

# Transportation Technical Manual for Subdivision and Site Development Projects

October 2017



## HILLSBOROUGH COUNTY

# TRANSPORTATION TECHNICAL MANUAL FOR SUBDIVISION AND SITE DEVELOPMENT PROJECTS

**APPROVED**

APPROVED:

A handwritten signature in blue ink that reads "Michael Williams".

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County Engineer

08/30/17

Date

10/02/17

Effective Date

## PREFACE

This manual contains current information for designing and submitting transportation plans for proposed projects to be constructed in unincorporated Hillsborough County. This manual is a readily useable reference document written in specific, concise technical language and is a compilation of existing regulations, policy statements, and engineering requirements. The manual was created to ease coordination of projects, and when applicable, facilitate the planning, design and construction of projects in conformance to the County's standards and requirements.

As material specifications, technical criteria and County polices change to meet new needs and changing technology, it will become necessary to revise and update this manual. The County's procedure for making revisions which includes issuing technical bulletins, accepting public comments, and requesting design exceptions can be previewed on the County's website at [HCFLGov.net](http://HCFLGov.net). In addition, you can submit comments and suggestions for changes to the manual using the online "Comment on PUD/PW Technical Publications" form located on the County's website.

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## SECTION 1.0 GENERAL

### 1.1 SCOPE

The requirements of this manual apply to public and private roads, bridges and other transportation facilities in Hillsborough County as addressed in the manual. All streets within and contiguous to a proposed development must be coordinated with other existing or planned roadways. For additional information, refer to Land Development Code (LDC) Article VI.

### 1.2 AUTHORITY OF INSPECTORS

1.2.1 County inspectors may inspect all construction and the preparation, fabrication, or manufacture of materials. The inspector is not authorized to revoke, alter, or waive any requirements of the specifications, but is authorized to call to the attention of the Contractor and/or the Engineer any failure of work or materials to conform to the plans or specifications. The inspector shall have the authority to reject materials or suspend the work until any questions of issue can be referred to and decided upon by the Public Works Department (PWD) Construction Services Section Manager.

1.2.2 The inspector shall in no case act as foreman or perform other duties for the Contractor, nor interfere with the management of the work. Any advice that the inspector may give shall in no way be construed as binding to the Construction Services Section Manager or releasing the Contractor from carrying out the intent of the plans and specifications.

### 1.3 COMMERCIAL SITES

All commercial sites shall meet the applicable requirements of this manual and be submitted to Development Services Department (DSD) for review.

### 1.4 ON-SITE ROADWAYS

1.4.1 All roadways designed within a subdivision (on-site) by the Engineer of Record (EOR) for a developer shall be submitted to DSD.

1.4.2 On-site local roadways shall meet the applicable requirements of this manual. The criteria established by the PWD (is the latest FDOT design criteria) applies to on-site collectors. The determination of an on-site collector is made by the Transportation Planning and Development Division, PWD, at the preliminary plat submittal.

1.4.3 All plans submitted to DSD will be reviewed by PWD for signalization, signing and marking, and other traffic related items.

1.4.4 All on-site residential improvements will be reviewed by PWD.

### 1.5 OFF-SITE ROADWAY IMPROVEMENTS

All off-site roadway improvements that will be located within the County right-of-way, such as new roads, new signals, auxiliary turn lanes, sidewalks, trails, golf cart paths, pedestrian paths and public transportation facilities, shall be designed to the appropriate Hillsborough County and Florida Department of Transportation (FDOT) standards. See Section 12 for additional information and guidance on these types of improvements.



## 1.6 FUNCTIONAL CLASSIFICATION

The primary purpose of functional classification is to describe the intended use/purpose of the road. The functional classification for each type of road in a development shall be determined early in the design process by the EOR for the developer. This classification shall be in accordance with the definitions and typical sections as set forth in the guidelines in Chapter 1, Section B of the Florida Green Book. The Transportation Planning and Development Division, PWD, shall approve the functional classification for each type of road.

## 1.7 DESIGN CRITERIA

1.7.1 Engineering analysis and documentation signed and sealed by the EOR for the developer and submitted to the County Engineer at [CEINTAKE@HCFLGov.net](mailto:CEINTAKE@HCFLGov.net) for review and approval is necessary to support any deviation from the criteria presented in this manual. The most stringent design criteria/standard/specification shall be used.

1.7.2 Design Exception

1.7.2.1 A design exception is an approval issued by the County to permit deviations from applicable standards as submitted by the EOR. The exception may be granted based on a signed and sealed report explaining the rationale used and the compelling reasons for the exception. In some cases, after the initial review, the EOR may be required to provide a cost benefit analysis to further justify the exception.

1.7.2.2 Design exception reviews will be approved or disapproved by the County Engineer. All design exception requests both on-site and off-site are submitted to the County Engineer at [CEINTAKE@HCFLGov.net](mailto:CEINTAKE@HCFLGov.net) for processing and reviewed by DSD and PWD staff. Refer to the Florida Green Book for format example and guidance in preparing the design exception submittal.

## 1.8 TRAFFIC

1.8.1 The existing traffic volumes on roadways and at up and downstream intersections providing access to the development, and traffic volumes that will be generated by the proposed development shall be determined. The results shall be summarized in a traffic analysis report by the EOR for the developer early in the planning and design process. This report shall meet the requirements of the PWD, who shall approve the traffic report for each development. When a proposed master development is planned, a traffic analysis report that covers all phases and stages shall be submitted as a part of the master development.

1.8.2 Traffic Volume Thresholds for Internal Subdivision Roadways (On-site): Roadways constructed to serve internal subdivision traffic shall comply with the following access classifications:

1.8.2.1 For developments which generate less than 5,000 trips a day, the class of roadways that provides access to an existing public roadway shall be at least a two-lane undivided roadway. Refer to Drawing Numbers TS-3 and TS-7.

1.8.2.2 For developments which generate 5,000 to less than 10,000 trips a day, the class of roadways that provides access to an existing public roadway shall be at least a two-lane undivided roadway providing separation of the lanes at required locations or a two-lane divided roadway. Refer to Drawing Numbers TS-4, TS-5, TS-7 and TS-8.

1.8.2.3 For developments which generate 10,000 to less than 20,000 trips a day, the class of roadways that provides access to an existing public roadway shall be at least a four-

- lane divided roadway. Refer to Drawing Number TS-6.
- 1.8.2.4 For developments which generate 20,000 trips a day and greater, the developer shall provide a four-lane divided collector roadway. Refer to Section 12 for additional information on design standards and the process for typical section approval.
- 1.8.3 Traffic Calming
- 1.8.3.1 The subdivision local and collector roadway systems shall be designed with traffic calming features as recommended in the "Traffic Calming, State of the Practice" Informational Report of the Institute of Transportation Engineer (ITE) and the Federal Highway Administration (FHWA). The guide, or other valid traffic calming guides produced by recognized transportation authorities, should be used in any appropriate manner to reduce the potential for vehicle, pedestrian and bicycle crashes and to effectively maintain the 85th percentile speed at or below the posted speed limits. Roadway, sidewalk and bicycle path designs will not be approved by the County unless there are features that will effectively calm traffic and enhance public safety.
- 1.8.3.2 Traffic calming features (measures) are required on on-site roadway systems in accordance with the Hillsborough County LDC – Article V, Development Options.
- 1.8.3.3 Some recommendations from the Informational Report, or other valid traffic calming guides, may conflict with the current County Transportation Technical Manual but will be considered for approval through the design exception process.
- 1.8.4 Free Flow Right-Turn Lanes
- 1.8.4.1 A free flow right-turn lane is an exclusive right-turn lane that can accommodate turning volumes, into its dedicated driveway providing there is no left-turn movement into the driveway.
- 1.8.4.2 Free flow turn lanes should be separated by either a triangular raised or painted divisional island from the through movements.
- 1.8.4.3 To be considered a free flow, the required receiving lane must be on-site and be a minimum of 150 feet of un-obstructive roadway. The break to stop distance of the right-turn lane shall be measured from the begin taper to the beginning of the turning radius.

## 1.9 PUBLIC TRANSIT

- 1.9.1 Roads classified as local collectors and higher in Hillsborough County shall make provisions for future public transit facilities. These facilities shall conform to the requirements of the HART Transit Friendly Planning and Design Handbook.
- 1.9.2 HART Bus Bay/Pad Standards
- 1.9.2.1 HART should be notified to obtain their latest bus bay details and required facilities at bus terminals. Refer to the following publications for additional information:
- Hillsborough County Typical Bus Shelter Scenarios, HART Project No. BTI-01-102
  - FDOT Public Transportation Office – Accessing Transit Design Handbook

## 1.10 VIOLATION AND ENFORCEMENT

In any instance in which any land is, or is proposed to be, used in violation of this Manual, the County Attorney may, in addition to other remedies provided by law, institute injunction,

abatement or any appropriate action or actions to prevent, enjoin, or abate unlawful use. In addition, upon a finding by the County Administrator that any provision of this Manual or related ordinances has been violated, all development and building permits issued to the violator and for the site in violation will be suspended or held in abeyance. Permits may be withheld from the violator or for development on the site in violation, until the violation has been corrected to the satisfaction of the County Administrator. The County Administrator may also present their findings to the State Board of Professional Regulation and/or to the Hillsborough County Code Enforcement Board.

## SECTION 2.0 DESIGN ELEMENTS

### 2.1 ROADWAY DESIGN AND CONSTRUCTION CRITERIA

Roadway design and construction criteria shall conform to the criteria contained herein, as well as the referenced criteria contained in the following publications in English units. In the event that there are conflicting requirements, the most stringent design criteria/standard/specification shall be met. All publications listed below shall be the latest editions available at the time of submission of final plan documents.

- American Association of State Highway and Transportation Officials (AASHTO) – A Policy on Geometric Design of Highways and Streets
- AASHTO – Roadside Design Guide
- AASHTO – Guide for the Development of Bicycle Facilities
- AASHTO – Load and Resistance Factor Design (LRFD) Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals
- AASHTO – Standard Specifications for Highway Bridges
- U.S. Department of Transportation, Federal Highway Administration – Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)
- Americans with Disabilities Act (ADA)
- American Concrete Institute (ACI) Building Code Requirements and Specification for Masonry Structures
- ACI Building Code Requirements for Structural Concrete
- Transportation Research Board (TRB) – Highway Capacity Manual
- ITE – Trip Generation Manual
- ITE and FHWA – Traffic Calming: State of the Practice Informational Report
- Florida Accessibility Code for Building Construction
- FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways, commonly known as the “The Florida Green Book” (referred as Florida Green Book)
- FDOT – Plans Preparation Manual (Florida Design Manual)
- FDOT – Design Standards for Construction Operations on the State Highway System (referred as “FDOT Design Standards”) and associated Design Standard Revisions
- FDOT – Flexible Pavement Design Manual
- FDOT – Rigid Pavement Design Manual
- FDOT – Traffic Engineering Manual
- FDOT – Median Handbook
- FDOT – Manual on Uniform Traffic Studies
- FDOT – Standard Specifications for Road and Bridge Construction. The submittal of a Contractor Quality Control (CQC) plan is not mandatory; however, Hillsborough County reserves the right to ask for documentation indicating that quality control was provided as required. FDOT – Supplemental Specifications and Special Provisions for Road and Bridge Construction Standard Specifications
- FDOT – Soils and Foundation Handbook
- FDOT – Florida Intersection Design Guide
- FDOT – Complete Streets Handbook
- FDOT – Rail Handbook
- FDOT – Structures Manual

- FDOT – CADD Manual
- FDOT – Highway Landscape Design Guide
- Typical Sections, TND Typical Sections and Typical Details Drawings in this manual
- Hillsborough County Public Works Specifications for Construction
- Hillsborough County Stormwater Management Technical Manual
- Hillsborough County Water, Wastewater and Reclaimed Water Technical Manual
- Hillsborough County Water and Wastewater Technical Specifications
- Hillsborough County Utility Accommodations Guide and Rights-of-Way Use Procedure Manual
- Hillsborough County Residential Traffic Control Handbook
- Hillsborough County LDC
- Hillsborough County Development Review Procedures Manual
- Hillsborough County Metropolitan Planning Organization’s (MPO) Pedestrian & Bicycle High Crash Areas Strategic Plan for Unincorporated Hillsborough County Roads (2012)
- HART Transit Friendly Planning and Design Handbook
- National Cooperative Highway Research Program (NCHRP) Report 672 Roundabouts: An Informational Guide

## **2.2 RIGHT-OF-WAY**

Right-of-way for all roadways shall be exclusive to Hillsborough County and have no exceptions or lessed out/platted areas for any purpose between right-of-way lines, unless specifically agreed to by PWD.

### **2.2.1 Minimum Standards**

2.2.1.1 Minimum right-of-way widths shall be provided as listed in the following table. Additional right-of-way may be required in order to provide for elements such as ditch depths greater than two feet, width of depressed medians greater than six feet to accommodate special stormwater management features, special ditches or water courses to bypass stormwater from off-site, curvature of the road that results in superelevation that will require more fill and longer slope tie-downs, cut or fill other than shown to meet existing ground, more right-of-way to account for tree or shrub planting strips wider than provided in this manual, special environmental provisions, special width for utilities, future widening and expansion, setback requirements for sight distance and clear zone, medians (including adequate width for expected addition of through lanes and left-turn storage lanes), auxiliary lanes, adequate pedestrian and bicycle facilities, public transit facilities, utilities, stopping and passing sight distances, adequate stormwater management facilities and development of adequate intersections with minimum sight distances.

**Table 2-1: Minimum Right-of-Way Widths**

Road Classification	Drawing	Minimum Right-of-Way
Recommended Utility Locations	TS-1	Varies
Multi-Use Trails	TS-2	26' -35'
Local Urban Roads (2-Lane Undivided)	TS-3	50' -54'
Urban Collectors (2-Lane Undivided)	TS-4	64'
Urban Collectors (2-Lane Divided)	TS-5	86'
Urban Collectors (4-Lane Divided)	TS-6	110'
Local & Collector Rural Roads (2-Lane Undivided)	TS-7	96'
Rural Collectors (2-Lane Divided)	TS-8	122'
Low Volume Public Roads (Subdivision with less than or equal to 10 Lots)	TS-9	84'

2.2.1.2 Hillsborough County, per the provisions of the LDC, encourages the use of Traditional Neighborhood Development (TND) roads. The following typical sections are approved for use on Hillsborough County TND roads. Minimum right-of-way widths shall be provided as listed in the following table.

