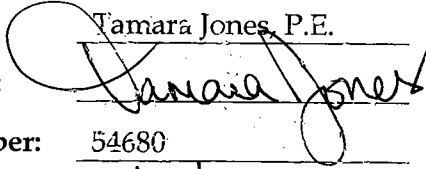


PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with CH2M HILL, Inc., a corporation, authorized to operate as an engineering business, FEID No. 59-0918189, by the State of Florida, Department of Professional Regulation, Board of Professional Engineers, and that I have reviewed or approved the evaluation, findings, opinions, conclusions, or technical advice hereby reported for:

Project: SR 415 PD&E Study
FIN: 407355-1-22-01, 407355-2-22-01
FAP: 7777 091 A, FL62 045 R
Location: Seminole and Volusia Counties, Florida
Client: FDOT - District 5

This Preliminary Engineering Report includes a summary of data collection efforts and conceptual design analyses for the SR 415 PD&E Study. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering and planning as applied through professional judgement and experience.

Name: Tamara Jones, P.E.
Signature: 
P.E. Number: 54680
Date: 10/20/2004

Note: Per direction from the Florida Department of Transportation - District Five, this Preliminary Engineering Report was prepared without the District Design Engineer's approval of the Typical Section Package due to a desire to reexamine the typical section(s) during the design phase.

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1. Summary

1.1 Commitments

In order to minimize the impacts of this project to the human environment, the Florida Department of Transportation (FDOT) is committed to the following measures for the SR 415 project.

Access

The Department is committed to the following issues related to access management. Refer to the *Preliminary Concept Plans* provided in Appendix D for an illustration of these access modifications. An access management plan was prepared for this study and is discussed further in Section 8.19 of this report.

SR 415/SR 46 Intersection Geometry - The Initial interim intersection improvement option was determined to be the Preferred Option for this intersection. This option ties to the existing SR 46 and assumes the SR 415 four-laning improvements would occur prior to capacity or turning lanes improvements along SR 46. The proposed right-of-way for the intersection as shown on the *Preliminary Concept Plans* can accommodate the intersection geometry for the Ultimate Option. The right-of-way requirements for the Initial Interim intersection improvement are less than the limits shown.

Celery Avenue Realignment - Alignment modifications for the proposed improvements require the relocation of the SR 415/Celery Avenue Intersection. The existing intersection will be relocated approximately 950 feet south of its existing location due to the need to raise the profile of SR 415 over the St. Johns River to meet the United States Coast Guard (USCG) vertical clearance criteria of 45 feet. Preferred Option 1 provides for a full median opening. Seminole County is currently studying potential improvements to Celery Avenue. Coordination with Seminole County during the design phase of SR 415 will be required to ensure compatibility with final decisions related to Celery Avenue.

Stormwater Management Systems

FHWA and FDOT will continue to coordinate with SJRWMD to address the final recommended stormwater pond locations and any additional drainage concerns or issues during the design phase of project development. The only location where stormwater ponds is not required, is in Segment C (from north of the St. Johns River Bridge to Reed Ellis Road in Volusia County). FDOT is committed to using exfiltration systems for stormwater treatment in this area. Exfiltration is the preferred method of treatment within this segment as opposed to dry detention ditches.

St. Johns River Floodplain

Backwater calculations for the existing and proposed bridge configurations will be performed during final design to determine scour depths for the bridge structures. Models may be used to demonstrate zero rise for the St. Johns River, which is an acceptable method of mitigation for addressing floodplain fill. Based on a meeting with SJRWMD staff (January 21, 2004 meeting minutes as attached in the *Pond Siting Report*), it was determined that this "no rise" calculation approach could be utilized in lieu of volume compensation during the permitting phase of this project.

Location of Right-of-Way Fence through Segment C

The Department has committed to placing the right-of-way fence in Segment C at the top of the slope in an effort to minimize wildlife impacts. Through discussions with SJRWMD staff, the SJRWMD has expressed interest in providing maintenance on the down side of the embankment slope. As a result, appropriate agreements between SJRWMD and FDOT would need to be developed that would allow FDOT personnel to access the slope area for inspection of culverts and any other structures within this segment. The final placement of the right-of-way fence and maintenance issue will be coordinated further with SJRWMD as part of the final design and right-of-way acquisition phases of this project.

Multi-Use Trail

FDOT is committed to assessing the feasibility of a multi-use trail facility within the SR 415 corridor. The study limits for the proposed trail extend from Celery Avenue in Seminole County to SR 44 in Volusia County. The facility will cross over the St. Johns River, which is a navigable waterway. Coordination with Seminole County and Volusia County will be needed to review their overall Multi-Use Trail Master plans. Potential funding partnership with Volusia County and Seminole County may be required.

FDOT is recommending that during the design phase, an alignment shift of the roadway be evaluated through Volusia County property located on the east side of SR 415 (just north of Reed Ellis Road and south of Lemon Bluff Road). The purpose of the realignment is to minimize additional right-of-way impacts to private property and maximize right-of-way impacts to the Volusia County property.

It is also recommended that the width of the trail be reevaluated during the design phase to reduce the width from 14 feet to 12 feet in order to accommodate future links to other proposed trails in the area.

Threatened and Endangered Species

During preparation of permit applications, all suitable habitat for scrub jays and gopher tortoises to be impacted by the roadway or the ponds will be identified and surveyed. If these species are found, coordination will be initiated with the appropriate resource agencies and required permits will be obtained.

FDOT is committed to implementing the USFWS-approved *Standard Protection Measures for the Eastern Indigo Snake* during design and construction, for the protection of the indigo snake.

The St. Johns River is federally designated as an area of Critical Habitat for the West Indian manatee. Manatees are known to be present and were observed within the St. Johns River at the SR 415/St. Johns River Bridge. Therefore, special precautions and best management practices will be employed during construction activities to avoid disturbance to this protected species. The *Manatee Watch Program* is included in Appendix E of this *Preliminary Engineering Report*.

If threatened, endangered species, or species of special concern are identified within the construction area during final design or construction, coordination will be initiated with the appropriate resource agencies to avoid or mitigate impacts.

Wildlife Crossings

Wildlife crossing ledges, will be provided at the St. Johns River Bridge and at the St. Johns River Relief Bridge over Mud Creek to accommodate small wildlife creatures. In discussions with SJRWMD, it was suggested that four to six crossings (36-inch culverts) be placed through ecotonal or transitional areas appropriately spaced between the St. Johns River and Mud Creek. Generally, recommendations are for spacing the wildlife crossings about 500 feet in wet areas and 1000 feet in drier upland or transitional areas. Specific locations and type of crossing will be determined and evaluated further during the final design phase of this project.

Noise Barrier

FDOT is committed to the construction of a noise barrier at the location just north of Rabbit Run near Kove Estates (Sta. 237+88 to Sta. 255+45) contingent upon the following:

1. Detailed noise analyses during the final design process supports the need for abatement.
2. Reasonable cost analysis indicates that the economic cost of the barrier will not exceed the FDOT guidelines.
3. Community input regarding desires, types, heights and locations of barriers has been solicited by the District Office.
4. Local officials have addressed preferences regarding compatibility with adjacent land uses.
5. Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed.

However, a final decision on the location and height of the barrier will be determined upon gaining sufficient information during the final design, completion of the public involvement program, and the input of the benefited residents.

A land use review will also be implemented during the design phase to identify noise sensitive sites that may have received a building permit subsequent to the noise study but prior to the date of public knowledge (i.e., date that the environmental document has been approved by the Federal Highway Administration (FHWA)). If the review identifies noise sensitive sites that have been permitted prior to the date of public knowledge, then those noise sensitive sites will be evaluated for traffic noise and abatement considerations.

Bridge Replacements

As part of the proposed widening and reconstruction of SR 415, two bridges will be replaced, the St. Johns River Bridge (Douglas Stenstrom Bridge No. 790124) and the St. Johns River Relief Bridge (Bridge No. 790198) over Mud Creek. The proposed bridge replacement over the St. Johns River is required to meet the USCG's navigational clearance for a 45-foot vertical bridge clearance. North of the St. Johns River, the proposed roadway and the St. Johns River Relief Bridge profile will be raised to meet stormwater runoff requirements.

Aesthetics and Landscaping

The Department is committed to offsetting visual impacts that may be incurred by evaluating aesthetics and landscaping along the project corridor as part of the final design phase of this project.

1.2 Recommendations

FDOT recommends the proposed improvements to widen and improve sections along SR 415 from SR 46 in Seminole County to SR 44 in Volusia County. The project study limits on SR 415 extend from SR 46 in Seminole County to SR 44 in Volusia County; a total distance of approximately 18.4 miles in length. The project study area includes the jurisdictions of City of Deltona, and unincorporated areas of Seminole and Volusia Counties. In addition, the study corridor traverses the towns of Osteen, Alamana, and Samsula located in Volusia County.

FDOT recommends reconstruction of the existing two-lane facility to a four-lane roadway (two lanes in each direction). Initially, the study limits for the proposed widening of the existing two-lane roadway were from SR 46 to SR 44. However, early in the study, it was determined that the future (2030) projected traffic demand did not support the need for a four-lane widening north of the City of Deltona. Therefore, the study limits for the roadway improvements were revised. The revised study limits for the proposed roadway widening extend from SR 46 to Acorn Lake Road, just north of Fort Smith Boulevard in Deltona; a total distance of approximately 8.3 miles.

As a result of the input from the community, interagency coordination, and engineering and environmental studies conducted as part of the PD&E study, the alternative recommended for location and design concept acceptance is a combination of the Urban Alternative and the Refined Rural Hybrid Alternative with Exfiltration option. The proposed improvements are intended to enhance the ability of the roadway to meet anticipated traffic demands, improve safety, and serve existing and future land uses along the SR 415 corridor.

The recommended Preferred Alternative involves:

- **Four-Lane Urban Alternative:** The typical section consists of four 12-foot travel lanes (two in each direction) with a four-foot bike lane and curb and gutter. The median separation varies between 22 and 40 feet in width depending on the segment. Five-foot sidewalks are provided on both sides between SR 46 and Celery Avenue. From Lemon Bluff Road to north of Kove Estates, sidewalks are provided on the west side and a 14-foot trail is provided on the east side of SR 415. Stormdrains and stormwater ponds would be required.

- Refined Rural Hybrid Alternative (North of St. Johns River Bridge to Reed Ellis Road): The roadway typical section (widening to the west) consists of four 12-foot travel lanes (two in each direction) with 12-foot outside shoulders and 8-foot inside shoulders. The median separation is 40 feet in width. Exfiltration systems are provided for stormwater treatment; therefore, stormwater ponds are not required for this area. In addition, 1:1 fill slopes are provided with geo-fabric slope protection. Sidewalks are not provided. A 14-foot trail is provided on the west side of SR 415 on the berm outside the exfiltration system.
- Five-Lane Urban Alternative (North of Kove Estates to Doyle Road, Volusia County): This proposed roadway typical section consists of four 12-foot travel lanes (two in each direction) with a four-foot bike lane and curb and gutter. A 12-foot bi-directional center turn lane is provided. A five-foot sidewalk is provided on the west side of SR 415 and a 14-foot trail is provided on the east side of SR 415. Stormdrains and stormwater ponds would be required.
- Multi-Use Trail: Additional right-of-way is required to accommodate the trail along the entire project corridor. With the exception of bridge crossings, the trail is proposed as a paved 14-foot asphalt trail. For the bridge section over the St. Johns River, a 12-foot trail width is proposed. For the St. Johns River Relief bridge cross section, a 14-foot trail width is proposed.
- Bridge Replacement: The proposed concept includes the construction of two new bridges: the St. Johns River Bridge and the St. Johns River Relief Bridge over Mud Creek. Refer to Section 8.17 of this report for more detailed information.
- Drainage and stormwater management facility improvements will be required for the roadway improvements to comply with local jurisdictions and SJRWMD criteria.

Specific components of the recommended Preferred Alternative are described in Chapter 8 of this Preliminary Engineering Report and in the Typical Section Package included as Appendix B. Note: Per direction from the Florida Department of Transportation - District Five, this *Preliminary Engineering Report* was prepared without the District Design Engineer's approval of the Typical Section Package due to a desire to reexamine the typical section(s) during the design phase. Conceptual design plans for the recommended Preferred Alternative are also included as Appendix D.

2. Introduction

This Preliminary Engineering (PE) Report has been prepared in accordance with the Florida Department of Transportation's (FDOT's) *Project Development and Environment (PD&E) Manual*.

2.1 Purpose

The general objective of this PD&E study is to provide documented information necessary for FDOT to reach a decision on the type, design, and location of improvements to SR 415 in Seminole and Volusia Counties, Florida. A regional location map, which identifies the project study area, is presented in Figure 2-1.

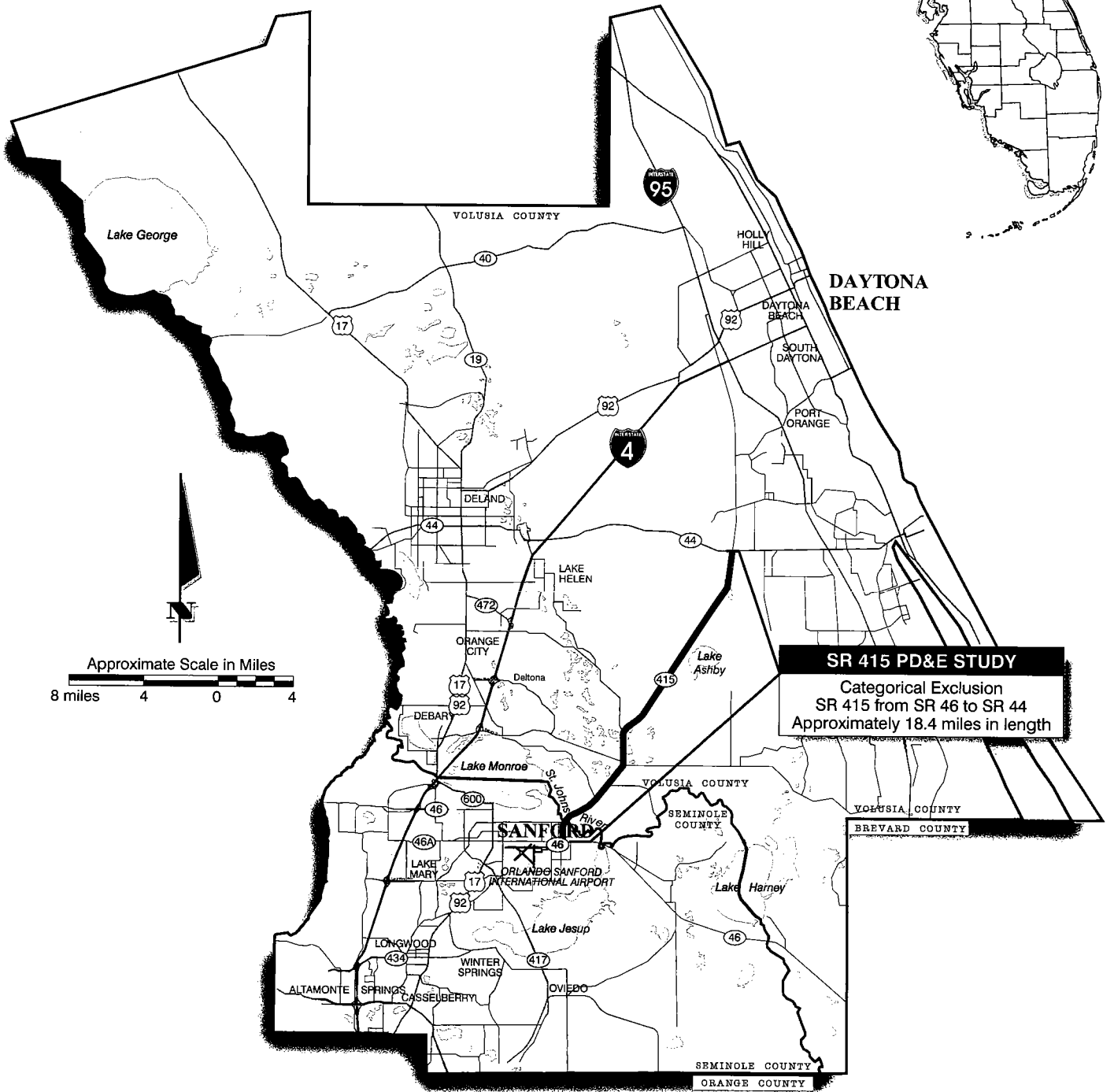
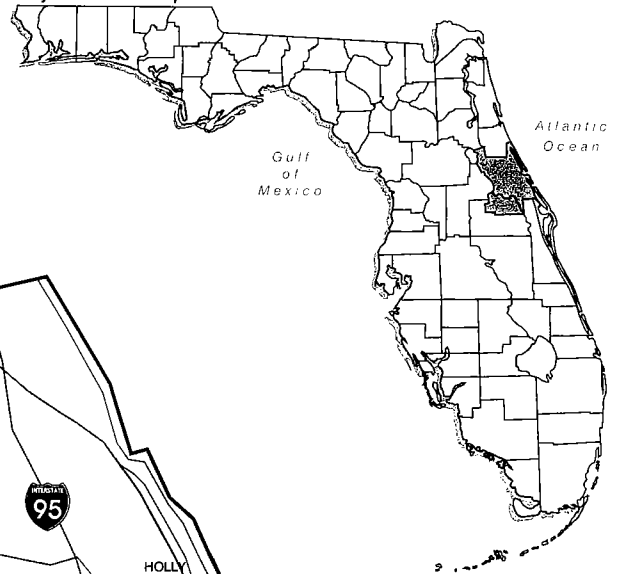
The Federal Highway Administration (FHWA), in consultation with the Florida Department of Transportation (FDOT), proposes to widen and improve sections along the State Road (SR) 415 corridor from SR 46 in Seminole County to SR 44 in Volusia County. The purpose of the project is to enhance the ability of the roadway to meet anticipated traffic demands, improve safety, and serve existing and future land uses along the SR 415 corridor. In addition, the objective of this study is to meet the requirements of the National Environmental Policy Act (NEPA) and to gain Location and Design Concept Acceptance (LDCA) from FHWA. The study includes consideration of social, economic, and environmental impacts and mitigation of those impacts as required by FHWA and FDOT's *PD&E Manual*, and summarize the findings in the required environmental documents, preliminary plans, and public involvement process. A Preliminary Engineering (PE) Report and a Type II, Categorical Exclusion (CatEx) are being prepared for this study. This project is commonly referred to as the SR 415 PD&E Study.

This PE Report presents information on the need for the project and existing conditions, develops and evaluates alternatives, and provides engineering details of the proposed improvements.

Several additional documents and studies were prepared for this study and serve as support documentation to this PE Report. The following documents include:

- *Type II, Categorical Exclusion* (September 2004)
- *Air Quality Technical Memorandum* (October 2003)
- *Comments and Coordination Report* (October 2004)
- *Contamination Screening Evaluation Report* (December 2003)
- *Cultural Resource Assessment Corridor* (November 2002)
- *Cultural Resource Assessment Survey* (October 2003)
- *Endangered Species Biological Assessment* (June 2004)
- *Final Technical Memorandum: Design Traffic Phase I – Existing Conditions* (August 2003)
- *Final Technical Memorandum: Design Traffic Phase II – Future Conditions* (August 2003)
- *Initial Alternatives Public Workshop Summary* (March 2003)

Key Location Map



SR 415 PD&E STUDY

Categorical Exclusion
SR 415 from SR 46 to SR 44
Approximately 18.4 miles in length

2.2.1 Proposed Multi-Use Trail

As part of the PD&E Study, FDOT has committed to assess the feasibility of a multi-use trail facility within the SR 415 corridor for non-motorized modes, including bikeways and pedestrian walkways. The study limits for the proposed trail extend from SR 46 in Seminole County to SR 44 in Volusia County. The facility will cross over the St. Johns River, which is a navigable waterway. In addition, the facility will cross over Mud Creek, Deep Creek, the Lake Ashby Canal, and the Alamana Canal. The potential for connections to the other existing/planned multi-use trail facilities and crossing locations along SR 415 are also being considered. The proposed multi-use trail is independent of the proposed roadway improvements to SR 415 and is being studied at the request of Volusia County.

2.2.2 SR 415 Land Use Corridor Analysis Study

In coordination with the PD&E Study, FDOT initiated *the SR 415 Land Use Corridor Analysis Study* to address concerns related to growth and potential sprawl in southeast Volusia County. The purpose of the land use study is to coordinate with Volusia County and the surrounding communities to better define a land use character and vision that will allow FDOT to develop transportation improvements for the area that complement and respond to the desired land use plan.

This is an independent study that was performed at the request of Volusia County that focuses on methods to promote and preserve the rural character of the SR 415 corridor. The study has identified a desire on the part of the community to develop roadway designs that protect scenic views and environmentally sensitive areas, while enhancing development within rural development clusters, such as Osteen.

2.2.3 Study Sections

To facilitate the engineering and environmental analyses and document preparation, the project study area has been divided into two sections, the Southern and Northern Sections. The Southern Section is further divided into seven segments.

Southern Section

- **Segment A** – Extends from SR 46 in Seminole County to just south of the St. Johns River Bridge in Volusia County.
- **Segment B** – The SR 415/St. Johns River Bridge at the Seminole/Volusia County line.
- **Segment C** – Extends from just north of the St. Johns River Bridge in Volusia County to Reed Ellis Road.
- **Segment D** – Extends from Reed Ellis Road to Lemon Bluff Road.
- **Segment E** – Extends from Lemon Bluff Road to north of Kove Estates.
- **Segment F** – Extends from north of Kove Estates to Doyle Road.
- **Segment G** – Extends from Doyle Road to Acorn Lake Road.

Capacity improvements are being evaluated only for this section (Segments A through G) of the project. In addition, a multi-use trail is being studied throughout this section.

Northern Section

The Northern Section extends from north of Acorn Lake Road to the end of the project study limits at SR 44 in Volusia County. Only the multi-use trail is being studied throughout this section.

2.3 Timing of Construction

To keep up with the tremendous growth in Seminole and Volusia Counties, METROPLAN Orlando and the Volusia County Metropolitan Planning Organization (MPO) have identified the need to widen and improve SR 415 through the project study limits as a top priority. Design for the four-lane widening is planned through Fiscal Year 2004/2005 for the portion from SR 46 to the Seminole County Line and is planned through Fiscal Year 2006/2007 for the portion through Volusia County. Right-of-way acquisition is funded in Fiscal Year 2008/2009. However, no funding for construction has been allocated.

