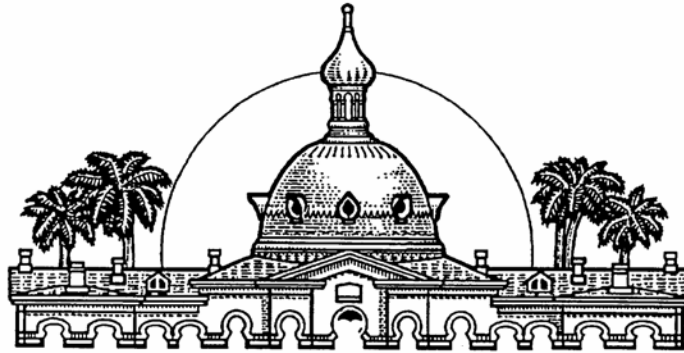


**HILLSBOROUGH COUNTY**

**TRANSPORTATION TECHNICAL MANUAL**

**FOR**

**SUBDIVISIONS AND SITE DEVELOPMENT PROJECTS**



Hillsborough County  
Florida

**PUBLIC WORKS DEPARTMENT  
ENGINEERING DIVISION**

**October 1, 2003**

# HILLSBOROUGH COUNTY TRANSPORTATION TECHNICAL MANUAL

**APPROVED**

Robert R. Gordon  
County Engineer

**Date:** Oct.1,2003

**Effective Date** 10-1-2003

## REVISIONS

The Transportation Technical Manual was revised in its entirety in 2003. The new manual became effective October 1, 2003.

All preliminary site development plans and preliminary plats submitted on or subsequent to the effective date of this manual shall be governed by this Transportation Technical Manual. All projects submitted prior to the effective date shall be governed by the version in effect upon preliminary submittal unless the developer voluntarily elects to comply with the more recent revised manual.

Based upon additional comments received from the building industry and consultants, revisions 1 through 7 to the Transportation Technical Manual approved on August 1, 2003 (effective October 1, 2003) have been made. Revisions 1 through 7 are permissive revisions effective October 1, 2003 and were incorporated and shown in the manual as it appeared on the County web site in October 2003. Revision 8 is a permissive revision and is incorporated and shown in the manual as it appeared on the County website in January 2004. The manual as shown on the County website in January 2004 contains all revisions through January 16, 2004. Revisions 9 and 10 are public safety revisions effective August 25, 2005 as approved by the County Engineer on August 25, 2005 and are incorporated and shown in the manual as it appeared on the County website in August 2005. Revisions 11, 12, 13, and 14 are permissive revisions implemented September 22, 2006. They better define what projects will be reviewed by PWD, allow for the use of the Type I, II & III Standard Inlets, and clarify sidewalk ramp ADA requirements. Revision 14 is safety related. The manual as shown on the County website in September 2006 contains all revisions through September 22, 2006.

1. Section 1.4, Off-Site Roadway Improvements was revised to include only improvements and facilities located within the County Right of Way.
2. Section 2.2, Right of Way, A. Minimum Standards, the minimum Right of Way for Local Urban Residential Roads was revised from 52' to a minimum of 50'. The following drawings were revised to reflect this change: TS-3 (Local Urban Roads), TD-3 (Temporary Dead End Treatment), TD-4 sheets 1 and 2 (Cul-de-sac), TD-7 (Residential Driveway).
3. Section 8.3, Base Courses for Flexible Pavement, C. Plant Produced Soil Cement Base, was revised to allow an equivalent to the minimum LBR 100 DOT limerock.
4. Section 11.2, Construction Plans Assembly was revised to indicate that the order of the plans is recommended, not required.
5. The structural number for local residential roads is revised to 2.3 while the structural number for all other roadway classifications remains at 2.5.
6. The minimum LBR for Crushed Concrete Base was revised from 100 to 150 in the Testing Schedule and in the Guidelines for Technical Specifications.
7. Please note that where FDOT specifications are referenced, the user may have to obtain the appropriate information from the FDOT website under the Archived Specifications for Local Agency Use Section (which do not contain QC 2000 requirements) due to changes in the current FDOT specification book and the QC 2000 requirements.
8. Section 2.14, Railroad Grade Crossings was revised to reflect a change in the Florida Administrative Code. Rule 14-46.003 as previously cited has been repealed and replaced with Rule 14-57.012.
9. Section 2.10, Dead End Streets was revised to be in compliance with Hillsborough County Ordinance, Florida Statue and National Fire Prevention Association guidelines. The length of a dead end street with a cul-de-sac at the end was revised to "up to 150 feet in length". Drawing TD-4 (Sheet 1 of 2) was revised to indicate this change. The length of a dead end street with a cul-de-sac at the end was revised to "greater than 150 feet in length". Drawing TD-4 (Sheet 2 of 2) was revised to indicate this change. Inside radius was revised from 47' to 60'. Right-of way requirements were revised from 116' to 140'. Updated list of drawings.
10. Drawing TD-3, Temporary Dead End Treatment was revised to meet minimum National Fire Prevention Association guidelines for turnarounds. Radius was revised from 20' to 45' per

design vehicle with a 5' tangent section. Right-of-way at turnaround was revised from 64' to 124'.

11. Section 1.3, Roadway Projects and Section 1.4, Off-Site Roadway Improvements were revised to better define what portion of development projects will be reviewed by the Public Works Department in accordance with the policy of the County Engineer and PGMD.
12. Section 3.3, Curb and Curb and Gutter, was revised to allow the County Standard Type I, II, & III Inlets. Also, Drawing TD-18 was added to define these inlets.
13. Section 2.9, Sidewalks was revised to clarify ramp location and ADA ramp requirements. Also, Drawing TD-8 was revised for clarification.
14. The last paragraph of Section 2.9 is a safety revision, which requires use of the latest version of FDOT Standard Specification – Section 527.

## REVISION PROCEDURE

### 1. Purpose and Responsibility

As material specifications and technical criteria change to meet new needs and changing technology, it will become necessary to revise and update this manual. These technical revisions will be handled administratively under the direction and approval of the County Engineer.

### 2. Restrictive Revisions

Proposed technical revisions to this manual that would result in higher design standards and/or more restrictive material specifications will be posted on the County Internet website [www.hillsboroughcounty.org](http://www.hillsboroughcounty.org). Notice of the posting will be electronically distributed for comment to those who have **subscribed to electronic notification of revisions** to this technical manual. Comments on the proposed technical revisions must be received via electronic mail within 21 calendar days after electronic notification. If the County Engineer subsequently determines that the proposed technical revision is in the best interest of Hillsborough County, then the proposed technical revision will be incorporated in this manual. All technical revisions subsequently approved by the County Engineer will be posted to the Internet and notice electronically provided in a timely manner to **electronic subscribers to revisions** of this technical manual. The effective date of such technical revision(s) shall be no sooner than 60 days from the date of electronic notification of the technical revision(s) by the County.

### 3. Permissive Revisions

Any technical revisions that allow additional alternatives to technical criteria and/or material specifications, or otherwise allow for greater design latitude, will not require advance notification. Technical revisions of this nature will be effective as of the date of approval by the County Engineer. Said revisions will be posted on the County website and electronic notifications will be distributed to electronic subscribers to this technical manual.

### 4. Conflict Resolution Procedure

In the event that a conflict or ambiguity exists in this manual or is inadvertently created by an approved revision to this technical manual, the County Engineer will approve a revision and/or clarification to resolve or eliminate the conflict/ambiguity. Users of this manual should contact the County Engineer's office if they believe that a conflict or need for clarification exists.

The effective date of "conflict revisions/clarifications" will be the date of the approval by the County Engineer. The revision will be posted on the Internet and notice of the change will be e-mailed to **electronic subscribers to revisions** of the manual. The County Engineer or his designee may also choose to resolve design problems directly related to potentially conflicting criteria in this manual on a case-by-case basis. Public health, safety and welfare, economic impact, and due diligence by the site designer will all be considered in the resolution of these design problems.

### 5. Typographical Correction Procedure

Corrections of any typographical errors contained herein that do not materially and significantly affect criteria will not require approval by the County Engineer. All corrections of this nature will become effective immediately, will be posted to the Internet, and notice will be e-mailed to **electronic subscribers to revisions** of the manual.

### 6. Statutory and/or Public Health, Safety or Welfare Revisions

Certain technical revisions may at times be required such as those necessary to meet statutory requirements or to protect public health, safety or welfare. The effective date of these revisions will be the date that the County Engineer approves them. They will be posted to the Internet and notice of the technical revisions will be electronically sent to **electronic subscribers to revisions** of the manual.

#### 7. Email Address Verification and Public Records Law

All electronic subscribers to this manual are solely responsible for providing current and accurate email addresses in order to receive automatic, electronic notification of proposed and final changes to this manual. Failure of an electronic subscriber to receive electronic notification shall not affect the effective date of any revisions that have been approved.

Hillsborough County will not sell nor distribute the email addresses of electronic subscribers for financial gain. However, please be advised that Hillsborough County is subject to the Public Records Law which would compel the County to provide email addresses of electronic subscribers upon request. Under the Public Records Law, Hillsborough County may charge a fee for recovering the cost of providing the requested information.

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## **THE TRANSPORTATION PRODUCT REVIEW COMMITTEE**

The Transportation Product Review Committee evaluates new and existing products for efficient and economical utilization with the County Roadway system. The Committee is charged with the development of a fair and reasonable methodology to systematically evaluate products for use through academic research and field evaluation.

The Committee is comprised of representatives of the Public Works and Planning and Growth Management Departments. The representatives have technical and/or management positions and either supervise maintenance or construction personnel or have a background in maintenance and/or construction.

## DEFINITIONS AND ABBREVIATIONS

The following terms and abbreviations, when used in this Manual have the meaning described or represent the full text shown.

**M<sub>R</sub>**- The Resilient Modulus (M<sub>R</sub>) is measurement of the stiffness of the roadbed soil.

**AADT**- Average Annual Daily Traffic

**AASHTO**- American Association of State Highway and Transportation Officials

**AC**- Asphalt Cement

**ASTM** – American Society for Testing and Materials

**Arterial** - A route providing service which is relatively continuous and of relatively high traffic volume, long average trip length, generally higher operating speed, and high mobility importance. In addition, all United States numbered highways shall be arterials.

**CMEC**- Construction Materials Engineering Council

**County Engineer**- Hillsborough County Engineer or his designee

**Collector** - A route providing service which is of relatively moderate traffic volume, moderately average trip length and moderately average operating speed. These routes also collect and distribute traffic between local roads or arterial roads and serve as a linkage between land access and mobility needs.

**Engineer of Record (EOR)** – An individual licensed by the State of Florida as a Professional Engineer. Further, the individual must be licensed to perform engineering assignments in the discipline of Civil Engineering.