**Table 2-2: TND Minimum Right-of-Way Widths**

Road Classification	Drawing	Minimum Right-of-Way
Alleys	TND-1	20'
Local Urban Lanes	TND-2	52'
Local Urban Streets	TND-3	69'
Type 1 Boulevards (Urban Collectors)	TND-4	128'
Type 2 Boulevards (Urban Collectors)	TND-5	110'
Avenues (Urban Collectors)	TND-6	104'
Main Streets (Urban Collectors)	TND-7	82'

2.2.2 Existing Roads

2.2.2.1 If an existing County road is required to be improved by the developer to incorporate design features such as standard lane widths, bicycle lanes/paved shoulders, trails, sidewalks, utilities, ditches, auxiliary lanes, etc., additional right-of-way may be required. If right-of-way is needed and the development is directly adjacent to the roadway then the right-of-way needed for the improvements is to be dedicated and conveyed to Hillsborough County. If the development is not directly adjacent to the roadway where the improvements are required and additional right-of-way is needed then the improvements required shall be determined in meetings with the County to include DSD and PWD as described in Section 12.

2.2.2.2 When existing roads serve as the access road(s) to new developments, the road(s) shall comply with the required level of the classification based on existing and proposed average daily trips to the extent feasible. Refer to Section 12 for additional information.

- 2.2.3 Intersections: The provisions for right-of-way and set back requirements at intersections shall be determined utilizing Section 5 Intersection Design of this manual.

## 2.3 SUBSOIL INVESTIGATION FOR ROADWAYS

- 2.3.1 A geotechnical engineering consultant firm accredited by AASHTO, CMEC or FHWA approved in the State of Florida shall perform a signed and sealed subsoil investigation report. This report shall be in accordance with the requirements of the FDOT Soils and Foundation Handbook except as noted by this section. This report shall be submitted for review and approval with the roadway plans and shall include the following:
- 2.3.1.1 Groundwater: The seasonal high groundwater elevation and boring locations shall be shown on the plan and profile sheets. The definition of "seasonal high groundwater" shall be per the Hillsborough County Stormwater Management Technical Manual.
- 2.3.1.2 Soil Classification
- a) The soil classification for each stratum shall be in accordance with AASHTO M-145. The soil classification testing shall be in accordance with FDOT Soils and Foundation Handbook.
  - b) Test borings shall be taken to a minimum depth of eight feet below the existing grade. The borings shall be a maximum of 200-foot intervals, or at 100-foot intervals, staggered, for divided roadways. There shall be no less than one boring per street. Additional borings shall be taken as necessary to determine limits of unsuitable material. Depth and horizontal limits of muck areas shall be determined and shown on the plans. Unsuitable material shall be removed and replaced in accordance with FDOT Design Standards 500 and 505.

## 2.4 CLEARING AND GRUBBING

All roadway rights-of-way shall be cleared and grubbed in accordance with the FDOT Standard Specifications for Road and Bridge Construction, and the Landscaping Section of this manual. Selective clearing and grubbing is allowed, provided that preserved vegetation, including trees, is in accordance with the landscaping standards of this manual.

## 2.5 DESIGN PERIOD

The minimum design period for all new road construction projects in Hillsborough County shall be 20 years from date of opening.

## 2.6 DESIGN VEHICLE

- 2.6.1 The design vehicle selected for geometric design should be one with dimensions and minimum turning radii larger than almost all the vehicles in its class. Design vehicles are listed in Table 3-2 of the Florida Green Book and Chapter 2 of AASHTO.
- 2.6.2 If the total vehicles of those classes larger than passenger vehicles that are most likely to use a particular road or collector is five percent of the total traffic, that class should be used as a design control. The decision as related to selection of a design vehicle should be based on a careful engineering study and reasonable estimate of the type of situation and volume of expected traffic as this parameter affects the following design criteria:
- 2.6.2.1 Horizontal and vertical clearance
  - 2.6.2.2 Alignment

- 2.6.2.3 Lane widening on curves
  - 2.6.2.4 Shoulder width requirements
  - 2.6.2.5 Turning and intersection radii
  - 2.6.2.6 Intersection sight distance
  - 2.6.2.7 Median opening width
  - 2.6.2.8 Maximum grades
  - 2.6.2.9 Return Radii
  - 2.6.2.10 Control Radii
- 2.6.3 See Section 5 Intersection Design for minimum requirements on return radii on local roads and collectors and associated design vehicle requirements at intersections.

## 2.7 HORIZONTAL ALIGNMENT

- 2.7.1 Design Speed
- 2.7.1.1 The design speed of local roads and collectors is an extremely important parameter in establishing the geometric design criteria for these types of facilities. The proper selection of this element is highly critical in establishing a safe and high-quality path for the drivers, pedestrians and bicyclists on a given roadway.
  - 2.7.1.2 According to the Florida Green Book, the primary basis for the selection of the design speed should be a rational prediction of the probable maximum operating speed (by approximately 90 percent of the vehicles) on the road or collector. Design speed is defined as the maximum safe speed that can be maintained over a given section of road/highway when weather, light, and traffic conditions are such that the design features of the road/highway govern.
  - 2.7.1.3 The minimum design speeds for local roads and collectors shall not be less than the values shown in the following table unless approved by the County Engineer:

**Table 2-3: Minimum Design Speeds for Local Roads and Collectors**

Road Classification	Design Speed
Local Urban Roads (2-lane Undivided)	30 MPH
Urban Collectors (2-Lane Undivided)	40 MPH
Urban Collectors (2-Lane Divided)	45 MPH
Urban Collectors (4-Lane Divided)	45 MPH
Local Rural Roads (Undivided)	30 MPH
Rural Collectors (2-Lane Undivided)	40 MPH
Rural Collectors (2-Lane Divided)	50 MPH

- 2.7.1.4 Design speed is used to determine the geometric design features of a roadway. It is determined by taking into consideration the topography, operating speed, adjacent land use, and the functional classification of the road. Local subdivision roads may be designed in a way to effectively reduce the operating speed, such as ninety degree turns, as long as proper sight and stopping distances are provided and they are used throughout the subdivision or expected by the driver. The table below summarizes the Florida Green Book recommended minimum design speed.



**Table 2-4: Florida Green Book Recommended Minimum Design Speed**

Type of Roadway	Green Book		Suburban (MPH)
	Urban (MPH)	Rural (MPH)	
Arterial	35 – 55	55 – 70	Reference FDOT Plans Preparation Manual, Volume 1 Chapter 2 for maximum design speeds.
Collector	30 – 45	40 – 65	
Local (Livable Communities)	20 – 30	30 – 50	

- 2.7.2 Roadway Transitions and Tapers: When redirection of through lanes to transition from one type of roadway to another becomes necessary, the required deflection angles, transition lengths and tapers shall be provided as per FDOT Standard Index 526. However, the table in this Standard that is identified as “Minimum Under Restraints” shall not be used for transitions on new roadways. See Section 12 for additional information for off-site and existing County roadways.
- 2.7.3 Deflection of Through Lanes through Intersections: The maximum deflection for through lanes through intersections shall meet the requirements of the Table 2.8.1a of Volume 1 of the FDOT Plans Preparation Manual. Table 2.8.1b in Volume 1 of the FDOT Plans Preparation Manual is not applicable for deflection of through lanes through intersections for new development.
- 2.7.4 Horizontal Curves: The minimum permitted radii (maximum degree of curvature) for rural/urban arterials and collectors should reference the FDOT Plans Preparation Manual. The Florida Green Book should be referenced for local roads. The minimum centerline radius for an urban subdivision street is 50 feet. The EOR shall use good engineering judgment and ensure proper sight and stopping distance when using a 50-foot radius due to the reduced speed needed to make the turn safely.
- 2.7.5 Superelevation: Superelevation rates and transitions requirements shall be per Section 2.9 of Volume I of the FDOT Plans Preparation Manual.

## 2.8 VERTICAL ALIGNMENT

- 2.8.1 Criteria
- 2.8.1.1 The designer shall closely coordinate the vertical and horizontal alignments. This aspect has proven to provide a higher level of safety and quality. The vertical alignment shall provide the highest sight distance possible with the use of gentle grades. The minimum design speed for vertical alignment shall not be less than 30 mph regardless of horizontal alignment constraints.
- 2.8.1.2 The minimum standard roadway base clearance required above the Seasonal High Groundwater Table (SHGWT) Elevation for roadway base courses is provided in Table 12-1 of the Hillsborough County Stormwater Management Technical Manual.
- 2.8.2 Grades: The minimum road grade shall be 0.30% for all local roads and collectors. Refer to Table 3-7 of the Florida Green Book for maximum grades. Maximum changes in grade without the use a vertical curve shall be per Table 3-8 of the Florida Green Book.

- 2.8.3 Vertical Curves: Vertical curves are required when the algebraic difference between two grades exceed the values listed in the Florida Green Book, Table 3-5. Vertical geometry shall ensure adequate stopping and passing sight distance by meeting or exceeding the values shown in the Florida Green Book, Table 3-6 and Figures 3-4, 3-5, and 3-6.
- 2.8.4 At-Grade Intersections
- 2.8.4.1 When a proposed roadway is tied into an existing County road at a proposed at-grade intersection, the intersection including the existing County road shall be rebuilt to provide a smooth transition between the two roads. This intersection shall be “plateaued” to provide a smooth transition between the two roadways. The “plateauing” of intersections shall meet the requirements of Section 3.8 of the FDOT Florida Intersection Design Guide. The coordination of the cross sections of two intersecting roadways shall be carefully analyzed; the design should insure a smooth cross slope transition between the two roads. Adequate drainage shall be provided at this intersection. The intersection shall be designed to accommodate future signalization.
- 2.8.4.2 See Section 5 Intersection Design for additional requirements.

## 2.9 SIDEWALKS

- 2.9.1 Sidewalk and curb-cut ramp design shall conform to the requirements as set forth in this manual, ADA requirements, and the Florida Accessibility Code for Building Construction and applicable FDOT Design Standards.
- 2.9.2 Sidewalks shall extend to the roadway at all intersections with the exception where the sidewalk cuts across major off-site roads, unless it is at a controlled/signalized intersection. Standard curb cut and accessible ramps are required where sidewalks meet curb or curb and gutter. Sidewalks shall be no less than five feet in width along all local roads and collectors.
- 2.9.3 The standard thickness for sidewalk is six inches for collector and arterial roads. The standard thickness for a sidewalk on local roadways shall be four inches, except for sidewalks at all driveways, curb-cut ramps and ADA ramps, and sidewalks located within the maintenance berm of retention/detention ponds as defined in the Stormwater Technical Manual, where the thickness shall be six inches. In the case where sidewalk is located adjacent to a pond and outside of the pond’s maintenance berm, its thickness may be four inches. Where access to the pond for maintenance purposes crosses this sidewalk, the thickness shall be six inches for a minimum length of 20 feet. This location must be clearly identifiable. The manner of how the access will be identified is subject to approval by County staff.
- 2.9.4 Sidewalks, curb-cut ramps, and handicap ramps shall be constructed of Portland Cement Concrete, Class I. Materials and methods of construction shall conform to the FDOT Standard Specifications for Road and Bridge Construction.
- 2.9.5 At the time of construction detectable warning surfaces shall meet all FDOT criteria including, but not limited to, the latest Design Standards – Index 304, Standard Specifications for Road and Bridge Construction – Section 527, and the Qualified Products List (QPL). The preferred color for curb cut detectable warning surfaces is red. However, the color must be a contrasting color.
- 2.9.6 When street trees are to be provided by the LDC or other regulation/criteria, sidewalk protection

at the trees is required. The length of the required protection shall be five feet on either side of the centerline (longitudinally) of the required tree. For additional information, refer to Sidewalk Protection Options Typical Details drawing in this manual.

- 2.9.7 In most cases, unless it can be fully justified, sidewalk is always required and on both sides of the road. An example of when it may not be needed on one side is when a new roadway is constructed adjacent and parallel to a limited access right-of-way and all development is located on one side so there would be no need for pedestrians to cross the road. In these cases, a wider sidewalk may be required on the one side to accommodate both directions up to a safe crossing point where it is needed on both sides or intersects with another roadway sidewalk system.

## **2.10 DEAD END STREETS**

- 2.10.1 All dead-end streets that are greater than 150 feet shall be designed to meet the requirements for a fire truck turnaround and meet LDC criteria. The maximum length for a dead-end street shall be 1000 feet, unless otherwise approved.
- 2.10.2 Cul-de-sacs shall be constructed at the end of dead-end streets. When the length of the street is 150 feet or less, including the cul-de-sac, it shall be constructed in accordance with the Cul-De-Sac Typical Details, Sheet 1 of 2. However, when the length of a dead-end street is greater than 150 feet, the cul-de-sac shall be constructed in accordance with the Cul-De-Sac Typical Details, Sheet 2 of 2 which meets the fire code for fire truck turnarounds.
- 2.10.3 Where a street is to be continued when adjacent property is subdivided, or during phased construction, a temporary "T" type turnaround will be required when the street is 150 feet or more in length as measured from the nearest intersection. The "T" type turnaround will be constructed in accordance with the Temporary Dead End Treatment Typical Details and shall be clearly delineated per FDOT Design Standard Index 17349.

## **2.11 BUFFER WALLS**

- 2.11.1 General: Buffer walls shall be constructed along all arterial and collector roadways that abut all residential land uses that are processed through the Subdivision and/or Site Development Regulations of the LDC. For additional information, refer to Buffer Wall/Berm Typical Details drawing in this manual. Developer should consider connectivity of pedestrians between developments and provide sidewalks and trails through buffer walls at appropriate locations.
- 2.11.2 Horizontal Location
- 2.11.2.1 Buffer walls, including footings, shall be parallel to and outside of the right-of-way.
- 2.11.2.2 In order to provide for the safe functional use of the sidewalk, a flat grass area measuring a minimum of two feet in width shall be maintained between the outer edge of sidewalks and the closest portion of the buffer wall structure.
- 2.11.2.3 Where permanent easements are parallel to and contiguous to the road right-of-way, all structural elements of the buffer wall shall be outside of the easement.
- 2.11.3 Ownership and Maintenance: Hillsborough County shall not be responsible for any maintenance or liability associated with the buffer walls. Buffer walls shall be owned and maintained by the property owner of the parcel on which it is located or by a Property/Homeowner's Association.

