Wildlife Crossing Evaluation

SR 29
from Oil Well Road to Sunniland Nursery Road
(Owl Hammock)
Collier County

Financial Project ID (FPID) No. 417540-8-52-01

Florida Department of Transportation

District One

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated May 26, 2022, and executed by FHWA and FDOT.

JUNE 2022

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1.0 Introduction and Project Description

The Florida Department of Transportation (FDOT) is conducting an evaluation for opportunities to enhance the passage of wildlife across SR 29 near Owl Hammock in Collier County. A 2.05-mile segment of SR 29 was identified to study locations and design concepts for enhanced wildlife passage. Five alternative locations were evaluated to provide passage across SR 29. The project is located in Collier County, Florida. The project location map, **Figure 1-1**, shows the evaluation area.

The evaluation segment is approximately 3.5 miles north of the intersection of SR 29 and Oil Well Road. Within this evaluation segment, the Barron Canal (Photo 1) is adjacent to SR 29 on the east side of the roadway. Existing wildlife crossings and conservation lands are shown on **Figure1-1**

Photo 1: Barron Canal

This segment was chosen for evaluation, as the Owl Hammock area is mapped as two Hot Spot areas by the Southwest Florida Roads Panther Hot Spots Mapping Report (PRIT Transportation Subteam, 2020). Hot Spots are assigned to road segments in which multiple panther-vehicle collisions have occurred in clusters. Within this evaluation segment, nine fatal panther-vehicle collisions have occurred.

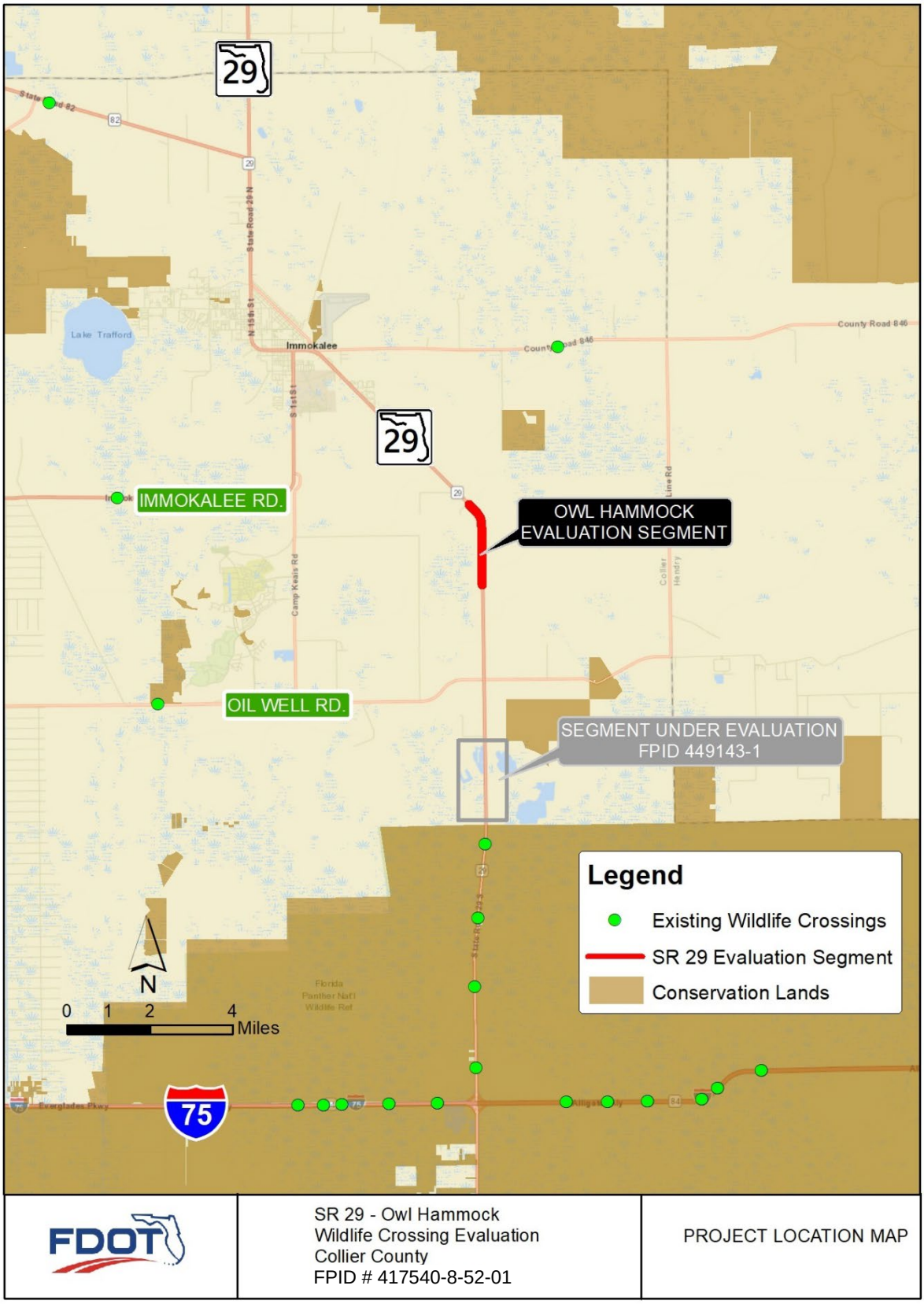

Figure 1-1: Project Location Map

2.0 Existing Conditions

2.1 Roadway

The eastern right-of-way is roughly at the top of the western bank of the Barron Canal, just beyond the SR 29 guardrail. The posted speed limit is 60 mph. Guardrail is present along the east side for the Barron Canal for the entire length of the evaluation segment.

Within the evaluation segment, there are five existing driveways providing direct access to SR 29. These driveways are shown on **Figure 2-1**.

2.2 Structures

The evaluation segment includes one bridge over Gator Slough (Bridge No. 030303). Bridge No. 030303 is a two-span concrete slab structure constructed in 1999.

Photo 2: Gator Slough

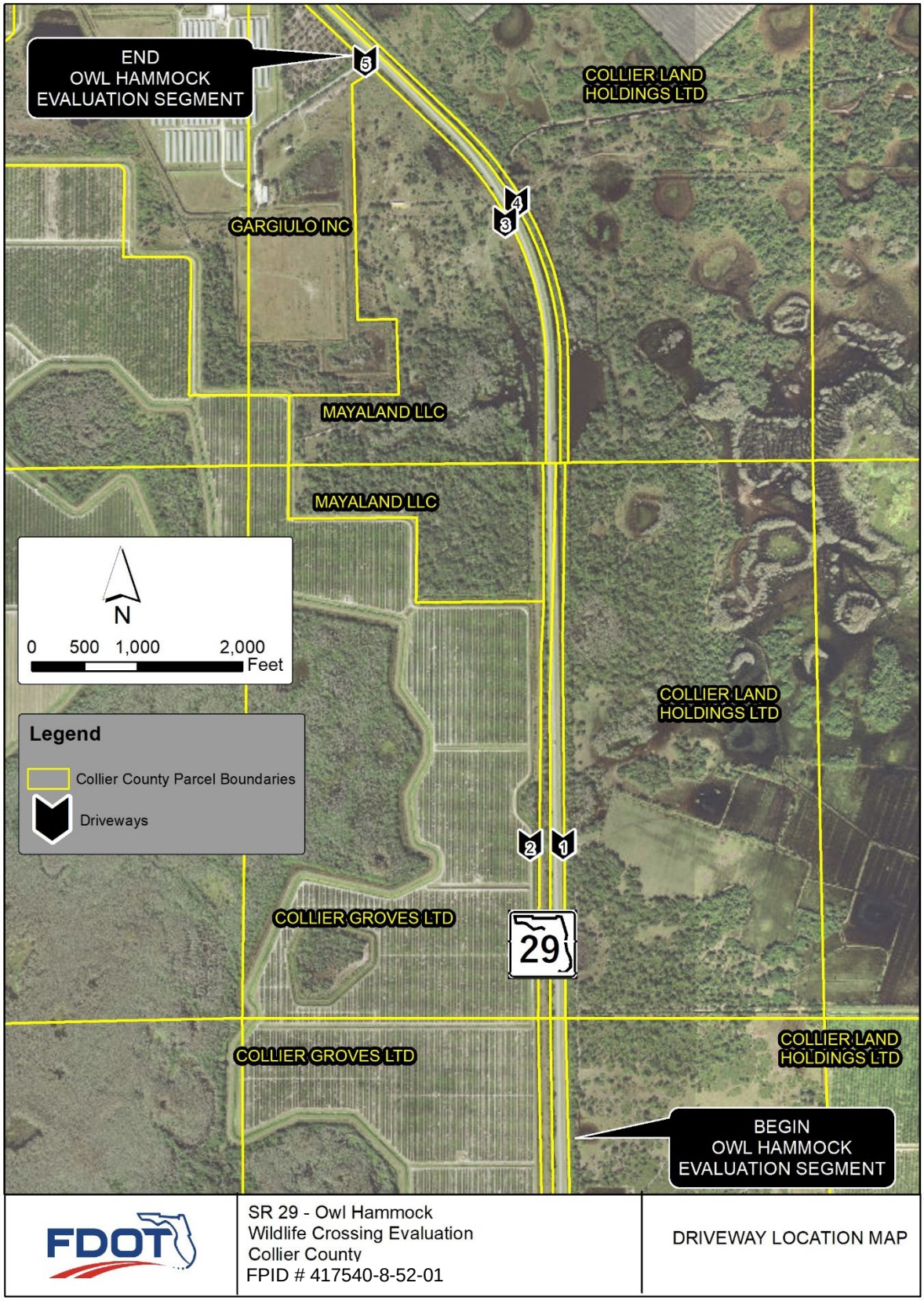

Figure 2-1: Driveway Location Map

2.3 Drainage

Existing flow patterns are west to east beneath SR 29 and into the Barron Canal which parallels the east side of SR 29. Stormwater runoff is conveyed into the Barron Canal via three 24-inch cross drains and the bridge over Gator Slough.

The 2012 FEMA floodplain mapping for this area shows published FEMA flood elevations varying between approximately 21.5 ft-NAVD88 and 22.5 ft-NAVD88. The existing ground on the west side of SR 29 where the alignment shift will occur varies between approximately 18 ft-NAVD88 and 21 ft-NAVD88. Based on the size of the floodplain it is anticipated that modeling would be a successful approach to demonstrating no adverse floodplain impacts. As such, floodplain compensation is not considered a cost driver.

2.4 Utilities

There are no major underground utilities. Buried CentruyLink communications lines are present on the east side of SR 29 between the edge of pavement and the guardrail. Overhead utilities owned by Lee County Electric Co-Op are present to the west of SR 29 and outside FDOT right-of-way.

Photo 3: Electric Utility Corridor

3.0 Existing Environmental Conditions

This section presents a description of existing conditions within the evaluation segment, including wetlands, land use and wildlife movements.

3.1 Land Use / Land Cover

The Barron Canal is a significant surface water adjacent to the roadway. The Barron River Canal was originally constructed in the 1920's as a borrow canal to provide fill for construction of the railroad grade between Immokalee and Everglades City.

Figure 3-1 shows the existing land use/land cover map, within the evaluation segment, as mapped by the South Florida Water Management District (SFWMD) Land Use Cover, and Forms Classification System (2016). The forested wetland system associated with Gator Slough on the west side of SR 29 is the most significant wetland system within evaluation segment. Panthers use such large areas, they traverse, hunt, and shelter in many various habitat types, but they prefer mature upland forests such as hardwood hammocks and pinelands, where they hunt for their preferred prey, white-tailed deer and feral hogs.

