SR 54

Project Development and Environment (PD&E) Study

From CR 577 (Curley Road)
to CR 579/CR 54 (Morris Bridge Road)

Final Alternative Stormwater Management Facility Report

WPI Segment No: 416561-1
Pasco County

Prepared for the

Florida Department of Transportation
District Seven

October 2008

SR 54

Project Development and Environment (PD&E) Study

From CR 577 (Curley Road)
to CR 579/CR 54 (Morris Bridge Road)

Final Alternative Stormwater Management Facility Report

WPI Segment No: 416561-1
Pasco County

Prepared for the

Florida Department of Transportation District Seven

Prepared by
American Consulting Engineers of Florida, LLC

October 2008

Section 1 - EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) conducted a Project Development and Environment (PD&E) Study to evaluate alternative improvements along State Road 54 (SR 54), from CR 577 (Curley Road) to CR 579/CR 54 (Morris Bridge Road) in Pasco County. The total project length is approximately 4.5 miles. Proposed improvements include the widening of SR 54 from a 2-lane rural facility to a 4-lane and 6-lane divided facility. SR 54 is a major east-west arterial which connects east Pasco County to west Pasco County and connects several major north-south routes including I-75 to the west with US 301 in Zephyrhills to the east.

This Alternative Stormwater Management Facility (SMF) Report identifies pond site alternatives (three per basin) and floodplain compensation (FPC) sites (one per impacted basin) and includes an alternatives analysis for selection of a preferred alternative as part of the PD&E Study. This study analyzed pond site alternatives that are hydraulically feasible and environmentally permissible based on the best available information. These alternatives were then compared based on relocations and community impacts; environmental impacts including wetlands, upland habitat and protected species involvement; petroleum and hazardous materials contamination; and economic factors including right-of-way costs.

The project area was divided into 10 sub-basins according to existing topography and the existing cross drains within the project limits. Basin 1 begins approximately at the eastern limits of Pasco County's Curley Road Realignment and Zephyrhills Bypass Extension projects.

Within the project limits are proposed developments with requirements for both right-of-way dedication and drainage provisions, based on either approved development orders or Pasco County's Land Development Code (Ordinance No. 05-39, adopted November 22, 2005). This code requires private developers to convey right-of-way, at no cost, to Pasco County and accommodate future drainage facilities. This code is discussed in greater detail in Section 4. **Table 4-1** identifies the limits of each developer's right-of-way along SR 54 and responsibility for drainage facilities based on their approved development orders.

The alternative SMFs are sized based on the difference in the volume of runoff (100 year 10 day storm event for areas within a closed basin and the 100 year 24 hour storm event for areas within an open basin) from the proposed roadway and right-of-way width as compared with the existing roadway and right-of-way width. For

determination of the required area, a maximum storage depth of 3.5 feet was assumed for the closed basin design and a maximum storage depth of 2 feet was assumed for the open basin design and adjustments in the required area were made if appropriate for an alternative site, based on the topography. Additional consideration was given to required easements for conveying stormwater to the SMF or discharging from the SMF to the outfall. Floodplain compensation areas are identified separately from the SMF as needed based on compensation to be provided and topography of the area to be used for compensation. The alternative SMF sites were sized to meet both the requirements of Southwest Florida Water Management District (SWFWMD) and FDOT's Critical Duration for stormwater quantity control as set forth in Florida Administrative Code (FAC) Chapter 14-86. Alternative SMF sites are shown on the conceptual drainage maps included in **Appendix B**.

Table of Contents

Appendices

List of Figures

List of Tables

Section 2 - INTRODUCTION

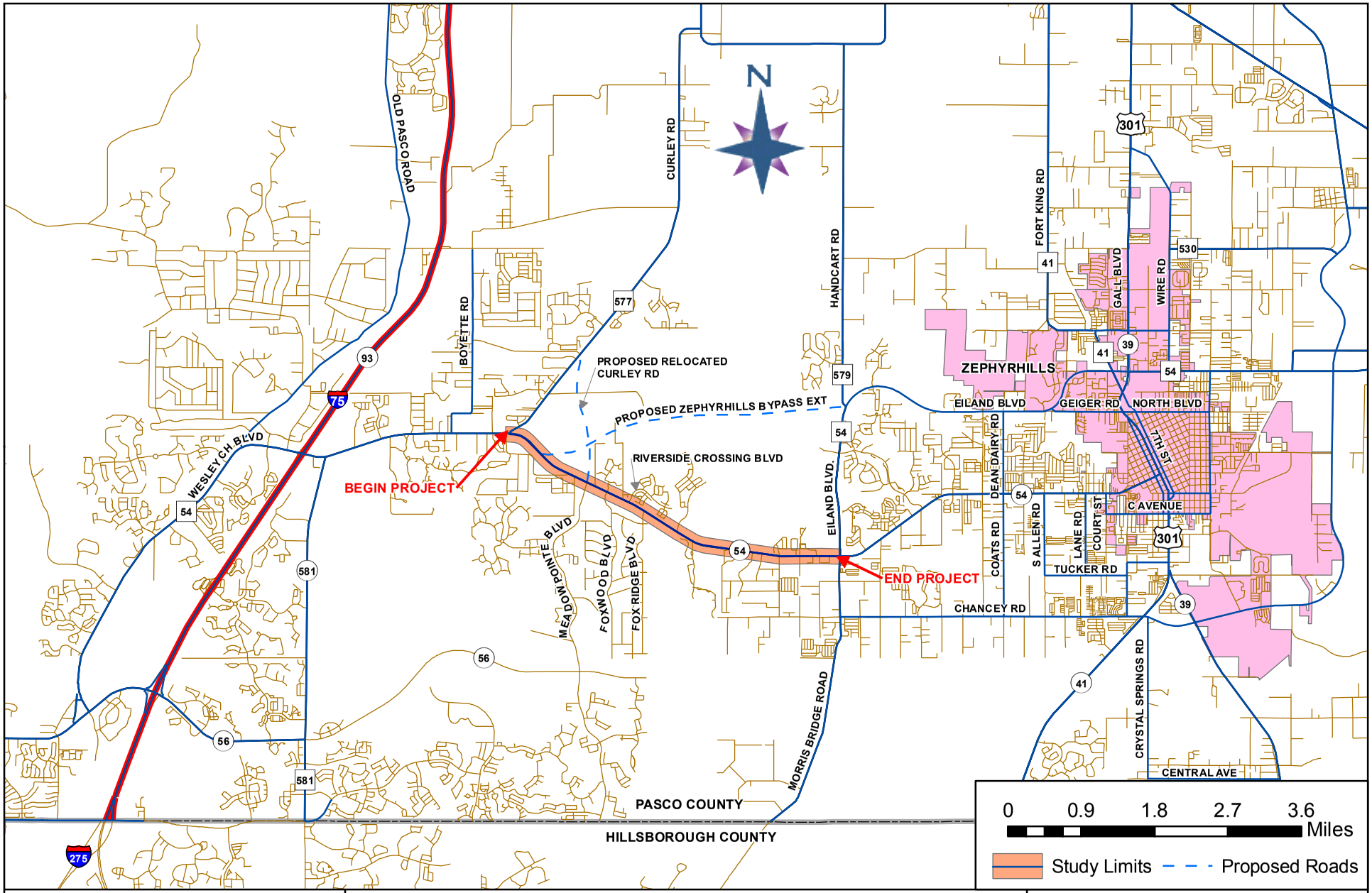
2.1 PROJECT DESCRIPTION

The Florida Department of Transportation (FDOT) conducted a Project Development and Environment (PD&E) Study to evaluate alternative improvements along State Road (SR) 54, from CR 577 (Curley Road) to CR 579/CR 54 (Morris Bridge Road), in southeast Pasco County (**Figure 2-1**). A Study Area map is shown in **Figure 2-2**.

The west end of the study area is located in Wesley Chapel, an unincorporated census-designated place. The project is located within Sections 9, 10, 13, 14, & 15, Township 26 S, and Range 20 E and Section 18, Township 26 S, Range 21 E. The total length of the proposed project limits is approximately 4.5 miles. The segment of SR 54 to the west, from I-75 to east of Curley Road (CR 577), is currently programmed by Pasco County for widening to six lanes. That project also includes a connection to the planned Zephyrhills West Bypass Extension.

The purpose of the proposed project is to provide a higher capacity and safer facility to better meet future transportation demand in this rapidly developing area of Pasco County. SR 54 is one of the primary east-west facilities within Pasco County, effectively connecting the eastern and western sides of the county. This corridor is also designated as an emergency evacuation route. The PD&E Study also included the consideration of a No-Build Alternative.

A Programming Screen Summary Report was published on August 17, 2006 as part of the Department's Efficient Transportation Decision Making (ETDM) process. The project is designated as #6651 in ETDM. The Federal Highway Administration has determined that the project qualifies as a Type 2 Categorical Exclusion.