- 2.11.4 Aesthetics: The walls shall be limited to six feet in height, unless otherwise noted by the Hillsborough County LDC or any applicable conditions of zoning. When residential projects are proposed to abut each other, adjacent to the same collector or arterial roadway, or if a new project is proposed which would abut an existing project that has a buffer wall, the proposed wall shall be visually compatible with the existing wall. If the developer desires to have a different exterior appearance for the new wall, then the Director of DSD must approve the change.
- 2.11.5 Alternate Buffer
- 2.11.5.1 As an alternative to buffer walls, vegetated berms will be considered.
- 2.11.5.2 The berm shall have a maximum height of six feet, maximum side slopes of four feet, horizontal to one-foot vertical, and a top width of five feet.
- 2.11.5.3 The berm shall be sodded with grass or other suitable vegetation as approved by the DSD.
- 2.11.6 Realignment due to Environmental Considerations: When alignment of buffer walls must be modified to clear protected trees as determined by the requirements of the Natural Resources and Landscaping Regulations of the Hillsborough County LDC, the footer or buffer walls and the toe of slope of vegetated berms shall clear the trees as approved by the DSD.
- 2.11.7 Stormwater Management: Buffer walls and vegetated berms shall be designed so as not to interfere with the proper functioning of existing or proposed stormwater management systems. For erosion and sedimentation control criteria, refer to Hillsborough County Stormwater Technical Manual.
- 2.11.8 Structural: Buffer walls may consist of concrete masonry units, cast-in-place concrete, or precast concrete and shall be designed in accordance with the applicable ACI Building Code (ACI-530 for masonry structures and ACI-318 for concrete). Other wall types may be used subject to approval of the County Engineer, or through Planned Development Zoning (PD). Buffer walls shall be designed to retain the soil resulting from a difference in ground line elevations on each side of the wall. Buffer wall calculations and plans shall be signed and sealed by a Professional Engineer licensed in the State of Florida.

## **2.12 PEDESTRIAN AND BICYCLE FACILITIES**

- 2.12.1 Pedestrian and bicycle facilities shall be provided on all collector roads unless approved otherwise. This includes any developer funded capital project roads listed within the MPO's Pedestrian & Bicycle High Crash Areas Strategic Plan for Unincorporated Hillsborough County Roads (2012) and/or the Vision Zero Action Plan (2017).
- 2.12.2 All pedestrian facilities shall be designed to meet the minimum standards set forth in Volume 1, Chapter 8 of the FDOT Plans Preparation Manual. All bicycle facilities shall be designed to meet the minimum standards set forth in the AASHTO Guide for the Development of Bicycle Facilities and Volume 1, Chapter 8 of the FDOT Plans Preparation Manual.
- 2.12.3 All multi-use trails shall be designed to meet the standards as set forth in Multi-Use Trails Typical Sections drawings in this manual and Volume 1, Chapter 8, Section 8.6 Shared Use Paths of the FDOT Plans Preparation Manual.
- 2.12.4 The minimum width for a shared use path shall be 10 feet.

## 2.13 UTILITIES

- 2.13.1 Utility locations shall be per the Recommended Utility Location Typical Section drawing in this manual.
- 2.13.2 Manholes shall be located within median areas for divided roadways unless approved otherwise. If approved to be in the roadway area, they shall be placed outside the normal wheel path including bicycles.

## 2.14 RAILROAD GRADE CROSSING

- 2.14.1 The purpose of this section is to establish guidelines for new railroad grade crossings in Hillsborough County. All railroad grade crossings shall be constructed according to current FDOT standards. Coordination with the railroad owner is mandatory prior to design.
- 2.14.2 New public grade crossings must be permitted through the FDOT Rail Office per Section 335.141, Florida Statutes and Rule 14-57.012, Florida Administrative Code. Elements of design such as profile and alignment; drainage; sight distances; lighting; traffic control device and signal selection and placement; and traffic signal preemption shall conform to the latest revisions of the FDOT Design Standards, FDOT Rail Handbook, AASHTO A Policy on Geometric Design of Highways and Streets, FHWA Manual on Uniform Traffic Control Devices, and the railroad standard criteria for grade crossings.

## 2.15 TESTING AND MATERIAL CERTIFICATION

### 2.15.1 Testing

- 2.15.1.1 An Independent Testing Consultant accredited by AASHTO, CMEC or FHWA approved and licensed by the State of Florida shall perform all tests specified within this manual. Hillsborough County may elect to observe the testing consultant performing tests in an accredited field and testing laboratory. All soil surveys, certifications, design mixes, and test reports shall be submitted by the EOR on a timely basis during the construction process to PWD Construction Services Section.
- 2.15.1.2 Hillsborough County reserves the right to also perform tests or call for the developer to perform tests as deemed necessary by the County inspector.
- 2.15.1.3 Testing shall be in accordance with the Testing Schedule of this manual, applicable FDOT Standard Specifications for Road and Bridge Construction, special provisions and supplements to the FDOT Standard Specifications for Road and Bridge Construction and Technical Specifications.

### 2.15.2 Material Certification

- 2.15.2.1 Material suppliers shall provide proof of certification that the following items in this section and the testing schedule of this manual are in compliance with the requirements of this manual and the FDOT Standard Specifications for Road and Bridge Construction:
- a) Base Material (other than soil cement and crushed concrete base)
  - b) Prime and Tack Coat
  - c) Superpave Asphaltic Concrete
  - d) Concrete

- e) Pipe (Other than Utility Pipe)
  - f) Pavement Markings (Striping)
- 2.15.2.2 The EOR shall submit all material certifications to the Construction Services Section of PWD on a timely basis during the construction process and prior to final acceptance of construction.

## SECTION 3.0 CROSS SECTION ELEMENTS

### 3.1 LANE WIDTHS

- 3.1.1 The minimum lane width shall be 11 feet for non-residential roads and collector roadways that provide buffered bike lanes. Ten feet is the minimum lane width for local residential roads. The minimum lane width shall be 12 feet for non-residential urban streets and rural roadways when no bike lanes or paved shoulders (five feet or less) are provided. All new urban collector roadways shall provide seven-foot buffered bicycle lanes, unless otherwise approved. See applicable Hillsborough County Typical Sections.
- 3.1.2 The minimum lane widths for auxiliary turn lanes shall be the same width as the adjacent through lane. All right-turn lanes shall provide for a keyhole lane between the through lane and the turn lane.

### 3.2 MEDIANS

- 3.2.1 General
- 3.2.1.1 Raised medians shall be curbed and conform to the FDOT Design Standards. All concrete traffic separators for left-turn lanes shall meet the requirements of FDOT Standard Indexes 301 and 302.
- 3.2.1.2 Medians shall meet the requirements of the FDOT Median Handbook and Table 3-6 Basic Median Functions and their Required Width in the FDOT Florida Intersection Design Guide.
- 3.2.2 Entrance: Entrance medians or islands within the road right-of-way shall conform to the Entrance Median and Guardhouse Typical Details.
- 3.2.3 Landscaping: Landscaping in medians shall meet the requirements of Section 10 Landscaping and Tree Preservation in this manual. Medians and islands shall not be designated as park or recreation areas. A dedication and maintenance agreement is required when landscaping is to be placed in a public road(s) right-of-way. Medians and islands may be landscaped. The landscaping in these areas shall comply with the requirements of this section for clear zone and sight distance. These areas shall be dedicated to an established maintenance entity. There shall be an approved County maintenance agreement in place before landscaping is allowed in County right-of-way. All landscaping is to be within dedicated right-of-ways.
- 3.2.4 Concrete Separators: Concrete separators shall be designed to accommodate pedestrians as a refuge area at crossings. A six-foot wide area is considered the minimum for this purpose. . If a separator less than four feet wide is proposed, a design exception shall be submitted. A two-foot separator is allowed for a special directional median opening without an exception. It is preferred that all separators be either Type I or Type II with the flatter type “E” curb in lieu of Type IV or Type V which is the raised type “F” curb. All designs and construction methods shall be per the FDOT Design Standards Index 302.

### **3.3 CURB AND CURB AND GUTTER**

#### **3.3.1 General**

3.3.1.1 Hydraulic design shall be in compliance with all the provisions of the Hillsborough County Stormwater Management Technical Manual.

3.3.1.2 Details of concrete curb and concrete curb and gutter shall conform to Hillsborough County Typical Details for Miami curb and the FDOT Design Standards as applicable. County Standard Type I, II & III Inlets, as shown in TD-18, may be used as allowed in the Hillsborough County Stormwater Management Technical Manual.

3.3.1.3 Materials and installation shall conform to the FDOT Standard Specifications for Road and Bridge Construction.

3.3.1.4 When curb or curb and gutter replacement is required, it shall be replaced in 10-foot sections.

3.3.2 Stabilization and Compactions: All curbs and gutters shall be placed on either a foundation of Type B stabilized subgrade with a minimum LBR value of 40, Type C stabilized subgrade with a minimum Florida Bearing Value of 75 for curb pads only when utilizing soil cement base or a 4-1/2-inch asphalt base curb pad with a Type B stabilized subgrade (See FDOT Plans Preparation Manual for details). All curbs and curb and gutters shall be stabilized to a minimum of four inches from back of curb. Refer to Typical Section Drawings of this manual and FDOT Index No. 506 for curb and curb and gutter stabilization details.

### **3.4 ROADSIDE CLEAR ZONE OR RECOVERABLE TERRAIN**

3.4.1 The roadside clear zone is that area of recoverable terrain outside the travel lanes available for use by errant vehicles. The roadside clear zone of intersecting roads shall be carried through intersections.

3.4.2 The width of clear zone and recoverable terrain for rural roadways varies depending on the design speed. The clear zone width for urban roadways shall be four feet from face of curb. However, when using “Miami” type curb, the minimum clear zone width shall be four feet from the back of curb.

3.4.3 Horizontal clearance to trees, light poles, utility installations, signal poles, control cabinets for signals, and bridge piers are to meet the more stringent requirements of this manual and Volume 1, Chapter 4 of FDOT Plans Preparation Manual.

### **3.5 VERTICAL CLEARANCE**

Minimum vertical clearance with the exception of structures over water shall conform to Volume 1, Section 2.10 of FDOT Plans Preparation Manual.

### **3.6 PAVEMENT CROSS SLOPES**

3.6.1 The minimum pavement cross slope for travel lanes on local roads and collectors shall be 0.02 ft./ft. The change in cross slope between adjacent through lanes shall not exceed 0.04 ft/ft.

3.6.2 The change in cross slope between travel lanes and shoulder pavement shall not exceed 0.07ft/ft.



### **3.7 ROADSIDE SLOPES**

Roadside slopes for local roads and collectors shall be per the Typical Sections in this manual. Side slopes within the clear zone that are 1:3 or steeper shall not be used without a guardrail or longitudinal barrier. The design of guardrail, crash cushions and barriers shall be in accordance with the AASHTO Roadside Design Guide and FDOT Design Standards.

## SECTION 4.0 ROADSIDE DESIGNS

### 4.1 DITCHES

- 4.1.1 Design: Roadway drainage design shall comply with the criteria as set forth in the Hillsborough County Stormwater Management Technical Manual.
- 4.1.2 Side drain Requirements
  - 4.1.2.1 Placement: Access connection permits shall be obtained from DSD prior to the placement of any side drain associated with driveway access for existing commercial sites and for new and existing residential lots. New commercial development access points are included as part of the Right-Of-Way Use Permit processed during the site development review process.
  - 4.1.2.2 Mitered End Sections: A mitered end section shall be placed at each end of a side drain and shall be constructed in accordance with applicable FDOT clear zone requirements and Design Standards.

### 4.2 GRASSING AND MULCHING, SODDING

- 4.2.1 Curb and Gutter Section: In residential and industrial subdivisions where building construction is not imminent, areas located between the back of curb and the right-of-way line, that are disturbed by construction shall be grassed and mulched or sodded in accordance with the Typical Sections and the FDOT Standard Specifications for Road and Bridge Construction. A two-foot minimum sod strip staggered in two rows shall be placed along the back of curb and around all structures.
- 4.2.2 Rural Section: All right-of-way, outside the roadway area, shall be grassed and mulched with the exception of a two-foot eight-inch sod strip at the edge of pavement/shoulder pavement in accordance with the Typical Sections and the FDOT Standards Specifications for Road and Bridge Construction.

### 4.3 LANDSCAPING AND TREE PRESERVATIONS

Public and private road rights-of-way may contain preserved or planted vegetation, including trees, provided that the preserved or planted vegetation, including trees, is in accordance with the landscaping standards of this manual.

## SECTION 5.0 INTERSECTION DESIGN

### 5.1 GENERAL

- 5.1.1 The design of intersections in Hillsborough County shall meet or exceed the requirements of this section, Chapter 3, Section C.9 Intersection Design of the Florida Green Book and the Florida Intersection Guide. The most stringent requirement in these standards shall be utilized in the design of intersections.
- 5.1.2 Intersecting streets shall be arranged so as to intersect as nearly as possible at right angles. The maximum deflection for through lanes through intersections shall meet the requirements of FDOT Plans Preparation Manual, Volume 1, Table 2.8.1a. However, Table 2.8.1b in Volume 1 of the FDOT Plans Preparation Manual is not applicable for deflection of through lanes through intersections for new development.
- 5.1.3 Channelizing islands for intersections, when required, shall meet the requirements of Section 3.11 of the FDOT Florida Intersection Design Guide.
- 5.1.4 Driveways that have or are anticipated to have a significant amount of daily traffic (greater than 400 vehicles per day) shall be designed as intersections with radial returns and no drop curbs.
- 5.1.5 Sidewalk locations and curb ramps at intersections shall meet the requirements of Section 2.9 of this manual. For additional details refer to applicable standards and Typical Details drawings in this manual.
- 5.1.6 Intersections and intersection improvements shall be designed with consideration for pedestrian and bicycle features. Curb inlets, including inlet transitions, shall not be located within handicap drop curb locations. Inlets should not be placed within curb returns.
- 5.1.7 Intersection improvements that result in four or more lanes of traffic including turn lanes shall have a minimum six-foot traffic separator to provide for a pedestrian refuge area.
- 5.1.8 Sidewalk curb-cut ramps, traffic separators, median construction, crosswalks, all associated striping and signalization features must be replaced or relocated as necessary when improvements are made at existing intersections.