**ESAL<sub>D</sub>**- The summation of the 18-kip ESAL's (Equivalent Single Axle Loads) during the design period of the project.

**FDOT**- Florida Department of Transportation

**FHA**- Federal Highway Administration

**“Florida Green Book”**- FDOT Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways.

**LBR**- Limerock Bearing Ratio

**Latest Edition**- The most current published edition of a reference, standard, guideline or publication available at the time of submission of final contract documents to PGMD.

**Local Road** - A route providing service which is of relatively low average traffic volume, short average trip length or minimal through-traffic movements, and high land access for abutting property.

**LDC**- Hillsborough County Land Development Code

**PG**- Performance Grade

**PGMD**- Hillsborough County Planning and Growth Management Department

**PWD** – Hillsborough County Public Works Department

**%R** - The Percent Reliability (%R) is the probability of achieving the design life for that roadway.

**TND**- Traditional Neighborhood Development

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## **SECTION 1 GENERAL**

### **1.0 SCOPE**

The requirements of this manual apply to public and private roads, bridges and other transportation facilities in Hillsborough County as addressed in the manual.

### **1.1 AUTHORITY OF INSPECTORS**

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

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

### **1.2 COMMERCIAL SITES**

All commercial sites shall meet the applicable requirements of this manual and be submitted to PGMD for review.

### **1.3 ROADWAY PROJECTS**

All roadway projects designed within a subdivision (on-site) by the EOR for a developer shall meet the applicable requirements of this manual and be submitted to PGMD for review.

All off-site transportation improvements shall meet all zoning conditions, be designed in accordance with criteria established by the PWD, and submitted to PGMD for review. Where a safety-related discrepancy exists between the requirements of a zoning condition and the criteria established by the PWD, the County Engineer will determine the most appropriate criteria.

PGMD will submit all off-site improvements and on-site collectors to PWD (DESS) for review, where the determination of on-site collector is made by the Director, Transportation and Land Development, PGMD, at preliminary plat submittal. He may also request design reviews from PWD (DESS) of other on-site improvements at any time for public safety purposes.

All off-site improvements and on-site collectors require PWD (DESS) design reviews at both the preliminary plat submittal and final plans submittal.

All plans submitted to PGMD will be reviewed by PWD (Traffic Services) for signalization, signing and marking, and other traffic related items.

### **1.4 OFF-SITE ROADWAY IMPROVEMENTS**

All off-site roadway improvements located within the County right of way or improvements that will be located within the County right of way, such as new roads, new signals, auxiliary turn lanes, sidewalks, trails, golf cart paths, pedestrian paths and public transportation facilities, shall be designed to the appropriate Hillsborough County and FDOT standards.

## **1.5 CONCURRENCY LEVEL OF SERVICE (LOS) DETERMINATIONS**

When a proposed development requires a current level of service (LOS) study to evaluate the adequacy of the transportation infrastructure to accommodate a proposed project, the study must be performed in accordance with the FDOT Quality/Level of Service Handbook, latest edition. Chapter 3 of the FDOT Quality/Level of Service Handbook discusses the data requirements for the analysis of specific road segments and how these are determined. It is imperative that the study be tailored to the specific road segment and that the generalized tables in the manual are not to be used for studies of County roadways. Any coordination required by the FDOT Quality/Level of Service Handbook shall be accomplished through the PGMD Transportation Division.

## **1.6 FUNCTIONAL CLASSIFICATION**

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

## **1.7 DESIGN CRITERIA**

Engineering analysis and documentation signed and sealed by the EOR for the developer and submitted to the County Engineer via PGMD for review and approval is necessary to support any deviation from the criteria presented in this manual. The most stringent design criteria/standard/specification shall be used.

## **1.8 TRAFFIC**

The existing traffic volumes on roadways providing access to the development, and traffic volumes that will be generated by the proposed development shall be determined and summarized in a design traffic report by the Engineer of Record (EOR) for the developer early in the planning and design process. This report shall meet the requirements of the Transportation Division of PGMD. The Transportation Division of PGMD shall approve the design traffic report for each development.

## **1.9 PUBLIC TRANSIT**

Roads classified as local collectors and higher in Hillsborough County shall make provisions for future public transit facilities. These facilities shall conform to the requirements of the Hartline Transit Friendly Planning and Design Handbook.

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## **SECTION 2 DESIGN ELEMENTS**

### **2.1 ROADWAY DESIGN AND CONSTRUCTION CRITERIA**

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

1. AASHTO - A Policy on Geometric Design of Highways and Streets
2. AASHTO - Roadside Design Guide
3. AASHTO - Guide for the Development of Bicycle Facilities
4. U.S. Department of Transportation, Federal Highway Administration - Manual on Uniform Traffic Control Devices for Streets and Highways
5. Americans With Disabilities Act (ADA)
6. ITE - Highway Capacity Manual
7. Florida Accessibility Code for Building Construction
8. "Florida Green Book"
9. FDOT - Plans Preparation Manual
10. FDOT - Design Standards
11. FDOT - Flexible Pavement Design Manual
12. FDOT - Rigid Pavement Design Manual
13. FDOT - Traffic Engineering Manual
14. FDOT - Median Handbook
15. FDOT - Manual on Uniform Traffic Studies
16. FDOT - Standard Specifications for Road and Bridge Construction except for the requirements of QC 2000. Please use the specifications located on the FDOT website under Archived Specifications for Local Agency Use for the appropriate referenced specification for earthwork, base, asphalt and concrete. The archived specifications do not contain QC 2000 information and also contain specifications that FDOT no longer supports in the latest version.
17. FDOT - Supplemental Specifications and Special Provisions for Road and Bridge Construction Standard Specifications except for the requirements of QC 2000
18. FDOT - Soils and Foundation Manual
19. FDOT – Florida Intersection Design Guide

20. Typical Sections, TND Typical Sections and Typical Details Drawings in this manual.
21. Hillsborough County Stormwater Management Technical Manual
22. Hillsborough County Water, Wastewater and Reclaimed Water Technical Manual
23. Hillsborough County Water and Wastewater Technical Specifications
24. Hillsborough County Utility Accommodations Guide And Rights of Way Use Procedure Manual
25. Hillsborough County Residential Traffic Control Handbook
26. Hillsborough County Land Development Code
27. Hillsborough County Development Review Procedures Manual
28. Hartline Transit Friendly Planning and Design Handbook

## 2.2 RIGHT OF WAY

### A. MINIMUM STANDARDS

Minimum right of way widths shall be provided as listed in the following table. Additional right of way may be required in order to provide for elements such as ditch depths greater than 2 feet, width of depressed medians greater than 6 feet to accommodate special stormwater management features, special ditches or water courses to bypass stormwater from offsite, 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.

<b>ROAD CLASSIFICATION</b>	<b>MINIMUM RIGHT OF WAY</b>
Multi-Use Trails	26'
Local Urban Roads – (2 Lane Undivided)	50'
Urban Collectors – (2 Lane Undivided)	64'
Urban Minor Collectors – (2 Lane Divided)	86'
Urban Major Collectors – (4 Lane Divided)	110'
Local Rural Roads – (2 Lane Undivided)	92'
Rural Minor Collectors – 40 MPH –(2 Lane Undivided)	96'
Rural Minor Collectors – 50 MPH –(2 Lane Undivided)	100'
Rural Minor Collectors – 50 MPH – (2 Lane Divided)	122'

Hillsborough County, per the provisions of the LDC, encourages the use of Traditional Neighborhood Development (TND) roads. The following typical sections are approved for

use on Hillsborough County TND roads. Minimum right of way widths shall be provided as listed in the following table.

<b>ROAD TYPE</b>	<b>MINIMUM RIGHT OF WAY</b>
Alleys	20'
Local Urban Lanes	52'
Local Urban Streets	69'
Type I Boulevards (Major Urban Collectors)	128'
Type II Boulevards (Major Urban Collectors)	110'
Avenues (Minor Urban Collectors)	104'
Main Streets (Minor Urban Collectors)	82'

**B. EXISTING ROADS**

Additional right of way adjacent to existing Hillsborough County and State Roads shall be dedicated to Hillsborough County as required to incorporate such design features as bicycle lanes, trails, sidewalks, utilities, ditches, auxiliary lanes, storage lanes, etc., required by the development. When existing roads serve as the access road(s) to new developments, the road(s) shall be improved to the maximum extent possible to comply with the minimum level required of the classification based on existing and proposed average daily trips.

**C. INTERSECTIONS**

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

**2.3 SUBSOIL INVESTIGATION FOR ROADWAYS**

A geotechnical engineering consultant firm accredited by AASHTO, CMEC or FHWA approved in the State of Florida shall perform a signed and sealed subsoil investigation report. This report shall be in accordance with the requirements of the FDOT Soils and Foundation Manual except as noted by this section. This report shall be submitted for review and approval with the roadway plans to PGMD and shall include the following:

**A. GROUNDWATER**

The seasonal high groundwater elevation and boring locations shall be shown on the plan and profile sheets. The definition of "seasonal high groundwater" shall be per the Hillsborough County Stormwater Management Technical Manual.

## **B. SOIL CLASSIFICATION**

The soil classification for each stratum shall be in accordance with AASHTO M 145-73. The soil classification testing shall be in accordance with FDOT Soils and Foundation Manual.

Test borings shall be taken to a minimum depth of 8.0 feet below the existing grade. The borings shall be a maximum of two hundred (200) foot intervals, or at one hundred (100) foot intervals, staggered, for divided roadways. There shall be no less than one (1) boring per street. Additional borings shall be taken as necessary to determine limits of unsuitable material. Depth and horizontal limits of muck areas shall be determined and shown on the plans. Unsuitable material shall be removed and replaced in accordance with FDOT Design Standards 500 and 505.

### **2.4 CLEARING AND GRUBBING**

All roadway rights of way shall be cleared and grubbed in accordance with the FDOT Standard Specifications for Road and Bridge Construction, latest edition (except for the requirements of QC 2000) and the Landscaping Section of this manual. Selective clearing and grubbing is allowed, provided that preserved vegetation, including trees, is in accordance with the landscaping standards of this manual.

### **2.5 DESIGN PERIOD**

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

### **2.6 DESIGN VEHICLE**

The design vehicle selected for geometric design should be one with dimensions and minimum turning radii larger than almost all the vehicles in its class. Design vehicles are listed in Table 3-2 of the "Florida Green Book".