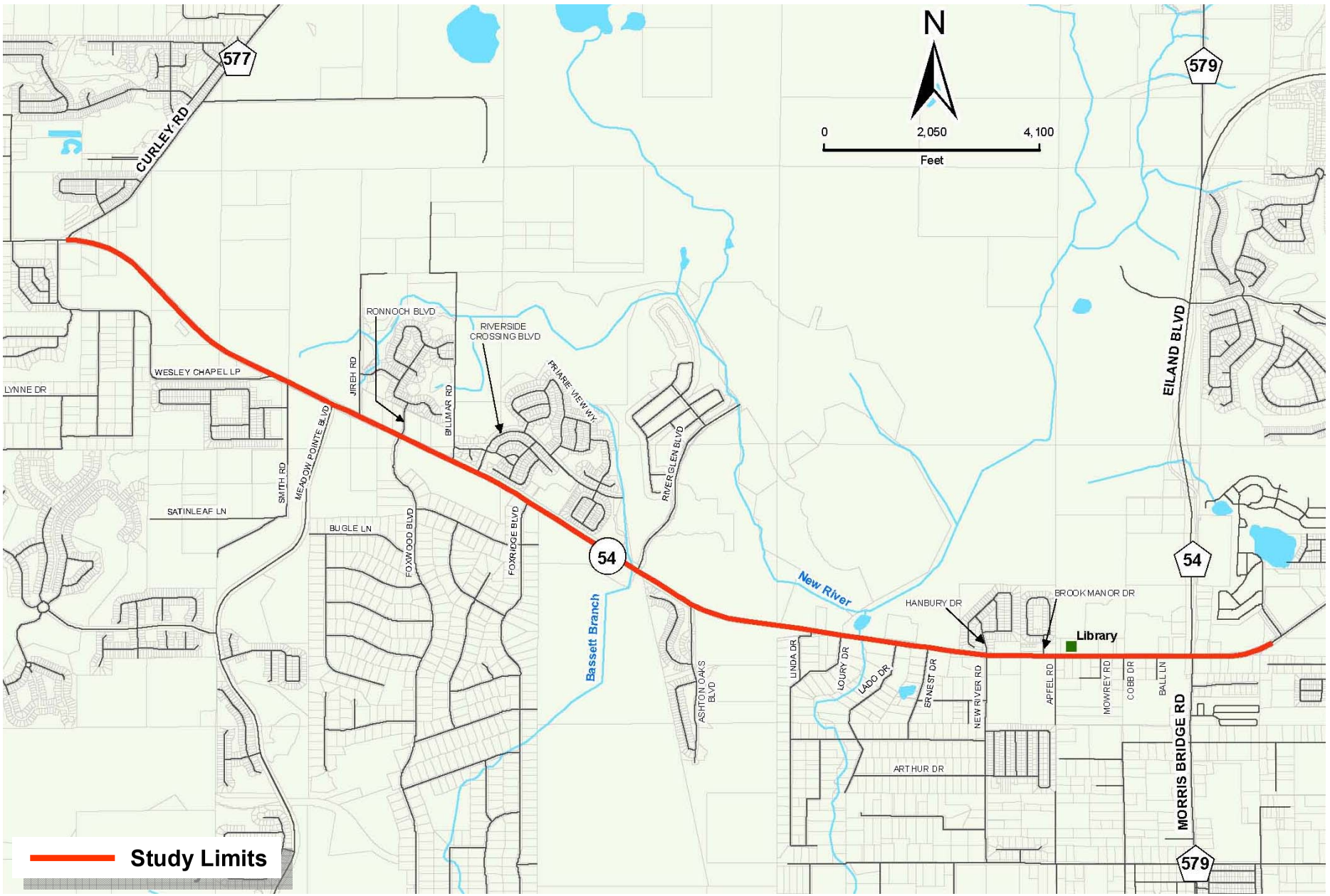


SR 54 PD&E Study
From Curley Road to Morris Bridge Road
Pasco County, FL
WPI Segment No. 416561-1

SR 54 PD&E STUDY AREA MAP

Rev. 11/19/08

FIGURE 2-1



SR 54 PD&E Study
From Curley Road to Morris Bridge Road
Pasco County, Florida
WPI Segment No. 416561-1

SR 54 PD&E STUDY AREA MAP

Rev. 10/8/07

Figure 2-2

2.2 REPORT PURPOSE

As part of the PD&E Study, this Alternative Stormwater Management Facility (SMF) Report identifies pond site alternatives and floodplain compensation (FPC) sites and includes the analysis for selection of preferred sites. This Alternative Stormwater Management Facility (SMF) Report identifies pond site alternatives (three per basin) and floodplain compensation (FPC) sites (one per impacted basin) and includes an alternatives analysis for selection of a preferred alternative as part of the PD&E Study. This study analyzed pond site alternatives that are hydraulically feasible and environmentally permissible based on the best available information. These alternatives were then compared based on relocations and community impacts; environmental impacts including wetlands, upland habitat and protected species involvement; petroleum and hazardous materials contamination; and economic factors including right-of-way costs.

2.3 EXISTING FACILITY AND PROPOSED IMPROVEMENTS

The existing SR 54 facility is functionally classified by FDOT as:

- "Urban Principal Arterial Other" from west of the project limits to Smith Rd
- "Rural Principal Arterial Other" from Smith Rd to west of New River
- "Urban Principal Arterial Other" from west of New River to east of the project limits

The existing roadway is a two-lane rural facility with 12-ft travel lanes and 5-ft paved shoulders (**Figure 2-3**). Several areas have been widened to provide left-turn and right-turn lanes. From west to east, the posted speed limit varies from 55 miles per hour (mph) to 45 mph. Traffic signals currently exist (or will be in operation) at Curley Road, Meadow Pointe Boulevard, River Glen Boulevard/Wyndfields Boulevard, and Morris Bridge Road. The existing right-of-way typically varies between 80 ft and 100 ft. In addition, the County has obtained (or will obtain) "reserved" right-of-way which is being donated by developers as a stipulation of development orders and rezoning conditions. The existing highway is classified by FDOT as Access Management Class 3. Class 3 standards require a minimum traffic signal spacing of 0.5 miles, which the existing facility meets, and minimum spacing for median openings as follows:

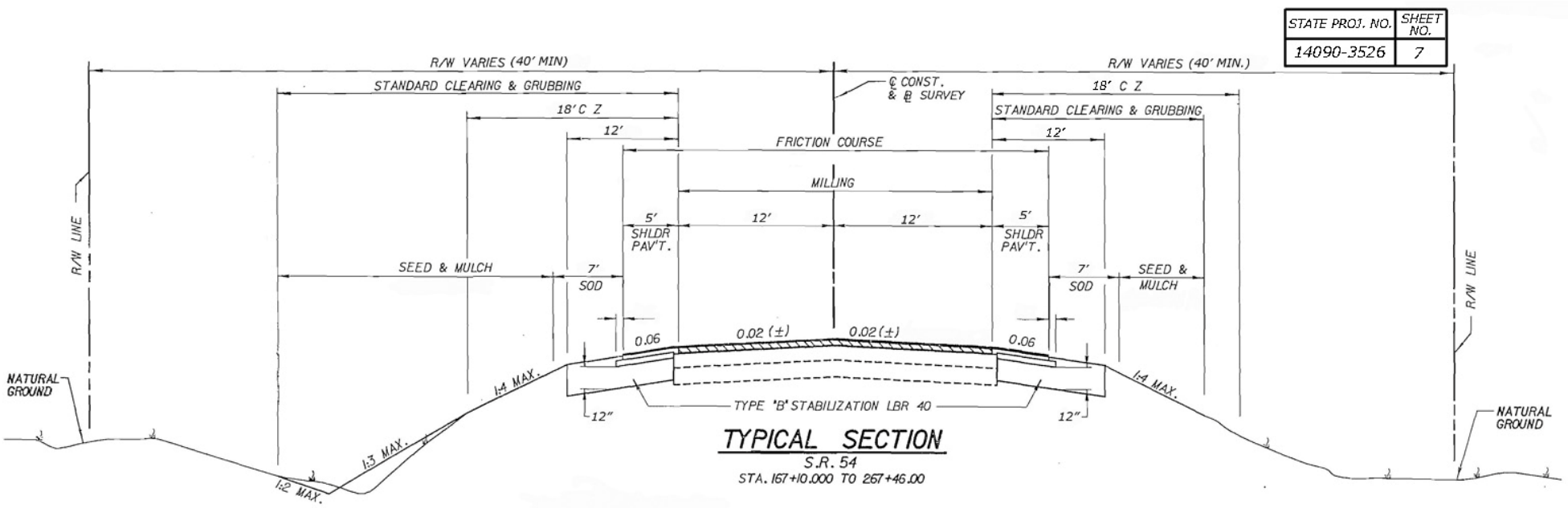
- 0.5 mile for full median openings
- 0.25 mile for directional median openings

The existing facility is mostly two-lane undivided and two-lane divided without raised medians, so the median opening spacing standards don't apply yet.

The Preferred Alternative includes the widening or reconstruction of the existing highway to a four-lane divided arterial with auxiliary lanes west of Meadow Point Boulevard (including the intersection) and a four-lane divided arterial east of Meadow Point Boulevard. Two different types of typical sections are proposed: an urban typical section and a suburban typical section **(Figure 2-4)**. The proposed typical sections include 12-ft travel lanes, sidewalks and "trails", and either 5-ft paved shoulders or 4-ft bicycle lanes, with a closed drainage system, extension or replacement of cross drains, and associated storm water management facilities for water quality treatment and discharge attenuation.

The proposed project is included in the Pasco County Metropolitan Planning Organization's (MPO) Year 2025 Cost Affordable Long-Range Transportation Plan for the period from 2016 to 2025, as a four-lane divided facility.

