

Transportation Technical Manual for Subdivision and Site Development Projects

October 2023

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HILLSBOROUGH COUNTY

TRANSPORTATION TECHNICAL MANUAL FOR SUBDIVISION AND SITE DEVELOPMENT PROJECTS

APPROVED

APPROVED: _____
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Effective Date

PREFACE

The Transportation Technical Manual for Subdivision and Site Development Projects (TTM) contains current information for designing and submitting transportation plans for proposed Subdivisions and Site Development 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 includes issuing technical bulletins, to be incorporated into the manual annually, and performing a biannual manual update on odd numbered years. The biannual update procedure, Technical Publications Update and Revision Procedures, requesting public comments, can be previewed on the County’s website. In addition, comments and suggestions for revisions to the TTM can be submitted using the online [“Comment on Public Utilities/Public Works Technical Publications”](#) form located on the County’s website.

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SECTION 1.0 GENERAL

1.1 PURPOSE OF MANUAL

The design requirements addressed in this manual, Transportation Technical Manual for Subdivision and Site Development Projects (TTM), apply to public and private roads and bridges located within subdivision and site development projects, and existing arterial and collector roads that are required to be modified by subdivision and site development projects. All roads within and contiguous to a proposed development must be coordinated with other existing and planned roadway systems. 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 approved plans or specifications. The inspector will 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 Administration (PWA) Construction Services Section Manager.
- 1.2.2 The inspector must 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 must 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 (non-residential) sites must meet the applicable requirements of this manual and be submitted to Development Services Department (DSD) for review and approval.

1.4 ON-SITE ROADWAYS DESIGN CRITERIA

- 1.4.1 All roads designed within a subdivision, commercial (non-residential), or private site must be submitted to DSD for review. The road designs must meet the intent of the Vision Zero policies adopted by Hillsborough County.
- 1.4.2 On-site roads, also known as local roads and subdivisions roads that have not been conveyed to the County, must be designed in accordance with Sections 1.0 through 11.0 of this manual. Local roads that have been conveyed to the County must be designed according to the Hillsborough County Transportation Design Manual (HCTDM) and the Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Commonly known as the Florida Greenbook.)
- 1.4.3 On-site arterial and collector roads must meet the criteria established for arterials, collectors and off-site roads defined in Section 12.0 of this manual, the HCTDM, and posted Transportation Design Bulletins on the [Public Utilities & Public Works Technical Bulletins website](#).

- 1.4.4 On-site roads that include any of the project types listed in Section 12.1.3 will be submitted to DSD and forwarded to Technical Service Division (TSD) for review.

1.5 OFF-SITE ROADWAY IMPROVEMENTS DESIGN CRITERIA

All off-site roadway improvements located within the County right-of-way must be designed in accordance with the standards in the HCTDM and posted Transportation Design Bulletins. Off-site roads are defined as arterials and collectors, whether on-site or off-site, and local roads that have been conveyed to the County. Refer to Section 12.0 of this manual for additional information and guidance on these types of improvements.

1.6 FUNCTIONAL CLASSIFICATION

Functional classification is the grouping of highways by the character of service and connectivity provided. Roads within Hillsborough County right-of-way are defined by their functional classification as either locals, arterial, or collectors. The Hillsborough County Roadways Functional Classification Map designates which roads are arterials or collectors. Since roads are continuously being added, new arterials or collectors will not be shown on the map until a future publication date. Local roads are not shown on this map.

The functional classification for each type of road in a development must be determined early in the design process by the EOR. The functional classification selection must be submitted to DSD for approval.

1.7 DESIGN EXCEPTIONS AND DESIGN DEVIATION MEMORANDUMS

- 1.7.1 A Design Exception (DE) or Design Deviation Memorandum (DDM) is required when Hillsborough County's standards and criteria are not met. When it becomes necessary to deviate from Hillsborough County's criteria, early documentation and approval are required.
- 1.7.2 A Design Exception or Design Deviation Memorandum for arterial and collector roads and local roads that have been conveyed to the County must meet the requirements in the HCTDM Section 1.3.5.
- 1.7.3 A Design Exception or Design Deviation Memorandum is required for Local Roads within a Subdivision or Site Development Project as identify below.
- 1.7.3.1 A Design Exception is an approval issued by the County when the proposed design elements are below both the County standards, identified in Section 1.7.1, and American Association of State and Highway Transportation Official's (AASHTO) criteria.
- 1.7.3.1.1 Hillsborough County local roads will require Design Exceptions for the following two (2) Controlling Design Elements:
1. Design Speed
 2. Design Loading Structural Capacity
- 1.7.3.2 A Design Deviation Memorandum is an approval issued by the County when the proposed design elements, other than the Controlling Design Elements, do not meet the

criteria contained in this manual and the Florida Greenbook.

- 1.7.3.3 The EOR is responsible for identifying and documenting a DE and DDM in the early stages of the design process. The level of detail for a DE or DDM should be commensurate with the complexity of the design element and the relevance of information to engineering decisions. Sufficient detail and explanation must be provided to those reviewing the request to justify approval. Each DE and DDM request must be submitted independently unless the controlling elements work in concert with one another. The EOR should request a Land Development Pre-Submittal Conference to discuss the need for a DE or DDM.

1.7.4 Documentation for Approval of Design Exceptions

- 1.7.4.1 Complete Approval Cover Letter (See Appendix H.)

1.7.4.2 Project Description:

- a) General project information, location map, existing roadway characteristics, project limits, Section Township Range, objectives, and obstacles.
- b) Associated or future limitations that exist because of public or legal commitments.

1.7.4.3 Project Schedule:

- a) Anticipated project completion date.
- b) Discussion of whether the deficiency is a temporary or permanent condition.
- c) Future work planned or programmed to address the condition.

1.7.4.4 Exception Criteria:

- a) Specific design criteria that will not be met (TTM, AASHTO, Florida Greenbook) and a detailed explanation of why the criteria or standard cannot be complied with or is not applicable.
- b) Proposed value for the project or location and why it is appropriate.
- c) Plan view, plan sheet, or aerial photo of the location with right of way lines and parcel lines of adjacent property shown.
- d) Photo of the area of the deficiency.
- e) Typical sections and/or cross-sections.
- f) Station location.

1.7.4.5 Alternative Design Considered

- a) Meeting TTM, AASHTO or Florida Greenbook criteria, partial correction, and the no-build (existing) condition.

1.7.4.6 Impacts of the Exception:

- a) Safety Performance:
 - Anticipated impact on safety, long and short-term effects and of any anticipated cumulative effects.
 - Summary of the most recent 5-year crash history including any pertinent crash reports.
- b) Operational Performance:
 - Description of the anticipated impact on operations (long- and short-term effects) and any anticipated cumulative effects.
 - Summary of the amount and character of traffic using the facility.
 - Compatibility of the design with adjacent sections of roadway.
 - Effects on capacity and Level of Service (proposed criteria vs. AASHTO)

- c) Right-of-way
- d) Community
- e) Environment
- f) Usability by all modes of transportation
- 1.7.4.7 Anticipated Costs:
 - a) Description of anticipated costs (design, right-of-way, construction, maintenance).
 - b) Provide a benefit-cost (B/C) ratio, where applicable (Florida Greenbook, Chapter 14 Section E, Benefit/Cost Analysis).
- 1.7.4.8 Mitigation Measures
 - a) Practical mitigation measures or alternatives that were considered and any selected treatments implemented on the project.
- 1.7.4.9 Summary and Conclusions
- 1.7.4.10 Final Conclusion and Recommendation
- 1.7.5 Documentation for Approval of Design Deviation Memorandum
 - a) Complete Approval Cover Letter (See Appendix H.)
 - b) Design criteria versus proposed criteria.
 - c) Reason the design criteria is not appropriate.
 - d) Justification for the proposed criteria.
 - e) Review and evaluation of the most recent 5 years of crash history where appropriate.
 - f) Background information which documents or justifies the request.

