep the surface of the base continuously moist by sprinkling it as necessary until applying the emulsified asphalt curing material. As soon as practicable, protect the base from drying for seven days by applying the emulsified asphalt at the rate of 0.20 to 0.25 gallon [0.9 to 1.1 L] of the diluted mixture per square yard [square meter]. The Engineer will direct the actual rate of application that will provide complete coverage without excessive runoff. While applying the bituminous material, ensure that the soil-cement surface is dense, free of all loose and extraneous material, and contains sufficient moisture to prevent excessive penetration of the bituminous materials.

If it is necessary to allow construction equipment or other traffic to use the completed base before the bituminous material has cured sufficiently to prevent pickup or displacement, sand the bituminous material, using approximately 10 lbs [5 kg] of clean sand per square yard [square meter]. Do not use cover material containing organic acids or other compounds detrimental to the soil-cement base.

Maintain the curing material during the seven day protection period.

**270-4.8 Opening to Traffic:** Do not allow traffic on the base subsequent to completion of the finishing operations specified in 270-4.5 for a minimum period of 72 hours. As an exception to this requirement, allow equipment necessary for correction of surface irregularities, application of water, and application of curing materials on the base, provided that the tire contact pressures of such equipment do not exceed 45 psi [300 kPa]. Under special conditions (i.e. low speed limit, low traffic volume, urban conditions), the Engineer may waive the 72-hour period.

**270-4.9 Maintenance:** Maintain the base to a true and satisfactory surface until the wearing surface is constructed. If the Engineer requires any repairing or patching, extend the repair or patch to the full depth of the base, and make them in a manner that will ensure restoration of a uniform base course in accordance with the requirements of these Specifications. Do not repair the base by adding a thin layer of soil-cement or concrete to the completed work. The Contractor may make full depth repairs to small or minor areas, such as at manholes, inlets, or the like, with Class I concrete.

For patching of deficient areas less than 100 ft<sup>2</sup> [9 m<sup>2</sup>] and less than 1 inch [25 mm] in depth, correct the areas using Type S-III Asphalt Concrete. For patching of deficient areas less than 100 ft<sup>2</sup> [9 m<sup>2</sup>] and greater than 1 inch [25 mm] in depth, remove the areas to full depth, and replace them using Asphalt Base Course Type 3, Type S Asphalt Concrete, or soil-cement.

**270-4.10 Control of Quality:** Produce all Soil-Cement Base in accordance with an approved quality control plan in accordance with the Department's Standard Operating Procedure attached to this Specifications Package. In general, the procedure requires a written quality control plan stating how the Contractor will establish, maintain, and implement an individualized process control system to provide a product meeting the requirements of the applicable specifications.

## **270-5 Acceptance Requirements.**

**270-5.1 Density:** As soon as possible after completing compaction, the Engineer will perform field density testing to ensure that the required density is 97% of the maximum density as determined by methods prescribed in AASHTO T 134.

For density determination, a LOT is defined as 2,500 yd<sup>2</sup> [2,000 m<sup>2</sup>] of base. The Engineer may include any small section of base at the end of a day's operation in the preceding LOT (no LOT shall include more than 3,500 yd<sup>2</sup> [3,000 m<sup>2</sup>]) or consider it as a separate LOT.

The Engineer will perform five density tests at locations randomly selected within each LOT and will ensure that a LOT value is the average of the five density tests performed within the LOT.

If a LOT value is less than 97% of the maximum density, the Department will reduce payment for the LOT in accordance with the requirements of 270-7.

If an individual test value within a LOT is less than 94% of the maximum density, the Engineer will determine the extent of this deficiency by performing density tests using a 5 foot [1.5 m] grid pattern until a test value of 95% or greater is located in all directions. Remove the delineated area of base, and replace it with base meeting all requirements of this Section, at no expense to the Department.

As an exception to the foregoing, if three or more of the original five individual test values within a LOT are less than 94% of the maximum density, the Engineer will reject the entire LOT, and the Contractor shall remove all base within the LOT and replace it with base meeting all requirements of this Section, at no expense to the Department.

**270-5.2 Surface Finish:** After compacting and finishing, and not later than the beginning of the next calendar day after constructing of any section of base, measure the surface with a template cut to the required cross-section and with a 15 foot [4.572 m] straightedge laid parallel to the centerline of the road. Correct all irregularities greater than 1/4 inch [6 mm] to the satisfaction of the Engineer with a blade adjusted to the lightest cut which will ensure a surface that does not contain depressions greater than 1/4 inch [6 mm] under the template or the straightedge. The Engineer may approve other suitable methods for measurement. In the testing of the surface, do not take the measurements in small holes caused by the blades pulling out individual rocks. Waste the material removed.

**270-5.3 Thickness:** After completing the base, including hard planing if necessary, dig or drill 3 inch [75 mm] minimum diameter test holes. The Engineer will determine the thickness from measurements made in these test holes.

For thickness evaluation, a LOT is defined as 2,500 yd<sup>2</sup> [2,000 m<sup>2</sup>] of base. The Engineer may include any small section of base at the end of a day's operation or small irregular areas as part of the preceding LOT. The Engineer will consider an area such as an intersection, crossover, ramp, etc., as a separate LOT. The Engineer may include small irregular areas as part of another LOT. No LOT shall include more than 3,500 yd<sup>2</sup> [3,000 m<sup>2</sup>] of base.