If the total vehicles of those classes larger than passenger vehicles that are most likely to use a particular road or collector is five (5) 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:

- 1) Horizontal and vertical clearance
- 2) Alignment
- 3) Lane widening on curves
- 4) Shoulder width requirements
- 5) Turning and intersection radii
- 6) Intersection sight distance
- 7) Median opening width
- 8) Maximum grades

9) Return Radii

10) Control Radii

See Section 5 Intersection Design for minimum requirements on return radii on local roads and collectors and associated design vehicle requirements at intersections.

## 2.7 HORIZONTAL ALIGNMENT

### A. DESIGN SPEED

The design speed of local roads and collectors is an extremely important parameter in establishing the geometric design criteria for these types of facilities. The proper selection of this element is highly critical in establishing a safe and high quality path for the drivers, pedestrians and bicyclists on a given roadway.

According to FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways, the primary basis for the selection of the design speed should be a rational prediction of the probable maximum operating speed (by approximately 90 percent of the vehicles) on the road or collector. Design speed is defined as the maximum safe speed that can be maintained over a given section of road/highway when weather, light, and traffic conditions are such that the design features of the road/highway govern.

The minimum design speeds for local roads and collectors shall not be less than the values shown in the following table and typical sections in this manual unless approved by the County Engineer and PGMD:

ROAD CLASSIFICATION	DESIGN SPEED
Local Urban Roads (2 lane Undivided)	30 MPH
Urban Collectors (2 Lane Undivided)	35 MPH
Urban Minor Collectors (2 Lane Divided)	35 MPH
Urban Major Collectors (4 Lane Divided)	45 MPH
Local Rural Roads (Undivided)	30 MPH
Rural Minor Collectors – 40 MPH (2 Lane Undivided)	40 MPH
Rural Minor Collectors – 50 MPH (2 Lane Undivided)	50 MPH
Rural Minor Collectors – 50 MPH (2 Lane Divided)	50 MPH

### B. ROADWAY TRANSITIONS AND TAPERS

When redirection of through lanes to transition from one type of roadway to another becomes necessary, the required deflection angles, transition lengths and tapers shall be provided as per FDOT Standard Index 526. However, the table in this Standard that is identified as "Minimum Under Restraints" on Sheet 2 of 8 shall not be used for transitions on County roads.

### C. DEFLECTION OF THROUGH LANES THROUGH INTERSECTIONS

The maximum deflection for through lanes through intersections shall meet the requirements of the Table 2.8.1a of Volume 1 of the FDOT Plans Preparation Manual. Table 2.8.1b in

Volume 1 of the FDOT Plans Preparation Manual is not applicable for deflection of through lanes through intersections on County roads.

**D. HORIZONTAL CURVES**

The minimum permitted radii (maximum degree of curvature) for rural roads, urban roads and collectors are given in Section 2.8.1 of Volume 1 of the FDOT Plans Preparation Manual.

**E. SUPERELEVATION**

Superelevation rates and transitions requirements shall be per Section 2.9 of Volume I of the FDOT Plans Preparation Manual.

**2.8 VERTICAL ALIGNMENT**

**A. CRITERIA**

The designer shall closely coordinate the vertical and horizontal alignments. This aspect has proven to provide a higher level of safety and quality. The vertical alignment shall provide the highest sight distance possible with the use of gentle grades. The minimum design speed for vertical alignment shall not be less than 30 mph regardless of horizontal alignment constraints.

The minimum standard roadway base clearance required above the Seasonal High Groundwater Table (SHGWT) Elevation for roadway base courses is provided in Table 11-1 of the Hillsborough County Stormwater Management Technical Manual, latest edition.

**B. GRADES**

The minimum road grade shall be 0.30% for all local roads and collectors. Refer to Table 3-4 of the "Florida Green Book" for maximum grades. Maximum changes in grade without the use a vertical curve shall be per Table 3-5 of the "Florida Green Book".

**C. VERTICAL CURVES**

Vertical curves are required when the algebraic difference between two grades exceed the values listed in "Florida Green Book", Table 3-5. Vertical geometry shall insure adequate stopping and passing sight distance by meeting or exceeding the values shown in "Florida Green Book", Table 3-6 and Figures 3-4, 3-5, and 3-6.

**D. AT-GRADE INTERSECTIONS**

When a proposed roadway is tied into an existing County road at a proposed at-grade intersection, the intersection including the existing County road shall be rebuilt to provide a smooth transition between the two roads. This intersection shall be "plateaued" to provide a smooth transition between the two roadways. The "plateauing" of intersections shall meet the requirements of Section 3.8 of the FDOT Florida Intersection Design Guide. The coordination of the cross sections of two intersecting roadways shall be carefully analyzed; the design should insure a smooth cross slope transition between the two roads. Adequate drainage shall be provided at this intersection. The intersection shall be designed to accommodate future signalization.

See Section 5 Intersection Design for additional requirements.

## 2.9 SIDEWALKS

Sidewalk and curb-cut ramp design shall conform to the requirements as set forth in this manual, the Americans With Disabilities Act (ADA), and the Florida Accessibility Code for Building Construction and applicable FDOT Design Standards.

Sidewalks shall extend to roadway at all intersections with the exception where the sidewalk cuts across major offsite roads, unless it is at a controlled/signalized intersection. Standard curb cut and accessible ramps are required where sidewalks meet curb or curb and gutter. Sidewalks shall be no less than five (5) feet in width along all local roads and collectors.

The standard thickness for a sidewalk shall be four (4) inches, except for sidewalks at commercial and residential driveways, and in areas fronting retention/detention ponds, where the thickness shall be six (6) inches.

Sidewalks, curb-cut ramps, and handicap ramps shall be constructed of Portland Cement Concrete, Class I. Materials and methods of construction shall conform to the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000).

**At the time of construction** detectable warning surfaces shall meet all FDOT criteria including, but not limited to, the latest Design Standards – Index 304, Standard Specifications for Road and Bridge Construction – Section 527, and the Qualified Products List (QPL). The preferred color for curb cut detectable warning surfaces is red. However, the color must be a contrasting color.

## 2.10 DEAD END STREETS

The maximum length for a dead-end street shall be 1000 feet, unless otherwise approved.

Cul-de-sacs shall be constructed at the end of dead-end streets. When the length of the cul-de-sac is up to 150 feet it shall be constructed in accordance with the Cul-De-Sac Typical Details, Sheet 1 of 2. However, when the length of a dead-end street is 150 feet or greater, the cul-de-sac shall be constructed in accordance with the Cul-De-Sac Typical Details, Sheet 2 of 2.

Where a street is to be continued when adjacent property is subdivided, or during phased construction, a temporary "T" type turnaround will be required when the street is 150 feet or more in length as measured from the nearest intersection. The "T" type turnaround will be constructed in accordance with the Temporary Dead End Treatment Typical Details and shall be clearly delineated per FDOT Design Standard Index 17349.

The minimum offset tangent distance as measured from the centerline of the main road to the center of the cul-de-sac (radius point) shall be 100 feet.

## 2.11 BUFFER WALLS

### A. GENERAL

Buffer walls shall be constructed along all arterial and collector roadways that abut all residential land uses that are processed through the Subdivision and/or Site Development Regulations of the Land Development Code. For additional information refer to Buffer Wall / Berm Typical Details drawing in this manual.

### B. HORIZONTAL LOCATION

1. Buffer walls, including footings, shall be parallel to and outside of the right-of-way.

2. In order to provide for the safe functional use of the sidewalk, a flat grass area measuring a minimum of two feet in width shall be maintained between the outer edge of sidewalks and the closest portion of the buffer wall structure.

3. Where permanent easements are parallel to and contiguous to the road right-of-way, all structural elements of the buffer wall shall be outside of the easement.

**C. OWNERSHIP AND MAINTENANCE**

Hillsborough County shall not be responsible for any maintenance or liability associated with the buffer walls. Buffer walls shall be owned and maintained by the property owner of the parcel on which it is located or by a Property/Homeowner's Association.

**D. AESTHETICS**

The walls shall be limited to six feet in height, unless otherwise noted by the Hillsborough County Land Development Code or any applicable conditions of zoning. When residential projects are proposed to abut each other, adjacent to the same collector or arterial roadway, or if a new project is proposed which would abut an existing project that has a buffer wall, the proposed wall shall be visually compatible with the existing wall. If the developer desires to have a different exterior appearance for the new wall, then the Director of PGMD must approve the change.

**E. ALTERNATE BUFFER**

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

The berm shall have a maximum height of six feet, maximum side slopes of four feet, horizontal to one foot vertical, and a top width of five feet.

The berm shall be sodded with grass or other suitable vegetation as approved by the PGMD.

**F. 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 Land Development Code, the footer or buffer walls and the toe of slope of vegetated berms shall clear the trees as determined by the PGMD.

**G. STORMWATER MANAGEMENT**

Buffer walls and vegetated berms shall be designed so as not to interfere with the proper functioning of existing or proposed stormwater management systems.

**H. STRUCTURAL**

Buffer walls may consist of concrete masonry units, cast-in-place concrete, or precast concrete and shall be designed in accordance with the latest edition of the applicable ACI Building Code (ACI-530 for masonry structures and ACI-318 for concrete). Other wall types may be used subject to approval of the County Engineer, or through Planned Development Zoning (PD). Buffer walls shall be designed to retain the soil resulting from a difference in ground line elevations on each side of the wall. Buffer wall calculations and plans shall be signed and sealed by a Professional Engineer licensed in the State of Florida.

## **2.12 PEDESTRIAN AND BICYCLE FACILITIES**

Pedestrian and bicycle facilities shall be provided on all local and collector roads. This includes any developer funded capital project roads listed within the Metropolitan Planning Organization's (MPO) Comprehensive Bicycle Plan.

All pedestrian facilities shall be designed to meet the minimum standards set forth in FDOT Pedestrian Planning and Design Handbook.

All bicycle facilities shall be designed to meet the minimum standards set forth in the latest edition of the AASHTO Guide for the Development of Bicycle Facilities and FDOT Bicycle Facilities Planning and Design Handbook.

All multi-use trails shall be designed to meet the standards as set forth in Multi-Use Trails Typical Sections drawings in this manual, FDOT Trail Intersection Handbook and Volume 1, Chapter 8, Section 8.6 Shared Use Paths of the FDOT Plans Preparation Manual.

## **2.13 UTILITIES**

Utility locations shall be per the Recommended Utility Location Typical Section drawing in this manual.

## **2.14 RAILROAD GRADE CROSSINGS**

The purpose of this section is to establish guidelines for new railroad grade crossings in Hillsborough County. All railroad grade crossings shall be constructed according to current Hillsborough County Drawings, available from the County Engineer.