1.8 TRAFFIC

- 1.8.1 Existing and proposed traffic volumes are to be determined on adjacent roads and at up and downstream intersections providing access to the development. Proposed traffic volumes generated by the development must also be determined and included in the traffic analysis. The results must be summarized in a traffic analysis report early in the planning and design process and signed and sealed by a registered Florida engineer. This report must meet the requirements of the PWA and/or DSD, who must approve the traffic report for each development. When a proposed master development is planned, a traffic analysis report that covers all phases and stages must 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 must comply with the following:
 - 1.8.2.1 For developments which generate less than 5,000 trips a day, the class of roadways that provide access to an existing public roadway must 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 provide access to an existing public roadway must be designed at a minimum as a two-lane arterial or collector roadway. Refer to HCTDM Typical and select the appropriate typical matching the context of the surrounding area: C1&C2-2U, C3-2U-SL, C3-2U, C3-2D, C3T-2U-SL, C3T-2U-BL, C3T-2D-BL and C4-2D-BL. Refer to Section 12.0 of this manual and HCTDM Typical for additional information on design standards for arterial and collector roads and the process for typical section approval.
 - 1.8.2.3 For developments which generate 10,000 to less than 20,000 trips a day, the class of

- roadways that provide access to an existing public roadway must be designed at least a four-lane divided arterial or collector roadway. Refer to HCTDM Typical and select the appropriate typical matching the context of the surrounding area: C1&C2-4D, C3-4D, C3-4D-OD, C3T-4D-BL and C4-4D-BL. Refer to Section 12.0 of this manual and HCTDM Typical for additional information on design standards for arterial and collector roads and the process for typical section approval.
- 1.8.2.4 For developments which generate 20,000 trips a day and greater, a four-lane divided arterial or collector roadway must be provided. Refer to HCTDM Typical C1&C2-4D, C3-4D, C3-4D-OD, C3T-4D-BL and C4-4D-BL. Refer to Section 12.0 of this manual and HCTDM Typical for additional information on design standards for arterial and collector roads and the process for typical section approval.
 - 1.8.2.5 For residential developments with 10 or fewer lots developed under the Minor Subdivision process may utilize a design consisting with Drawing Numbers TS-3 or TS-10.
- 1.8.3 Traffic Calming
- 1.8.3.1 On-site local, arterial and collector roads within residential and commercial development projects are to be designed with speed management measures and traffic calming features as recommended in the HCTDM, FDOT Design Manual, and the Florida Greenbook. Some common speed management measures and traffic calming features include, but are not limited to; roundabouts, chicanes, median island with lane narrowing, lane repurposing, raised crosswalk with pedestrian activated signals, and buffered or protected bike lanes. The above measures can be used to reduce the potential for vehicle, pedestrian, and bicycle crashes to help achieve Vision Zero policies and to effectively maintain low speeds. All roadway, sidewalk and bicycle path designs must consider effective speed management measures and traffic calming features in an effort to 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.
- 1.8.4 Free Flow Right-Turn Lanes into Dedicated Driveways
- 1.8.4.1 This Section addresses exclusive right-turn lanes that can accommodate turning volumes into a dedicated driveway providing there is no possible left-turn movement into the driveway and said driveway is not part of a plus intersection with an intersecting street or other 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 lane, the required receiving and queuing 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 must be measured from the begin taper to the beginning of the turning radius.
- 1.8.5 Right Turn Acceleration Lanes Eliminated
- 1.8.5.1 The County will not allow an intersection, side street or driveway design that provides an acceleration lane for a right turn maneuver. A right turn acceleration maneuver must turn directly onto the receiving through lane.

1.9 PUBLIC TRANSIT

- 1.9.1 Roads classified as arterial and collector in Hillsborough County should provide for public transit facilities. These facilities must conform to the requirements of Hillsborough Area Regional Transit Authority (HART).
- 1.9.2 Bus stop and shelter location design requirements and configurations must follow guidance and be coordinated with HART. Sidewalk connectivity must be provided to the bus stop shelter or landing. Bus facilities must be clearly visible from roads and buildings and must be designed to ensure that there is no hiding space in or around the bus facility in conformance with the Crime Prevention Through Environmental Design Guidebook, National Crime Prevention Council.
- 1.9.3 Marked crosswalk(s) should be considered to provide access to bus stops.

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.

1.11 CONSTRUCTION MATERIAL TESTING

The acceptance of Construction materials for projects constructed according to the Transportation Technical Manual for Subdivision and Site Development Projects will comply with the testing schedules and guidelines established in Appendix E: Testing Schedule, Appendix F: Guidelines for Technical Specifications, and the latest addition of the FDOT Standard Specifications for Road and Bridge Construction. Appendix E and Appendix F will supersede the FDOT Standard Specifications for Road and Bridge Construction.

SECTION 2.0 DESIGN ELEMENTS

2.1 ROADWAY DESIGN CRITERIA AND TYPICAL SECTIONS

2.1.1 Roadway Design and Construction Criteria

Roadway design and construction criteria must 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 must be met. All publications listed below must 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 Florida Greenbook)
- FDOT – Design Manual (FDM)
- 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 – 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 1043 Guide for Roundabouts.

2.1.2 Typical Sections

2.1.2.1 The typical sections found in this manual are applicable to On-Site Roads for Subdivision and Site Development Projects. Refer to Section 1.8.2 for typical section selection guidance. Design guidelines for Hillsborough County arterial and collector road typical sections are provided in the HCTDM.

Typical sections found in previous TTM versions are shown in Table 2-1. Table 2-1 also provides the design guidance resource. For example, the guidance for shared use path (multi-use trail) and arterial and collector roads are found in the HCTDM and guidance for on-site local roads are found in the TTM.

Table 2-1: Subdivision and Site Development Typical Sections Guidance

Road Classification	Drawing	Guidance
Recommended Utility Locations	TS-1	TTM
Shared Use Paths (Multi-Use Trail)	TS-2	HCTDM
Local Urban Roads (2-Lane Undivided)	TS-3	TTM
Urban Collectors (2-Lane Undivided)	TS-4	HCTDM
Urban Collectors (2-Lane Divided)	TS-5	HCTDM
Urban Collectors (4-Lane Divided)	TS-6	HCTDM
Local & Collector Rural Roads (2-Lane Undivided)	TS-7 ¹	TTM
Rural Collectors (2-Lane Divided)	TS-8	HCTDM
Low Volume Public Roads (Subdivision with less than or equal to 10 Lots)	TS-9 ²	TTM
Local Low Volume Private Roads (Minor Subdivisions with 10 Lots or less)	TS-10	TTM

¹ TS-7 does not include collector roads. Refer to HCTDM for collector roads.

² Combined with TS-7.

The following typical sections, shown in Table 2-2, are approved for use on Hillsborough County Subdivision and Site Development roads. The typical sections are provided in the [Transportation Technical Manual Website](#).

Table 2-2: Subdivision and Site Development Typical Sections

Road Classification	Drawing
Recommended Utility Locations for Subdivision Roads	TS-1
Local Urban Roads 2 Lane Undivided	TS-3
Local Rural Roads 2 Lane Undivided	TS-7
Local Low Volume Private Roads for Minor Subdivisions with 10 Lots or less	TS-10

2.1.2.2 Hillsborough County, per the provisions of the LDC, encourages the use of Traditional Neighborhood Development (TND) roads. The following typical sections, shown in Table 2-3, are approved for use on Hillsborough County TND roads.

Table 2-3: TND Typical Sections

Road Classification	Drawing
Alleys	TND-1
Local Urban Lanes	TND-2
Local Urban Streets	TND-3
Type 1 Boulevards Urban Collectors	TND-4
Type 2 Boulevards Urban Collectors	TND-5
Avenues	TND-6
Main Streets	TND-7

2.1.3 Typical Details

2.1.3.1 Hillsborough County has developed standard road Typical Details (TD) that are required for subdivision and site development project designs. A list of standard typical details are provided in Appendix G and the detail drawings are provided in the [Transportation Technical Manual Website](#).

2.2 RIGHT-OF-WAY

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

2.2.1 Minimum Standards

2.2.1.1 Minimum right-of-way widths must be provided as listed in the following tables. For Hillsborough County arterial and collector roads refer to the HCTDM typical sections.

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

2.2.2 Minimum Right-of-way widths for Subdivision and Site Development Typical Sections must be provided as listed in Table 2-4.

Table 2-4: Minimum Right-of-Way Widths

Road Classification	Drawing	Minimum Right-of-Way
Recommended Utility Locations for Subdivision Roads	TS-1	N/A
Local Urban Roads 2 Lane Undivided	TS-3	50'- 54'
Local Rural Roads 2 Lane Undivided	TS-7	84'- 96'
Local Low Volume Private Roads for Minor Subdivisions with 10 Lots or less	TS-10	28'

2.2.2.1 Minimum right-of-way widths for TND roads must be provided as listed in Table 2-5.

Table 2-5: 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	75'
Type 1 Boulevards	TND-4	130'
Type 2 Boulevards	TND-5	110'
Avenues	TND-6	106'
Main Streets	TND-7	84'

2.2.3 Existing Roads

2.2.3.1 If an existing County road is required to incorporate design features such as standard lane widths, bicycle lanes/paved shoulders, shared use paths (multi-use trail), 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 must be determined in meetings with the County to include DSD and PWA as described in Section 12.0

- 2.2.3.2 When existing roads serve as the access road(s) to new developments, the road(s) must comply with the required level of the classification based on existing and proposed average daily trips to the extent feasible.
- 2.2.3.3 Refer to Section 12.0 of this manual for additional information.
- 2.2.4 Intersections: The provisions for right-of-way and set back requirements at intersections must 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 must perform a signed and sealed subsoil investigation report. This report must be in accordance with the requirements of the FDOT Soils and Foundation Handbook except as noted by this Section. This report must be submitted for review and approval with the roadway plans and must 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" must be per the Hillsborough County Stormwater Management Technical Manual.
 - 2.3.1.2 Soil Classification
 - a) The soil classification for each stratum must be in accordance with AASHTO M-145. The soil classification testing must be in accordance with FDOT Soils and Foundation Handbook.
 - b) Test borings must be taken to a minimum depth of eight feet below the existing grade. The borings must be a maximum of 200-foot intervals, or at 100-foot intervals, staggered, for divided roadways. There must be no less than one boring per street. Additional borings must be taken as necessary to determine limits of unsuitable material. Depth and horizontal limits of muck areas must be determined and shown on the plans. Unsuitable material must be removed and replaced in accordance with FDOT Standard Plans 120-001 and 120-002.

