October 28-29, 2025
Orlando, FL

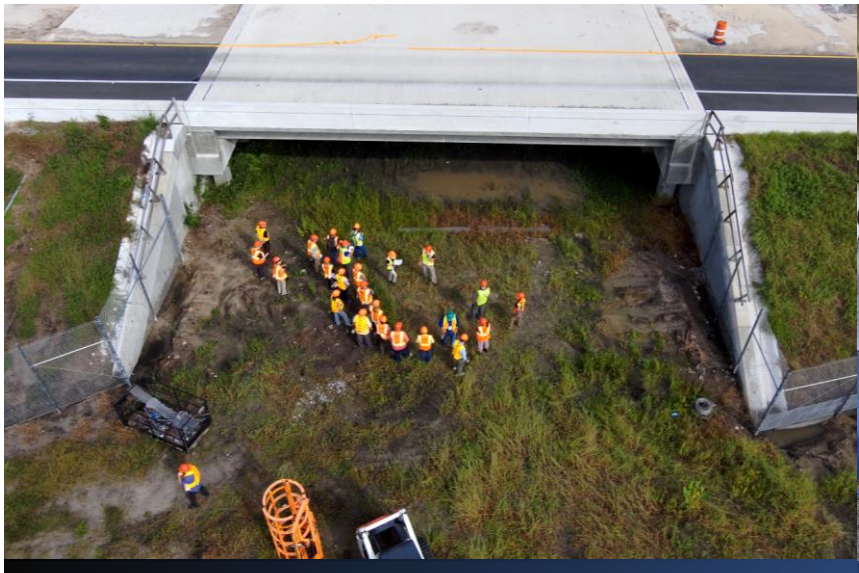
TRANSPORTATION SYMPOSIUM

Wildlife Crossing Tools, Design and Lessons Learned

Katasha Gruver, Interim Director, Office of Environmental Management
Deysia Roberson, District 5 Environmental Specialist
Brent Setchell, P.E., District 1 Drainage Design Engineer

Transportation Symposium Website
SCAN ME

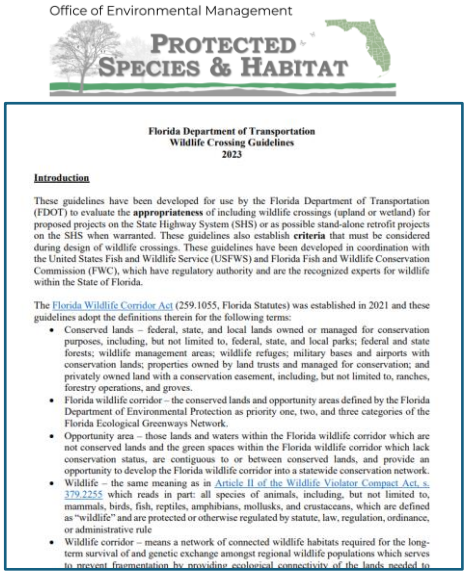
1



Wildlife Crossing Guidance and Tools

2

FDOT Wildlife Crossing Guidance


Office of Environmental Management

PROTECTED SPECIES & HABITAT

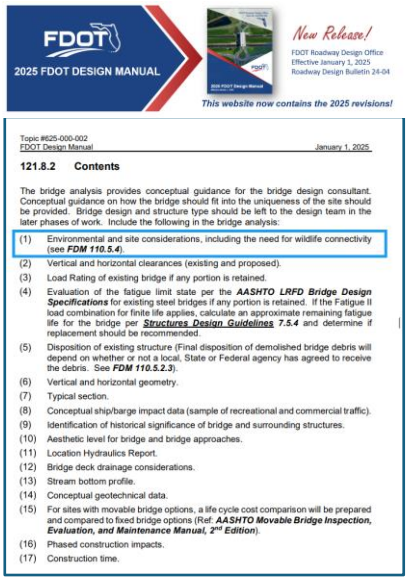
Florida Department of Transportation
Wildlife Crossing Guidelines
2023

Introduction

These guidelines have been developed for use by the Florida Department of Transportation (FDOT) to evaluate the **appropriateness** of including wildlife crossings (upland or wetland) for proposed projects on the State Highway System (SHS) or as possible stand-alone retrofit projects on the SHS when warranted. These guidelines also establish **criteria** that must be considered during design of wildlife crossings. These guidelines have been developed in coordination with the United States Fish and Wildlife Service (USFWS) and Florida Fish and Wildlife Conservation Commission (FWC), which have regulatory authority and are the recognized experts for wildlife within the State of Florida.

The Florida Wildlife Corridor Act (259.1055, Florida Statutes) was established in 2021 and these guidelines adopt the definitions therein for the following terms:

- Conserved lands – federal, state, and local lands owned or managed for conservation purposes, including, but not limited to, federal, state, and local parks; federal and state forests; wildlife management areas; wildlife refuges; military bases and airports with conservation lands; properties owned by land trusts and managed for conservation; and privately owned land with a conservation easement, including, but not limited to, ranches, forestry operations, and groves.
- Florida wildlife corridor – the conserved lands and opportunity areas defined by the Florida Department of Environmental Protection as priority one, two, and three categories of the Florida Ecological Greenways Network.
- Opportunity area – those lands and waters within the Florida wildlife corridor which are not conserved lands and the green spaces within the Florida wildlife corridor which lack conservation status, are contiguous to or between conserved lands, and provide an opportunity to develop the Florida wildlife corridor into a statewide conservation network.
- Wildlife – the same meaning as in Article II of the Wildlife Violator Compact Act, s. 379.2255 which reads in part: all species of animals, including, but not limited to, mammals, birds, fish, reptiles, amphibians, mollusks, and crustaceans, which are defined as "wildlife" and are protected or otherwise regulated by statute, law, regulation, ordinance, or administrative rule
- Wildlife corridor – means a network of connected wildlife habitats required for the long-term survival of and genetic exchange amongst regional wildlife populations which serves to prevent fragmentation by providing ecological connectivity of the lands needed to


FDOT
2025 FDOT DESIGN MANUAL

New Release!

FDOT Roadway Design Office
Effective January 1, 2025
Roadway Design Bulletin 24-04

This website now contains the 2025 revisions!

Topic #625-000-002
FDOT Design Manual — January 1, 2025

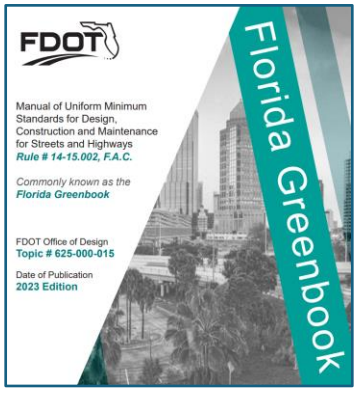
121.8.2 Contents

The bridge analysis provides conceptual guidance for the bridge design consultant. Conceptual guidance on how the bridge should fit into the uniqueness of the site should be provided. Bridge design and structure type should be left to the design team in the later phases of work. Include the following in the bridge analysis:

(1) Environmental and site considerations, including the need for wildlife connectivity (see ***FDM 110.5.4***).
(2) Vertical and horizontal clearances (existing and proposed).
(3) Load Rating of existing bridge if any portion is retained.
(4) Evaluation of the fatigue limit state per the ***AASHTO LRFD Bridge Design Specifications*** for existing steel bridges if any portion is retained. If the Fatigue II load combination for finite life applies, calculate an approximate remaining fatigue life for the bridge per ***Structures Design Guidelines 7.5.4*** and determine if replacement should be recommended.
(5) Disposition of existing structure (Final disposition of demolished bridge debris will depend on whether or not a local, State or Federal agency has agreed to receive the debris. See ***FDM 110.5.2.3***).
(6) Vertical and horizontal geometry.
(7) Typical section.
(8) Conceptual ship/barge impact data (sample of recreational and commercial traffic).
(9) Identification of historical significance of bridge and surrounding structures.
(10) Aesthetic level for bridge and bridge approaches.
(11) Location Hydraulics Report.
(12) Bridge deck drainage considerations.
(13) Stream bottom profile.
(14) Conceptual geotechnical data.
(15) For sites with movable bridge options, a life cycle cost comparison will be prepared and compared to fixed bridge options (Ref: ***AASHTO Movable Bridge Inspection, Evaluation, and Maintenance Manual, 2nd Edition***).
(16) Phased construction impacts.
(17) Construction time.

3

FDOT Wildlife Crossing Guidance


FDOT

Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways

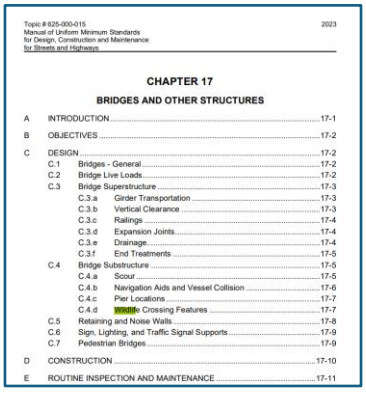
Rule # 14-15.002, F.A.C.

Commonly known as the
Florida Greenbook

FDOT Office of Design
Topic # 625-000-015

Date of Publication
2023 Edition

Florida Greenbook


Topic # 625-000-015 — 2023
Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways

CHAPTER 17

BRIDGES AND OTHER STRUCTURES

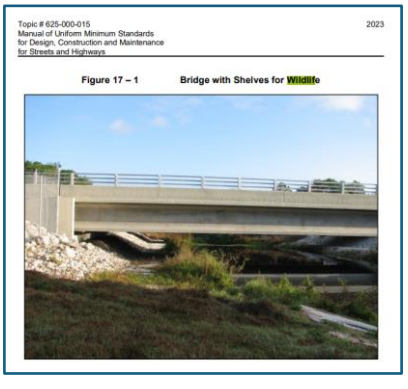

Topic # 625-000-015 — 2023
Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways

Figure 17 – 1 Bridge with Shelves for Wildlife

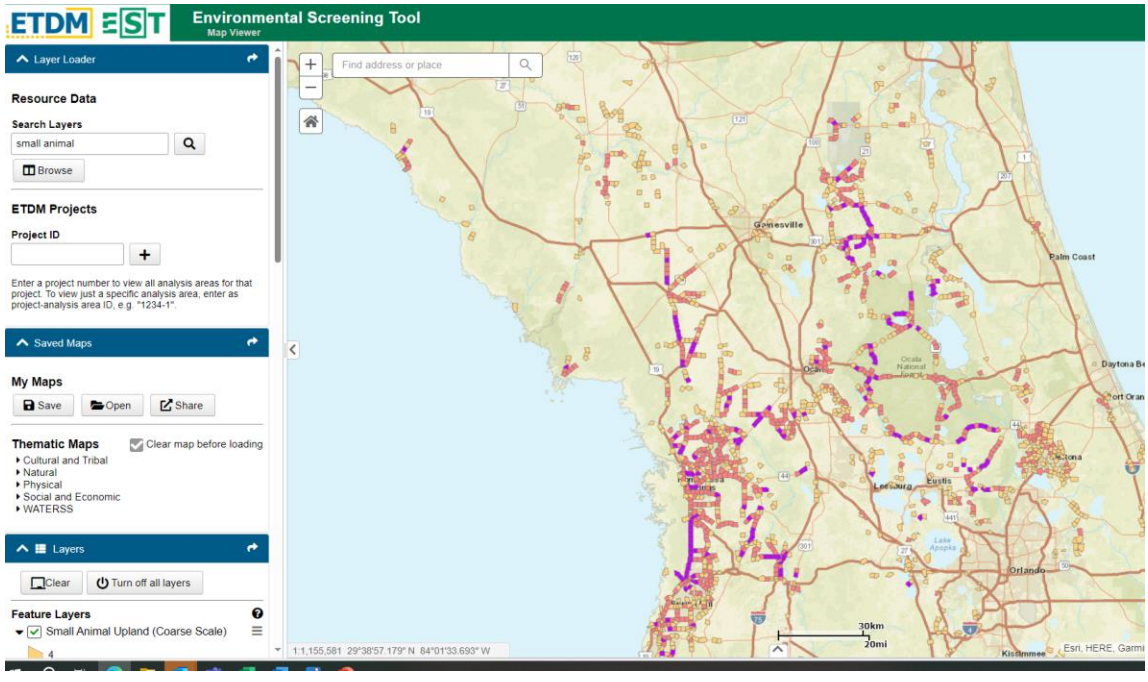
4

Efficient Transportation Decision Making

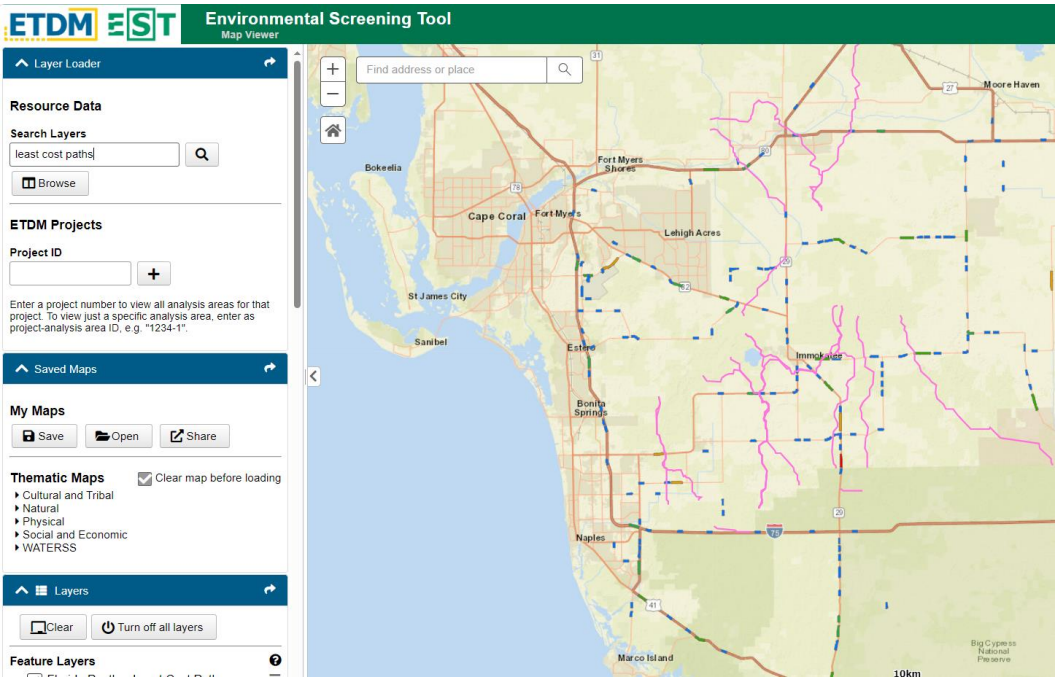
ETDM EST Environmental Screening Tool
Map Viewer