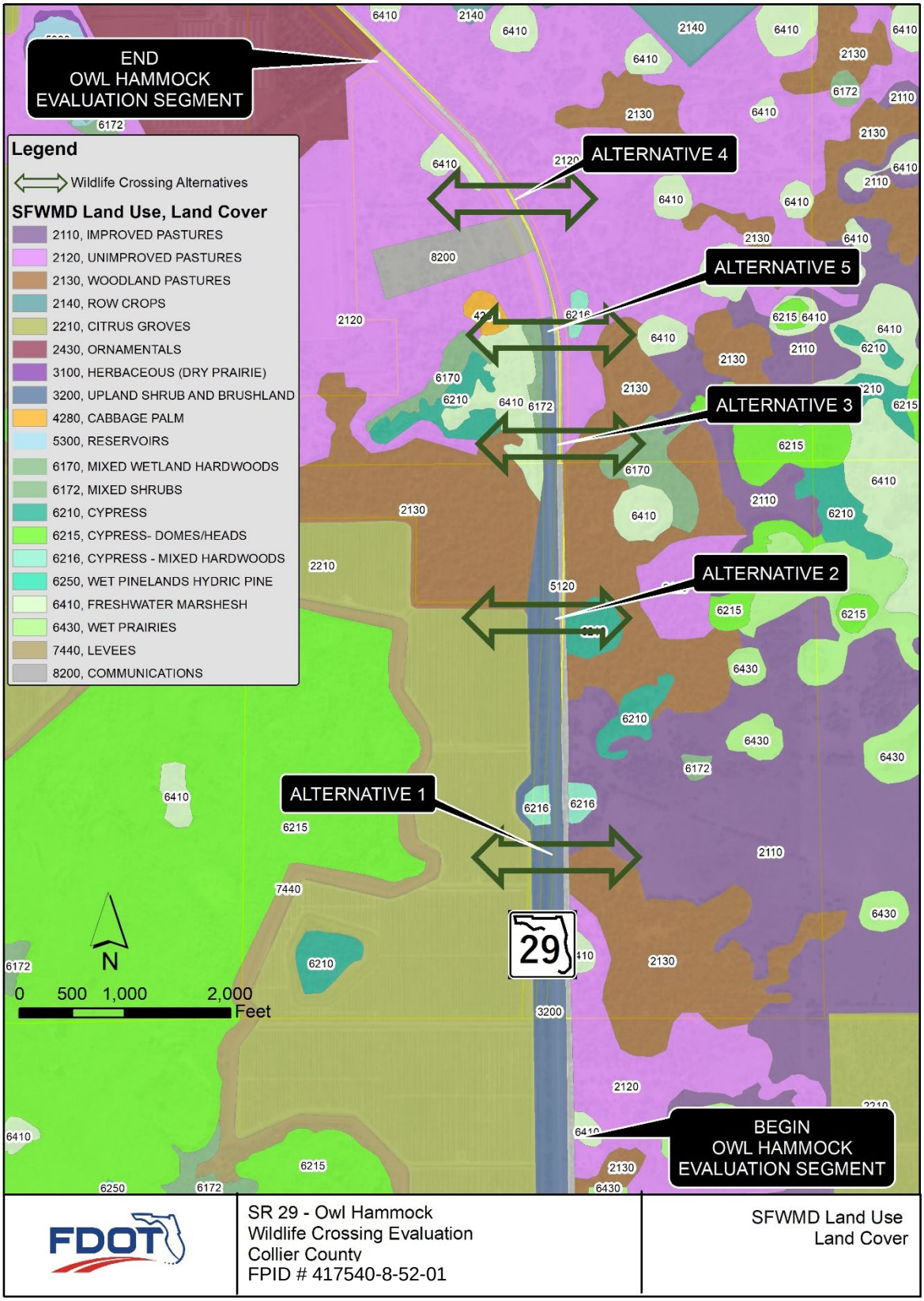

Figure 3-1: Land Use / Land Cover Map

3.2 Eastern Collier County Multiple Species Habitat Conservation Plan

The evaluation segment is within lands included in the Eastern Collier County Multiple Species Habitat Conservation Plan (ECMSHCP). The ECMSHCP proposes compact commercial/residential development and mining on up to 45,000 acres within the area covered by the plan. Conservation elements of the ECMSHCP include maintaining 107,000 acres; a management plan for preserved lands; a mitigation and monitoring plan for measuring success of the ECMSHCP; and contributions to a funding mechanism for conservation activities. If issued, the Incidental Take Permits (ITPs) would cover take incidental to development activities within the ECMSHCP area. The ITPs would also include take incidental to land management activities designed to maintain or improve habitat functions; maintain agriculture operations; maintain drainage infrastructure; control exotic vegetation; and control pests and diseases. Finally, the ITPs would consider long-term effects covering the 50-year life of the permit to include more intense use within the ECMSHCP area and other results of the covered activities. The U.S. Fish and Wildlife Service published a draft environmental impact statement (EIS) for the ECMSHP on October 19, 2018, in the Federal Register (https://www.regulations.gov/docket/FWS-R4-ES-2018-0079).

The draft EIS identifies 11 applicants as members of Eastern Collier Property Owners, LLC. These applicants are listed in **Table 3-1**. As the draft EIS was published in 2018, ownership in some parcels within the evaluation segment have changed ownership. As shown in **Figure 2-1**, Collier Land Holdings LTD owns land on the eastern side of SR 29 within the evaluation segment. The Florida Department of State, Division of Corporations, lists Collier Land Holdings LTD as a subsidiary of Collier Enterprises, Inc, which is a member of the Eastern Collier Property Owners, LLC.

Table 3-1: ITP Applicants

Applicants	Incidental Take Permit Application No.
Alico Land Development, Inc	TE05647D-0
Barron Collier Investment, Ltd	TE04440D-0
Collier Enterprises Management, Inc	TE04443D-0
Consolidated Citrus Limited Partnership	TE04471D-0
English Brothers Partnership	TE04152D-0
Half Circle L Ranch, LLP	TE05238D-0
Heller Bros. Packing Corp	TE05668D-0
JB Ranch I, LLC	TE04473D-0
Owl Hammock Immokalee, LLC	TE06114D-0
Pacific Land, Ltd	TE05665D-0
Sunniland Family Limited Partnership	TE04472D-0

As shown in Figure 3-2 from the draft EIS, the ECMSHCP (HCP) proposes "Preserve" lands on both sides of SR 29, in the vicinity of Owl Hammock.

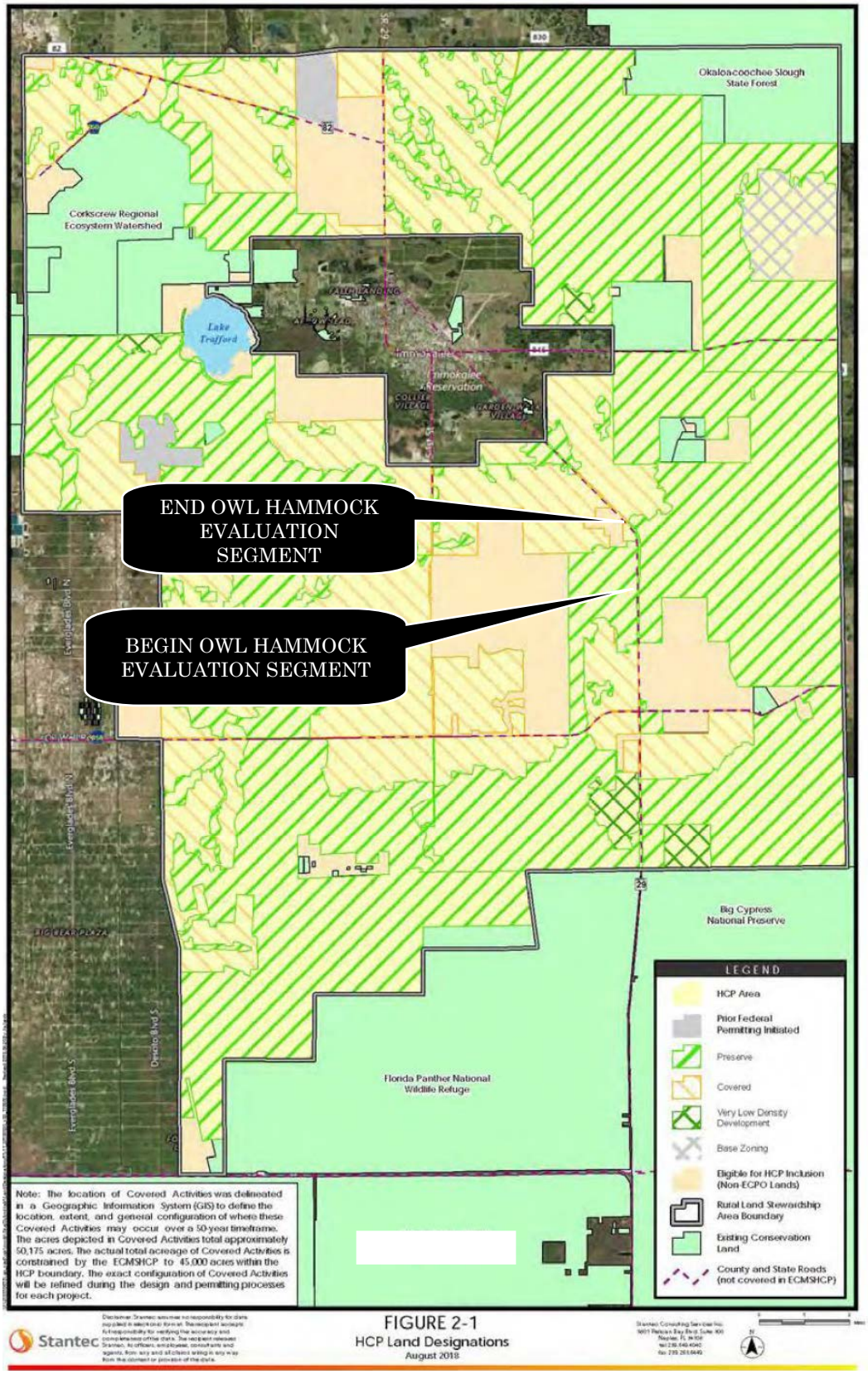

Figure 3-2: HCP Land Designations

3.3 Wildlife Movement

Wildlife cameras were placed at driveways 1 and 3, which cross the Barron Canal. Wildlife cameras were placed on July 15, 2021, and were collected on September 18, 2021. Neither of these cameras collected photographs of wildlife using these driveways during this limited survey period.

A review of available wildlife usage within the evaluation segment was conducted. This dataset includes Florida panther (*Puma concolor coryi*) and Florida black bear (*Ursus americanus floridanus*) radio-telemetry data collected between February 1981-June 2020. **Figure 3-3** shows the telemetry data collected in the vicinity of Owl Hammock.

Table 3-2 shows the collared panthers which utilized the area surrounding Owl Hammock and approximate dates they were in the area.

Table 3-2: Panther Telemetry in Owl Hammock

Panther Number	Approximate date of activity
FP011	1999
FP020	1987
FP031	1993-1994
FP046	1993
FP048	2006
FP052	1993-1994
FP058	1996
FP059	2000-2001
FP065	2002
FP097	2001
FP131	2004-2006
FP135	2006
FP143	2007
FP154	2007
FP185	2011

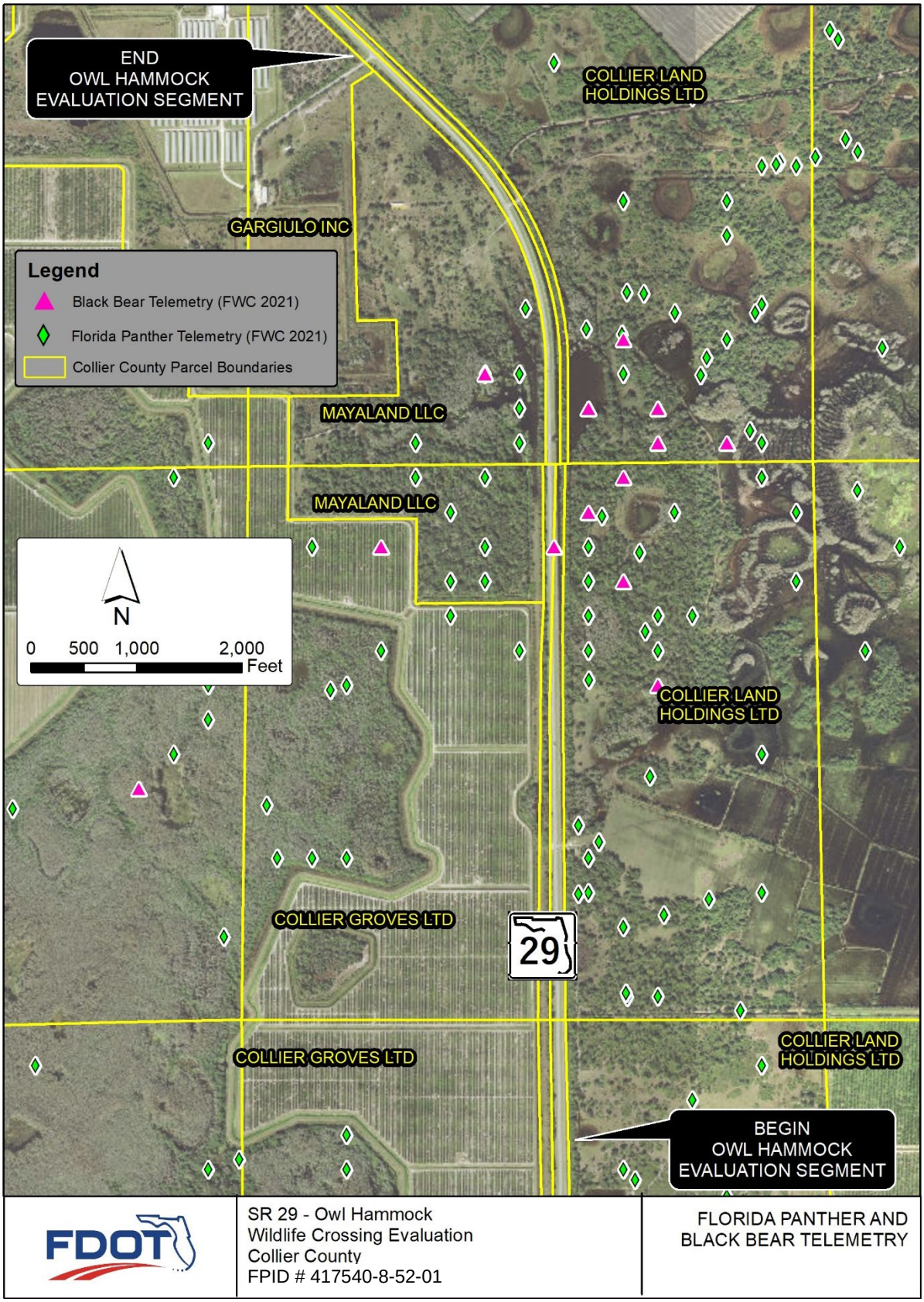

Figure 3-3: Panther and Black Bear Telemetry

Of particular note was the movement of FP131. Between March 31, 2004, and June 17, 2005, FP131 telemetry data was collected 16 times within two miles of Owl Hammock. When evaluating the timestamps for this telemetry data, FP131 crossed SR 29 at least six times. **Figure 3-4** shows the telemetry data for FP131 near Owl Hammock.