2.4 CLEARING AND GRUBBING

All roadway rights-of-way must 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 must 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 Greenbook 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 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 Refer to Section 5.0 of this manual for Intersection Design, minimum requirements on return radii 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 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 The posted speed will be set equal to the selected design speed for all County projects.
 - 2.7.1.3 The maximum design speeds for local roads must not exceed the values shown in the following table unless approved by the County Engineer:

Table 2-6: Maximum Design Speeds

Road Classification	Type of Development	Maximum Design Speed
Local Urban Roads 2 Lanes Undivided	Residential	25 MPH
	Commercial (Non-Residential)	30 MPH
Local Rural Roads 2 Lanes Undivided	Residential	25 MPH
	Commercial (Non-Residential)	30 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.

- 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 must be provided as per Chapter 212 of the FDOT Design Manual. However, the table in this Standard that is identified as “Minimum Under Restraints” must not be used for transitions on new roadways. Refer to Section 12.0 of this manual 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 must meet the requirements of the Chapter 210.8.1 of the FDOT Design Manual. Table 212.7.1 of the FDOT Design 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 arterial and collector should reference the FDOT Design Manual. The Florida Greenbook should be referenced for local roads. The minimum centerline radius for an urban subdivision street is 50 feet. The EOR must 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 must be per Section 210.9 of the FDOT Design Manual.
- 2.7.6 Roundabout Requirements
Design of a roundabout will be submitted to DSD and forward to TSD for review and approval. The design must follow the National Cooperative Highway Research Program (NCHPR) Research Report 1043 Guide for Roundabouts and the Florida Design Manual (FDM). In Addition, the following specific design criteria and elements must be included in the design of all roundabouts:
- 2.7.6.1 A minimum 5 foot wide landscape buffer must be provided between the curb and the sidewalk outside the limits of the inscribed circle diameter and must extend at a minimum to the bicycle ramp or 25 feet beyond the accessible pedestrian crossings.
- 2.7.6.2 Roundabout sidewalk width:
- Where ramps provide sidewalk access to bicyclists, the sidewalk minimum width must be 10 feet to accommodate shared use by pedestrians and bicyclists.
 - Sidewalk width must be a minimum of 8 feet for Urban (C4) context classification roads.
 - Sidewalk width must be a minimum of 6 feet for all other context classification roads without bicyclists.
- 2.7.6.3 Place conduits for future electric (2-2” Schedule 40 PVC) and water (3” Schedule 40 PVC). Determine where the electric and water can be supplied from outside the limits of the inscribed circle diameter and provide the conduits from these locations to 3 feet beyond the truck apron into the grass area of the central island. The beginning and end of electrical conduit must be placed in a pull box and the electrical conduits must have pull strings. The ends of the water conduits must be marked with a concrete survey

monument and placed in a grassed area for future access. The electrical and water conduits must be capped to prevent filling with soil. The conduits will be located in the construction plan set. Additional conduits for electric and water maybe required as directed by the Engineer of Record.

- 2.7.6.4 Central Island grading for arterial and collector:
- A mounded grassed area must be created in the central island with a minimum elevation of 3.5 feet and a maximum elevation of 6 feet above the back of the truck apron curb.
 - Slopes to achieve the height must not exceed 1:4 to maintain recoverable and transversal terrain.
 - The highest elevation and grades must be specified on the construction plan set.
 - Mini roundabouts may have elevations less than 3.5 feet and may have relatively flat slopes.
- 2.7.6.5 Roundabout truck aprons are to be designed as shown in [Index TAD-001](#). Truck aprons should be concrete or brick on concrete pavement.

2.8 VERTICAL ALIGNMENT

2.8.1 Criteria

- 2.8.1.1 The designer must closely coordinate the vertical and horizontal alignments. This aspect has proven to provide a higher level of safety and quality. The vertical alignment must provide the highest sight distance possible with the use of gentle grades. The minimum design speed for vertical alignment must 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 must be 0.30% for all local roads. Refer to Table 3-16 of the Florida Greenbook for maximum grades. Maximum changes in grade without the use of a vertical curve must be designed per Table 3-17 of the Florida Greenbook.

2.8.3 Vertical Curves: Vertical curves are required when the algebraic difference between two grades exceed the values listed in the Florida Greenbook, Table 3-17. Vertical geometry must meet or exceed the values in the Florida Greenbook for stopping sight distance (Table 3-18 and Figure 3-3) and passing sight distance (Table 3-19). Sag vertical geometry must meet or exceed the operational values in Figure 3-4 of the Florida Greenbook.

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 must be rebuilt to provide a smooth transition between the two roads. This intersection must be “plateaued” to provide a smooth transition between the two roadways. The “plateauing” of intersections must meet the requirements of Chapter 212, Section 212.8.2 Plateauing of the FDOT Design Manual . The coordination of the cross sections of two intersecting roadways must be carefully analyzed; the design should insure a smooth cross slope transition between the two roads. Adequate drainage must be provided at this

- 2.8.4.2 intersection. The intersection must be designed to accommodate future signalization.
Refer to Section 5.0 for additional requirements.

2.9 SIDEWALKS

- 2.9.1 The direction in Sections 2.9.2 through 2.9.9 will supersede the FDM design criteria.
- 2.9.2 **Sidewalk Configuration**
All proposed sidewalks are to have an Americans with Disabilities Act (ADA) compliant pedestrian ramps connecting the pedestrian path to the crossing road. Curbs will be designed according to Florida Department of Transportation (FDOT) Standard Plans Index 522- 002 so that the slope from the gutter line to the back of curb matches the slope of the ramp. The curb slope and the ramp slope must not exceed 1:12. The sidewalk ramps must be oriented, so the centerline of the pedestrian ramp is perpendicular to the road traversed. Ramps angled at 45 degrees into the intersection will not be allowed.
- 2.9.3 The pedestrian crossing must occur between the stop sign and the edge of pavement on the intersecting minor road. Hillsborough County Pedestrian Ramp Configuration [Index PRC-001](#) is provided to illustrate sidewalk curb ramp configurations at “4-Leg” intersections and “3-Leg” intersections. Where an arterial or collector road intersects with a local road the pedestrian local road crossing must occur between the stop bar and the edge of pavement.
- 2.9.4 Sidewalks must extend to the roadway at all intersections. Curb ramps are required at all locations where the sidewalk meets the road.
- 2.9.4.1 Midblock crossings on all roads must be approved by the TSD.
- 2.9.5 **Sidewalk widths and thicknesses on local roads**
- 2.9.5.1 Sidewalk widths on arterial and collector roads must meet the design criteria established in the FDOT Design Manual Section 222 Pedestrian Facilities. The standard thickness of a sidewalk on arterial and collector roads is six inches.
- 2.9.5.2 Sidewalk widths on local roads must be five feet or greater. The standard thickness of a sidewalk on local roads is four inches, except for sidewalks at driveways, curb ramps, and on maintenance berms of retention/detention ponds, where the thickness must be six inches. Where access to the pond for maintenance purposes crosses this sidewalk, the thickness must be six inches for a minimum length of 20 feet centered on the access. The manner of how the access will be identified is subject to approval by County staff. This location must be clearly identified in the plans.
- 2.9.6 Sidewalks, curb ramps, and handicap ramps must be constructed of Portland Cement Concrete, Class I. Materials and construction methods must conform to the latest version of the FDOT Standard Specifications for Road and Bridge Construction.
- 2.9.7 Detectable warning surfaces must meet all FDOT criteria including the latest versions of Standard Plans Index 522-002, Standard Specifications Section 527, and the Approved Products List (APL). The preferred color for curb ramp detectable warning surfaces is red. Should the background color of the sidewalk surface be red, a contrasting color must be approved by the County prior to installation.
- 2.9.8 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 must be five feet on either side of the centerline (longitudinally) of the required tree. For additional information, refer to Tree Protection Details TD-16.

- 2.9.9 Sidewalks are required on both sides of the road. Exceptions to this requirement must be expressly permitted by the County LDC and reviewed and approved by the County Engineer.

2.10 BICYCLE FACILITIES AND SHARED USE PATHS (MULTI-USE TRAIL)

- 2.10.1 When selected, bicycle facilities must be designed to meet the standards in the latest editions of the HCTDM.
- 2.10.2 When selected, shared use paths (multi-use trail) must be designed to meet the standards in the latest edition of the HCTDM Section 2.1.5 (Shared Use Paths within the road right-of-way) and 2.1.7 (Shared Use Paths with independent right-of-way).

2.11 DEAD END STREETS

- 2.11.1 All dead-end streets that are greater than 150 feet must be designed to meet the requirements for a fire truck turnaround and meet LDC criteria. The maximum length for a dead-end street must be 1000 feet, unless otherwise approved.
- 2.11.2 Cul-de-sacs must be constructed at the end of dead-end streets. When the length of the street is 150 feet or less, the cul-de-sac can be constructed in accordance with the Cul-De-Sac Typical Detail TD-4, Sheet 1 of 2. However, when the length of a dead-end street is greater than 150 feet, the cul-de-sac must be constructed in accordance with the Cul-De-Sac Typical Detail TD-4, Sheet 2 of 2, which meets the fire code for fire truck turnarounds.
- 2.11.3 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 TD-3 and must be clearly delineated per FDOT Standard Plans 700-109.