STATE PROJ. NO.	SHEET NO.
14090-3526	7



TYPICAL SECTION

S.R. 54

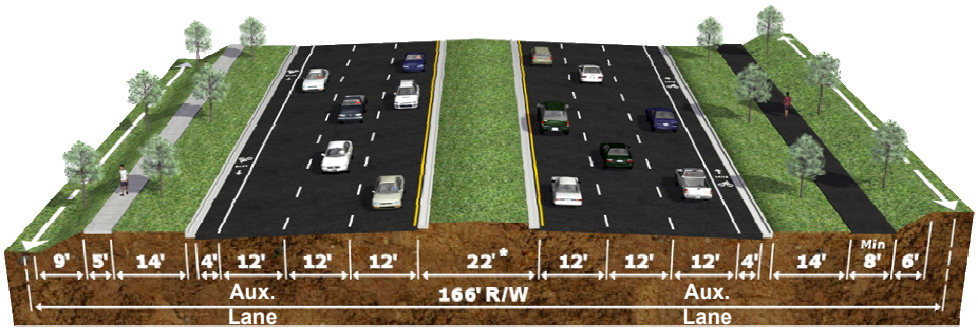
STA. 167+10.000 TO 267+46.00

SR 54 PD&E Study
From Curley Road to Morris Bridge Road
Pasco County, Florida
WPI Segment No. 416561-1

EXISTING TYPICAL SECTION

FIGURE 2-3

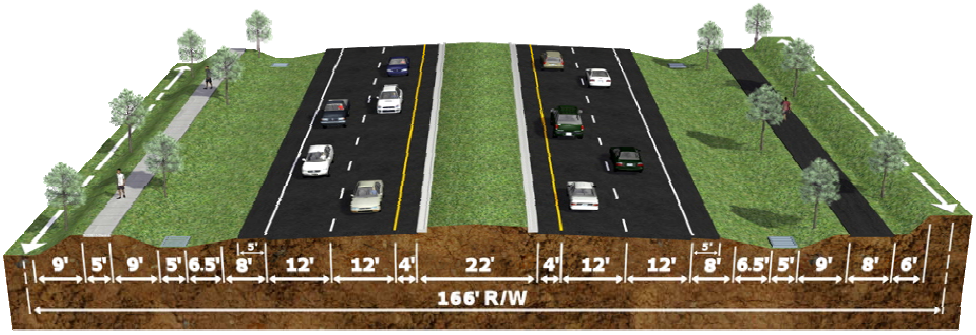
(Looking east for all sections)



Four-Lane Divided with Auxiliary Lanes Urban Typical Section

From Curley Road to Foxwood Blvd

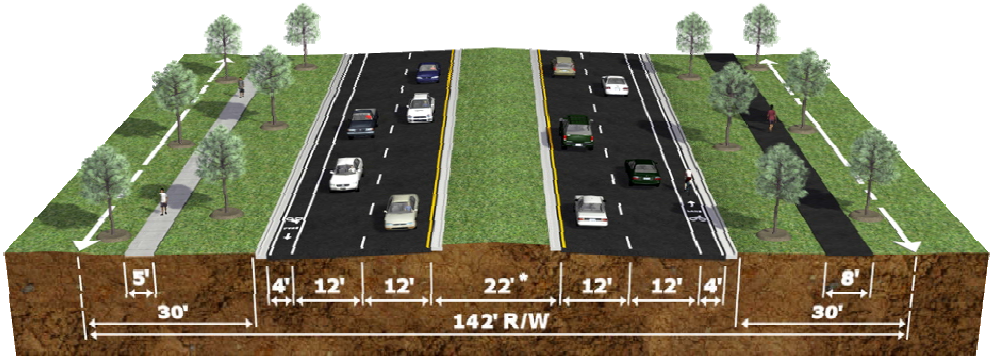
Design Speed = 45 mph



Four-Lane Divided Suburban Typical Section

From Foxwood Blvd to Linda Drive

Design Speed = 55 mph



Four-Lane Divided Urban Typical Section

From Linda Drive to Morris Bridge Road

Design Speed = 45 mph

*For the few areas where a 30' median would be required for dual left turn lanes at signalized intersections, the outside border areas would be reduced by 4' on each side to provide the extra median width required.

Rev. 5/13/08

SR 54 PD&E Study
From Curley Road to Morris Bridge Road
Pasco County, Florida
WPI Segment No. 416561-1

SR 54 Alternative Typical Sections

Figure 2-4

Section 3 – HYDROLOGIC FEATURES

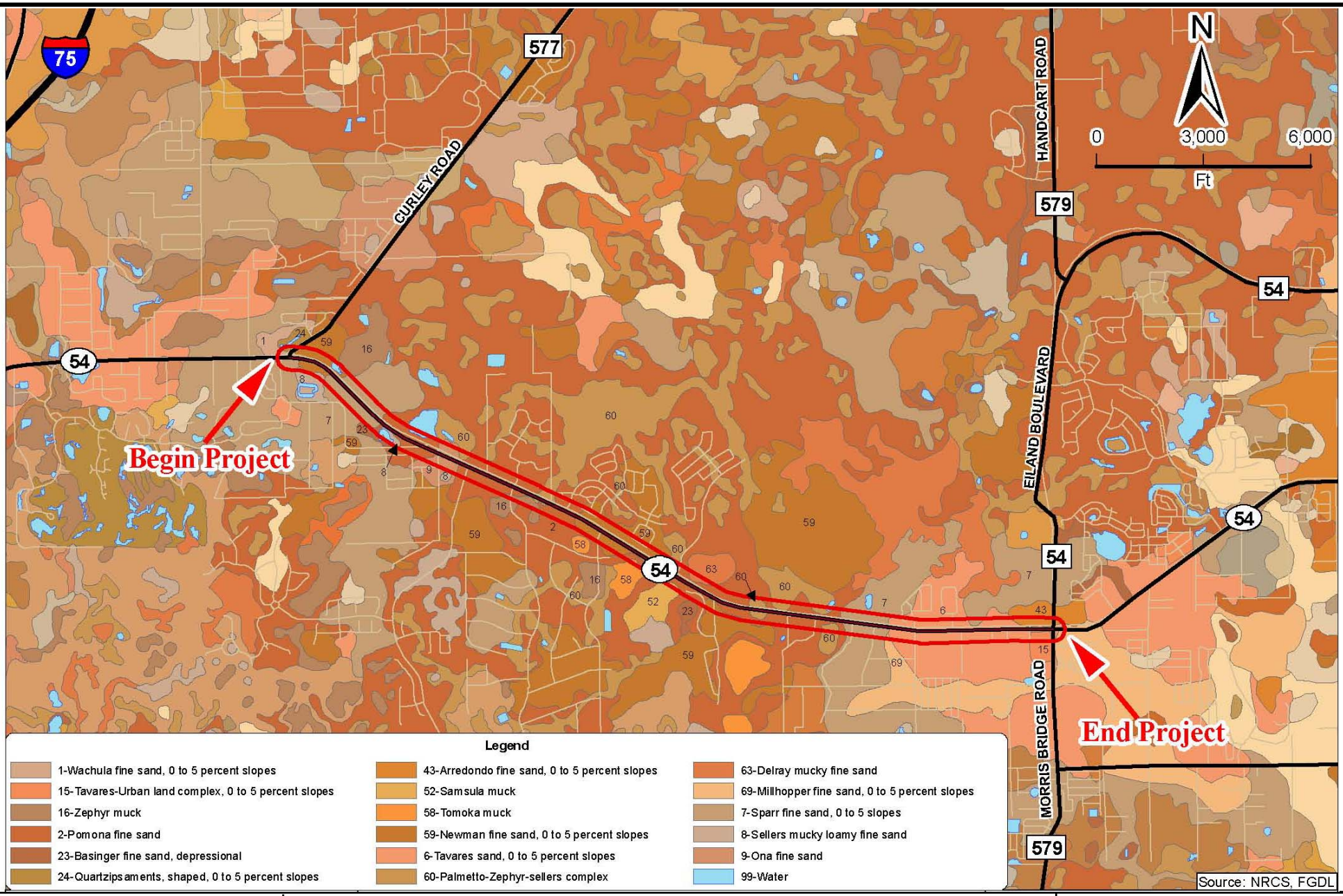
3.1 SOIL CHARACTERISTICS

Based on a review of the U.S. Department of Agriculture (USDA) and the Natural Resources Conservation Service (NRCS) Soil Survey for Pasco County, Florida, the project lies within flat areas with pine-palmetto flatwoods and seasonally wet uplands. Soils within the project area include fine sands, sands, mucky/loamy fine sands, muck, and sandy/clayey loam (**Figure 3-1** and **Table 3-1**). According to the Soil Survey, the seasonal high water (SHW) table varies from above land surface to approximately six feet below land surface. Most of the soils within the project area are identified in the USDA/NRCS Soil Survey as Hydrologic Soil Groups A, D, and B/D consisting of moderately well drained to poorly drained sands.