New public grade crossings must be permitted through the FDOT Rail Office per Section 335.141, Florida Statutes and Rule 14-57.012, Florida Administrative Code. Elements of design such as profile and alignment; drainage; sight distances; lighting; traffic control device and signal selection and placement; and traffic signal preemption shall conform to the latest revisions of the FDOT Design Standards, FDOT *Rail Manual*, AASHTO A Policy on Geometric Design of Highways and Streets, FHA Manual on Uniform Traffic Control Devices, and the railroad standard criteria for grade crossings.

## **2.15 TESTING AND MATERIAL CERTIFICATION**

### **A. TESTING**

An Independent Testing Consultant accredited by AASHTO, CMEC or FHWA approved and licensed by the State of Florida shall perform all tests specified within this manual. Hillsborough County may elect to observe the testing consultant perform tests in an accredited field and testing laboratory. All soil surveys, certifications, design mixes, and test reports shall be submitted by the Engineer of Record on a timely basis during the construction process to PGMD Construction Services Section.

Hillsborough County reserves the right to also perform tests or call for the developer to perform tests as deemed necessary by the PGMD Inspector.

Testing shall be in accordance with the Testing Schedule of this manual, applicable FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000), special provisions and supplements to the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000) and Technical Specifications.

An operational project is defined as projects less than 500 feet in length or relatively small improvements such as turn lane additions. Operational type projects shall not be subject to the testing criteria pending approval of the PGMD Construction Services Section.

**B. MATERIAL CERTIFICATION**

Material suppliers shall provide proof of certification that the following items in this section and the testing schedule of this manual are in compliance with the requirements of this manual and the FDOT Standard Specifications for Road and Bridge Construction (except for the Requirements of QC 2000):

Base Material (other than soil cement and crushed concrete base)

Prime and Tack Coat

Type ABC-3, Type S or Type SP Asphaltic Concrete

Concrete

Pipe (Other than Utility Pipe)

Pavement Markings (Striping)

The EOR shall submit all material certifications to the Construction Services Section of PGMD on a timely basis during the construction process and prior to final acceptance of construction.

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## **SECTION 3 CROSS SECTION ELEMENTS**

### **3.1 LANE WIDTHS**

The minimum lane widths shall be 12 feet for non-residential roads and collectors and 10 feet for local residential roads. See applicable Hillsborough County Typical Sections.

The minimum lane widths for auxiliary turn lanes shall be 10' for local residential roads and 12' for non-residential collectors unless border width constraints at an intersection preclude the use of these lane widths. Variations to lane widths for border width constraints at intersections shall be well documented and submitted to PGMD for review and approval.

### **3.2 MEDIANS**

#### **A. GENERAL**

Raised medians shall be curbed and conform to the FDOT Design Standards. All concrete traffic separators for left turn lanes shall meet the requirements of FDOT Standard Indexes 301 and 302.

Medians shall meet the requirements of the FDOT Median Handbook and Table 3-6 Basic Median Functions and their Required Width in the FDOT Florida Intersection Design Guide.

#### **B. ENTRANCE**

Entrance medians or islands within the road right of way shall conform to the Entrance Median and Guardhouse Typical Details.

#### **C. LANDSCAPING**

Landscaping in medians shall meet the requirements of Section 10 Landscaping and Tree Preservation in this manual. Medians and islands shall not be designated as park or recreation areas. A dedication and maintenance agreement is required when landscaping is to be placed in a public road(s) right of way. Medians and islands may be landscaped. The landscaping in these areas shall comply with the requirements of this section for clear zone and sight distance. These areas shall be dedicated to an established maintenance entity. There shall be an approved County maintenance agreement in place before landscaping is allowed in County right of way. All landscaping is to be within dedicated right of ways.

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

#### **A. GENERAL**

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

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

Materials and installation shall conform to the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000), latest edition.

When curb or curb and gutter replacement is required, it shall be replaced in ten (10) foot sections.

## **B. STABILIZATION AND COMPACTION**

All curbs and gutters shall be placed on either a foundation of Type B stabilized subgrade with a minimum LBR value of 40, Type C stabilized subgrade with a minimum Florida Bearing Value of 75 for curb pads only when utilizing soil cement base or a 4 ½" asphalt base curb pad with a Type B stabilized subgrade (See FDOT Plans Preparation Manual for details). All curbs and curb and gutters shall be stabilized to a minimum of four inches from back of curb. Refer to Typical Section Drawings of this manual and FDOT Index No. 506 for curb and curb and gutter stabilization details.

### **3.4 ROADSIDE CLEAR ZONE**

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

The width of clear zone for local roads and collectors shall be as specified in the Typical Sections of this manual. The clear zone width for urban roadways shall be four feet from face of curb. However, when using "Miami" type curb, the minimum clear zone width shall be four feet from the back of curb. All other types of curb and gutter shall maintain a four feet clear zone from face of curb.

Horizontal clearance to trees, light poles, utility installations, signal poles, control cabinets for signals, and bridge piers are to meet the more stringent requirements of this manual and Volume 1, Section 2.11 of FDOT Plans Preparation Manual.

### **3.5 VERTICAL CLEARANCE**

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

### **3.6 PAVEMENT CROSS SLOPES**

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

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

### **3.7 ROADSIDE SLOPES**

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

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## **SECTION 4 ROADSIDE DESIGN**

### **4.1 DITCHES**

#### **A. DESIGN**

Roadway drainage design shall comply with the criteria as set forth in the Hillsborough County Stormwater Management Technical Manual.

#### **B. SIDEDRAIN REQUIREMENTS**

##### **1. Placement**

Access connection permits shall be obtained from the Hillsborough County PGMD prior to the placement of any sidedrain 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.

##### **2. Mitered End Sections**

A mitered end section shall be placed at each end of a sidedrain and shall be constructed in accordance with applicable FDOT clear zone requirements and Design Standards.

### **4.2 GRASSING AND MULCHING, SODDING**

#### **A. CURB AND GUTTER SECTION**

In residential and industrial subdivisions where building construction is not imminent, areas located between the back of curb and the right-of-way line, that are disturbed by construction and have slopes of 1:6 or greater, shall be grassed and mulched or sodded in accordance with the Typical Sections and the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000). A minimum of a 1'-4" sod strip shall be placed along the back of curb and around all structures.

#### **B. RURAL SECTION**

All right-of-way, outside the roadway area, shall be grassed and mulched with the exception of a 2'-8" 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 (except for the requirements of QC 2000).

### **4.3 LANDSCAPING AND TREE PRESERVATION**

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.

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## **SECTION 5 INTERSECTION DESIGN**

### **5.1 GENERAL**

The design of intersections in Hillsborough County shall meet or exceed the requirements of this section, Chapter 3, Section C.9 Intersection Design of the “Florida Green Book” and the Florida Intersection Guide. The most stringent requirement in these standards shall be utilized in the design of intersections.

Intersecting streets shall be arranged so as to intersect as nearly as possible at right angles. The maximum deflection for through lanes through intersections shall meet the requirements of FDOT Plans Preparation Manual, Volume 1, Table 2.8.1a. However, Table 2.8.1b in Volume 1 of the FDOT Plans Preparation Manual is not applicable for deflection of through lanes through intersections on County roads.

Channelizing islands for intersections, when required, shall meet the requirements of Section 3.11 of the FDOT Florida Intersection Design Guide.

Driveways that have or are anticipated to have a significant amount of daily traffic (greater than 400 vehicles per day) shall be designed as intersections.

Sidewalk locations and curb ramps at intersections shall meet the requirements of Section 2.9 of this manual. For additional details refer to applicable standards and Typical Details drawings in this manual.

Intersection improvements that result in 4 or more lanes of traffic including turn lanes shall have a minimum four-foot traffic separator to provide for a pedestrian refuge area.

Intersections and intersection improvements shall be designed with consideration for pedestrian and bicycle features. Sidewalk curb-cut ramps, traffic separators, median construction, crosswalks, all associated striping and signalization features must be replaced/relocated as necessary when improvements are made at existing intersections.

### **5.2 RIGHT-OF- WAY REQUIREMENTS**

Sight distance shall be provided at all intersections by either providing rounded right of way lines or straight corner cuts in accordance with sight distance triangles. Rounded right of way lines at local road and collector intersections shall have a minimum twenty-five (25) foot radius or as otherwise required by traffic conditions or geometric requirements. Corner cuts shall meet or exceed the limits of the twenty-five (25) foot radius or return radius value, whichever is larger.

Stopping sight distance requirements shall be considered by the EOR in the determination of the minimum right of way to be provided at roadway intersections for local roads and collectors. The EOR shall design to the sight distance requirements of FDOT Design Standard Index 546 and the requirements of this section. Additional right of way may be needed to provide for sight distance at intersections with curved roadways.

### **5.3 MINIMUM RETURN RADII REQUIREMENTS**

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

<b>TYPE OF DEVELOPMENT</b>	<b>ROADWAY CLASSIFICATION</b>	<b>MINIMUM RADIUS</b>
Residential: Type of Design Vehicle: P, SU P, SU	Local Road Collector Road	25' 50'
Commercial: Type of Design Vehicle: P, SU, WB-40, WB-50 P, SU, WB-40, WB-50		

#### **5.4 CONTROL RADII**

The control radii requirements for minimum turning paths at intersections shall be determined using Table 3-16 of the FDOT Florida Intersection Design Guide.

#### **5.5 INTERSECTION SIGHT DISTANCE REQUIREMENTS**

The minimum required sight distance requirements at intersections for various design speeds and vehicles shall be determined using FDOT Design Standard 546 and Figures 3-10 and 3-11 of the "Florida Green Book". The more stringent design standard shall be used to determine the sight distance at intersections.

#### **5.6 AUXILIARY LANES**

The criteria for the minimum length of auxiliary lanes and tapers at intersections shall be determined using the "Florida Green Book" and FDOT Design Standard Index 301. The more stringent design standard shall be used to determine the auxiliary lane storage and deceleration length requirements.

The EOR for the developer shall be required to perform and submit a traffic analysis at major intersections using an acceptable method to PGMD, that is signed and sealed by a licensed Florida professional engineer. The EOR shall meet with the PGMD Engineering Review Team to define the traffic methodology and scope of work required for this analysis. The traffic analysis shall be submitted to the PGMD Engineering Review Team for review and approval.

#### **5.7 MEDIAN OPENINGS**

Opening widths for medians are dependent on several factors such as control radii, width of traffic separators and the skew angle of side streets. Openings at divided side streets will vary with side street median widths. The length of a median opening shall not be less than 40 feet.

Whenever possible, driveways shall be located at existing median openings.

All new median openings shall provide adequate left turn storage to existing and proposed driveways and roadways.

#### **5.8 DRIVEWAYS**

Driveway design shall conform to the Access Management Regulations of the Land Development Code and this manual. For additional details refer to Residential/Commercial Driveway Typical Details drawings in this manual.