### 5.2 RIGHT-OF-WAY REQUIREMENTS

- 5.2.1 Sight distance shall be provided at all intersections by either providing rounded right-of-way lines or straight corner cuts in accordance with sight distance triangles. Rounded right-of-way lines at all roads intersecting with a collector road shall have a minimum 25-foot radius or as otherwise required by traffic conditions or geometric requirements.
- 5.2.2 Stopping sight distance requirements shall be considered by the EOR in the determination of the minimum right-of-way to be provided at roadway intersections for local roads and collectors. The EOR shall design to the sight distance requirements of FDOT Design Standard Index 546 and the requirements of this section. Additional right-of-way may be needed to provide for sight distance at intersections with curved roadways.

### 5.3 MINIMUM RETURN RADII REQUIREMENTS

Minimum return radii are largely dependent upon the design vehicle. The designer shall verify and confirm the turning movement of the design vehicle in consideration for the intersection that is being designed.

**Table 5-1: Minimum Return Radii**

Type of Development	Type of Design Vehicle	Roadway Classification	Minimum Radius
Residential	P, SU	Local Road	25'
	P, SU	Collector Road	50'
Commercial	P, SU, WB-40, WB-50	Local Road	35'
	P, SU, WB-40, WB-50	Collector Road	50'

### 5.4 CONTROL RADII

The control radii requirements for minimum turning paths at intersections shall be determined using Table 3-13 of the FDOT Florida Intersection Design Guide.

### 5.5 INTERSECTION SIGHT DISTANCE REQUIREMENTS

The minimum required sight distance requirements at intersections for various design speeds and vehicles shall be determined using FDOT Design Standard 546 and Figures 3-7 and 3-8 of the Florida Green Book. The more stringent design standard shall be used to determine the sight distance at intersections.

### 5.6 AUXILIARY LANES

Auxiliary lanes shall be provided at subdivisions and commercial sites when warranted in accordance with the LDC. The criteria for the minimum length of auxiliary lanes and tapers at intersections shall be determined using the FDOT Design Standard Index 301. Queue lengths for required turn lanes shall, at a minimum, be equal to the value required by the analysis outputs. Notwithstanding the forgoing, when a turn lane is required the minimum queue lengths for the turn lane shall be as follows: Left turn lanes, all or partially within the urban service area require a minimum 100 foot queue length; Left turn lanes completely within the rural service area require 50 foot queue length; Right turn lanes (both inside the urban and rural service areas) require a minimum 50 foot queue length; and Free-flow right turn lanes (both inside the urban and rural service areas) require no minimum queue length unless otherwise required by analysis.

### 5.7 MEDIAN OPENINGS

- 5.7.1 Opening widths for medians are dependent on several factors such as control radii, width of traffic separators and the skew angle of side streets. Openings at divided side streets will vary with side street median widths. The length of a median opening shall not be less than 40 feet.
- 5.7.2 Whenever possible, driveways shall be located at existing median openings.
- 5.7.3 All new median openings shall provide adequate left-turn storage to existing and proposed driveways and roadways.

## 5.8 DRIVEWAYS

- 5.8.1 Driveway design shall conform to the Access Management Regulations of the LDC and this manual. For additional details refer to Driveway Typical Details drawings in this manual.
- 5.8.2 Profiles: Driveway profiles shall conform to the requirements of FDOT Design Standard Index 515.
- 5.8.3 Thickness Requirements
  - 5.8.3.1 All concrete driveway aprons and driveways shall be a minimum of six inches thick and shall only be constructed with Class I concrete.
  - 5.8.3.2 The use of curbs on driveways will require pedestrian (accessible) ramps where the sidewalk meets the driveways.
  - 5.8.3.3 Expansion joints are required where the apron meets back-of-curb and sidewalks meet the driveway apron, unless poured monolithically.
- 5.8.4 Limits of Construction
  - 5.8.4.1 All driveways shall be constructed from the edge of the roadway pavement to the right-of-way line.
  - 5.8.4.2 County lift station driveways shall be constructed from the back of curb, or edge of pavement, to the lift station. Grading and site work is to be per Specification 333003 of the Hillsborough County Water, Wastewater and Reclaimed Water Technical Specifications.

## SECTION 6.0 PAVEMENT MARKINGS AND SIGNING

### 6.1 GENERAL

- 6.1.1 Pavement markings and signing plans shall be submitted for any roadway with two or more lanes and as required for entrance ways, etc. Pavement markings, signal and signing plans and materials shall meet Traffic Services requirements and conform to all criteria herein, including those applicable specifications contained in the latest edition of the following publications:
- FDOT – Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Florida Green Book)
  - US Department of Transportation, Federal Highway Administration – Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)
  - FDOT – Standard Specifications for Road and Bridge Construction AASHTO – A Policy on Geometric Design of Highways and Streets
  - FDOT – Design Standards for Construction Operations on the State Highway System (FDOT Design Standards) and associated Design Standard Revisions
  - Hillsborough County Roadway Maintenance Division Standards
  - Hillsborough County Public Works Standard Specifications for Construction
- 6.1.2 Supplemental criteria for post mounted street name sign fabrication and installation are as follows:
- 6.1.2.1 Background color shall be green reflective sheeting, Type III, for public roadways. The street name legend size shall be seven-inch, type “C” font with the first letter of each name capitalized followed by lower case lettering which shall be 5-1/2 inch modified. The block number legend shall be four-inch type “C” font and appear in the lower right of the sign. The street name extension shall be abbreviated (i.e., “AVE”, “DR”, “ST”, “BLVD”) shall be all capitalized, four-inch, type “C” font and appear in the upper right of the sign. Directional extensions (i.e., north, south, east, west) shall be abbreviated with the first letter of the direction (i.e., “N”, “S”, “E”, “W”) in capitalized, six-inch, type “C” font and appear before the name of the street. All legend and border color shall be white reflective sheeting, Type III. The border shall be 3/4-inch wide at the perimeter of the sign. Reflective sheeting shall comply with FDOT Standard Specifications for Road and Bridge Construction, Section 994.
- 6.1.2.2 The sign blades shall be aluminum, 12 inches by 30 inches minimum, 12 inches by 48 inches maximum, with sign length variances in six-inch increments (i.e., 30-inch, 36-inch, 42-inch, and 48-inch). Sign blade length shall be the minimum required incremental length to accommodate the required lettering with 1-1/2-inch clearance at both ends of the street name. Sign blade material shall be in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 700.
- 6.1.2.3 ALL signs shall be mounted on approved U channel, galvanized, 2.5 lb./ft., posts in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 700 and installed in accordance with the publications listed above.
- 6.1.2.4 For fabrication details refer to the Typical Details Drawing for post mounted street name signs.
- 6.1.2.5 Typical installation for street name signs at two multi-lane facilities is at the northeast and southwest corners on separate posts from the stop signs.
- 6.1.2.6 All traffic stop signs and streets must be mounted on separate posts from each other.

- 6.1.3 Internally illuminated street name signs shall follow FDOT fabrication and installation standards and details.
  - 6.1.3.1 For fabrication and structural details, refer to the Typical Details for Internally Illuminated Street Name Signs.
  - 6.1.3.2 All approaches shall have street name signs.
  - 6.1.3.3 Concrete or steel strain poles, overhead street name signs shall be mounted on sign bracket arms attached to the strain pole in accordance with the FDOT Design Standards.
  - 6.1.3.4 Mast arm installations, overhead street name signs shall be attached to the mast arm in accordance with the FDOT Design Standards.
- 6.1.4 Supplemental criteria for pavement markings are as follows:
  - 6.1.4.1 All pavement markings shall be alkaline base thermoplastic compound following FDOT Standard Specifications.
  - 6.1.4.2 All bike markings shall be preformed thermoplastic.
  - 6.1.4.3 Raised pavement markers (RPMs) shall be included with all markings and shall use a bituminous adhesive material and follow FDOT Design Standards

## **6.2 TRAFFIC CONTROL DEVICES AND STREET SIGNS**

- 6.2.1 The developer shall be responsible for the installation of and all associated costs for required traffic control devices including but not limited to signals, pavement markings and signing.
- 6.2.2 After receiving approval for street names and block assignments from the appropriate reviewing agency based on the final plat review, the developer shall be responsible for the purchase and installation of all signals, pavement markings and signage approved through the subdivision and site development review processes.
- 6.2.3 All required traffic control devices must be properly installed. Prior to acceptance of infrastructure improvements for subdivision developments, or certificates of occupancy (C.O.'s) for commercial developments, PWD shall approve signing and pavement markings and the signalization and appurtenances.

## **6.3 PRIVATE DEVELOPMENTS**

- 6.3.1 Private developments shall be subject to the same requirements listed in Section 6.2.
- 6.3.2 Street marker signing for private roads shall have the same requirements as signing for public roads (See Section 6.1); however, private road background color shall be blue reflective sheeting, Type III, with the legend "PRIVATE ROAD" in all capitalized, two-inch, white, type "C" font centered under the street name.

## SECTION 7.0 SIGNALIZATION

### 7.1 GENERAL

- 7.1.1 Mast arm designs shall be utilized along urban roadways with curb and gutter for the installation of traffic signals, overhead signs and advance overhead flashing school signs.
- 7.1.2 Either concrete or steel strain poles (span box design) may be used with the approval of the PWD if one or more of the following conditions exist:
  - 7.1.2.1 Lack of sufficient right-of-way or excessive cost.
  - 7.1.2.2 Schedule would be affected due to design and/or delivery time.
  - 7.1.2.3 The relocation of utilities would not be cost effective.
  - 7.1.2.4 The width of the intersecting roadway would require excessively long mast arms.

### 7.2 DESIGN

- 7.2.1 The design shall be in accordance with the AASHTO "LRFD Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals", FDOT Design Standards and FDOT Standard Specifications for Road and Bridge Construction and Hillsborough County's Public Works Standard Specifications for Construction.
- 7.2.2 Approved mast arm shapes shall include one of the following:
  - 7.2.2.1 Tapered tubular shaft
  - 7.2.2.2 Swaged step-tapered shaft
  - 7.2.2.3 Sixteen-sided tapered shaft
  - 7.2.2.4 Tubular shaft (constant diameter)
- 7.2.3 The latest FDOT Mast Arm, General Notes, Mast Arm details and Pole Schedule shall be utilized and made part of the plan set. The end of the mast arm shall extend to the inside edge of the left-turn lane closest to the median.
- 7.2.4 Structural design to assume wind loading due to back plates including future left-turn phases and one additional traffic sign. All traffic signal heads shall have tunnel visors and back plates with reflective yellow borders.
- 7.2.5 Signal mast arms shall include luminaries or lighting be provided through separate light poles. Intersections shall meet the lighting criteria identified in the FDOT Plans Preparation Manual Chapter 7 for Sidewalks.
- 7.2.6 All signalized intersections shall include LED signals, LED countdown international symbol pedestrian signals, advance street name signs, and internally illuminated street name signs on all roadway approaches that do not service an isolated area.
- 7.2.7 All signals shall include interconnect communications. Copper or Fiber optics as required by Hillsborough County Traffic Services.



## SECTION 8.0 PAVEMENT DESIGN

### 8.1 GENERAL

- 8.1.1 The EOR shall submit a signed and sealed flexible pavement design report with sufficient documentation, which includes but not limited to calculations, plan sheets, documentation of any variances or coordination with local municipalities, design high water (DHW) elevation, projected Design Year AADT of proposed roadway, Design Year 18-kip (Equivalent Single Axle Loads) ESALD calculations, LBR test results and a quality control checklist, to DSD for review and approval.
- 8.1.2 The standards denoted in this section represent the minimum requirements that must be met for flexible pavement design for new construction within Hillsborough County. For new collector roadways and widening existing roadways reference Section 12.
- 8.1.3 Superpave asphalt is required on all roads that are within Hillsborough County jurisdiction. No substitutions will be allowed for other mixes.
- 8.1.4 Pavement design for new construction shall be in accordance with the criteria as set forth in the FDOT Flexible Pavement Design Manual with the following exceptions:
- 8.1.4.1 The Required Structural Number (SNR) for any pavement design shall not be less than 2.3 for local residential roads and 2.5 for all other classifications of roadways.
  - 8.1.4.2 The structural coefficient for any Class II Crushed Concrete to be used in a proposed base shall not exceed 0.18 per inch.
  - 8.1.4.3 The structural coefficient for in-situ or in-place roadbed soils having an existing or stabilized Limerock Bearing Ratio (LBR) minimum value of 20 beneath a proposed soil cement base shall not exceed 0.04 per inch. A copy of the LBR test results shall be submitted when using the 0.04-layer coefficient for in-place or in-situ soil beneath a proposed soil cement base.
  - 8.1.4.4 The structural coefficient for Recycled Asphalt Pavement (RAP) Base having a minimum LBR of 40 shall not exceed 0.08 per inch. A copy of the LBR test results shall be submitted when using the 0.08-layer coefficient for a proposed RAP base.
  - 8.1.4.5 The use of a Performance Grade (PG) binder may permit the ground tire rubber requirement to be omitted from friction courses.
  - 8.1.4.6 Equivalent AC grades of asphalt may be used in lieu of PG binders.
  - 8.1.4.7 Reliability factor (%R) for new construction on local roads shall not be less than 80.
  - 8.1.4.8 The following pavement designs, which do not require underdrain with at least one-foot clearance of the SHGWT from the bottom of the base at the low edge of pavement, may be used with documentation proving that the in-situ or in place soil has a LBR of 20 or higher in lieu of a signed and sealed flexible pavement design in accordance with the FDOT Flexible Pavement Design Manual. It should be noted that in addition to this thicker pavement structure for one-foot base clearance, significant construction problems are likely and dewatering may be required to achieve compaction.:
    - a) The structural course shall be a minimum of 1 ½ inches, optional base group 5 (including crushed concrete) and 12 inches of type “B” stabilization (LBR 40).
    - b) The structural course shall be a minimum of 1 ¾ inches with 11 inches of soil cement (300 psi, plant mixed) and 12 inches compacted in place soils (LBR 20) as the stabilization

- 8.1.5 Any variation of pavement design or materials not conforming specifically to the guidelines set forth herein and/or the FDOT Flexible Pavement Design Manual shall require a prior written approval from the County Engineer.