2.4 Other Related Studies

Other related transportation studies are currently planned within the project study area. Some of the related studies include the following:

- **East Lake Mary Boulevard (Silver Lake Drive) Widening** – This project involves four-laning approximately 3.2 miles of East Lake Mary Boulevard from US 17/92 to the Orlando Sanford International Airport entrance (FM No. 410521). This is a County Incentive Grant Program project.
- **East Lake Mary Boulevard (Silver Lake Drive) Extension** – This project involves the construction of a new four-lane roadway that would extend from the Orlando Sanford International Airport entrance to the intersection of SR 46/SR 415 in Seminole County (FM No. 410522). The total length of this project is approximately 3.8 miles in length. This is a County Incentive Grant Program project.
- **Celery Avenue Roadway Retrofitting/Drainage Improvements** – This project involves drainage improvements and/or retrofitting a segment of Celery Avenue from Mellonville Avenue to Chickasaw Drive in Seminole County.
- **SR 415 Resurfacing (completed)** – This project involves resurfacing 5 miles of SR 415 from the north end of the St. Johns River Bridge to north of Doyle Road (FM No. 404131).
- **SR 415 Turn lane Additions (completed)** – This project involves the addition of bi-directional turn lanes between Doyle Road and Enterprise-Osteen Road, and the addition of a northbound right turn lane at Reed Ellis Road just east of Deltona (FM No. 404312).
- **Low-Level Relief Bridge Replacement (completed)** – This project involves the replacement of Bridge No. 790032, which is located approximately 2 miles south of Osteen (FM No. 240921).
- **Doyle Road Signal Warrant Study**

- **Deltona Road Widening Projects** – These Volusia County projects involve widening (from two to four lanes) Fort Smith Boulevard between Courtland Boulevard and SR 415; Normandy Boulevard between Saxon Boulevard and Firwood Drive; and Courtland Boulevard between Fort Smith Boulevard and Howland Boulevard (FM No. 410984, 410985, and 410987). These are Transportation Outreach projects.
- **Elkcam Boulevard Extension** – It should be noted, that this project was removed from the Volusia County's 5-Year Work Program. The decision to remove this project from the list took place at the January 23, 2003 Council Meeting.
- **SR 417 Extension Study (Turnpike's Feasibility Study)** - Florida's Turnpike Enterprise conducted a Volusia County Corridor Study to investigate the feasibility of a new toll road in Seminole and Volusia Counties. This road would extend from SR 417 (Central Florida GreeneWay) in Seminole County north to connect with Interstate 95 in Volusia County. The Florida's Turnpike Enterprise presented their findings to the Volusia County Council in June 2003 in which the project was found not to be feasible due to high environmental impacts and mitigation costs. Estimated revenues fell significantly short of project costs, and therefore, due to State Statute, the Florida's Turnpike Enterprise cannot advance the project concept without identifying potential funding partners.
- **SR 44 Widening** – This project involves four-laning 6.4 miles of SR 44 from I-4 to Pioneer Trail and add two eastbound lanes to the new alignment along the 1 mile stretch west of I-4 (FM No. 2408052 and 2409982). In addition, SR 44 is planned to be four-laned from Pioneer Trail to SR 415 (FM No. 2408053); a total distance of approximately 3.7 miles.
- **LPGA Boulevard Extension** – An environmental study is planned to investigate the feasibility of extending LPGA Boulevard as a new two-lane roadway from US 92 south to Tomoka Farms Road (CR 415) (FM No. 4102521).
- **LPGA/Madeline Avenue Extension** – An alignment study being conducted by Volusia County is planned to investigate the feasibility of a new two-lane roadway that would extend Madeline Avenue from Tomoka Farms Road (CR 415) to Williamson Boulevard (FM No. 5010). This westward connection would ultimately link to a proposed southward extension of LPGA Boulevard (FM No. 4102521).

The above-mentioned projects are all independent and not associated with this PD&E study.

3. Need for Improvement

SR 415 is a key component of East Central Florida's transportation roadway network. It provides system linkage between Seminole and Volusia Counties and serves as an alternate route to both Interstate 4 (I-4) to the west and Interstate 95 (I-95) to the east. Traffic congestion along SR 415 adversely affects the transportation and the needs of the region's travelers. In recent years, accidents have increased in frequency on SR 415, resulting in injuries, fatalities, and economic damage. Safety issues and delays on SR 415 are considered to be a transportation problem facing this area.

To keep up with the tremendous growth in Seminole and Volusia Counties, METROPLAN ORLANDO and the Volusia County Metropolitan Planning Organization (MPO) have identified the need to widen and improve SR 415 through the project study limits as a top priority. Potential widening improvements to the SR 415 corridor are also recognized by local and regional long range plans and are consistent with the METROPLAN ORLANDO *2020 Long Range Transportation Plan Update* and the Volusia County MPO *2020 Long Range Transportation Plan Refinement*. In addition, the improvements are also consistent with the METROPLAN ORLANDO *Transportation Improvement Program FY 2003/04-2007/08*, the Volusia County MPO *Transportation Improvement Program FY 2003/04-2007/08*, and the Volusia County Comprehensive Plan.

3.1 Deficiencies

As the residential population of the study area and travel demands increase, it is anticipated that many of the existing arterial and collector roadways within the project study area will be operating at unacceptable levels of service by the year 2030.

The existing SR 415 facility within the project study area was compared against current minimum roadway design criteria and was found to have several deficiencies, including traffic capacity from SR 46 to Deltona, bridge vertical and horizontal clearances at the SR 415/St. Johns River crossing, horizontal curves lengths through Osteen, and shoulder widths throughout the study limits. These are discussed further in Chapter 4. Additional information on current minimum design criteria is provided in Chapter 5 of this report.

The proposed improvement for SR 415 consists of the four-lane widening of the existing facility; however, in order to minimize right-of-way impacts, this improvement is a reconstruction of the existing facility. Therefore, the existing deficiencies on SR 415 within the study limits from SR 46 to Acorn Lake Road will be corrected by the proposed improvements.

3.1.1 Capacity Deficiencies

The concept of levels of service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream, and the perception by motorists and/or passengers. Six LOS are defined for each type of facility for which analysis procedures are available. The six LOS are given letter designations, A through F, with LOS A representing the best operating conditions and LOS F the worst.

The following discussion summarizes existing capacity constraints and projected future capacity constraints in relation to the need for the proposed improvements. For more detailed discussion of existing and future traffic conditions, refer to Chapter 6 of this report and the *SR 415 Final Technical Memorandum: Design Traffic Phase I Existing Conditions and Phase II Future Conditions*.

3.1.1.1 Existing Conditions

Traffic counts were performed to determine the existing (2002) operating conditions and LOS along the SR 415 corridor. The LOS analyses were completed in accordance with the procedures outlined in the FDOT's *Design Traffic Handbook*, Topic No. 525-030-120-f.

According to the existing (2002) traffic capacity analyses, the average annual daily traffic (AADT) within the project study limits ranged between approximately 4,971 vehicles along SR 415, north of SR 44 to 18,091 vehicles along SR 415, between Celery Avenue (CR 415) and Reed Ellis Road. The volumes are expected to increase to approximately 12,300 vehicles along SR 415, between Howland Boulevard and Fort Smith Boulevard, and approximately 32,000 vehicles between SR 46 and Celery Avenue for the No Build Scenario in year 2030. Based on 2002 FDOT traffic data, SR 415 currently operates at an acceptable level of service (LOS D) from SR 46 to Doyle Road (CR 4162). To the north of Doyle Road (CR 4162), SR 415 operates at LOS C or better.

In addition, several SR 415 cross streets currently operate at deficient LOS (below the acceptable standard of LOS D). These cross streets include SR 46, Celery Avenue (CR 415), Reed Ellis Road, Enterprise-Osteen Road (CR 5758), and Doyle Road (CR 4162). Past and current development within the study area have increased traffic flow such that portions of the corridor operate under forced flow conditions. Primary causes for these deficient LOS result from inadequate capacity at the cross street locations. It is anticipated that this operational constraint will remain a primary factor that will impede traffic flow along the facility even under improved conditions. For a more detailed discussion of existing traffic conditions, refer to Chapter 6 of this report and the *SR 415 Final Technical Memorandum: Design Traffic Phase I Existing Conditions*.

3.1.1.2 Future Conditions

LOS analyses were performed for the No Build and Build Scenarios for the design year (2030). The LOS analyses were completed in accordance with the procedures outlined in the FDOT's *Design Traffic Handbook*, Topic No. 525-030-120-f. The results of the traffic forecasting effort predict that the AADT along SR 415 will vary from approximately 19,600 vehicles north of SR 44 to approximately 45,300 vehicles from SR 46 to Celery Avenue (CR 415) for the 2030 Build Scenario.

The results of the analyses for the No Build Scenario indicate that portions of SR 415 will operate at LOS F from the beginning of the project, at SR 46 to Doyle Road (CR 4162). The remainder of the corridor will operate at LOS D or better from north of Doyle Road (CR 4162) to the project's terminus, SR44. Figure 6-4, in Chapter 6 of this report, illustrates the future (2030) LOS for the No Build Scenario.

The results of the traffic analyses indicate that implementing the proposed improvements will improve the operations of SR 415 for the design year (2030). For the Build Scenario, SR 415 will operate at an acceptable LOS D or better from north of Reed Ellis Road to SR 44. The highway will operate at a LOS E from Celery Avenue (CR 415) to Reed Ellis Road, and LOS F from south of SR 46 to Celery Avenue (CR 415).

3.1.2 Evacuation Routes and Emergency Services

SR 415 is classified as an emergency evacuation route by the Volusia County Emergency Management Division, providing an inland evacuation route for the coastal regions of Volusia County. SR 46 and SR 44 are also emergency evacuation routes.

3.2 Safety

Overall, the FDOT and County's crash data for SR 415 indicate that a considerable number of crashes are occurring in Seminole County. FDOT and County crash data are not consistent, but are similar. The number of crashes in the Seminole County portion of the corridor results in FDOT safety ratios well over 1.0. The number of crashes in the Volusia County portion result in a safety ratio lower than 1.0, based on the FDOT crash data; however, 100% of the fatalities along the corridor are occurring in Volusia County. The proposed expansion of the SR 415 facility will better accommodate the projected number of trips along the study area between SR 46 and Deltona. The improvement will also provide better channelization of traffic and access management. This will reduce the number of potential vehicle conflict points along the corridor. This would likely have a positive impact on reducing the number of crashes and injuries in the study area.

3.3 Consistency with Regional and Local Transportation Planning

The proposed improvements have been coordinated with and are consistent with other transportation improvements planned for the project study area. The FDOT transportation plan provides the basis for the development of a statewide transportation system by prioritizing state projects listed in the Long Range Transportation Plans (LRTPs) of regional and local jurisdictions. METROPLAN ORLANDO and the Volusia County MPO are responsible for developing and updating the LRTPs within Seminole and Volusia Counties, respectively and for addressing all the transportation needs of the region. All local government comprehensive plans must be consistent with the LRTPs of both planning organizations.

The following current adopted comprehensive planning documents of the regional and local government jurisdictions within the project study area were reviewed to determine their consistency with the proposed improvements:

- Florida Department of Transportation 2020 Florida Transportation Plan (adopted March 1995).
- METROPLAN ORLANDO *2020 Long Range Transportation Plan Update* (adopted December 2000). Major long-term planned improvements of the surrounding roadway network within Seminole County are summarized in Table 3-1 and presented in Figure 3-1.
- Volusia County MPO *2020 Long Range Transportation Plan Refinement* (adopted November 2000). Major long-term planned improvements of the surrounding roadway network within Volusia County are summarized in Table 3-1 and presented in Figure 3-1.
- METROPLAN ORLANDO *Transportation Improvement Program (TIP) FY 2003/04 – 2007/08* (adopted July 9, 2003). The SR 415 widening from SR 46 to the Volusia County line and other major roadway improvements within close proximity to the project study area are listed in Table 3-2 and presented in Figure 3-2.
- Volusia County MPO *Transportation Improvement Program FY 2003/04 – 2007/08* (adopted June 24, 2003). The SR 415 widening from the Seminole County line to SR 44 and other major roadway improvements within close proximity to the project study area are listed in Table 3-2 and presented in Figure 3-2.
- Seminole County *Vision 2020 Comprehensive Plan* (adopted September 1991; amended through September 2002)
- *The Volusia County Comprehensive Plan* (adopted March 1990; amended through August 2002)

It should be noted that the regional and local government comprehensive plans have not been approved by FHWA and, therefore, do not constitute a Federal action or an endorsement.

Table 3-1. METROPLAN ORLANDO and Volusia County MPO's 2020 Long Range Transportation Plans

County	Project Name	From	To	Work Description
Federal and State				
Volusia	SR 44	Pioneer Tr (CR 4118)	SR 415	Widen to 4 lanes
Seminole	SR 46	Mellonville Ave	SR 415	Widen to 4 lanes
Seminole	SR 46	SR 415	Volusia County line	Widen to 4 lanes
Seminole	SR 415	SR 46	Volusia County line	Widen to 4 lanes
Volusia	SR 415	SR 44	Howland Blvd	Widen to 4 lanes
Volusia	SR 415	Howland Blvd	Seminole County line	Widen to 4 lanes
Local				
Volusia	Elkcam Blvd Extension	Riverhead Dr	SR 415	New 2-lane road
Volusia	Howland Blvd	Deltona High School	Providence Blvd	Widen to 4 lanes
Volusia	Providence Blvd	Ft Smith Blvd	Tivoli Dr	Widen to 4 lanes
Volusia	Providence Blvd	Howland Blvd	Elkcam Blvd	Widen to 4 lanes
Volusia	Saxon Blvd	Enterprise Rd	I-4	Widen to 6 lanes
Volusia	Saxon Blvd	Tivoli Dr	Providence Blvd	Widen to 4 lanes

Note: Only projects that are within close proximity to the project study area are included above and presented on Figure 3-1.
 Sources: METROPLAN ORLANDO 2020 Long Range Transportation Plan Update (adopted December 2000) and Volusia County MPO 2020 Long Range Transportation Plan Refinement (adopted November 2000)

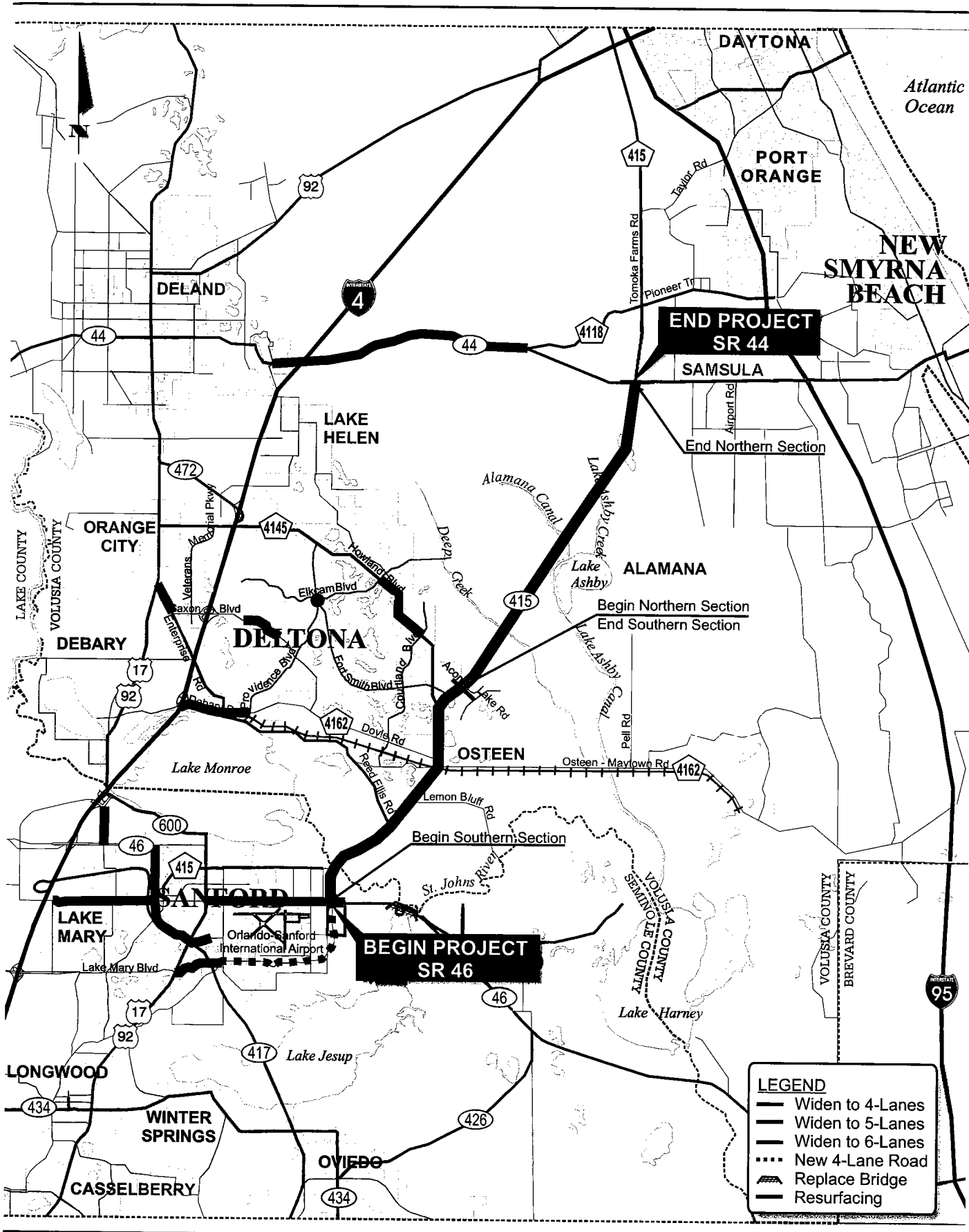
Table 3-2. METROPLAN ORLANDO and Volusia County MPO's Transportation Improvement Programs FY 2003/04 – 2007/08

County	Project Name ¹	From	To	Work Description
Federal and State				
Volusia	SR 44	Summit Ave	West ramps of I-4	Widen to 4 lanes
Volusia	SR 44	West ramps of I-4	Pioneer Tr (CR 4118)	Widen to 4 lanes
Seminole	SR 46	US 17/92	0.145 miles east of SR 415	Resurfacing
Seminole	SR 46	St. Johns River north of Lake Jesup	Bridge #770004	Replace low-level bridge
Seminole	SR 415	SR 46	Volusia County line	Widen to 4 lanes
Volusia	SR 415	Seminole County line	Howland Blvd	Widen to 4 lanes
Volusia	SR 415	Howland Blvd	SR 44	Widen to 4 lanes
Seminole/ Volusia	Volusia/Seminole Co. Corridor Project ²	SR 417 in Seminole County	I-95 in Volusia County	New 4-lane road in SR 415 Corridor
Local				
Seminole	Airport Blvd	US 17/92	CR 46A	Widen to 4 lanes
Seminole	Airport Blvd	CR 46A	SR 46	Widen to 4 lanes
Seminole	C-15/Monroe Rd	SR 46	US 17/92	Widen to 4 lanes
Seminole	CR 46A	C-15	Old Lake Mary Blvd	Widen to 4 lanes
Volusia	DeBary Ave/Doyle Rd	I-4	Providence Blvd	Widen to 4 lanes
Seminole	E. Lake Mary Blvd	US 17/92	Airport entrance	Widen to 4 lanes
Seminole	E. Lake Mary Blvd	Airport entrance	SR 46/SR 415	New 4-lane road
Volusia	Enterprise Rd	Saxon Blvd	US 17/92	Widen to 6 lanes
Volusia	Howland Blvd	Elkcam Blvd	Newmark Dr	Widen to 4 lanes
Volusia	Howland Blvd	Newmark Dr	Courtland Blvd	Widen to 4 lanes
Volusia	Providence Blvd	Ft Smith Blvd	Elkcam Blvd	Widen to 4 lanes
Volusia	Saxon Blvd (Phase II)	Sumatra Ave	Tivoli Dr	Widen to 5 lanes

Notes:

1. Only projects that are within close proximity to the project study area are included above and presented on Figure 3-2.
2. This project was considered by both METROPLAN ORLANDO and the Volusia County MPO to be their joint #1 priority unfunded project due to the need to provide additional roadway capacity in the SR 415 corridor to serve the travel demand between I-95 in Volusia County and SR 417 in Seminole County. Florida's Turnpike District was conducting a planning study to determine the feasibility of such a facility. No subsequent phases are funded at this time, and therefore, this project is not shown on Figure 3-2.

Sources: METROPLAN ORLANDO *Transportation Improvement Program FY 2003/04 – 2007/08* (adopted July 9, 2003) and Volusia County MPO *Transportation Improvement Program FY 2003/04 – 2007/08* (adopted June 24, 2003).



3.4 Social Demands or Economic Developments

This section provides an overview of population, economics, and land use characteristics of Seminole and Volusia Counties, as well as the project study area.

3.4.1 Population and Employment

Over the last two decades, Volusia and Seminole Counties have experienced tremendous growth. In 2001, approximately 452,050 people resided in Volusia County and approximately 377,960 people resided in Seminole County. However, it is anticipated that by the year 2010, the population of Volusia and Seminole Counties will grow to approximately 513,800 residents and 447,100 residents, respectively. This represents a population increase of 14 percent for Volusia County and 18 percent for Seminole County from 2001. In addition, the population of Volusia and Seminole Counties is expected to increase to approximately 585,100 residents and 526,700 residents, respectively, by 2020. This represents a population increase of 29 percent for Volusia County and 39 percent for Seminole County from 2001. Notably, SR 415 is the one of the primary north-south facilities that serves the Volusia County area and has become a primary commuting corridor for residents.

3.4.2 Activity Centers

The *Land Use Corridor Analysis Study* has identified the area surrounding the Town of Osteen as a potential area for limited urban growth. Under this concept, compact commercial growth in the vicinity of Osteen-Maytown Road and Doyle Road would be encouraged. Other commercial nodes along the SR 415 corridor exist at the intersection of SR 46 and SR 44. In the Northern Section of the project study area, north of Deltona, portions of the project corridor have been identified as a Natural Resource Management Area (NRMA) by Volusia County, in which only growth which is compatible with the environmentally sensitive area would be encouraged.

3.4.3 DRIs and other Development Activity

Information on DRIs was collected using the East Central Florida Regional Planning Council's (ECFRPC's) *1998 - 2001 Development of Regional Impact Summaries*. The ECFRPC's *Perspective on Regional Growth 1992 - 1996* was referenced in order to determine the development activity that is being proposed for the study area.

The only DRI located within close proximity to the project study area is the Orlando Sanford International Airport. SR 46 provides regional access to the Airport from the west via Interstate 4 and from the east via Interstate 95. The Airport was opened in 1942 and has experienced considerable growth since. Future plans include more development and expansion in this area. The Airport master plan was recently updated in 2001. Highlights of infrastructure development during the last 5 years include runways, domestic/international terminals, taxiways, a control tower, a fire station, and additional parking. Other new projects include commerce park improvements, a hangar, a Fixed Base Operator facility and a seven-gate domestic terminal expansion.

Some of the land use types characterized by this area is comprised of a mixture of flight training school/general aviation/light industrial. The location of the Airport is presented on Figure 3-3.