2.12 BUFFER WALLS

- 2.12.1 General: Buffer walls must 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 TD-10 drawing. Buffer wall design should consider connectivity of pedestrians between developments and public facilities providing sidewalks and shared use paths (multi-use trail) at appropriate locations. Appropriate points of connection must be coordinated with the adjacent off-site property.
- 2.12.2 Horizontal Location
- 2.12.2.1 Buffer walls, including footings, must be parallel to and outside of the right-of-way.
- 2.12.2.2 In order to provide for the safe functional use of the sidewalk, a flat grass area measuring a minimum of two feet in width must be maintained between the outer edge of sidewalks and the closest portion of the buffer wall structure.
- 2.12.2.3 Where permanent easements are parallel to and contiguous to the road right-of-way, all structural elements of the buffer wall must be outside of the easement.
- 2.12.3 Ownership and Maintenance: Hillsborough County will not be responsible for any maintenance or liability associated with the buffer walls. Buffer walls must be owned and maintained by the

property owner of the parcel on which it is located or by a Property/Homeowner's Association. Aesthetics: The walls must 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 arterial and collector roadway, or if a new project is proposed which would abut an existing project that has a buffer wall, the proposed wall must be visually compatible with the existing wall. If the development is to have a different exterior appearance for the new wall, then the Director of DSD must approve the change. In cases where buffer walls are separating a new development from an existing, lower density development, the style of the wall must be compatible with the existing community.

2.12.4 Alternative Buffer

2.12.4.1 As an alternative to buffer walls, vegetated berms will be considered.

2.12.4.2 The berm must 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.

2.12.4.3 The berm must be sodded with grass or other suitable vegetation as approved by the DSD.

2.12.5 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 must clear the trees as approved by the DSD.

2.12.6 Stormwater Management: Buffer walls and vegetated berms must 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.

2.12.7 Structural: Buffer walls may consist of concrete masonry units, cast-in-place concrete, or precast concrete and must 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 PD Zoning. Buffer walls must 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 must be signed and sealed by a Professional Engineer licensed in the State of Florida.

2.13 UTILITIES

2.13.1 Utility locations must be per the Recommended Utility Location Typical Section (TS-1) drawing in this manual.

2.13.2 Manholes must be located within median areas for divided roadways unless approved otherwise. If approved to be in the roadway area, manholes must 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 must 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 must conform to the latest revisions of the FDOT Standard Plans, 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 must 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 must be submitted by the EOR on a timely basis during the construction process to PWA 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 must 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 must 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 must submit all material certifications to the Construction Services Section of PWA 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 must be 10 feet for local residential roads and 12 feet for local commercial (non-residential) roads. The minimum lane width for commercial roads must be 11 feet when bike lanes are present. See applicable Hillsborough County Typical Sections for Local Roads TS-3, TS-7 and TS-10.
- 3.1.2 The minimum lane widths for auxiliary turn lanes must be the same width as the adjacent through lane. All right-turn lanes must provide for a keyhole when bike lanes are provided.

3.2 MEDIANS

- 3.2.1 General
- 3.2.1.1 Raised medians must be curbed and conform to the FDOT Standard Plans. All concrete traffic separators for left-turn lanes must meet the requirements of FDOT Standard Plans 520-020.
- 3.2.1.2 Medians must meet the requirements of the Florida Greenbook, Chapter 3 Section C.7.e Medians.
- 3.2.2 Entrance: Entrance medians or islands within the road right-of-way must conform to the Entrance Median and Guardhouse Typical Details TD-9.
- 3.2.3 Landscaping: Landscaping in medians must meet the requirements of Section 10 in this manual. Medians and islands must 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 must comply with the requirements of this Section for clear zone and sight distance. These areas must be dedicated to an established maintenance entity. There must 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 Traffic Separators:
- 3.2.4.1 Traffic separators designed to accommodate a refuge area for pedestrians must be six-foot wide or greater.
- 3.2.4.2 Traffic separators not designed as a pedestrian refuge area must be four-foot wide.
- 3.2.4.3 Traffic separators designed to be placed in the buffer area for bike lanes may be two-foot wide.
- 3.2.4.4 It is preferred that all traffic separators be either Type I or Type II with Type “E” curb in lieu of Type IV or Type V separators with Type “F” curb. All designs and construction methods must be per the FDOT Standard Plan 520-020.
- 3.2.4.5 The design of the proposed traffic separators must include the following:
- maintain the County’s minimum lane widths
 - not interfere with adjacent turn lane configurations
 - be striped with transitions that meet design criteria
 - be marked with appropriate delineators, raised pavement markers, and painted island noses.

3.3 CURB AND CURB AND GUTTER

3.3.1 General

- 3.3.1.1 Hydraulic design must 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 must conform to Hillsborough County Typical Details for Miami curb and the FDOT Standard Plans 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 must 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 must be replaced in 10-foot sections.

- 3.3.2 Stabilization and Compactions: All curbs and gutters must 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 (Refer to FDOT Design Manual for details). All curbs and curb and gutters must be stabilized to a minimum of four inches from back of curb. Refer to Typical Section Drawings of this manual and FDOT Standard Plan No. 160-001 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 must 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 must be four feet from face of curb. However, when using “Miami” type curb, the minimum clear zone width must 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 Chapter 215 of FDOT Design Manual.

3.5 VERTICAL CLEARANCE

Minimum vertical clearance with the exception of structures over water must conform to Chapter 224.8 of FDOT Design Manual.

3.6 PAVEMENT CROSS SLOPES

- 3.6.1 The minimum pavement cross slope for travel lanes on local roads must be 0.02 ft./ft. The change in cross slope between adjacent through lanes must not exceed 0.04 ft/ft.
- 3.6.2 The change in cross slope between travel lanes and shoulder pavement must not exceed 0.07ft/ft.

3.7 ROADSIDE SLOPES

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

SECTION 4.0 ROADSIDE DESIGNS

4.1 DITCHES

- 4.1.1 Design: Roadway drainage design must 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 must 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 must be placed at each end of a side drain and must be constructed in accordance with applicable FDOT clear zone requirements and Design Standard Plans.

4.2 GRASSING AND MULCHING, SODDING

- 4.2.1 Curb and Gutter Section: In residential and commercial 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 must 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 must be placed along the back of curb and around all structures.
- 4.2.2 Rural Section: All right-of-way, outside the roadway area, must 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 must meet or exceed the requirements of this section, Chapter 3 Section C.9 of the Florida Greenbook and Chapter 212, Intersections of the FDOT Design Manual. . The most stringent requirement in these standards must be utilized in the design of intersections.
- 5.1.2 Intersecting streets must be arranged so as to intersect as nearly as possible at right angles. The maximum deflection for through lanes through intersections must meet the requirements of FDOT Design Manual, Chapter 210.8.1. However, Table 212.7.1 of the FDOT Design Manual is not applicable for deflection of through lanes through intersections for new development.
- 5.1.3 Channelizing islands for intersections, when required, must meet the requirements of Chapter 3, Section C.7.f.1 Channelizing Islands of the Florida Greenbook .
- 5.1.4 Driveways that have daily traffic volumes greater than 400 vehicles per day must be designed as intersections with radial returns and no drop curbs.
- 5.1.5 Sidewalk locations and curb ramps at intersections must meet the requirements of Section 2.9 of this manual. For additional details refer to applicable standards and Typical Details TD-8 drawings.
- 5.1.6 Intersections and intersection improvements must be designed with consideration for pedestrian and bicycle features. Curb inlets, including inlet transitions, must 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 must have a minimum six-foot traffic separator to provide for a pedestrian refuge area.
- 5.1.8 Sidewalk curb 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.
- 5.1.9 When separated right-turn lanes are used, locate crosswalks and ramps so that an approaching motorist has a clear view of a pedestrian within or entering the intersection.

5.2 RIGHT-OF-WAY REQUIREMENTS

- 5.2.1 Sight distance must 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 arterial or collector road must have a minimum 25-foot radius or as otherwise required by traffic conditions or geometric requirements.
- 5.2.2 Stopping sight distance requirements must be considered by the EOR in the determination of the minimum right-of-way to be provided at roadway intersections for local roads, collectors, and arterials. The EOR must design to the sight distance requirements of FDOT Design Manual 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 must verify and confirm the turning movement of the design vehicle in consideration for the intersection that is being designed. Additionally, it is recommended that street corner radii in residential areas be reduced to minimize speeds and create a safe and walkable environment for pedestrians. Verify selected design vehicle can negotiate turning movement without encroachment onto adjacent curbs and sidewalks. Encroachment into adjacent lanes may be permissible on low-volume roads.

