

# Loxahatchee Groves Water Control District



## Districtwide Paving Analysis Report

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## 1 Introduction

This report provides criteria, concepts, and cost estimates for the paving of the primary roadways within the Loxahatchee Groves Water Control District. Alternative pavement materials are presented and compared with retaining the existing unpaved roadways to assess the feasibility and benefits of paving the roadways. Intersection configurations, drainage, and permitting requirements are also presented in sections of this report.



## 2 Typical Section

### 2.1 Controlling Criteria – FDOT Greenbook

The Manual Of Uniform Minimum Standards For Design, Construction And Maintenance For Streets And Highways, commonly known as the “Florida Greenbook” establishes standards that are to be applied to all design and construction plans for projects that are to become part of the county road system. These standards are adopted under Section 336.015, Florida Statutes and serve as the basic guidance for developing and maintaining a roadway system with reasonable operating characteristics and a minimum number of hazards. The design elements comprising the proposed typical section and intersection alignments for this study are based on this document.

Typical sections are a combination of several interrelated design elements as described below. The combination of these elements establishes the width of right of way needed to construct the proposed improvements. Some elements such as bike and pedestrian pathways, while very desirable, are optional, while elements such as minimum lane widths and horizontal clearance to fixed obstructions are required for safety purposes.

### 2.2 Border Width/Horizontal Clearance

Border width accommodates roadside design components such as signing, drainage features, guardrail, fencing, and clear zone, the construction and maintenance of the facility and permitted public utilities. The border is measured from the shoulder point to the right of way line or from the lip of the gutter (or face of curb when there is not a gutter) to the right of way line.

Border width for low speed roadways without curb and gutter is desirably 33’ and can be reduced to 10’ with curb and gutter and a design speed of 30 mph or less.

The Florida Department of Transportation recognizes that unique circumstances occur and states, “On existing streets and highways where right of way cannot be acquired or where the decision has been made to simply maintain and preserve the facility, the border area must be reserved for the functional and safety needs of the facility. Extraordinary design effort will be required to meet ADA requirements, driveway construction and the other essential features. Spot right of way acquisitions may be required along the corridor to accommodate these essential components. The absolute minimum border under these conditions is 8’.”

Since the primary function of border width for this project will be to provide adequate clearance from fixed roadside objects the horizontal clear zone criteria for local, rural roads with design speeds of 35 mph or less will be applied. The horizontal clear zone is 6’ per the Florida Greenbook. Therefore using a border width of 8’ provides an acceptable buffer area between the roadway and adjacent properties.



## **2.3 Travel Lanes**

Travel lanes provide the path for vehicular travel and are comprised of several elements as described below:

### **2.3.1 Width**

A minimum width of ten (10') feet is mandated and increases in conjunction with the speed of the roadway and level of traffic. Lane widths of 11' or 12' are desirable and more commonly used. Due to the mix of vehicles using the roadway network in Loxahatchee Groves our recommendation is to use only 12' wide travel lanes. This lane width will more readily accommodate the trucks and agricultural vehicles found in the area.

### **2.3.2 Cross slope**

Pavement cross slopes on travel lanes vary from 1.5% to 4.0% with a normal cross slope being 2.0%.

### **2.3.3 Edge treatment**

Adjacent to the travel lanes the roadway edges are lines with either concrete curbing or a shoulder. The edge treatment provides a means for errant vehicles to regain control and stay on or re-enter the roadway.

### **2.3.4 Curb and gutter**

There are several different curb and gutter types however the most common type used in the South Florida area is known as "Type F" curb and gutter. This item is comprised of a 1.5' wide gutter to direct stormwater flow and a 6" high curb. The total width of this item is two feet. The curb has minimal redirective capabilities and recent studies have indicated that it is ineffective for shielding fixed objects that constitute crash hazards such as trees and power poles.

### **2.3.5 Shoulder**

A common and cost effective edge treatment is to provide a stabilized shoulder adjacent to the roadway. In many cases a portion of the shoulder is paved to allow errant vehicles easy recovery back to the travel lanes. The paved shoulder can also function as bicycle lane depending upon its width. The minimum shoulder width established by the Florida Greenbook is six (6') feet for low volume rural roadways (ADT <750) and eight (8') for higher volume rural roadways.

## **2.4 Bike Lanes**

Bike lanes are a desirable element of a typical section however the need for bike lanes is based on the anticipated usage and community input.



### **2.4.1 Designated**

Bike lanes incorporated as part of the paved shoulder of a roadway need to be 5' in width to be marked as a bike lanes. If curb and gutter is provided, the width can be reduced to 4'.

### **2.4.2 Undesignated**

Paved shoulders that are 4' wide can be considered undesignated bike lanes. Narrower paved shoulders are not conducive to mixing bicycle and vehicular traffic.

### **2.4.3 Separate**

In some communities separate paved paths are provided for bicyclists. These paths need to be 6' wide for one way travel and 12' wide for two way travel.

## **2.5 Equestrian Trail/Bridle Path**

Design criteria for equestrian trails are not well established. Our research found several sources throughout the country, however there are no national or statewide standards. Listed below are some of the design elements that are common to the various studies.

### **2.5.1 Width**

Generally accepted widths varied from 5' for one way travel to 12' for two way travel (18' to 20' is desirable if sufficient land area is available).

### **2.5.2 Separation from roadway and other facilities**

A 10' separation from other uses such as vehicles and bicyclists is desirable to avoid conflicts with the horses.

### **2.5.3 Material**

The bridle path should be a soft, natural material such as soft dirt or wood chips.