## 8.2 STABILIZED SUBGRADE FOR FLEXIBLE PAVEMENT

- 8.2.1 Stabilized subgrade shall meet the requirements of Section 160 of the FDOT Standard Specifications for Road and Bridge Construction and as noted below.
- 8.2.2 All proposed subgrades with the exception of those beneath a proposed soil cement base shall have a minimum LBR of 40 and meet the density requirements outlined in APPENDIX E: Testing Schedule. The proposed depth shall not be less than the depths noted below for the specific roadway classification:

**Table 8-1: Stabilized Subgrade Minimum Thickness**

Type of Development	Roadway Classification	Stabilized Subgrade Minimum Thickness
Residential	Local Road	6"
	Collector Road	12"
Commercial	Local Road	12"
	Collector Road	12"

- 8.2.2.1 The subgrade for soil cement shall be proof rolled with suitable compaction equipment to meet the density requirements outlined in APPENDIX E: Testing Schedule for a minimum depth of 12 inches. The subgrade beneath a proposed soil cement base shall have a minimum (LBR) of 20. Any existing soil meeting the density and LBR criteria specified above may remain in place and the associated structural value utilized in the proposed pavement design.

## 8.3 BASE COURSES FOR FLEXIBLE PAVEMENT

- 8.3.1 All base courses shall meet the general requirements of Section 285 of the FDOT Standard Specifications for Road and Bridge Construction and FDOT Design Standard 514 as well as the specific specification requirements for each particular type of base course to be used. The approved base courses for use are as follows: limerock, shell, plant produced soil cement, crushed concrete, recycled asphalt pavement (RAP) and asphalt. In no case shall the soil bearing value or density be less than that specified in the FDOT Standard Specifications for Road and Bridge Construction. The base course thickness for each road classification shall not be less than those specified in the following table:

**Table 8-2: Minimum Base Course Thickness**

Type of Development	Roadway Classification	Base Course Minimum Thickness
Residential	Local Road	6"
	Collector Road	8"
Commercial	Local Road	8"
	Collector Road	8"

- 8.3.2 Limerock Base: Shall meet the requirements of Section 200 of the FDOT Standard Specifications for Road and Bridge Construction
- 8.3.3 Shell Base: Shall meet the requirements of Section 285 of the FDOT Standard Specifications for Road and Bridge Construction
- 8.3.4 Plant Produced Soil Cement Base
- 8.3.4.1 The use of mixed-in place soil cement is prohibited. Plant produced soil cement base shall meet the requirements of Section 285 of the current FDOT Standard Specifications for Road and Bridge Construction and as noted below. Soil cement base shall only be used for on-site local roads and is not to be used on collectors or arterials whether they are onsite or offsite.
- 8.3.4.2 The design mix (300 PSI) shall be prepared by an Independent testing laboratory accredited by AASHTO, CMEC or FHWA approved in the State of Florida. The design mix submittal shall be submitted to DSD.
- 8.3.4.3 180 psi, which is sixty percent (60%) of the design compressive strength of 300 psi, shall be achieved in seven days. If this criterion is not met, the material shall be removed and replaced.
- 8.3.4.4 Test cores shall be taken after seven days to verify thickness. The average core thickness shall not exceed the specified design thickness by more than one inch. Individual cores shall not be deficient by more than one-half inch from the specified design thickness.
- 8.3.4.5 Prior to paving, there shall be a 14-day curing time unless a geo-textile membrane is utilized.
- 8.3.5 Superpave Asphalt Base: Type B-12.5 Asphaltic Concrete shall meet the requirements of Section 234 of the FDOT Standard Specifications for Road and Bridge Construction.
- 8.3.6 Reclaimed Asphalt Pavement (RAP) Base: Shall meet the requirements of Section 283 of the FDOT Standard Specifications for Road and Bridge Construction
- 8.3.7 Crushed Concrete Base: Shall meet the requirements for crushed concrete base as specified in the Guidelines for Technical Specifications in the APPENDIX of this manual

## **8.4 STRUCTURAL COURSES FOR FLEXIBLE PAVEMENT**

- 8.4.1 Structural courses for flexible pavements shall be Type SP Superpave Asphaltic Concrete. The requirements of Section 330 and 334 of the FDOT Standard Specifications for Road and Bridge

Construction shall be met. Incidental items such as prime and tack coats shall conform to the FDOT Standard Specifications for Road and Bridge Construction.

- 8.4.2 The design mix for Asphaltic Concrete shall be prepared by an accredited testing laboratory (CMEC, AASHTO or FHWA Approved in the State of Florida) and conditionally verified by the FDOT Central Bituminous Laboratory or its designee prior to use in the field.
- 8.4.3 Structural courses shall meet the following minimum thickness requirements:

**Table 8-3: Minimum Asphaltic Concrete Structural Course Thickness Requirements**

Type of Development	Roadway Classification	Asphaltic Concrete Structural Course
Residential	Local Road	1½"
	Collector Road	2"
Commercial	Local Road	2 ½"
	Collector Road	2 ½"

- 8.4.4 It is recommended that on multiple lift structural courses, the top structural lift of Asphaltic Concrete be laid at a minimum spread rate of 105 lb/sy or one inch in thickness.
- 8.4.5 Valid plant assignment sheets are to be submitted by the EOR to PWD, Construction Management Section prior to commencing production. Testing frequencies during production shall be in accordance with the Testing Schedule of this manual.

## 8.5 FRICTION COURSE

All proposed friction courses shall meet the requirements of the FDOT Flexible Pavement Design Manual, Section 337 of the FDOT Standard Specifications for Road and Bridge Construction and as noted in Table 8-4.

**Table 8-4: CQC Friction Course Requirements**

Design Speed	Two-Lane Roads	Multi-Lane Roads
Local Roads with AADT less than 3000 vpd or that are less than 1000' in length	SP Structural Course	SP Structural Course
35 mph thru 45 mph	FC-9.5 or FC-12.5	FC-9.5 or FC-12.5
50 mph or Greater	FC-9.5 or FC-12.5	FC-5

## 8.6 ALTERNATE PAVEMENTS

- 8.6.1 Portland Cement Concrete Pavement
  - 8.6.1.1 Concrete pavement design for new construction shall be in accordance with the criteria as set forth in the FDOT Rigid Pavement Design Manual.
  - 8.6.1.2 Concrete pavement shall meet the requirements of Section 350 of the FDOT Standard Specifications for Road and Bridge Construction and FDOT Design Standards 287, 305 and 505.
- 8.6.2 Bomanite Pavement: Bomanite Pavements shall meet the requirements for Portland Cement

Concrete Pavement. The developer or his authorized representative shall submit to the DSD's Engineering Review Team specifications confirming adherence to these regulations for approval. Bomanite Pavements shall only be used on roads with design speeds less than 35 mph.

- 8.6.3 Architectural Pavers: Architectural Pavers may be used subject to the approval of the County. The developer or his authorized representative shall submit PWD, for approval, manufacturer's literature and technical specifications regarding the structural strength, skid resistance, and subgrade requirements per Section 526 of FDOT Standard Specifications for Road and Bridge Construction. Architectural pavers shall only be used on roads with design speeds less than 35 mph.
- 8.6.4 White Topping at Existing Intersections: The use of White topping at intersections is subject to review and approval of the PWD. White topping may be used at existing intersections where significant rutting has been observed or in areas where the anticipated volume of trucks to utilize the roadway will be significant. The use of a White topping option will require the submission of documentation that the contractor has two years of experience in laying the proposed White topping alternative and the specialty engineer has two years of experience in designing the said White topping alternative. The EOR shall submit a copy of technical specifications to the PWD, for approval, for this type of construction prior to use on County roads.
- 8.6.5 Stamped Asphalt: Stamped asphalt may be placed at commercial and residential roads, crosswalks in subdivisions, subdivision entrances, sidewalks and driveways as long as the following criteria are met: The asphalt surface layer shall have a minimum thickness of 1.5 inches consisting of the appropriate type mixture that meets Hillsborough County design standards. Stamped asphalt utilized on sidewalks shall meet latest ADA standards. The contractor performing this type of work shall be an experienced applicator of stamped asphalt for a minimum of two years. All stamped asphalt shall be constructed and maintained by the subdivision association. Stamped asphalt replaced by Hillsborough County will be replaced with standard county asphalt pavement.

## 8.7 DESIGN REQUIREMENTS

- 8.7.1 The following design requirements shall be taken into account during the design and construction process:
- 8.7.2 The EOR shall sign and seal and submit all technical specifications for use with pavement designs to PWD prior to use on a project.
- 8.7.3 Any in-place soil below the proposed base having been designated as a Group Classification of A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7 and A-8 shall be removed and replaced with suitable material in accordance with the depths and limits shown in the FDOT Design Standard Index 500 and 505.
- 8.7.4 For Design Criteria on Roadway Base Clearance and Low Edge of Pavement Elevation refer to Chapter 12, Table 12-1 of the Stormwater Management Technical Manual.
- 8.7.5 The EOR shall submit all proposed mix designs that are to be utilized on a project prior to production and placement of the said material to the PWD's Construction Services Manager for review and approval. The EOR is to provide a copy of the approved mix designs to the County

inspector assigned to that specific project.

- 8.7.6 During construction, all material certifications and approved mix designs are to be submitted on a timely basis and in accordance with FDOT Standard Specifications for Road and Bridge Construction by the EOR to the PWD's Construction Services Manager for review, and for As-Built records.
- 8.7.7 The standards/criteria contained within this section address only the minimum typical pavement design situations, as it is impractical to attempt to define rules that would apply to every conceivable situation.

## SECTION 9.0 BRIDGE DESIGN

### 9.1 DEFINITION

- 9.1.1 A bridge is defined as a structure with a span greater than or equal to 20 feet between abutments, spring lines of arches, or inside faces of outboard stems for multiple cells. When the span ranges from 20 feet to 24 feet, an order of magnitude cost comparison will be made to determine if a bridge or culvert is the chosen structure type based on lowest cost. Spans greater than 24 feet will be designated as a bridge.
- 9.1.2 The County does not consider the following items to be a bridge:
- 9.1.2.1 Any individual pipe or series of pipes crossing a road.
  - 9.1.2.2 Culverts with a span between inside faces of outboard stems less than 20 feet.

### 9.2 OBJECTIVES

Hillsborough County maintains, rehabilitates and, if necessary, replaces bridges within the County under its jurisdiction. Bridge design and construction, whether initiated by the County or a developer, shall comply with the same latest design and construction specifications and possess the same quality and standards as set forth in the following criteria.

### 9.3 DESIGN SPECIFICATIONS

- 9.3.1 Bridge design shall be in accordance with the AASHTO Standard Specifications for Highway Bridges and the FDOT Structures Manual.
- 9.3.2 The bridge design live load shall be HS25-44; however, the engineer shall verify the bridge adequacy for all Florida legal loads (SU2, SU3, SU4, C3, C4, C5 and ST5).
- 9.3.3 For example, SU2 is a two-axle single unit truck, and C3 is a three-axle tractor-trailer combination truck.
- 9.3.4 Concrete covers will be in accordance with the FDOT Structures Manual. Any deviations or additions must be submitted to the County Engineer at [CEINTAKE@HCFLGov.net](mailto:CEINTAKE@HCFLGov.net) for review and approval as a design exception.
- 9.3.5 No vehicular timber bridges are allowed.

### 9.4 CONSTRUCTION SPECIFICATIONS

Construction shall conform to the FDOT Standard Specifications for Road and Bridge Construction.

### 9.5 TESTING

Testing shall be performed and reports shall be submitted to PWD's Construction Services as required by the specifications. Material specifications, methods of sampling, and testing procedures shall conform to ASTM Standard Specifications.

### 9.6 PLANS PREPARATION

- 9.6.1 Bridge plans shall be prepared and assembled in accordance with the FDOT Plans Preparation Manual.
- 9.6.2 Bridge plans shall be prepared and submitted in two stages: preliminary plans and final plans. In each stage, plans shall be submitted to the PWD, via DSD, for review and approval.
- 9.6.3 The bridge design calculations and plans shall be signed, sealed and dated by a Professional Engineer licensed in the State of Florida who practices as a Structural Engineer.

## **9.7 PEDESTRIAN WALKWAYS**

- 9.7.1 Pedestrian walkways shall be designed in accordance with the AASHTO Guide Specifications for the Design of Pedestrian Bridges and the AASHTO Standard Specifications for Highway Bridges. Construction shall conform to the FDOT Standard Specifications for Road and Bridge Construction. Testing and plans preparation shall be as stipulated in Sections 9.5 and 9.6 above.
- 9.7.2 The grade and cross slope of the walkway shall be preferably flat, but in no case, shall the cross slope exceed two percent. The walkway shall meet ADA requirements.
- 9.7.3 Pedestrian walkways shall have a minimum railing height of three feet, six inches. When walkways are to be used by both pedestrians and bicyclists, the minimum railing height shall be four feet.



## SECTION 10.0 LANDSCAPING AND TREE PRESERVATION

### 10.1 GENERAL

- 10.1.1 Landscape design, vegetation planting, and tree preservation provisions shall conform to the requirements of the Natural Resources Section of the LDC, FDOT Highway Landscape Design Guide, FDOT Rule Chapter 14-40, “Highway Landscape Improvements”, LDC's Landscape and Buffering Section and the Guidelines for Landscaping Hillsborough County Roadways, and the requirements of this manual. The most stringent design standard shall be used.
- 10.1.2 Major tree preservation and the minimizing of the removal of trees that will not conflict with the standards of this manual are considered an important concept in landscape design by Hillsborough County.
- 10.1.3 The preparation of landscape plans in Hillsborough County shall be signed and sealed by a Florida registered Landscape Architect in conformance with Chapter 481 of the Florida Statutes.
- 10.1.4 The Florida Highway Landscape Guide and provisions as noted in this manual shall be used in the design of roadway projects to coordinate the application of approved roadway design standards in the development of roadway landscape plans.

### 10.2 HORIZONTAL CLEARANCE

- 10.2.1 The horizontal clearance for trees is that they must be located outside the clear zone. There can be no fixed objects within the limits of the horizontal clearance area that would prevent an errant vehicle from recovering. In roadway landscape design, all plantings within the horizontal clearance area must have a trunk diameter of four inches or less when measured six inches above the ground when at maturity. Horizontal clearance and clear zone criteria are based on the type of highway design (rural or urban) and the design speed of the highway.
- 10.2.2 Urban Roads and Collectors: Reference Volume I, Chapter 2 of the FDOT Plans Preparation Manual for horizontal clear zone requirements on local urban roads and collectors.
- 10.2.3 Rural Roads and Collectors
  - 10.2.3.1 Reference Volume I, Chapter 2 of the FDOT Plans Preparation Manual for horizontal clear zone requirements on local rural roads and collectors.
  - 10.2.3.2 When trees are installed along the outer roadside of rural highways, they must be outside the horizontal clearance area.
- 10.2.4 Intersection Clear Site Requirements
  - 10.2.4.1 Clear-sight distance is required at intersections, median openings and driveways connections. These distances shall be provided per the requirements of the FDOT Design Standard Index 546, Sight Distance for Intersections.
  - 10.2.4.2 The sight datum line for clear-sight windows at intersections is established from the point of the driver's eye on the side street to the point of the driver's eye on the main highway. The design location for the end of the datum line on the side street is 3.5 feet above the pavement at the driver's stop location 20 feet from the through lane. The design location for the end of the datum line on the main highway is 3.5 feet above the

pavement at the point being checked. A clear-sight window must be maintained five feet above and 1.5 feet below the site datum line. See the Landscaping Clear Site Window for Medians Typical Details drawings in this manual for clear sight window standards.