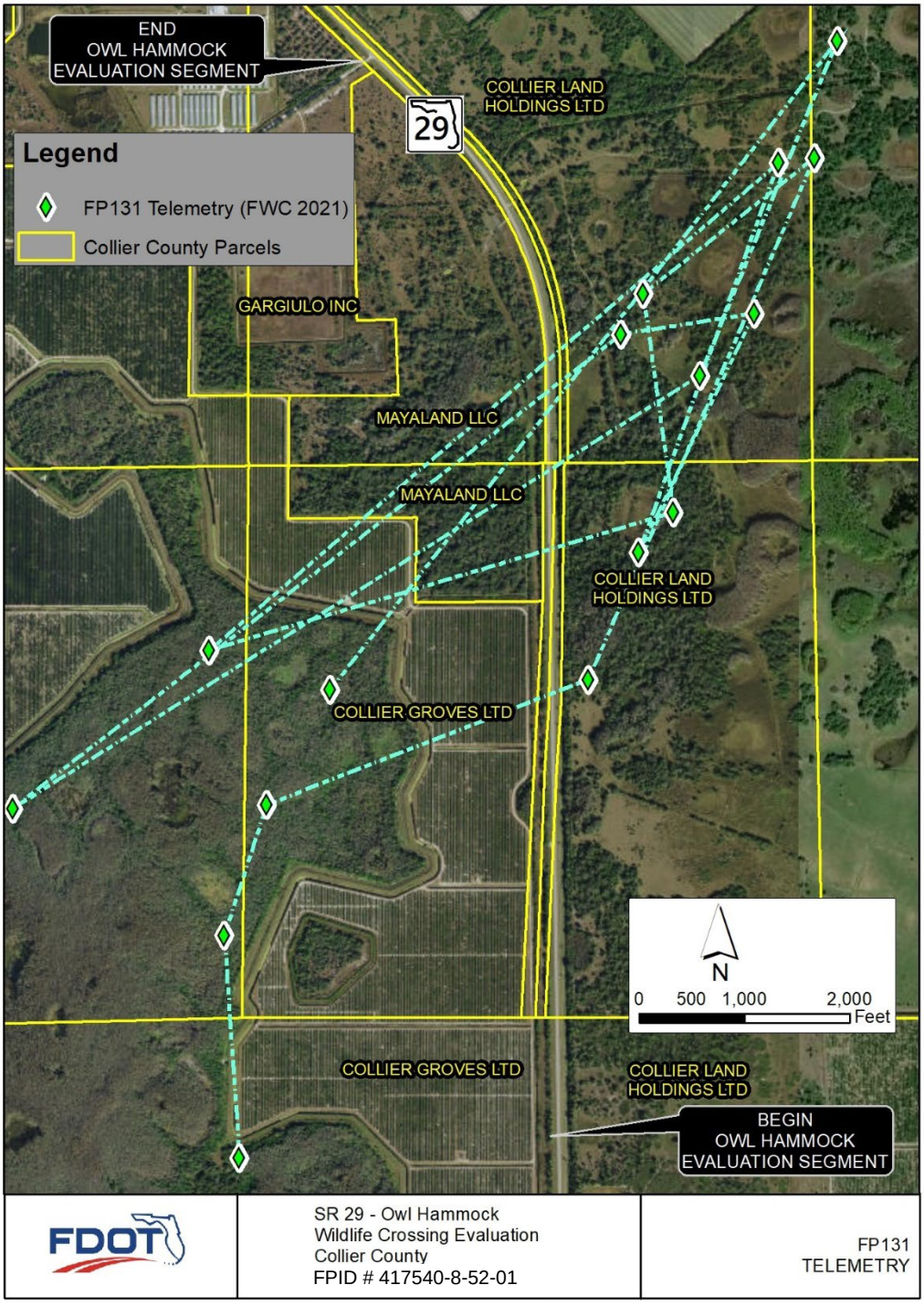

Figure 3-4: Panther FP131 Telemetry

3.4 Wildlife Mortality

Reviewing FWC wildlife mortality data shows that there have been nine Florida panther vehicle collisions in the vicinity of Owl Hammock between 2004 and 2019. There have been four Florida black bear vehicle collisions in the vicinity of Owl Hammock. Near Owl Hammock the horizontal curve of SR 29 is likely a contributing factor to the number of wildlife vehicle collisions. This horizontal curve limits driver visibility. This evaluation segment is in alignment with two Panther Collision Hot Spots. The Hot Spots and wildlife collision data is shown on **Figure 3-5**.

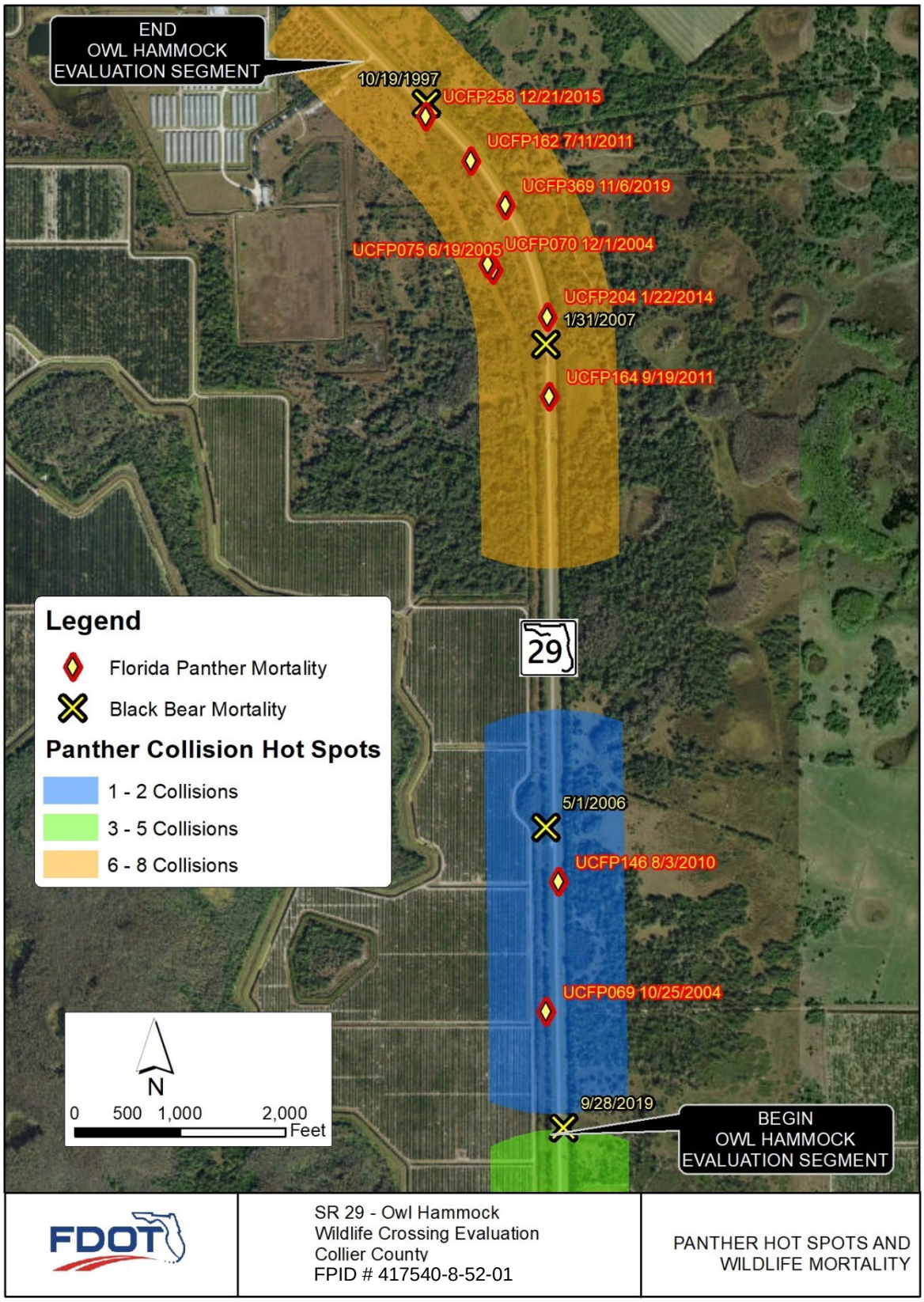

Figure 3-5: Panther Hot Spots and Wildlife Mortality

4.0 Crossing Alternatives

The following sections discuss the feasible wildlife crossings developed in Owl Hammock. Alignments for each option were set with consideration of the existing right-of-way and constructability. The alignments allow for the maintenance of traffic on the existing lanes and minimize the need for extensive traffic control measures and temporary diversions. Horizonal alignment shifts for all options are based on reverse curves with normal crown cross slope for a 65 mph design speed.

The interim construction of any of these wildlife crossing do not preclude the construction of the ultimate four-lane SR 29 typical section, however, minor modifications may be required at the wildlife crossings to accommodate the ultimate typical section. Plan sheets showing details of each of the alternatives evaluated are included in **Attachment A**.

Cross section views of each culvert option show a 72" pipe, which allows flexibility with slope of the culvert to match existing ground. A 10' x 6' box can also be utilized with minor modifications to the cross section and vertical alignment. For this evaluation, the culverts were all placed in uplands with an invert elevation located at least one-half foot above seasonal high water elevation.

All alternatives include wildlife fencing for the entire 2.05-mile length. FDOT wildlife crossing guidelines recommend providing adequate fencing to guide wildlife for a sufficient distance to the wildlife crossing feature. Type B fence, 10 feet in height with three-strand barbed wire, in the Standard Plans Index 550-002 is recommended. **Figure 4-1** shows the alternatives evaluated for Owl Hammock, including the limits of wildlife fencing.