- Environmental Screening Tool
  - Habitat Layers
  - Conservation Land Layers
  - Wildlife Layers
    - Crossings
    - Opportunity Locations
    - Hotspots
    - WVCs
    - Least Cost Paths
    - Signs
  - Infrastructure
    - Bridges
    - Culverts

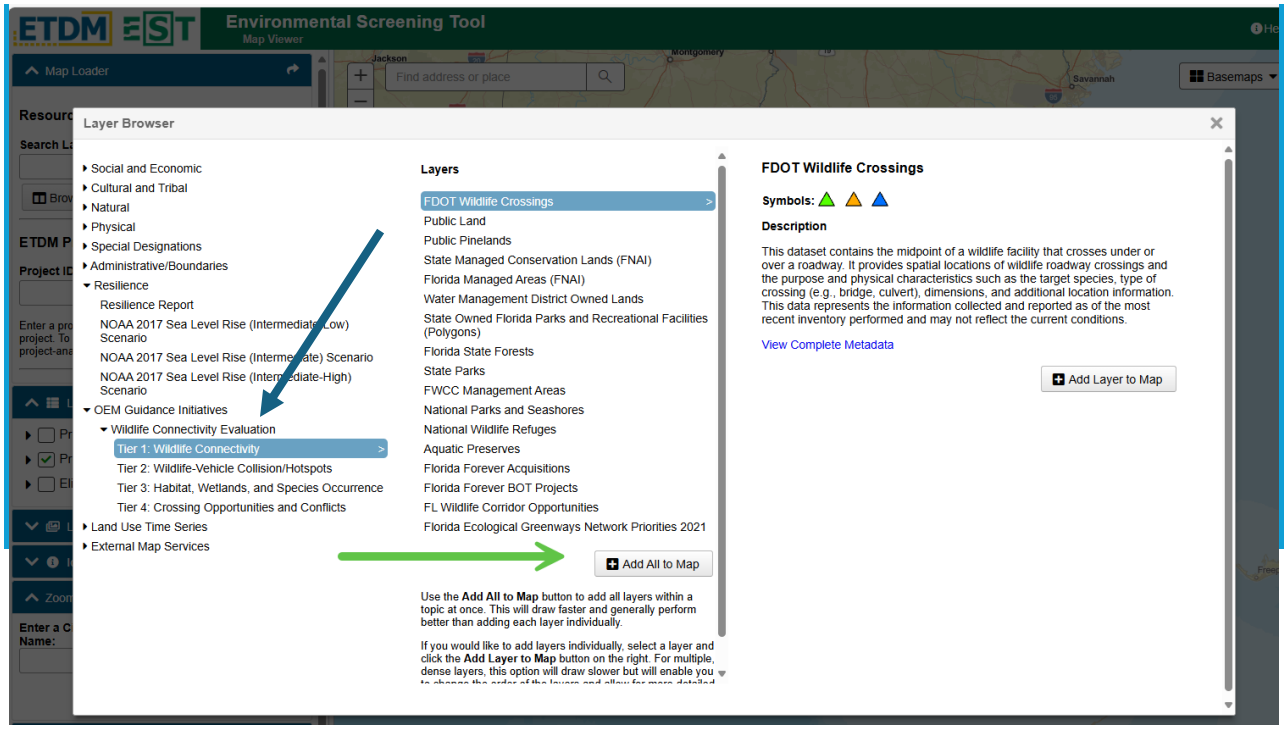
5



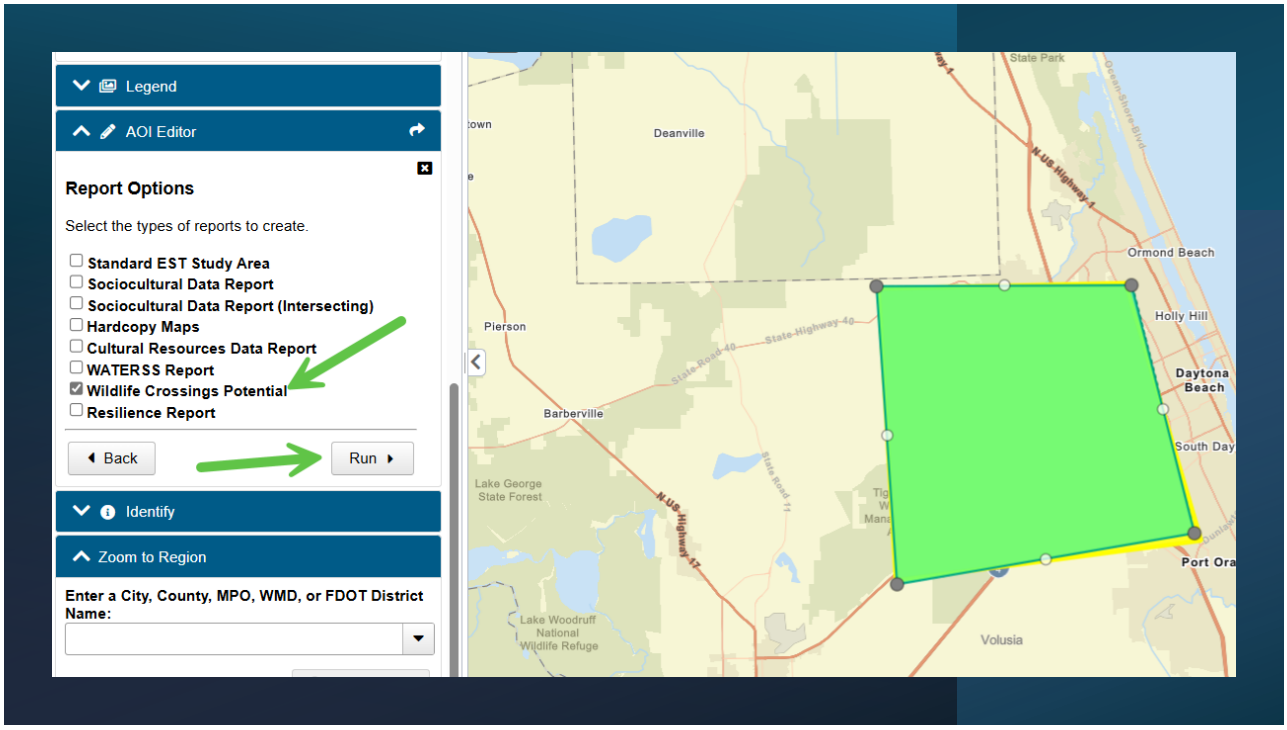
6


ETDM EST
Environmental Screening Tool
Map Viewer
Layer Loader
Resource Data
Search Layers
least cost paths
Browse
ETDM Projects
Project ID
Enter a project number to view all analysis areas for that project. To view just a specific analysis area, enter as project-analysis area ID, e.g. "1234-1".
Saved Maps
My Maps
Save
Open
Share
Thematic Maps
Clear map before loading
Cultural and Tribal
Natural
Physical
Social and Economic
WATERSS
Layers
Clear
Turn off all layers
Feature Layers
Find address or place
Moore Haven
Bokeelia
Fort Myers Shores
Cape Coral
Fort Myers
Lehigh Acres
St James City
Sanibel
Estero
Immokalee
Bonita Springs
Naples
Marco Island
Big Cypress National Preserve
10km

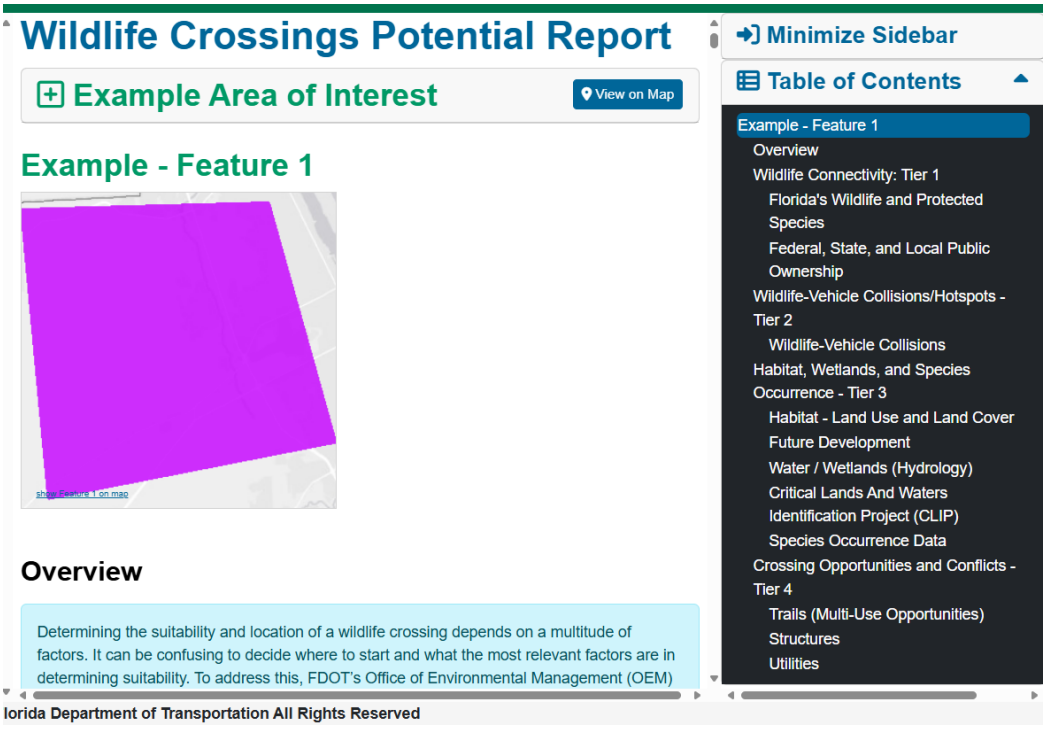
7


ETDM EST
Environmental Screening Tool
Map Viewer
Map Loader
Find address or place
Basemaps
Layer Browser
Social and Economic
Cultural and Tribal
Natural
Physical
Special Designations
Administrative/Boundaries
Resilience
Resilience Report
NOAA 2017 Sea Level Rise (Intermediate-Low) Scenario
NOAA 2017 Sea Level Rise (Intermediate) Scenario
NOAA 2017 Sea Level Rise (Intermediate-High) Scenario
OEM Guidance Initiatives
Wildlife Connectivity Evaluation
Tier 1: Wildlife Connectivity
Tier 2: Wildlife-Vehicle Collision/Hotspots
Tier 3: Habitat, Wetlands, and Species Occurrence
Tier 4: Crossing Opportunities and Conflicts
Land Use Time Series
External Map Services
Layers
FDOT Wildlife Crossings
Public Land
Public Pinelands
State Managed Conservation Lands (FNAI)
Florida Managed Areas (FNAI)
Water Management District Owned Lands
State Owned Florida Parks and Recreational Facilities (Polygons)
Florida State Forests
State Parks
FWCC Management Areas
National Parks and Seashores
National Wildlife Refuges
Aquatic Preserves
Florida Forever Acquisitions
Florida Forever BOT Projects
FL Wildlife Corridor Opportunities
Florida Ecological Greenways Network Priorities 2021
Add All to Map
Use the Add All to Map button to add all layers within a topic at once. This will draw faster and generally perform better than adding each layer individually.
If you would like to add layers individually, select a layer and click the Add Layer to Map button on the right. For multiple, dense layers, this option will draw slower but will enable you
FDOT Wildlife Crossings
Symbols:
Description
This dataset contains the midpoint of a wildlife facility that crosses under or over a roadway. It provides spatial locations of wildlife roadway crossings and the purpose and physical characteristics such as the target species, type of crossing (e.g., bridge, culvert), dimensions, and additional location information. This data represents the information collected and reported as of the most recent inventory performed and may not reflect the current conditions.
View Complete Metadata
Add Layer to Map