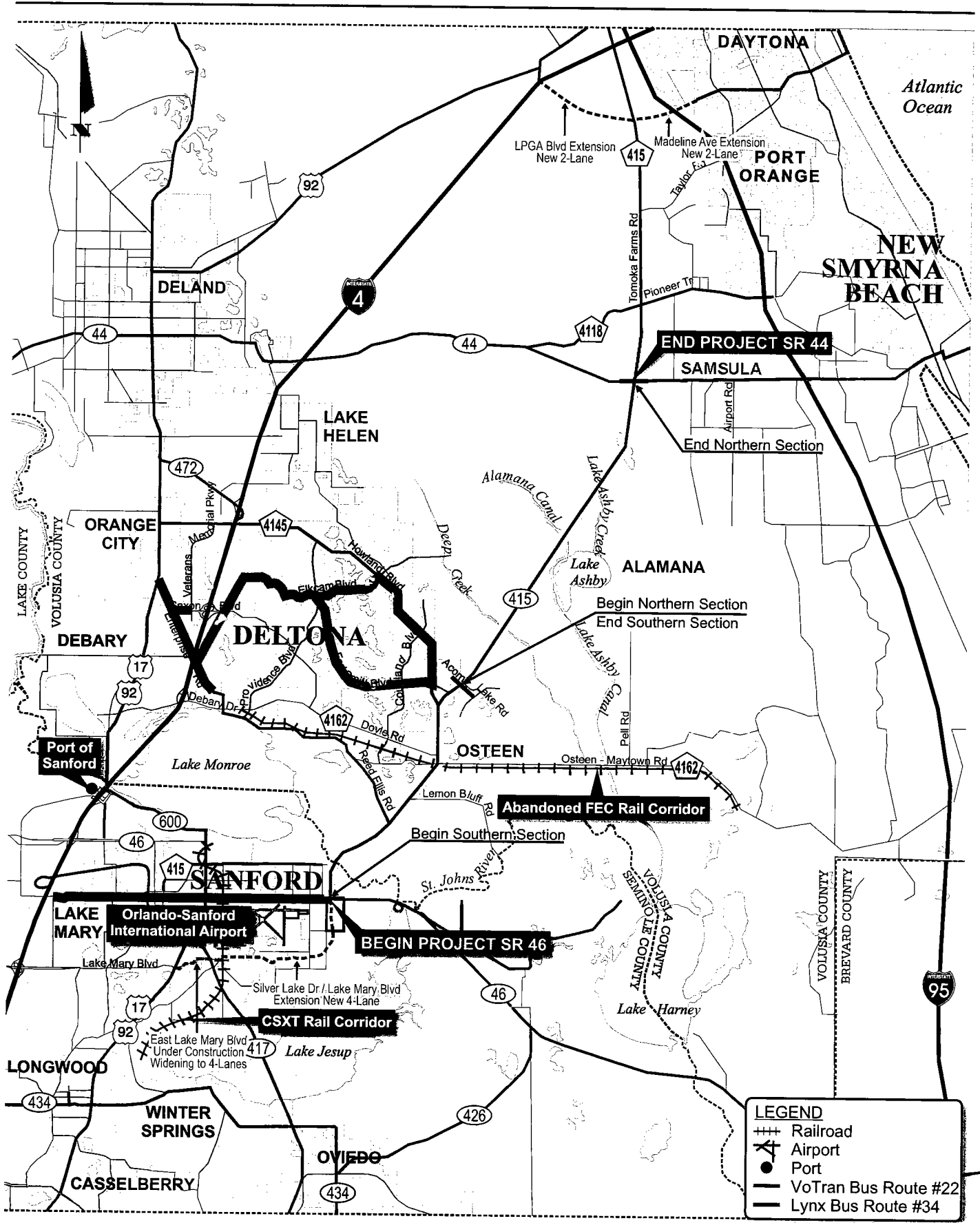


Figure 3-3
Intermodal Services

3.4.4 Modal Interrelationships

The project study area is served by different modes of travel including public transit service, rail service, airports, and sea ports.

3.4.4.1 Mass Transit

LYNX provides existing public transportation service within the Seminole County area while VOTRAN provides service within the Volusia County area. LYNX was established in 1989 as an agency by the Florida Legislature to operate and maintain public regional bus service. The existing LYNX system consists of one bus route (Link 34) that serves the SR 46 corridor just southwest of the beginning of the SR 415 study limits. This route links commuters to the City of Sanford, Seminole County Administrative Services, and the Orlando Sanford International Airport. The existing LYNX bus route is presented on Figure 3-3.

VOTRAN was established in 1975 by the Volusia County Government to operate and maintain bus service in Volusia County. The existing VOTRAN system consists of one bus route (Route 22) that serves the City of Deltona, just west of the project study area. This route links commuters to the City of Deltona, Deltona Plaza, the Saxon Market Place, and Pine Ridge High School. The existing VOTRAN bus route is presented on Figure 3-3.

3.4.4.2 Rail Service

CSX Transportation (CSXT) currently provides freight and passenger rail service in the Central Florida area. There is one railroad line that runs west of the Orlando Sanford International Airport, which is shown on Figure 3-3. There are no existing freight or passenger lines located within the project study limits. There is an abandoned Florida East Coast (FEC) railroad line that runs east-west through the Town of Osteen and parallels Doyle Road and Osteen-Maytown Road.

3.4.4.3 Airports

Orlando Sanford International Airport, located in the City of Sanford, has expanded to become the third busiest international port of entry in Florida. Orlando Sanford International Airport offers both domestic and international service to locals and business travelers while providing charter flights, ground handling, and cargo services. The Airport is operated and maintained by the Sanford Airport Authority. SR 415 provides regional access to the Airport from the north via SR 44 in Volusia County and from the south via SR 46 in Seminole County. Refer to Figure 3-3 for a general location of the airport. Orlando Sanford International Airport is located to the south of the project study limits. Therefore, there are no existing airports located along the SR 415 corridor.

3.4.4.4 Ports

The Port of Sanford has river barge access from the Atlantic Intercoastal Waterway in Jacksonville via the St. Johns River to Lake Monroe. It is located in Seminole County near the I-4/US 17-92 interchange. This port includes 250,000 square feet of industrial and distribution space, a 350-foot main pier, and a 100-foot bulk unloading pier. Access to the port from the SR 415 corridor is via SR 46 west to US 17-92 north. Although this port is not located within the project study limits, SR 415 does provide regional access to this facility. The location of the port is shown on Figure 3-3.

4. Existing Conditions

The existing (2003) conditions for the SR 415 corridor were evaluated by performing a review of existing plans and documents, coordination with regulatory agencies, and field reconnaissance. The posted speed limit on SR 415 varies between 45 and 55 mph through the urban and rural sections, respectively. This project was reviewed against a design speed ranging from 45 to 60 mph and desirable design criteria (as referenced in Chapter 5).

The following sections provide a description of the existing roadway and bridge conditions, and social and environmental characteristics for the SR 415 corridor. As described in Chapter 2, the project study area has been divided into two sections, the Southern and Northern Sections. The Southern Section extends from SR 46 to Acorn Lake Road and is further divided into seven segments, Segment A through G. The Northern Section extends from Acorn Lake Road to SR 44.

4.1 Existing Roadway Characteristics

4.1.1 Functional Classification

SR 415 is functionally classified by the FDOT Straight Line Diagrams as a two-lane, rural minor arterial from MPs 0.000 to 0.897 in Seminole County. In Volusia County, SR 415 is classified as a rural minor arterial from MPs 0.000 to 4.388 and 8.826 to 17.590, and as an urban minor arterial from MPs 4.388 to 8.826. The corridor is a key north-south facility that provides system linkage between Seminole and Volusia Counties, and is part of Florida's State Highway System. In addition, SR 415 is classified as an emergency evacuation route by the Volusia County Emergency Management Division, providing an inland evacuation route for the coastal regions of Volusia County.

The existing roadway network along the SR 415 corridor from SR 46 to SR 44 consists of several at-grade intersections with local roads, collectors, and arterials. Table 4-1 presents the functional classification and the maintaining agency of the collector and arterial cross streets located along the SR 415 corridor. All other cross streets within the project corridor are classified as local roads. The functional classification data was obtained from the Seminole County *Vision 2020 Comprehensive Plan* and the Volusia County *Comprehensive Plan*.

4.1.2 Typical Section(s)

Roadway

The existing typical section for the majority of the SR 415 study corridor consists of two 12-foot travel lanes (one in each direction) with no median separation. The outside shoulders vary between 8 and 12 feet, with 4 feet paved on both sides of the roadway. Through the center of Osteen, from Thompson Avenue, south of Enterprise-Osteen Road, to Lake Street, just south of Doyle Road, the typical section is modified to include a 12-foot center turn lane.

Table 4-1. Functional Classification of Cross Streets

Cross Street	Classification	Maintaining Agency
<i>Southern Section</i>		
Lake Mary Blvd Extension (under construction)	Minor Arterial	Seminole County
SR 46	Principle Arterial	FDOT
Celery Ave (CR 415)	Collector	Seminole County
Reed Ellis Rd	Collector	Volusia County
Lemon Bluff Rd	Collector	Volusia County
Enterprise-Osteen Rd	Collector	Volusia County
Doyle Rd (CR 4162)	Arterial	Volusia County
Howland Blvd (CR 4145)	Arterial	Volusia County
Fort Smith Blvd	Collector	Volusia County
<i>Northern Section</i>		
SR 44	Rural Principle Arterial	FDOT

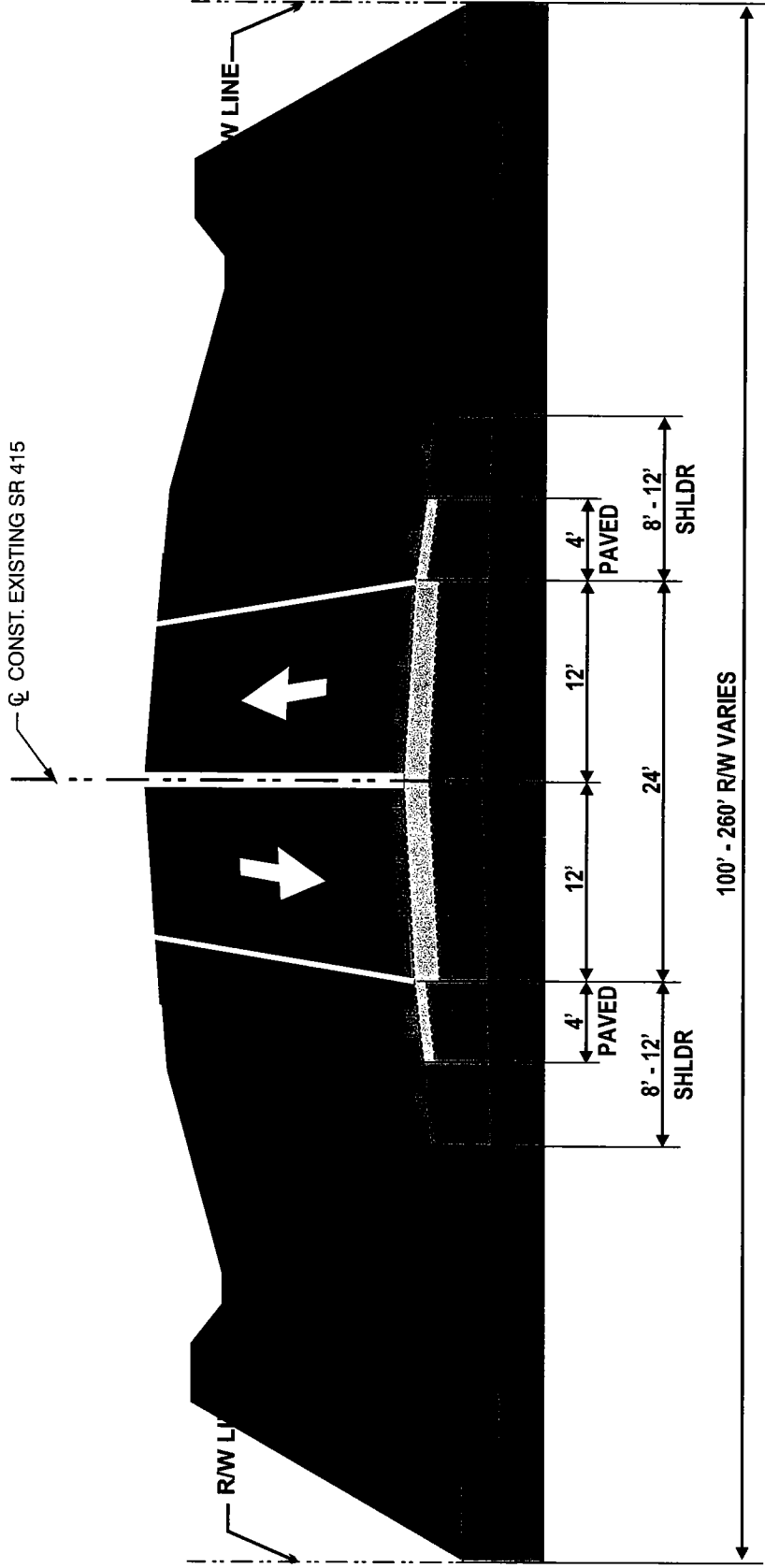
The original roadway was constructed with a 3/16" per foot (0.0156 ft/ft) cross slope; however, several reconstruction and milling and resurfacing projects in recent years have corrected the slope to 0.02 ft/ft, per current design standards (with the exception of the superelevated sections). The original grassed shoulders were constructed with a 0.0625 ft/ft slope to natural ground. The shoulders have since been reworked with a 4-paved width to the outside of the travel lane, and a varying grassed width to natural ground, with a 0.06 ft/ft slope. The typical section right-of-way width varies between approximately 100 and 150 feet with the exception of a wider section near the SR 415/St. Johns River Bridge (Douglas Stenstrom Bridge No. 790124). For further information on the existing right-of-way widths refer to Section 4.1.5. The existing typical section was obtained from existing SR 415 construction drawings. Figure 4-1 presents the existing SR 415 roadway typical section. The existing bridge typical section is described in Section 4.2.

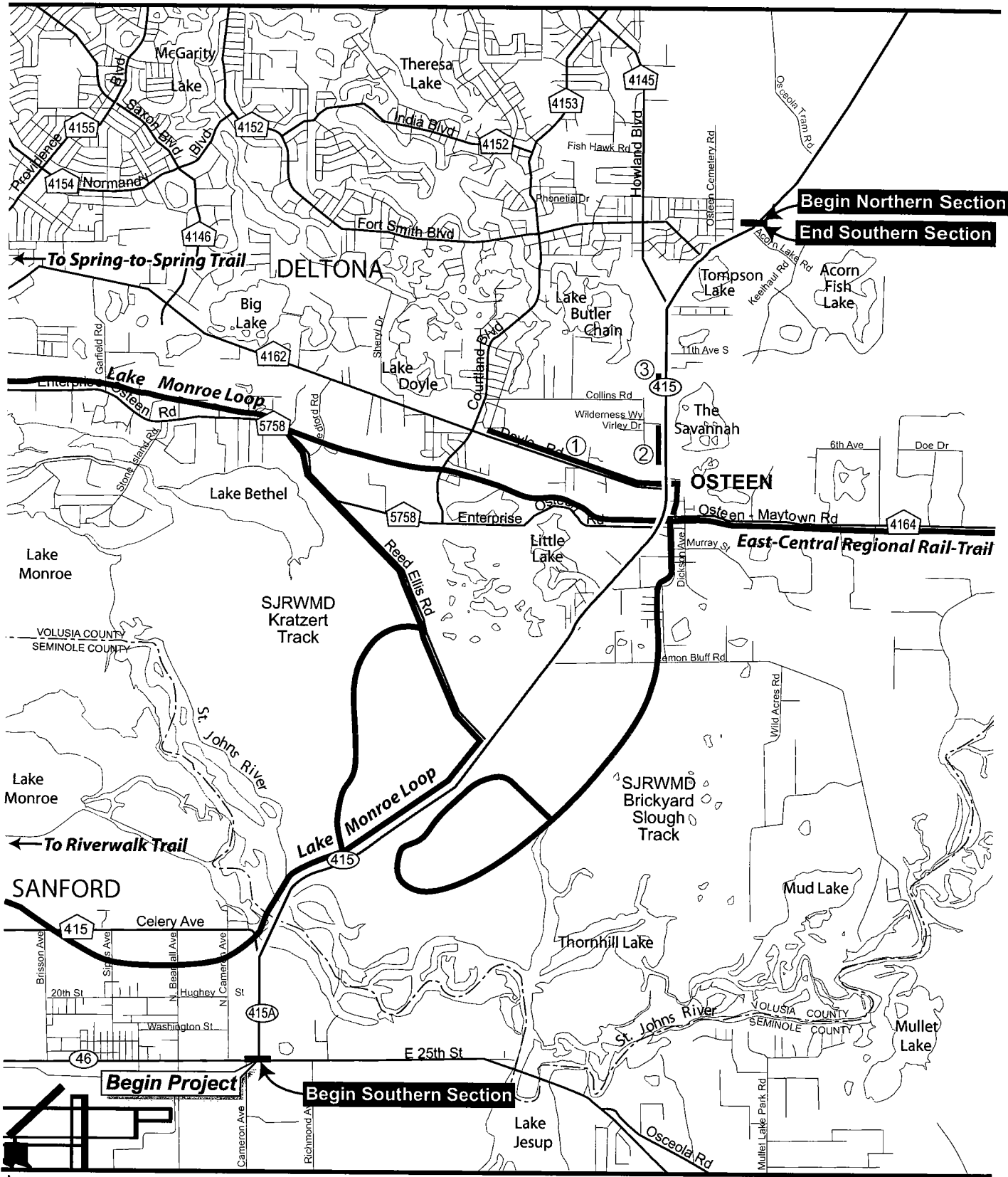
4.1.3 Pedestrian and Sidewalk Facilities

A summary of existing sidewalks along the SR 415 corridor is presented in Table 4-2.

A crosswalk on the north side of the intersection of SR 415 and Doyle Road connects the existing 8-foot sidewalk that runs along the east side of SR 415 from New Smyrna Boulevard to Doyle Road with an existing sidewalk that runs along the north side of Doyle Road. The location of these existing sidewalks are shown on Figure 4-2.

Existing SR 415 Typical Section





- Existing Sidewalk (Refer to Table 4-2 for detail)
- Multi-Use Trail (Proposed)
- Riding Trail Corridors (Proposed)

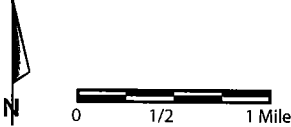
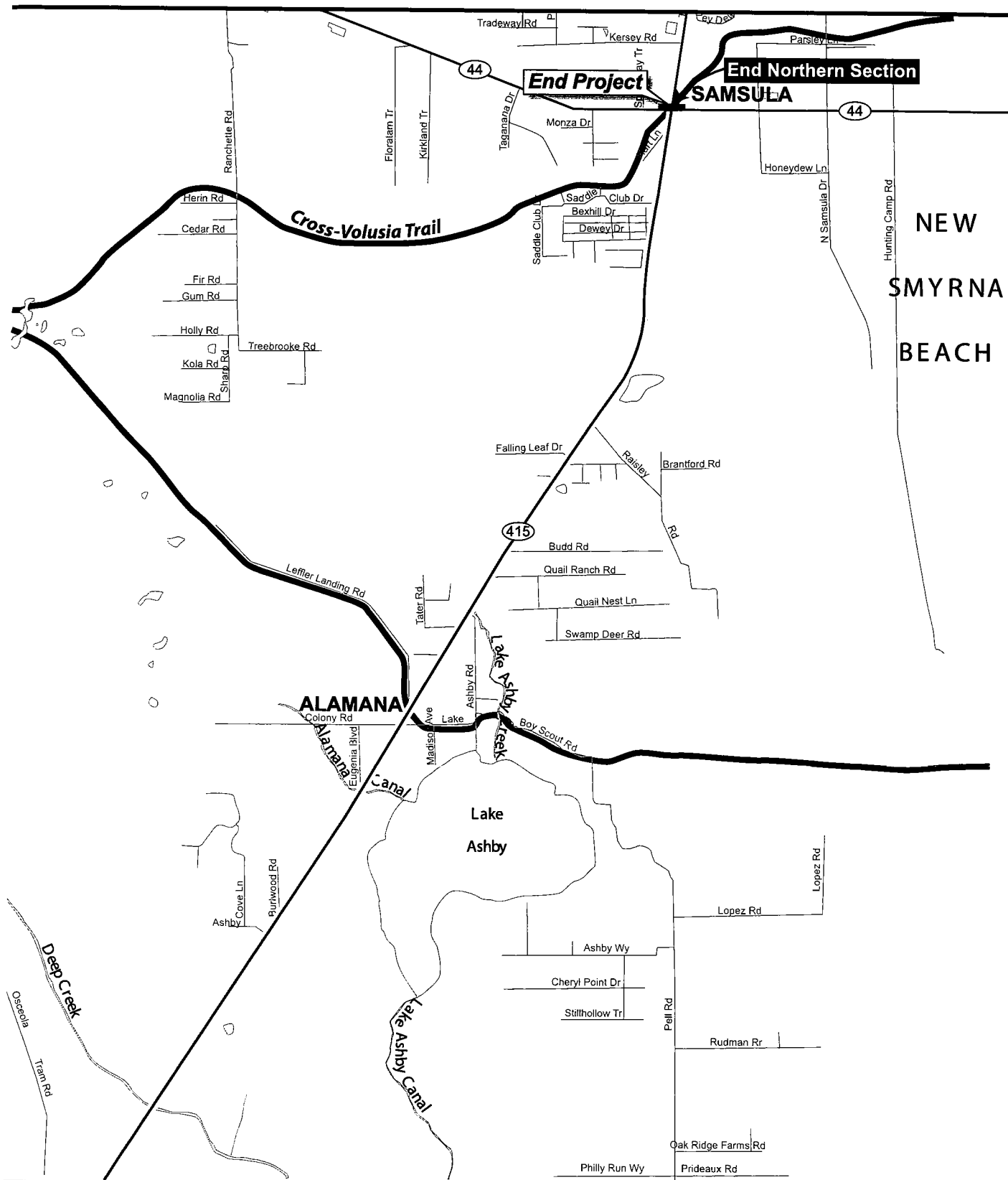





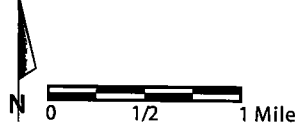
Figure 4-2
Sidewalk and Trail Facilities
 Sheet 1 of 2
 SR 415 PD&E Study





**NEW
SMYRNA
BEACH**

-  Existing Sidewalk (Refer to Table 4-2 for detail)
-  Multi-Use Trail (Proposed)
-  Riding Trail Corridors (Proposed)



**Figure 4-2
Sidewalk and Trail Facilities**
Sheet 2 of 2
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Table 4-2. Pedestrian and Sidewalk Facilities

Location	Approximate Station Limits	Pedestrian/ Sidewalk Facility	Notes
Southern Section			
New Smyrna Blvd to First Baptist Church of Osteen directly across from the intersection of SR 415/Doyle Rd	299+00 to 309+00 (Location 1 on Figure 4-2)	Existing Sidewalk	8 ft sidewalk on east side.
Fronting the FP&L Osteen Distribution Substation north of Doyle Rd	317+00 to 322+00 (Location 2 on Figure 4-2)	Existing Sidewalk	8 ft sidewalk on west side
Eastside Lane/Calvary Baptist Church	356+00 to 359+00 (Location 3 on Figure 4-2)	Existing Sidewalk	8 ft sidewalk on east side

4.1.4 Bicycle, Trail, and Greenway Facilities

A summary of information for bicycle, trails, and greenway facilities in areas within close proximity to the project study area was obtained from field reviews, the Volusia County MPO, Volusia County Leisure Services, the *Volusia Trails Plan* (November 1999), Seminole County's *Greenways and Trails Master Plan* (2000), and the St. Johns River Water Management District *Recreation Guide to District Lands*. Based on the information obtained, there are no existing bicycle/trail/greenway facilities along SR 415; however, there are several trails planned for the surrounding area.

In August 2002, the Volusia County MPO approved Resolution 2002-10 requesting that the FDOT include as part of the SR 415 PD&E Study, consideration of an independent multi-use trail along the SR 415 corridor. As previously discussed in Chapter 2, FDOT has committed to assess the feasibility of a multi-use trail facility within the SR 415 corridor for non-motorized modes of travel, including bikeways and pedestrian walkways. The study limits for the proposed trail extend from SR 46 in Seminole County to SR 44 in Volusia County. The proposed trail and typical sections are discussed further in Chapters 7 and 8 of this report.

Seminole County

Seminole County is in the process of building an extensive system of trails. It is the goal of the Seminole County's *Greenways and Trails Plan* to link all county facilities into an interconnecting network of trails and sidewalks with the neighboring counties of Orange, Lake, and Volusia. Existing and planned trails proposed to be linked within Seminole County include the Seminole/Wekiva Trail, the Cross Seminole Trail, the Rinehart Road/Crossings Trail, the Flagler Trail, and the Florida National Scenic Trail.

Seminole County's Riverwalk Trail, currently under construction, will follow the shoreline of Lake Monroe from the Volusia County line, just east of I-4, to Mellonville Avenue in Sanford. A planned trail along Celery Avenue will connect the Riverwalk Trail to the multi-use trail that is proposed under the SR 415 PD&E Study.