### 10.3 VERTICAL CLEARANCES

All sidewalks and pedestrian crossing areas should be maintained free of all obstructions and growth. See Landscaping Vertical Clearances and Clear Site Window for Medians Typical Details drawings in this manual for vertical clearance standards.

### 10.4 TREE PRESERVATION

- 10.4.1 **Tree Well/Aeration Systems:** A tree well/aeration system is used when the proposed finished grade within the critical root zone exceeds the natural grade by eight inches or more. The critical root zone represents that portion of a tree's root system equivalent to an area of a one-foot radius for each inch diameter of the tree's trunk measured 4.5 feet above the natural grade (i.e. a 12-inch diameter tree has a critical root zone of 12 feet radius from the tree's trunk). See additional guidelines on tree well/aeration systems in the Tree Protection, Typical Details.
- 10.4.2 **Retaining Wall:** A retaining wall is used when the proposed finished grade within a tree's critical root zone is below the natural grade. The installation of a retaining wall shall be placed no nearer the tree's trunk than three times the trunk diameter measured at 4.5 feet above the natural grade and when no more than 30% of the tree's root system will be severed. Prior to the finished grade adjustments and retaining wall installation, prune the tree's roots with a Dosko root cutter or equivalent where the retaining wall is to be installed. See additional guidelines on retaining walls in the Tree Protection Typical Details.
- 10.4.3 **Pervious Pavement:** Pervious pavement may be applied when the proposed finished grade within a tree's critical root zone does not exceed the natural grade by more than eight inches with predominantly sandy textured fill. Various pervious materials such as paver bricks, turf block and porous concrete are acceptable. Curbing proposed at the perimeter of the pavement material must be designed to not sever the root system the pervious pavement is to protect. Extruded curb, pin curbs or other similar designs are necessary to minimize root disturbance. See additional guidelines on pervious pavement in the Tree Protection Typical Details.
- 10.4.4 **Cantilevering:** Bridging the root system of protected trees may be necessary for the installation of buffer walls or other similar vertical structures.
- 10.4.5 **Root Pruning:** Root pruning shall be an important consideration when land alteration activity is proposed within a tree's critical root zone. Root pruning shall be effectively performed to promote desired wound wood production and to discourage a root's infection by root-rotting fungi. Effective root pruning represents a clean, even cut and discourages a torn, jagged result.
- 10.4.6 **Tree Protection Barriers:** Refer to the guidelines on tree protection barriers in the Tree Protection Typical Details drawings in this manual.
- 10.4.7 **Tree Pruning:** All tree pruning shall conform to the pruning standards as specified in the Tree Protection Typical Details drawings in this manual and the National Resources Section of the

LDC. These standards refer to the American National Standards Institute (ANSI) A-300 Pruning Standards.

- 10.4.8 Sidewalk Protection from Street Trees: When street trees are required to be provided by the LDC or other regulation/criteria, sidewalk protection at the tree are required. The length of the required protection shall be five feet on either side of the centerline (longitudinally) of the required tree. For additional information, refer to Sidewalk Protection Options Typical Details drawing in this manual.

## SECTION 11.0 CONSTRUCTION PLANS SUBMITTAL

### 11.1 SUBMITTAL PROCESS

The County has implemented an electronic submittal process. The “Electronic Submittal Process for Site Development Plans” can be found online at [HCFLGov.net](http://HCFLGov.net) (under Departments, Development Services, Land Development).

### 11.2 SUBMITTAL REQUIREMENTS

- 11.2.1 All submittals must be provided in digital format. CAD files are to be converted to Adobe file format (.pdf) and set to print at 24 inches by 36 inches. Other formatting procedures and requirements are described on the above website. Initial submittals are scheduled by appointment through the DSD and assigned a Case Manager that will process and follow the project from beginning to end. Re-submittals are submitted through the PGM Store online using the Optix system and for now hard copies are still required to be turned in through the DSD. The standard sheet size for construction plans submitted to the County for review shall be 24 inches by 36-inches. Work sheets and data sheets used in preliminary design work and reviews are not limited to any size, except that which is convenient to handle.
- 11.2.2 The following statement shall be shown on the Cover Sheet: Construction shall be in accordance with the Hillsborough County LDC; Stormwater Management Technical Manual; Transportation Technical Manual for Subdivision and Site Development Projects; Water, Wastewater and Reclaimed Water Manual; the FDOT Standard Specifications; and FDOT Design Standards.
- 11.2.3 Final record drawings shall be submitted in accordance with Hillsborough County Specifications, Section 01300.

## SECTION 12.0 ON-SITE COLLECTORS AND OFF-SITE ROADWAYS

### 12.1 GENERAL

- 12.1.1 This section provides general guidance for the development of roadway designs for off-site roadways to include on-site collectors and for plans production.
- 12.1.2 Off-site transportation improvements shall meet all DRI, concurrency, developer agreements, zoning conditions, Hillsborough County's LDC, and Transportation Review Coordination requirements, and be designed in accordance with criteria established by the PWD, and submitted to DSD for processing. Where a safety-related discrepancy exists between the requirements of a zoning condition and the criteria established by the PWD, the County Engineer will determine the most appropriate criteria.
- 12.1.3 DSD will submit all off-site improvements and on-site collectors to PWD for review.
- 12.1.4 All off-site improvements and on-site collectors require PWD design reviews at both the preliminary plat submittal and final plans submittal.

### 12.2 OFF-SITE ROADWAY DESIGN CRITERIA

The FDOT Plans Preparation Manual, Volume 1 and the FDOT Design Standards for Construction Operations on the State Highway System (Design Standards) are applicable for design of all off-site roads. All roadways classified as collectors and higher within (on-site) or outside a subdivision (off-site) shall be designed in accordance with criteria established by the latest Plans Preparation Manual and Design Standards. The Hillsborough County, Stormwater Technical Manual shall govern also. The Florida Greenbook criterion does not apply to off-site County roadways or on-site collectors. The design criteria for these facilities shall be submitted to the PWD for review at milestones specified by the PWD.

### 12.3 DESIGN COORDINATION

- 12.3.1 Prior to starting a design, it is highly recommended that the EOR meet with the PWD to obtain critical design and plans production guidelines required by the County. The intent of this pre-design meeting is to allow the EOR to confirm specific design criteria in order to move forward with the design and to prevent unnecessary re-submittals. Such things as design speed, layout, potential design exceptions, typical section requirements, bike lanes, pavement design, pavement milling and resurfacing requirements, required check list, etc. are discussed and agreed upon. Checklists of required data for various stages of design are available and presented at these meetings. Following are the recommended minimum number of meetings:
  - 12.3.1.1 Simple Projects: For simple projects, it is recommended that a pre-design or no later than 60% design completion meeting be held. A minimum of one meeting is recommended.
  - 12.3.1.2 Complex or Large Projects: For complex or large projects, it is recommended that a preliminary layout and design criteria coordination meeting, a pre-submittal meeting prior to the 60% submittal and a final 100% submittal meeting (depending on the complexity of the project) be held. A minimum of two meetings are recommended.
  - 12.3.1.3 The above are minimum recommendations; The EOR can request as many meetings as necessary to establish and confirm any County requirements or discuss review

comments concerning the roadway improvements.

## 12.4 DESIGN EXCEPTION

- 12.4.1 A design exception is an approval issued by the County to permit deviations from applicable standards submitted by the EOR. The exception may be granted based on a signed and sealed report explaining the rationale used and the compelling reasons for the exception. In some cases, after the initial review, the EOR may be required to provide a cost benefit analysis to further justify the exception. Please refer to 1.4 Design Exceptions of the Technical Publications Update and Revision Procedure for additional information.
- 12.4.2 Off-site design exceptions are intended for roads currently in Hillsborough County jurisdiction. All design exception requests are to be submitted to DSD for processing. All off-site requests shall be submitted to the County Engineer at [CEINTAKE@HCFLGov.net](mailto:CEINTAKE@HCFLGov.net) for approval.

## 12.5 TYPICAL SECTION

The typical sections found in this manual, while applicable to off-site improvements in some instances, should not be used for off-site roadway projects. The appropriate typical section for such projects is to be determined during the design coordination meeting. A typical section must be provided for each proposed road. Additional typical sections must also be provided for each section of a road for which design elements vary significantly to warrant the need of additional typical sections.

## 12.6 PLANS

- 12.6.1 Plans for off-site work that is permitted separately from the on-site shall follow the requirements of Section 12.6.
- 12.6.2 Plan Set Format: In order to be considered for review, the construction plan set shall be prepared in accordance with the format specified below:
- 12.6.3 Construction plan set sheets will be assembled in the following order:
- Key sheet
  - Design criteria
  - Geometric layout/project layout (one master site plan)
  - Drainage maps
  - Survey – reference points (Could be included in geometric layout/project layout)
  - Summary of quantities
  - General notes
  - Typical section
  - Roadway plan and profile sheets
  - Intersection details
  - Special details/special profiles
  - Drainage structure sheets
  - Cross sections/driveway half sections
  - Signing and pavement marking plans
  - Signalization plans

- Lighting plans
- Utility plans/adjustments (Could be included with roadway plan and profile sheets for minor work)
- Landscape plans
- Mitigation plans
- Structural plans (board walk, box culverts, etc.)
- Roadway soil survey

12.6.4 A complete index of off-site plan sheets shall be placed on the left of the cover sheet (key sheet) under the heading “Index of Roadway Plans”. For an extensive list of what is required for inclusion in a plan set, see FDOT Plans Preparation Manual Vol. II Chapter 2 and Chapter 3.

12.6.5 The baseline (BL) survey and/or centerline (CL) of construction must be established and tied to the State Plane Coordinates.

12.6.6 Cross Section Elements (Off-Site Only)

12.6.6.1 Cross sections shall depict the existing ground conditions with all its elements and the proposed conditions with all its elements. The sections are to be perpendicular to the construction centerline (Construction CL) or survey baseline (Survey BL). Existing elements are to be shown with dashed lines and the proposed elements are to be shown with solid lines.

12.6.6.2 Cross sections are to be provided as needed and at critical locations. Cross section preparation is to follow the latest FDOT Design Manual (FDM) or latest FDOT Plans Preparation Manual – Volume 2. The required information will include, but is not limited to, existing and proposed pavement, curb, sidewalks; normal and seasonal high-water elevations; soil borings; special ditch bottom elevations; existing underground utilities; existing and proposed right-of way lines and easements.

## 12.7 RIGHT-OF-WAY COORDINATION

12.7.1 The developer may be required to dedicate and convey additional right-of-way along the off-site roadway to safely accommodate the necessary improvements required due to the developments impact, ensuring that adequate border width or the necessary design requirements are satisfied.

12.7.2 The developer shall determine the existing right-of-way, including maintained right-of-way, within the limits of the proposed project by obtaining preliminary maps, tax assessor maps, record maps and property ownership maps from the County’s Real Estate Department. Additional coordination with the PWD may be necessary for maintain right-of-way limits.

12.7.3 Right-of-way plan/construction drawings are to be submitted to the Survey Division in order to verify the process by which the right-of-way was determined and that the right-of-way is properly depicted on the construction drawings. The developer must receive concurrence from the County Surveyor prior to the submission of the plans to the DSD/PWD.

12.7.4 Proposed right-of-way lines must clearly be shown and labeled on the proposed design plans and updated throughout the design phase.

## 12.8 PUBLIC WORKS REVIEW

- 12.8.1 The PWD Review Checklist should be completed by the EOR and included with the off-site plans submittals. These check lists can be obtained from PWD at any time or during the recommended pre-design meeting. It is recommended that plans be submitted for review at 30% to 60% (preliminary) and 100% (final) stages depending on the complexity of the roadway improvements. The EOR may choose to submit plans at any design stage, but the plans must be clearly labeled as preliminary or final. Plans labeled as preliminary do not need to be signed and sealed.
- 12.8.2 Prior to commencing construction within Hillsborough County Right-of-Way, video document the existing site conditions in accordance with Hillsborough County Specifications, Section 01385.

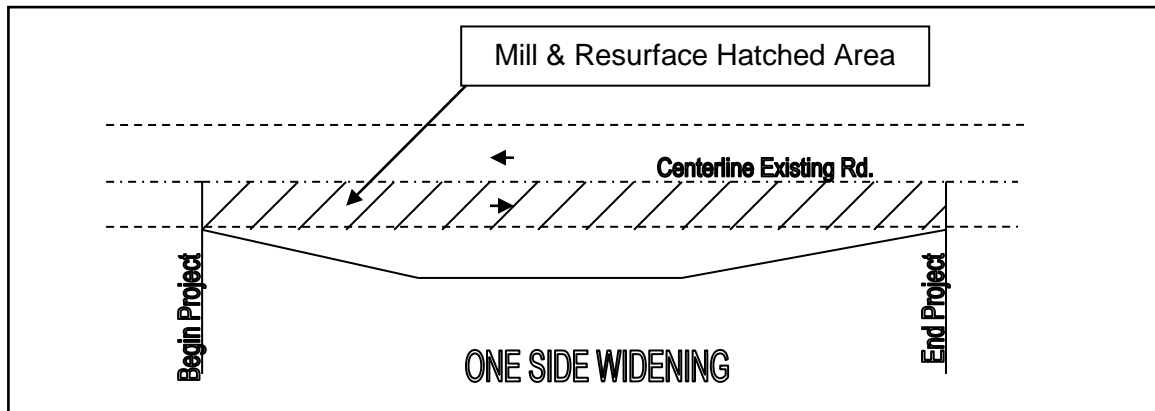
## **12.9 PAVEMENT DESIGN**

- 12.9.1 Pavement design shall be in accordance with the criteria as set forth in the latest FDOT Flexible Pavement Design Manual with the following options:
- 12.9.1.1 Option 1: Provide a detailed analysis based on traffic counts or forecasted counts for new collector roadways following the guidelines in the FDOT Flexible Pavement Design Manual latest edition.
- 12.9.1.2 Options 2: Perform cores and match the existing pavement as described in the Flexible Pavement Design Manual latest edition (For widening only).
- 12.9.1.3 Option 3: The following pavement design may be used in lieu of options 1 and 2 (For widening only): The combined friction course and structural course shall be a minimum of four inches, optional base group 9 (including crushed concrete) and 12 inches of type “B” stabilization (LBR 40).
- 12.9.2 Superpave Requirement: Superpave asphaltic concrete is required on all roads. No substitutions will be allowed for other mixes.
- 12.9.3 Roadway Base: Crushed concrete (LBR 150) is allowed for use on all roads. Soil cement base will not be permitted on off-site roads.