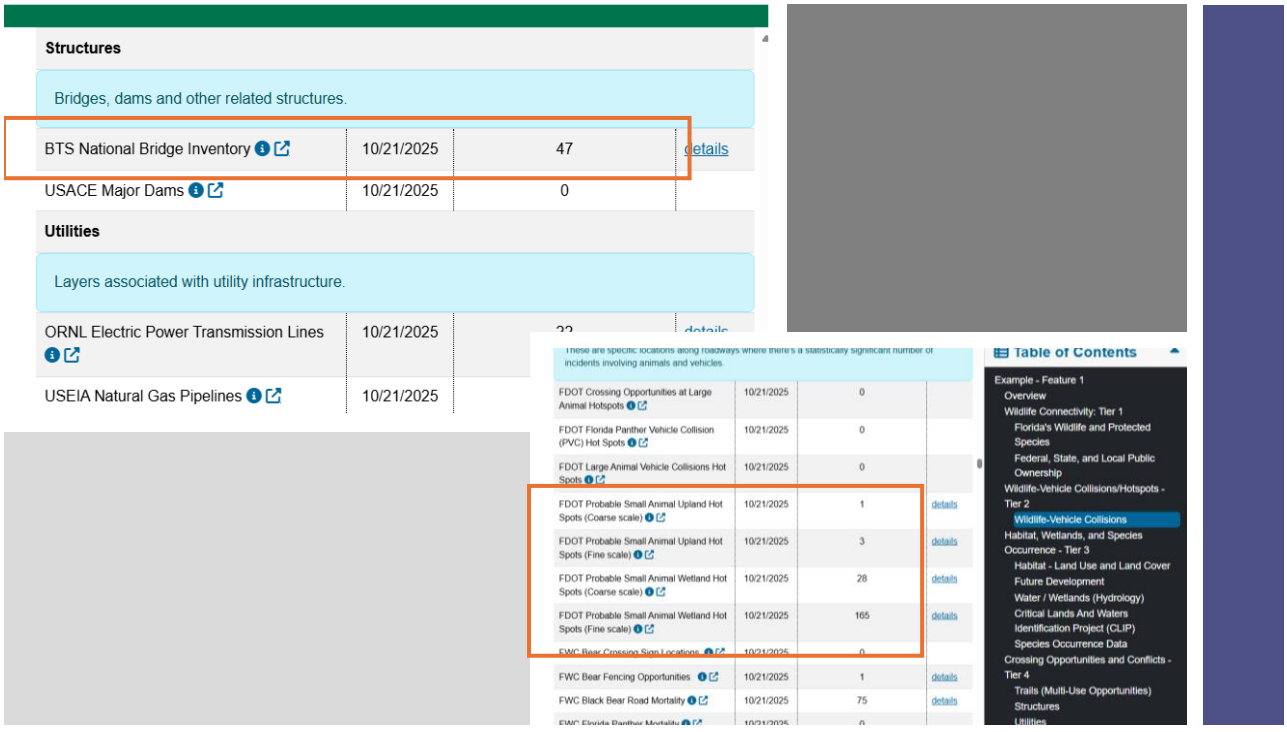
8


Legend
AOI Editor
Report Options
Select the types of reports to create.
Standard EST Study Area
Sociocultural Data Report
Sociocultural Data Report (Intersecting)
Hardcopy Maps
Cultural Resources Data Report
WATERSS Report
Wildlife Crossings Potential
Resilience Report
Back
Run
Identify
Zoom to Region
Enter a City, County, MPO, WMD, or FDOT District Name:
Deanville
Pierson
Barberville
Lake George State Forest
Lake Woodruff National Wildlife Refuge
Ormond Beach
Holly Hill
Daytona Beach
Volusia

9


Wildlife Crossings Potential Report
Example Area of Interest
View on Map
Example - Feature 1
Overview
Determining the suitability and location of a wildlife crossing depends on a multitude of factors. It can be confusing to decide where to start and what the most relevant factors are in determining suitability. To address this, FDOT's Office of Environmental Management (OEM)
Minimize Sidebar
Table of Contents
Example - Feature 1
Overview
Wildlife Connectivity: Tier 1
Florida's Wildlife and Protected Species
Federal, State, and Local Public Ownership
Wildlife-Vehicle Collisions/Hotspots - Tier 2
Wildlife-Vehicle Collisions
Habitat, Wetlands, and Species Occurrence - Tier 3
Habitat - Land Use and Land Cover
Future Development
Water / Wetlands (Hydrology)
Critical Lands And Waters Identification Project (CLIP)
Species Occurrence Data
Crossing Opportunities and Conflicts - Tier 4
Trails (Multi-Use Opportunities)
Structures
Utilities
lorida Department of Transportation All Rights Reserved

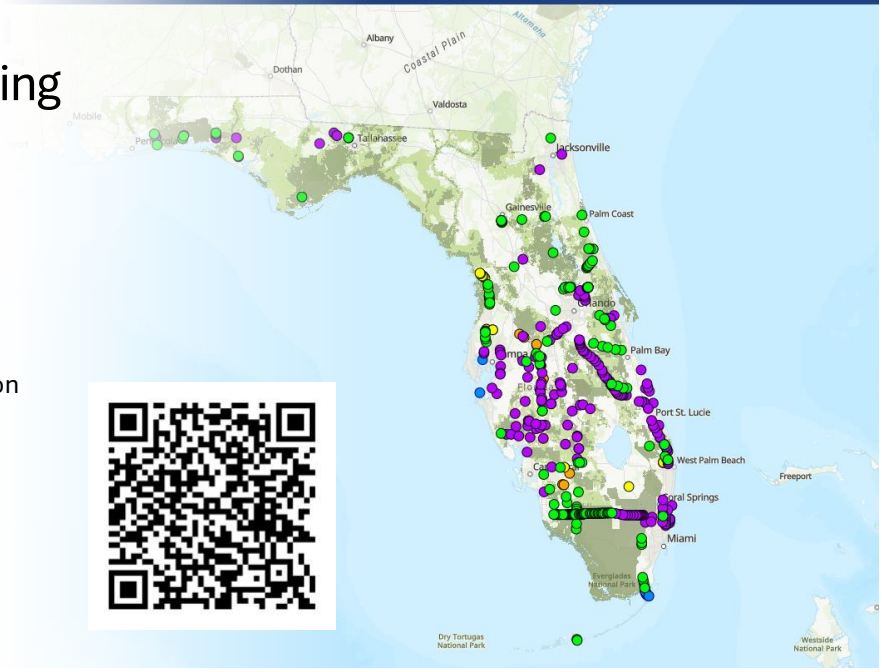
10



11

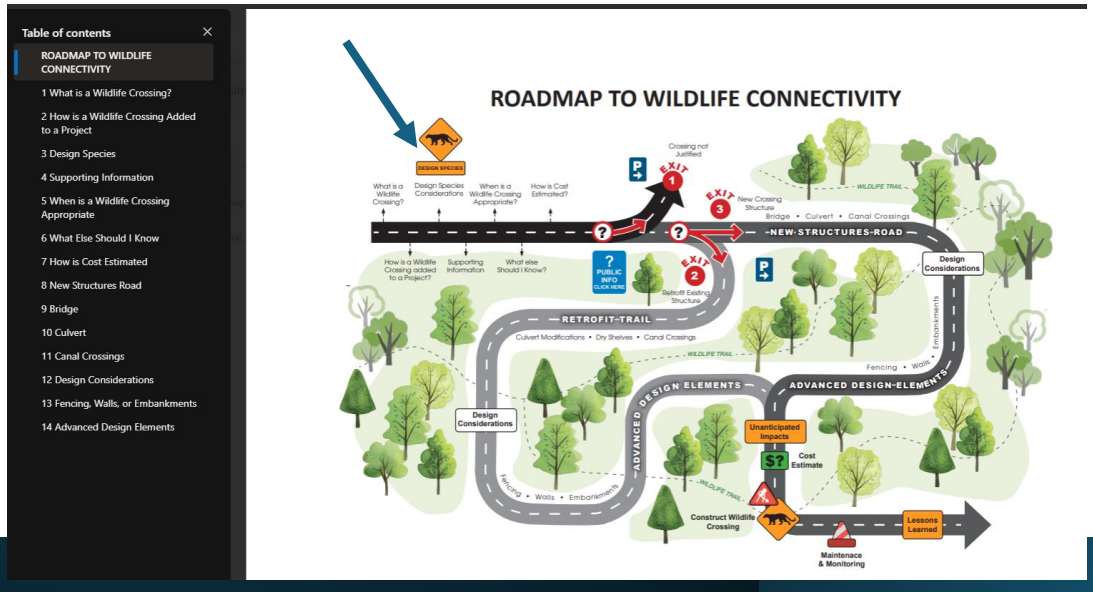
Statewide Wildlife Crossing Map

- Crossing Attributes
- Photo Gallery
- Dashboard – coming soon



12

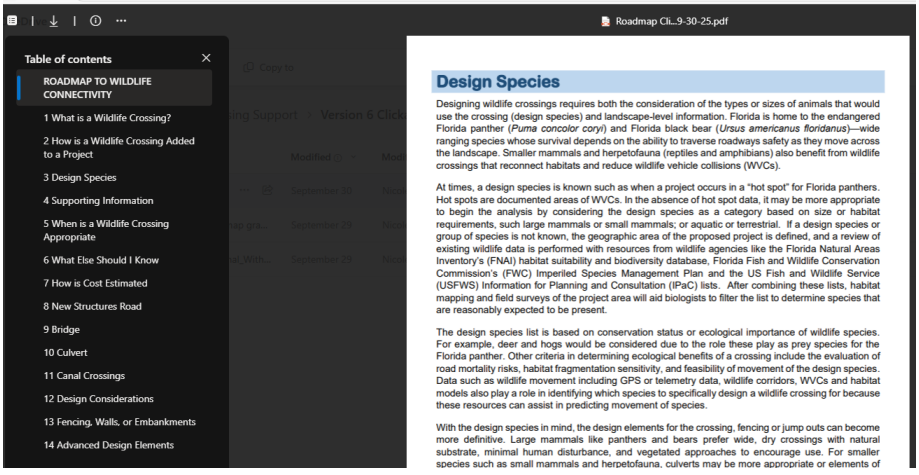
13



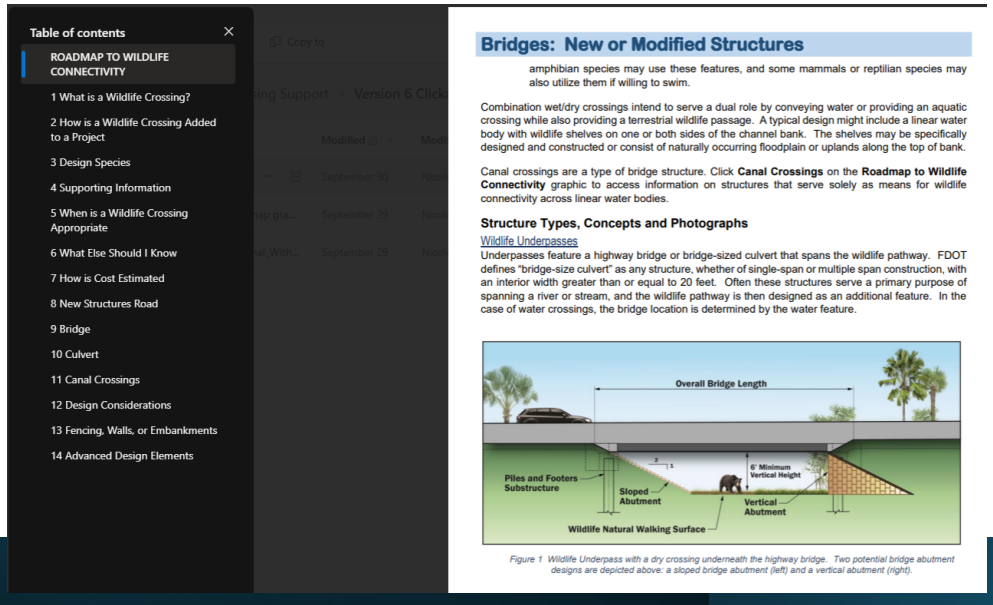
Road Map for Designers

14

Design Species



15



16

Bridges: New or Modified Structures

Transition from Walking Surface to Natural Ground

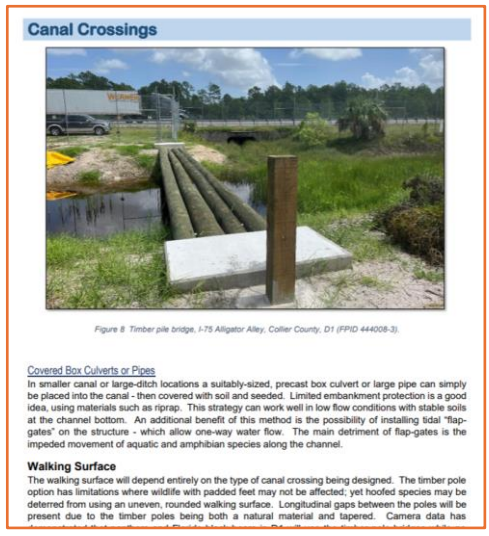
While the walking surface under the bridge itself is a primary design focus, the transition from the shelf to the natural ground is equally critical to the success of the design. Riprap at the bridge abutments or wetlands at the toe of slope may be barriers between the end of the walking surface and adjacent habitat. Site specific conditions will dictate the overall design, however often a pathway between the end of the dry walking surface and adjacent habitat may be needed to encourage wildlife towards the crossing.