TABLE 3-1 – USDA SOILS

Map #	Soil Name	Hydrologic Group	Depth to High Water Table (ft)	Soil Type	Description
2	Pomona FS	B/D	0 - 1.0	Fine sandy soil	Nearly level, poorly drained soil on low ridges in flatwoods
6	Tavares Sand	A	3.5 - 6.0	Sandy soil	Nearly level to gently sloping, moderately well drained soils on ridges and knolls
7	Sparr FS	C	1.5 - 3.5	Fine sandy soil	Nearly level to gently sloping, somewhat poorly drained soils on seasonally wet uplands
9	Ona FS	B/D	0 - 1.0	Fine sandy soil	Nearly level, poorly drained soil in broad areas in flatwoods
15	Tavares Urban Land complex	A	3.5 - 6.0	Sandy soil	Nearly level to gently sloping, moderately well drained Tavares soils on low ridges
16	Zephyr Muck	D	+2 - 1.0	Muck/ mucky fine sandy soil	Nearly level, very poorly drained soil in depressions
23	Basinger FS	B/D	+2 - 1.0	Fine sandy soil	Nearly level, poorly drained soil in depressions in flatwoods
59	Newnan FS	C	1.5 - 2.5	Fine sandy soil/ sandy clay loam	Somewhat poorly drained soil on low ridges in flatwoods
60	Palmetto-Zephyr-Sellers complex	D	+2 - 1.0	Fine sandy soil/muck/ mucky loamy fine sandy soil	Nearly level, poorly drained Palmetto soils w/small areas of nearly level, poorly drained Zephyr & Seller soils

FS = Fine Sand



SR 54 PD&E Study
From Curley Road to Morris Bridge Road
Pasco County, Florida
WPI Segment No. 416561-1

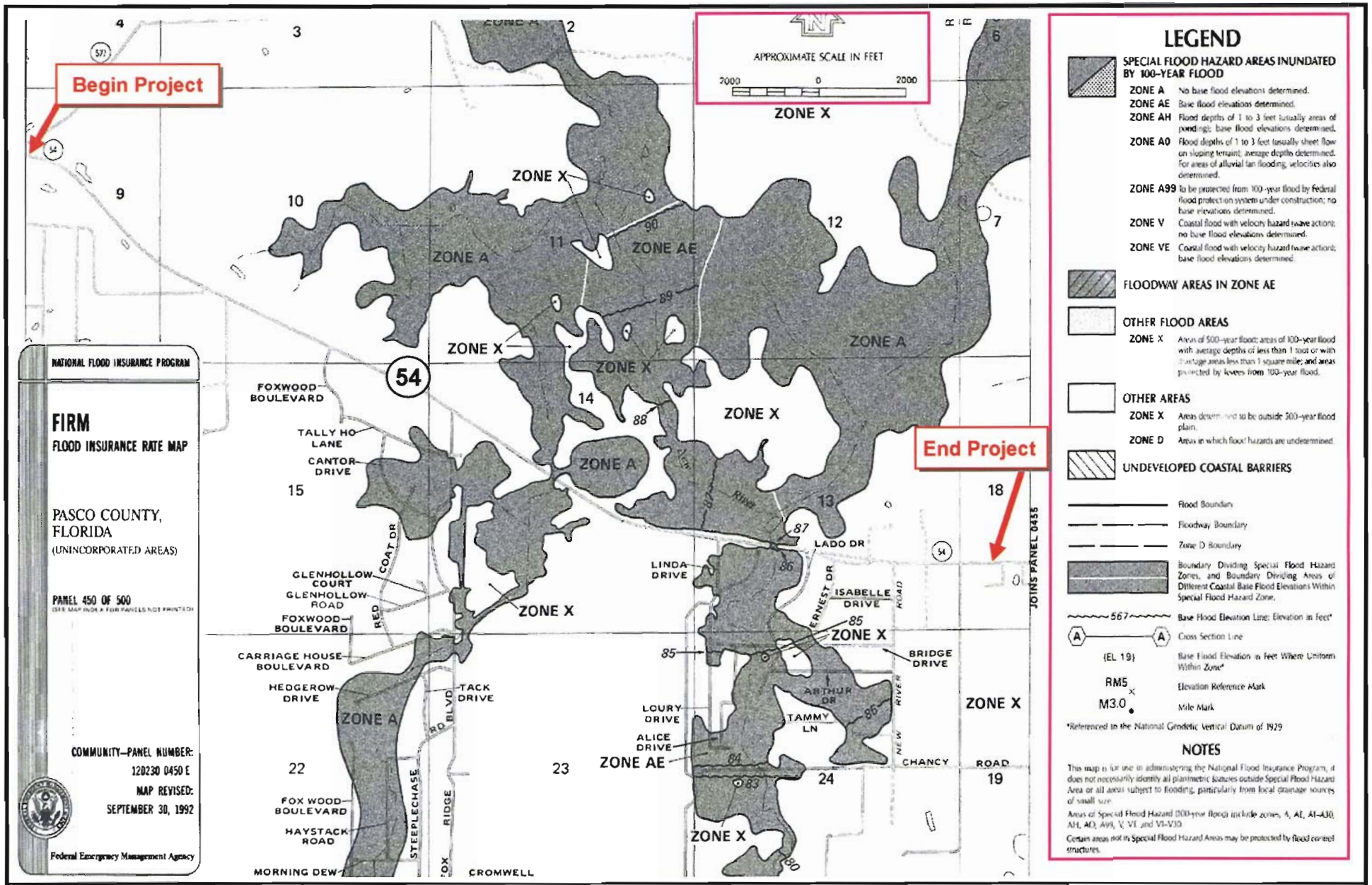
USDA Soils Map

FIGURE 3-1

3.2 Floodplain Information

The majority of the project is located above the 100-year floodplain elevation in Flood Zone X (an area determined to be outside the 100-year and 500-year floodplain) as shown on Flood Insurance Rate Map (FIRM) Community-Panel Number 120230 0450E (**Figure 3-2**). A review of this panel indicates that there are two areas where the 100-year floodplain crosses SR 54. The Basset Branch crossing is located within Zone A, a special flood hazard area that is inundated by a 100-year flood and where no base flood elevation has been determined. The New River crossing is located with Zone AE, a special flood hazard area that is inundated by a 100-year flood and where the base flood elevation has been determined (87 ft National Geodetic Vertical Datum [NGVD], upstream, and 86 ft NGVD downstream of the triple box culvert at New River). Therefore, there will be floodplain involvement. There are no regulated floodways within the project limits.

The fill within the floodplain that is associated with the proposed project will be compensated for per basin in stormwater management ponds or separate floodplain mitigation areas. Within the Basset Creek Basin area, the floodplain falls within the proposed project limits for a total length of approximately 430 feet. The fill within the Basset Creek floodplain is estimated to be approximately 1 acre-ft. Within the New River Basin area, the floodplain falls within the proposed project limits for a total length of approximately 1,400 feet. The fill within the New River floodplain is estimated to be approximately 3 acre-ft.



SR 54 PD&E Study
From Curley Road to Morris Bridge Road
Pasco County, Florida
WPI Segment No. 416561-1

FEMA FLOOD INSURANCE RATE MAP

FIGURE 3-2

Section 4 –DRAINAGE REFERENCE AND RESOURCE INFORMATION

4.1 Field Reviews and Meetings

Several field reviews were performed in the development of drainage basins, potential pond sites, and in review of the existing cross drains an Environmental Resource Permit (ERP) pre-application meeting was held with SWFWMD on February 6, 2008.

4.2 Curve Numbers

For comparison of pre vs. post stormwater runoff volumes, weighted SCS Curve Numbers were calculated. Based on the soil data a curve number of 80 was used for pervious areas, type D soil in good condition. A curve number of 98 was used for impervious area.

4.3 Rainfall Intensity Data

The 100-year, 10-day storm event was utilized for determining the required pond size for closed basins. From FDOT's Hydrology Handbook Figure F-20 the 100-year, 10-day storm event was determined to be 20 inches in depth.

The 100-year, 24 hour storm event was utilized for determining the require pond size for areas within open basins. From FDOT's Hydrology Handbook Figure F-16 the 100-year, 24-hour storm precipitation depth is 11.5 inches, and from the SWFWMD's precipitation depth and frequency map the 100-year, 24-hour precipitation depth is 12.00 inches.

4.4 Resources for Analysis

The process of defining and developing the information base included review of the following sources:

- Aerial Cartographics of America, Inc., Rectified Control Aerial Imagery (flown 4-24-06);
- FEMA FIRM for Pasco County -Panel Number 120230 0450E, dated September 30, 1992;
- FDOT Construction Plans for State Project Number 14090-3526, SR 54 from East of CR 581 to CR 579 (1999);
- FDOT Culvert Design Handbook (2004);
- FDOT Drainage Manual (2006);
- FDOT Design Standards;

- FDOT Stormwater Management Facility Handbook (2004);
- FDOT Stormwater Storm Drains Handbook (2004);
- FDOT SLD of Road Inventory for SR 54/Pasco County (November 2005);
- Field reviews by American personnel;
- Florida State University, Water Resources Atlas of Florida (1998);`
- Pasco County GIS Information/ Contours (Flown and updated 2004);
- Pasco County Property Appraiser's Tax Maps;
- Pasco County, Final Route Study – Curley Road (South) CR577 (December 2003);
- Pasco County Growth Management Department's Development of Regional Impact (DRI) and Master Planned Unit Developments (MPUD):
    1) New River MPUD/DRI #210;
    2) Wesley Chapel Lakes (aka Meadow Point III/IV) MPUD/DRI #166;
    3) Aberdeen Lakes MPUD; Wyndfields MPUD;
    4) Ho (aka Ashley Pines) MPUD;
    5) Parkview – Serino (aka Hamilton Park) MPUD; and
    6) Houck Property/The Crossings (aka Ashton Oaks) MPUD;
- Pasco County Land Development Code, Section 600 (September 1999);
- Pasco County Stormwater Management Practices Manual (April 1998);
- Pasco County, Zephyrhills West Bypass Extension Route Study (August 2002);
- SWFWMD GIS/ERP Information (2007);
- SWFWMD ERP Information Manual, Chapter 40D, F.A.C., Parts A and B;
- SWFWMD Floodplain Information on the Hillsborough River Watershed/Hillsborough River and New River (November 1979);
- USDA/NRCS, Soil Survey of Pasco County, Florida, June 1982; and
- U.S. Geological Survey (USGS) Wesley Chapel Map, Scale 1:24,000, (Photo revised 1987).