**A. PROFILES**

Driveway profiles shall conform to the requirements of FDOT Design Standard Index 515.

**B. THICKNESS REQUIREMENTS**

All driveway aprons and driveways shall be a minimum of six (6) inches thick and shall only be constructed with Class I concrete.

The use of curbs on driveways will require pedestrian (accessible) ramps where the sidewalk meets the driveways.

Expansion joints are required where the apron meets back-of-curb and sidewalks meet the driveway apron, unless poured monolithically.

**C. LIMITS OF CONSTRUCTION**

All driveways shall be constructed from the edge of the roadway pavement to the right of way line.

County lift station driveways shall be constructed from the back of curb, or edge of pavement, to the lift station. Grading and site work is to be per Section 4 of the Hillsborough County Water, Wastewater and Reclaimed Water Technical Manual.

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## SECTION 6 PAVEMENT MARKINGS AND SIGNING

### 6.1 GENERAL

- A. Pavement markings and signing plans shall be submitted for any roadway with two or more lanes and as required for entrance ways, etc... Pavement markings, signal and signing plans and materials shall conform to all criteria herein, including those applicable specifications contained in the latest edition of the following publications:
1. FDOT – Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways.
  2. Department of Transportation, Federal Highway Administration – Manual on Uniform Traffic Control Devices for Streets and Highways.
  3. FDOT – Standard Specifications for Road and Bridge Construction except for the requirements of QC 2000.
  4. AASHTO – A Policy On Geometric Design of Highways and Streets.
  5. FDOT – Roadway Design Standards.
  6. District 7 Traffic Design Guidelines
  7. Hillsborough County Roadway Maintenance Division Standards.
  8. Hillsborough County Signal Specifications
- B. Supplemental criteria for post mounted street name sign fabrication and installation are as follows:
1. Background color shall be green reflective sheeting, Type III, for public roadways. The street name legend size shall be 5", type "C" font with the first letter of each name capitalized followed by lower case lettering. The block number legend shall be 2 ½" type "C" font and appear in the lower right of the sign. The street name extension shall be abbreviated (i.e., "AVE", "DR", "ST", "BLVD.") shall be all capitalized, 2 ½", type "C" font and appear in the upper right of the sign. Directional extensions (i.e., north, south, east, west) shall be abbreviated with the first letter of the direction (i.e., "N.", "S.", "E.", "W.") in capitalized, 4", type "C" font and appear before the name of the street. All legend and border color shall be white reflective sheeting, Type III. The border shall be ¾" wide at the perimeter of the sign. Reflective sheeting shall comply with FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000), Section 994.
  2. The sign blades shall be aluminum, 9" X 30" minimum, 9" X 48" maximum, with sign length variances in 6" increments (i.e., 30", 36", 42", and 48"). Sign blade length shall be the minimum required incremental length to accommodate the required lettering with 1 ½" clearance at both ends of the street name. Sign blade material shall be in accordance with FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000), Section 700-3.4.
  3. ALL signs shall be mounted on approved U channel, galvanized, 2.5 lb./ft., posts in accordance with FDOT Standard Specifications for Road and Bridge Construction

(except for the requirements of QC 2000), Section 700-2.3.3 and installed in accordance with the publications listed above.

4. For fabrication details refer to the Typical Details Drawing for post mounted street name signs.
  5. Typical installation for street name signs at two multi-lane facilities is at the northeast and southwest corners on separate posts from the stop signs.
- C. Internally Illuminated Street name Signs. Follow FDOT fabrication and installation standards and details.
1. For fabrication details refer to the Typical Details for Internally Illuminated Street Name Signs.
  2. All approaches shall have street name signs.
  3. Concrete or steel strain poles, overhead street name signs shall be mounted on sign bracket arms attached to the strain pole in accordance with District VII Index No. 212.
  4. Mast arm installations, overhead street name signs shall be attached to the mast arm in accordance with District VII Index No. 210.
- D. Supplemental criteria for pavement markings are as follows:
1. All pavement markings shall be alkaline base thermoplastic compound.
  2. All bike markings shall be paint.
  3. Raised pavement markers shall be included with all markings and shall use a bituminous adhesive material.

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

- A. The developer shall be responsible for the installation of and all associated costs for required traffic control devices including but not limited to signals, pavement markings and signing.
- B. After receiving approval for street names and block assignments from the appropriate reviewing agency based on the final plat review, the developer shall be responsible for the purchase and installation of all signals, pavement markings and signage approved by the PGMD through the subdivision and site development review processes.
- C. 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, PGMD shall approve signing and pavement markings and the PWD shall approve signalization and appurtenances.

### **6.3 PRIVATE DEVELOPMENTS**

- A. Private developments shall be subject to the same requirements listed in Section 6.2.
- B. Street marker signing for private roads shall have the same requirements as signing for public roads (See Section 6.1); however, private road background color shall be blue reflective sheeting, Type III, with the legend "PRIVATE ROAD" in all capitalized, 2", white, type "C" font centered under the street name.

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## SECTION 7 SIGNALIZATION

### 7.1 GENERAL

- A. Mast arm designs shall be utilized along urban roadways with curb and gutter for the installation of traffic signals, overhead signs and advance overhead flashing school signs.
- B. Either concrete or steel strain poles may be used with the approval of the Public Works Department if one or more of the following conditions exist:
  - 1. Lack of sufficient right of way or excessive cost.
  - 2. Schedule would be affected due to design and/or delivery time.
  - 3. The relocation of utilities would not be cost effective.
  - 4. The width of the intersecting roadway would require excessively long mast arms.

### 7.2 DESIGN

- A. The design shall be in accordance with the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals" Latest Edition, FDOT Design Standards and FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000).
- B. Approved mast arm shapes shall include one of the following:
  - 1. Tapered tubular shaft
  - 2. Swaged step-tapered shaft
  - 3. Sixteen sided tapered shaft
  - 4. Tubular shaft (constant diameter)
- C. The latest Florida Department of Transportation Mast Arm, General Notes, Mast arm details and Pole Schedule shall be utilized and made part of the plan set. The end of the mast arm shall be to the center of the inside left turn lane plus one foot.
- D. Structural design to assume wind loading due to back plates including future left turn phases and one traffic sign. All eastbound and westbound traffic signals shall have back plates.
- E. All signal mast arms shall include luminaries.
- F. All signalized intersections shall include full pedestrian and bicycle features, advance street name signs and internally illuminated street name signs on all roadway approaches that do not service an isolated area.

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## SECTION 8 PAVEMENT DESIGN

### 8.1 GENERAL

The standards denoted in this section represent the minimum requirements that must be met for flexible pavement design for new construction within Hillsborough County.

Pavement design for new construction shall be in accordance with the criteria as set forth in the FDOT Flexible Pavement Design Manual with the following exceptions:

- A. The Required Structural Number ( $SN_R$ ) for any pavement design shall not be less than 2.3 for local residential roads and 2.5 for all other classifications of roadways.
- B. The structural coefficient for any Class II Crushed Concrete to be used in a proposed base shall not exceed 0.18 per inch.
- C. The structural coefficient for in-situ or in-place roadbed soils having an existing or stabilized Limerock Bearing Ratio (LBR) minimum value of 20 beneath a proposed soil cement base shall not exceed 0.04 per inch. A copy of the LBR test results shall be submitted when using the 0.04 layer coefficient for in-place or in-situ soil beneath a proposed soil cement base.
- D. The structural coefficient for Recycled Asphalt Pavement (RAP) Base having a minimum LBR of forty (40) shall not exceed 0.08 per inch. A copy of the LBR test results shall be submitted when using the 0.08 layer coefficient for a proposed RAP base.
- E. The use of FC-3 friction course without rubber or a SP-12.5 virgin Asphaltic Concrete mix with a PG 76-22 binder in lieu of an FC-9.5/FC-12.5 will be permitted on local streets where the design speed is less than 45 MPH. See Section 8.5 Friction Course for details.
- F. The use of a PG Binder may permit the ground tire rubber requirement to be omitted from friction courses.
- G. Equivalent AC grades of asphalt may be used in lieu of PG binders.
- H. Reliability factor (%R) for new construction on local roads shall not be less than 80.

The EOR shall submit a signed and sealed flexible pavement design report with sufficient documentation, which includes but not limited to calculations, plan sheets, documentation of any variances or coordination with local municipalities, design high water elevation (DHW), projected Design Year AADT of proposed roadway, Design Year 18-kip (Equivalent Single Axle Loads)  $ESAL_D$  calculations, LBR test results and a quality control checklist, to PGMD for review and approval.

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

Please use the specifications located on the FDOT website under Archived Specifications for Local Agency Use for the appropriate referenced specification for earthwork, base, asphalt and concrete. The archived specifications do not contain QC 2000 information and also contain specifications that FDOT no longer supports in the latest version.

## 8.2 STABILIZED SUBGRADE FOR FLEXIBLE PAVEMENT

Stabilized subgrade shall meet the requirements of Section 160 of the FDOT Standard Specifications for Road and Bridge Construction (except for requirements of QC 2000) and as noted below.

All proposed subgrades with the exception of those beneath a proposed soil cement base shall have a minimum LBR of forty (40) and a density not less than ninety-eight (98) percent Modified

Proctor (AASHTO T-180). The proposed depth shall not be less than the depths noted below for the specific roadway classification:

TYPE OF DEVELOPMENT	ROAD CLASSIFICATION	STABILIZED SUBGRADE MINIMUM THICKNESS
Residential:		
	Local	6"
	Minor Collector	8"
	Major Collector	12"
Commercial:		
	Local	12"
	Collector Road	12"

The subgrade for soil cement shall be proof rolled with suitable compaction equipment to achieve a density of ninety-eight (98) percent Modified Proctor AASHTO T-180 for a minimum depth of twelve (12) inches. The subgrade beneath a proposed soil cement base shall have a minimum (LBR) of twenty (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

All base courses shall meet the general requirements of Sections 285 of the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000) and FDOT Design Standard 514 as well as the specific specification requirements for each particular type of base course to be used. The approved base courses for use are as follows: limerock, shell, plant produced soil cement, crushed concrete, recycled asphalt pavement (RAP) and asphalt. In no case shall the soil bearing value or density be less than that specified in the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000). The base course thickness for each road classification shall not be less than those specified in the following table:

TYPE OF DEVELOPMENT	ROAD CLASSIFICATION	BASE COURSE MINIMUM THICKNESS
Residential:		
	Local	6"
	Minor Collector	8"
	Major Collector	8"
Commercial:		
	Local	8"
	Collector	8"

**A. LIMEROCK BASE**

Shall meet the requirements of Section 200 of the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000).