## **2.6 Sidewalk/Pedestrian Pathway**

Sidewalks are provided within the roadway corridor to accommodate pedestrian travel. The standard sidewalk width is 5' when it is separated from the roadway by a buffer strip and is sometimes narrowed to 4' when physical constraints are present.

### **2.6.1 Adjacent to roadway**

When the sidewalk is placed behind a curb/curb and gutter adjacent to the travel lanes it must be 6' wide.

### **2.6.2 Multi-use**

Shared use pathways that accommodate pedestrian and bicycle traffic must be 6' wide for one way travel and 12' wide for two way travel.



## 2.7 Drainage

The Loxahatchee Groves Water Control District is governed by the rules and regulations of the South Florida Water Management District (SFWMD). Under the SFWMD requirements the stormwater runoff from new impervious areas must be treated to meet water quality standards before it is discharged into the receiving bodies of the District. This treatment can be provided by wet or dry detention in swales, ponds or exfiltration trenches. Traditional road paving falls under this criteria and generally provides one of these measures to achieve water quality for the roadway.

In consultation with representatives of the SFWMD we determined that this criteria does not apply to the current unpaved roads. Therefore under the present conditions the unpaved roads could continue to be maintained on a regular basis and no drainage improvements would be required.

The open graded asphalt mixes also fall under this criteria as long as there is:

1. No change in existing road surface elevation;
2. The activity is carried out solely in uplands; and
3. Road grading does not result in the impoundment or interruption of surface water into wetlands

Under these conditions road paving using the OGEM option will qualify for a "No Notice General Permit for Road Grading and Pavement Resurfacing" under SFWMD Rule 40E-400.316. Prior to pavement construction a letter should be submitted to the SFWMD confirming that the project qualifies for the "No Notice General Permit" and stating that:

1. The final roadway grades will be within  $\pm 2"$  of the existing grades
2. The width of the roadway has not been substantially increased
3. Pollution and erosion control measures will be implemented during construction

The use of conventional pavement will require provision of water quality treatment to meet SFWMD criteria. This treatment can be attained by using roadside swales, French drains or wet ponds to treat the stormwater runoff prior to discharge into the District's canal system. Roadside swales and wet ponds require additional right of way acquisition while the installation of French drains carries a high construction cost. These factors must be taken into consideration when assessing the viability of the standard paving option.

## 2.8 Canal Protection

The FDOT defines a canal as an open ditch parallel to the roadway for a minimum distance of 1000' and with a seasonal water depth in excess of 3' for extended periods of time (24 hours or more).

### 2.8.1 Unprotected

When no barriers are present the roadway must be separated from the canal by 40' (with curb and gutter) to 50' (flush shoulders).



## 2.8.2 Cable Barrier

Cable barrier systems are gaining popularity for shielding longitudinal hazards requiring long length. These systems need to provide 7' to 9' for deflection which requires additional right of way width and negates the cost savings over guardrail.

## 2.8.3 Guardrail

Guardrails are a common barrier protection and provide a rigid barrier; therefore no additional deflection area is required. Guardrails can be placed 8' (shoulder width + 2') from the edge of the travel lane when there is no curb and gutter. With curb and gutter, the guardrail is placed either in line with the face of the curb or 8.2' behind the face of curb according to FDOT criteria.

## 2.9 Utility accommodations

The roadway corridors also function as utility corridors. The typical section needs to account for the following:

### 2.9.1 Overhead telephone, power and CATV

Existing utilities within the roadway corridors are limited to overhead power and telephone lines. Clear zone criteria must be met to provide an offset of at least 6' from the edge of pavement to the roadside face of the pole. If curb and gutter is installed this offset can be reduced to 4' from the face of curb.

### 2.9.2 Future underground utilities

Future underground utilities could be placed under the pavement or the roadway shoulders. No separate allocation of space within the typical section is needed for this purpose.

## 2.10 Proposed Typical Section

The compilation of these various elements produces a typical section that can be applied to the roadways within the Loxahatchee Groves community. The typical section must balance the needs of the community with the amount of right of way required to accommodate the width of the desired typical section and the cost of the individual elements. Our initial approach to the development of the typical section was to establish a section representing the minimum right of way width required. This section would need to meet minimum safety criteria and provide adequate drainage. Exhibit 1 (at the end of section 2) establishes the "minimum width" typical section that provides features for vehicular and pedestrian movements while meeting safety criteria for canal offsets and clear zone to fixed objects along the edge of the corridor. For the typical two lane roadway this section requires a total width of 102.5' for roadway and canal features.

An alternative typical section was developed that included multiple features such as equestrian pathways, bicycle lanes and pedestrian pathways. Exhibit 2 (at the end of section 2) presents a typical section that requires substantially more right of way to



provide these features. This typical section requires 133' of right of way to fit these features.

The third typical section presented in this report as Exhibit 3 (at the end of section 2) establishes a section that provides a cost effective approach to meeting community needs while providing several amenities within the section. This section provides guardrail for protection from the adjacent canals, a pedestrian walkway and travel lanes for vehicular and bicycle traffic. In reviewing the average daily traffic on the local roadways the traffic volumes are low enough to safely mix long distance bicycle traffic with vehicular traffic. This typical section also provides the necessary clear zone to fixed objects and provides room for a shallow drainage swale. This typical section has been identified as the "preferred typical section" and will be used in the development of cost estimates for construction and right of way costs in subsequent sections of this report.

A computer generated simulation of the preferred typical section has been prepared to show how the typical section will look in an actual setting. Exhibit 4 (at the end of section 2) provides "before and after" views of a typical roadway in Loxahatchee Groves.

Appendix 1 (section 6) shows cross sections of the existing roadways and how this preferred typical section will fit within each of the roadway corridors.