Section 5 – EXISTING DRAINAGE CHARACTERISTICS

5.1 Existing Conditions

The project lies in the Zephyrhills Gap of the Gulf Coastal Lowlands between the Brooksville Ridge and the Polk Upland. The topography of the project area consists of relatively flat plains. The Gulf Coastal Lowlands is an area of intensive karst development, which is characterized by numerous sinkholes and a lack of surface drainage. Significant surface water features within the project area include Trout Creek, Basset Branch, New River, and Indian Creek.

The existing condition consists of a roadway with associated intermittent shallow swales and/or flow from the roadway and shoulders directly into depressional areas or adjacent wetlands that discharge to their respective sub-basins and ultimately to the Hillsborough River. There are no stormwater detention or retention facilities that serve the roadway within the project limits.

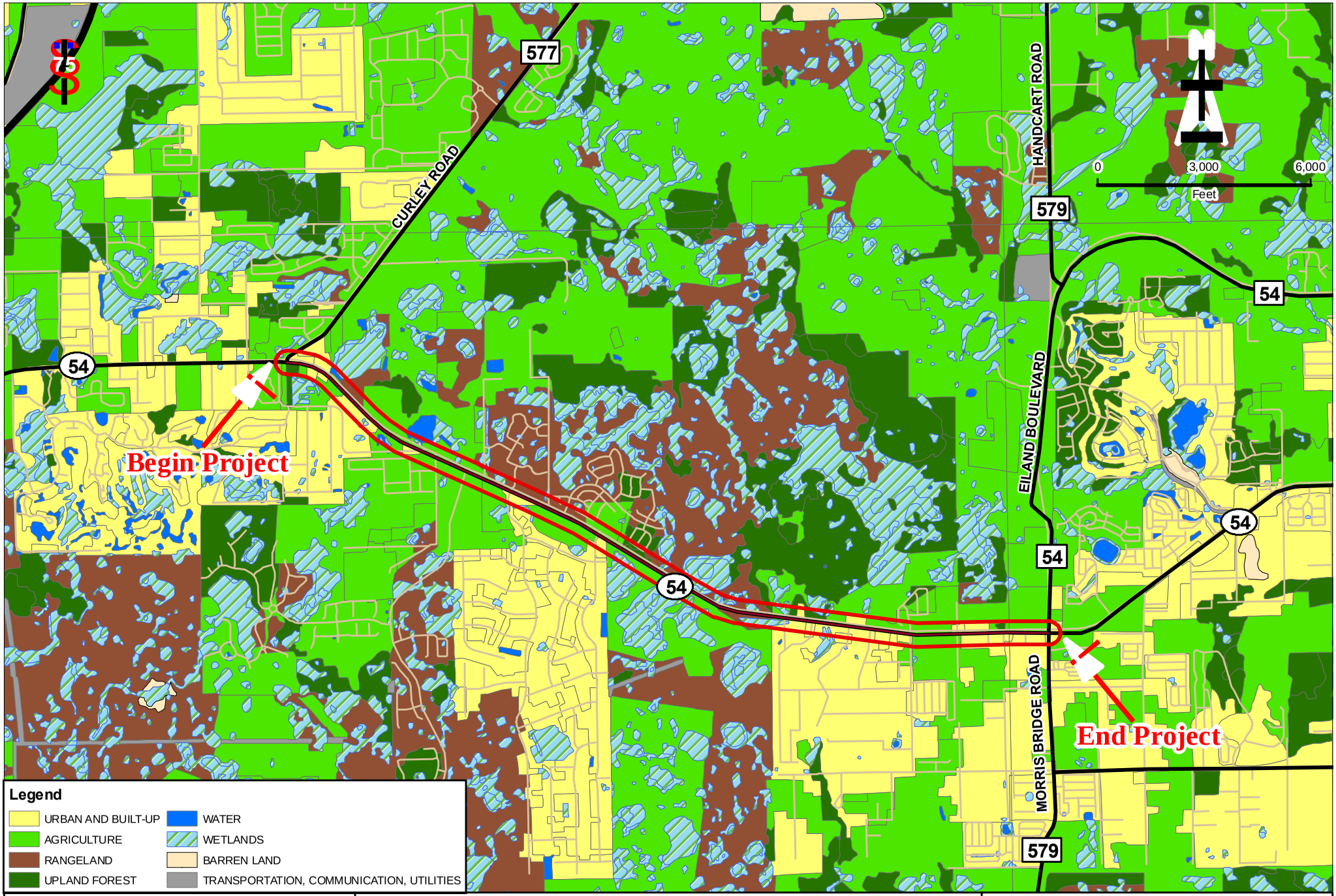
The project is located within the Hillsborough River watershed, which outfalls to Tampa Bay. The existing drainage patterns and basin boundaries were determined from survey data. The project area is subdivided into 10 subbasins, which were determined by the existing cross-drains and high points along the roadway (see **Appendix B**). **Table 5-1** provides a list and description of existing cross drains on the project.

TABLE 5-1 - EXISTING CROSS DRAINS

Structure Number	Station (ft)	Type of Drainage Structure	Number of Barrels	Length (ft)	Flow Direction	Basin Area (ac)
1	645+38.6	24-inch RCP	2	70.1	N-S	N/A
2	658+63.9	30-inch RCP	2	56.0	N-S	N/A
3	678+22.8	24-inch RCP	1	78.0	N-S	NA/
4	689+36.9	24-inch RCP	1	78.4	S-N	4.50
5	700+51.0	24-inch RCP	1	98.3	S-N	5.36
6	713+86.8	24-inch RCP	1	91.1	S-N	3.91
7	725+64.2	30-inch RCP	2	77.7	S-N	8.62
8	806+06.0	24-inch RCP	1	50.0	S-N	2.97
9	**829+29.2**	**42-inch RCP**	**3**	**83.4**	**N-S**	**16.39**
10	854+95.3	24-inch RCP	1	64.6	S-N	8.63
11	**875+65.1**	**11-ft x 8-ft CBC**	**3**	**57.2**	**N-S**	**15.43**
12	924+86.0	24-inch RCP	1	76.8	S-N	14.14

Bold = Floodplain Involvement

There are existing off-site drainage areas that contribute direct runoff to the FDOT right-of-way. These areas discharge to the existing roadside swales and/or concrete ditches and then outfall to their respective receiving waters. Land uses vary from agriculture, rangeland, upland forest, and wetlands to urban/built up (see **Figure 5-1**). Of major concern in this study is the vast amount of current and near future development along the project corridor.



SR 54 PD&E Study

from Curley Road to Morris Bridge Road
Pasco County, Florida
FPID: 416561-1-22-01

Source: Pasco County GIS, FGDL

Existing Land Use Map

Figure **5-1**

5.2 Watershed Descriptions

From west to east (i.e., begin to end project), SR 54 falls within or is adjacent to the following drainage basins (**Figure 5-2**):

- Upper East Cypress Creek
- Trout Creek
- Basset Branch
- New River
- Indian Creek

Within the project area, the Trout Creek basin is comprised of forested wetlands, which eventually drain to the Hillsborough River. Basset Branch is conveyed under SR 54 via triple 42-inch reinforced concrete pipes (RCP) and flows to swamps that are associated with the Hillsborough River. New River conveys flow through a bridge culvert under SR 54 in a well-defined, narrow channel to swamps that are also associated with the Hillsborough River. Trout Creek, Basset Branch, and New River are open basins that drain the project area and are tributaries to the Hillsborough River, which is designated an Outstanding Florida Water (OFW).