Figure 11 Example of a Crossing Retrofit: A dry shelf with a pathway to transition between end of dry shelf and natural ground at Harold Strand, I-75 Alligator Alley, Collier County, D1 (FPID 444008-2). PVC pipe in right foreground is a drainage feature for the walking surface.

Maintenance

As with other highway improvements, wildlife crossings need to be maintained. Various components such as bridge substructure and superstructure, culverts, fences, gates, wildlife shelves, canal or water crossings, and road or parking access accommodations require maintenance.

Wildlife overpasses and some box culverts will enter the FDOT's bridge inventory for the Bridge and Other Structures Inspection Program. Structures with spans less than 20 feet in length are typically inspected as part of the FDOT's area maintenance center. The bridge components for wildlife overpasses will be inspected through the Bridge Inspection Program, however criteria for maintenance of the walking surfaces will need to be established.



Canal Crossings

Figure 8 Timber pile bridge, I-75 Alligator Alley, Collier County, D1 (FPID 444008-3).

Covered Box Culverts or Pipes

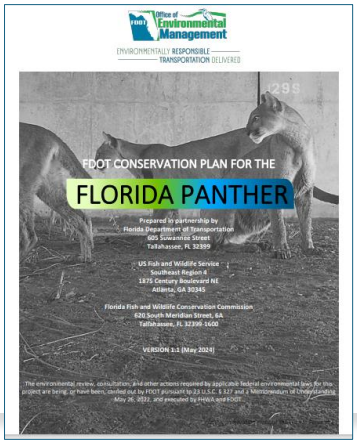
In smaller canal or large-ditch locations a suitably-sized, precast box culvert or large pipe can simply be placed into the canal - then covered with soil and seeded. Limited embankment protection is a good idea, using materials such as riprap. This strategy can work well in low flow conditions with stable soils at the channel bottom. An additional benefit of this method is the possibility of installing tidal "flap-gates" on the structure - which allow one-way water flow. The main detriment of flap-gates is the impeded movement of aquatic and amphibian species along the channel.

Walking Surface

The walking surface will depend entirely on the type of canal crossing being designed. The timber pole option has limitations where wildlife with padded feet may not be affected; yet hoofed species may be deterred from using an uneven, rounded walking surface. Longitudinal gaps between the poles will be present due to the timber poles being both a natural material and tapered. Camera data has

Hot Sheet Examples

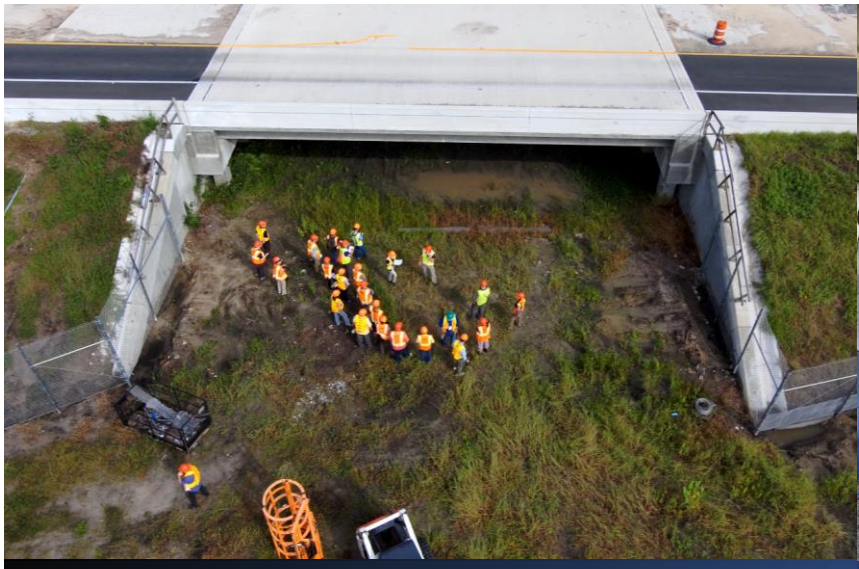
17



Florida Panther Conservation Plan

- GIS Analysis
- Telemetry
- Vehicle Collision Locations/Hot Spots
- Camera Traps

18



D5 Design and Lessons Learned

19

Challenges

- Perception #1:
  - Wildlife Crossings are helpful for environmental needs, but do not serve transportation goals.
- Reality:
  - Wildlife crossings are a tool in the “roadway safety toolbox.”
  - 200 fatalities, 26,000 injuries per year*
  - 1-2 million large animals killed per year*
  - Crossings with fencing reduce roadkill by 97%*
  - Every animal that uses a wildlife crossing is a crash that didn’t happen

*https://largelandscapes.org/wp-content/uploads/2021/01/Wildlife-vehicle-Conflict-Crossing-Structures-and-Cost-Estimates.pdf

TRANSPORTATION SYMPOSIUM

20

20

Challenges

- Perception #2:
  - There's only one type of wildlife crossing

TRANSPORTATION SYMPOSIUM

21

21

Challenges

- Reality:

TRANSPORTATION SYMPOSIUM

22

22

Challenges

- Reality:

Challenges

- Reality:

TRANSPORTATION SYMPOSIUM

Challenges

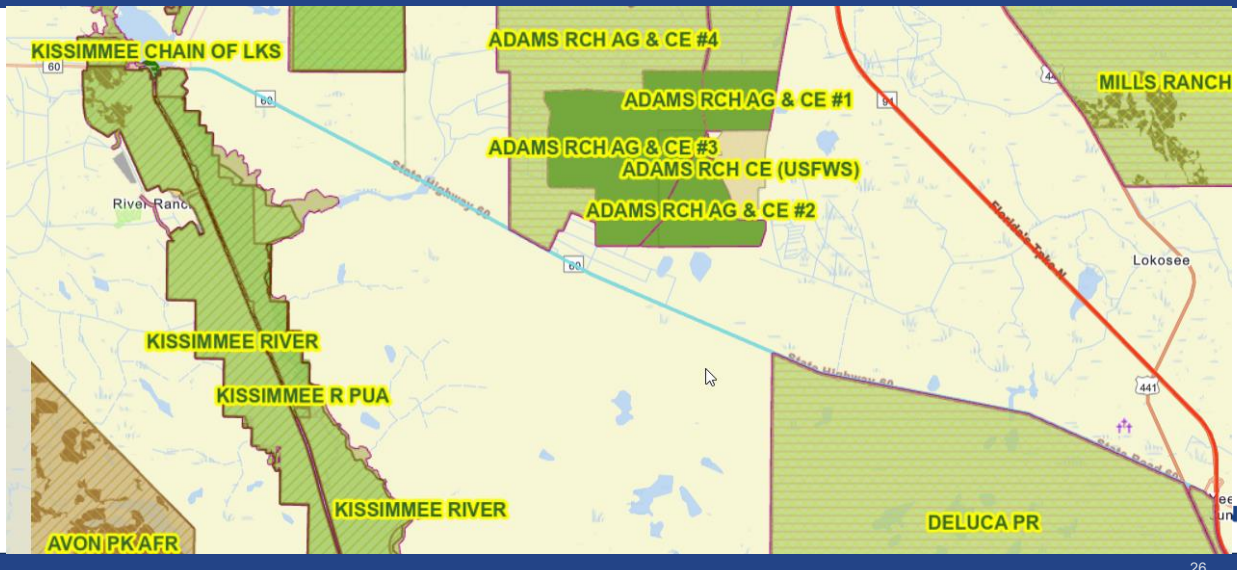
- Location, Location, Location:
  - Ideally WC's will link existing conservation land
  - Agency buy-in
    - Invasive species
    - Edge effects
    - Special considerations
  - Private landowner concerns:
    - cattle operation resistance (predation on cattle is low)
    - funneling listed species into property and restricting landowner usage.

TRANSPORTATION SYMPOSIUM

25

25

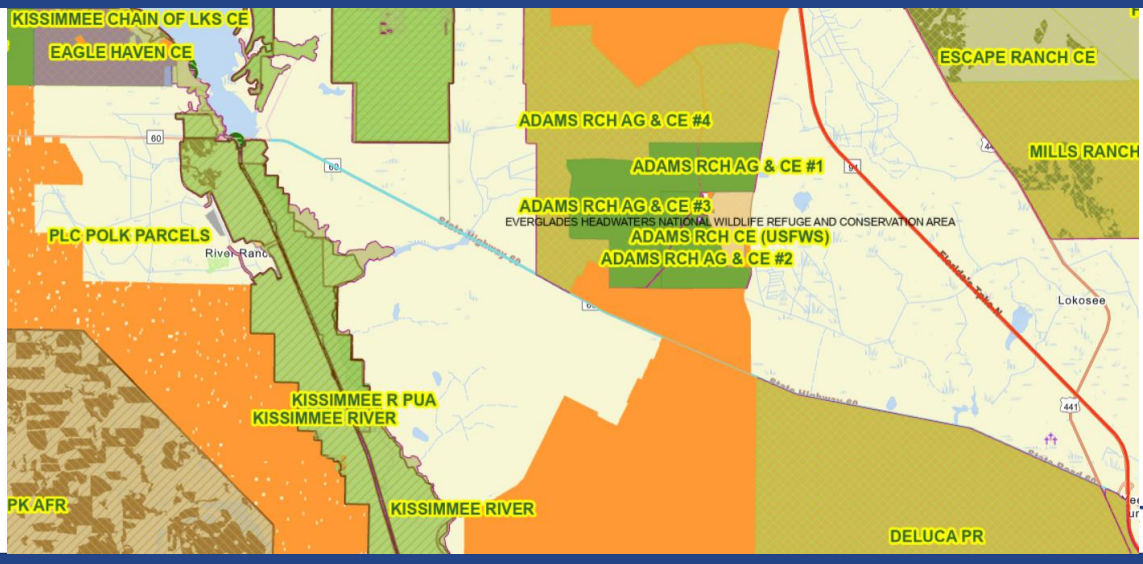
Challenges



26

26

Challenges

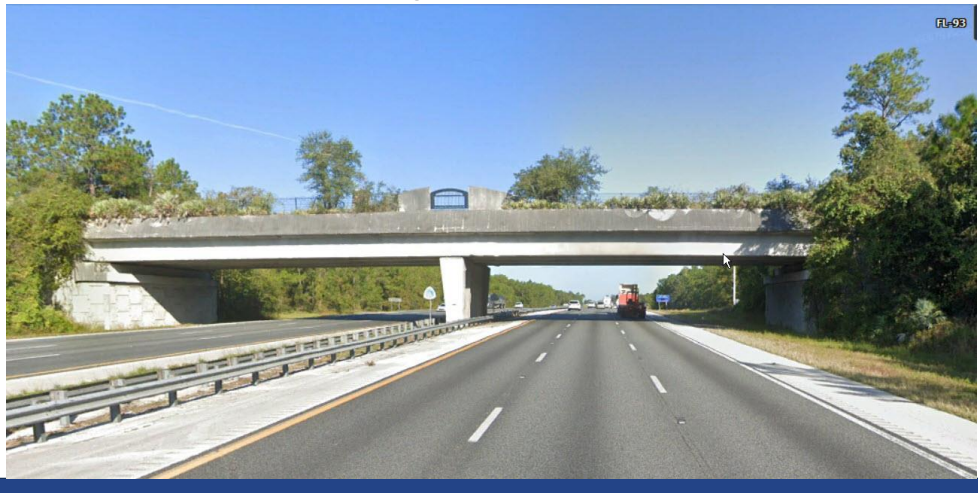


27

27

Challenges

- Where did the Animals go?