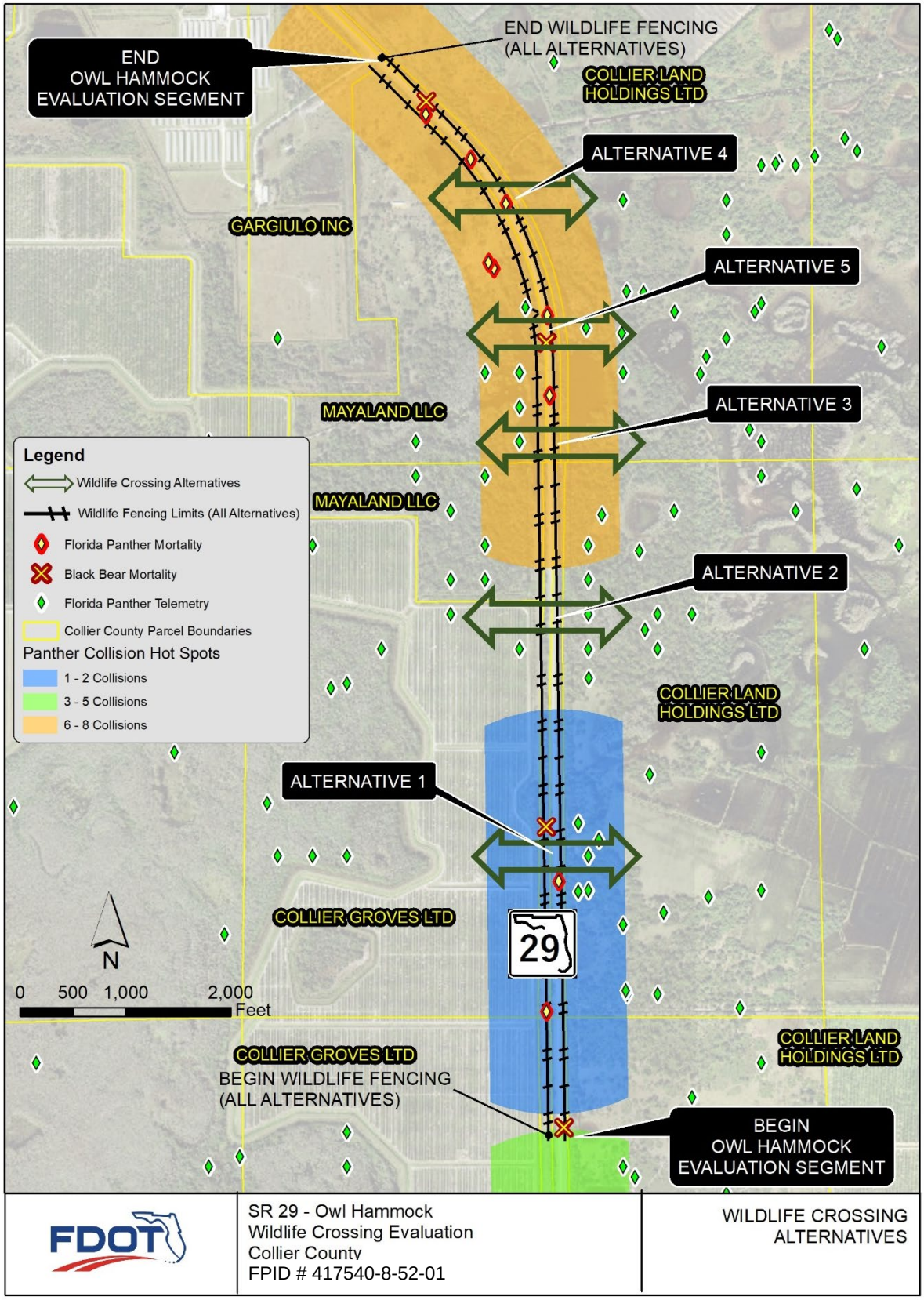

Figure 4-1: Wildlife Crossing Alternatives

4.1 Alternative 1

Alternative 1 is the southernmost alternative evaluated for this segment. Alternative 1 is located within a blue Panther Collison Hot Spot representing two independent panther vehicle collisions. Alternative 1 utilizes a 10-foot x 6-foot box culvert or a 72" pipe placed on western side of SR 29. To accommodate a vertical clearance of 6 feet, the existing SR 29 roadway profile would have to be raised approximately 8 feet at this location (**Figure 4-2**). The vertical alignment is based on maintaining a minimum two feet of cover from the top of the culvert to the bottom of the proposed pavement base.

The cross section at this location includes a shifted two-lane section, with two 12-foot lanes, 8-foot paved shoulders with shoulder gutter and guardrail. These lanes can be utilized as the southbound lanes in the ultimate four-lane condition. MSE wall will be required on the southbound outside shoulders in the ultimate four-lane section. Shoulder gutter and guardrail is utilized to ensure the new alignment ties down within the existing right of way (R/W). Temporary barrier will be required along the west side of the existing SR 29 lanes during construction, and minimal temporary overbuild may be required on the existing northbound shoulder.

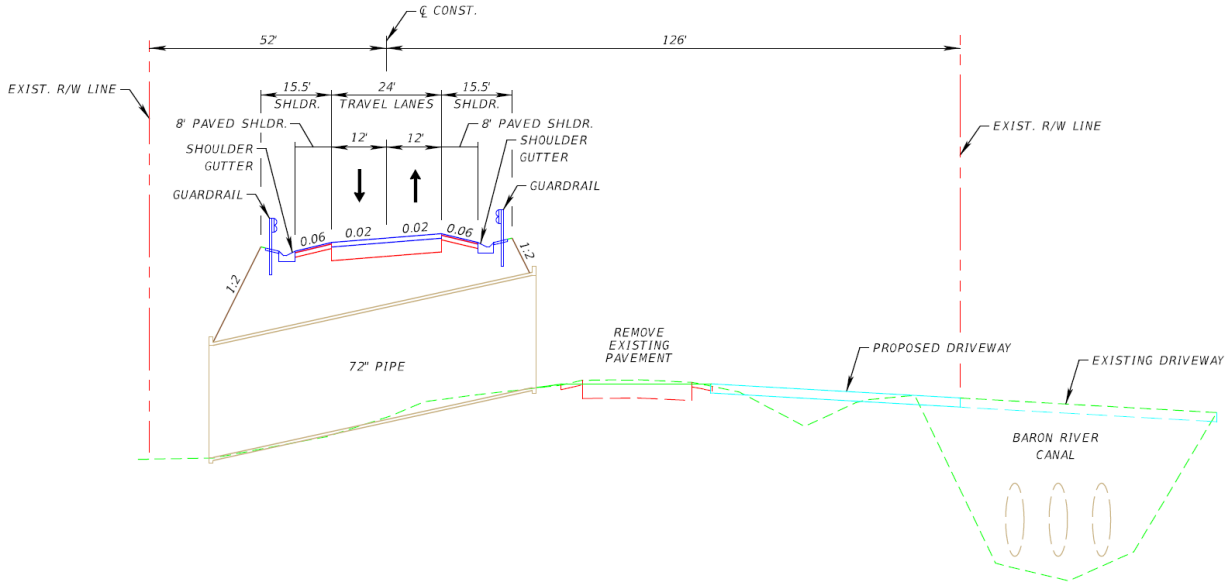

Figure 4-2: Alternative 1 Typical

Alternative 1 would require the extension of a driveway to provide access to land owned by Collier Holdings Ltd. Maintenance of the existing Collier Holdings driveway will require construction of a long frontage drive adjacent to the SR 29 mainline. The connection of this driveway frontage at each end of the new alignment will be challenging for entering and exiting vehicles due to the limited right-of-way available. This driveway connection constrains this alternative. As shown in **Figure 4-3**, wildlife can utilize the existing driveway connection for Collier Holdings Ltd. over the Barron River Canal, eliminating the need for a new bridge, however wildlife gates would be required to channelize wildlife to the proposed box/pipe. An unpaved driveway on the west side of SR 29 that provides access to the powerline easement would also require relocation to the south.

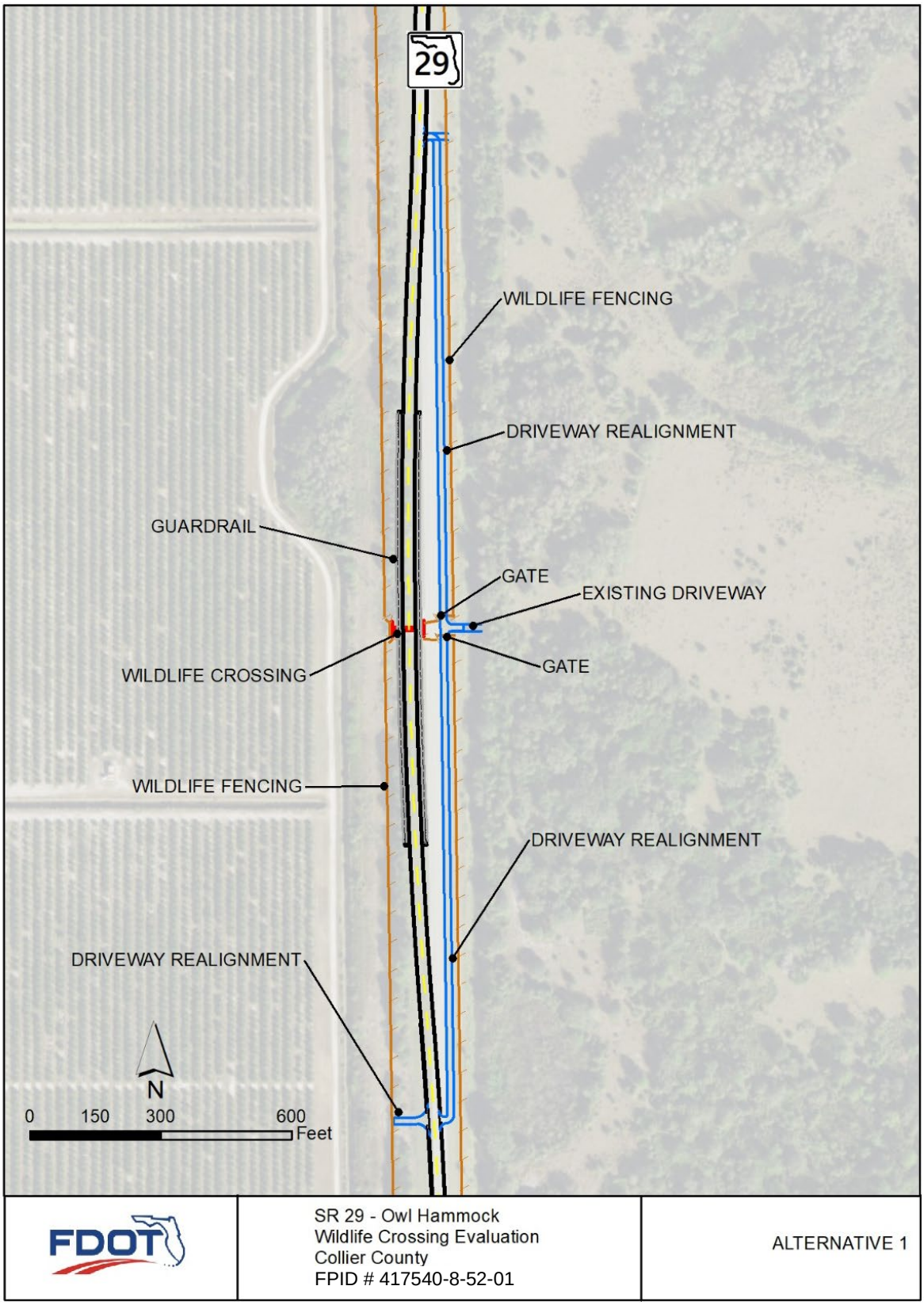

Figure 4-3: Alternative 1

This alternative is not anticipated to affect wetlands or surface waters. As this alternative does not affect wetlands, no 404 permit from FDEP is anticipated to be required.

It is anticipated that Option 1 would require stormwater treatment and attenuation due to the additional impervious area associated with driveway construction. However, since the Barron River Canal parallels every option, treatment could be provided at any location along this section of SR 29 for any combination of existing and/or proposed pavement required to provide treatment for an area equal to the additional impervious. Using 1.57 acres of additional impervious and a presumptive treatment depth of 2.5 inches as required by the SFWMD a total treatment volume of approximately 0.33 acre-feet or 14,400 cubic feet of treatment volume is required. Note that 1.57 acres is the maximum delta between the pre and post impervious area for all alternatives. Further, this delta could be reduced and additional storage volume gained through the removal of existing driveways that were previously culverted or bisected the existing ditch Owl Hammock is within WBID 3278W which is impaired for iron and nutrient removal calculations should not be required, but the SFWMD may request these calculations during the permitting phase.

The area between the Barron River Canal and SR 29 is the most logical location for a linear extended detention system. Linear extended detention is allowed by SFWMD and does not rely on percolation into the soil, but rather includes an outfall control structure with a bleed-down weir that can discharge or recover the treatment volume in as little as 24 hours. This provides the advantage of minimizing any impact to the roadway base.

Assuming an available width of approximately 30 feet between the edge of travel and the guardrail adjacent to the Barron River Canal as well as a flat width of 15 feet and a storage depth of 0.75 feet, a swale approximately 1300 feet long would be required to provide the necessary treatment volume. With respect to attenuation, 0.30 acre-feet of volumetric storage is the maximum volume required to provide the necessary attenuation for any given option. If the required attenuation volume is allowed to exist coincidentally with the treatment volume, then attenuation could be provided in the same swale that provides the treatment volume. As the Barron Canal is the common outfall for all alternatives and because the water management district will allow treatment of existing pavement in lieu of

new pavement to satisfy the regulatory requirements, this treatment approach could be applied at all alternative locations.