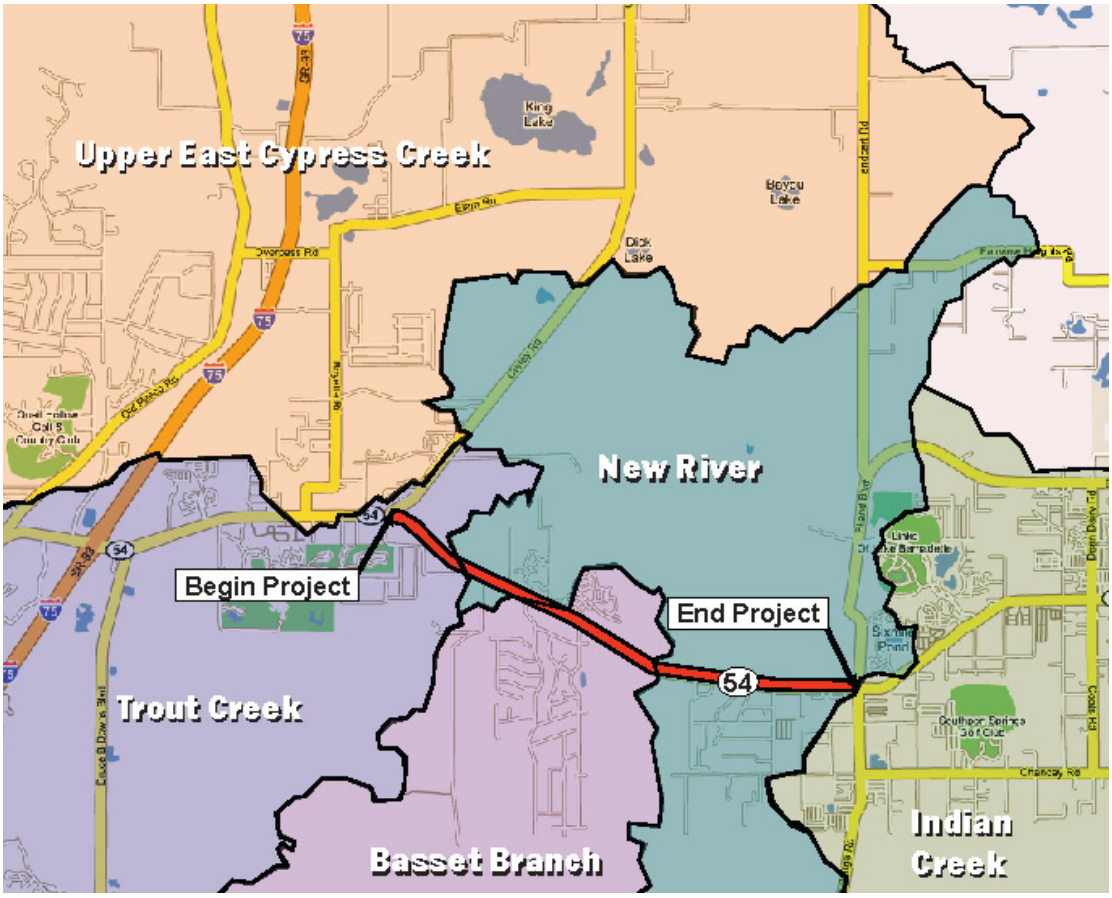


FIGURE 5-2 – REGIONAL DRAINAGE MAP

5.3 Sub-Basins

The project area includes 10 sub-basins which include SR 54 and contributing offsite drainage areas. These areas are delineated on the Conceptual Drainage Maps as Basin 1 thru 10 (**Appendix B**).

At the beginning of the project the project will tie into proposed improvements to be constructed under Pasco County CIP #4298, SR 54 from west of SR 581 to east of CR 577. That proposed project will include a stormwater management facility (pond) located in the gore area just west of this project. For the tie in section adjustments will be required to meet stormwater management criteria. These adjustments should include removal of impervious area that will no longer be needed to compensate for a portion of the added impervious area, balancing of the area to be drained to Basin 1 (SMF 1), and possible grading adjustments to create additional storage in the adjacent stormwater management facility drainage area. No additional SMF site acquisition should be required since there will be impervious area that can be removed and there is some overlap in the accounting for proposed impervious areas between the two projects due to the design occurring simultaneously. An exhibit identifying this area is provided following the Conceptual Drainage Maps (**Appendix B**).

Section 6.0 – PROPOSED DRAINAGE DESIGN

6.1 Stormwater Management Design Approach

This project will be permitted with SWFWMD. In general, SMFs are required to provide water quality treatment and peak attenuation of storm water runoff prior to discharge to receiving waters and to ensure that the project will not adversely impact offsite drainage. The SMFs are designed in accordance with requirements set forth by SWFWMD and are also designed to comply with FDOT Critical Duration for stormwater quantity control as set forth in Florida Administrative Code (FAC) Chapter 14-86.

SWFWMD water quality requirements. Water quality treatment for this project is proposed by controlled release of detained storm water runoff. Each of the drainage basins has a proposed wet pond that is designed to provide water quality treatment and quantity attenuation. The required treatment volume is determined as one (1) inch of runoff from its contributing area. The total treatment volume is stored in the ponds between the control elevation (seasonal high water elevation) and the weir crest elevation. The treatment volume depth between the control elevation and weir crest must be less than or equal to 18 inches. The treatment volume is discharged from control structures in each of the basins' ponds to its respective outfall. For recovery of storage, the entire water quality volume may not be discharged in less than five days with no more than one half of the total volume discharged within the first 60 hours (2.5 days), and only that volume which discharges within 36 hours may be counted towards the attenuation volume.

SWFWMD water quantity requirements. For areas within a closed basin the required attenuation volume is the difference between the post-development runoff volume and the pre-development runoff volume for the 100 year 24 hour storm (the FDOT requirement is the post less pre volume for the 100 year 10 day storm event). For areas within an open basin the allowable discharge is the peak rate at which runoff leaves the basin by gravity under existing conditions for the 25 year 24 hour storm. Pond sizing calculations are provided in **Appendix A**.

As mentioned above, the Hillsborough River is designated an OFW. SWFWMD stated in the Programming Screen Summary Report for ETDM project number 6651 that the surface waters in the immediate project vicinity are designated as Class III Surface Waters (i.e., recreation, propagation, and maintenance of healthy, well-balanced populations of fish and wildlife and/or approved for shellfish harvesting). Therefore, there is no need for additional treatment volume.

The final design will need to meet all SWFWMD criteria. For the purpose of sizing required pond sites, FAC Chapter 14-86 criteria exceeds SWFWMD requirements and will govern. For closed basins the pond site requirements are based on the volume required to store 100 percent of the difference in pre vs. post runoff volume from the 100-year 10-day storm event. For open basins the pond sizing requirements are based on the 100-year 24-hour storm event and the water quality volume requirements.

The pre development (existing conditions) runoff volume is based on the existing right-of-way and land use (impervious area) while the post development runoff volume is based on proposed right-of-way and land use. The difference in runoff volume for the roadway reflects both the increase in area due to wider right-of-way as well as the added impervious area.

6.2 Design Criteria

In addition to field reconnaissance, the information listed in Section 2.4 was reviewed to assess the potential SMF locations. The required pond sizes were calculated based on the pre vs. post comparison of the 100-year 10-day storm event for closed basins and the 100-year 24-hour storm event for open basins. Calculations are provided in **Appendix A**. The following bullets summarize the assumptions and criteria utilized in development of alternative pond sites for the project:

- Property information was obtain from the Pasco County Property Appraiser's Tax Maps
- The existing average ground elevation was obtained from the Pasco County GIS Information (2004)
- The maximum allowable stage in the pond for a 100-year storm event (DHW_{100}) was estimated as 2.5 to 3.5 feet in depth
    - The storage per acre of pond was reduced by 20 inches for the closed basins an by 12 inches for the open basins to account for the portion of storage that would be used by the rain falling on the pond site
    - In addition to the precipitation depths being subtracted from the ponds, another 1 inch was also subtracted from the ponds to account for the treatment volume requirement.
    - The remaining 1.42 ft to 1.75 ft maximum storage depth was utilized to estimate a minimum pond size per basin with an additional 20 percent requirement for maintenance area width
    - Adjustments to the minimum pond area requirement were made on a case by case basis based on engineering judgment of evaluated topographical information, wetland areas present, and field review

- The existing and proposed basins were delineated based on points of discharge from the right-of-way to receiving surface waters, natural conveyance, or man made conveyance
    - Most of the existing cross drains have one basin associated with them. The cross drains for Bassett Branch and New River each have two basins associated with them in recognition that designing conveyance to cross under these streams will include significant construction costs and a pond on each side may be desirable
- Conveyance to and from alternative pond sites was considered and easement requirements were identified and included in alternatives as appropriate
- Critical Duration (FDOT Rule Chapter 14-86); Rules of the Department of Transportation, which addresses water quantity, rate, and quality requirements.
- Floodplain encroachment volumes were estimated based on the area of proposed right-of-way encroachment on the floodplain and an average depth of fill
- Alternative floodplain compensation areas were estimated based on the existing topography, the elevation of the 100 year flood, the estimated seasonal high water elevation, and the volume of compensation required for the basin

6.3 Pasco County Development Conditions

Within the project limits are proposed developments with requirements for both right-of-way dedication and drainage provisions, based on either approved development orders or Pasco County's Land Development Code (Right-of-Way Preservation Ordinance No. 05-39, adopted November 22, 2005). This code requires private developers to convey right-of-way, at no cost, to Pasco County and accommodate future drainage facilities. In addition to the right-of-way dedication, private developers are required to provide appropriate and sufficient drainage facilities, at no cost to Pasco County, on the developer's property, or another site acceptable to the county, for mitigation for all impacts associated with the initial and future improvements of SR 54 on the developer's property, for half of the SR 54 right-of-way (to centerline of roadway), adjoining the development. An excerpt from the county ordinance is included below:

> *Land to be dedicated shall be limited to the amount of land needed for the planned transportation improvements….including, where applicable,* ***land for drainage/retention****, wetland and floodplain mitigation,… and other roadway related improvements. If the drainage, wetland or floodplain mitigation facilities for the roadway or appurtenances will be co-mingled or combined with drainage, wetland or floodplain facilities of the developer's project, the developer, or another maintenance entity acceptable to the County, shall be responsible for operation and maintenance of such facilities; provided, however, the developer or*

maintenance entity shall convey an easement giving the County and FDOT the right, but not the obligation, to enter onto developer's property and maintain the facilities.