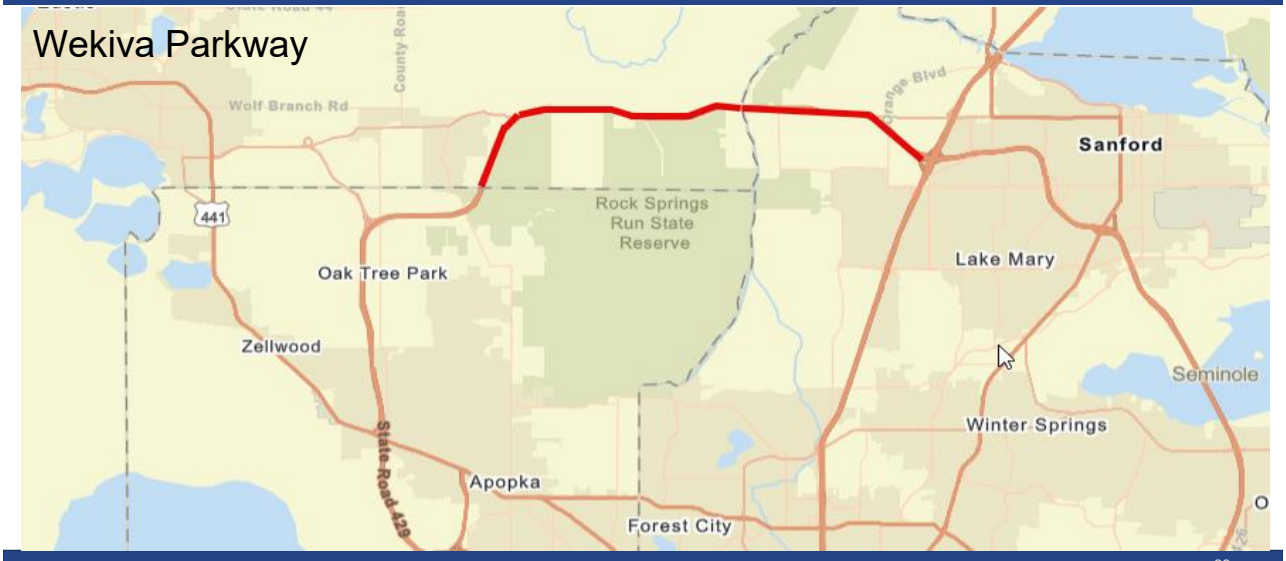
TRANSPORTATION SYMPOSIUM

28

28

Successes

Wekiva Parkway

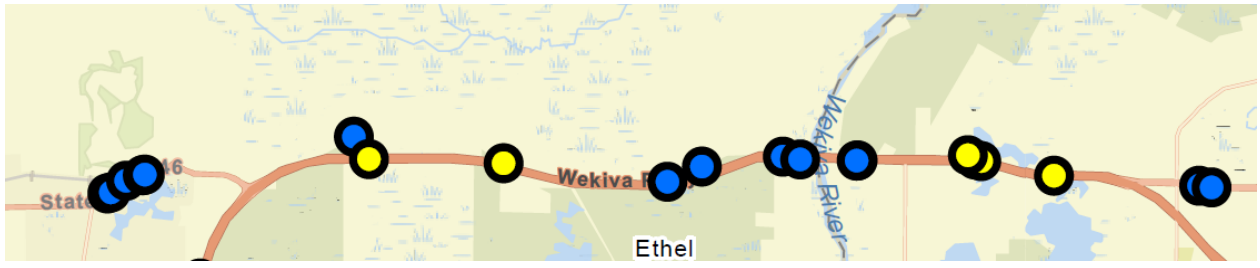


29

29

Successes

- Wekiva Parkway



Legend

Post-Build Black Bear Road Mortality Incident

Pre-Build Black Bear Road Mortality Incident

TRANSPORTATION SYMPOSIUM

30

30

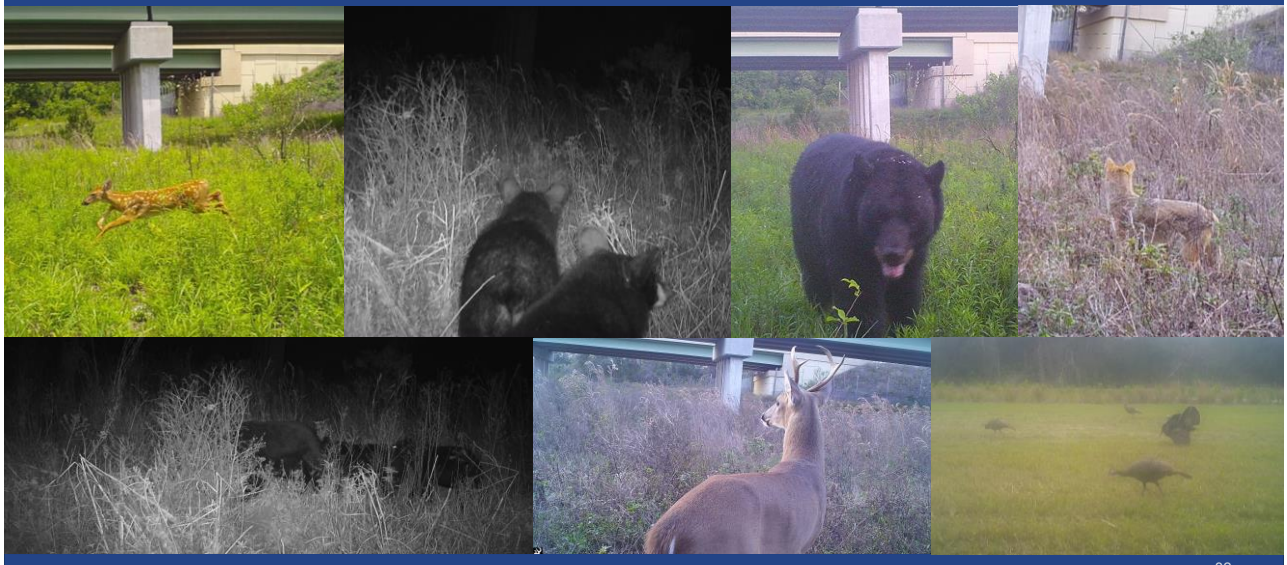
Successes

- Wekiva Parkway

31

31

Successes



32

32

Successes

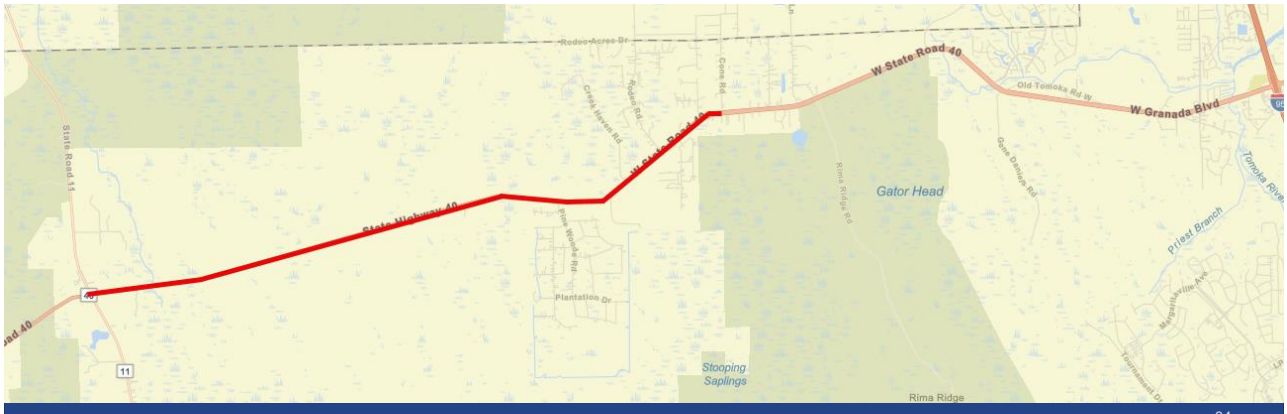
- I-4 Volusia County Wildlife Crossings

33

33

Successes

- 240837-1 Volusia SR 40 from SR 11 to Cone Road– Widen from 2 to 4 lanes - First wildlife crossing to get federal mitigation credit for Florida.



34

34

Safety Message

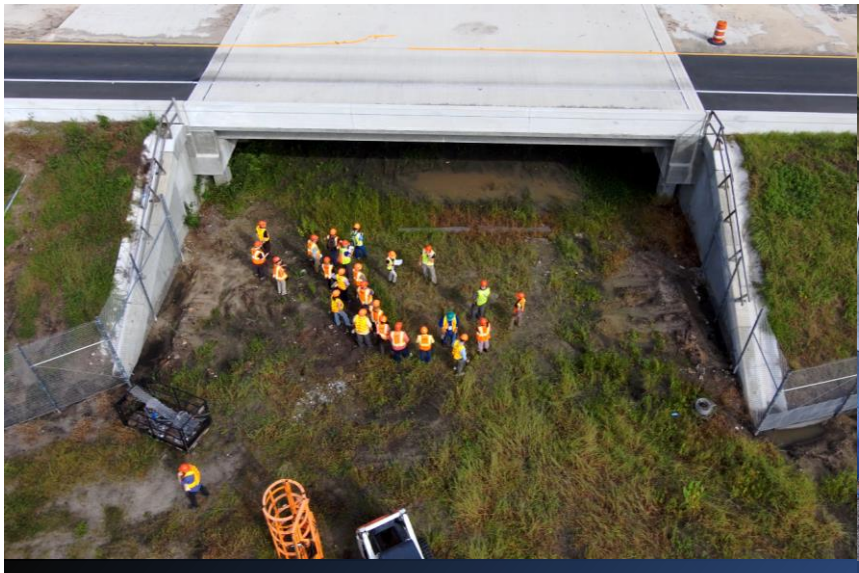
- Wildlife Crossings are a tool to improve roadway safety
- Reduce wildlife vehicle collisions by 80-90%
- Mitigation costs can be reduced by factoring in the benefits provided by the wildlife crossing.
- Improves habitat connectivity, which improves roadway safety.

Wildlife crossings aren't just the right thing, they're also the safe thing to do.

TRANSPORTATION SYMPOSIUM

35

35



D1 Design and Lessons Learned

36

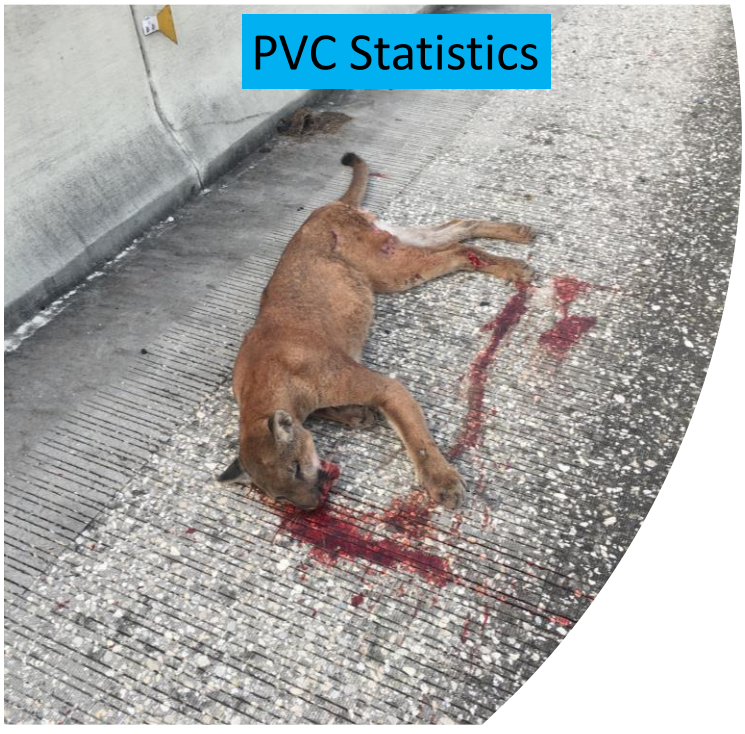
Florida Wildlife Corridor

- The legislature unanimously approved the Florida Wildlife Corridor Act in 2021 which aims to protect and enhance the Florida Wildlife Corridor.
- In 2024, the approved budget included $100 million for land conservation.
- The Wildlife Corridor Act (WCA) is intended to prevent habitat fragmentation, safeguard clean water and air, preserve agricultural lands and allow for continued recreational access to natural areas.
- FDOT's mission includes providing a transportation system which "prioritizes Florida's environment and natural resources"
- Wildlife crossings improve habitat connectivity and support the WCA.

TRANSPORTATION SYMPOSIUM

37

37



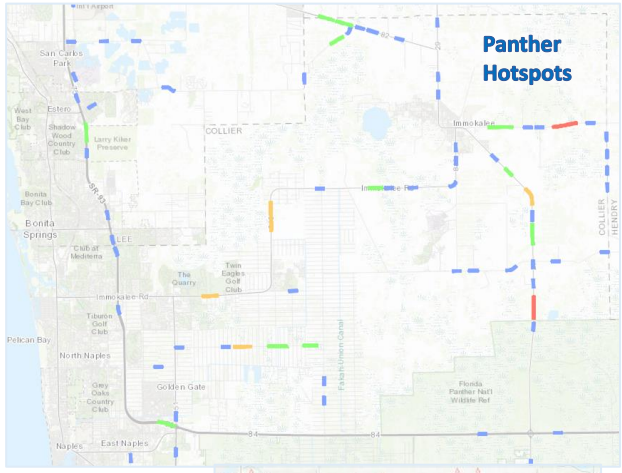
- Vehicle Collisions are the leading known cause of death for Florida Panthers and Black Bears
- Additionally, FDOT reported more than 20,000 wildlife vehicle collisions including 35 fatalities and nearly 2,900 injuries between 2018 and 2022.