## **12.10 MILLING AND RESURFACING PROCEDURE**

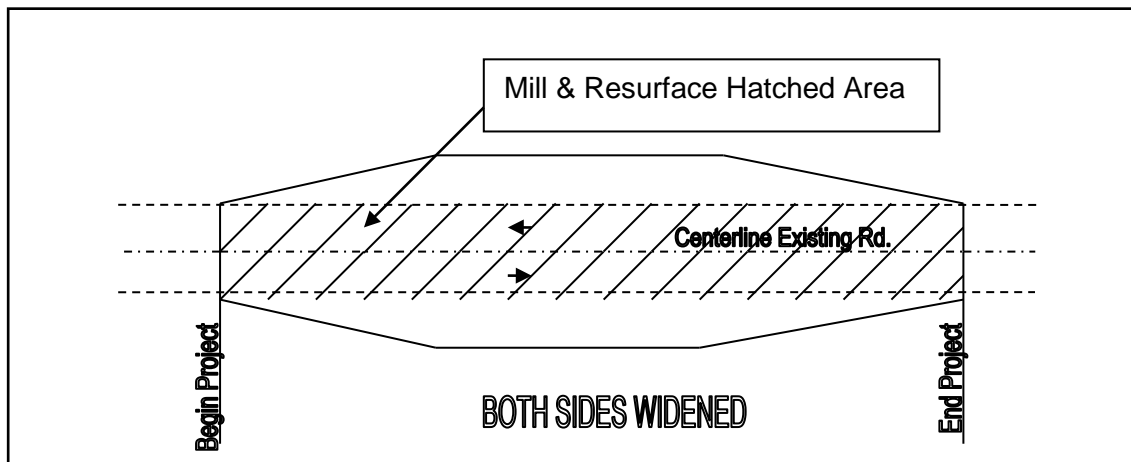
- 12.10.1 Pavement cores may be required to determine the condition of the existing pavement (i.e. severe cracking is present) for off-site milling and resurfacing projects before any recommendations are made.
- 12.10.2 The following cases shall apply:
- 12.10.2.1 Widening on One Side: When widening is done on one side of an existing two-lane roadway then a minimum of one-inch milling and resurfacing is required between the begin and end limits of the project to the center line of the existing roadway.





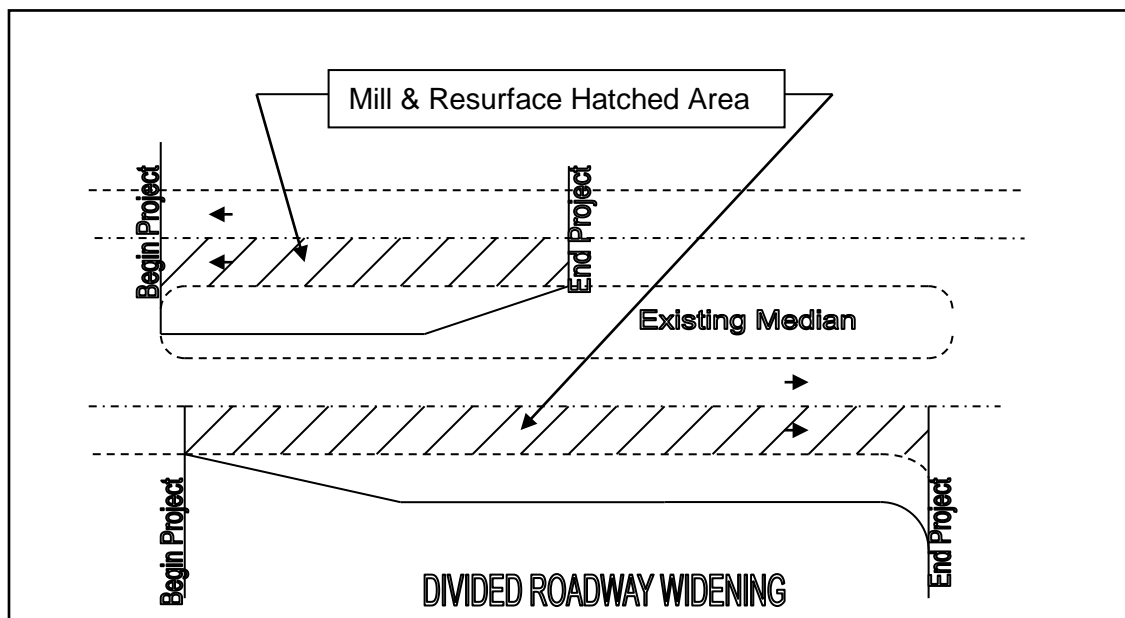
**Figure 12-1: Widening on One Side**

12.10.2.2 Widening on Both Sides: When widening is done on both sides of an existing two-lane roadway, a minimum of one-inch milling and resurfacing is required between the begin and end limits of the project for the entire width of the existing roadway.



**Figure 12-2: Widening on Both Sides**

12.10.2.3 Widening on a Divided Roadway: When widening is done adjacent to an existing two or more lanes divided roadway, a minimum of one-inch milling and resurfacing is required between the begin and end limits of the project to include the adjacent lane. This includes widening in the median area (left-turn lanes).



**Figure 12-3: Widening on a Divided Roadway**

- 12.10.2.4 For proposed improvements adjacent to existing roadways that have been recently resurfaced, (three years or less at time of permitting and five years or less at time of construction) milling and resurfacing one foot of the adjacent lane (a minimum of one inch) may be considered. The PWD will have final determination.
- 12.10.2.5 When existing thermoplastic striping that crosses or is in the center of the lane is to be removed then a minimum of one-inch milling and resurfacing is required between the begin and end limits of the project for the entire width of that lane.
- 12.10.2.6 For conditions other than those depicted above, resurfacing limits will be at the discretion of and determined by the PWD.
- 12.10.2.7 The County reserves the right to increase the milling depth and required asphalt thickness in the design phase if existing conditions of the roadway warrant the need.

## 12.11 SURVEY MONUMENTATION

If the off-site construction operation destroys any baseline or centerline monumentation, it will be the developer's responsibility to re-establish it in the field.

## 12.12 DRIVEWAY CONNECTION PROFILES

Driveway profiles will be developed for each off-site driveway impacted as part of the construction improvements. The profiles will be included at each submittal and will address how driveway connections will be made to existing adjacent properties. Driveway profiles shall follow FDOT Standard Index 515 guidelines.

## 12.13 STRIPING REMOVAL

12.13.1 When removing striping from existing pavement, the following conditions may apply:

12.13.1.1 Condition 1: When the existing pavement markings or pavement messages are not

within the wheel path of the travel lanes, rinding methods may be used for removal of the pavement markings up to 1,500 feet or as approved by the County. (Examples: skip & edge lines).

- 12.13.1.2 Condition 2: When the existing pavement markings are over the entire travel lane, then a one-inch layer of milling and resurfacing is required to remove pavement markings and maintain the coefficient of friction of the pavement. (Examples: Pavement turn arrows, messages & cross hatched areas).

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# APPENDIX A: ENGINEER OF RECORD CERTIFICATION

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## ENGINEER OF RECORD CERTIFICATION

I, \_\_\_\_\_, hereby certify that I am associated with the firm of \_\_\_\_\_ which has been retained by \_\_\_\_\_ . I certify that I will function as the Engineer of Record for \_\_\_\_\_ Subdivision. I certify that I am licensed by the State of Florida as a Professional Engineer. I certify that I am licensed to perform engineering assignments in the discipline of Civil Engineering. I certify that my practice of Civil Engineering is covered by professional liability insurance in an amount not less than one hundred thousand dollars (\$100,000.00).

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

\_\_\_\_\_  
Signature

Florida Professional Engineer No. \_\_\_\_\_

Affix Seal

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# APPENDIX B: ENGINEER OF RECORD CERTIFICATION (CHANGE OF ENGINEER OF RECORD)

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## ENGINEER OF RECORD CERTIFICATION (CHANGE OF ENGINEER OF RECORD)

I, \_\_\_\_\_, hereby certify that I am associated with the firm of \_\_\_\_\_, which has been retained by \_\_\_\_\_ I certify that as of this date I will function as the Engineer of Record for \_\_\_\_\_ Subdivision.

I certify that I am licensed by the State of Florida as a Professional Engineer. I certify that I am licensed to perform engineering assignments in the discipline of Civil Engineering. I certify that my practice of Civil Engineering is covered by professional liability insurance in an amount not less than one hundred thousand dollars (\$100,000.00). The Engineer of Record for this subdivision prior to this date was \_\_\_\_\_, associated with the firm of \_\_\_\_\_ which was retained by \_\_\_\_\_

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

\_\_\_\_\_  
Signature

Florida Professional Engineer No. \_\_\_\_\_

Affix Seal

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# APPENDIX C: ENGINEER OF RECORD CERTIFICATION OF CONSTRUCTION COMPLETED

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## ENGINEER OF RECORD CERTIFICATION OF CONSTRUCTION COMPLETION

I, \_\_\_\_\_, hereby certify that I am associated with the  
firm of \_\_\_\_\_, which has been retained by  
\_\_\_\_\_

I certify that construction of \_\_\_\_\_

Subdivision has been completed in substantial compliance with the Hillsborough County Land Development Code, Stormwater Management Technical Manual, Transportation Technical Manual for Subdivision and Site Development Projects, Water, Wastewater and Reclaimed Water Technical Manual, the FDOT Standard Specifications for Road and Bridge Construction, the FDOT Design Standards, and the approved plans and specifications. I certify that these Record "As Built" Drawing plans have recorded any substantial design deviations due to field conflicts.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

\_\_\_\_\_  
Signature

Florida Professional Engineer No. \_\_\_\_\_

Affix Seal

No County agreement, approval, or acceptance is implied by this Record Drawing certification.

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# APPENDIX D: CONTRACTOR'S AFFIDAVIT

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## CONTRACTOR'S AFFIDAVIT

I/We as Contractor for the construction of the street, stormwater, water, wastewater and reclaimed water facilities for \_\_\_\_\_ Subdivision, having been first duly sworn, depose

and say: That all of the material used in the construction of the streets, stormwater, water, wastewater and reclaimed water facilities meet the requirements of the Hillsborough County Land Development Code, Stormwater Management Technical manual, Hillsborough County Transportation Technical Manual for Subdivision and Site Development Projects, Water, Wastewater and Reclaimed Water Technical Manual, the FDOT Standard Specifications for Road and Bridge Construction, FDOT Design Standards, and the approved plans and specifications.

By \_\_\_\_\_

**SIGNATURE**

Print name & title: \_\_\_\_\_

\_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_

\_\_\_\_\_

Notary Public - State of Florida at Large

My commission expires: \_\_\_\_\_

**AFFIX SEAL**

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# APPENDIX E: TESTING SCHEDULE

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## TESTING SCHEDULE

Item	Test	Test Frequency	
Embankment	Optimum Moisture/Maximum Dry Density of soil (proctor) as determined by AASHTO T180.	Per Soil Type	
	Density Test within Right-of-Way (R.O.W.).	98% of Maximum Dry Density as determined by AASHTO T180.	One per 500' horizontally, in one-foot lifts (1)
	Density Test Outside of R.O.W.	95% of Maximum Dry Density as determined by AASHTO T180.	One per 500' horizontally, in one-foot lifts (1)
	Gradation (Sieve Analysis) AASHTO TO27.		Per Soil Type
Utility Trench Backfill – over pipelines and around structures from R.O.W. line to R.O.W. line	Optimum Moisture/Maximum Dry Density of soil by AASHTO T180.	Per Soil Type	
	98% of Maximum Dry Density (proctor). Soil mix by AASHTO T180.	(1)(2)	
Utility Trench Backfill – over pipelines and around structures outside R.O.W. line	Optimum Moisture/Maximum Dry Density (proctor). Soil Mix by AASHTO T180.	Per Material Type	
	95% of Maximum Dry Density as determined by AASHTO T180.	(1)(2)	
Stabilized Subgrade	Limerock Bearing Ratio (LBR) as per FM 5-515.	Per Soil Type	
	Minimum 40 LBR.	Per Material Type (3)	
	Minimum 20 LBR (For Soil Cement Only).	Per Material Type	
	Subgrade to be used under soil cement shall has a minimum 20 LBR.	Per Material Type	
	Moisture/Maximum Dry Density of soil (proctor). Proctor as per FM 5-515.	Per Material Type	
	98% of Maximum Dry Density as determined by FM 5-515. No tolerance. Soil Cement - 97% of Maximum Dry Density as determined by AASHTO-T134. No tolerance	(3)(4)	
Base (Other than soil cement or crushed concrete)	Limerock Bearing Ratio (FM 5-515). Minimum LBR 100.	Per Material Type/Per Source	
	98% of Maximum Dry Density as determined by FM 5-515. No tolerance.	(3)(4)	

## TESTING SCHEDULE (Continued)

Item	Test	Test Frequency
Soil Cement Base	Mix Design	Per Material Type
	Moisture/Maximum Dry Density of soil (proctor) AASHTO T134	Per Material Type
	97% of Maximum Dry Density as determined by AASHTO T134. No tolerance.	(3)(4)
	Compressive Strength of Specimens	One set of three per material type daily
	Cores Thickness Test	(3)
Crushed Concrete Base	Gradation	Per Type of Material/Source (5)
	Abrasion per FM 1-T096	Per Type of Material/Source
	Limerock Bearing Ratio (LBR) as per FM 5-515. Minimum LBR 150.	Per Type of Material/Source
	100% of Maximum Dry Density as determined by FM 5-515. No tolerance.	(4)
Concrete	Temperature (ASTM C1064)	One per set of cylinders
	Slump (ASTM C143)	One per set of cylinders
	Air Content (ASTM C231 or C173 as applicable)	One per set of cylinders
	Compressive Strength Cylinders (ASTM C31 and C39)	One set of four (6x12) inch or one set of five (4x8) inch cylinders for 100 cubic yards or fraction thereof, per class of concrete. Tested as follows: 1 at 7 days, 2 at 28 days, and 1 as reserve tested 56 days is necessary. Three cylinders shall be tested at 28 days if 4x8 inch cylinders are used.