Volusia County

Within the St. Johns River Water Management District's (SJRWMD) Kratzert and Brickyard Slough Tracts, west and east of SR 415 and north of the St. Johns River are existing nature trails meandering through the conservation lands. The suggested use of these trails includes hiking and horseback riding.

The Spring-to-Spring Trail is a proposed 17-mile multi-use trail in west Volusia County. Four segments of the proposed trail are on the Volusia County MPO List of Prioritized Bicycle/Pedestrian Set-aside Projects, adopted August 27, 2002 and August 26, 2003. Together, these segments comprise the portion of the trail from DeLeon Springs to Gemini Springs. Another segment of the trail that has received partial funding will extend south from Gemini Springs Park to Lake Monroe Park.

Volusia County's Lake Monroe Park is undergoing renovations and improvements that include the construction of a trailhead with parking and restroom facilities that will serve the future multi-use 2.1-mile, 12-foot wide trail connecting Gemini Springs Park to Lake Monroe Park. This trail segment will also connect to the proposed Lake Monroe Loop, which will eventually join Volusia and Seminole County's segments to form a continuous trail around the perimeter of Lake Monroe.

The Florida East Coast (FEC) Railroad owns an abandoned rail corridor that crosses SR 415 at Railroad Avenue. The corridor extends from Titusville/Mims in Brevard County to Enterprise in Volusia County, and from Maytown to Edgewater, also in Volusia County. The State of Florida has plans to purchase the rail corridor and convert it to a 15-foot bicycle/pedestrian trail. The proposed 49-mile trail, known as the East Central Regional Rail-Trail, will connect Brevard, Volusia, and Seminole Counties. The corridor has been targeted for funding by the state, as part of Florida's Rails-to-Trails program, to pursue this initiative.

The proposed Cross-Volusia Trail will span 30 miles from its western terminus at the DeLand train station to its eastern terminus at the Flagler Avenue Beach Ramp in New Smyrna Beach. The City of Lake Helen has received partial funding for the development of a trailhead facility on the City's 10-acre Pleasant Street property as part of the Cross-Volusia Trail.

A graphical depiction of the existing and proposed trails described above is also presented in Figure 4-2.

4.1.5 Right-of-Way

Within the project limits, the existing right-of-way width of the SR 415 roadway varies between 100 and 150 feet, with the exception of a wider section at the north end of the SR 415/St. Johns River Bridge. Beginning at Station 78+88.57, the right-of-way is widened to the left of the existing centerline to a maximum width of 260 feet (Sta 79+11.42, 185.05' LT), and then tapers back along the horizontal curve to a width of 150 feet at Station 95+83.70. The limits of the existing right-of-way widths within the study limits are presented in Table 4-3.

Table 4-3. Existing SR 415 Right-of-Way

Station Limits	Approx. Location	Right-of-Way Width (ft)	Right-of-Way Left (ft)	Right-of-Way Right (ft)
Southern Section				
10+11.54 to 10+79.55	SR 415/ SR 46	---	---	---
10+79.55 to 17+54.55		120	60.01 - 60.14	59.98 - 59.86
17+54.55 to 47+59.67		110	60.14 - 60.69	49.86 - 49.31
47+59.67 to 49+96.48	Begin Transition to Celery Ave Intersection	Varies 110 - 125.24	60.69 - 75.79	49.31 - 49.45
49+96.48 to 57+11.45	SR 415/Celery Ave	Varies 150 - 198.46	Varies	Varies
57+11.45 to 78+88.57	Bridge No. 790124	150	75.00 - 75.07	74.93 - 75.00
78+88.57 to 95+83.72	Bridge No. 790124	Varies 150 - 260	74.56 - 185.05	74.95 - 75.44
95+83.72 to 153+95.06	Bridge No. 790198	150	74.56 - 75.02	74.98 - 75.44
153+95.05 to 154+30.16		125 - 150	50.02 - 75.02	74.98
154+30.16 to 155+89.41		100 - 150	50.02 - 50.04	49.96 - 74.98
155+89.41 to 447+52.94		100	50	50
Northern Section				
447+52.94 to 986+30.13	To SR 44	100	50	50

According to correspondence from the Florida Department of Environmental Protection (FDEP), dated April 14, 2004 provided in Appendix A, there is an existing Board of the Trustees of the Internal Improvement Trust Fund (TIIFT) easement for the existing St. Johns River Bridge. Therefore, an updated TIIFT easement would be required for the proposed improvements.

4.1.6 Horizontal Alignment

The existing horizontal alignment of SR 415 was obtained from the original construction plans, as well as the construction plans of several recent rehabilitation/reconstruction projects. The existing pavement cross slope has a downward slope of 0.02 ft/ft on the travel lanes towards the outside with the exception of the superelevated curves. Table 4-4 lists the horizontal curves within the study limits.

The study area includes several at-grade non-signalized intersections with local access, collector, and arterial roads. Refer to Chapter 5 of this report for additional information on design criteria.

Table 4-4. Existing SR 415 Horizontal Alignment

Curve/ Point of Inflection (PI)	PI Station	Back Tangent	Degree of Curvature	Curve Direction	Curve Length (ft)	Existing Super- elevation (ft/ft)
Southern Section						
1B	52+47.06	N 0°17'57.10" W	3°00'00.00"	Right	951.67	0.069
2B	88+99.88	N 28°15'02.87" E	3°00'00.00"	Right	1443.39	0.077
3B	105+04.65	N 71°33'08.99" E	1°59'59.65"	Left	696.92	0.067
4A	157+25.73	N 57°36'53.28" E	1°59'59.65"	Left	983.42	0.064
5A	197+69.92	N 37°56'50.50" E	0°59'59.95"	Right	111.66	0.035
6A	218+37.14	N 39°03'50.16" E	0°59'59.95"	Left	271.67	0.042
7	233+09.50	N 39°20'50.16" E	0°59'59.95"	Left	515.84	0.046
8	243+00.56	N 31°11'20.32" E	1°59'59.65"	Right	450.46	0.068
9	287+95.95	N 40°11'51.96" E	2°59'58.75"	Left	500.38	0.077
10A	298+60.15	N 25°11'17.69" E	2°59'58.75"	Left	858.82	0.077
11A	383+11.91	N 0°34'23.79" E	3°59'57.03"	Right	854.63	Not Available
12A	401+94.48	N 33°36'16.95" E	1°59'59.65"	Right	663.37	Not Available
13A	412+58.29	N 46°52'16.95" E	2°59'58.75"	Right	577.29	Not Available
14A	429+32.59	N 64°11'16.95" E	1°59'59.65"	Left	949.21	Not Available
Northern Section						
15A	458+09.75	N 45°12'16.95" E	1°59'59.60"	Left	572.67	Not Available
16A	532+43.77	N 33°45'06.77" E	0°29'59.99"	Right	167.06	Not Available
17A	536+43.91	N 34°35'13.84" E	0°29'59.99"	Left	145.00	Not Available
18A	630+38.61	N 33°51'43.84" E	0°59'59.95"	Left	243.37	Not Available
---	705+77.27	N 31°25'42.53" E	NA	NA	---	N/A
---	761+31.31	N 31°28'19.18" E	NA	NA	---	N/A
19A	812+07.50	N 31°24'51.29" E	0°29'59.99"	Right	480.43	Not Available
20A	885+84.28	N 33°48'58.93" E	2°59'58.75"	Left	864.50	Not Available
---	986+30.13	N 7°53'04.05" E	NA	NA	---	N/A

4.1.7 Vertical Alignment

The existing vertical profile of SR 415 was obtained from existing construction plans. Table 4-5 summarizes the vertical alignment of SR 415 within the project study limits.

Table 4-5. Existing SR 415 Vertical Alignment

PVI Stationing	Location	Crest/ Sag/PI (C/S/PI)	Grade In (%)	Grade Out (%)	Existing Vertical Curve Length (ft)	Existing "K" Value
Southern Section						
10+11.54	SR 46	PI	---	0.15	NA	NA
11+00.00	---	PI	0.15	0.10	NA	NA
19+00.00	---	PI	0.10	-0.10	NA	NA
39+00.00	---	PI	-0.10	-0.05	NA	NA
46+90.00	---	PI	-0.05	-0.51	NA	NA
58+03.23	Bridge No. 790124	S	-0.51	3.00	500	142.4
70+13.23	Bridge No. 790124	C	3.00	-3.00	1350	225.0
82+26.23	---	S	-3.00	0.02	400	132.5
150+29.90	Bridge No. 790198	C	0.02	-0.22	400	1683.7
156+25.76	---	S	-0.22	0.33	300	545.7
183+40.07	---	PI	0.33	0.34	NA	NA
199+87.07	---	C	0.34	0.14	300	1472.6
223+35.07	---	C	0.14	0.07	300	4481.3
243+54.07	---	PI	0.07	1.07	NA	NA
262+81.07	---	C	1.07	0.24	400	482.2
273+10.07	---	C	0.24	-0.16	300	750.1
287+32.07	---	PI	-0.16	0.00	NA	NA
291+24.07	---	PI	0.00	-0.20	NA	NA
295+16.07	---	PI	-0.20	-0.04	NA	NA
302+82.60	---	C	-0.04	-0.55	300	583.6
310+16.57	---	PI	-0.55	-0.53	NA	NA
315+37.57	---	PI	-0.53	-0.47	NA	NA
320+28.57	---	C	-0.47	-0.99	300	579.3
326+11.57	---	S	-0.99	0.00	300	304.2
336+85.57	---	PI	0.00	0.01	NA	NA
342+68.57	---	PI	0.01	0.18	NA	NA
352+49.57	---	S	0.18	1.09	300	330.2
360+77.57	---	C	1.09	-1.23	400	172.3
367+78.57	---	S	-1.23	0.13	300	220.3
386+99.57	---	PI	0.13	0.35	NA	NA
397+96.57	---	C	0.35	-0.21	300	537.7
418+29.57	---	PI	-0.21	-0.50	NA	NA
428+23.57	---	PI	-0.50	-0.10	NA	NA

Table 4-5. Existing SR 415 Vertical Alignment (Continued)

PVI Stationing	Location	Crest/ Sag/PI (C/S/PI)	Grade In (%)	Grade Out (%)	Existing Vertical Curve Length (ft)	Existing "K" Value
Northern Section						
460+16.57	---	PI	-0.10	0.02	NA	NA
497+58.57	---	PI	0.02	0.01	NA	NA
526+01.57	---	PI	0.01	0.06	NA	NA
580+28.57	---	PI	0.06	-0.09	NA	NA
630+04.57	---	PI	-0.09	0.00	NA	NA
649+92.57	---	PI	0.00	-0.14	NA	NA
659+56.57	---	PI	-0.14	0.00	NA	NA
667+53.57	---	S	0.00	0.41	300	736.0
674+89.57	Eugenia Blvd	PI	0.41	0.24	NA	NA
680+42.57	---	PI	0.24	0.23	NA	NA
704+36.57	Lake Ashby Rd	S	0.23	0.20	300	9933.9
711+43.19	---	PI	0.20	0.30	NA	NA
713+18.19	---	C	0.30	-0.49	350	441.1
716+38.19	---	S	-0.49	0.03	250	480.5
720+75.91	---	PI	0.03	0.00	NA	NA
730+60.53	---	PI	0.00	-0.11	NA	NA
737+98.99	---	PI	-0.11	-0.07	NA	NA
750+36.49	Clovercrest Dr	PI	-0.07	0.00	NA	NA
769+11.49	---	PI	0.00	0.10	NA	NA
780+36.49	---	PI	0.10	0.00	NA	NA
811+17.98	---	PI	0.00	0.09	NA	NA
817+50.89	---	PI	0.09	0.20	NA	NA
824+47.09	---	S	0.20	0.59	300	777.7
828+90.13	---	S	0.59	1.25	300	452.3
832+10.10	---	PI	1.25	0.00	NA	NA
849+90.56	---	S	0.00	0.20	300	1524.8
858+03.81	---	C	0.20	-0.51	300	424.0
865+86.94	---	S	-0.51	-0.10	300	729.6
877+91.76	---	PI	-0.10	0.00	NA	NA
888+76.10	---	PI	0.00	-0.12	NA	NA
909+40.45	---	S	-0.12	-0.67	300	540.9
916+11.19	---	S	-0.67	0.00	300	447.2
923+42.89	---	S	0.00	0.41	300	731.7
930+74.60	---	C	0.41	-0.12	400	747.7

Table 4-5. Existing SR 415 Vertical Alignment (Continued)

PVI Stationing	Location	Crest/Sag/PI (C/S/PI)	Grade In (%)	Grade Out (%)	Existing Vertical Curve Length (ft)	Existing "K" Value
943+55.09	---	PI	-0.12	-0.11	NA	NA
950+83.84	---	S	-0.11	0.16	300	1118.7
965+98.99	---	PI	0.16	0.14	NA	NA
977+50.51	---	C	0.14	-0.12	300	1195.3
984+17.17	SR 44	PI	-0.12	---	NA	NA

4.1.8 Drainage and Hydrology

Existing drainage characteristics along the SR 415 corridor were determined by reviewing FDOT and SJRWMD construction plans, FDOT drainage and permitting files, USGS Quadrangle Maps, and Geographic Information System (GIS) files. In addition, field reviews were performed and a literature review of information was collected from the SJRWMD, Seminole County, and Volusia County.

The project corridor lies within the jurisdiction of the SJRWMD, Seminole and Volusia Counties. The limits of the study are located within the Middle St. Johns River Hydrologic Basin, specifically the Lake Monroe and Deep Creek Units.

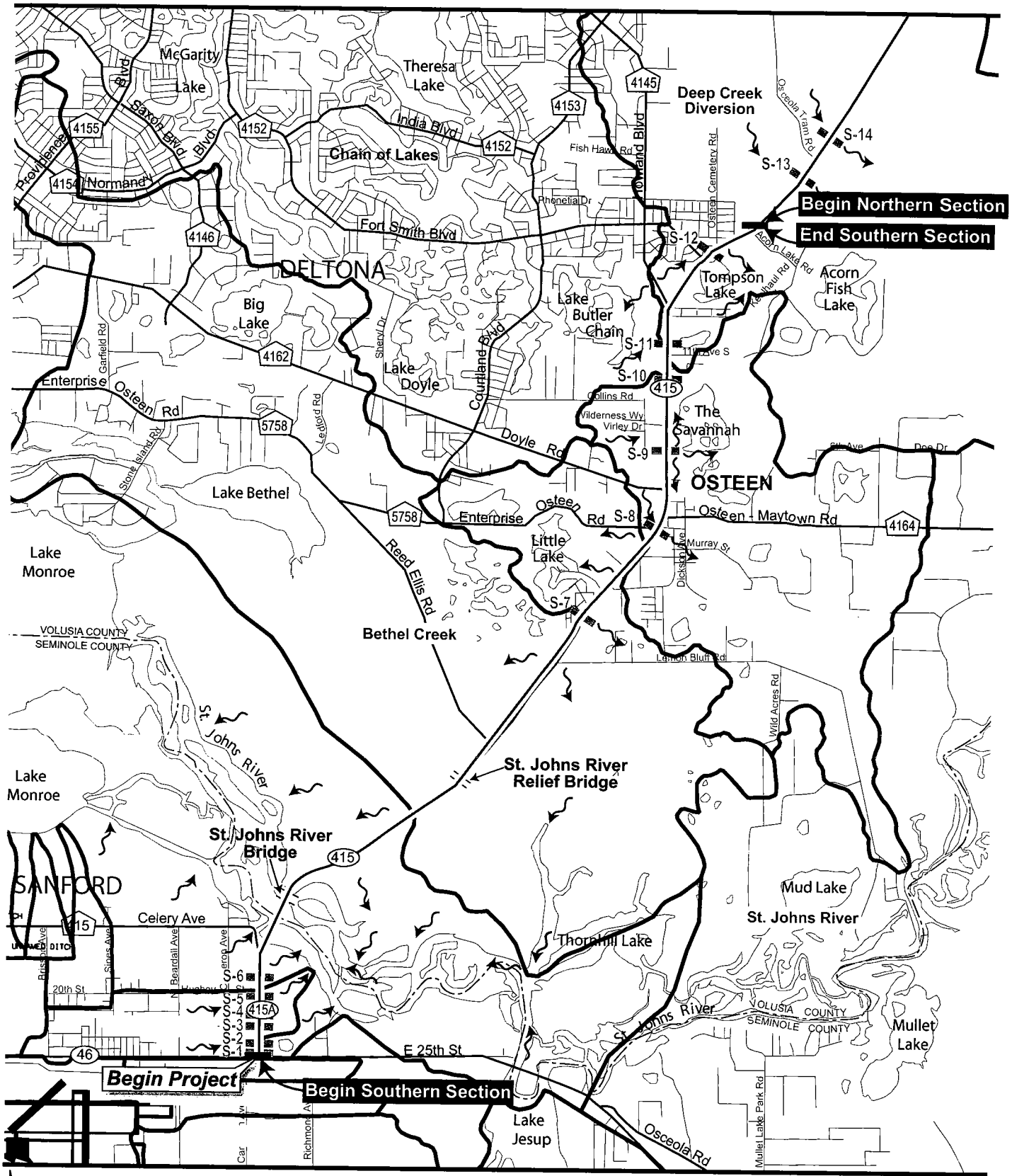
All surface waters, including wetlands, in the Middle St. Johns Basin are designated as Class III in accordance with the Section 62-302.400, Florida Administrative Code (FAC). The Florida Department of Environmental Protection (FDEP) classifies existing surface waters according to designated use. Class III is defined as surface waters that are primarily used as for recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. Additional protection has been given to many of the surface waters of the Middle St. Johns Basin through the designation of Outstanding Florida Waters (OFWs). None of the surface waters within the SR 415 study area have been assigned this designation; however, portions of the project are in areas FDEP has listed as an impaired water body. On the FDEP September 4, 2003 *Revised Verified List*, the Deep Creek/Lake Ashby Canal and the St. Johns River above the Wekiva River have been listed as an impaired water body with a projected year for TMDL development of 2008.

4.1.8.1 Existing Drainage Patterns

A summary of the existing drainage and hydrologic conditions is described below. A graphical representation of the existing drainage characteristics within the project study limits is shown on Figure 4-3.

Southern Section

The Southern Section of the project is defined from SR 46 to Acorn Lake Road. The existing drainage characteristics associated with this section include intermittent roadside ditches and culverts to convey runoff (both onsite and offsite) to canal and floodplain areas. Cross culverts, S-2 through S-12, and two bridge crossings of the St. Johns River are included as part of the drainage system. The portion of this section between SR 46 and Kove Estates is within the limits of the mapped Lake Monroe Unit. The remaining portion between Kove Estates and SR 44 is within the limits of the mapped Deep Creek Unit.



- Flow Direction
- S-17 Existing Cross Culvert
- Drainage Basin Divides

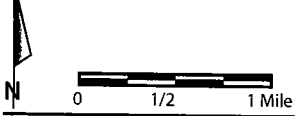
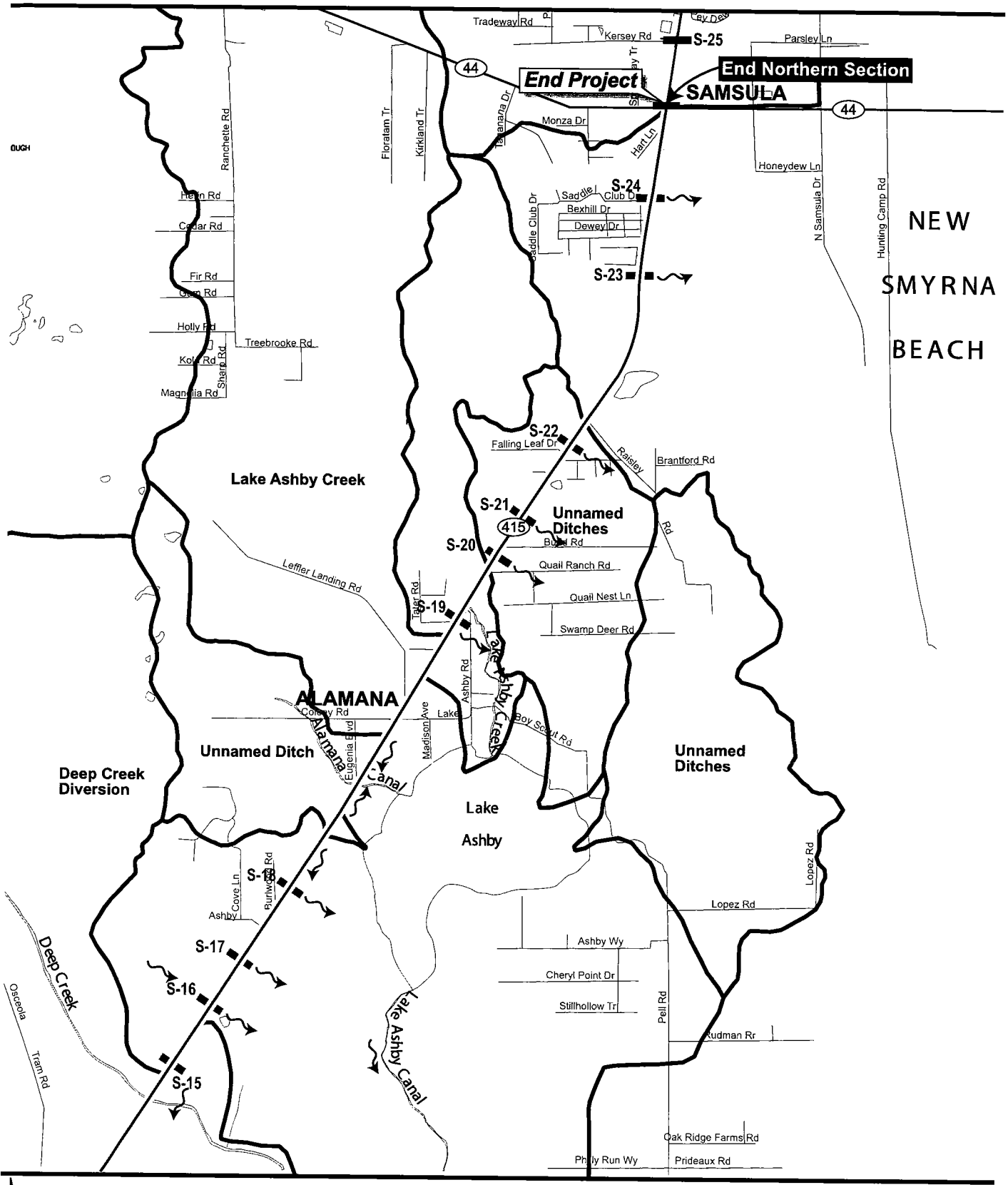


Figure 4-3
Existing Drainage Characteristics
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- Flow Direction
- S-17 Existing Cross Culvert
- Drainage Basin Divides



Figure 4-3
Existing Drainage Characteristics
 Sheet 2 of 2
 SR 415 PD&E Study

Northern Section

The Northern Section of the project is defined from Acorn Lake Road to SR 44. Existing drainage characteristics associated with these segments include intermittent roadside ditches and culverts to convey runoff (both onsite and offsite) to canal and floodplain areas. Cross culverts, S-13 through S-25, and the three bridge crossings of Deep Creek, Alamana Canal, and Lake Ashby Canal are included as part of the drainage system of this section. This section is within the limits of the mapped Deep Creek Unit.

4.1.8.2 Cross Culverts

There are 24 cross culverts within the project limits. Several of these cross culverts are located within the floodplain and/or wetland areas and were constructed to maintain historic drainage connections that would have been bisected due to construction of SR 415. Other cross culverts were constructed to connect the existing canals that run throughout the project area. The existing cross culverts are either concrete pipe or concrete box culverts and appear to be in good condition with no problems or history of flooding. Based on available data from roadway construction plans and FDOT drainage files, the results indicated that the existing cross culverts do not overtop the existing roadway for the 100-year storm; however, the 100-year headwater elevation does exceed the edge of travel lane elevation in three cross drain locations. Table 4-6 summarizes the characteristics of the cross drains along the SR 415 corridor. The existing cross drain locations are also presented on Figure 4-3. Refer to the *Location Hydraulics Report* (April 2004) for more detailed information.