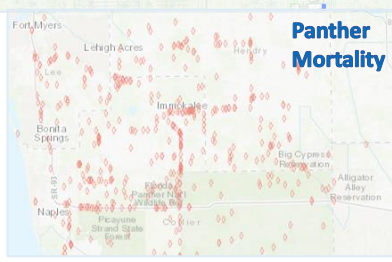
38

Locating Crossings

FDOT utilizes various tools to identify potential locations for wildlife crossings:

- Florida Panther-vehicle collision hotspots
- Least Cost Pathways (GIS modeling)
- Animal telemetry data
- Conservation lands data
  - Florida Forever
- Future land use maps
- Florida Ecological Greenways Network (FEGN)
- Florida Wildlife Corridor
- Motion Activated Trail Cameras





FDOT Florida Department of Transportation

39

Data Collection

FDOT Florida Department of Transportation

- FDOT utilizes motion activated trail cameras.
- FDOT places cameras on both sides of potential crossings to better understand the type and abundance of wildlife and to monitoring existing crossings.

40

Florida Department of Transportation

Wildlife Crossings Work!

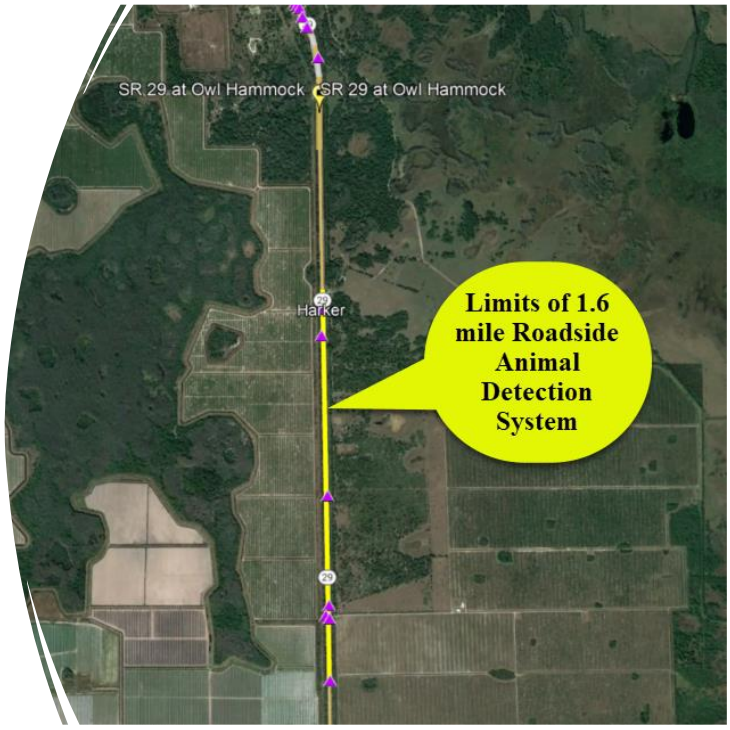
- Literature reviews show wildlife crossings are 80-90% effective at reducing wildlife vehicle collisions, especially when wildlife fencing is included.
- FDOT, Agencies and Non-Governmental Organizations (NGOs) have monitored FL's existing wildlife crossings and collected data showing wildlife use crossings.

41

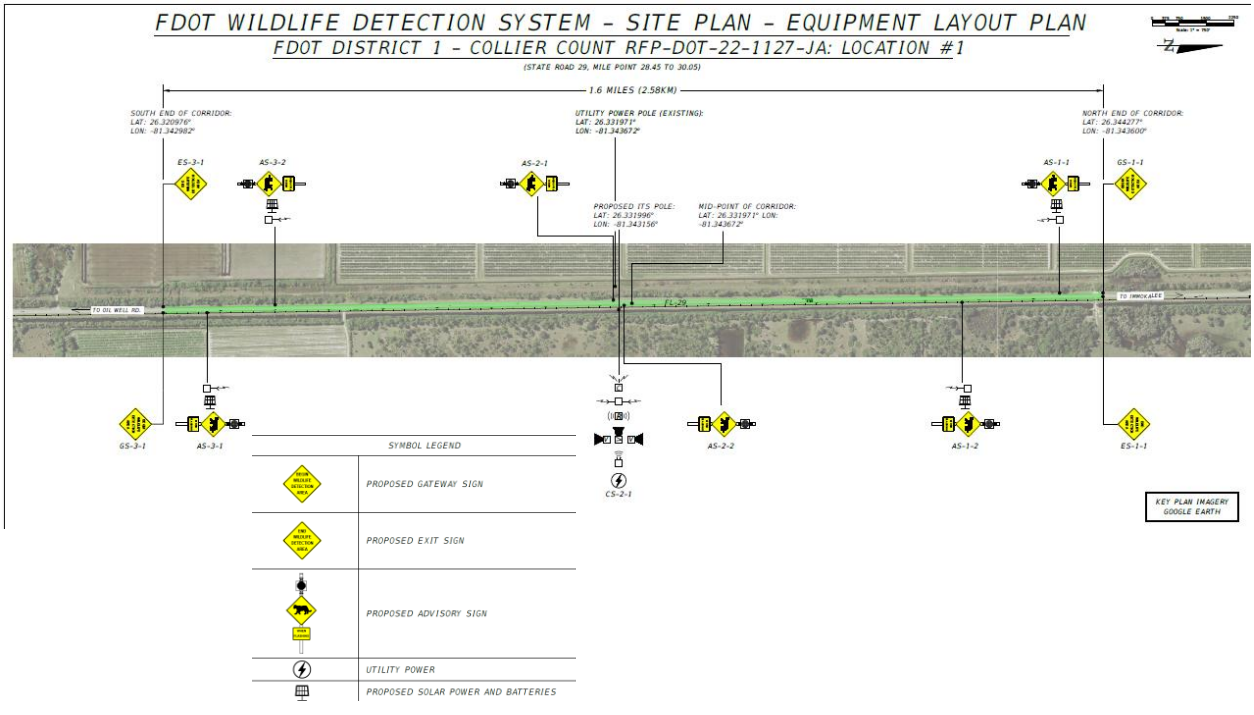
42

SR 29 Roadside Animal Detection System

- Pilot project using Radar and thermal imaging cameras
- Includes both signs and in-vehicle warnings
- Construction nearing completition
- Cost $600k



43



44

Live Feed Dashboard

45

SR 80 Bridge Retrofits

- SR 80 at C-1, C-2 and C-3 complete – shelves added
- SR 80 at Townsend Canal complete – shelves added
  - FDOT currently monitoring
- SR 80 at Roberts Canal – shelves have been added with maintenance contract

46

Shelf added to SR 80 over Roberts Canal

47

SR 80 over Roberts Canal

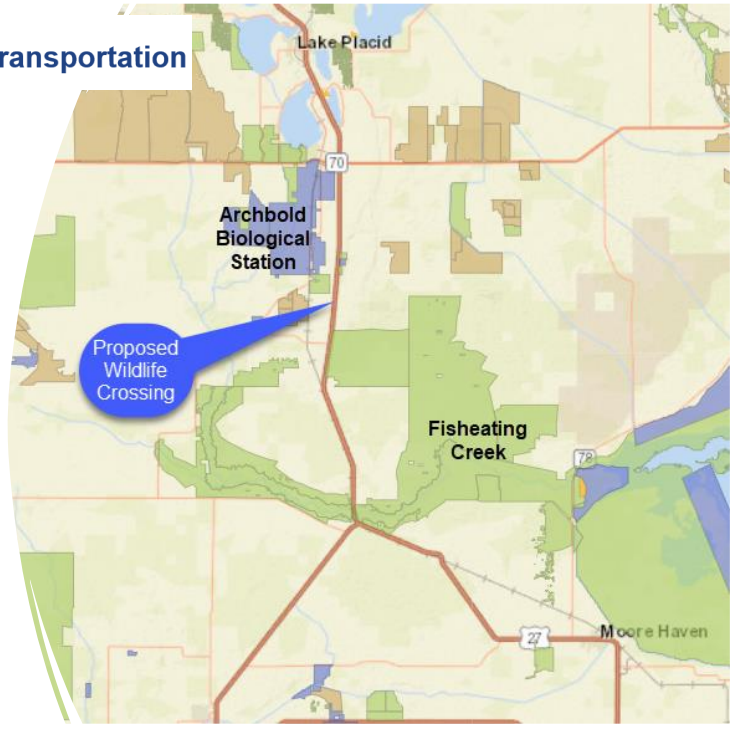
https://photos.app.goo.gl/whGMW4RtAMopsBDSA

48

Florida Department of Transportation

US 27 Venus Wildlife Crossing

- Connecting Archbold Biological Station and Lake Wales Ridge Wildlife and Environmental Area (>40,000 acres) to Fisheating Creek (>50,000 acres)

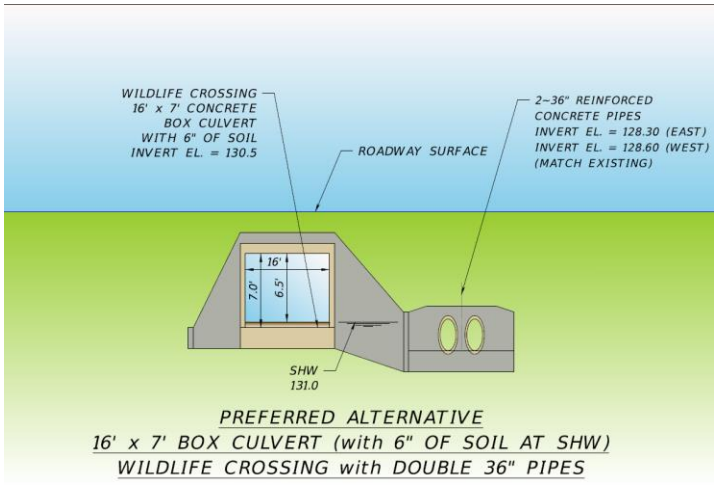


49

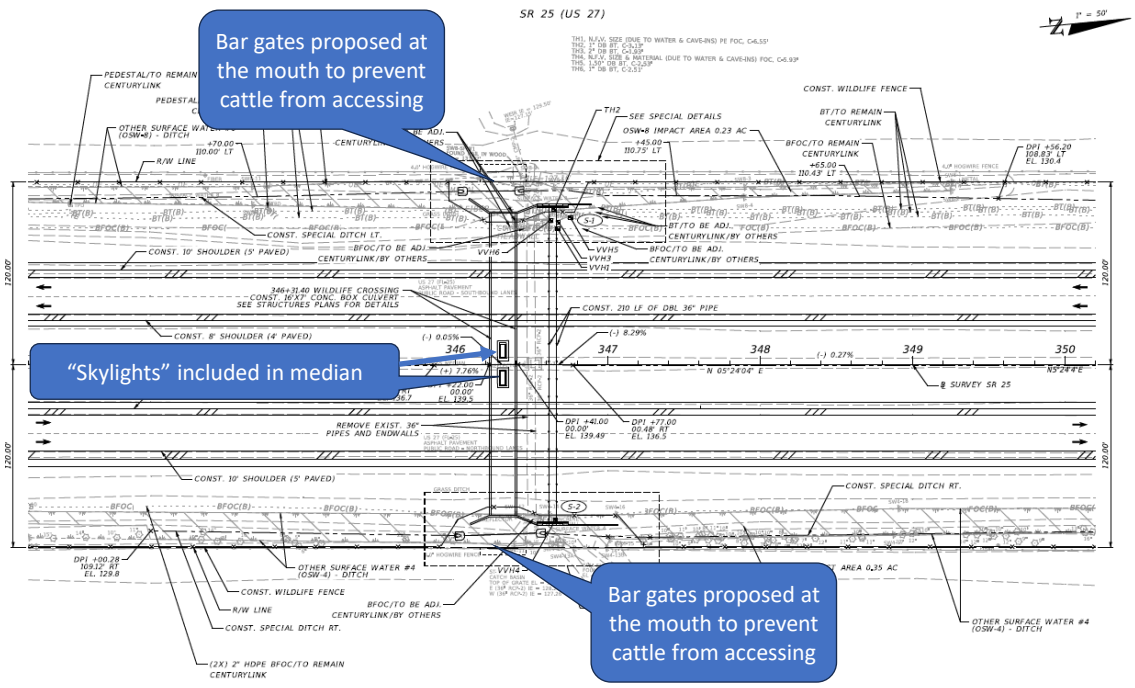
US 27 Venus Wildlife Crossing (449144-2)

- 16'x7' culvert proposed
- Includes 1.0 mile of wildlife fencing on both sides.
- Final Plans complete
- Permits Clear
- No ROW required
- Grant Award = $6,124,522
- FDOT providing $1.6 million
- Earliest letting December 2025
- conservation lands approved by FL cabinet on both sides (RFLPP)