## TESTING SCHEDULE (Continued)

Item	Test	Test Frequency
Superpave Asphalt	Mix Design	One per FDOT Approved type
	Temperature	(6)
	Maximum Specific Gravity (FM 1-T209)	As per Section 330 of the Hillsborough County Public Works Standard Specifications for Construction.
	Extraction/Gradation (FM5-563/FM 1-T030)	
	Thickness. No core shall be less than the specified thickness.	Three cores per production day.
	Straightedge (FM 5-509)	(7)
	Bulk Specific Gravity (MF 1-T166) 90% of Lab Density for Local Roadways (Remove and Replace if not met); and 92% of Lab Density for Collectors and Arterials (Remove and Replace if not met).	(3)

- (1) *Recommend testing methods: FM 1-T238, FM- T204, ASTM D6938, and ASTM D2937.*
- (2) *Tests shall be located no more than 500 feet apart. Tests shall be performed on each lift, except that tests shall not be further apart than one foot vertically. Field Densities shall be taken over all road crossings. Field Densities for Sanitary Lines shall be staggered to include results over service laterals. There shall be a minimum of one test series for each one foot of lift over pipeline between manholes. Tests around structures shall be spiraled in one-foot lifts. For all type pipe, fill to be compacted beneath the haunches using suitable tampers. For pipe less than 24 inches in diameter, backfill in appropriate lifts and test from the top of the pipe and every one foot vertically thereafter. For pipe 24 inches to 72 inches in diameter, backfill in appropriate lifts and test from the springline and every one-foot vertically thereafter. For pipe larger than 72 inches, tests shall begin one foot above the base of the trench.*
- (3) *Tests shall be located no more than 500 feet apart. There shall be no less than one test per street. No core shall be less than specified minimum thickness.*
- (4) *Testing for the subgrade and base compaction shall be located no more 500 feet apart and shall be staggered to the left, right, and on the centerline of the roadway. Hillsborough County may reserve the right to sample and test any material utilized in the construction of the roadway. Testing shall be in accordance with the Testing Schedule of this manual and applicable FDOT Standard Specifications for Road and Bridge Construction. Inspection of the subgrade and base shall be conducted by the Engineer of Record, the County Inspector, and shall be approved by the Project Manager prior to the base and asphalt construction respectively.*
- Note: Hillsborough County reserves the right to sample and test any material during construction.*
- (5) *Materials requirements as per latest of Section 204 of the Hillsborough County Public Works Standard Specifications for Construction.*
- (6) *Continuous for the five first loads if the temperature is within the master range take a temperature measurement every five (5) loads thereafter.*
- (7) *For local roads, within residential subdivision projects, the straightedge test will be required only if requested by Hillsborough County. For other type of road and projects the straightedge test is require as per Section 330 of the Hillsborough County Public Works Standard Specifications for Construction.*

## HILLSBOROUGH COUNTY SOIL & MATERIAL FINAL TEST REPORT PACKAGES

One bound (in book format) and one electronic (pdf) final project test report package shall be submitted in the following format, with required documentation as appropriate. Plans showing the test locations, along with the test numbers, must be identified with each section. The plans can be a pdf of the construction plans where the test report information is added or it can be a color scanned pdf copy.

- **COVER** – Include project name, Hillsborough County project ID, location and contact information.
- **SIGNED AND SEALED CERTIFICATE** – Must be signed and sealed by Geotechnical Engineer and include a verification statement that testing requirements of the Hillsborough County technical manuals have been achieved or exceeded. If testing requirements were not, a description of deficiencies shall be noted.
- **SECTION 1** – Excavation and embankment requirements, materials testing, proctors of materials, earth work test results, and offsite fill material testing.
- **SECTION 2** – All tests for the installation of the sanitary sewer system.
- **SECTION 3** – All tests for the potable and reclaimed water systems.
- **SECTION 4** – All tests for the installation of the storm water system.
- **SECTION 5** – Tests for the sub grade material followed by the buildup placement in the roadways tests.
- **SECTION 6** – Reports for the materials to be used in the road base, followed by the reports for the buildup of the road base. Mix designs shall also be included.
- **SECTION 7** – Roadway surface material tests, followed by the tests done during the buildup of the roadway surfaces, including asphalt mix design, extraction/gradation, bulk specific gravity (core density), and thickness reports.
- **SECTION 8** – All concrete tests for curbs, storm structures, walls, etc.

Refer to Testing Schedule for required frequency of tests.

The rolling straight edge report shall be submitted separately with as-builts.



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# APPENDIX F: GUIDELINES FOR TECHNICAL SPECIFICATIONS

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## GUIDELINES FOR TECHNICAL SPECIFICATIONS

The following guidelines should not be used arbitrarily. These specifications should be reviewed/accepted by a professional engineer knowledgeable in each applicable subject area prior to concurrence or use.

### A. Crushed Concrete Base

The work specified under this Section consists of the construction of roadway base utilizing crushed concrete on prepared subgrade, in conformity with the lines, grades, notes and typical cross sections shown in the Plans, and as directed by the EOR.

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 EOR during construction. The EOR shall have full authority to modify the provisions of this Section as deemed necessary, in his opinion, to meet field conditions and requirements.

#### Materials

Shall meet the following gradation requirements:

#### Composition

Base material shall conform to the following gradation:

Sieve Size	Percent by Weight Passing
2"	100
1 1/2"	95-100
3/4"	65-90
3/8"	45-75
No. 4	35-60
No. 10	25-45
No. 50	5-25
No. 200	0-10

Material for Crushed Concrete Base shall consist only of crushed concrete pavement (Class II or greater) and such additive materials as may be approved by the EOR for the purpose of facilitating construction and achieving the desired characteristics of the finished in-place product. Material that shows a significant tendency toward adverse chemical or physical change on exposure to moisture will not be acceptable. The material shall be free of any Ferrous Metals.

#### Mechanical and Physical Properties

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, or strength of the crushed concrete base. The specific mechanical and physical properties of crushed concrete aggregate and any additive materials permitted in the construction of Crushed Concrete Base under this contract shall be determined on the basis of test results as the work progresses. The finished in-place product shall provide at least an LBR of 150 or greater.

1. TESTING OF BASE COURSE

Tests for base thickness and density shall be located no more than five hundred (500) feet apart and shall be staggered to the left, right, and on the centerline of the roadway. There shall be no less than three (3) tests per street. Test reports for thickness, bearing, and density shall be submitted by the EOR to the County for as-built records. Hillsborough County reserves the right to sample and test base material. All testing shall be in accordance with the Testing Schedule.

2. PRIME AND TACK COATS

All bases shall be primed in accordance with the Florida DOT Standard Specifications for Road and Bridge Construction (except for the requirements of QCQ). Tack coat material and construction methods shall conform to the Florida DOT Standard Specifications for Road and Bridge Construction (except for the requirements of QCQ).

3. INSPECTION

Subgrade and base inspections shall be conducted by the Engineer of Record and the County Inspector prior to surface course construction.

4. CONSTRUCTION

Placement and Spreading of Material

The material shall be transported to the point where it is to be used, over crushed concrete previously placed where possible, and dumped at the end of the preceding spread. Hauling over the subgrade, or dumping on the subgrade for further placement operations, will be permitted only when, in the opinion of the EOR, such procedures will not adversely affect the integrity of the completed base and subgrade.

Spreading shall be accomplished by mechanical spreaders capable of producing an even distribution of the crushed concrete aggregate. Spreading by other means shall be permitted only where and as directed by the EOR.

Base Courses

The minimum thickness of the Crushed Concrete Base constructed under this contract shall be as shown on the plans, and shall be constructed in one course for six inches (6") and two courses for eight inches (8") or greater.

Compacting and Finishing 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 APPENDIX E: Testing Schedule. During final compaction operations, if the blading of any areas is necessary to obtain the true grade and cross section, the compacting operations for such areas shall be completed prior to the performance of density tests on the finished base.

Priming and Maintaining

The prime coat shall be applied only when the base meets the required moisture and density requirements. At the time of priming, the base shall be firm, unyielding, and in such condition that no undue distortion will occur. The Contractor will be responsible for insuring that the true crown and template of the base are maintained, with no rutting or other distortion, and that the base meets all requirements at the time the surface course is applied.

Correction of Defects

All defects in materials and construction shall be corrected by the Contractor, at his expense, and to the satisfaction of the Engineer, as the work progresses. All segregated areas of fine or coarse crushed concrete shall be removed and replaced with properly graded crushed concrete.

Testing

The Contractor shall be responsible for all testing performed in connection with the construction of the base.

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# APPENDIX G: LIST OF DRAWINGS

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## LIST OF DRAWINGS

### Typical Sections

TS-1 .....	Recommended Utility Locations
TS-2 .....	Multi-Use Trails
TS-3 .....	Local Urban Roads (2 Lane Undivided)
TS-4 .....	Urban Collectors (2 Lane Undivided)
TS-5 .....	Urban Collectors (2 Lane Divided)
TS-6 .....	Urban Collectors (4 Lane Divided)
TS-7 .....	Local & Collector Rural Roads (2 Lane Undivided)
TS-8 .....	Rural Collectors (2 Lane Divided)
TS-9 .....	Low Volume Public Roads (Minor Subdivisions with Less Than or Equal to 10 Lots)
TS-10 .....	Low Volume Private Road (Minor Subdivisions with 10 Lots or Less)

### TND Typical Sections

TND 1 .....	Alleys
TND 2 .....	Local Urban Lanes
TND 3 .....	Local Urban Streets
TND 4 .....	Type 1 Boulevard (Urban Collectors)
TND 5 .....	Type 2 Boulevard (Urban Collectors)
TND 6 .....	Avenues (Urban Collectors)
TND 7 .....	Main Streets (Urban Collectors)

### Typical Details

TD-1 (1 of 2) .....	Disabled Parking / Pavement Marking
TD-1 (2 of 2) .....	Disabled Parking / Signing
TD-2 .....	Parking Lot Configuration
TD-3 .....	Temporary Dead End Treatment
TD-4 (1 of 2) .....	Cul-de-sac at End of Road (Up to 150 feet in Length)
TD-4 (2 of 2) .....	Cul-de-sac (Mandatory for Dead End Roads Greater than 150 feet in Length)
TD-5 (1 of 3) .....	Miami Curb Section
TD-5 (2 of 3) .....	Miami Curb Transition
TD-5 (3 of 3) .....	Miami Curb Drainage
TD-6 .....	Intersection Valley Gutter
TD-7 .....	Driveway
TD-8 .....	Sidewalk Curb Ramps at Intersections
TD-9 .....	Entrance Median, Guardhouse and Electronic Entry
TD-10 .....	Buffer Wall / Berm
TD-11 (1 of 2) .....	Pedestrian Walkway
TD-11 (2 of 2) .....	Pedestrian Walkway
TD-12 (1 of 1) .....	Post Mounted Street Name Signs
TD-13 (1 of 4) .....	Internally Illuminated Street Name Signs
TD-13 (2 of 4) .....	Sign Bracket Arm (One-Way)
TD-13 (3 of 4) .....	Sign Bracket Arm (Two-Way)
TD-13 (4 of 4) .....	Sign Bracket Arm (Sign Panel)
TD-14 (1 of 6) .....	Sign Locations
TD-14 (2 of 6) .....	Sign Locations
TD-14 (3 of 6) .....	Sign Locations

## LIST OF DRAWINGS (CONTINUED)

TD-14 (4 of 6) .....	Sign Locations
TD-14 (5 of 6) .....	Sign Locations
TD-14 (6 of 6) .....	Sign Locations
TD-15 (1 of 2) .....	Landscaping Clear Sight Window for Medians
TD-15 (2 of 2) .....	Landscaping Vertical Clearances
TD-16 (1 of 7) .....	Tree Protection
TD-16 (2 of 7) .....	Tree Protection
TD-16 (3 of 7) .....	Tree Protection
TD-16 (4 of 7) .....	Tree Protection
TD-16 (5 of 7) .....	Tree Protection
TD-16 (6 of 7) .....	Tree Protection
TD-16 (7 of 7) .....	Sidewalk Protection from Street Trees
TD-17 .....	Directional Turns
TD-18 (1 of 14) .....	Type I, II and III Inlets General Notes
TD-18 (2 of 14) .....	Type I Inlet (Offset from Curb) Plan and Elevation
TD-18 (3 of 14) .....	Type II Inlet (Offset from Curb) Plan and Elevation
TD-18 (4 of 14) .....	Type III Inlet (Offset from Curb) Plan and Elevation
TD-18 (5 of 14) .....	Type I, II and III Inlet (Offset from Curb) Sections and Details
TD-18 (6 of 14) .....	Type I Inlet (1 of 3) (Adjacent to Curb) Plan & Elevation
TD-18 (7 of 14) .....	Type I Inlet (2 of 3) (Adjacent to Curb) Details and Slab Reinforcing
TD-18 (8 of 14) .....	Type I Inlet (3 of 3) (Adjacent to Curb) Details and Slab Reinforcing
TD-18 (9 of 14) .....	Type II Inlet (1 of 2) (Adjacent to Curb) Plan and Elevation
TD-18 (10 of 14) .....	Type II Inlet (2 of 2) (Adjacent to Curb) Slab Reinforcing
TD-18 (11 of 14) .....	Type III Inlet (1 of 2) (Adjacent to Curb) Plan and Elevation
TD-18 (12 of 14) .....	Type III Inlet (2 of 2) (Adjacent to Curb) Slab Reinforcing
TD-18 (13 of 14) .....	Type II & III Inlet (1 of 2) (Adjacent to Curb) Sections and Details
TD-18 (14 of 14) .....	Type II & III Inlet (2 of 2) (Adjacent to Curb) Sections and Details
TD-19 (1 of 1) .....	Parking Facility Criteria for Model Dwelling Units and Sales Offices