Table 5-1: Minimum Return Radii

Type of Development	Type of Design Vehicle	Roadway Classification ¹	Minimum Radius
Residential	P, SU	Local Road	25'
Commercial	P, SU, WB-40, WB-50	Local Road	35'

¹For arterial and collector roads refer to the HCTDM

5.4 CONTROL RADII

The control radii requirements for minimum turning paths at intersections must be determined using FDOT Design Manual Table 212.9.2.

5.5 INTERSECTION SIGHT DISTANCE REQUIREMENTS

The minimum required sight distance requirements at intersections for various design speeds and vehicles must be determined using FDOT Design Manual, Chapter 210 and Figures 3-3 and 3-4 of the Florida Greenbook. The more stringent design standard must be used to determine the sight distance at intersections.

5.6 AUXILIARY LANES

Auxiliary lanes must be provided at subdivisions and commercial sites when warranted in accordance with the LDC. Refer to HCTDM, Section 2.3.1.4 for auxiliary lanes design criteria.

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 must not be less than 40 feet.
- 5.7.2 Whenever possible, driveways must be located at existing median openings.
- 5.7.3 All new median openings must provide adequate left-turn storage to existing and proposed driveways and roadways.

5.8 DRIVEWAYS

- 5.8.1 Driveway design must conform to Part 6.04 Access Management of the LDC and the criteria described in this manual. Driveways located on local roads will be constructed using Driveway Typical Details TD-7. Refer to Section 12.12 of this manual for driveways located on arterial and collector roads.
- 5.8.2 Profiles: Driveway profiles must conform to the requirements of FDOT Design Manual, Chapter 214 Driveways and FDOT Standard Plan 522-003.
- 5.8.3 Thickness Requirements
 - 5.8.3.1 All concrete driveway aprons and driveways must be a minimum of six inches thick and must 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 must be constructed from the edge of the roadway pavement to the right-of-way line.
 - 5.8.4.2 County lift station driveways must 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 must be submitted for any roadway with two or more lanes in one direction and must follow HCTDM criteria Section 2.4.1
- 6.1.2 Supplemental criteria for post mounted street name sign fabrication and installation are as follows:
- 6.1.2.1 Background color must be green reflective sheeting, Type IV, for public roadways. The street name legend size must be seven-inch, type “D” font with the first letter of each name capitalized followed by lower case lettering which must be four inches modified. The block number legend must be four inches type “D” font and appear in the lower right of the sign. The street name extension must be abbreviated (i.e., “AVE”, “DR”, “ST”, “BLVD”) must be all capitalized, four inches, type “D” font and appear in the upper right of the sign. Directional extensions (i.e., north, south, east, west) must be abbreviated with the first letter of the direction (i.e., “N”, “S”, “E”, “W”) in capitalized, six inches, type “D” font and appear before the name of the street. All legend and border color must be white reflective sheeting, Type IV. The border must be 3/4-inch wide at the perimeter of the sign. Reflective sheeting must comply with FDOT Standard Specifications for Road and Bridge Construction, Section 994.
 - 6.1.2.2 The sign blades must be aluminum, 12 inches by 30 inches minimum to 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 must 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 must be in accordance with FDOT Standard Specifications for Road and Bridge Construction, Section 700.
- 6.1.3 All signs must be mounted on approved square galvanized steel posts. Refer to Hillsborough County Public Works Standard Specifications for Construction Sections 700 and 900 for post dimensions, material, and finish.
- 6.1.4 Traffic stop signs and street name signs must be mounted on separate posts from each other.
- 6.1.5 Refer to the FDM, FDOT Standard Plans and MUTCD for sign location guidelines.
- 6.1.6 Internally illuminated street name sign layout must follow HCTDM section 2.4.2.4 Overhead Street Name Sign Details and sign hardware must be provided as shown in FDOT standard plans.
- 6.1.7 Supplemental criteria for pavement markings are as follows:
- 6.1.7.1 All pavement markings must be alkaline base thermoplastic compound following FDOT Standard Specifications.
 - 6.1.7.2 All bike markings must be preformed thermoplastic.
 - 6.1.7.3 Raised pavement markers (RPMs) must be included with all markings and must use a bituminous adhesive material and follow FDOT Standard Plans

6.2 TRAFFIC CONTROL DEVICES AND STREET SIGNS

- 6.2.1 The developer is to be responsible for the installation and 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 is to 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, TSD must approve signing and pavement markings and the signalization and appurtenances.

6.3 PRIVATE DEVELOPMENTS

- 6.3.1 Private developments must follow the requirement in Section 6.2.
- 6.3.2 Street name signing for private roads must have the same requirements as signing for public roads (See Section 6.1.2); however, private road background color must be blue reflective sheeting, Type IV, with the legend “PRIVATE ROAD” in all capitalized, two-inch, white, type “D” font centered under the street name.

SECTION 7.0 SIGNALIZATION

7.1 GENERAL

- 7.1.1 All signal designs must be in accordance with and follow all the design criteria in the HCTDM, Section 2.4.2 Signalization and Section 2.5 Structure Design Standards.
- 7.1.2 Refer to HCTDM, Section 2.5.3 Structure Mast Arm Policy for traffic signal structure requirements.
- 7.1.3 All existing and proposed signalized intersections must provide pedestrian crosswalks and associated pedestrian signal equipment on every street approach to the intersection.

SECTION 8.0 PAVEMENT DESIGN

8.1 GENERAL

- 8.1.1 The EOR must 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 arterial and collector roadways and widening existing roadways refer to Section 12 of this manual.
- 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 must 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 must 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 must 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 must not exceed 0.04 per inch. A copy of the LBR test results must 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 must not exceed 0.08 per inch. A copy of the LBR test results must 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 must 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 must 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 must 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 must require a prior written approval from the County Engineer.

8.2 STABILIZED SUBGRADE FOR FLEXIBLE PAVEMENT

- 8.2.1 Stabilized subgrade must meet the requirements of Chapter 5 of the FDOT Flexible Pavement Design Manual and as noted below.
- 8.2.2 All proposed subgrades with the exception of those beneath a proposed soil cement base must have a minimum LBR of 40 and meet the density requirements outlined in APPENDIX E: Testing Schedule. The proposed depth must 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 ¹	Stabilized Subgrade Minimum Thickness
Residential	Local Road	6"
Commercial	Local Road	12"

¹For arterial and collector roads refer to the HCTDM

- 8.2.2.1 The subgrade for soil cement must 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 must 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 must meet the general requirements of Chapter 5, Table 5.6 General Use Optional Base Groups and Structural Numbers of the FDOT Flexible Pavement Design Manual 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 must 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 must not be less than those specified in the following table:

Table 8-2: Minimum Base Course Thickness

Type of Development	Roadway Classification ¹	Base Course Minimum Thickness
Residential	Local Road	6"
Commercial	Local Road	8"

¹For arterial and collector roads refer to the HCTDM

- 8.3.2 Limerock Base: Must meet the requirements of Chapter 5, Table 5.7 Limited Use Optional Base Groups and Structural Numbers of the FDOT Flexible Pavement Design Manual.
- 8.3.3 Shell Base: Must meet the requirements of Chapter 5, Table 5.7 Limited Use Optional Base Groups and Structural Numbers of the FDOT Flexible Pavement Design Manual.
- 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 must meet the requirements of Chapter 5, Table 5.7 Limited Use Optional Base Groups and Structural Numbers of the FDOT Flexible Pavement Design Manual and as noted below. Soil cement base must only be used for on-site local roads and is not to be used on arterial or collector whether they are onsite or offsite.
 - 8.3.4.2 The design mix (300 PSI) must be prepared by an Independent testing laboratory accredited by AASHTO, CMEC or FHWA approved in the State of Florida. The design mix submittal must be submitted to DSD.
 - 8.3.4.3 180 psi, which is sixty percent (60%) of the design compressive strength of 300 psi, must be achieved in seven days. If this criterion is not met, the material must be removed and replaced.
 - 8.3.4.4 Test cores must be taken after seven days to verify thickness. The average core thickness must not exceed the specified design thickness by more than one inch. Individual cores must not be deficient by more than one-half inch from the specified design thickness.
 - 8.3.4.5 Prior to paving, there must 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 must meet the requirements of Chapter 5, Table 5.7 Limited Use Optional Base Groups and Structural Numbers of the FDOT Flexible Pavement Design Manual.
- 8.3.6 Reclaimed Asphalt Pavement (RAP) Base: Must meet the requirements of Chapter 5, Table 5.7 Limited Use Optional Base Groups and Structural Numbers of the FDOT Flexible Pavement Design Manual.
- 8.3.7 Crushed Concrete Base: Must 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 is to be Type SP Superpave Asphaltic Concrete. The requirements of Section 330 and 334 of the Hillsborough County Specifications must be met. Incidental items such as prime and tack coats must conform to the FDOT Standard Specifications

for Road and Bridge Construction.

- 8.4.2 The design mix for Asphaltic Concrete must 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 must meet the following minimum thickness requirements:

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

Type of Development	Roadway Classification ¹	Asphaltic Concrete Structural Course
Residential	Local Road	1 ½”
Commercial	Local Road	2 ½”

¹For arterial and collector roads refer to the HCTDM

- 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 PWA, Construction Management Section prior to commencing production. Testing frequencies during production must be in accordance with the Testing Schedule of this manual.