4.1.9 Floodplains and Regulatory Floodways

The existing SR 415 corridor traverses several floodplain areas; however, floodways are not found in this area of Seminole and Volusia Counties. The floodplain locations were determined using the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for Seminole and Volusia Counties. The locations of the floodplains and the FIRM community panels are shown on Figure 4-4.

The FIRM identified two floodplain zones present within the project study area. These zones are defined as follows:

- Zone AE – Base flood elevation determined
- Zone A – No base flood elevation determined

The remainder of the project area is designated Zone X, which is defined two ways:

- Zone X – Areas determined to be outside the 500-year floodplain, and
- Zone X – Areas of 500-year flood; areas of 100-year flood with average depths less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood

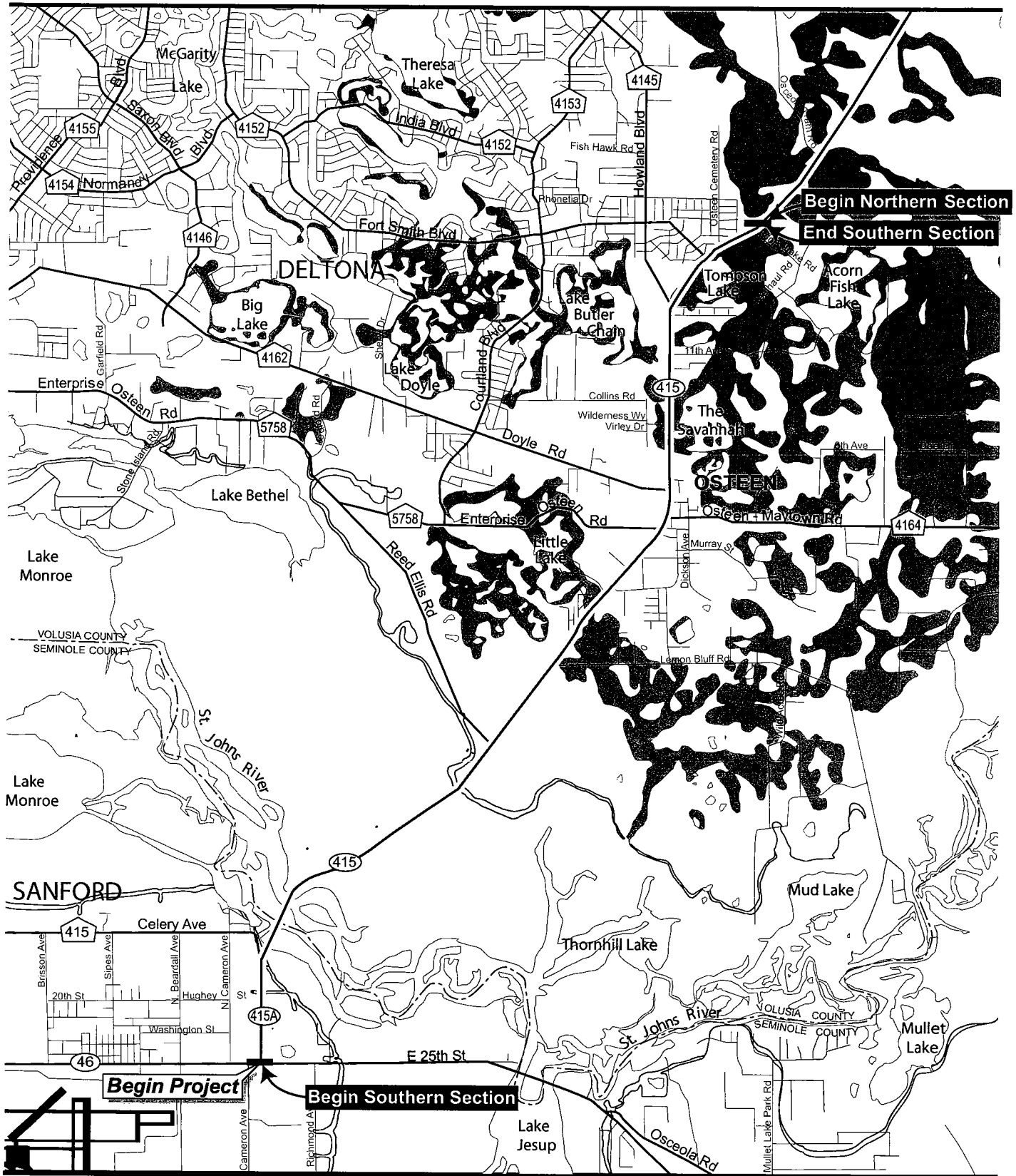
SR 415 was constructed on fill, and according to available information, it appears that the road is above the 100-year floodplain. Adjacent developments, such as Kove Estates, experience periodic flooding problems; however, this is largely due to the fact that the development was constructed within the Little Lake floodplains.

Table 4-6. Summary of Existing Cross Culvert

Structure Number	PD&E Station	Description from FDOT Original Construction Plans						Elevations		Calculated Elevations			
		Count	Size		Type	Station	Length (ft)	Left	Right	PGL	Edge of Travel	Head-water (50-yr)	Head-water (100-yr)
			H/D (in)	B (in)				(ft NGVD)					
Southern Section													
S-2	14+80	2	24		CONC	17+74	84.0	14.80	14.20	18.72	18.48	17.66	18.42
S-3	23+49	1	36	120	CBC	23+49	84.0	12.00	12.00	18.69	18.45	16.41	17.18
S-4	24+05	1	24		CONC	26+65	88.0	13.00	12.80	18.63	18.39	16.36	17.12
S-5	36+20	1	48	96	CBC	36+33	84.0	8.10	8.10	17.42	17.18	13.30	14.06
S-6	43+26	1	24		CONC	43+26	84.0	12.11	11.91	16.93	16.45	15.47	16.23
S-7	246+60	1	36		CONC	86+55	76.0	24.90	24.70	33.48	33.24	29.07	29.69
S-8	292+50	1	24		CONC	235+07	66.0	47.03	47.03	N/A	N/A	N/A	N/A
S-9	335+20	1	30		CONC	278+47	82.0	29.40	29.20	35.10	34.86	33.08	33.85
S-10	349+00	1	54		CONC	291+97	171.0	27.20	27.50	36.28	36.04	33.16	33.64*
S-11	367+75	1	24		CONC	310+36	80.0	33.77	33.28	37.78	37.54	37.13	37.79*
S-12	409+80	1	24		CONC	352+48	92.0	35.92	34.52	40.99	40.75	39.27	40.03
Northern Section													
S-13	459+80	6	42		CONC	402+49	67.0	22.76	22.74	31.48	31.24	27.43	27.90
S-14	479+15	2	60	108	CBC	421+69	66.0	22.45	22.43	31.20	30.96	28.56	29.17
S-15	547+90	2	24		CONC	490+51	60.0	28.09	28.02	33.15	32.91	31.45	32.21
S-16	576+15	2	24		CONC	518+71	58.0	29.37	29.37	34.76	34.52	32.74	33.34
S-17	597+90	3	30		CONC	540+53	58.0	27.28	27.13	33.41	33.17	30.96	31.73
S-18	632+40	1	48	120	CBC	574+95	73.0	23.55	23.54	30.50	30.26	28.69	29.51
S-19	760+00	2	84	108	CBC	702+60	70.0	27.80	27.79	37.80	37.56	35.94	36.44
S-20	790+20	1	24		CONC	732+75	64.0	32.60	32.40	38.90	38.66	35.96	36.72
S-21	808+15	3	36		CONC	750+73	56.0	32.90	32.70	38.90	38.66	37.02	37.69
S-22	843+70	2	24		CONC	786+38	60.0	43.19	43.13	47.50	47.26	46.55	47.31*
S-23	918+80	1	84	120	CBC	861+42	78.0	27.00	26.86	37.00	36.76	35.08	35.61
S-24	948+40	2	36		CONC	890+98	56.0	32.30	32.10	37.87	37.63	36.42	37.09
S-25	998+40	1	60	72	CBC	N/A	56.0	24.50	24.49	N/A	N/A	N/A	N/A

Note: Calculations were not performed for S-1, S-8, and S-25 due to lack of information. S-1 is a side drain system to SR46 and S-8 is being modified from the values listed to a storm drain system as part of a current turn lane construction project. S-25 is north of SR44.

*shows encroachment into travel lane.



Begin Northern Section
End Southern Section

Begin Project
Begin Southern Section

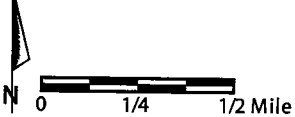
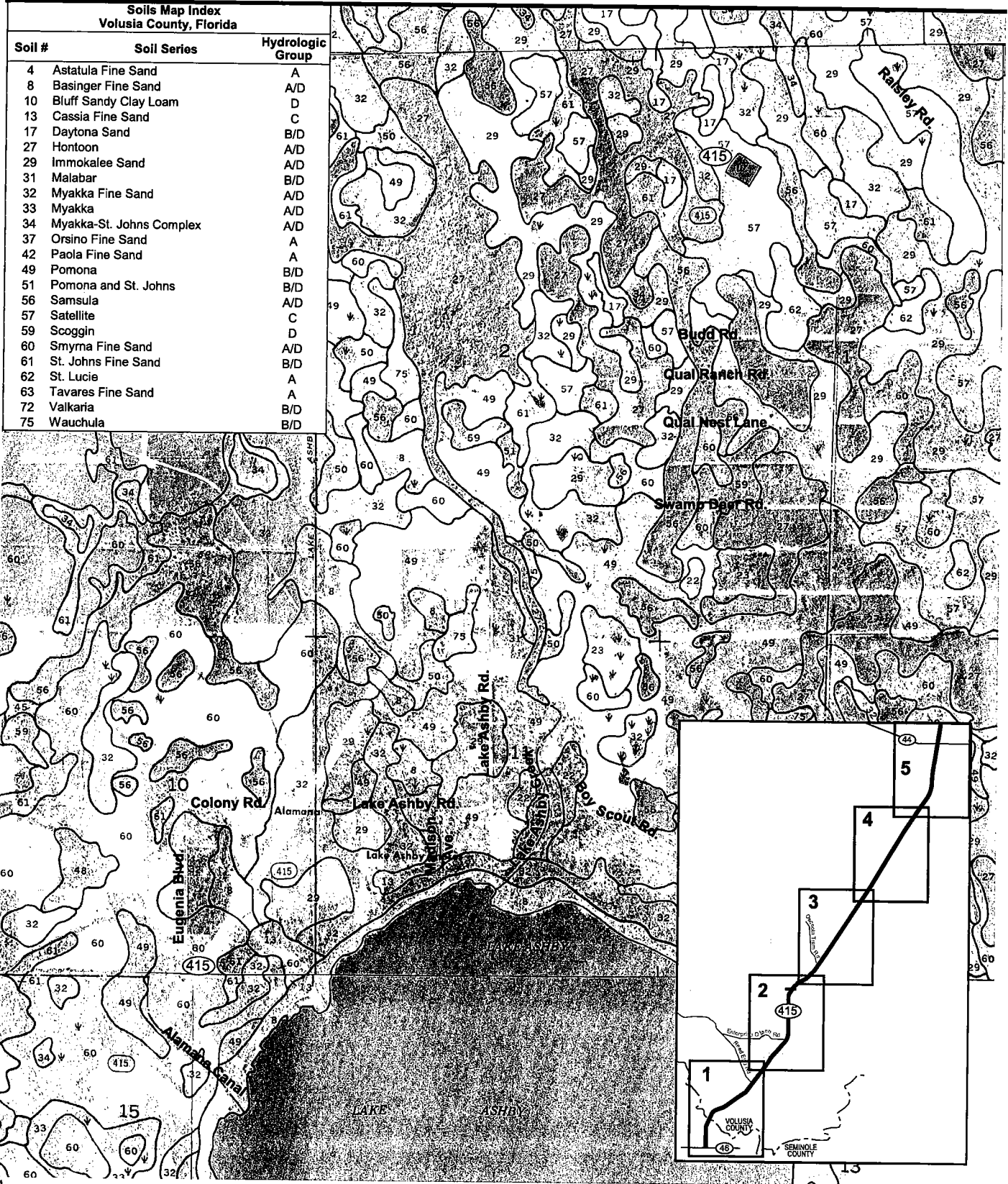
- Zone A** - No base flood elevations determined
- Zone AE** - Base flood elevations determined
- Zone X** - Areas determined to be outside the 500-year floodplain
- Zone X** - Areas of 500-year flood; Areas of 100-year flood with average depths less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.



Source:
 Federal Emergency Management Agency (FEMA)
 National Flood Insurance Maps
 Seminole County: 12117C 0065 E (April 17, 1995)
 Volusia County:
 12127C 0525G (April 15, 2002) 12127C 0755G (April 15, 2002)
 12127C 0650G (April 15, 2002) 12127C 0760G (April 15, 2002)
 12127C 0675G (April 15, 2002) 12127C 0765G (April 15, 2002)

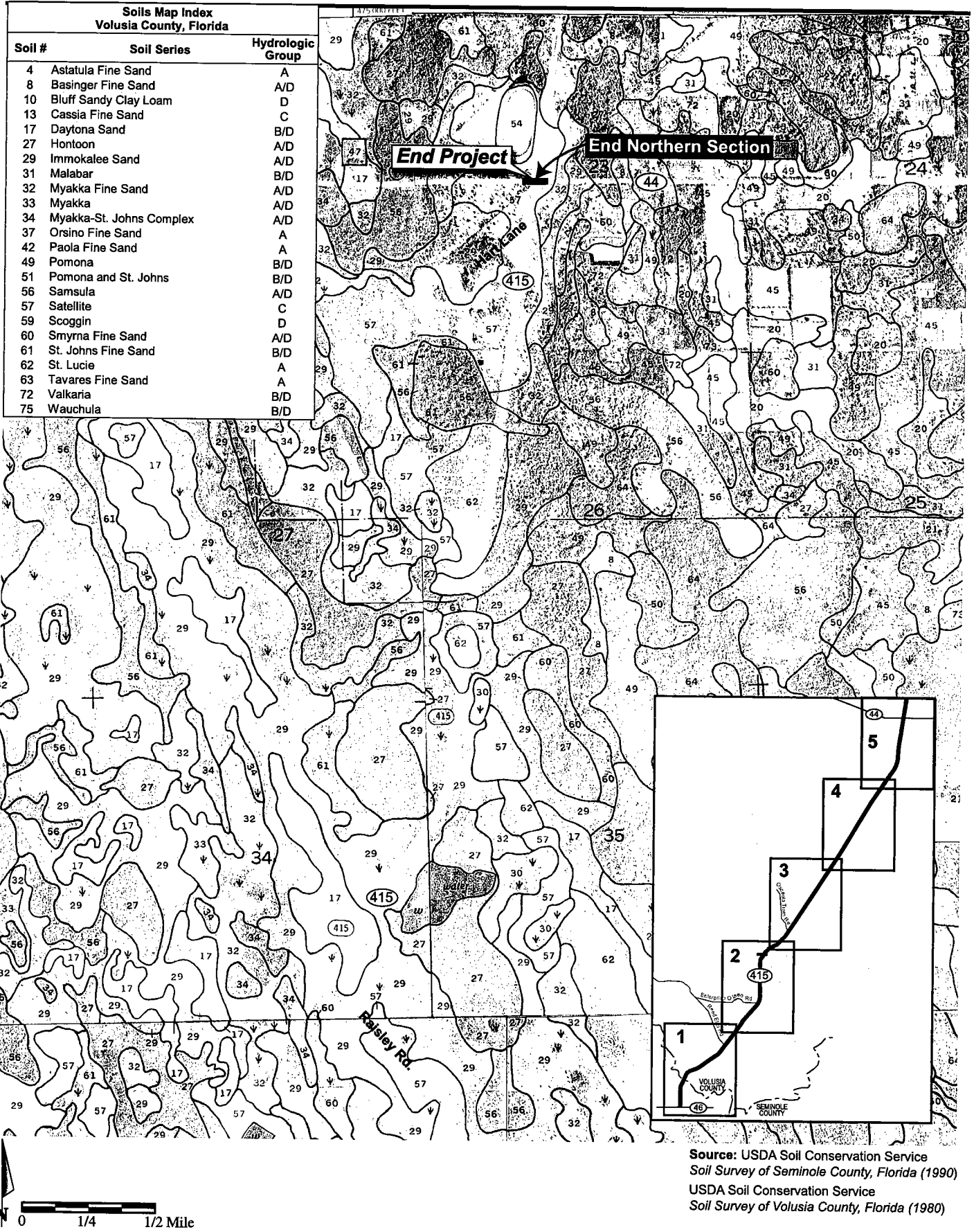
Figure 4-4
Existing Floodplains and Floodways
 Sheet 1 of 2
 SR 415 PD&E Study





Source: USDA Soil Conservation Service
 Soil Survey of Seminole County, Florida (1990)
 USDA Soil Conservation Service
 Soil Survey of Volusia County, Florida (1980)

Figure 4-5
Soil Survey
 Sheet 4 of 5
 SR 415 PD&E Study



Source: USDA Soil Conservation Service
 Soil Survey of Seminole County, Florida (1990)
 USDA Soil Conservation Service
 Soil Survey of Volusia County, Florida (1980)

Figure 4-5
Soil Survey
 Sheet 5 of 5
 SR 415 PD&E Study

also provide better channelization of traffic and access management. This will reduce the number of potential vehicle conflict points along the corridor. This would likely have a positive impact on reducing the number of crashes and injuries in the study area.

4.1.11.1 FDOT Crash Data

Table 4-7 summarizes the crash data and economic loss for the SR 415 study corridor from SR 46 to SR 44. The data indicates a significant FDOT safety ratio growth trend within the Seminole County portion of the study area. The safety ratio exceeds the 1.000 significance level for the years 1998 and 1999. Although the safety ratio exceeds the 1.000 significance level, no fatalities occurred. However, the high safety ratio does indicate that crashes are occurring more often within this portion of the study area causing large economic losses with respect to the small segment of roadway (0.897 miles).

This increase in safety ratio corresponds to the steady increase in average daily traffic volumes (ADT) seen over the three most recent years of data on this study section of Seminole County roadway. ADT, crash rates, safety ratios, injuries, and economic loss all increase over the 3-year FDOT crash data analysis period. On average zero fatalities and six injuries from seven crashes were recorded along the project corridor in Seminole County for each year. The crashes that occurred in the Seminole County project corridor resulted in an approximate economic loss of \$1.3 million per year.

In direct contrast to the Seminole County crash data analysis, the FDOT safety ratios have consistently been below the 1.000 significance level for the years 1997 to 1999 for the Volusia County portion of the study area, fluctuating in direct correspondence to ADT levels. ADT, crash rates, safety ratio, fatalities, injuries, and economic loss all peaked in 1998 in the Volusia County portion of the study area. The fatalities and number of injuries did not remain similar over the study period. On average, two fatalities and 51 injuries from 48 crashes were recorded along the project corridor in Volusia County for each year. This shows a slightly higher crash severity than the segment in Seminole County. The crashes that occurred in the Volusia study corridor resulted in an approximate economic loss of \$8 million per year.

The majority of the crashes along the SR 415 corridor occurred within the Seminole County portion and the first 9 miles of the 17-mile Volusia County portion of the study corridor. According to FDOT data, the top three high injury intersections along SR 415 are at cross streets Reed Ellis Road (MP 2.264), Railroad Avenue (MP 4.411), and Collins Road (MP 5.221) with 15, 11, and ten injuries, respectively. These intersections are all located within the Southern Section of the study corridor.

A total of four fatal crashes, resulting in six fatalities, occurred along the SR 415 study corridor within the 3-year reporting period. All of the incidents occurred in the Volusia County portion of the corridor: two occurred in the Southern Section, and two occurred in the Northern Section. The causes of the fatal crashes were recorded as careless driving, improper lane change, improper passing, and driving left of the center. All occurred in the dark with no street lighting, and one occurred in poor weather.

Table 4-8 presents a summary of the overall types of crashes that occurred on the SR 415 study corridor during the reporting period. According to the FDOT crash data, the most common types of crashes were rear-end type, angle type, and collision with animal. The angle type of crashes may be caused by left turning vehicles colliding with high-speed through vehicles. Crashes of this type generally have more severe injury to the vehicle occupants.

Table 4-7. FDOT Summary of Crashes

County	Year	Begin Mile Post	End Mile Post	Average Daily Traffic	Crash Rate Actual	Crash Rate Critical	Safety Ratio	No. of Crashes	No. of Fatalities	No. of Injuries	Economic Loss (\$)
Seminole	1997	000.000	000.897	11,425	1.060	1.349	0.785	4	0	4	\$742,200
Seminole	1998	000.000	000.897	13,271	1.663	1.463	1.136	7	0	7	\$1,331,200
Seminole	1999	000.000	000.897	14,222	1.933	1.282	1.507	9	0	8	\$1,770,111
Seminole Yearly Average				12,973	1.552	1.365	1.143	7	0	6	\$1,281,467
Volusia	1997	000.000	017.590	8,286	0.796	1.357	0.586	42	1	43	\$7,399,500
Volusia	1998	000.000	017.590	10,834	1.001	1.337	0.748	58	4	62	\$9,532,000
Volusia	1999	000.000	017.590	10,670	0.669	1.259	0.531	43	1	48	\$6,821,300
Volusia Yearly Average				9,930	0.822	1.318	0.622	48	2	51	\$7,917,600
Totals (Seminole and Volusia)				22,903				163	6	172	\$9,199,067

Source: FDOT Crash Data Report

Table 4-8. Project Area Overall Crash Type Summary

Crash Type	Number of Crashes			Total	Percent of Total
	1997	1998	1999		
Collision, Rear-end	15	22	15	52	31.9%
Collision, Head On	1	3	3	7	4.3%
Collision, Angle	4	10	7	21	12.9%
Collision, Left Turn	3	4	2	9	5.5%
Collision, Right Turn	1	--	1	2	1.2%
Collision, Sideswipe	3	2	4	9	5.5%
Collision, Parked Car	2	--	--	2	1.2%
Collision, W/Pedestrian	1	--	--	1	0.6%
Collision, W/Animal	3	8	1	12	7.4%
MV H/Sign/Sign Post/Utility Pole	1	2	2	5	3.1%
MV H/Guardrail/Fence/Barrier Wall	2	5	--	7	4.3%
MV H/Tree/Shrub	3	2	1	6	3.7%
Collision w/Construct. Barricade/Sign	--	--	1	1	0.6%
Collision w/Fixed Object Above Road	--	--	1	1	0.6%
MV Ran Into Ditch/Culvert	2	3	4	9	5.5%
Ran Off Road Into Water	1	--	2	3	1.8%
Overtuned	1	3	4	8	4.9%
Occupant Fell From Vehicle	--	--	1	1	0.6%
All Other	3	1	3	7	4.3%
Total	46	65	52	163	100%

Source: FDOT Crash Data Report

4.1.11.2 County Crash Data

Table 4-9 summarizes the Seminole crash data for the years 1999 through 2001 and the Volusia County crash data from 1998 through 2001 for the SR 415 study corridor from SR 46 to SR 44. The FDOT crash data is generally compiled from "long-form" reports, whereas the County data is compiled from both "long-form" and "short-form" reports; for this reason, the County crash data reports a higher number of crashes for the same reporting period. In addition, the FDOT and County agencies utilize different crash database systems which may cause minor inconsistencies in the data. Crash rates, average daily traffic, safety ratios, and economic loss data were not available from the Counties.