If the drainage, wetland or floodplain mitigation facilities for the roadway will not be co-mingled or combined with drainage, wetland or floodplain facilities of the developer's project, the developer shall convey such facilities and access easements to the County, or FDOT, as applicable, and the County or FDOT, as applicable, shall own operate and maintain such facilities subsequent to the expiration of any applicable maintenance guarantee period.

Table 6-1 identifies the limits of each developer's right-of-way along SR 54 and responsibility for drainage facilities.

TABLE 6-1 – PASCO COUNTY DEVELOPER DRAINAGE COMMITMENTS

Pasco County MPUD/ DRI Map #	Project and/or Development Name	Project Type	Distance Adjoining SR 54					Known Drainage Commitments or Responsibility[1]	
			Station Limits: Begin & End	Side LT/ RT	(feet)	(miles)	% of Sub-basin	Document & Date of Approval	Condition(s) of Approval
127	Ho Property (aka Ashley Pines)	MPUD	693+26 695+97	RT	271	0.05	4.1 Sbsn-2	MPUD Zoning Petition Review Report 6/29/04	The developer is required to provide drainage facilities for future SR 54 improvements in addition to 20' ROW donation
53	Wesley Chapel Lakes (aka Meadow Point III/IV)	MPUD/ DRI #166	695+97 714+43	RT	1846	0.35	28.1 Sbsn-2	DRI Development Order Amendments 6/27/06 & 7/26/05	A master drainage plan for Wesley Chapel Lakes was required. County can request up to 105' of ROW from CL of SR 54. No mention of drainage requirements
82	Aberdeen Lakes	MPUD	718+31 719+67	LT	136	0.03	1.0 Sbsn-2 1.6 Sbsn-3	Approved 1/19/00	Unknown
29	New River/Flag Development Company	MPUD/ DRI #119	729+76 894+62 See Station Equation Note	LT	10,540	3.12	24.8 Sbsn-3 50.0 Sbsn-4 50.0 Sbsn-5 50.0 Sbsn-6 50.0 Sbsn-7 35.7 Sbsn-8	DO amended 11/18/03	ROW along SR 54 required to be donated, up to 105' from CL. Drainage requirements not clear. Master drainage plan was required.
92	Wyndfields – Schickendanz – Hammock Pines	MPUD	808+57 832+10	RT	2,353	0.45	14.1 Sbsn-4 50.0 Sbsn-5 10.5 Sbsn-6	Zoning Petition Review Report approved 12/19/00	Developer required to reserve 20' of ROW adjacent to SR 54; no mention of drainage requirements
135	Houck Property/The Crossings (aka Ashton Oaks)	MPUD	832+10 843+40	RT	1,130	0.21	39.5 Sbsn-6 1.2 Sbsn-7	Zoning Petition Review Report approved 2/22/05	The developer is required to provide drainage facilities for future SR 54 improvements in addition to 83' ROW donation from CL of SR 54.
131	Parkview - Serino (aka Hamilton Park)	MPUD	894+85 901+33	LT	648	0.12	12.1 Sbsn-8	Zoning Petition Review Report approved 12/16/03	Additional ROW for drainage facilities for future SR 54 improvements may be required in addition to 60' ROW donation from CL of SR 54.

Note: Station Equation (Sta. 736+60.17 Back = Sta. 796+05.81 Ahead)

[1]Note: County's Right of Way preservation ordinance was approved on 11/22/05.

6.4 Evaluations and Recommendations

Based on the methodology and criteria stated in Section 4.2, three alternative SMF sites were evaluated per sub-basin; a summary of the alternative sites is presented in section 5.0. Included in the evaluation are the requirements related to conveying stormwater from and to the pond. The summary table identifies easement requirements for land area required to convey water from the roadway to the pond and/or from the pond to the outfall. For alternative pond sites that would require significant piping of the discharge from the pond to the outfall point, a separate system parallel to the roadway drainage to the pond, this has been identified as "outfall" length. Finally, there are two instances where the roadway drainage would need to be conveyed under a major cross drain to the alternative pond site identified as "Cross Major Conveyance". All are included in the table since the true cost of an alternative will be the combined cost of these components.

As future developments are proposed and reviewed by Pasco County, the county should evaluate these developments and whether conditions are appropriate to require the developments to facilitate and/or construct SMFs as identified in this Report.

6.5 Floodplain Compensation (FPC) Evaluations and Recommendations

6.5.1 Flood History

Local maintenance offices in the project area were contacted to determine the history of flooding problems. A representative with the FDOT Maintenance Office said that there is no record of SR 54 overtopping and/or water on the roadway along the project limits during the past 30 years. It was also noted that after the 2004 hurricanes, there was standing water in adjacent fields up to the SR 54 shoulders in some areas.

A representative from Pasco County Engineering Services/Design & Stormwater Division stated that the New River crossing has had episodes of "bad flooding" but that there are no reports of SR 54 being overtopped in that area. After Hurricane Frances in 2004, the mobile home park to the southeast of SR 54 and the New River was completely inundated with floodwater; these floodwaters came within two feet of overtopping SR 54. There was no flooding to the north of the New River box culvert adjacent to SR 54. This same representative said that this is the only area between Curley Road and Morris Bridge Road that has any flooding issues.

6.5.2 Floodplain Designation

The FEMA FIRM for Pasco County (unincorporated), Florida, community panel number 120230 0450E (dated September 30, 1992) indicates that there are two areas where the 100-year floodplain crosses SR 54. The Bassett Branch crossing is located within Zone A, a special flood hazard area that is inundated by a 100-year flood and where no base flood elevation has been determined (**Figure 1-5**). The New River crossing is located with Zone AE, a special flood hazard area that is inundated by a 100-year flood and where the base flood elevation has been determined (87 ft National Geodetic Vertical Datum [NGVD], upstream; and 86 ft NGVD, downstream of the triple box culvert at New River). Therefore, there will be floodplain involvement. There are no regulated floodways within the project limits.

6.5.3 Floodplain Compensation

The existing roadway crosses the 100-year floodplain at two points: a triple 42-inch cross drain at mile post 14.0 and a triple 11-ft x 8-ft bridge culvert at mile post 14.9. The one (1) foot differential in the 100-yr base flood elevation at the New River crossing demonstrates that backwater effects contribute significantly to the upstream floodwater elevations and the floodplain characteristics in general. The extension or replacement of these box culverts will be determined at the time of design to avoid downstream impacts

that could occur if the capacity were increased and upstream impacts that could occur if head loss was increased. Head loss thru cross drains should not be increased more than 0.1 ft for the 100-yr design event.

The fill within the floodplain that is associated with the proposed project will be compensated for per basin in stormwater management ponds or separate floodplain mitigation areas. Within the Basset Creek Basin area, the floodplain falls within the proposed project limits for a total length of approximately 430 feet. The fill within the Basset Creek floodplain is estimated to be approximately 1.0 acre-ft. Within the New River Basin area, the floodplain falls within the proposed project limits for a total length of approximately 1,400 feet. The fill within the New River floodplain is estimated to be approximately 3 acre-ft.

Alternative floodplain compensation areas have been identified based on cup-for-cup compensation and available topography. These areas are identified along with the stormwater management ponds on the conceptual drainage maps included in **Appendix B.**

Section 7.0 – RECOMMENDED SITES

Table 7-1 summarizes the stormwater management facility alternative pond sites identified and includes area requirements for conveyance (conveyance easement) as well as parallel outfall construction in right of way (ROW) (outfall) requirements and crossing major conveyance. Following the table is a brief discussion of the preferred site selection considerations per sub-basin. The final recommended SMF sites will be provided in later versions of this report as additional environmental and engineering considerations are refined.