8.5 FRICTION COURSE

All proposed friction courses must meet the requirements of the Chapter 4, Friction Course Policy of the FDOT Flexible Pavement Design Manual and as noted in Table 8-4.

Table 8-4: CQC Friction Course Requirements¹

	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
Local Roads with AADT greater than or equal to 3000 vpd	FC-12.5 ²	FC-12.5 ²

¹For arterial and collector roads refer to the HCTDM

² FC-12.5 (Traffic Level C)(1½”)(PG 76-22)

8.6 ALTERNATE PAVEMENTS

- 8.6.1 Portland Cement Concrete Pavement
 - 8.6.1.1 Concrete pavement design for new construction must be in accordance with the criteria as set forth in the FDOT Rigid Pavement Design Manual.
 - 8.6.1.2 Concrete pavement must 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 must meet the requirements for Portland Cement

Concrete Pavement. The developer or his authorized representative must submit to the DSD's Engineering Review Team specifications confirming adherence to these regulations for approval. Bomanite Pavements must 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 must submit PWA, for approval, manufacturer's literature and technical specifications regarding the structural strength, skid resistance, and subgrade requirements per the Chapter 5.6.1 Stabilized Subgrade of the FDOT Flexible Pavement Design Manual. Architectural pavers must 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 PWA. 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 must submit a copy of technical specifications to the PWA, for approval, for this type of construction prior to use on County roads.
- 8.6.5 Stamped Asphalt (Patterned Pavement): 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 must 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 must meet latest ADA standards. The contractor performing this type of work must be an experienced applicator of stamped asphalt for a minimum of two years. All stamped asphalt must be constructed and maintained by the subdivision association. Stamped asphalt replaced by Hillsborough County will be replaced with standard county asphalt pavement. Stamped concrete is not allowed.

8.7 DESIGN AND CONSTRUCTION REQUIREMENTS

- 8.7.1 The following design requirements must be taken into account during the design and construction process:
- 8.7.1.1 The EOR must sign and seal and submit all technical specifications for use with pavement designs to DSD prior to use on a project.
 - 8.7.1.2 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 must be removed and replaced with suitable material in accordance with the depths and limits shown in the FDOT Standard Plans 120-001 and 120-002.
 - 8.7.1.3 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.
 - 8.7.1.4 The EOR must submit all proposed mix designs that are to be utilized on a project prior to production and placement of the said material to the PWA'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.
 - 8.7.1.5 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 PWA's Construction Services Manager for review, and for As-Built records.

- 8.7.1.6 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 DEFINITIONS

Hillsborough County maintains and designates two classifications of bridges:

- 9.1.1 Qualifying bridges with a span greater than or equal to 20-feet, as defined by the National Bridge Inspection Standards (NBIS), are inspected by the FDOT. Qualifying bridge structures are standard bridges, arch spans, concrete box culverts, and parallel series of pipe culverts, as described in the FDOT Bridge Management System Coding Guide, latest edition.
- 9.1.2 Non-qualifying bridges with spans less than 20-ft are inspected by the County and only include standard bridges and arch spans. Concrete box culverts and parallel series of pipe culverts with a span less than 20-feet are not considered as non-qualifying bridges.

9.2 OBJECTIVES

Hillsborough County maintains, rehabilitates and replaces bridges within the County under its jurisdiction. Bridge design and construction, whether initiated by the County or a developer, must comply with latest design and construction specifications and standards identified in Section 9.3 of this manual.

9.3 DESIGN SPECIFICATIONS

- 9.3.1 Bridge design must be in accordance with the FDOT Structures Manuals and the AASHTO Standard Specifications for Highway Bridges.
- 9.3.2 The bridge design live load must be HS25-44; however, the engineer must 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 PW-CEIntake@hillsboroughcounty.org for review and approval as a design exception.
- 9.3.5 No vehicular timber bridges are allowed.

9.4 CONSTRUCTION SPECIFICATIONS

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

9.5 TESTING

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

9.6 PLANS PREPARATION

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

9.7 APPROACH SLAB ON BRIDGES

- 9.7.1 County bridges will require approach slabs to be 30-feet-long. This requirement will be applied to approach slab replacement and new approach slabs except as noted below.
- 9.7.2 Local Roads with less than 5,000 Average Daily Traffic (ADT) may have 20-feet-long approach slabs. See FDOT Developmental Standard Plans, Index D400-093 Approach Slab (20 ft).

9.8 PEDESTRIAN WALKWAYS

- 9.8.1 Pedestrian walkways must be designed in accordance with the AASHTO Guide Specifications for the Design of Pedestrian Bridges and the AASHTO Standard Specifications for Highway Bridges. Construction must conform to the FDOT Standard Specifications for Road and Bridge Construction. Testing and plans preparation must be as stipulated in Sections 9.5 and 9.6 .
- 9.8.2 Boardwalks
 - A boardwalk may be necessary to provide continuity to sidewalks and shared use paths over environmental or natural landscapes.
 - 9.8.2.1 The cross slope of the walkway should generally be flat, but must not exceed two percent, and must meet ADA requirements.
 - 9.8.2.2 Boardwalks must have a minimum railing height of 3-feet, 6 inches. Boardwalks to be used by both pedestrians and bicyclists must have a minimum railing height of 4-feet.
 - 9.8.2.3 Boardwalks must be constructed of concrete or steel materials. Wood or composite plastic materials will not be accepted.

SECTION 10.0 LANDSCAPING AND TREE PRESERVATION

10.1 GENERAL

- 10.1.1 Landscape design, vegetation planting, and tree preservation provisions must conform to the requirements of the Natural Resources Section, Landscaping and Buffering Section of the Land Development Code (LDC), FDOT Highway Landscape Design Guide, Florida Administrative Code, Rule Chapter 14-40, “Landscape Beautification and Conservation”, [FDM](#), [FDOT Standard Plans](#), [FDOT Standard Specification for Road and Bridge Construction](#), and the [Hillsborough County’s Public Works Standard Specifications for Construction](#). The County Landscape guidelines and details in this section takes precedence over FDOT standards. The most stringent design standard must 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 must be signed and sealed by a Florida registered Landscape Architect in conformance with Chapter 481 of the Florida Statutes.
- 10.1.4 The Hillsborough County approved [Street Trees](#) and [Approved Hedge List](#) can be utilized for plantings in unincorporated Hillsborough County.

10.2 HORIZONTAL CLEARANCE

- 10.2.1 Locate trees outside the clear zone. All tree plantings within the horizontal clearance area must have a trunk diameter of four inches or less when measured six inches above the ground at maturity.
- 10.2.2 Reference FDOT Design Manual, Chapter 215 for horizontal clear zone requirements on local urban and rural roads.
- 10.2.3 Intersection Clear-Sight Requirements
- 10.2.3.1 Clear-sight distance is required at intersections, median openings, and driveway connections. Clear-sight distance requirements are defined in FDOT Design Manual, Chapter 212.11. See Figure 212.11.1 Clear Sight Triangles and Exhibits 212-4 through 212-7 for sight distances requirements.
- 10.2.3.2 A clear-sight window must be maintained, 5'- 0" above and 1'- 6" below the site datum line (height of drive eyes 3'- 6" above the pavement). Refer to Landscaping Clear Site Window for Medians, Standard County Index drawing TD-15 (Sheet 1 of 2).
- 10.2.4 Signage Clear Sight Requirements
- Conflicts with street trees and proposed street signage (which can include regulatory, warning, no parking, transit, and other signs) must be avoided. Street trees must:
- not block proposed street signage from driver’s line of sight
 - not interfere with the driver’s stopping distance visibility of any signage
 - not be placed closer than thirty (30) feet in front of a proposed street sign
 - not block the driver’s view of signage at maturity.

10.3 VERTICAL CLEARANCES

All sidewalks and pedestrian crossing areas should be maintained free of all obstructions and growth. Refer to Landscaping Vertical Clearances, Standard County Index drawing TD-15 (Sheet 2 of 2).

10.4 TREE PRESERVATION

- 10.4.1 Tree Well/Aeration Systems: A tree well/aeration system is used when the finished grade within the critical root zone exceeds the natural grade by eight inches or more. The critical root zone of a tree is that portion of the 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). Refer to Standard County Index drawing TD-16 (Sheet 2&3 of 7) for additional guidelines on tree well in the Tree Protection,.
- 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 must 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. Refer to Standard County Index drawing TD-16 (Sheet 2 of 7) for additional guidelines on retaining walls in the Tree Protection,
- 10.4.3 Pervious Pavement: Pervious pavement may be applied to protect the trees critical root zone when the proposed finished grade does not exceed the natural grade by more than eight inches. ~~with~~. The pervious pavement must be a predominantly sandy textured fill which can be overlain with pervious materials such as paver bricks, turf block, or porous concrete. Curbing proposed at the perimeter of the pervious pavement material must be designed to not sever the root system. Extruded curb, pin curbs or other similar designs are necessary to minimize root disturbance. Refer to Standard County Index drawing TD--16 (Sheet 4 of 7) for additional guidelines on pervious pavement in the Tree Protection.
- 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 is to be an important consideration when land alteration activity is proposed within a tree's critical root zone. Root pruning must be effectively performed to promote desired wound wood production and to discourage a root's infection by root-rotting fungi. Effective root pruning provide a clean, even cut and discourages a torn and jagged root end.
- 10.4.6 Tree Protection Barriers: Tree protection barrier guidelines are provided in the Tree Protection, Standard County Index drawing TD-16 (Sheet 1 of 7).
- 10.4.7 Tree Pruning: All tree pruning must conform to the pruning standards specified in the Tree Protection, Standard County Index drawing TD-16 (Sheet 5 of 7) and the Natural Resources Section of the LDC. These standards refer to the American National Standards Institute (ANSI) A-300 Pruning Standards.
- 10.4.8 For additional guidelines on tree excavations in the Tree Protection, refer to Standard County Index

drawing TD-16 (Sheet 6 of 7).