Table 4-9. Seminole and Volusia Counties Summary of Crashes

County	Year	Begin Mile Post	End Mile Post	No. of Crashes	No. of Fatalities	No. of Injuries	No. of Injuries per Crash
Seminole	1999	000.000	000.897	14	0	9	0.64
Seminole	2000	000.000	000.897	13	0	9	0.69
Seminole	2001	000.000	000.897	17	0	6	0.35
Seminole Yearly Average				11	0	6	0.42
Seminole Totals				44	0	24	
Volusia	1998	000.000	017.590	96	4	69	0.72
Volusia	1999	000.000	017.590	84	1	55	0.65
Volusia	2000	000.000	017.590	55	2	49	0.89
Volusia	2001	000.000	017.590	119	2	72	0.61
Volusia Yearly Average				89	2	61	0.72
Volusia Totals				354	9	245	

Source: Seminole and Volusia Counties Crash Data Reports

The data compiled by the Counties show that in the 3-year period from 1999 through 2001, 44 of the total 302 reported crashes along the SR 415 corridor occurred in Seminole County's 0.897 miles of the 18.4 mile corridor. This represents 14.6% of the total number of crashes occurring within 4.8% of the total length of roadway. The disproportionately high number is consistent with the FDOT data, which reported 20 of 163 documented accidents along the SR 415 corridor occurring in the Seminole County segment, or 12.3% of the total, for the period from 1997 through 1999. As with the FDOT data, no fatalities were reported in this segment for the County's reporting period. Within the Seminole County portion of the study area, the crash data is relatively consistent over the 3-year reporting period. In Volusia County, the data indicates a significant decline in the number of crashes for the year 2000; however, the number of injuries per crash is comparatively high. In contrast, the number of crashes increased in 2001, while the number of injuries per crash decreased.

Table 4-10 presents the cross-street crash data for Seminole and Volusia Counties. The crash data indicate that the intersections with the highest number of crashes in the 3-year period from 1999 through 2001 along SR 415 are at cross-streets SR 46, Railroad Avenue, Howland Boulevard, and SR 44, with 19, 14, 16, and 23, respectively. Reed Ellis Road, Doyle Road, Howland Boulevard, and SR 44 all show a significant increase in the number of crashes in 2001. With the exception of SR 44, all of these cross-streets are located in the Southern Section of the study limits.

Table 4-10. Seminole and Volusia Counties Intersection Crash Summary

Cross Street (+/- 0.02 miles)	County	Number of Crashes				
		1998	1999	2000	2001	Total
SR 46	Seminole	--	5	7	7	19
Celery Ave	Seminole	--	3	3	3	9
Volusia-Seminole Co. Line	Seminole	--	--	1	--	1
Bridge 32	Volusia	1	--	--	1	2
Reed Ellis Rd	Volusia	4	3	--	7	14
Lemon Bluff Rd	Volusia	2	1	--	2	5
Rabbit Run	Volusia	2	--	--	1	3
Longwood Rd	Volusia	--	2	--	--	2
Thompson Ave/Leonardy Dr.	Volusia	4	7	2	1	14
Thomas Ave	Volusia	5	--	1	2	8
Enterprise-Osteen Rd	Volusia	4	3	2	1	10
Railroad Ave	Volusia	5	6	4	4	19
New Smyrna Blvd	Volusia	4	1	3	3	11
Parkinson Blvd	Volusia	1	--	--	2	3
Lake St	Volusia	1	1	--	1	3
Doyle Rd	Volusia	5	3	1	5	14
Shell St	Volusia	--	1	--	--	1
Collins Rd	Volusia	5	2	2	3	12
Prospect Hill Rd	Volusia	1	--	--	--	1
Eastside Ln	Volusia	--	--	--	2	2
8th Ave	Volusia	--	--	--	1	1
11th Ave	Volusia	1	--	--	--	1
Howland Blvd	Volusia	2	2	3	11	18
Fort Smith Blvd	Volusia	1	2		3	6
Twin Lake Ave	Volusia	--	--	1	--	1
Noremac Ave	Volusia	--	1	--	--	1
Osceola Tram Rd	Volusia	--	--	--	1	1
Ashby Cove Ln	Volusia	--	--	1	--	1
Eugene Rd/Hollander Rd	Volusia	3	--	1	1	5
Lake Ashby Rd/Colony Rd	Volusia	--	1	3	4	8
Quail Ranch Rd	Volusia	1	--	1	--	2
Falling Leaf Dr	Volusia	1	--	--	--	1
Budd Rd	Volusia	--	--	--	1	1
Sorrento Rd/Russo Rd	Volusia	--	1	--	--	1
La Starza Dr	Volusia	--	--	--	--	0
New Run Dr	Volusia	--	--	--	3	3
Rasley Rd	Volusia	--	2	2	--	4

Table 4-10. Seminole and Volusia Counties Intersection Crash Summary (Continued)

Cross Street (+/- 0.02 miles)	County	Number of Crashes				
Crestwood Dr/Cresthill Ln	Volusia	--	--	--	1	1
Crestwood Manor Dr	Volusia	--	--	--	2	2
Saddle Club Dr	Volusia	--	2	--	--	2
SR 44	Volusia	4	6	6	12	27

Source: Seminole and Volusia Counties Crash Data Report

Table 4-11 summarizes the crashes by type along the SR 415 study corridor, according to the Seminole and Volusia County's Crash Data Reports. Seminole and Volusia County's crash data show that rear-end and angle types of collisions are predominant, which is consistent with the FDOT crash data.

Table 4-11. Project Area Overall Crash Type Summary

Crash Type	Number of Crashes			Total	Percent of Total
	1999	2000	2001		
Collision, Rear-end	35	27	51	113	37.4%
Collision, Head On	4	2	1	7	2.3%
Collision, Angle	14	11	15	40	13.2%
Collision, Left Turn	9	8	9	26	8.6%
Collision, Right Turn	1	--	1	2	0.7%
Collision, Sideswipe	7	4	12	23	7.6%
Collision, Backed Into	1	--	--	1	0.3%
Collision, Parked Car	--	--	1	1	0.3%
Collision, W/MV Other Roadway	--	1	--	1	0.3%
Collision, W/Pedestrian	--	--	2	2	0.7%
Collision, W/Animal	2	2	7	11	3.6%
MV H/Sign/Sign Post/Utility Pole	2	--	1	3	1.0%
MV H/Guardrail/Fence/Barrier Wall	2	1	3	6	2.0%
MV H/Tree/Shrub	6	1	3	10	3.3%
Collision w/Construct. Barricade/Sign	--	1	--	1	0.3%
MV H/Other Fixed Object	1	1	1	3	1.0%
MV Ran Into Ditch/Culvert	4	1	11	16	5.3%
Ran Off Road Into Water	1	2	--	3	1.0%
Overtaken	4	2	6	12	4.0%
Occupant Fell From Vehicle	1	--	--	1	0.3%
All Other ¹	4	4	12	20	6.6%
TOTAL	98	68	136	302	100%

Source: Seminole and Volusia County's Crash Data Report

¹ Other type of crash refers to those crash types that were not identified or were not available.

4.1.12 Intersections and Signalization

There are two signalized intersections at the southern and northern project study limits of the SR 415 corridor, and several unsignalized cross streets within the study limits. In Seminole County, at the southern end of the study limits, the intersection of SR 415 and SR 46 is signalized. In Volusia County, at the northern end of the study limits, the intersection of SR 415 and SR 44 is signalized.

A Traffic Signal Warrant Study was conducted in January 2002 at the intersection of SR 415 at Doyle Road. The study determined that a signal should not be installed at this location as it would likely increase delay to motorists on both SR 415 and Doyle Road, and would increase the potential for high-speed, rear-end collisions on SR 415. Table 4-12 presents the major intersections along the project corridor.

Table 4-12. Existing Intersections and Signalization

Intersection	MP	County	Signal (Y/N)	2002 LOS
SR 46	0.000	Seminole	Y	E
Celery Ave (CR 415)	0.811	Seminole	N	F
Reed Ellis Rd	2.264	Volusia	N	F
Enterprise-Osteen Rd	4.385	Volusia	N	E
Railroad Ave	4.411	Volusia	N	D
Doyle Rd (CR 4162)	4.746	Volusia	N	F
Howland Blvd (CR 4145)	6.218	Volusia	N	B
Fort Smith Blvd	6.637	Volusia	N	C
SR 44	17.590	Volusia	Y	C

4.1.13 Lighting

There is no existing lighting along the SR 415 corridor within the study limits.

4.1.14 Utilities

The existing utilities located within approximately 300 feet of the existing right-of-way were identified within the project study limits. The preliminary utility coordination and investigation effort was conducted through written and verbal communication with the existing utility owners. A list of existing utility owners was provided by the Seminole County Engineering Department, the Volusia County Engineering Department, and the Florida Department of Transportation District 5. Table 4-13 provides a list of the utility companies and contact information. Table 4-14 summarizes the major utilities located within the project corridor.

Table 4-13. Summary of Utility Contacts

Utility	Contact Name	Address	Phone Number
BellSouth Telecommunications (Orange and Seminole Counties)	James Farrell	450 N. Goldenrod Rd Orlando, FL 32807	(407) 273-5084
BellSouth Telecommunications (Volusia and Flagler Counties)	John Arnold/ Vic Water	900 N. Nova Rd Daytona Beach, FL 32117	(386) 257-7913/ (386) 252-1385
Progress Energy Florida, Inc. -Jamestown (Distribution)	Bob Mathews/ Stephanie Tate	2801 W. SR 426 Oviedo, FL 32765	(407) 359-4405 (407) 359-4883
Progress Energy Florida, Inc. (Transmission)	Jorge Oviedo	2600 Lake Lucien Dr, Suite 400 Maitland, FL 32751	(407) 942-9215
Florida Power & Light Co.	Bruce Stevenson	3000 Spruce Creek Rd Port Orange, FL 32129	(386) 322-3417
Utility Commission City of New Smyrna Beach Electric/Utility Commission-NBS-Electric (Transmission)	Greg Goldsworthy	PO Box 100 New Smyrna Beach, FL 32170	(386) 427-1361 ext. 7106
Time Warner Cable (Daytona Office)	Larry Henderson/ Jim Sappington	1479 S. Nova Rd Daytona Beach, FL 32114	(386) 775-4444 ext. 7123 (386) 267-7528
Time Warner Cable (Ocoee Office)	Marvin Usry/ Mark Mendoza	844 Maguire Rd Ocoee, FL 34761	(407) 532-8509/ (407)532-8519
Epik Communications (Williams Communications, Florida East Coast Telecom)	David Long	3501 Quadrangle Blvd, Suite 225 Orlando, FL 32817	(407) 482-8400
WiiTel Communications, LLC (Formerly Williams Communications)	Judith S. Lake	Mail Drop TC-9S 100 S. Cincinnati Tulsa, OK 74103	(918) 547-9919
City of Sanford	Kevin Tolliver	PO Box 1788 Sanford, FL 32772	(407) 330-5639
Florida Water Services Corp.	Doug Lovell	225 Enterprise Rd Deltona, FL 32725	(386) 574-2181 ext. 107
Florida Water Services Corp. (Flagler-North Region)	Mike Dunn	1000 Color Pl Apopka, FL 32703	(407) 598-4198
Utility Commission City of New Smyrna Beach Water	Greg Goldsworthy	PO Box 100 New Smyrna Beach, FL 32170	(386) 427-1361 ext. 7106
TECO Peoples Gas	Wayne Kilby	600 W. Robinson St Orlando, FL 32801	(407) 420-6610
TECO Peoples Gas	Heath M. McArdle	1724 Kurt St Eustis, FL 32726	(407) 425-4661
Florida Public Utilities	Dan Scribbons	450S. Highway 17-92 DeBary, FL 32713	(386) 668-9319
Florida Gas Transmission	Joe Sanchez	601 S. Lake Destiny Dr. Suite 450 Maitland, FL 32715	(407) 838-7171

Table 4-14. Major Utilities Located along SR 415

Type of Utility	Company Name	Service	Location
Electric	Florida Power & Light Co.	Overhead Power Line	All utilities are generally 23 KV overhead electric lines. They are located along the eastern side of SR 415 within ROW running north from St. Johns River to just north of Kove Blvd then west to SR 44. No known underground utilities except underground power lines through the creeks.
Electric	Utility Commission City of New Smyrna Beach Electric/Utility Commission-NBS-Electric (Transmission)	Overhead Power Line	23 KV overhead distribution electric line, located in the south side of SR 44 within ROW crossing SR 415; 115 KV overhead transmission electronic line crossing SR 415 approximately 2 miles south of SR 44.
Cablevision	Time Warner Communications-Seminole County	Underground cable TV Fiber Coaxial	From south of St. Johns River Bridge to County line along the western side of SR 415 within ROW.
Cablevision	Time Warner Communications-Volusia County	Fiber Coaxial Cable	Overhead cable along SR 415 within ROW from north of St. Johns River Bridge to SR 44 runs along the same poles as the overhead power lines..
Cablevision		Underground cable	Along SR 415 within ROW at St. Johns River Bridge, the Howland Blvd/SR 415 intersection, south of the Raisley Rd/SR 415 intersection, north of the Budd Rd/SR 415 intersection south of Eugenia Blvd, and south of the Russell Rd/SR 415 intersection. A small portion along SR 415 between Osceola Tram Rd to Ashby Cove Ln at FPL.
Cablevision	WITel Communications, LLC (Formerly Williams Communications)	Fiber Optic Cable	Fiber optic cable underground along the eastern side of SR 415 within ROW.
Cablevision	Epik Communications (Formerly Florida East Coast Telecom)	Fiber Optic Cable	Fiber optic cable underground conduct along the eastern side of SR 415 within ROW, sharing the same running line with WITel Communications, LLC
Telecommunication	BellSouth Telecommunications, Inc. (Volusia/Flagler Areas)	Buried Cable	Along the western side of SR 415 within ROW from the City of Deltona line expanding north to SR 44.
Sewer & Water	Florida Water Services Corp. (Flagler-North Region)	Existing Water	4" water main located on the north side of SR 415 between Noremac Ave and Twin Lake Ave. There are no sewer utilities in that corridor.
Sewer & Water	Utility Commission City of New Smyrna Beach Water	Existing Water	20" raw water main, located in the south ROW of SR 44 crossing SR 415 at a depth of approximately 3 feet.
Sewer & Water	City of Sanford	Existing Water	10" water main extending from SR 46 approximately 3,900 feet north along the east ROW line of SR 415. The pipe is 10 feet within the eastern ROW line.

4.1.15 Pavement Conditions

Pavement condition surveys for the SR 415 study corridor from SR 46 to SR 44 are conducted by FDOT and are rated on a scale of zero to ten. A rating of six or less is considered deficient. Table 4-15 provides the pavement condition ratings for the year 2003; however, the segment from MP 0.459 to MP 4.883 is currently under construction for resurfacing, widening for turn lanes, and bridge replacement (St. Johns River Relief Bridge). Upon completion of this project, the pavement will be in good condition. The segment from MP 4.883 to MP 17.590 was resurfaced in October 2001, as is reflected in the deficiency ratings.

Table 4-15. Pavement Conditions

County	Begin MP	End MP	Rut Rating	Crack Rating	Ride Rating
Seminole	0.000	0.897	9.0	7.0	9.0
Volusia	0.459	4.456	3.5	7.7	7.0
Volusia	4.456	4.831	3.5	7.0	8.0
Volusia	4.831	17.590	10.0	8.7	9.0

Source: FDOT, *All System Pavement Condition Forecast (2003 Ratings)*

4.2 Existing Bridges

Information on the existing SR 415 bridge structures was obtained using FDOT's *Bridge Management System (BMS) Comprehensive Inventory Data Report* and by reviewing the existing SR 415 construction drawings. There are five existing SR 415 bridges within the Volusia County portion of the study limits. All five of the structures serve as water crossings over rivers, canals, and creeks along the project corridor. The St. Johns River is the only navigable waterway within the study limits.

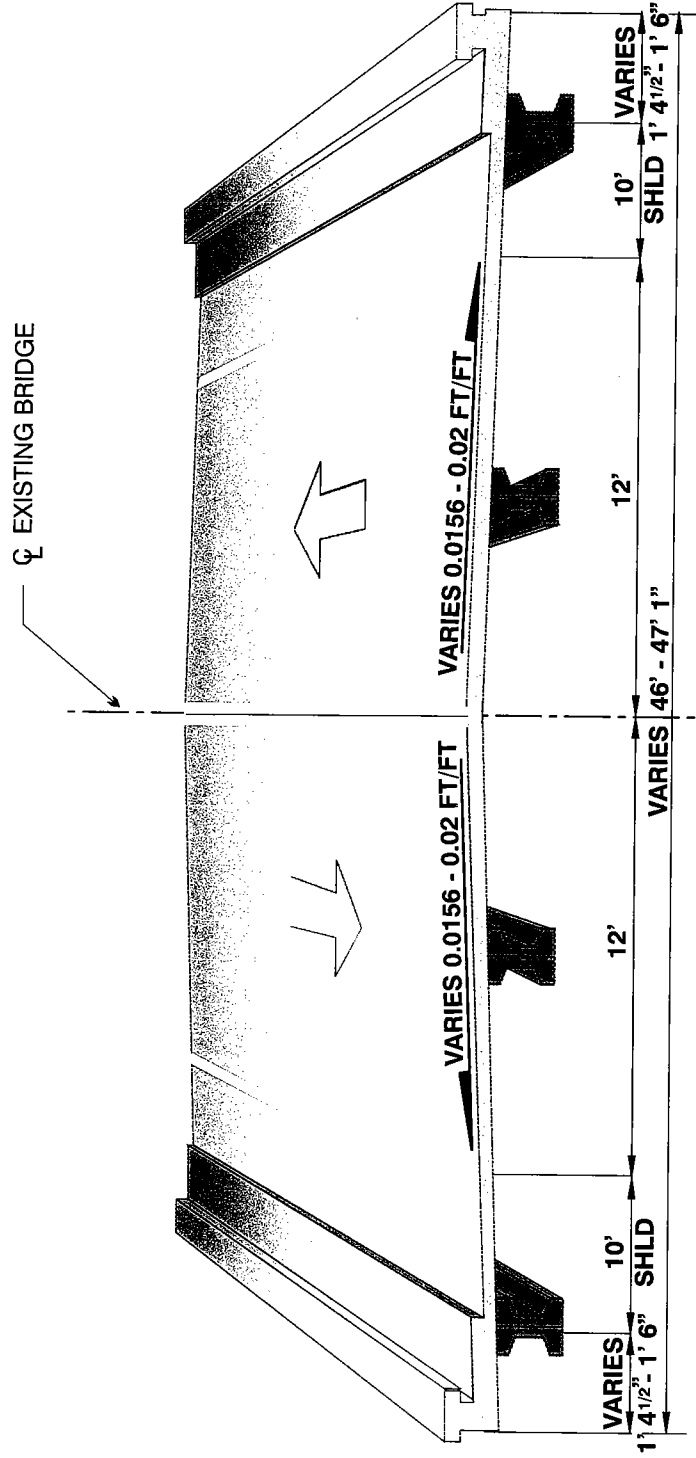
In the Southern Section, the St. Johns River Bridge crosses the St. Johns River at MP 0.00, and the St. Johns River Relief Bridge crosses a relief channel of the St. Johns River at MP 1.755. The proposed four-laning of the Southern Section of the SR 415 corridor would require replacement of these bridges.

The three SR 415 bridges in the Northern Section of the study area include the Deep Creek Bridge at MP 8.829, the Alamana Canal Bridge at MP 11.495, and the Lake Ashby Canal Bridge at MP 12.344. Each of these bridges was named for the creek or canal that they cross.

4.2.1 Typical Section

The existing bridge typical section consists of two 12-foot lanes with no median separation, and 10-foot outside shoulders. The bridge section in Figure 4-6 is typical of the five bridges within the study limits. The St. Johns River Bridge and the St. Johns River Relief Bridge will require replacement due to the proposed improvements.

Existing Bridge Typical Section



4.2.2 Type of Structure

The existing bridge structure spanning the St. Johns River, a navigable waterway, is an AASHTO Type III, prestressed concrete stringer/girder facility that was built in 1977. The deck of the superstructure is constructed of cast-in-place concrete measuring approximately 47 feet wide. The superstructure consists of 37 spans with the longest span measuring approximately 72 feet. The current structure has a vertical clearance of 25 feet and a horizontal clearance of 56 feet.

The original St. Johns River Relief Bridge (Bridge No. 790032) was replaced in 2003 with an in-kind concrete slab structure (Bridge No. 790198).

The remaining three bridges, in the Northern Section of the SR 415 corridor, are concrete slab-type structures customarily used at small channel crossings. Table 4-16 provides a summary of the existing bridge structures within the study limits.

Table 4-16. Existing Bridge Structures

Feature Intersect	Bridge No.	No. of Spans	Bridge Length (ft)	Maximum Span Length (ft)	Deck Width (ft)	Superstructure Type(s)
St. Johns River	790124	37	2426.00	71.85	46.72	AASHTO Type III Stringer/Girder
St. Johns Relief	790198	4	121.00	30.50	41.08	Flat Slab
Deep Creek	790033	6	120.08	20.01	46.23	Flat Slab
Alamana Canal	790034	4	80.71	20.01	46.00	Flat Slab
Lake Ashby Canal	790035	5	160.10	32.15	46.92	Flat Slab

Notes:

[1] AASHTO Type (uno)

[2] 48"X18" Prestress Units (voided slab)

4.2.3 Current Condition and Year of Construction

Table 4-17 provides a description of the five existing bridges within the SR 415 study limits. This information was obtained from existing construction plans, the FDOT's *Structural Inventory Detail Report*, and the most current bridge inspection reports. The sufficiency rating is derived from a formula that methodically evaluates factors that are indicative of the structure's ability to remain in service. A rating of 100 would represent an entirely sufficient bridge and a rating of zero would represent an entirely deficient bridge. The FDOT standards indicate that structures with a sufficiency rating of 80 or less require some rehabilitation and those less than 60 require replacement. The original St. Johns River Relief bridge, built in 1947, scored sufficiency rating of 50 on the inspection performed in June of 2001, prior to being replaced in 2003.

Table 4-17. Current Structure Condition and Year of Construction

Feature Intersect	Bridge No.	Sufficiency Rating	Overall NBI Rating [1]				Year Built	Year Replaced/Widened
			Deck	Superstr.	Substr.	Channel		
St. Johns River	790124	85.0 ¹	6	7	7	7	1977	N/A
St. Johns Relief	790198	N/A	N/A	N/A	N/A	N/A	2003 ²	2003
Deep Creek	790033	90.2	6	6	6	7	1957	2000
Alamana Canal	790034	88.0	7	7	7	7	1957	2000
Lake Ashby Canal	790035	85.0	7	7	7	8	1957	1997

¹ The Underwater Inspection Report performed 8/30/01 assigned a sufficiency rating of 90.5.

² Replaced Bridge No. 790032, built in 1947.

4.2.4 Channel Dimensions

The United States Coast Guard (USCG) imposes regulations regarding navigable channel width and vertical clearance from the waterline to the bottom of the bridge structure. Pursuant to the Coast Guard Authorization Act of 1982 and Public Notice 3-83, issued February 28, 1983, the St. Johns River is considered a navigable water of the United States. Jurisdiction is considered from its mouth at the Atlantic Ocean in Jacksonville, Florida to mile 186.4 at Lake Harney, near Sanford, Florida. The St. Johns River Bridge (Bridge No. 790124) crosses the St. Johns River at mile 169.5, and therefore, is under the jurisdiction of the USCG.