Alternative 1 is not anticipated to affect wetlands or surface waters.

4.2 Alternative 2

Alternative 2 is located approximately 2,300 feet north of Alternative 1. Alternative 2 is not located within a Panther Collision Hot Spot. Reviewing panther telemetry data, Alternative 2 is located within an area of likely panther activity. As this crossing is within a tangent section of SR 29, vehicle operators may be able to observe panthers to avoid collisions.

The crossing at Alternative 2 includes a new alignment west of the existing pavement. The horizontal location is based on the ensuring that the embankment approaching and departing the wildlife culvert can be constructed within the existing right-of-way (**Figure 4-4**). The resulting typical section consists of two 12-foot lanes with eight-foot shoulder pavement, shoulder gutter, and guardrail. The shoulder gutter and guardrail allow the new alignment to be constructed while maintaining traffic on the existing pavement. Similar to Alternative 1, the existing SR 29 roadway profile would have to be raised approximately 8 feet at this location (**Figure 4-5**). The vertical alignment is based on maintaining a minimum two feet of cover from the top of the culvert to the bottom of the proposed pavement base. Temporary barrier will be required along the west side of the existing SR 29 lanes, and minimal temporary overbuild may be required on the existing northbound shoulder.

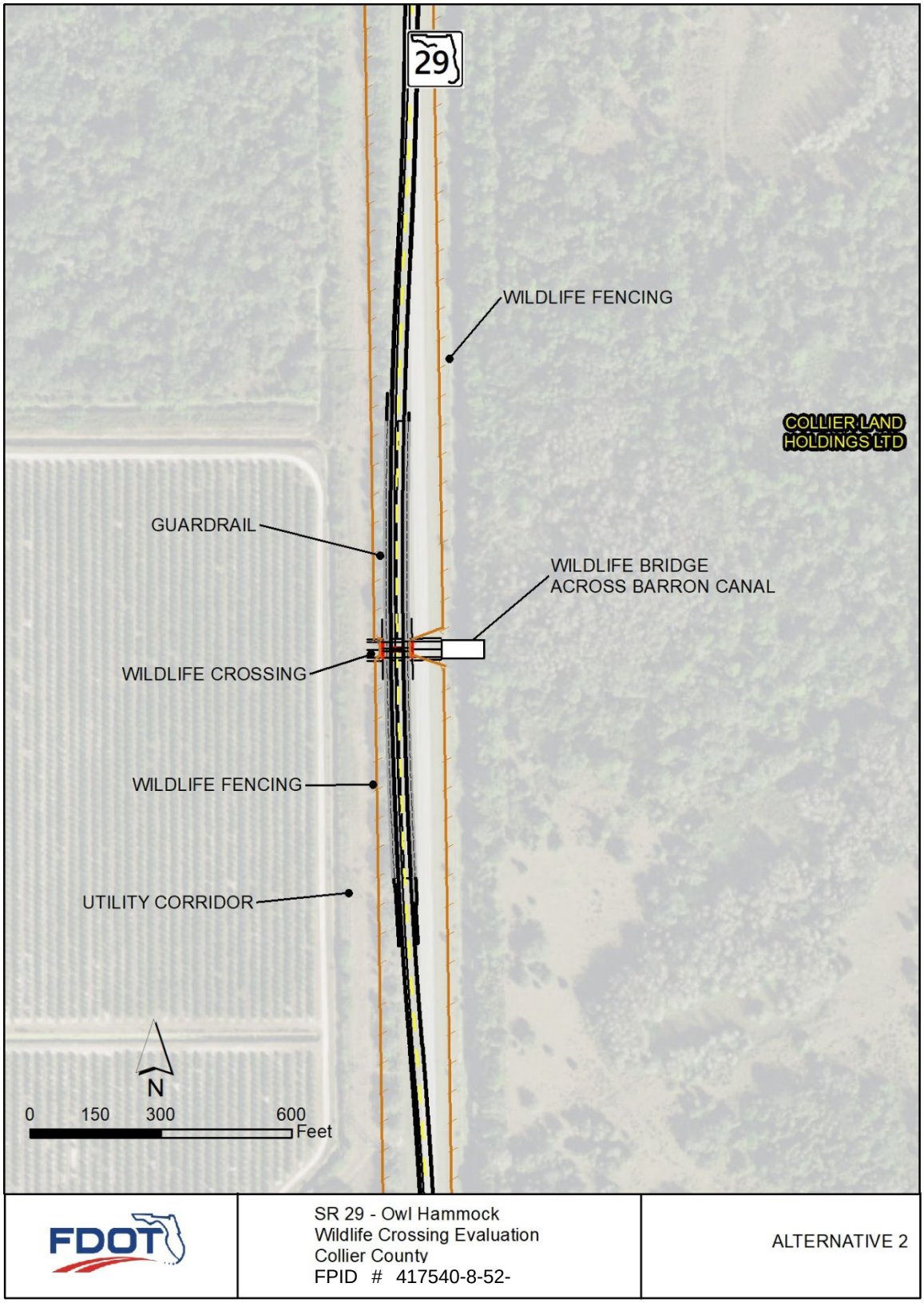

Figure 4-4: Alternative 2

Alternative 2 would require an additional wildlife bridge for wildlife to cross the Barron Canal (**Figure 4-5**). Alternative 2 evaluates the use of 30" prestressed concrete piles to clear the width of the canal. The piles would be placed side-by-side horizontally to create a 5 ft. walking surface to cross the canal. The use of concrete end blocks would be employed at the ends of the piles with slope protection to prevent any future bank erosion at the structure location. As shown in **Figure 4-5**, placement of this wildlife bridge across the Barron Canal will require additional right-of-way. In the vicinity of Owl Hammock, The Barron Collier Canal is located within privately-owned lands, but Collier County routinely conducts maintenance of the canal. The existing pavement will be removed and the area on the east side of the new culvert will be graded to meet the wildlife bridge.

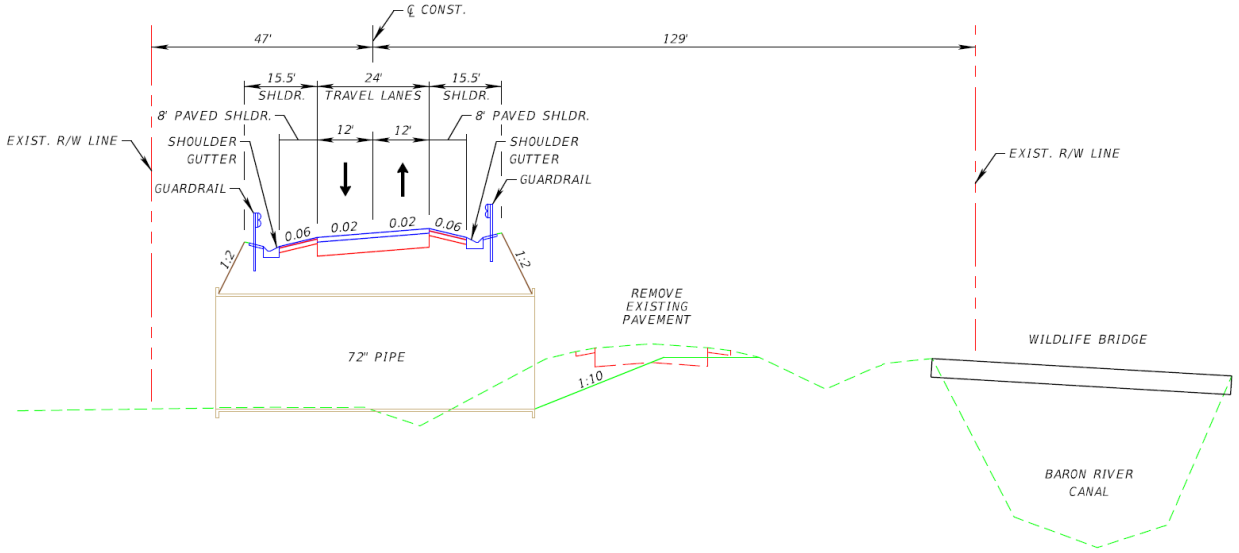

Figure 4-5: Alternative 2 Typical

Stormwater treatment and attenuation is not anticipated to be required for Alternative 2. This alternative includes improvements over the Barron Canal. Statute 62-330.439 provides criteria for issuance of a General Permit from the SFWMD for Construction or Maintenance of Culverted Driveway or Roadway Crossings, and Bridges of Artificial Waterways. As this alternative includes a bridge over the Barron Canal, this project will likely qualify for General Permit 62-331.217 from the FDEP.

As Alternative 2 includes a wildlife crossing over the Barron Canal, minor impacts to surface waters are anticipated. Alternative 2 is not anticipated to affect wetlands.

4.3 Alternative 3

Alternative 3 includes the replacement of Bridge No. 030303 over Gator Slough. As shown in Photo 2, during the wet season, Bridge No. 030303 does not have adequate vertical clearance to accommodate wildlife shelves. The existing SR 29 over Canal 303 bridge (Bridge No. 030303) will need to be replaced with a reinforced flat slab bridge. The new bridge geometry accommodates a ten-foot-wide shelf on the south side of the canal above the seasonal high water (SHW) elevation acting as the pathway for wildlife (**Figure 4-6**).

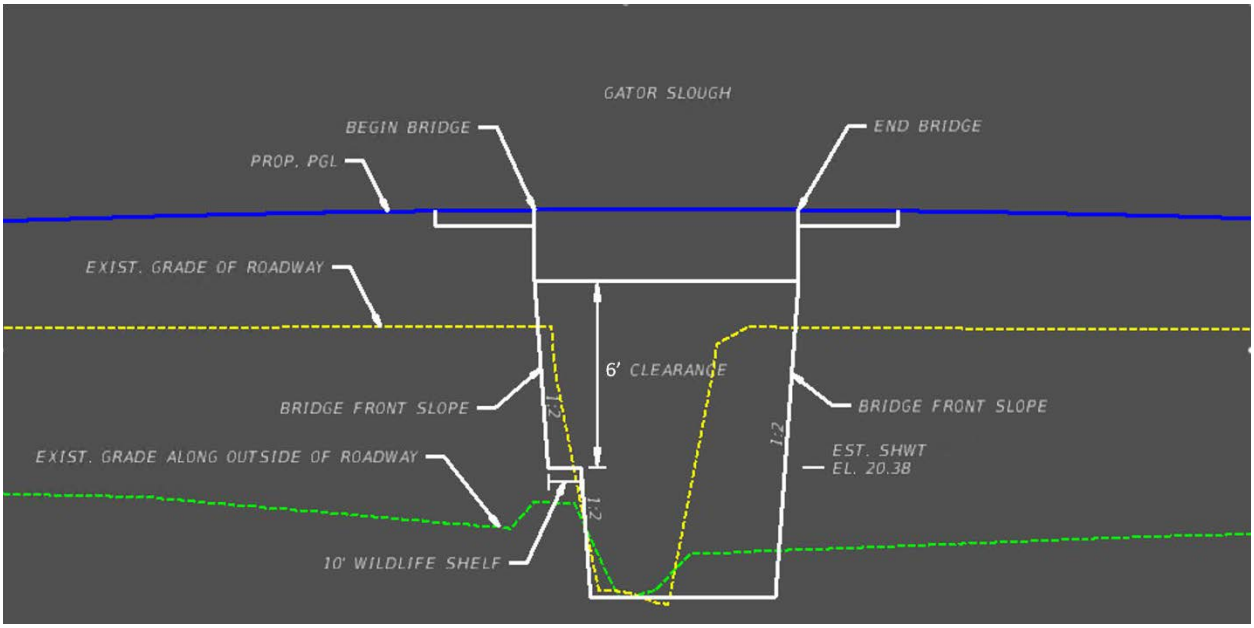

Figure 4-6: Gator Slough Cross Section

The Gator Slough bridge replacement concept alignment is located west of the existing alignment and bridge, with the horizontal offset to the new bridge set by the required embankment to meet the elevated bridge structure. The roadway typical section consists of two 12-foot lanes with eight-foot shoulder pavement, shoulder gutter, and guardrail leading to the bridge. The shoulder gutter and guardrail allow the new alignment to be constructed while maintaining traffic on the existing pavement (**Figure 4-7**). The bridge typical section consists of two 12-foot lanes with 10-foot shoulders. Temporary barrier will be required for construction, and minimal temporary overbuild will be required on the existing northbound shoulder.