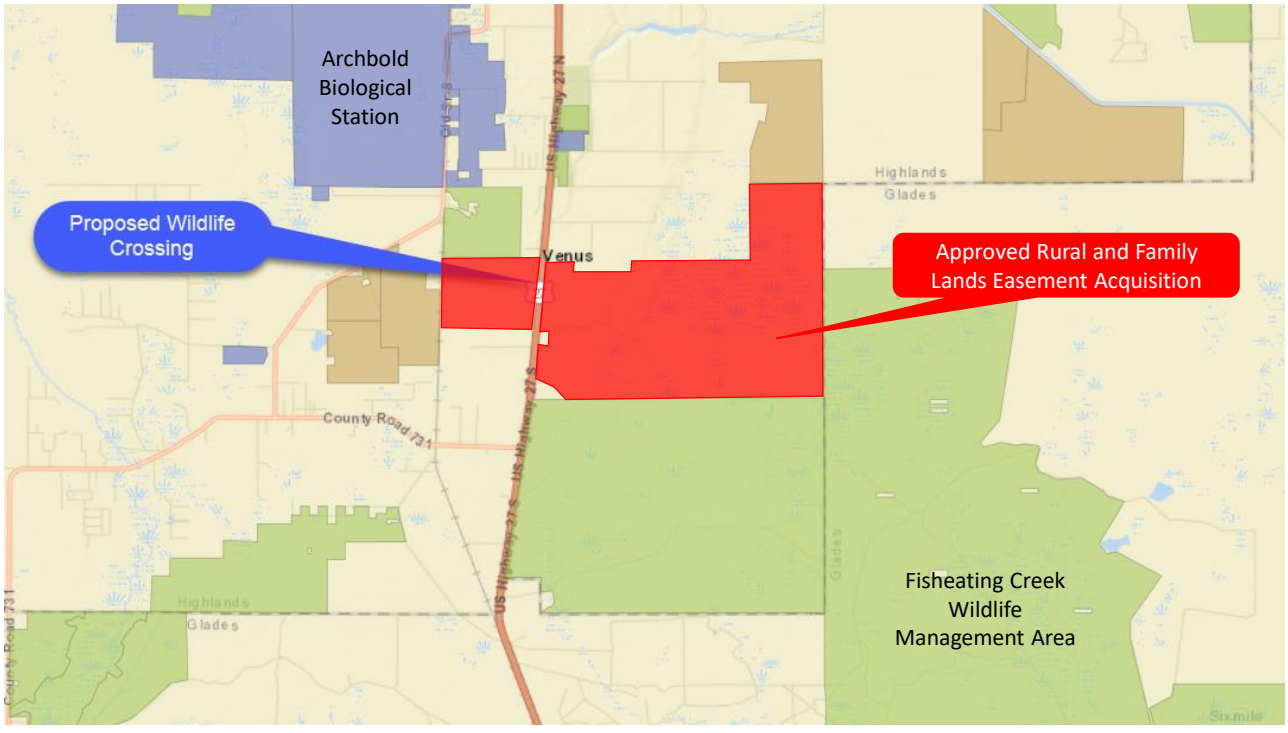
Won WCPP Grant AWARD!!



50


Bar gates proposed at the mouth to prevent cattle from accessing
"Skylights" included in median
Bar gates proposed at the mouth to prevent cattle from accessing
SR 25 (US 27)
CONST. WILDLIFE FENCE
CONST. 10' SHOULDER (5' PAVED)
CONST. 8' SHOULDER (4' PAVED)
CONST. SPECIAL DITCH LT.
CONST. SPECIAL DITCH RT.
CONST. 210 LF OF DBL 36" PIPE
346+31.40 WILDLIFE CROSSING
CONST. 16'X7' CONC. BOX CULVERT
SEE STRUCTURES PLANS FOR DETAILS
REMOVE EXIST. 36" PIPES AND ENDWALLS
OTHER SURFACE WATER #4 (OSW-4) - DITCH
(2X) 2" HDPE BFOC/TO REMAIN CENTURYLINK
CENTURYLINK/BY OTHERS
BFOC/TO BE ADJ.
BT/TO REMAIN CENTURYLINK
SEE SPECIAL DETAILS
OSW-8 IMPACT AREA 0.23 AC
R/W LINE
346
347
348
349
350
℄ SURVEY SR 25

51


Archbold Biological Station
Proposed Wildlife Crossing
Approved Rural and Family Lands Easement Acquisition
Fisheating Creek Wildlife Management Area
Venus
Highlands Glades
County Road 731
US Highway 27 N
US Highway 27 S
Six mile

52

US 27 Venus Wildlife Crossing (West side)

TRANSPORTATION SYMPOSIUM

US 27 Venus Wildlife Crossing (East side)