**B. SHELL BASE**

Shall meet the requirements of Section 250 of the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000).

**C. PLANT PRODUCED SOIL CEMENT BASE**

Plant Produced soil cement base shall meet the requirements of Section 270 of the FDOT Standard Specifications for Road and Bridge Construction, (except for the requirements of QC 2000) and as noted below.

The design mix shall have a minimum 4.0 % cement content by weight and a minimum LBR 100 DOT limerock or equivalent. An Independent testing laboratory accredited by AASTO, CMEC or FHWA approved in the State of Florida shall prepare the design mix. The design mix submittal shall be submitted to PGMD in triplicate.

The use of mixed-in-place soil cement construction is prohibited.

The design compressive strength of 300 psi shall be achieved in seven days. Any appreciable increase in the strength shall be deemed acceptable at the discretion of the PGMD Inspection Team Leader.

Test cores shall be taken after seven (7) days to verify thickness. The average core thickness shall not exceed the specified design thickness by more than one (1) inch. Individual cores shall not be deficient by more than one-half (1/2) inch from the specified design thickness.

Prior to paving, there shall be a fourteen (14) day curing time unless a geo-textile membrane is utilized.

**D. ASPHALTIC CONCRETE**

Type S, ABC-3 and Type B-12.5 Asphaltic Concrete shall meet the requirements of Section 280 and 234 respectively of the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000).

**E. RECYCLED ASPHALT PAVEMENT (RAP) BASE**

Shall meet the requirements of Section 283 of the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000).

**F. CRUSHED CONCRETE BASE**

Shall meet the requirements for crushed concrete base as specified in the Guidelines for Technical Specifications in the Appendix of this manual.

**8.4 STRUCTURAL COURSES FOR FLEXIBLE PAVEMENT**

Structural courses for flexible pavements shall be Type S Asphaltic Concrete or Type SP Superpave Asphaltic Concrete. The requirements of Section 330, 331, and 334 of the FDOT

Standard Specifications for Road and Bridge Construction shall be met (except for the requirements of QC 2000). Incidental items such as prime and tack coats shall conform to the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000).

The design mix for Asphaltic Concrete shall be prepared by an accredited testing laboratory (CMEC, AASHTO or FHWA Approved in the State of Florida) and conditionally verified by the FDOT Central Bituminous Laboratory or its designee prior to use in the field.

Structural courses shall meet the following minimum thickness requirements:

TYPE OF DEVELOPMENT	ROAD CLASSIFICATION	ASPHALTIC CONCRETE STRUCTURAL COURSE
Residential:		
	Local	1 ½"
	Minor Collector	1 ½"
	Major Collector	2"
Commercial:		
	Local	2 ½"
	Collector	2 ½"

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 (1) inch in thickness.

Valid plant assignment sheets are to be submitted by the EOR to PGMD prior to commencing production. Testing frequencies during production shall be in accordance with the Testing Schedule of this manual.

## 8.5 FRICTION COURSE

All proposed friction courses shall meet the requirements of the FDOT Flexible Pavement Design Manual, Section 337 of the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000) and as noted below:

DESIGN SPEED	TWO LANE ROADS	MULTI LANE ROADS
<p><b>From 35 mph to 45 mph</b></p> <p>Local Roads with AADT less than 3000 vpd or that are less than 1000' in length</p>	<p>FC-3, SP 12.5 VIRGIN ASPHALTIC CONCRETE MIX WITH A PG 76-22 BINDER OR FC-9.5/FC-12.5</p>	<p>FC-3, SP 12.5 Virgin Asphaltic Concrete mix with a PG 76-22 Binder or FC-9.5/FC-12.5</p>
<p><b>Greater than or equal to 45 mph</b></p> <p>AADT greater than 3000 vpd</p>	<p>FC-9.5/FC-12.5</p>	<p>FC-9.5/12.5</p>
<p><b>Greater than or equal to 50 mph</b></p>	<p>FC-9.5/FC-12.5</p>	<p>FC-5</p>

## **8.6 ALTERNATE PAVEMENTS**

### **A. PORTLAND CEMENT CONCRETE PAVEMENT**

Concrete pavement design for new construction shall be in accordance with the criteria as set forth in the FDOT Rigid Pavement Design Manual.

Concrete pavement shall meet the requirements of Sections 180 and 350 of the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000) and FDOT Design Standards 287, 305 and 505.

### **B. BOMANITE PAVEMENT**

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

### **C. ARCHITECTURAL PAVERS**

Architectural Pavers may be used subject to the approval of the County. The developer or his authorized representative shall submit to the PGMD's Engineering Review Team, for approval, manufacturer's literature and technical specifications regarding the structural strength, skid resistance, and subgrade requirements per Section 526 of FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000). Architectural pavers shall only be used on roads with design speeds less than 35 mph.

### **D. WHITE TOPPING AT EXISTING INTERSECTIONS**

The use of White topping at intersections is subject to review and approval of the PGMD's Engineering Review Team. 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 2 yrs of experience in laying the proposed White topping alternative and the specialty engineer has 2 yrs of experience in designing the said White topping alternative. The EOR shall submit a copy of technical specifications to the PGMD's Engineering Review Team, for approval, for this type of construction prior to use on County roads.

### **E. STAMPED ASPHALT**

Stamped asphalt may be placed at but not limited to residential roads, crosswalks in subdivisions, subdivision entrances, sidewalks and driveways. The asphalt surface layer shall have a minimum thickness of 1.5 inches consisting of the appropriate type mixture that meets HC design standards. Stamped asphalt utilized on sidewalks shall meet latest ADA standards. The contractor performing this type of work shall be an experienced applicator of stamped asphalt for a minimum of 2 years. All stamped asphalt shall be constructed and maintained by the subdivision association. Stamped asphalt replaced by HC will be replaced with standard county asphalt pavement.

## **8.7 DESIGN REQUIREMENTS**

The following design requirements shall be taken into account during the design and construction process:

The EOR shall sign and seal and submit all technical specifications for use with pavement designs to PGMD for review and approval prior to use on a project.

Any in-place soil below the proposed base having been designated as a Group Classification of A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7 and A-8 shall be removed and replaced with suitable material in accordance with the depths and limits shown in the latest edition of the FDOT Design Standard Index 500 and 505.

For Design Criteria on Roadway Base Clearance and Low Edge of Pavement Elevation refer to Chapter 11, Table 11.1 of the Stormwater Management Technical Manual.

The EOR shall submit all proposed mix designs that are to be utilized on a project prior to production and placement of the said material to the PGMD's Construction Services Manager for review and approval. The EOR is to provide a copy of the approved mix designs to the PGMD Inspector assigned to that specific project.

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 (except for the requirements of QC 2000) by the EOR to the PGMD's Construction Services Manager for review, and for As-Built records.

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.

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## **SECTION 9 BRIDGE DESIGN**

### **9.1 DEFINITION**

A bridge is defined as a structure with a span greater than or equal to 20'-0" between abutments, spring lines of arches, or inside faces of outboard stems for multiple cells.

When the span ranges from 20'-0" to 24'-0", an order of magnitude cost comparison will be made to determine if a bridge or culvert is the chosen structure type based on lowest cost.

Spans greater than 24'-0" will be designated as a bridge.

The County does **not** consider the following items to be a bridge:

Any individual pipe or series of pipes crossing a road.

Culverts with a span between inside faces of outboard stems less than 20'-0".

### **9.2 OBJECTIVES**

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

### **9.3 DESIGN SPECIFICATIONS**

Bridge design shall be in accordance with the latest editions of the AASHTO Standard Specifications for Highway Bridges and the FDOT Structure Design Guidelines.

The bridge design live load shall be HS25-44; however, the engineer shall verify the bridge adequacy for all Florida legal loads (SU2, SU3, SU4, C3, C4, C5 and ST5).

For example, SU2 is a two-axle single unit truck, and C3 is a three-axle tractor-trailer combination truck.

Concrete covers will be in accordance with the latest edition of the FDOT Structure Design Guidelines. Any deviations or additions must be submitted to the County Engineer for review and approval.

### **9.4 CONSTRUCTION SPECIFICATIONS**

Construction shall conform to the latest edition of the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000).

### **9.5 TESTING**

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

### **9.6 PLANS PREPARATION**

Bridge plans shall be prepared and assembled in accordance with the latest edition of the FDOT Plans Preparation Manual.

Bridge plans shall be prepared and submitted in two stages: preliminary plans and final plans. In each stage, two sets of plans shall be submitted to the County Engineer in the Public Works Department, via PGMD, for review and approval.

The bridge design calculations and plans shall be signed, sealed and dated by a Professional Engineer licensed in the State of Florida who practices as a Structural Engineer.

## **9.7 PEDESTRIAN WALKWAYS**

Pedestrian walkways shall be designed in accordance with the latest editions of the AASHTO Guide Specifications for the Design of Pedestrian Bridges and the AASHTO Standard Specifications for Highway Bridges. Construction shall conform to the latest edition of the FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000). Testing and plans preparation shall be as stipulated in Sections 9.5 and 9.6 above.

The grade and cross slope of the walkway shall be preferably flat, but in no case shall exceed 2% without approval of the County Engineer.

Pedestrian walkways shall have a minimum railing height of 3'-6". When walkways are to be used by both pedestrians and bicyclists, the minimum railing height shall be 4'-6".

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## **SECTION 10 LANDSCAPING AND TREE PRESERVATION**

### **10.1 GENERAL**

Landscape design, vegetation planting, and tree preservation provisions shall conform to the requirements of the Natural Resources Section of the Land Development Code, FDOT Highway Landscape Design Guide, FDOT Rule Chapter 14-40, "Highway Landscape Improvements", Land Development Code's Landscape and Buffering Section and the Guidelines for Landscaping Hillsborough County Roadways, and the requirements of this manual. The most stringent design standard shall be used.

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.

The preparation of landscape plans in Hillsborough County shall be signed and sealed by a Florida registered Landscape Architect in conformance with Chapter 481 of the Florida Statutes.

The Florida Highway Landscape Guide and provisions as noted in this manual shall be used in the design of roadway projects to coordinate the application of approved roadway design standards in the development of roadway landscape plans.

### **10.2 HORIZONTAL CLEARANCE**

The horizontal clearance criteria for trees are that they must be located outside the clear zone. There can be no fixed objects within the limits of the horizontal clearance area that would prevent an errant vehicle from recovering. In roadway landscape design, all plantings within the horizontal clearance area must have a trunk diameter of 4" or less when measured 6" above the ground when at maturity. Horizontal clearance and clear zone criteria are based on the type of highway design (rural or urban), the design speed of the highway and the projected 20-year average daily traffic. See Section 3.4 and the Typical Sections drawings in this manual for these criteria.