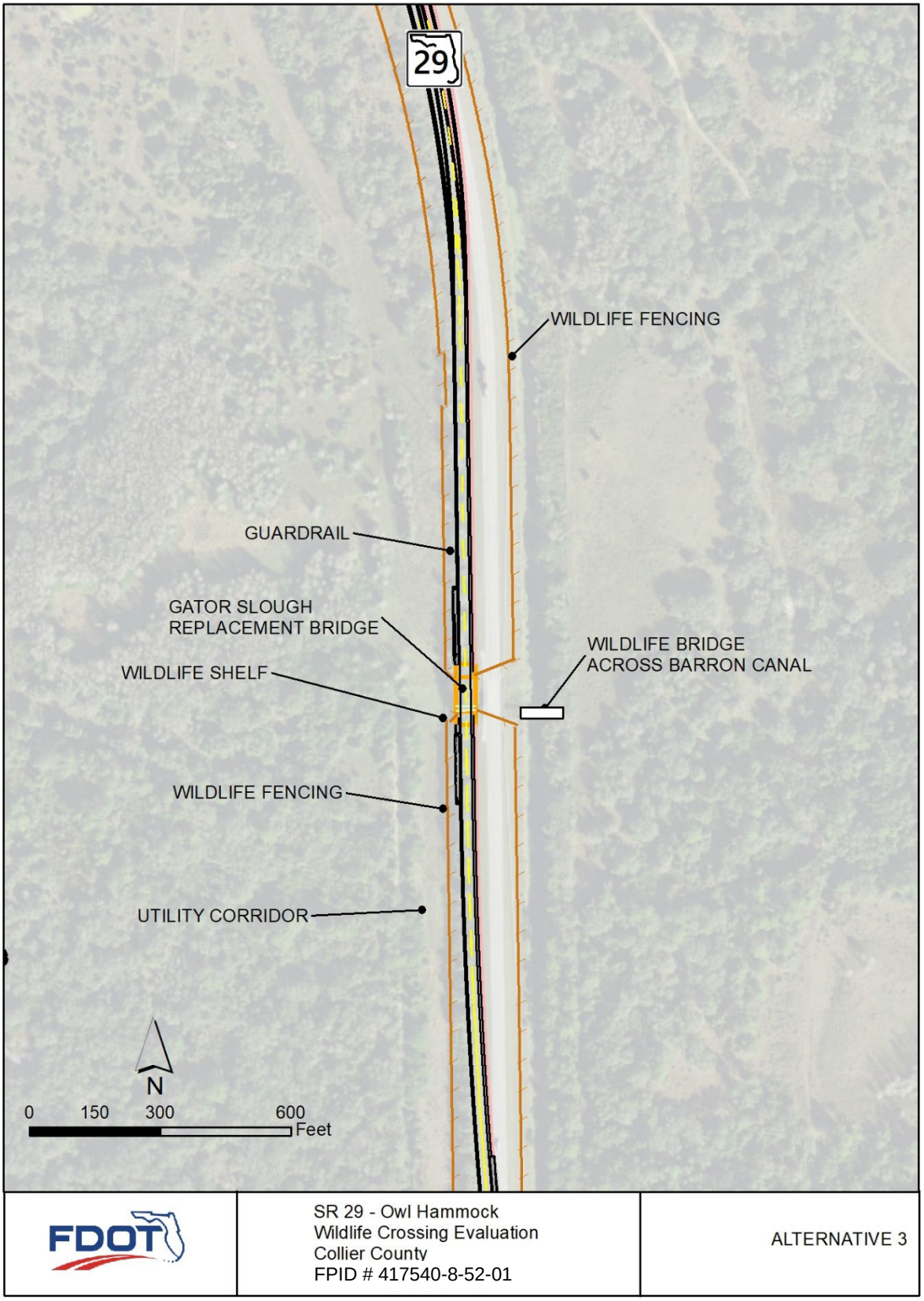

Figure 4-7: Alternative 3

The Alternative 3 vertical alignment is based on maintaining six feet minimum clearance from the proposed wildlife shelf (set at the approximate high-water elevation – estimated elevation 20.38) to the low member of the bridge (**Figure 4-8**). This results in a new bridge approximately three feet higher than the existing bridge. A wildlife concrete canal bridge over the Barron River Canal is also required.

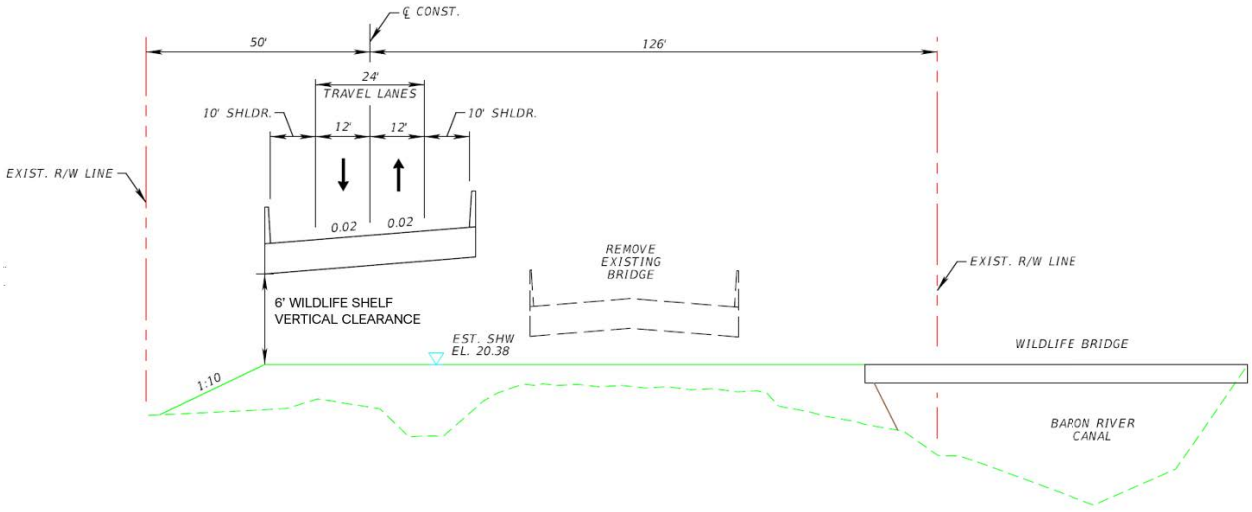

Figure 4-8: Alternative 3 Typical

Similar to Alternative 2, Alternative 3 would require an additional bridge for wildlife to cross the Barron Canal. Alternative 2 evaluates the use of 30" prestressed concrete piles to clear the width of the canal. The piles would be placed side-by-side horizontally to create a 5 ft. walking surface to cross the canal. The use of concrete end blocks would be employed at the ends of the piles with slope protection to prevent any future bank erosion at the structure location. As this alternative is located within the floodplain of Gator Slough, it is anticipated that high water during wet season will significantly limit wildlife usage at this crossing.

It is anticipated that this alternative will require an individual ERP from the SFWMD. As this alternative includes a bridge over the Barron Canal, this alternative will likely qualify for General Permit 62-331.217 from the FDEP. Temporary and permanent wetland impacts are anticipated for Alternative 3. Wetland mitigation is likely to be required for this alternative to mitigate for unavoidable wetland impacts.

4.4 Alternative 4

Alternative 4 is the northernmost alternative evaluated for this segment. Alternative 4 is located within an orange Panther Collison Hot Spot, representing five Florida panther vehicle collisions. Alternative 4 is located within the horizontal curve south of Sunniland Nursery Road at the existing Collier Holdings driveway. The cross section at this location includes a shifted two-lane section, with two 12-foot lanes 8-foot paved shoulders with shoulder gutter and guardrail (**Figure 4-9**). These lanes can be utilized as the northbound lanes in the ultimate four-lane condition. MSE wall will be required on the northbound outside shoulder in the ultimate four-lane section.

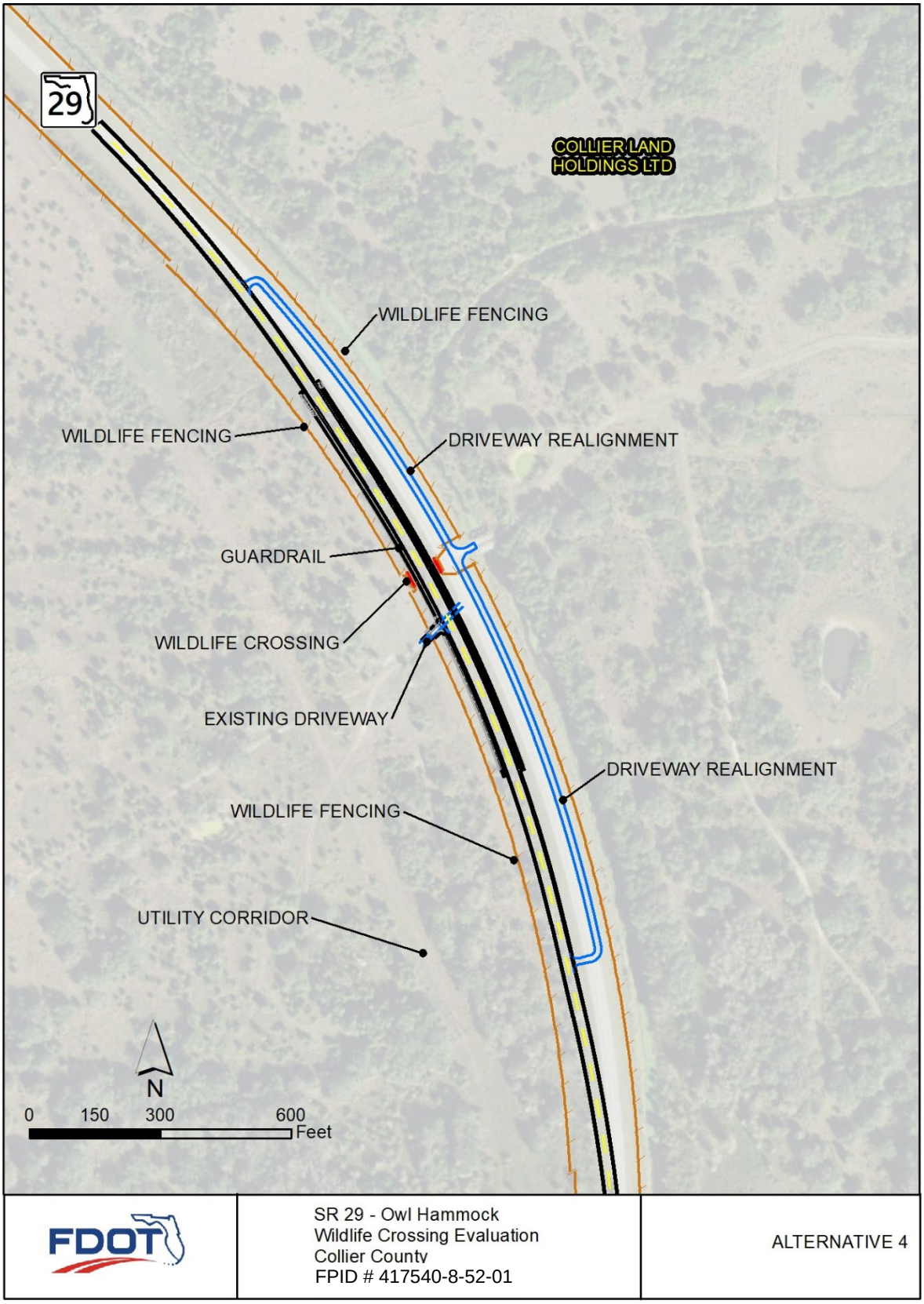

Figure 4-9: Alternative 4

Alternative 4 utilizes a 10-foot x 6-foot box culvert placed on western side of SR 29. To accommodate a vertical clearance of 6 feet, the existing SR 29 roadway profile would have to be raised approximately 8 feet. at this location (**Figure 4-10**). Shoulder gutter and guardrail is utilized to ensure the new alignment ties down within the existing R/W. The existing travel lanes would then be shifted to the west.