Table 7-1: Pond & Floodplain Compensation Sites Evaluation Matrix

	Basic Design Parameters and Construction Cost Estimates																	
Pond #	Pond Area (Ac)	FPC Sites (Ac)	Total Area (Ac)	Conveyance Easement (Ac)	Clearing & Grubbing	Avg.exc depth (ft)	Excavation (cy)	Excavation	Conveyances (ft) From Pond	Conveyances (ft) To Pond	Conveyance	Major crossing cost	Other (control structures, etc)	Total Const. Cost	Wetland Impacts (Ac)	Est. Right of Way Costs ($mill)[1]	Est. Total Costs ($mill)	Comments
Units -->					acre			cubic yard			feet							
Unit Costs -->					$ 19,290			$ 6.14			$ 250							
1A	6		6	0	$ 115,740	4	38,720	$ 237,741	0	0	$ -	$ -	$ 234,542	$ 588,023	3.72	0.68	$1.27	Least expensive site
1B	**2.7**		2.7	0	$ 52,083	5	21,780	$ 133,729	300	0	$ 75,000	$ -	$ 234,542	$ 495,354	0	**2.70**	$3.20	May interfere with commercial dev'p
1C	**2.7**		2.7	0	$ 52,083	5	21,780	$ 133,729	425	200	$ 156,250	$ -	$ 234,542	$ 576,604	0	**3.21**	$3.79	Requires relocation & demolition
2A	**5.7**		5.7	0	$ 109,953	5	45,980	$ 282,317	0		$ -	$ -	$ 94,000	$ 486,270	0	**3.64**	$4.13	2 owners
2B	**5.7**		5.7	0	$ 109,953	5	45,980	$ 282,317	0	700	$ 175,000	$ -	$ 94,171	$ 661,441	1.37	**2.85**	$3.51	Least expensive and best location
2C	**5.7**		5.7	0	$ 109,953	5	45,980	$ 282,317	1000	0	$ 250,000	$ -	$ 94,000	$ 736,270	1.04	**4.93**	$5.67	Future development
3A	3.9		3.9	0.5	$ 75,231	5	31,460	$ 193,164	0	600	$ 150,000	$ -	$ 220,428	$ 638,824	0	4.81	$5.45	Not convient to outfall
3B	3.9		3.9	0	$ 75,231	5	31,460	$ 193,164	0	0	$ -	$ -	$ 220,428	$ 488,824	0.731	5.95	$6.44	Most desirable hydraulically
3C	4.9		4.9	0	$ 94,521	5	39,527	$ 242,694	0	0	$ -	$ -	$ 220,428	$ 557,643	0	2.49	$3.05	Convienient to outfall
4A	2		2	0	$ 38,580	5	16,133	$ 99,059	700	200	$ 225,000	$ -	$ 39,935	$ 402,574	0	1.58	$1.98	Biscects property
4B	2.1		2.1	0	$ 40,509	5	16,940	$ 104,012	600	100	$ 175,000	$ -	$ 39,935	$ 359,456	0.053	1.13	$1.49	Same owner as 3C
4C	2		2	0	$ 38,580	15	48,400	$ 297,176	500	500	$ 250,000	$ -	$ 39,935	$ 625,691	0	2.06	$2.69	Future development considerations
5A	2.7	0.5	3.2	0	$ 61,728	5	25,813	$ 158,494	2000	2000	$ 1,000,000	$ -	$ 177,923	$ 1,398,145	0	1.94	$3.34	Least desirable hydraulically
5B	2.7	0.5	3.2	0	$ 61,728	5	25,813	$ 158,494	450	0	$ 112,500	$ -	$ 177,923	$ 510,645	0	1.84	$2.35	Frontage
5C	2.7	0.5	3.2	0.5	$ 61,728	5	25,813	$ 158,494	0	400	$ 100,000	$ -	$ 177,923	$ 498,145	0	1.00	$1.50	Rear - check easement cost included
6A	2		2	0	$ 38,580	5	16,133	$ 99,059	0	250	$ 62,500	$ 20,000	$ 81,240	$ 301,379	0	0.57	$0.87	Least expensive site
6B	2		2	0	$ 38,580	5	16,133	$ 99,059	0	0	$ -	$ 20,000	$ 81,240	$ 238,879	0	1.21	$1.45	Could combine with 5C
6C	2		2	0.5	$ 38,580	5	16,133	$ 99,059	0	0	$ -	$ 20,000	$ 81,240	$ 238,879	0	0.87	$1.11	Could combine with 5B
7A	5.8	2.4	8.2	0	$ 158,178	5	66,147	$ 406,141	400	0	$ 100,000	$ -	$ 327,537	$ 991,856	0.085	3.22	$4.21	Lowest in elevation
7B	5.1	1.5	6.6	0	$ 127,314	5	53,240	$ 326,894	0	0	$ -	$ -	$ 327,537	$ 781,745	0	2.89	$3.67	Excellent proximity to outfall
7C	5.1	1.5	6.6	0	$ 127,314	5	53,240	$ 326,894	0	700	$ 175,000	$ -	$ 327,537	$ 956,745	0	3.52	$4.48	Requires demolition/relocations
8A	4.2	0.75	4.95	0	$ 95,486	5	39,930	$ 245,170	500	0	$ 125,000	$ -	$ 324,213	$ 789,869	0	1.19	$1.98	Excellent proximity to outfall
8B	4.7	1.0	5.7	0	$ 109,953	5	45,980	$ 282,317	0	0	$ -	$ -	$ 324,213	$ 716,484	0.052	9.64	$10.36	Would have to wrap around a cell tower
8C	4.2	1.0	6.8	1	$ 131,172	1	10,971	$ 67,360	550	500	$ 262,500	$ -	$ 324,213	$ 785,245	0.178	3.50	$4.29	Least convienient location
9A	**6.2**		6.2	1	$ 119,598	10	100,027	$ 614,164	600	600	$ 300,000	$ -	$ 106,454	$ 1,140,216	0	**1.82**	$2.96	Consider historical outfall
9B	**6.0**		6	0	$ 115,740	5	48,400	$ 297,176	400	0	$ 100,000	$ -	$ 106,454	$ 619,370	0.159	**40.10**	$40.72	New apartments under const. here
9C	**6.0**		6	0	$ 115,740	5	48,400	$ 297,176	0	0	$ -	$ -	$ 106,454	$ 519,370	0	**4.21**	$4.73	Future development considerations
10A	**2.5**		2.5	0	$ 48,225	5	20,167	$ 123,823	0	0	$ -	$ -	$ 143,045	$ 315,093	0	**2.26**	$2.58	
10B	**2.5**		2.5	0	$ 48,225	5	20,167	$ 123,823	0	0	$ -	$ -	$ 143,045	$ 315,093	0	**3.03**	$3.35	
10C	3.8		3.8	0	$ 73,302	2	12,261	$ 75,285	0	0	$ -	$ -	$ 143,045	$ 291,631	0.6	2.18	$2.47	Would involve multiple relocations
														$5,993,010		$16.88	$22.87	Totals for current least expensive sites

[1]Right of way cost estimates dated 9/19/07

Notes: Preliminary recommended site

7.1 Sub-Basin Considerations

Sub-basin 1

This sub-basin is located within a closed basin. The preliminary recommended pond site for this sub-basin is **Pond 1A**. This recommendation is based on the significantly lower estimated cost for this site. Of the three sites evaluated, this site would be the most complicated in terms of design, permitting, and construction since the site receives flow from adjacent off site properties and includes a wetland. The other two sites would detain the runoff prior to discharge which would flow to this site. For this site, the volume of additional runoff would be mitigated by creating an equivalent additional volume of storage.

Sub-basin 2

This sub-basin is located within a closed basin. The preliminary recommended pond site for this sub-basin is **Pond 2B**. This pond site will be bounded by the future Curley Road extension so it would be adjoined by roads on three sides. This would make good use of this location that would be somewhat less suitable for development than other alternatives and would prevent future land use that could create access management problems. The site is also conveniently located adjacent to an outfall at the far end.

Sub-basin 3

This sub-basin is located within a closed basin. The preliminary recommended pond site for this sub-basin is **Pond 3C**. This is the least expensive based on the estimated costs. It is also situated across from the existing outfall from the roadway.

Sub-basin 4

This sub-basin is located within a closed basin. The preliminary recommended pond site for this sub-basin is **Pond 4B**. This is the least expensive based on the estimated costs. It is also convenient to the existing outfall and has the same ownership as 3C such that negotiations for both pond sites would be with the same owner.

Sub-basin 5

This sub-basin is located within an open basin and has a direct outfall to Basset Branch Creek. The preliminary recommended pond site for this sub-basin is **Pond 5C**. This site is convenient to the outfall. It is situated off the mainline. Prior to obtaining land cost estimates it was anticipated that an expanded pond to serve both sub-basins 5 and 6 may be desirable utilizing both frontage and this rear lot area for pond siting. The estimated land cost for the frontage portion of the pond to serve sub-basin 6 was significantly more expensive than another alternative site. Therefore the current recommendation is to acquire Pond 5C as a stand alone site. An easement from the roadway to the pond is required as it will be isolated and not part of an expanded pond site. The alternative floodplain compensation area FPC 5C is also recommended for the sub-basin.

Sub-basin 6

This sub-basin is located within an open basin and has a direct outfall to Basset Branch Creek. The preliminary recommended pond site for this sub-basin is **Pond 6A** based on the estimated costs being significantly lower than the other alternatives. As discussed above, Pond 6B could be combined with 5C in order to create one expanded pond to serve both basins. The additional estimated cost may be worth the investment as it would facilitate maintenance, one site to maintain instead of two, and construction would be facilitated as well.

Sub-basin 7

This sub-basin is located within an open basin and has a direct outfall into the New River tributary. The preliminary recommended pond site for this sub-basin is **Pond 7B**. This site has the lowest estimated costs and is also conveniently located with respect to an outfall. Floodplain compensation area 7C is also recommended.

Sub-basin 8

This sub-basin is located within an open basin and has a direct outfall into the New River tributary. The preliminary recommended pond site for this sub-basin is **Pond 8A**. This site has the lowest estimated costs and is also conveniently located with respect to an outfall.

Sub-basin 9

This sub-basin is located within a closed basin. The preliminary recommended pond site for this sub-basin is **Pond 9A**. This site has the lowest estimated costs. This sub-basin has a low point at Station 925+00 and once flood stages rise the discharge would flow thru the alternative Pond 9C location, which is also the location of the proposed Wyndrush development. During field review the site was walked and appears to be lower than what is indicated by the available contour information. Concerns are that the Wyndrush development may impact discharge from the area north to the wetlands.

Sub-basin 10

This sub-basin is located within a closed basin. The preliminary recommended pond site for this sub-basin is **Pond 10A**. This site has only slightly higher cost than Pond 10C and does not require a joint use pond agreement. Pond 10C may be a better alternative if approached as a joint use pond agreement to expand the existing pond area, thereby reducing acquisition cost and future maintenance cost as well.

Appendices

A SMF Calculations

B Conceptual Drainage Maps with Alternative SMF Sites

C Agency Coordination