Current regulations require a minimum navigable channel width (channel horizontal clearance) of 100 feet between bridge supports and a channel vertical clearance of 45 feet from the normal high water level to the bottom of the structure. The existing bridge, built in 1977, does not meet the current criteria. The existing channel horizontal clearance is 56 feet between supports, perpendicular to the roadway, and the channel vertical clearance is 25 feet.

The *BMS Comprehensive Inventory Data Report* (Report ID INVT001A, October 8, 2001) records the existing channel depth at Bridge No. 790124 as 15.7 feet. *The United States Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) Coast Survey, 15th Edition*, dated November 29, 1998, shows a sounding depth of 6 feet in the location of the bridge crossing at SR 415.

4.2.5 Bridge Openings

There are no moveable bridges within the project corridor. Therefore, bridge openings are not applicable to this project.

4.2.6 Ship Impact Data

There have been no significant ship impacts to Bridge No. 790124 since the structure was constructed.

4.3 Environmental Characteristics

This section summarizes the existing conditions on the social, cultural, natural and physical environment that would potentially be affected by widening the SR 415 corridor. The environmental characteristics discussed herein are based on extensive literature and field reviews and include planning efforts to date that use currently available information.

4.3.1 Land Use

4.3.1.1 Existing Land Use

Existing land use information was based on a review of current aerial photography, project site visits, and existing land use maps provided by Seminole and Volusia Counties' Geographic Information System (GIS) Department. Adjacent land uses along the study corridor include residential, agricultural/pasture, public lands, commercial, recreational, and natural conservation areas. Current land use densities range from 1 unit per 25 acres to 1 unit per acre in selected areas. Figure 4-7 presents the generalized existing land uses adjacent to the project corridor.

Southern Section

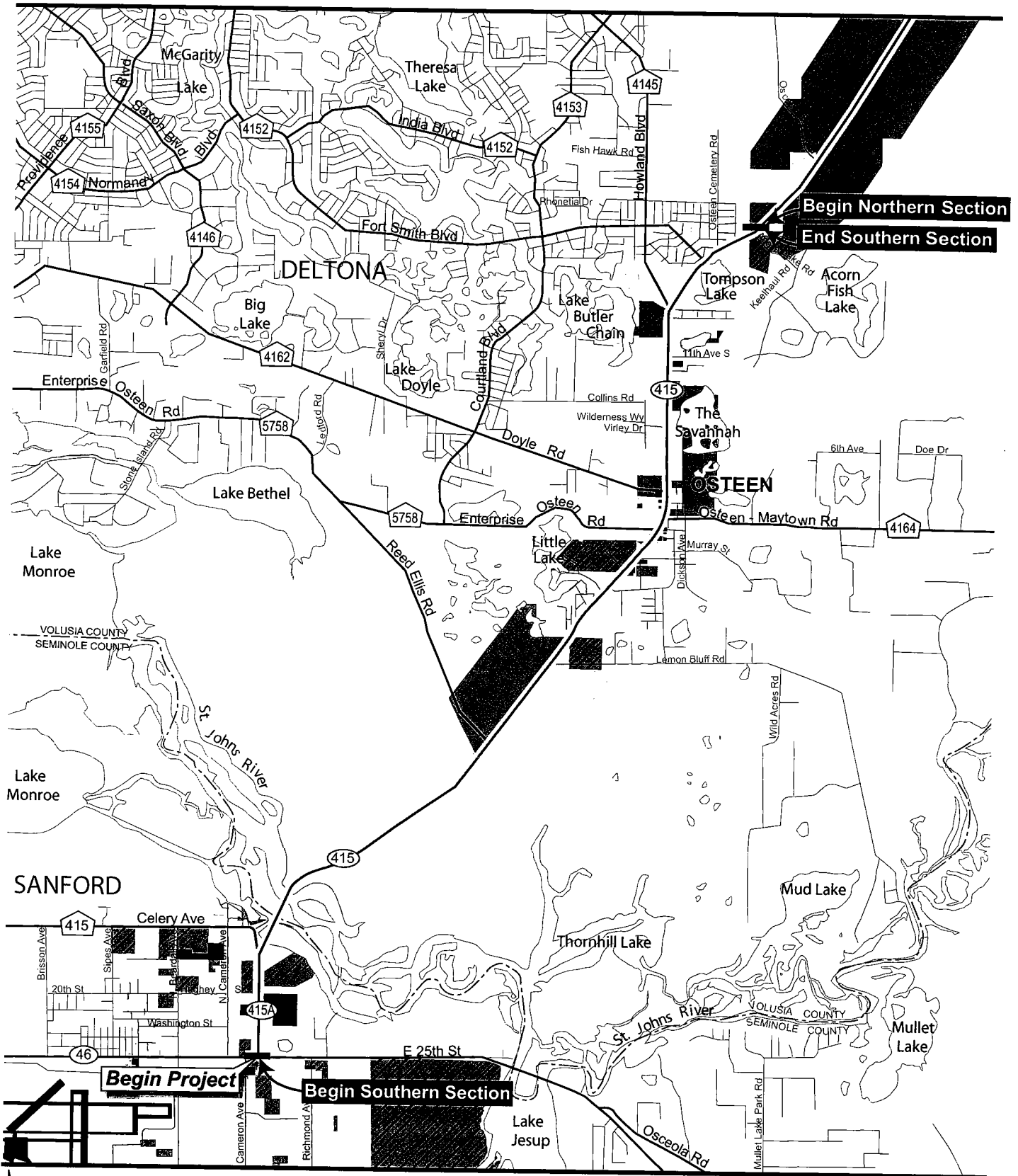
Existing land use within the Seminole County portion of the Southern Section, from SR 46 to the St. Johns River, consists of a mix of residential, commercial, industrial, agricultural, and public lands.










In Volusia County, the dominant feature in the Southern Section is the St. Johns River and its associated floodplains, much of which is publicly owned conservation land. North of the St. Johns River, the Lake Monroe Conservation Area, owned by the SJRWMD, includes the Kratzert Tract extending north to Reed Ellis Road on the west side of SR 415, and the Brickyard Slough Tract extending north to Lemon Bluff Road on the east side of SR 415.

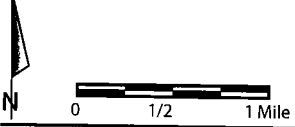
South of Lemon Bluff Road, Volusia County owns a 270 acre parcel of conservation land bounded by SR 415 on the west and the Brickyard Slough Tract on the east. The property is a former cattle farm. The County is proposing to convert the property to an active recreational facility in the future; however, no funding is allotted at this time. Volusia County is considering a more immediate proposal to develop 10 to 15 acres of the property for public use, while awaiting funding for the full acreage. North of the Kratzert Tract, agricultural land extends from Reed Ellis Road to the community of Osteen.

The rural community of Osteen is the most developed section of SR 415. Limited commercial property exists along the section from north of Lemon Bluff Road to Doyle Road. The commercial land uses consist of gas station/convenience stores and small businesses typical of rural communities.

Other land uses within the area from Lemon Bluff Road to Howland Boulevard include residential, vacant residential, vacant commercial, rural agricultural, and small public land areas located in the vicinity of Howland Boulevard. The dense residential areas primarily consist of Kove Estates, a cooperative mobile home park, and single-family homes within Deltona.



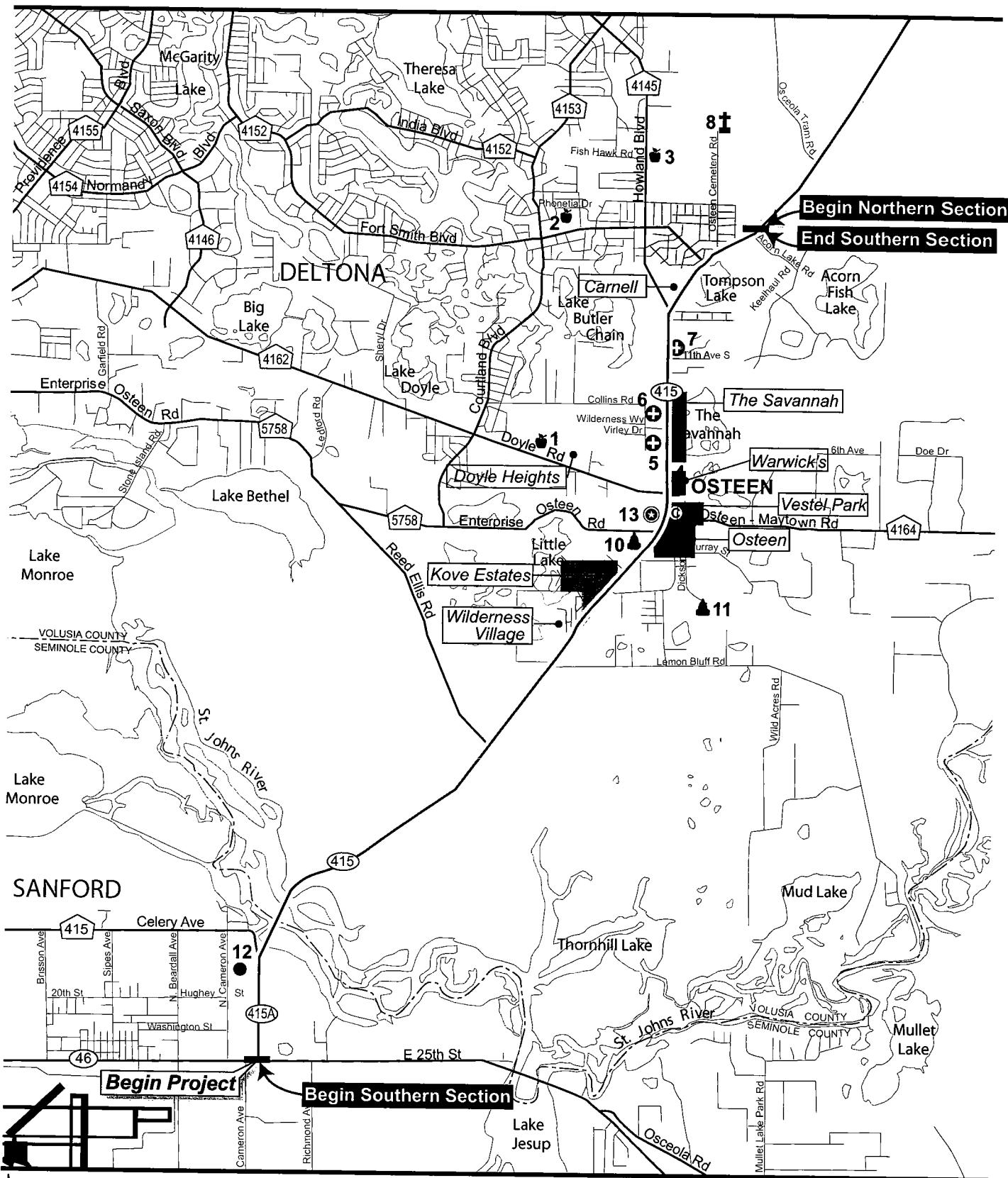
-  Rural Agricultural
-  Agricultural
-  Commercial
-  Industrial
-  Publicly Owned
-  Recreation
-  Residential
-  Vacant Residential
-  Vacant Commercial



Source: Seminole and Volusia County GIS (December 2002)

Figure 4-7
Generalized Existing Land Use





- Neighborhoods within 1/2 mile of corridor
- † Cemetery
- ⊕ Churches
- ▲ Government
- Ⓜ Police - Fire - EMS
- 🎓 Schools
- Ⓞ Social Service
- Medical

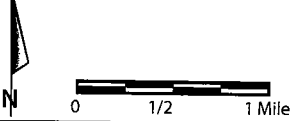
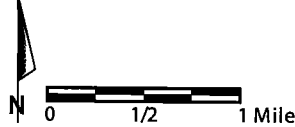
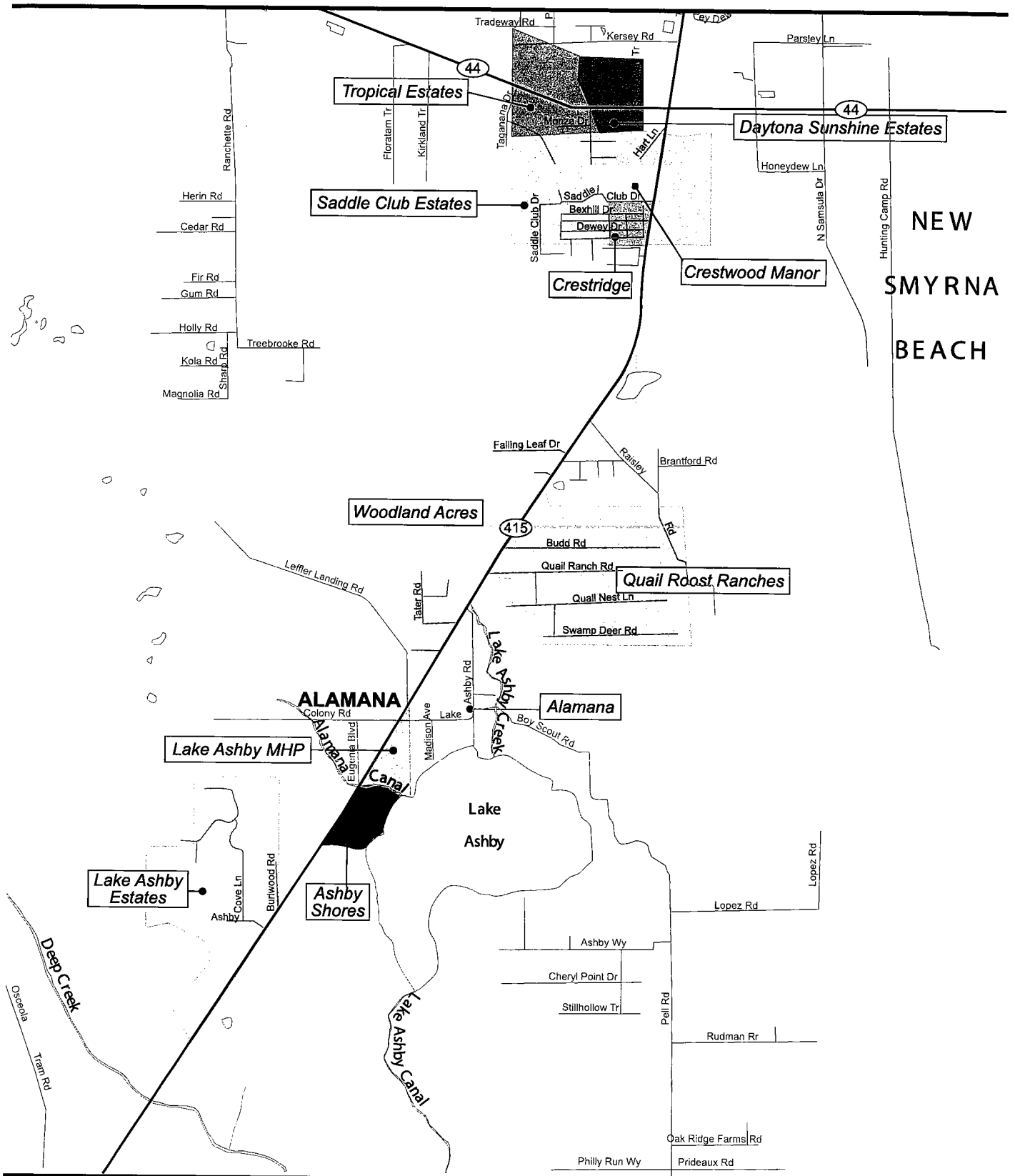


Figure 4-9
Neighborhoods and Community Facilities
 Sheet 1 of 2
 SR 415 PD&E Study





- Neighborhoods within 1/2 mile of corridor
- ☪ Cemetery
 - ⊕ Churches
 - ▲ Government
 - Ⓜ Police - Fire - EMS
 - 🎓 Schools
 - Ⓢ Social Service
 - Medical



Figure 4-9
Neighborhoods and Community Facilities

4.3.2.2 Community Facilities

Community facilities help provide the social service needs of the community and include schools and higher education facilities, adult and childcare centers, churches/religious centers, social service organizations, government facilities, medical facilities, police and fire rescue stations. These facilities were identified through field reconnaissance, local government comprehensive plans, and coordination with state and local governments/agencies with jurisdictions within the project study area.

Such facilities are generally important in shaping a community's identity and sense of togetherness. Several community facilities were identified within approximately 1/2 mile of the SR 415 corridor. Table 4-18 summarizes the number and type of community facilities located within the project study area. Refer to Figure 4-9 for a generalized location of these facilities.

Table 4-18. Summary of Corridor Community Facilities

Community Facility	Southern Section	Northern Section	Total
Schools (K-12) / Emergency Shelters*	3	0	3
Church/Religious Center	4	0	4
Cemeteries	0	1	1
Social Service Organization	1	0	1
Government	2	0	2
Medical	1	0	1
Fire Rescue	1	0	1
Total:	12	1	13

*Schools within 2-miles of the project corridor were identified.

4.3.2.3 Cultural Resources

A Cultural Resource Assessment Survey (CRAS), conducted as part of the SR 415 PD&E Study, was undertaken to comply with Section 106 of the National Historic Preservation Act of 1966 (Public Law 89-655), as amended, and the implementing regulations 36 CFR Part 800 (Protection of Historic Properties), as well as provisions contained in the revised Chapter 267, Florida Statutes. Background research and a field survey coordinated with the State Historic Preservation Office (SHPO) were performed for the project.

The purpose of the CRAS was to locate, identify, and bound any cultural resources with the project area of potential effects (APE), including the existing and proposed rights-of way as well as proposed pond alternative sites, and to assess their significance in terms of eligibility for listing in the National Register of Historic Places (NRHP). The historical/architectural and archaeological field surveys were conducted between January and July 2003.

Review of the Florida Master Site File (FMSF) and the NRHP indicated that six previously recorded archaeological sites (8SE6, 8SE84, 8SE85, 8SE1310, 8SE1724, and 8SE1725) are located within approximately 2,000 feet of SR 415. All are located in the Seminole County portion of the study limits. Two of these sites (8SE1310, and 8SE1725) are located within or adjacent to the SR 415 archaeological APE. Field survey and subsurface testing, both within and adjacent to the project APE resulted in the identification and updating of site information, including expansion of site boundaries, for 8SE1310. However, no evidence was found of 8SE1725. The newly updated 8SE1310 is considered potentially eligible for listing in the NRHP given its high research value. No roadway improvements are proposed within the site area, which is situated adjacent to the Celery Avenue (CR 415) right-of-way.

The archaeological survey resulted in the identification of two new archaeological sites (8VO5000, 8VO6759) within the project right-of-way (located approximately 2,400 feet south of Howland Boulevard, in the southeast quadrant of SR 415 and 11th Avenue). Neither of these sites is considered to meet the eligibility requirements for listing in the NRHP. In addition, one archaeological occurrence (AO #1) was discovered in proposed Pond Alternative DC4-1 (approximately 3,800 feet south of Howland Boulevard, east of SR 415 and south of Eastside Lane). Although this site was found to contain a single diagnostic artifact, it is not considered significant. Therefore, this site is not considered potentially eligible for listing in NRHP.

The architectural/historical survey resulted in the identification and evaluation of 23 historic resources, including nine previously recorded (8SE1726, 8VO4885, 8VO4886, 8VO4918, 8VO4919, 8VO4922, 8VO4923, 8VO4924, AND 8VO4929) and 14 newly identified (8VO5309, 8VO7503 through 8VO7515) sites. The majority, located within the community of Osteen, are residences built between 1910 and 1951 in the Frame Vernacular style. None is considered potentially NRHP-eligible, either individually or as part of a historic district.

Figure 4-10 presents the location of previously and newly recorded archaeological sites and historic structures. Further detailed information on the cultural resource evaluation can be obtained from the *Cultural Resource Assessment Survey* (October 2003) performed for this project.

4.3.2.4 Parks and Recreation

Preliminary data collection efforts identified three publicly-owned and one privately-owned park and recreational facility within close proximity of the SR 415 corridor. Table 4-19 summarizes the parks/recreational areas identified within approximately one-half mile of the SR 415 corridor. The general location of these facilities is shown on Figure 4-11.

In addition to parks and recreational areas, there are public/state-owned lands located within the project study limits. These lands are owned by SJRWMD. There are some potential acquisitions for publicly-owned and/or conservation easements currently underway. Refer to Figure 4-11 for the approximate location of these lands.

Volusia County currently owns some public lands (generally known as Beck Ranch) adjacent to SR 415 on the east. These lands are located adjacent to the Lake Monroe Conservation Area just south of Reed Ellis Road. The 250-acre parcel is on Volusia County's Master Plan to be developed as a regional park with ball fields, multi-use fields, and other active and passive recreational uses.

4.3.3 Natural and Biological Features

4.3.3.1 Wetlands

In compliance with Presidential Executive Order 11990, and the FHWA Technical Advisory T640.8A, Title 23 CFR, Part 777, and Part 2, Chapter 18 of the FDOT *PD&E Manual*, extensive assessments of wetland and natural resources within the project corridor have been completed.

The SR 415 PD&E study limits include the SR 415 corridor from SR 46 to SR 44; however, traffic studies performed early in the PD&E process determined that only the segment from SR 46 to Fort Smith Boulevard was in need of modifications. Therefore, the ecological evaluation of wetland habitat focused more closely on this segment of the study corridor when considering wetland quality, habitat assessment, and potential impacts. The width of the study area was defined as 550 feet east and west of the SR 415 centerline. Project ecologists identified and delineated all uplands, wetlands, and surface water features during field reviews conducted during the Winter of 2002 and Spring of 2003. The approximate wetland locations are presented in Figure 4-12.

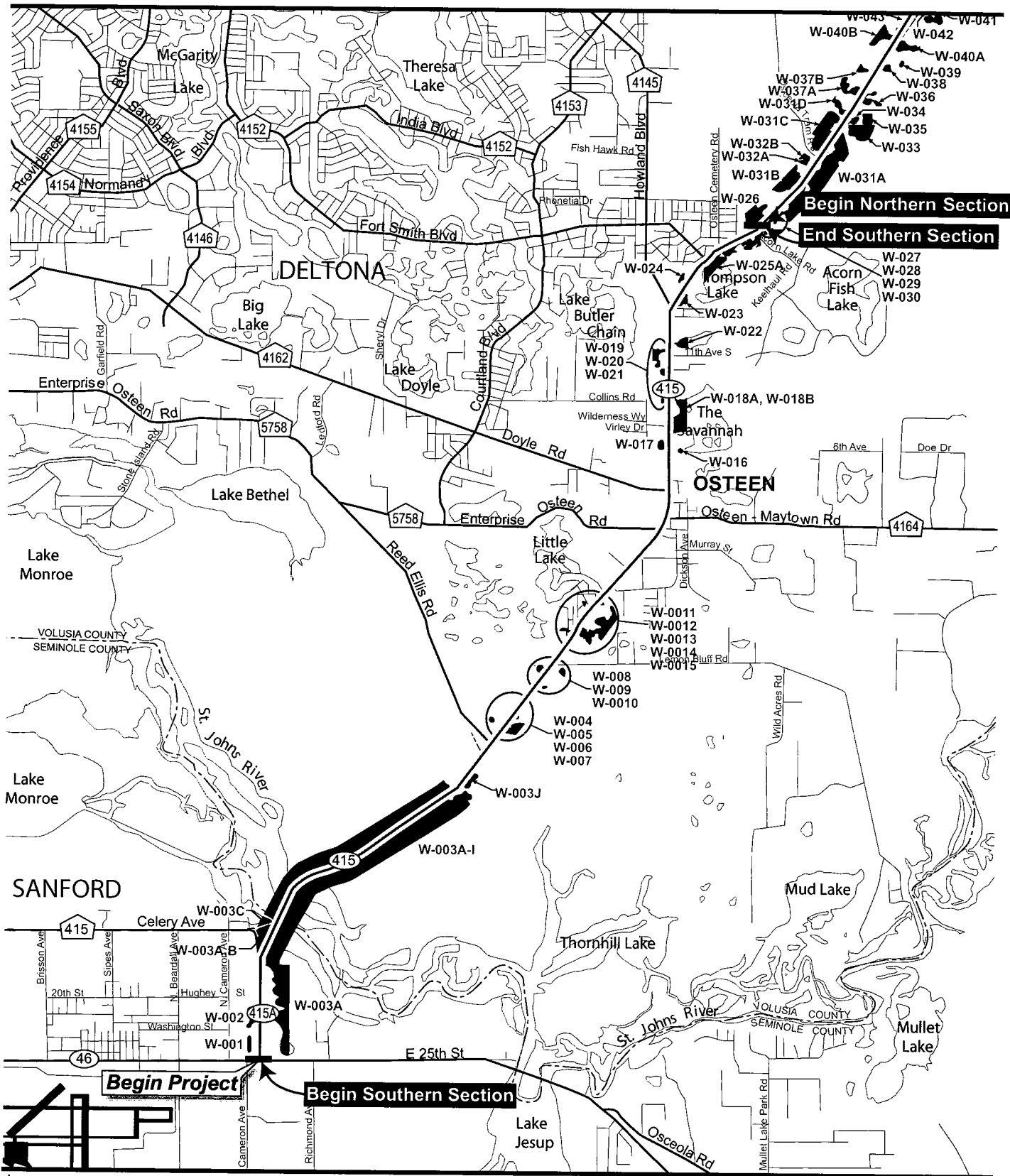
The field reviews and mapping of wetlands resulted in the identification of 26 wetland areas in the Southern Section and 110 systems in the Northern Section consisting of mixed-forested wetlands, freshwater marshes, riverine and lacustrine swamps (bottomland), and wet prairies ranging in size from less than one-half acre to greater than 100 acres. Typical freshwater marshes and forested riverine swamp systems are associated with the St. Johns River and adjacent floodplain. Surface water systems include both naturally occurring open water features and artificially channelized stormwater swales and ditches. Further detailed information on wetlands can be obtained from the *Wetland Evaluation Report* (June 2004).