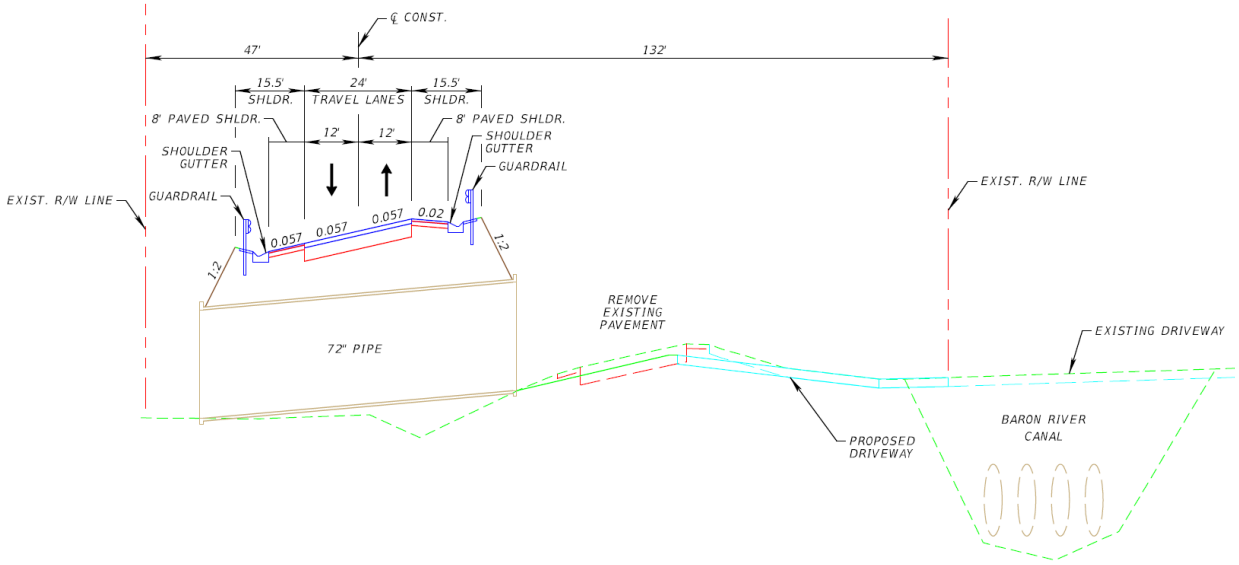

Figure 4-10: Alternative 4 Typical

Like Alternative 1, maintenance of the existing Collier Holdings driveway will require construction of a long frontage drive adjacent to the SR 29 mainline. The connection of this driveway frontage at each end of the new alignment will be challenging for entering and existing vehicles due to the limited right-of-way available and sight distance limitations around the curve and elevated alignment. This driveway connection constrains this alternative. Wildlife can utilize the existing driveway connection for Collier Holdings Ltd. over the Barron River Canal, eliminating the need for a new bridge, however wildlife gates would be required to channelize wildlife to the proposed box/pipe. The Mayaland LLC driveway on the west side of SR 29 will be adjusted to tie to the new alignment vertically.

This alternative is not anticipated to affect wetlands or surface waters. As this alternative does not affect wetlands, no 404 permit from FDEP is anticipated to be required.

It is anticipated that Alternative 4 would require stormwater treatment and attenuation due to the additional impervious area associated with driveway construction. However,

since the Barron River Canal parallels every option, treatment could be provided at any location along this section of SR 29 for any combination of existing and/or proposed pavement required to provide treatment for an area equal to the additional impervious. Using 1.57 acres of additional impervious and a presumptive treatment depth of 2.5 inches as required by the SFWMD a total treatment volume of approximately 0.33 acre-feet or 14,400 cubic feet of treatment volume is required. Note that 1.57 acres is the maximum delta between the pre and post impervious area for all alternatives. Owl Hammock is within WBID 3278W which is impaired for iron and nutrient removal calculations should not be required, but the SFWMD may request these calculations during the permitting phase.

4.5 Alternative 5

Alternatives 1 through 4 provide a crossing on a new adjacent alignment, allowing for the maintenance of traffic on the existing lanes during construction and minimizing the need for extensive traffic control measures and temporary diversions. This is a conservative estimate for the purpose of alternatives analysis, with the horizontal and vertical geometrics dictating where the crossing can be placed. All options could be constructed on the existing alignment, which would allow some additional flexibility of location options since locations would only be dictated by less restrictive temporary traffic control alignments, not permanent design criteria. As Alternative 4 is located within one-quarter mile of five fatal panther vehicle collisions, this location would be a primary location for placement of a wildlife crossing, based on wildlife connectivity. Due to the existing horizontal curve of SR 29 and driveway connections required within this curve, Alternative 4 is not considered the preferred option based on roadway safety considerations.

Alternative 5 was added to provide an additional viable alternative within the orange Panther Hot Spot. Alternative 5 is similar to Alternative 2, utilizing a similar typical section (**Figure 4-11**) with two 12-foot lanes with eight-foot shoulder pavement, shoulder gutter, and guardrail and a new bridge over the Barron River Canal. However, in order to place this option north of the existing bridge at Gator Slough and south of the existing horizontal curve, it is necessary to place the new crossing approximately on the existing alignment. As shown in **Figure 4-12**, the location of Alternative 5, 1200 feet north of Gator

Slough, is based on the vertical alignment to meet the approximate eight-foot elevation change required.

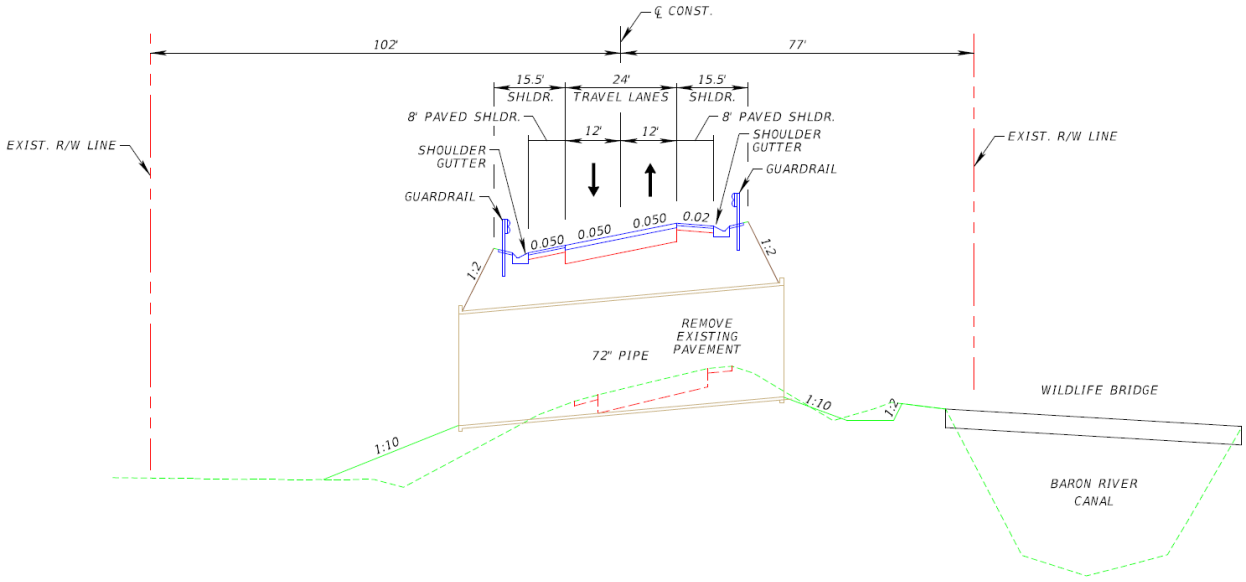

Figure 4-11: Alternative 5 Typical Section

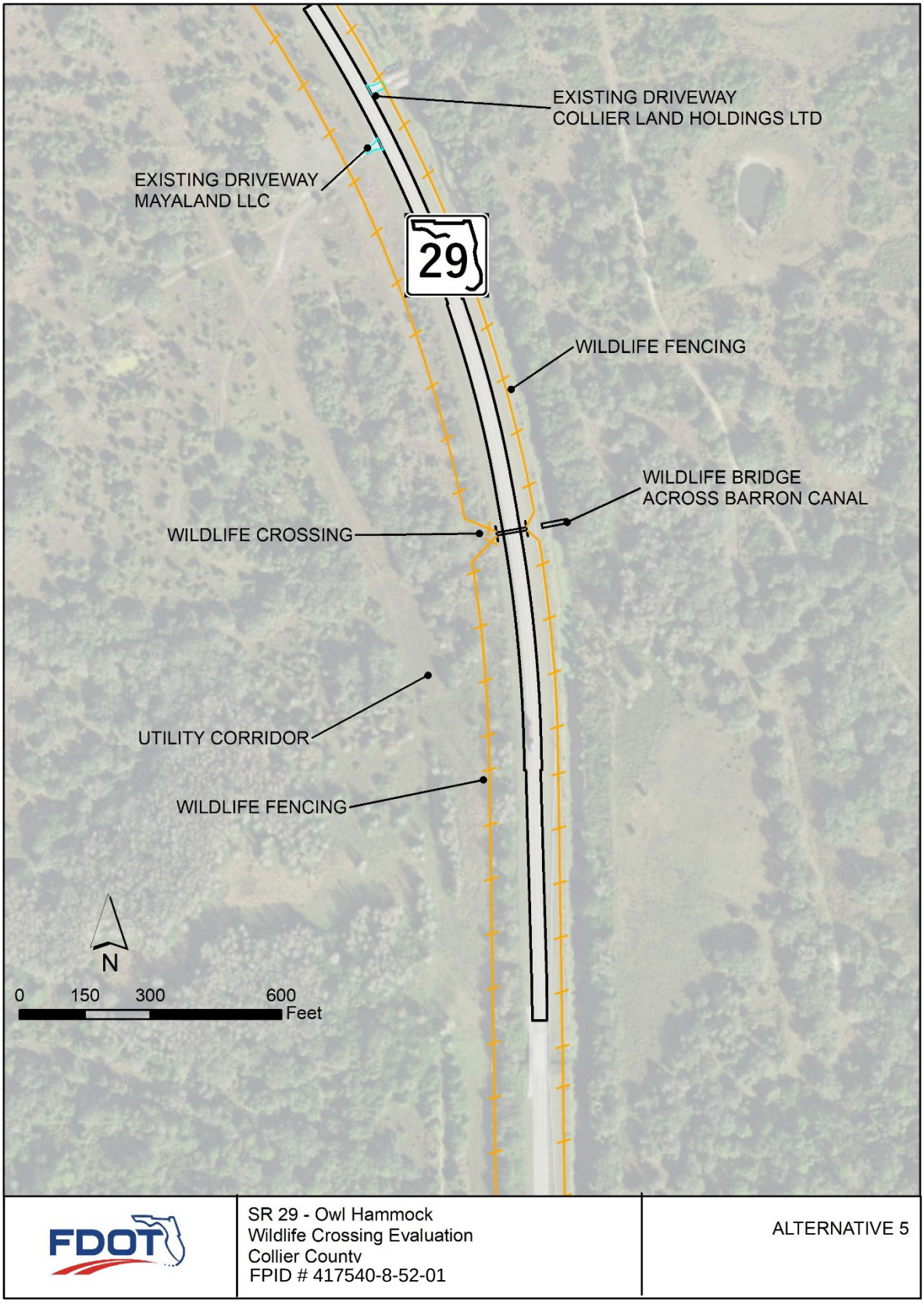

Figure 4-12: Alternative 5

5.0 Cost Estimates and Recommendations

Preliminary cost estimates for each alternative were based on FDOT statewide average unit costs. There has been no value engineering completed in evaluating these alternatives, so that each estimate can be reasonably compared to other alternatives. Alternatives 1, 2, and 4 could be constructed on the existing alignment, maintaining traffic during construction on temporary alignments to reduce costs.

Due to wildlife utilization, wildlife fencing is proposed for the entire Owl Hammock wildlife crossing evaluation segment. As shown on **Figure 4-1**, All alternatives include the same length of fencing, but the number of gates required vary by alternative. Each alternative utilizing a box culvert also includes an estimate for utilizing a 72" pipe culvert. A detailed cost estimate for each alternative is included as **Attachment 2**.

5.1 Alternative 1

Alternative 1 includes a box culvert or pipe and a driveway extension. The preliminary cost estimate for the box culvert is $3,647,700.49. The preliminary cost estimate for the pipe culvert is $3,553,103.84. Due to undesirable driveway extensions, this alternative is not recommended for further evaluation.

5.2 Alternative 2

Alternative 2 includes a box culvert or pipe and a wildlife bridge over the Barron Canal. Alternative 2 does not require any driveway modification. The preliminary cost estimate for the box culvert is $3,262,746.64. The preliminary cost estimate for the pipe culvert is $3,171,994.67. Although Alternative 2 is not located within a Panther Hot Spot, the addition of 2.05 miles of wildlife fencing is anticipated to channelize wildlife to this crossing. Alternative 2 would provide a viable pathway for wildlife to traverse the SR 29 corridor at Owl Hammock.