Clear-sight distance is required at intersections, median openings and driveways connections. These distances shall be provided per the requirements of the FDOT Design Standard Index 546, Sight Distance for Intersections.

#### **A. URBAN ROADS AND COLLECTORS**

See Typical Sections drawings and Section 3.4 in this manual for horizontal clear zone requirements on local urban roads and collectors.

#### **B. RURAL ROADS AND COLLECTORS**

See Typical Sections drawings and Section 3.4 in this manual for horizontal clear zone requirements on local rural roads and collectors.

When trees are installed along the outer roadside of rural highways, they must be outside the horizontal clearance area.

#### **C. INTERSECTION CLEAR SITE REQUIREMENTS**

The sight datum line for clear-sight windows at intersections is established from the point of the driver's eye on the side street to the point of the driver's eye on the main highway. The design location for the end of the datum line on the side street is 3.5' above the pavement at the driver's stop location 20' from the through lane. The design location for the end of the

datum line on the main highway is 3.5' above the pavement at the point being checked. A clear-sight window must be maintained 5' above and 1.5' below the site datum line. See the Landscaping Clear Site Window for Medians, Typical Details drawings in this manual for clear sight window standards.

### **10.3 VERTICAL CLEARANCES**

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

### **10.4 TREE PRESERVATION**

#### **A. TREE WELL/AERATION SYSTEMS**

A tree well/aeration system is used when the proposed finished grade within the critical root zone exceeds the natural grade by 8 inches or more. The critical root zone represents that portion of a tree's root system equivalent to an area of a one-foot radius for each inch diameter of the tree's trunk measured 4.5 feet above the natural grade (i.e. a 12 inch diameter tree has a critical root zone of 12 feet radius from the tree's trunk). See additional guidelines on tree well/aeration systems in the Tree Protection, Typical Details.

#### **B. RETAINING WALL**

A retaining wall is used when the proposed finished grade within a tree's critical root zone is below the natural grade. The installation of a retaining wall shall be placed no nearer the tree's trunk than 3 times the trunk diameter measured at 4.5 feet above the natural grade and when no more than 30% of the tree's root system will be severed. Prior to the finished grade adjustments and retaining wall installation, prune the tree's roots with a Dosko root cutter or equivalent where the retaining wall is to be installed. See additional guidelines on retaining walls in the Tree Protection, Typical Details.

#### **C. PERVIOUS PAVEMENT**

Pervious pavement may be applied when the proposed finished grade within a tree's critical root zone does not exceed the natural grade by more than 8 inches with predominantly sandy textured fill. Various pervious materials such as paver bricks, turf block and porous concrete are acceptable. Curbing proposed at the perimeter of the pavement material must be designed to not sever the root system the pervious pavement is to protect. Extruded curb, pin curbs or other similar designs are necessary to minimize root disturbance. See additional guidelines on pervious pavement in the Tree Protection Typical Details.

#### **D. CANTILEVERING**

Bridging the root system of protected trees may be necessary for the installation of buffer walls or other similar vertical structures.

#### **E. ROOT PRUNING**

Root pruning shall be an important consideration when land alteration activity is proposed within a tree's critical root zone. Root pruning shall be effectively performed to promote desired wound wood production and to discourage a root's infection by root-rotting fungi. Effective root pruning represents a clean, even cut and discourages a torn, jagged result.

**F. TREE PROTECTION BARRIERS**

Refer to the guidelines on tree protection barriers in the Tree Protection Typical Details drawings in this manual.

**G. TREE PRUNING**

All tree pruning shall conform to the pruning standards as specified in the Typical Details drawings in this manual and the National Resources Section of the Land Development Code. These standards refer to the American National Standards Institute (ANSI) A-300 Pruning Standards.

**H. HERBICIDAL BARRIERS**

Refer to the guidelines on herbicidal barriers for the protection of curbs and curb and gutters, and sidewalks in the Tree Protection Typical Details drawings in this manual.

**SECTION 11   CONSTRUCTION PLANS**

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## **SECTION 11 CONSTRUCTION PLANS**

### **11.1 STANDARD SIZE**

The standard sheet size for construction plans submitted to the County for review shall be 24" x 36". 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 ASSEMBLY**

The recommended order for the assembly of the plans shall be as listed below (as applicable):

1. Cover Sheet
2. Geometric Layout
3. Stormwater Map/Master Management Plan
4. Typical Section
5. Summary of Quantities
6. Roadway Plan and Profiles
7. Intersection Details
8. Stormwater Plan
9. Lot Grading Plan
10. Stormwater Structures
11. Cross Sections
12. Sidewalk Plans
13. Water and Sewer Plans
14. Sanitary Sewer Profiles
15. Lift Station Details
16. Maintenance of Traffic Plans
17. Signing and Pavement Marking Plans
18. Signalization Plans
19. Lighting Plans
20. Landscape Plans
21. Architectural Plans
22. Mitigation Plans

## 23. Bridge/Structural Plans

The following statement shall be shown on the Cover Sheet: Construction shall be in accordance with the Hillsborough County Land Development Code, Stormwater Management Technical Manual, Transportation Technical Manual For Subdivision and Site Development Projects, and Water, Wastewater and Reclaimed Water Manual, the FDOT Standard Specifications, and FDOT Design Standards.

### 11.3 RECORD DRAWINGS, REPRODUCIBLES AND ELECTRONIC FILES

The record drawings shall follow the requirements set by the Hillsborough County Development Review Procedures Manual, as well as the requirements listed below. The incorporation of as-built elements shall be in accordance with the Hillsborough County Computer-Aided Drawing (CAD) Standard that will be available in the near future and posted to the website.

There will be two distinct sets of drawings that will be submitted as deliverables.

The record drawings will show the intent of original design. The as-built drawings will show the project as actually constructed.

In addition to the record drawing plan sets required by the Hillsborough County Development Review Procedures Manual, the following record drawing deliverables are required:

- A. (1) set of mylar reproducible, of the record drawing plan set.
- B. (1) CD-R recordable disk set of record drawings in AutoCAD (Dwg. format) (No earlier than release 14).
- C. (2) CD-R recordable disk sets containing DXF format translation of the record drawings and TIFF format of aerial photographs, if applicable.
- D. (2) CD-R recordable disk sets of the record drawing construction plans in Tiff format.
- E. (3) CD-R recordable disk sets of the as-built construction plans in Tiff format in conjunction with the below mentioned as-built archiving procedure.
- F. (3) Signed and sealed hard copies of the as-built construction plan set.
- G. (3) CD-R recordable disk sets of as-built drawings in AutoCAD (Dwg. format)( No earlier than release 14).
- H. A listing of the correlation of all electronic drawing file names as they relate to the hard copies of the construction plan set.
- I. A written description by the originator of the construction plan sets on the procedure to plot the drawings. A description of the plotter pen settings shall be submitted that includes line thickness and line type.

The following quality control procedure shall be utilized for preparation for as-built drawing archiving:

- A. The as-built drawings shall be drawn on the original mylars that the construction plans were made from.

- B. The as-built drawings will be scanned in 300-dpi resolution and saved in Tiff format on CD-R recordable disks.
- C. The signed and sealed as-built drawings will be on plots made from the scanned images. (This process is to ensure the quality control of the scanned images)
- D. The updated original mylars, scanned images on CD-R recordable disks and the signed and sealed plots will be submitted as the "Final As-Builts".

**APPENDIX**

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**ENGINEER OF RECORD CERTIFICATION**

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

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

\_\_\_\_\_  
Signature

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

**AFFIX SEAL**

**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

**ENGINEER OF RECORD CERTIFICATION  
OF CONSTRUCTION COMPLETION**

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

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

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

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

\_\_\_\_\_

Signature

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

Affix Seal

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

**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 Subdivisions and Site Development Projects, Water, Wastewater and Reclaimed Water Technical Manual, the FDOT Standard Specifications for Road and Bridge Construction, FDOT Design Standards, and the approved plans and specifications.

By \_\_\_\_\_  
**SIGNATURE**

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

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

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

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

\_\_\_\_\_

Notary Public - State of Florida at Large

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

**AFFIX SEAL**

**TESTING SCHEDULE**

<b><u>ITEM</u></b>	<b><u>TEST</u></b>	<b><u>TEST FREQUENCY</u></b>
<b>Embankment</b>	Optimum Moisture/Maximum Density.....	Per Soil Type
	100% of Maximum Density as determined by AASHTO T99-57 (D-698-70) no tolerance.....	One per 500' horizontally, in one (1) foot lifts
	Gradation 1-T027.....	1/500' Section per lift
	Proctor 1-T180.....	Per material type
	Proctor 5-525.....	Per material type
	Density 1-T238.....	1/500' Section per lift
<b>Utility Trench Backfill</b> - over pipelines and around structures from R.O.W. line to R.O.W. line	Optimum Moisture/Maximum Density.....	Per Soil Type
	98% of Maximum Density as determined by AASHTO T180-57 (ASTM D1557-70) - minus 3% tolerance.....	*, **
<b>Utility Trench Backfill</b> - over pipelines and around structures outside the R.O.W.	Optimum Moisture/Maximum Density.....	Per Soil Type
	95% of Maximum Density as determined by AASHTO T180-57 (ASTM D1557-70) - minus 3% tolerance.....	*, **
<b>Stabilized Subgrade</b>	Optimum Moisture/Maximum Density.....	Per material type
	Minimum 40 LBR .....	**** Per Material Type
	98% of Maximum Density as determined by AASHTO T180-57 (ASTM D1557-70) - no tolerance.....	***
<b>Base</b> (Other than soil cement or crushed concrete)	Optimum Moisture/Maximum Density.....	Per source
	Minimum 100 LBR .....	Per source
	98% of Maximum Density as determined by AASHTO T180-57 (ASTM D1557-70) - no tolerance.....	***
	Gradation, Atterberg Limits.....	Per source

**TESTING SCHEDULE**

(continued)

<b><u>ITEM</u></b>	<b><u>TEST</u></b>	<b><u>TEST FREQUENCY</u></b>
<b>Soil Cement Base</b>	Mix Design .....	Per material type
	Optimum Moisture/Maximum Density .....	Per material type daily
	Proctor 1-T180 .....	Per material type
	Compressive Strength Specimens .....	One set of three (3) per material type daily
	Test Cores - thickness .....	***
	98% of Maximum Density as determined by AASHTO T134 - no tolerance .....	***
<b>Crushed Concrete Base</b>	Minimum LBR 150 .....	3/Street to obtain an average of 150
	Liquid Limit (as determined by AASHTO T80) (less than 25) .....	Per material type
	Plasticity Index (as determined by AASHTO T90) (less than 4) .....	Per material type
	Abrasion .....	per Los Angeles Abrasion (FM-1TO90) (50 min)
	.....	Per material type
	Density 100% of maximum density (as determined by AASHTO T-180) .....	Per material type
<b>Concrete</b>	Slump Test .....	One per set of cylinders
	Compressive Strength Cylinders .....	One set of three (3) cylinders for 100 cubic yards or fraction thereof
	Air Content .....	One per set of cylinders
<b>Asphaltic Concrete</b>	Aggregate Analysis .....	One per design
	Design Mix .....	One per FDOT Approved type
	Bitumen Content .....	One per day unless tonnage exceeds 1000 tons
	Gradation Stability Flow .....	One per day