4.3.3.2 Threatened and Endangered Species

A threatened and endangered species survey was conducted to qualitatively assess the potential for wildlife usage, or rare plant occurrence within the project study area. The survey involved the following:

- Literature reviews to determine the current Federal and State listed status of all protected flora and fauna species having the potential for occurrence in the vicinity of the project;
- Characterization of known and preferred habitat types for each listed species; and
- On-site investigations to determine the potential or actual occurrences.

A series of sources were also used to identify potential threatened and endangered listed species along the project corridor. These sources include US Fish and Wildlife Service (USFWS), the Florida Fish and Wildlife Conservation Commission (FWC), and the National Marine Fisheries Service (NMFS), and the Florida Natural Areas Inventory (FNAI) database for Seminole and Volusia Counties, April 1998. A brief discussion of the species present within the study corridor is provided below. Observed listed wildlife and vegetative species along the project corridor are presented in Table 4-20. Figure 4-13 presents the approximate locations of all listed species observed or reported by agencies to occur within the project corridor.





 Area of Generalized Wetland Location (For specific wetland boundaries refer to the Wetland Evaluation Report)

Figure 4-12
Existing Wetlands
 Sheet 1 of 2
 SR 415 PD&E Study

**Table 4-20. Observed Listed Wildlife and Vegetative Species within,
or adjacent to, the SR 415 Project Corridor**

Scientific Name	Common Name	Status		Notes
		USFWS ¹	FWC ²	
Reptiles				
<i>Alligator mississippiensis</i>	American Alligator	--	SSC	Observed
Birds				
<i>Aphelocoma coerulescens</i>	Florida Scrub Jay	T	T	FNAI reported outside study area
<i>Egretta caerulea</i>	Little Blue Heron	--	SSC	Observed
<i>Grus canadensis pratensis</i>	Sandhill Crane	--	T	Observed
<i>Haliaeetus leucocephalus</i>	Bald Eagle	T	T	FNAI Recorded
<i>Mycteria americana</i>	Wood Stork	E	E	Observed
Mammals				
<i>Trichechus manatus latirostris</i>	West Indian (Florida) Manatee	E/CH	E	Observed

¹ USFWS = US Fish and Wildlife Service

² FWC = Florida Fish and Wildlife Conservation Commission

T = Threatened; E = Endangered; SSC = Species of Special Concern; CH = Critical Habitat

Note: The Florida Scrub Jay is not shown on Figure 4-13 since FNAI reports depict all occurrences outside of the project corridor. However, scrub habitat is more frequent in the Northern Section, north of Ft. Smith Boulevard.

Wildlife Species

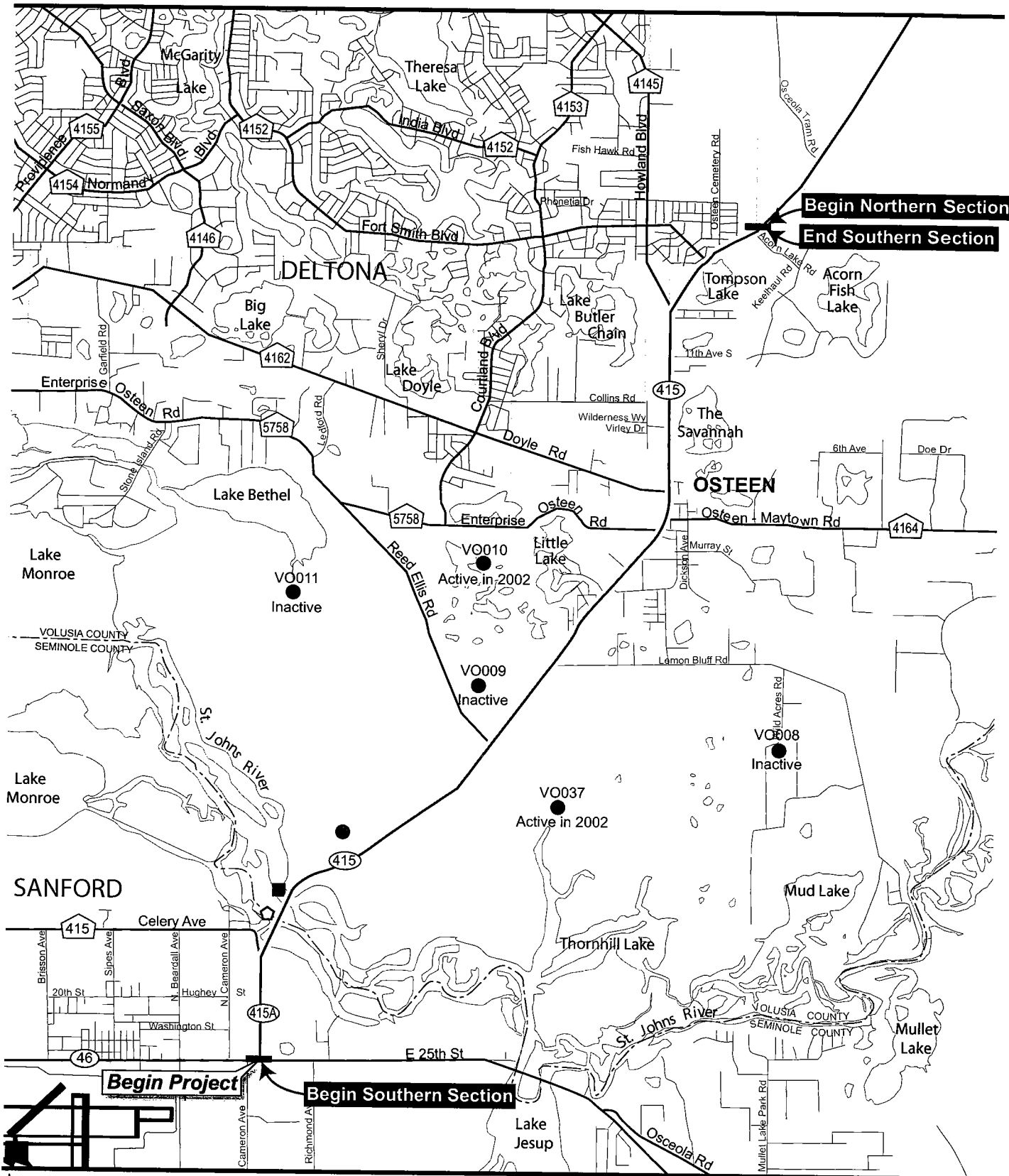
Portions of the study area appear to be located within a significant region of natural habitat for rare wildlife species. Potential habitat is defined as those areas, which may offer suitable habitat for one or more rare species that may be known to occur in the vicinity. Federally listed wildlife species most likely to be found within the SR 415 corridor. Literature information, personnel communications and field reviews suggest that the SR 415 corridor potentially provides habitat for the following listed species:

Federally Listed Species:

- Florida Scrub Jay (*Aphelocoma coerulescens*)
- Bald Eagle (*Haliaeetus leucocephalus*)
- Wood Stork (*Mycteria americana*)
- West Indian Manatee (*Trichechus manatus latirostris*)
- Eastern Indigo Snake (*Dumarchon corais couperi*)

State Listed Species:

- Sandhill Crane (*Grus canadensis pratensis*),
- Gopher Tortoise (*Gopherus polyphemus*)
- Florida Black Bear (*Ursus americanus floridanus*)
- Wading Birds include: Limpkin (*Aramus guarauna*), Little Blue Heron (*Egretta caerulea*), Tri-colored Heron (*Egretta tricolor*), Snowy Egret (*Egretta thula*), and White Ibis (*Eudocimus albus*)
- American Alligator (*Alligator mississippiensis*)



Note: All species were observed in the field with the exception of the bald eagle which was previously recorded by FNAI.

- Bald Eagle (FNAI Recorded)
- Little Blue Heron
- American Alligator
- Manatee
- ★ Wood Stork
- ⊙ Sandhill Crane

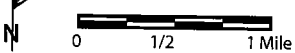
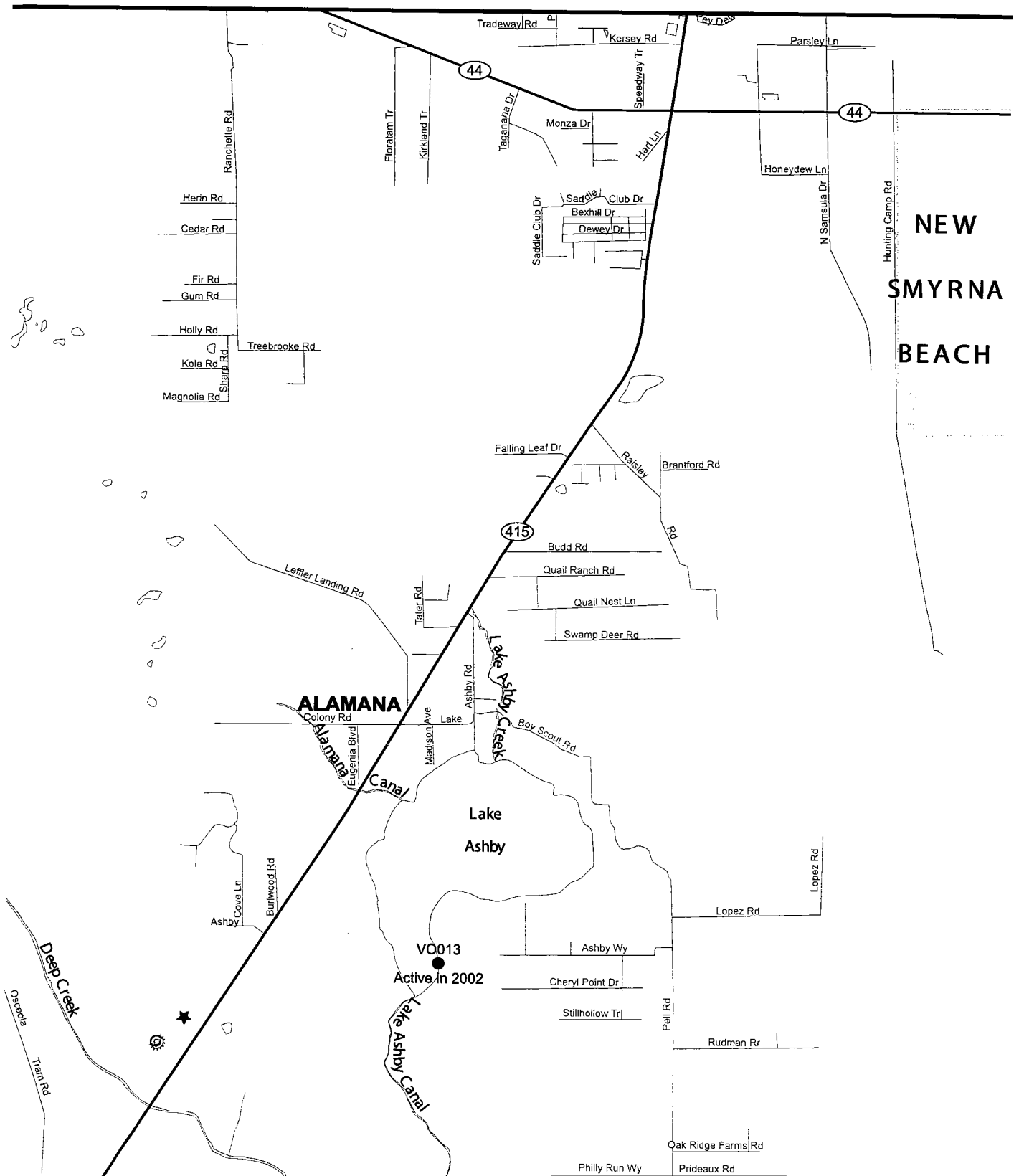


Figure 4-13
Threatened and Endangered Species Observed



Note: All species were observed in the field with the exception of the bald eagle which was previously recorded by FNAI.

- Bald Eagle (FNAI Recorded)
- Little Blue Heron
- American Alligator
- ⬢ Manatee
- ★ Wood Stork
- ☼ Sandhill Crane

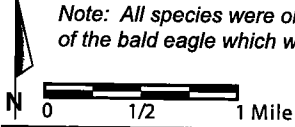


Figure 4-13
Threatened and Endangered Species Observed

Six faunal species have been directly observed or previously recorded within the SR 415 project corridor. Three of the species are federally listed and one (Scrub Jay) has the potential to be present due to scrub habitat occurrence in the corridor. Further information, including a comprehensive list of potentially occurring listed species for Seminole and Volusia Counties, is provided in the *Endangered Species Biological Assessment* (June 2004) prepared for this study.

Vegetative Species

Although a thorough review was performed during the field reconnaissance, protected floral species listed as "Threatened" or "Endangered" were not identified within the study area. This is largely the result of the altered or disturbed condition of the natural floral communities along the SR 415 corridor.

Further detailed information on wildlife and habitat is included in the *Endangered Species Biological Assessment* (June 2004).

4.3.4 Physical Environment

4.3.4.1 Air Quality

The purpose of the air quality analysis is to evaluate the air quality effects that would be caused by the proposed improvements to the SR 415 corridor, and to determine whether project-related motor vehicle emissions will cause or contribute to an exceedance of the National Ambient Air Quality Standard (NAAQS) for carbon monoxide (CO). The project corridor is located in Seminole and Volusia Counties which have been designated as attainment for all the air quality standards under the criteria provided in the Clean Air Act Amendments of 1990.

As required by the Clean Air Act, NAAQS have been established for seven criteria air pollutants. These standards, which are summarized in Table 4-21, also have been adopted as the ambient air quality standards for the State of Florida. The primary standards have been established to protect the public health. The secondary standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

An air quality screening test was performed to ascertain the effects the proposed improvements may impose on air quality. Refer to Section 8.11.6 for the results of FDOT's COSCREEN98 air quality screening test performed for this project.

4.3.4.2 Noise

The proposed improvements to the SR 415 corridor could potentially result in traffic noise that is greater than the existing conditions. Therefore, a noise analysis was conducted to identify noise sensitive sites adjacent to the project corridor; to compare and evaluate the significance of traffic noise at these sites with and without the project; and to evaluate the need for and the effectiveness of noise abatement measures. All noise levels described in this study are expressed in A-weighted decibels (dBA) in terms of one-hour equivalent steady-state sound level (L_{eq}).

Table 4-21. National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Period	National Standards	
		Primary	Secondary
Ozone (O ₃)	1 Hour ¹	0.12 ppm (235 µg/m ³)	Same as Primary Standard
	8 Hour ²	0.08 ppm (157 µg/m ³)	Same as Primary Standard
Carbon Monoxide (CO)	8 Hour ³	9 ppm (10 mg/ m ³)	Same as Primary Standard
	1 Hour ³	35 ppm (40 mg/ m ³)	Same as Primary Standard
Nitrogen Dioxide (NO ₂)	Annual Average	0.053 ppm (100 µg/m ³)	Same as Primary Standard
Sulfur Dioxide (SO ₂)	Annual Average	0.03 ppm (80 µg/m ³)	None
	24 Hour ³	0.14 ppm (365 µg/m ³)	None
Suspended Particulate Matter (PM ₁₀)	24 Hour ⁴	150 µg/m ³	Same as Primary Standard
	Annual Arithmetic Mean	50 µg/m ³	Same as Primary Standard
Suspended Fine Particulate Matter (PM _{2.5})	24 Hour ⁴	65 µg/m ³	Same as Primary Standard
	Annual Arithmetic Mean	15 µg/m ³	Same as Primary Standard
Lead (Pb)	Quarterly Mean	1.5 µg/m ³	Same as Primary Standard

Sources: US EPA, "National Primary and Secondary Ambient Air Quality Standards" (49 CFR 50) Monitoring Report.

Abbreviations: ppm - parts per million, µg/m³ - micrograms per cubic meter, mg/m³ - milligrams per cubic meter

Notes:

¹ Applicable to current non-attainment areas until such areas meet the standard for three consecutive years.

² New Standards effective September 16, 1997 (Final rules can be found in Federal Register July 18, 1997).

³ Not to be exceeded more than once per year per site.

⁴ The number of days with hourly levels greater than the standards is not to be exceeded more than once per year.

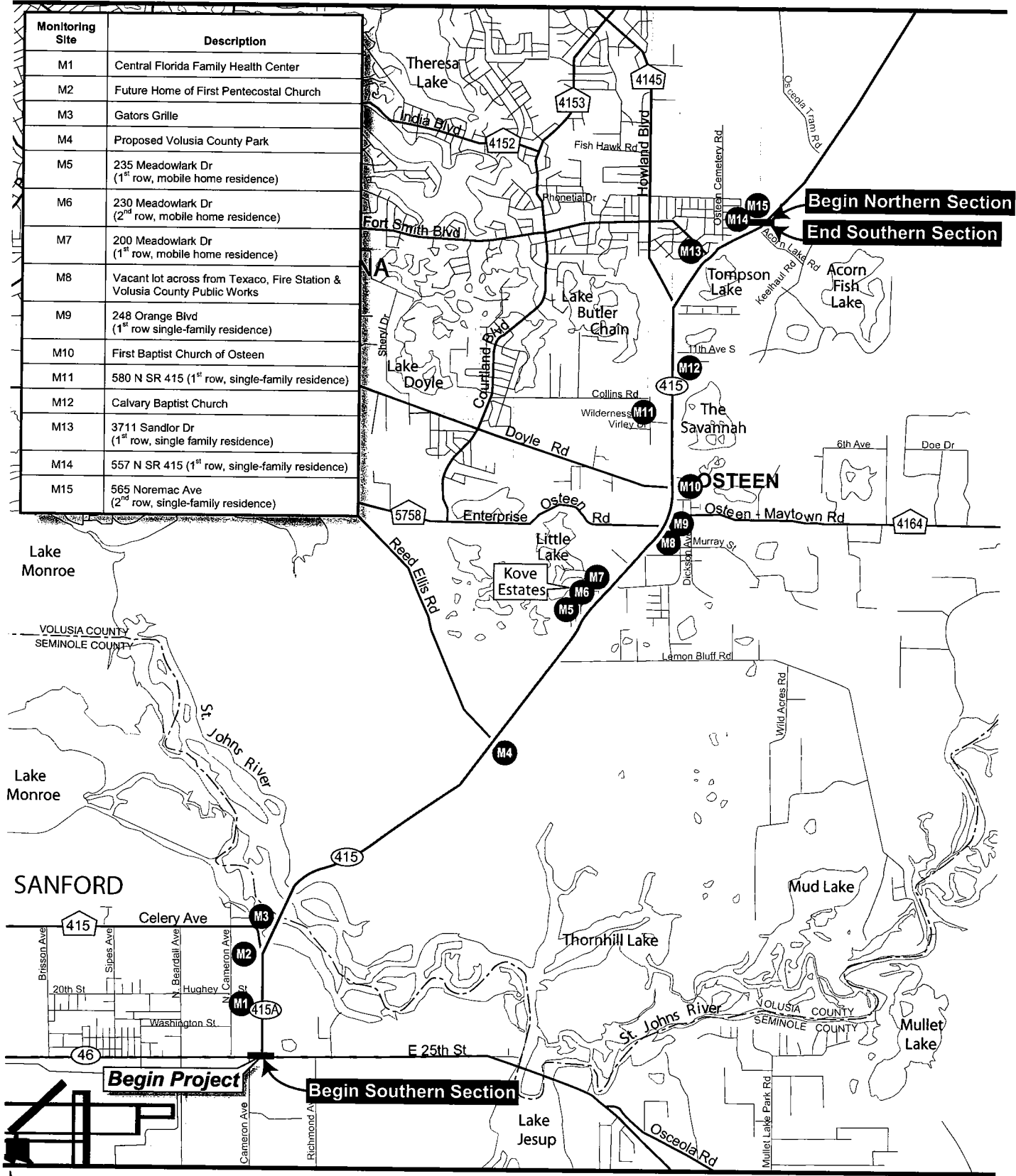
A noise sensitive site is any property (i.e., owner occupied, rented, or leased) where frequent exterior human use occurs and where a lowered noise level would be of benefit. An evaluation of the project corridor revealed that noise sensitive sites are primarily comprised of a mixture of single-family and mobile home residences and churches adjacent to both sides of SR 415. The other noise sensitive land uses include the Central Florida Family Health Center, Gators Grille, and a proposed Volusia County park. The noise monitoring sites are identified on Figure 4-14.

4.3.4.2.1 Noise Abatement Criteria

The noise analysis was conducted in accordance with the methodology established in Title 23 Code of Federal Regulations Part 772 (23 CFR Part 772), entitled *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. It is within 23 CFR Part 772 that the noise analysis guidance, including FHWA Noise Abatement Criteria (NAC), is provided.

Table 4-22 presents the criteria according to land-use activity category.

Monitoring Site	Description
M1	Central Florida Family Health Center
M2	Future Home of First Pentecostal Church
M3	Gators Grille
M4	Proposed Volusia County Park
M5	235 Meadowlark Dr (1 st row, mobile home residence)
M6	230 Meadowlark Dr (2 nd row, mobile home residence)
M7	200 Meadowlark Dr (1 st row, mobile home residence)
M8	Vacant lot across from Texaco, Fire Station & Volusia County Public Works
M9	248 Orange Blvd (1 st row single-family residence)
M10	First Baptist Church of Osteen
M11	580 N SR 415 (1 st row, single-family residence)
M12	Calvary Baptist Church
M13	3711 Sandlor Dr (1 st row, single family residence)
M14	557 N SR 415 (1 st row, single-family residence)
M15	565 Noremac Ave (2 nd row, single-family residence)



M5 Noise Monitoring Locations

Note: There are no Noise Monitoring Locations within the Northern Section.

Figure 4-14
Noise Monitoring Locations