The Engineer will perform five thickness measurements at locations randomly selected within each LOT.

The Engineer will determine construction tolerances for thickness as follows:

	Deviation From Plan Thickness
Central-Plant-Mixed Processing	-1 inch [-25 mm]
Mixed-in-Place Processing	±1 inch [±25 mm]

When any thickness measurement is outside the construction tolerance, the Engineer will take additional thickness measurements at 10 foot [3 m] intervals parallel to the centerline in each direction from the measurement which is outside the construction tolerance until a measurement in each direction is within the construction tolerance.

The Engineer will evaluate an area of base found to have a thickness outside the construction tolerance and, if he determines that the service life of the base will be significantly

reduced, he will require the Contractor to remove and replace it with acceptable base of the thickness shown in the plans, at no expense to the Department. The Department will pay for areas of deficient thickness that are within the construction tolerance in accordance with 270-7.

**270-5.4 Strength Testing of Field Specimens:** Meet the following requirements for soil-cement when proportioning the mix by the Strength Design Method.

The Engineer is responsible for the following:

1. Checking the adequacy of cement content and uniformity of distribution of cement within the base by sampling and testing the completed mix.
2. Taking samples at the project site just prior to final compaction and determining a minimum of two Strength Test Values (STV) each day, with at least one STV per each 2,500 yd<sup>2</sup> [2,000 m<sup>2</sup>] mixed.
3. Ensuring that each STV is the average strength value of a minimum of three individual specimens, and for discarding any obvious outliers.
4. Taking representative samples of the mixed soil-cement material for determining an STV just prior to final compaction, recording the sample location, and ensuring that the samples are large enough to mold three or more compressive strength test specimens as prescribed in FM 5-520.
5. Molding these test specimens at the field moisture content and casting the individual test specimens as close to identical as possible.
6. Resting the molds, during compaction of strength test specimens, on a 200 pound [90 kg] concrete block, or the equivalent thereto, that the Contractor provides.
7. Gently extruding these test specimens from the compaction mold, and carefully placing them in a moist curing environment (not in direct contact with ponded or moving water) such as a tightly closed container under wet cloth or burlap at locations where they will not be disturbed.

Continue the initial field cure for at least 24 hours, and if after 24 hours the Engineer determines that the specimens have not gained sufficient strength to be moved without probable damage, continue field curing until the Engineer determines that each specimen can be safely moved without probable damage occurring. When the Engineer determines that the specimens can be safely moved, the Engineer will transport them to the laboratory where they will be cured, as described in the design procedure (FM 5-520), to seven days of age. At seven days of age, the Engineer will test the individual specimen for determination of compressive stress and ensure that the loading procedure and rates are the same, as described in FM 5-520.

If an STV is less than 60% of the Laboratory Design Strength, remove and replace the material represented by the STV, at no expense to the Department.

#### **270-6 Method of Measurement.**

The quantity to be paid for will be plan quantity, in square yards [square meters], completed and accepted. The Contractor shall provide the Engineer with written documentation so he can perform calculations to confirm that the design quantity of cement for the project was incorporated into the project.

#### **270-7 Basis of Payment.**

Price and payment will be full compensation for all work specified in this Section, including preparing the soil; preliminary grading; furnishing and adding cement; furnishing and

adding water; mixing of soil, cement, and water; compacting the mixture; finishing the surface; furnishing and applying curing material; protecting the completed base from traffic; maintaining the completed base; and removing and replacing base which is deficient in thickness as provided in 270-5.3.

No separate payment will be made for cement or for bituminous material applied as a curing seal.

The completed base will be accepted on a LOT to LOT basis. LOTs that have a density less than 97%, or a thickness less than the plan thickness in excess of 0.5 inch [10 mm], will be paid for at reduced rates in accordance with the following schedules.

Density	
Percent Of Maximum Density, LOT Average	Percent Payment
97 and above	100
95.0 to 96.9	90
94.0 to 94.9	50, or remove and replace at the option of the Engineer

Thickness (Applicable only when processing is by the central-plant-mixed method)	
Deficiency From Plan Thickness LOT Average*	Percent Payment
0.00 - 0.50 inch [0.00 - 13 mm]	100
0.51 - 0.75 inch [13.1 - 19 mm]	90
0.76 - 1.00 inch [19.1 - 25 mm]	80

\*When processing is by the central-plant-mixed method, the average of the five thickness measurements will be determined. In calculating the average, thickness measurements which exceed the plan thickness by more than 0.5 inch [10 mm] will be considered to be the plan thickness plus 0.5 inch [10 mm] and measurements which are deficient from the plan thickness by more than 1 inch [25 mm] will not be included in the average. Exploratory measurements for determining the extent of an area in which the thickness is outside the construction tolerance will not be included in the average.

When the LOT average thickness of soil-cement base is deficient by more than 1 inch [25 mm] and the judgement of the Engineer is that the area of such deficiency should not be removed and replaced, payment for the area retained will be at 50%.

When multiple deficiencies occur, the applicable percent payment schedule will be applied to the LOT of base that is identified with each deficiency. The penalty for each deficiency will be applied separately to the unit price.

Payment will be made under:

- Item No. 270- 1- Soil-Cement Base - per square yard.
- Item No. 2270- 1- Soil-Cement Base - per square meter.