5.3 Alternative 3

Alternative 3 includes the replacement of the bridge over Gator Slough and an additional wildlife bridge over the Barron Canal. The preliminary cost estimate for Alternative 3 is

$6,725,882.64. Due to the highest preliminary cost and reduced wildlife usage due to high seasonal high water, this alternative is not recommended for further evaluation.

5.4 Alternative 4

Alternative 4 includes a box culvert or pipe and a driveway extension. The preliminary cost estimate for the box culvert is $3,405,007.12. The preliminary cost estimate for the pipe culvert is $ $3,311,479.11. As this alternative is located within a horizontal curve and requires significant driveway modifications, this alternative is not recommended for further evaluation.

5.5 Alternative 5

Alternative 5, a modified Alternative 2, can be located within the orange Panther Hot Spot (**Figure 4-1**) if placed on the existing alignment Placing Alternative 5 approximately 1,200 feet north of Gator Slough aligns more closely with recent panther and black bear vehicle collisions. Due to the proximity to the Gator Slough bridge, a crossing at this location would need to be placed on the existing alignment. The geometric requirements for shifting the alignment temporarily to the west while constructing on the existing alignment are not as strict as a permanent shift, allowing the crossing to be located at the south end of the existing horizontal curve, without the need to relocate, or adjust existing driveway connections. Placing the crossing on the existing alignment requires the use of temporary pavement during construction. The preliminary cost estimate for the box culvert is $3,277,118.34. The preliminary cost estimate for the pipe culvert is $ $3,186,366.37.

5.6 Preferred Alternative

As outlined above, Alternatives 1, 3, and 4 are not recommended for further evaluation. The preliminary cost estimates of Alternative 2 ($3,262,746.64) and Alternative 5 ($3,277,118.34) are within 0.4% of each other. Due proximity of Alternative 5 being located closer to documented wildlife usage, Alternative 5 is the preferred alternative.

6.0 References

FDOT. (2021). FDOT Wildlife Bridge Crossings. ArcGIS Online. Retrieved from https://services1.arcgis.com/O1JpcwDW8sjYuddV/arcgis/rest/services/WildlifeBridgeCrossings2/FeatureServer

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Attachment 1

Roadway Plan Sheets

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	COLLIER	417540-8-52-01

PLAN SHEET - ALT 2

SHEET NO. 2

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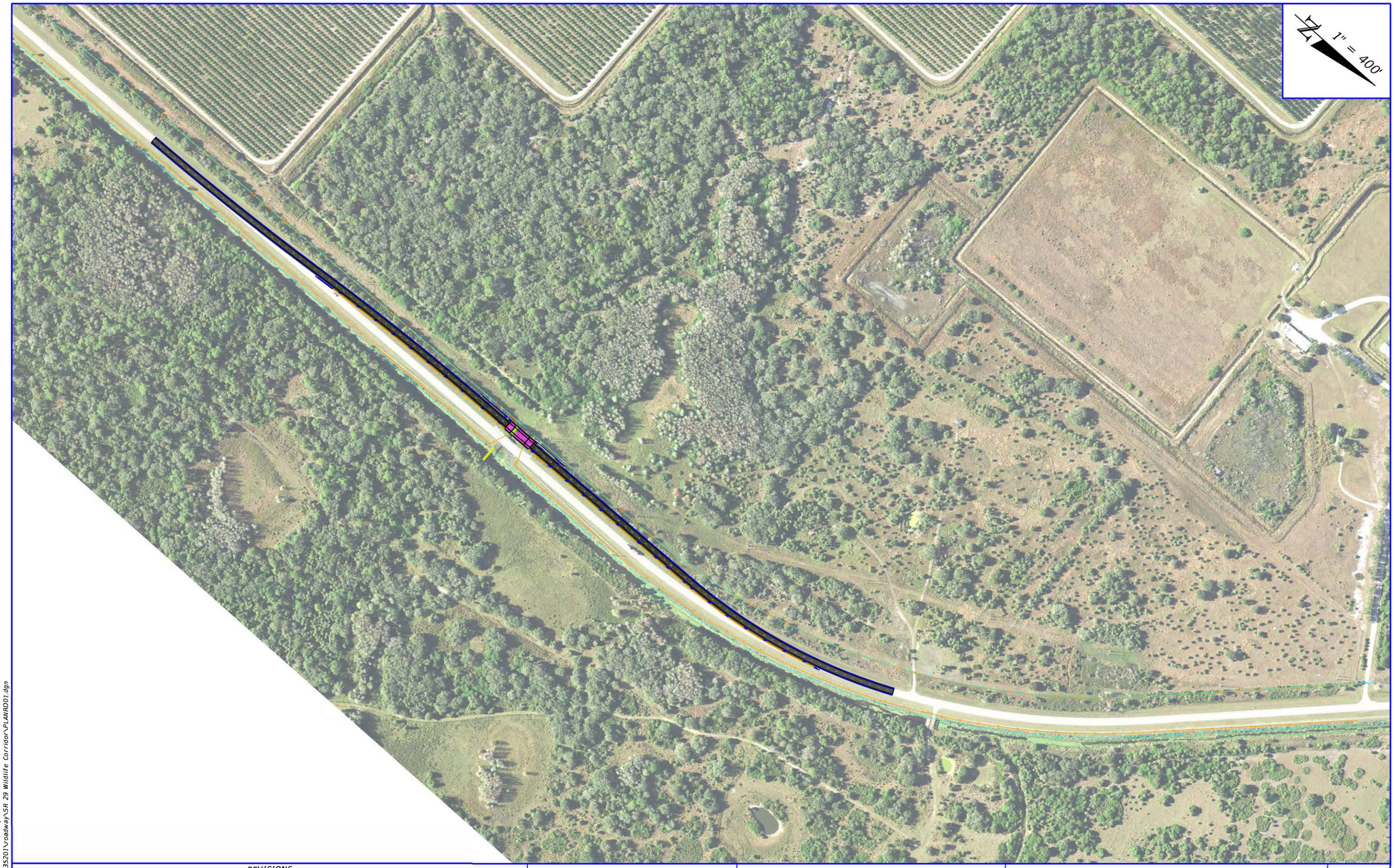

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 29	COLLIER	417540-8-52-01

PLAN SHEET - ALT 3

SHEET NO. 3

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
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PLAN SHEET - ALT 4

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
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PLAN SHEET - ALT 5

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Attachment 2

Detailed Preliminary Cost Estimates

SR 29 WILDLIFE CORRIDOR - OWL HAMMOCK

Cost Options	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Structures/Bridge*					
Bridge			$ 1,367,585.00		
Wildlife Bridge		$ 34,250.00	$ 34,250.00		$ 34,250.00
MSE Wall			$ 508,200.00		
Concrete Barrier			$ 663,000.00		
Removal of Existing Bridge			$ 192,000.00		
Construction over water (3%)		$ 6,862.00	$ 82,951.00		$ 6,862.00
Structures Subtotal	**$ -**	**$ 41,112.00**	**$ 2,847,986.00**	**$ -**	**$ 41,112.00**
Roadway					
Clearing and Grubbing (AC x $20,865)	$ 268,696.75	$ 214,736.22	$ 268,033.34	$ 243,405.84	$ 183,612.00
Embankment (Cubic Yards x $7.59)	$ 294,933.49	$ 160,554.41	$ 297,127.42	$ 195,123.38	$ 159,384.94
Stabilization (Square Yards x $4.24)	$ 91,518.49	$ 76,154.59	$ 79,417.11	$ 81,123.92	$ 56,064.99
Base Course (Square Yards x $14.78)	$ 204,666.71	$ 210,597.92	$ 246,839.14	$ 186,410.29	$ 146,055.96
Asphalt (Tons x $107.17)	$ 244,866.82	$ 251,963.03	$ 295,322.65	$ 223,024.52	$ 174,743.90
Guardrail (Linear Ft x $16.82)	$ 33,555.90	$ 35,322.00	$ 5,298.30	$ 30,915.16	$ 36,768.52
Shoulder Gutter (Linear Ft x $30.00)	$ 59,850.00	$ 63,000.00	$ 10,770.00	$ 59,280.00	$ 65,580.00
Inlets (Each x $4000.00)	$ 28,000.00	$ 28,000.00	$ 8,000.00	$ 28,000.00	$ 32,000.00
*72" Pipe Culvert (Linear Ft x $1000.00)	$ 74,000.00	$ 69,000.00	$ -	$ 71,000.00	$ 69,000.00
Endwall (Cubic Yard x $1716.57)	$ 49,780.53	$ 49,780.53	$ -	$ 49,780.53	$ 49,780.53
Reinforcing Steel (Pounds x $0.22)	$ 549.56	$ 549.56	$ -	$ 549.56	$ 549.56
Driveway Base Course (Square Yards x $9.21)	$ 37,777.60	$ -	$ -	$ 30,169.91	$ 1,324.19
Driveway Asphalt (Tons x $110.00)	$ 37,223.86	$ -	$ -	$ 29,727.68	$ 1,304.78
Gravity Wall (Cubic Yards x $687.48)	$ 79,747.68	$ -	$ 79,747.68	$ 79,747.68	$ -
Wildlife Fencing Cost (Linear Ft x $60.00)**	$ 1,267,200.00	$ 1,267,200.00	$ 1,267,200.00	$ 1,267,200.00	$ 1,267,200.00
Wildlife Gate Cost (Each x $4000.00)	$ 12,000.00	$ -	$ -	$ 12,000.00	$ -
Temporary Barrier Wall Type K (LF x $9.68	$ 33,938.08	$ 34,716.84	$ 40,123.60	$ 30,743.68	$ 23,454.64
Special Detour (temporary pavement)	$ -	$ -		$ -	$ 206,653.11
Roadway Subtotal	**$ 2,818,305.46**	**$ 2,461,575.10**	**$ 2,597,879.24**	**$ 2,618,202.16**	**$ 2,473,477.13**
Project Subtotal	**$ 2,818,305.46**	**$ 2,502,687.10**	**$ 5,445,865.24**	**$ 2,618,202.16**	**$ 2,514,589.13**
MOT (5%)	$ 140,915.27	$ 125,134.36	$ 272,293.26	$ 130,910.11	$ 125,729.46
Mobilization (10%)	$ 281,830.55	$ 250,268.71	$ 544,586.52	$ 261,820.22	$ 251,458.91
Project Total	**$ 3,241,051.28**	**$ 2,878,090.17**	**$ 6,262,745.02**	**$ 3,010,932.49**	**$ 2,891,777.50**
Project Unknowns (5%)	$ 162,052.56	$ 143,904.51	$ 313,137.25	$ 150,546.62	$ 144,588.87
Initial Contingency	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00
Project Grand Total	**$ 3,553,103.84**	**$ 3,171,994.67**	**$ 6,725,882.27**	**$ 3,311,479.11**	**$ 3,186,366.37**

* Concept costs include 72" pipe for wildlife crossing as cost savings measure. Cost to utlize box culvert shown below.

** Fencing cost based on engineering estimate.

Box Culvert Option					
Box Culvert (10' x 6')	$ 202,671.00	$ 194,487.00		$ 198,786.00	$ 194,487.00
72" Pipe Culvert (Linear Ft x $1000.00)	$ (74,000.00)	$ (69,000.00)	$ -	$ (71,000.00)	$ (69,000.00)
Endwall (Cubic Yard x $1716.57)	$ (49,780.53)	$ (49,780.53)	$ -	$ (49,780.53)	$ (49,780.53)
Reinforcing Steel (Pounds x $0.22)	$ (549.56)	$ (549.56)	$ -	$ (549.56)	$ (549.56)
Project SubTotal (Box Culvert)	**$ 2,896,646.37**	**$ 2,577,844.01**	**$ 5,445,865.24**	**$ 2,695,658.07**	**$ 2,589,746.04**
MOT (5%)	$ 144,832.32	$ 128,892.20	$ 272,293.26	$ 134,782.90	$ 129,487.30
Mobilization (10%)	$ 289,664.64	$ 257,784.40	$ 544,586.52	$ 269,565.81	$ 258,974.60
Project Total (Box Culvert)	**$ 3,331,143.33**	**$ 2,964,520.61**	**$ 6,262,745.02**	**$ 3,100,006.78**	**$ 2,978,207.94**
Project Unknowns (5%)	$ 166,557.17	$ 148,226.03	$ 313,137.25	$ 155,000.34	$ 148,910.40
Initial Contingency	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00	$ 150,000.00
Project Grand Total	**$ 3,647,700.49**	**$ 3,262,746.64**	**$ 6,725,882.27**	**$ 3,405,007.12**	**$ 3,277,118.34**
Difference in Cost	**$ 94,596.65**	**$ 90,751.97**	**$ -**	**$ 93,528.01**	**$ 90,751.97**