- 10.4.9 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 is required. The length of the required protection must be five feet on either side of the centerline (longitudinally) of the required tree. Refer to Standard County Index drawing TD-16 (Sheet 7 of 7) for additional guidelines on Sidewalk Protection from Street Trees.

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](https://www.hcfl.gov) (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. Hard copies are required to be turned in through the DSD. The standard sheet size for construction plans submitted to the County for review must 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 must be shown on the Cover Sheet:

“Construction must 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 Standard Plans.”

11.2.3 Final record drawings must be submitted in accordance with Hillsborough County Specifications, Section 01300.

SECTION 12.0 ARTERIALS, COLLECTORS AND OFF-SITE ROADS

12.1 GENERAL

This Section provides general guidance for the design and plans production of roads designated as off-site roads.

- 12.1.1 Off-site roads are defined as arterials and collectors, whether on-site or off-site, and local roads that have been conveyed to the County.
- 12.1.2 Transportation improvements on roads identified in Section 12.1.1 of this manual must meet all Development of Regional Impact (DRI), concurrency, developer agreements, zoning conditions, Hillsborough County's LDC, and the design criteria specified in Section 12.2, 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 PWA, the County Engineer will determine the most appropriate criteria.
- 12.1.3 Design of the following project types will be submitted to DSD and forwarded to TSD for review and must follow the governing design criteria in the HCTDM:
- Signals
 - Rectangular Rapid Flashing Beacons (RRFBs)
 - Roundabouts
 - Mid-block crossings
 - Intelligent Transportation Systems (ITS)
 - Lighting (Intersections and Corridors)
 - School Zones
 - Bridges
 - Addition of or modification to through or turn lane at County-signalized intersection
 - Addition of or modification of Ped push button/pole at new/relocated curb ramps

12.2 DESIGN CRITERIA

- 12.2.1 The governing design criteria for Hillsborough County arterial and collector roads are provided in the latest version of the HCTDM and posted Transportation Design Bulletins.
- 12.2.2 Utilize the HCTDM and Florida Greenbook criteria to design local roads that have been conveyed to the County. The Florida Greenbook criteria does not apply to County roads designated as arterials or collectors.
- 12.2.3 The design criteria must be submitted for review to DSD and forwarded to TSD along with the formal submission of the plans. The Design Criteria Table is provided in the HCTDM, Section 1.3.4.

12.3 DESIGN COORDINATION

Prior to starting a design, it is recommended that the EOR meet with the DSD 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, and other issues are discussed and agreed upon. Checklists of required data for various stages of design are available and presented at these meetings.

12.4 DESIGN EXCEPTIONS AND DESIGN DEVIATIONS MEMORANDUMS

12.4.1 All Design Exception (DE) and Design Deviation Memorandum (DDM) requests are to be submitted to DSD and forwarded to TSD for review, for the project types listed in Section 12.1.3 of this manual. The Design Exceptions and Design Deviation Memorandums for these projects must follow the procedures outlined in the HCTDM Section 1.3.5 Design Exceptions and Deviations.

12.4.2 All off-site requests for DEs and DDMs must be submitted to the County Engineer at PW-CEIntake@hillsboroughcounty.org for approval.

12.5 TYPICAL SECTION

The typical sections found in this manual should not be used for off-site road projects. A typical section package must be prepared for off-site roads. Refer to HCTDM, Section 1.3.6 for Typical Section Package Requirements. The appropriate typical sections for a project are to be determined during the pre-design meeting. A typical section must be provided for each proposed road. Separate typical sections must be developed for a road where the typical section design elements vary significantly at the direction of the County.

12.6 PLANS

12.6.1 Plans for off-site work that is permitted separately from the on-site must follow the requirements of Section 12.6.

12.6.2 Plan Set Format: In order to be considered for review, the construction plan set must 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 (if pertinent information is not placed in geometric layout/project layout sheets)
- 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 (if pertinent information is not placed in plan and profile sheets)
- Landscape plans
- Mitigation plans
- Structural plans (board walk, box culverts, etc.)
- Roadway soil survey
- Sediment and Erosion Control Plan

12.6.4 A complete index of off-site plan sheets must 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, Refer to HCTDM, Section 1.3.1.1. Sequence of Plans Preparation.

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 must 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). 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. 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 must 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 County may be necessary for maintained 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.

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

updated throughout the design phases.

12.8 PUBLIC WORKS REVIEW

- 12.8.1 The DSD Review Checklist should be completed by the EOR and included with the off-site plan submittals. 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 plans must be clearly labeled with the % phase submittal. Plans labeled as final must be signed and sealed.

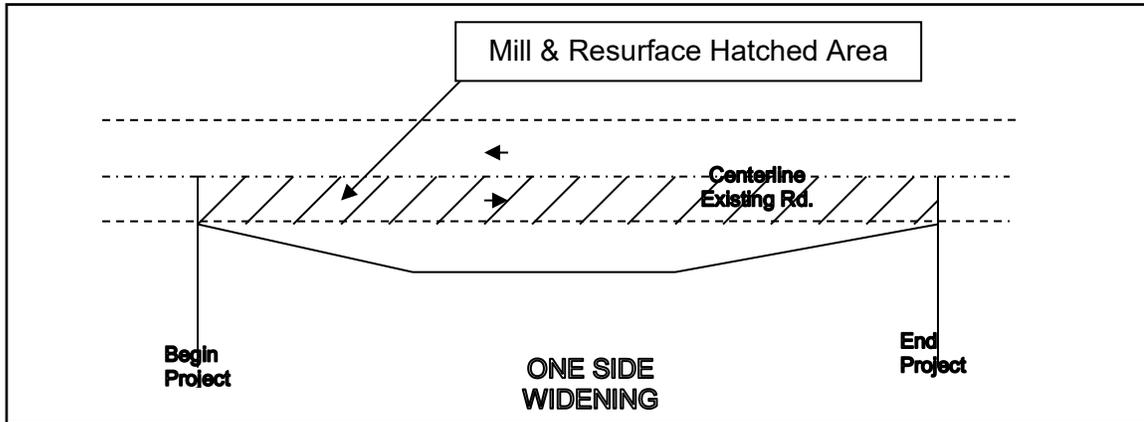
12.9 PAVEMENT DESIGN

- 12.9.1 Pavement design must 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 arterial and collector roads following the guidelines in the FDOT Flexible Pavement Design Manual latest edition.
 - 12.9.1.2 Option 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 must 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 FOR WIDENED ROADS

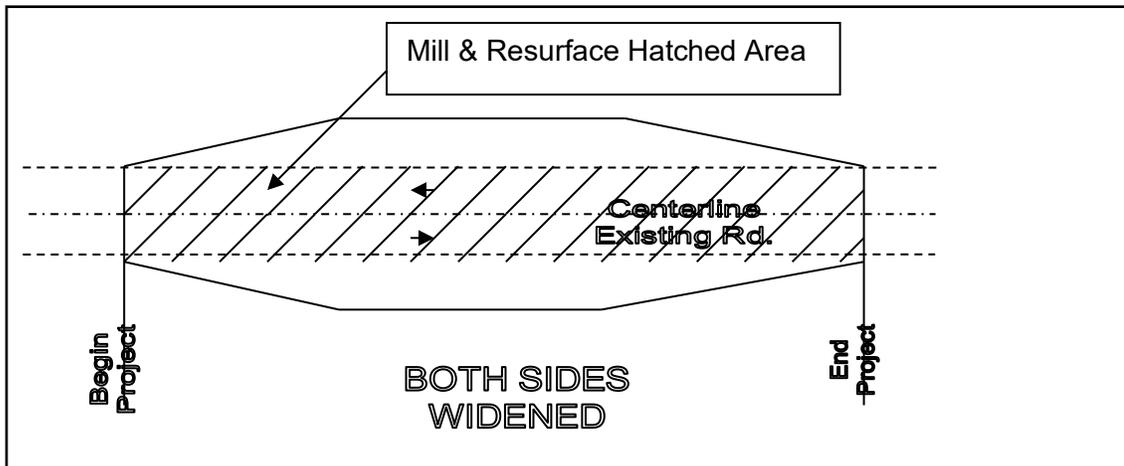
- 12.10.1 Milling and Resurfacing of widened off-site roads can be accomplished with a friction course FC-12.5 (Traffic Level C)(1½”)(PG 76-22) when cracking is less than 1½-inches depth.
- 12.10.2 Pavement cores may be required to determine the condition of the existing pavement (i.e. severe cracking is present) for off-site milling and resurfacing projects before any recommendations are made for depth of milling and resurfacing.
- 12.10.3 The following cases are applicable and the pavement thickness will be applied as determined in Sections 12.10.1 and 12.10.2:
- 12.10.3.1 Widening on One Side: When widening is done on one side of an existing roadway then milling and resurfacing is required between the begin and end limits of the project from outside EOP to center line of the existing roadway.