Properties of in-place materials (Marshall) .....	One per day
Thickness.....	***
Maximum Specific Gravity (Gmm) .....	One per day
95% of Lab Density.....	***

- \* Tests shall be located no more than 500 feet apart. Tests shall be performed on each lift, except that tests shall not be further apart than one (1) foot vertically. Field Densities shall be taken over all road crossings. Field Densities for Sanitary Lines shall be staggered to include results over service laterals. There shall be a minimum of one (1) test series for each one (1) foot of lift over pipeline between manholes. Tests around structures shall be spiraled in one (1) foot lifts. For all type pipe, fill to be compacted beneath the haunches using suitable tampers. For pipe less than 24" in diameter, backfill in appropriate lifts and test from the top of the pipe and every one (1) foot vertically thereafter. For pipe 24" to 72" in diameter, backfill in appropriate lifts and test from the springline and every one (1) foot vertically thereafter. For pipe larger than 72", tests shall begin one foot above the base of the trench.
- \*\* For flexible pipe (corrugated steel or aluminum), 95% of maximum density (AASHTO-T99) per FDOT Supplemental Specifications Subarticle 125-8.3.2 (except for the requirements of QC 2000) as modified.
- \*\*\* Tests shall be located no more than 500 feet apart. There shall be no less than one (1) test per street. No core shall be less than specified minimum thickness.
- \*\*\*\* Testing for the subgrade bearing capacity and compaction shall be located no more than five hundred (500) feet apart and shall be staggered to the left, right, and on the centerline of the roadway. There shall be no less than three (3) tests per street to obtain an average LBR 40 value. Hillsborough County may reserve the right to sample and test any material utilized in the construction of the subgrade. Testing shall be in accordance with the Testing Schedule of this manual and applicable FDOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000). Inspection of the subgrade shall be conducted by the Engineer of Record, the PGMD Inspector, and shall be approved by the Project Manager prior to base construction.

Note: Hillsborough County reserves the right to sample and test any material during construction.

## Guidelines for Technical Specifications

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

### **A. CRUSHED CONCRETE BASE**

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

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

#### Materials

Shall meet the following gradation requirements:

#### Composition

Base material shall conform to the following gradation:

SIEVE SIZE	PERCENT BY WEIGHT PASSING
2"	100
1 1/2"	95-100
3/4"	65-90
3/8"	45-75
No. 4	35-60
No. 10	25-45
No. 50	5-25
No. 200	0-10

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

### Mechanical and Physical Properties

The material shall not contain lumps, balls, or pockets of sand or clay material in size or quantity sufficient to be detrimental to the proper bonding, finishing, or strength of the crushed concrete base. The specific mechanical and physical properties of crushed concrete aggregate and any additive materials permitted in the construction of Crushed Concrete Base under this contract shall be determined on the basis of test results as the work progresses. The finished in-place product shall provide at least an LBR of 150 or greater.

#### 1. TESTING OF BASE COURSE

Tests for base thickness, bearing value, and density shall be located no more than five hundred (500) feet apart and shall be staggered to the left, right, and on the centerline of

the roadway. There shall be no less than three (3) tests per street. Test reports for thickness, bearing, and density shall be submitted by the EOR to the County for as-built records. Hillsborough County reserves the right to sample and test base material. All testing shall be in accordance with the Testing Schedule.

2. PRIME AND TACK COATS

All bases shall be primed in accordance with the Florida DOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000). Tack coat material and construction methods shall conform to the Florida DOT Standard Specifications for Road and Bridge Construction (except for the requirements of QC 2000).

3. INSPECTION

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

4. CONSTRUCTION

Placement and Spreading of Material

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

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

Base Courses

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

Compacting and Finishing Requirements

After spreading is completed the crushed concrete shall be uniformly compacted, with water being added as required, to a density of not less than one hundred percent (100%) of the maximum density as determined by AASHTO T-180. During final compaction operations, if the blading of any areas is necessary to obtain the true grade and cross section, the compacting operations for such areas shall be completed prior to the performance of density tests on the finished base.

Priming and Maintaining

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

Correction of Defects

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

### Testing

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

## **B. EMBANKMENT MATERIAL UNDER CONCRETE PAVEMENT**

### **(REV 1-3-94) (7-00)**

SUBARTICLE 120-7.2 (of the Supplemental Specifications) is expanded by the following:

When a typical section indicates special soil material requirements for embankment construction in the area above a plane parallel to and 4 feet below the bottom of portland cement concrete pavement the following will apply:

A-3 Soil: Conduct embankment construction operations to control the characteristics of the soil such that it will consistently meet the requirements of a soil in the A-3 classification as set forth in AASHTO M 145. The soil will be judged for acceptance with respect to the percent material passing the No. 200 [75  $\mu$ m] sieve on the basis of samples obtained by the EOR from soil in place in the roadway. Three samples will be randomly selected from each 10-inch thick layer of soil over each 1000-foot long section of roadway.

The maximum percent of soil material by dry weight passing the No. 200 sieve is not to exceed 10%. In order to assure a high probability of achieving this limit, the soil within a volume represented by any three samples will be acceptable only if the average of the test values for the three samples does not exceed 8% and if no test value for an individual sample exceeds 11%.

If the soil within any section represented by a set of three samples fails to meet the acceptance criteria, remove the soil within that section shall be removed and replace it with acceptable soil or modify the soil by adding and blending in additional soil. A section will be re-sampled only after replacement or modification has been completed in an approved manner.

A-3 Soil with Maximum of 5% Passing No. 200 Sieve: Construct the embankment to control the characteristics of the soil such that it will consistently meet the requirements of a soil in the A-3 classification, as set forth in AASHTO M 145 with the additional requirement that the percent of soil by dry weight passing the No. 200 sieve shall not exceed 5%. The soil will be judged for acceptance with respect to the percent material passing the No. 200 sieve on the basis of samples obtained by the Engineer from soil in place in the roadway. Three samples will be randomly selected from each 9-inch thick layer of soil over each 1000-foot long section of roadway.

The maximum percent soil material by dry weight passing the No. 200 sieve is not to exceed 5%. In order to ensure a high probability of achieving this limit, the soil within a volume represented by any three samples will be deemed acceptable only if the average of the test values for the three samples does not exceed 4% and if no test value for an individual sample exceeds 6%.

If the soil within any section represented by a set of three samples fails to meet the acceptance criteria for percent passing the No. 200 sieve as set out in the preceding paragraph, remove the soil within that section

and replace it with acceptable soil or modify the soil by adding and blending in additional soil. A section will be re-sampled only after replacement or modification has been completed in an approved manner.

Special Treatment in Cut Sections: In cut sections, A-3 Soil with a maximum of 5% passing the No. 200 sieve will be required in the top 2 feet under the portland cement concrete pavement. The 4 feet of A-3 soil shown on the typical section applies to embankment sections only.

If the soil represented by any set of three test values fails to meet the above acceptance criteria, immediately modify the construction operations to ensure that soil placed in the future is acceptable.

SUBARTICLE 120-8.2.1 (Page 141) is expanded by the following:

When a typical section indicates special soil material requirements for embankment construction in the area above a plane parallel to and 4 feet below the bottom of portland cement concrete pavement, embankment may be placed in successive layers up to the thickness indicated below, measured in a compacted state.

Location	Maximum Layer Thickness
Lower 30 inches	10 inches
Upper 18 inches	9 inches

The test method for determining percent of soil by dry weight passing the No. 200 sieve will be as follows:

The soil sample as received from the field will be dried thoroughly to a constant weight at a temperature not exceeding  $230 \pm 90^{\circ}\text{F}$ . A 4 to 5 oz. sample will be weighed, placed in a dispersion cup and filled with distilled or de-mineralized matter. The contents will be dispersed for a period of one minute in a mechanical stirring apparatus. After dispersion, the material will be washed on a No. 200 sieve and dried to a constant weight at a temperature not exceeding  $230 \pm 9^{\circ}\text{F}$ . After drying, the sample will be weighed, the percent passing the No. 200 sieve calculated, and reported to the nearest whole percent.

### **C. STABILIZED SUBBASE UNDER CONCRETE PAVEMENT.**

(REV 1-3-94) (7-00)

ARTICLE 160-3 (Page 161) is expanded by the following:

When stabilized subbase is specified for use under concrete pavement, use shell commercial stabilizing material meeting the requirements of Section 913. Back dump and spread the shell on the prepared subgrade to a depth of 4 inches loose measure and mix and compact to a final depth of 12 inches. During paving operations, keep the subgrade in advance of the paving train (including track for paving train) at optimum moisture  $\pm 1\%$ .

**LIST OF DRAWINGS**

Typical Sections

TS-1 ..... Recommended Utility Locations  
TS-2 ..... Multi-Use Trails  
TS-3 ..... Local Urban Roads  
TS-4 ..... Urban Collectors- Undivided  
TS-5 ..... Urban Minor Collectors- Divided  
TS-6 ..... Urban Major Collectors - Divided  
TS-7 ..... Local Rural Roads  
TS-8 ..... Rural Minor Collectors - 40 MPH – Undivided  
TS-9 ..... Rural Minor Collectors – 50 MPH – Undivided  
TS-10 ..... Rural Minor Collectors – 50 MPH - Divided

TND Typical Sections

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

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TD-1 (2 of 2) ..... Disabled Parking/Signing  
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TD-3 ..... Temporary Dead End Treatment  
TD-4 (1 of 2) ..... Cul-de-sac (Up to 150 feet)  
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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 ..... Residential/Commercial Driveway Details  
TD-8 ..... Sidewalk Curb Ramps at Intersections  
TD-9 ..... Entrance Median and Guardhouse Detail  
TD-10 (1 of 2) ..... Buffer Wall / Berm  
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TD-12 ..... Post Mounted Street Name Signs  
TD-13 ..... Internally Illuminated Street Name Signs  
TD-14 ..... Sign Location  
TD-15 (1 of 2) ..... Landscaping Clear Sight Window For Medians  
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TD-16 ..... Tree Protection  
TD-18 ..... Type I, II, & III Inlets