Figure 12-1: Widening on One Side



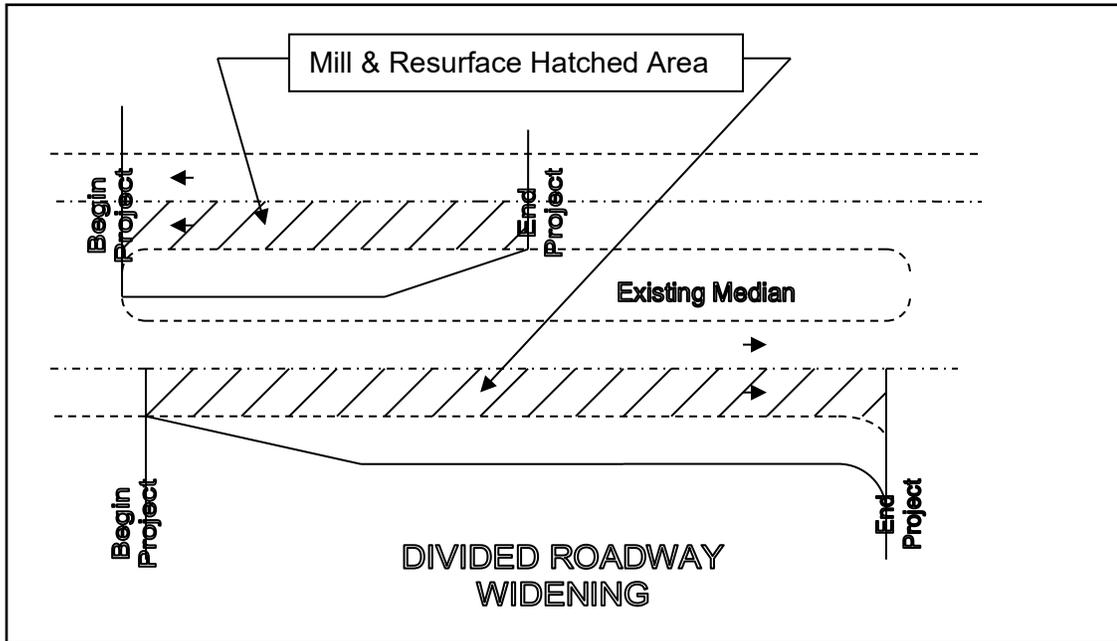
12.10.3.2 Widening on Both Sides: When widening is done on both sides of an existing roadway milling and resurfacing is required between the begin and end limits of the project for the entire width of the existing roadway.

Figure 12-2: Widening on Both Sides



12.10.3.3 Widening on a Divided Roadway: When widening is done adjacent to an existing divided roadway milling and resurfacing is required between the begin and end limits of the project for the adjacent lane. This includes proposed widening in the median area (left-turn lanes).

Figure 12-3: Widening on a Divided Roadway



- 12.10.3.4 Proposed improvements adjacent to existing roads that have been recently resurfaced, (three years or less at time of permitting and five years or less at time of construction) will require milling and resurfacing a one foot width of the existing adjacent lane, a minimum depth of 1½-inches.
- 12.10.3.5 A minimum of 1½-inch milling and resurfacing is required for the entire width of lane, between the begin and end limits of the project, when existing thermoplastic striping is to be removed that crosses a lane or is in the center of the lane.
- 12.10.3.6 Resurfacing limits will be determined at the discretion of the County for conditions other than those depicted above.
- 12.10.3.7 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

It is the developer's responsibility to re-establish any baseline or centerline monumentation that are destroyed by off-site construction operations.

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 are to be developed utilizing the guidelines in FDOT Design Manual, Chapter 214 Driveways and FDOT Standard Plan 330-001 and 522-003.

12.13 REMOVAL OF EXISTING PAVEMENT MARKING

Refer to HCTDM, Section 2.4.1.1 for Removal of Existing Pavement Markings. Include the Temporary Traffic Control General Notes that are identified.

APPENDIX A: ENGINEER OF RECORD CERTIFICATION



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

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



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

APPENDIX C: ENGINEER OF RECORD CERTIFICATION OF CONSTRUCTION COMPLETED



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 Standard Plans, 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.

APPENDIX D: CONTRACTOR'S AFFIDAVIT



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 Standard Plans, 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

APPENDIX E: TESTING SCHEDULE

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 must have 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 must 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 is to 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 Arterials and Collectors (Remove and Replace if not met).	(3)

- (1) *Recommend testing methods: FM 1-T238, FM- T204, ASTM D6938, and ASTM D2937.*
- (2) *Tests must be located no more than 500 feet apart. Tests must be performed on each lift, except that tests must not be further apart than one foot vertically. Field Densities must be taken over all road crossings. Field Densities for Sanitary Lines must be staggered to include results over service laterals. There must be a minimum of one test series for each one foot of lift over pipeline between manholes. Tests around structures must 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 must begin one foot above the base of the trench.*
- (3) *Tests must be located no more than 500 feet apart. There must be no less than one test per street. No core must be less than specified minimum thickness.*
- (4) *Testing for the subgrade and base compaction must be located no more 500 feet apart and must 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 must 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 must be conducted by the Engineer of Record, the County Inspector, and must 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 must 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 must 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 must 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 must be submitted separately with as-builts.

APPENDIX F: GUIDELINES FOR TECHNICAL SPECIFICATIONS

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 must conform to the requirements of this Section, or, in lieu thereof, such requirements as may be established by the EOR during construction. The EOR must have full authority to modify the provisions of this Section as deemed necessary, in his opinion, to meet field conditions and requirements.

Materials

Must meet the following gradation requirements:

Composition

Base material must 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 must 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 must be free of any Ferrous Metals.

Mechanical and Physical Properties

The material must 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 must be determined on the basis of test results as the work progresses. The finished in-place product must provide at least an LBR of 150 or greater.

1. TESTING OF BASE COURSE

Tests for base thickness and density must be located no more than five hundred (500) feet apart and must be staggered to the left, right, and on the centerline of the roadway. There must be no less than three (3) tests per street. Test reports for thickness, bearing, and density must 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 must be in accordance with the Testing Schedule.

2. PRIME AND TACK COATS

All bases must 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 must conform to the Florida DOT Standard Specifications for Road and Bridge Construction (except for the requirements of QCQ).

3. INSPECTION

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

Base Courses

The minimum thickness of the Crushed Concrete Base constructed under this contract must be as shown on the plans, and must 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 must 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 must be completed prior to the performance of density tests on the finished base.

Priming and Maintaining

The prime coat must be applied only when the base meets the required moisture and density requirements. At the time of priming, the base must 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 must 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 must be removed and replaced with properly graded crushed concrete.

Testing

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

APPENDIX G: LIST OF DRAWINGS

LIST OF DRAWINGS

NOTE: Use [this link](#) to access all Standard County Index Drawings online.

Typical Sections

TS-1.....	Recommended Utility Locations for Subdivision Roads
TS-2.....	Shared Use Paths (DELETED)
TS-3.....	Local Urban Roads 2 Lane Undivided
TS-4.....	Urban Collectors (2 Lane Undivided) (DELETED)
TS-5.....	Urban Collectors (2 Lane Divided) (DELETED)
TS-6.....	Urban Collectors (4 Lane Divided)
TS-7.....	Local Rural Roads 2 Lane Undivided
TS-8.....	Rural Collectors (2 Lane Divided) (DELETED)
TS-9.....	Low Volume Public Roads (Minor Subdivisions with Less Than or Equal to 10 Lots) (DELETED)
TS-10.....	Local Low Volume Private Roads for 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 Boulevards (Urban Collectors)
TND 5.....	Type 2 Boulevards (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 (DELETED)
TD-11 (2 of 2).....	Pedestrian Walkway (DELETED)
TD-12 (1 of 1).....	Post Mounted Street Name Signs
TD-13 (1 of 4).....	Internally Illuminated Street Name Signs (DELETED)
TD-13 (2 of 4).....	Sign Bracket Arm (One-Way)

LIST OF DRAWINGS (CONTINUED)

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 (DELETED)
TD-14 (2 of 6).....	Sign Locations (DELETED)
TD-14 (3 of 6).....	Sign Locations (DELETED)
TD-14 (4 of 6).....	Sign Locations (DELETED)
TD-14 (5 of 6).....	Sign Locations (DELETED)
TD-14 (6 of 6).....	Sign Locations (DELETED)
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 (DELETED)
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

APPENDIX H: DESIGN EXCEPTION / DESIGN DEVIATION MEMORANDUM APPROVAL COVER LETTER