TRANSPORTATION SYMPOSIUM

US 27 Venus Wildlife Crossing

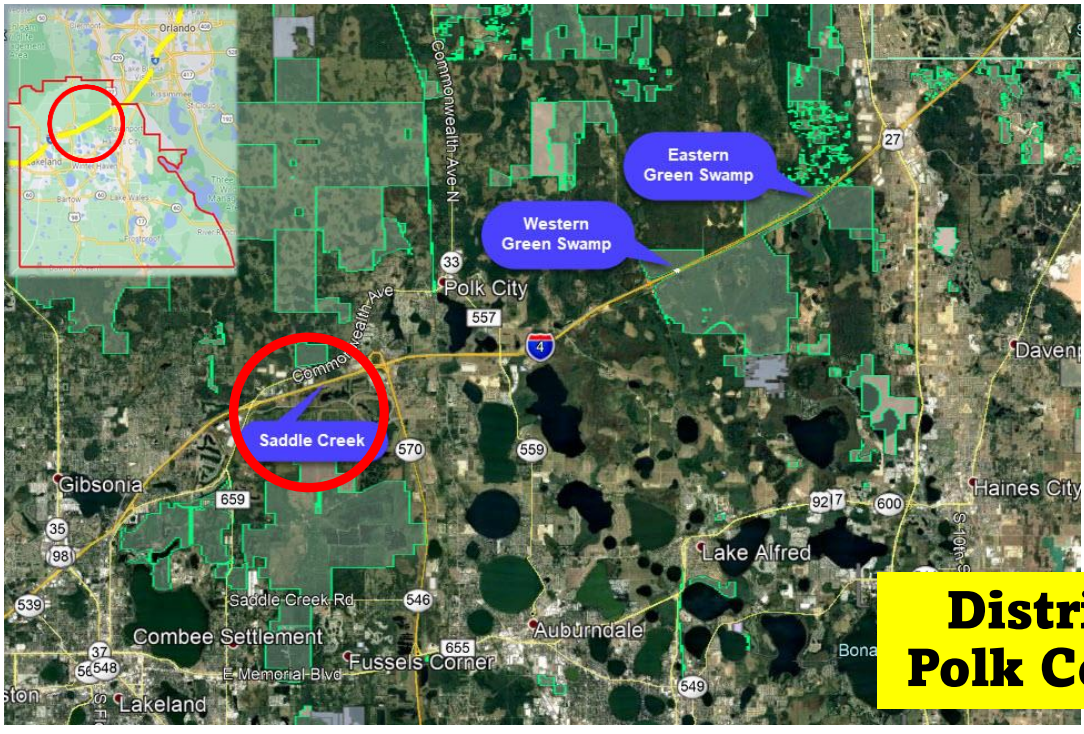
9/28/2025

Within 0.5 miles of proposed wildlife crossing

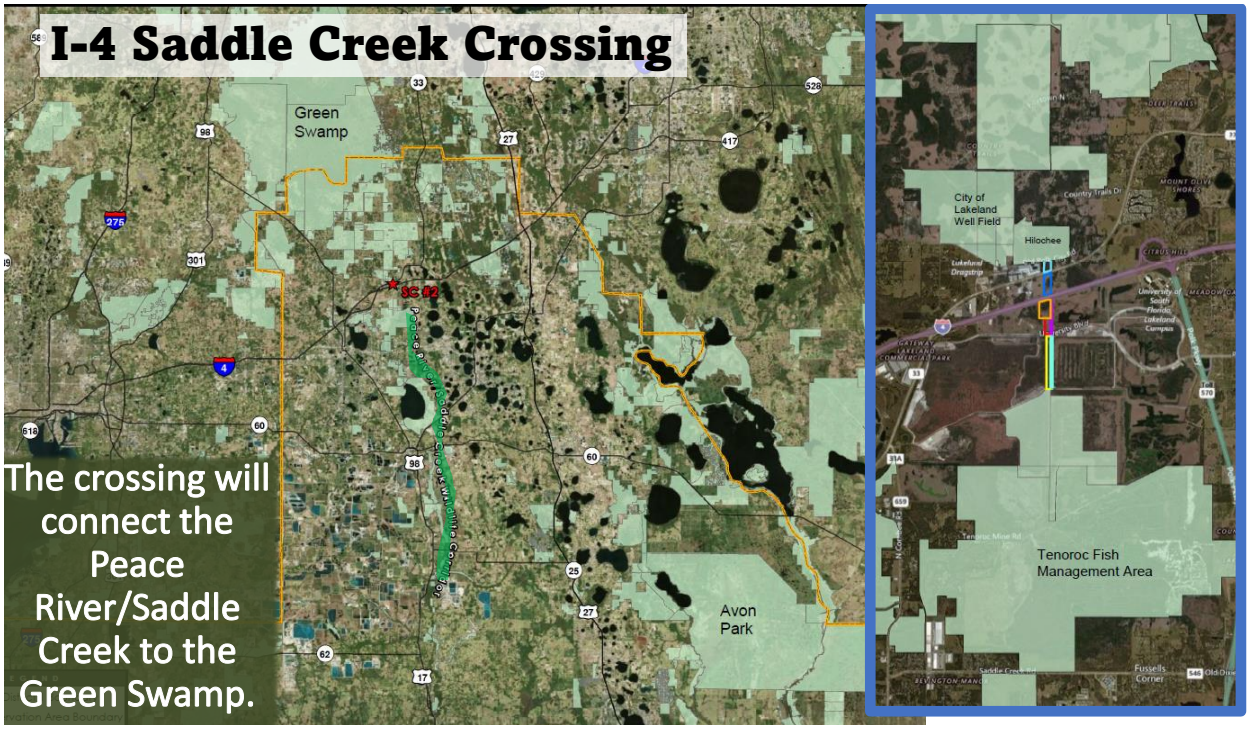
TRANSPORTATION SYMPOSIUM

55

55



56



57

Florida Department of TRANSPORTATION

I-4 Overpass Wildlife Crossing

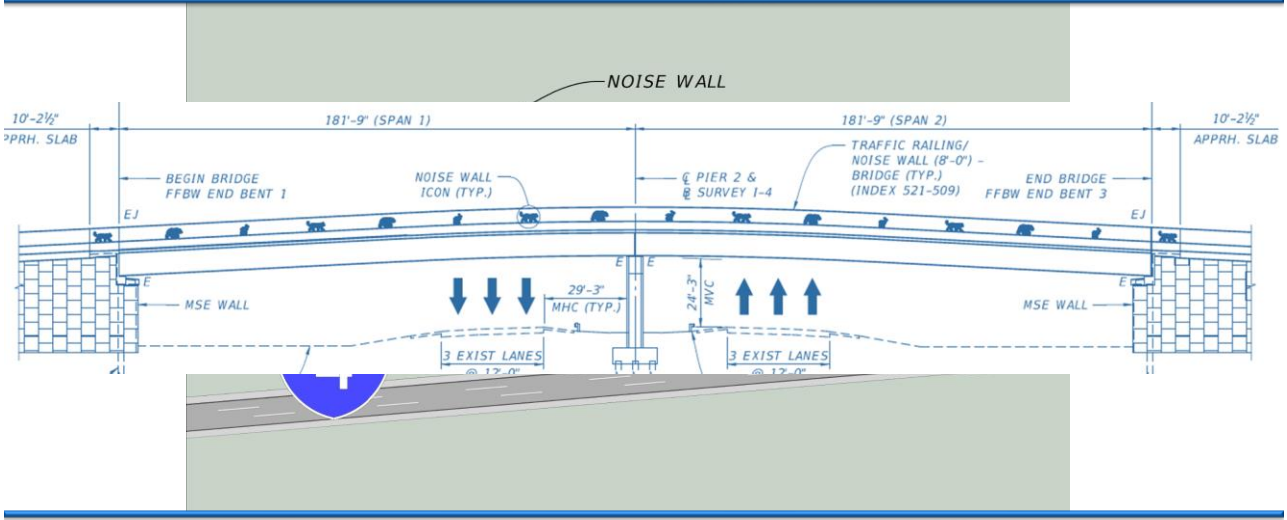
Project Layout

58

Florida Department of TRANSPORTATION

I-4 Overpass Wildlife Crossing

Typical Section At Bridge Crossing

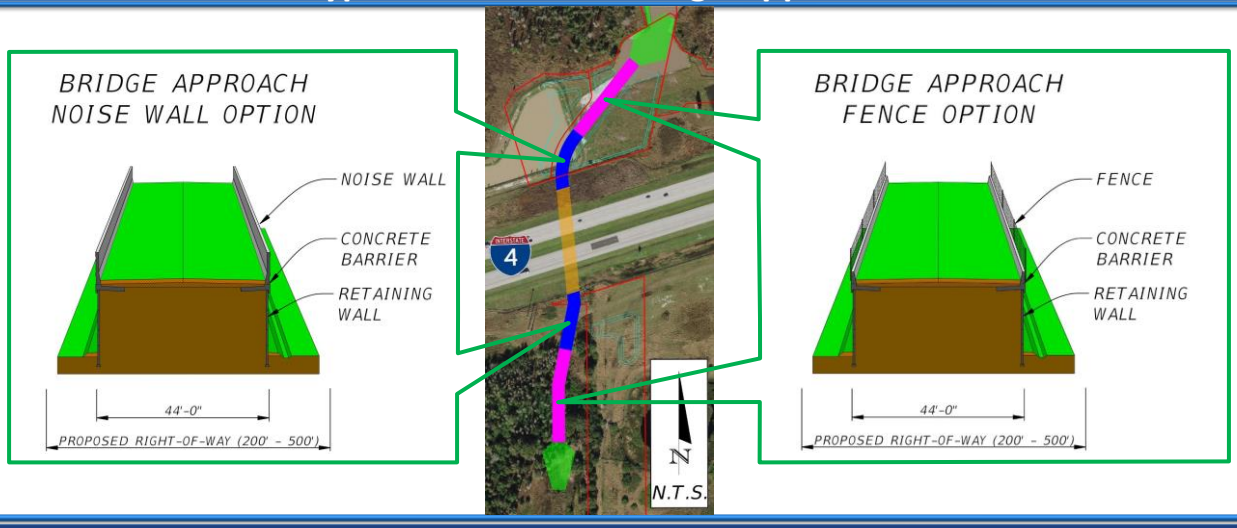


59

Florida Department of TRANSPORTATION

I-4 Overpass Wildlife Crossing

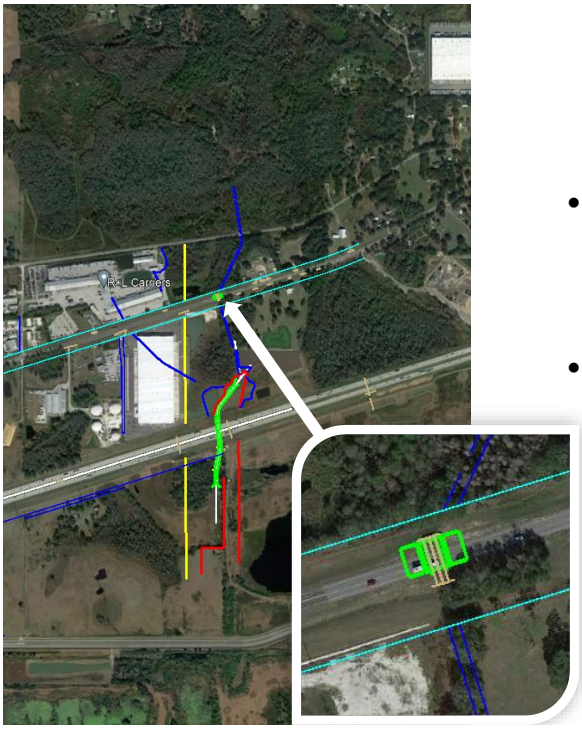
Typical Sections At Bridge Approaches



60

I-4 Wildlife Crossing Overpass (Under Construction)

61

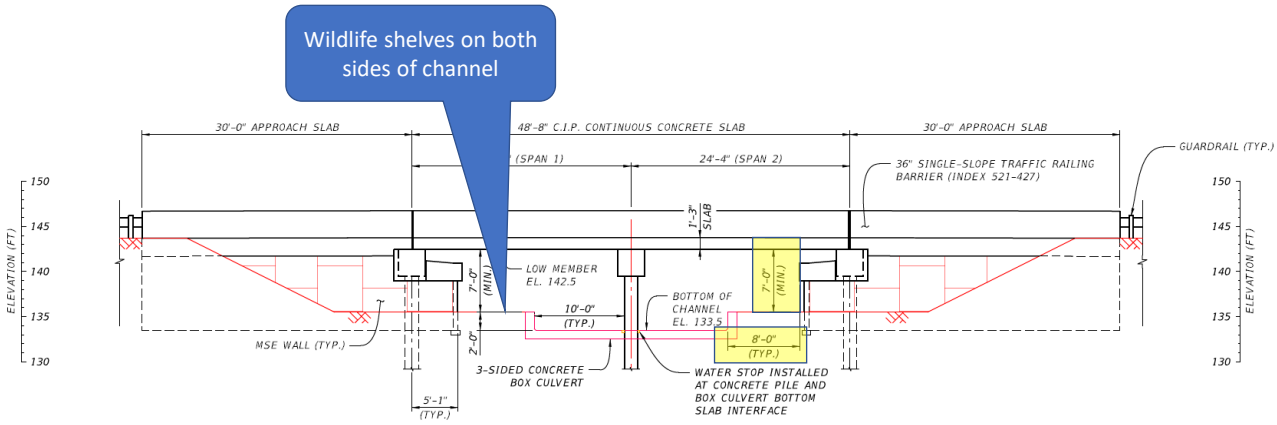


SR 33 Saddle Creek Crossing

- An underpass crossing is also proposed under SR 33 which parallels I-4 immediately to the north.
- Other local roadways (currently with low traffic volumes) inhibiting wildlife movement will need to be monitored for future retrofits.

62

SR 33 Saddle Creek Crossing



63

SR 33 Wildlife Crossing

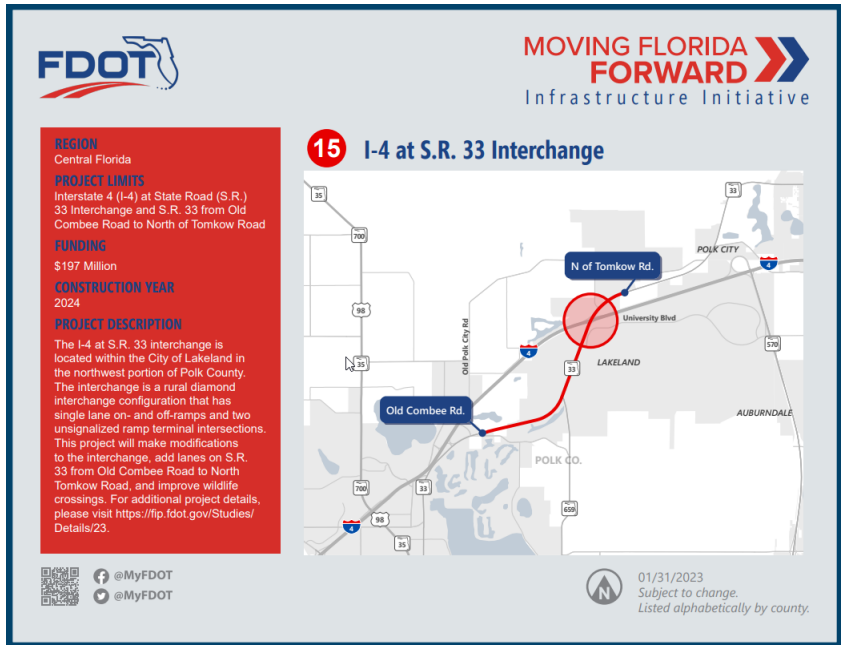
TRANSPORTATION SYMPOSIUM

64

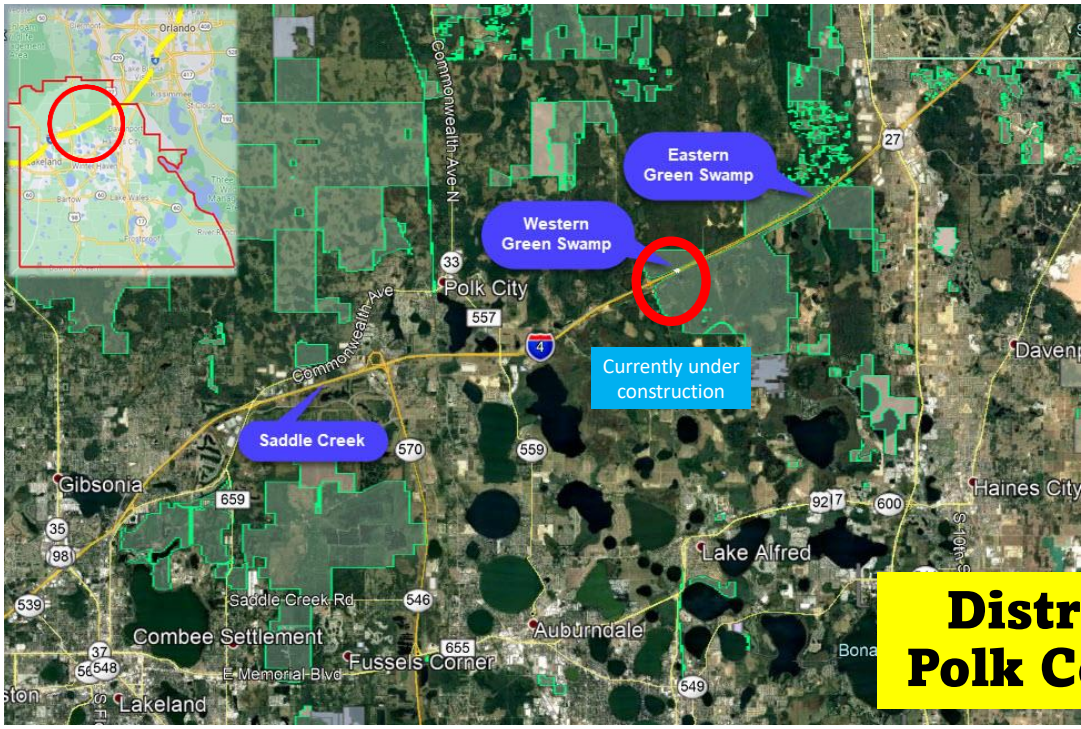
64

I-4 Wildlife Crossings Moving Florida Forward

- Includes I-4 overpass (201214-8) and SR 33 underpass (430185-7)
- Construction Cost:
- SR 33 = $8.9 million
- I-4 = $18.0 million
- Let to construction August 2024
- Construction started 1/6/2025

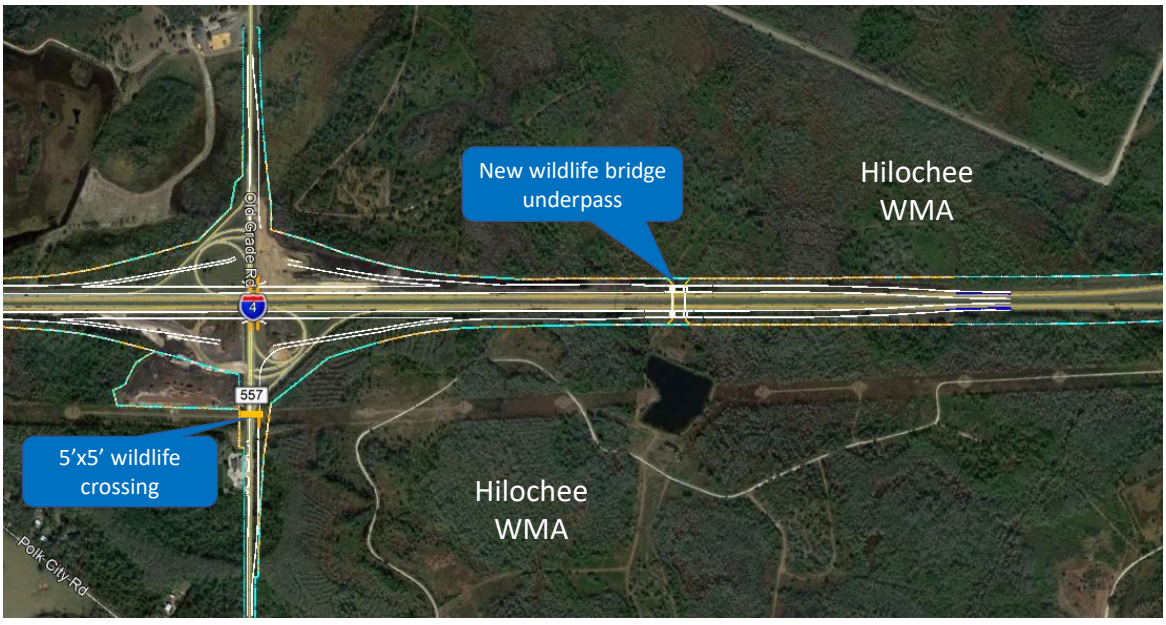


65



66

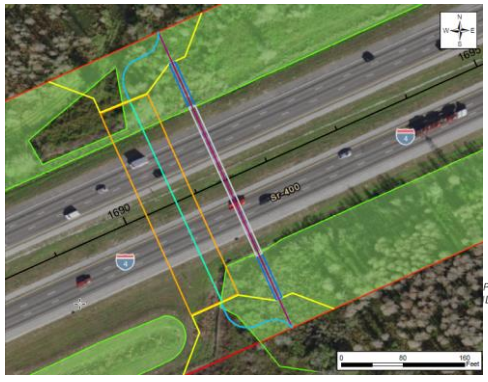
I-4 Western Green Swamp near SR 557

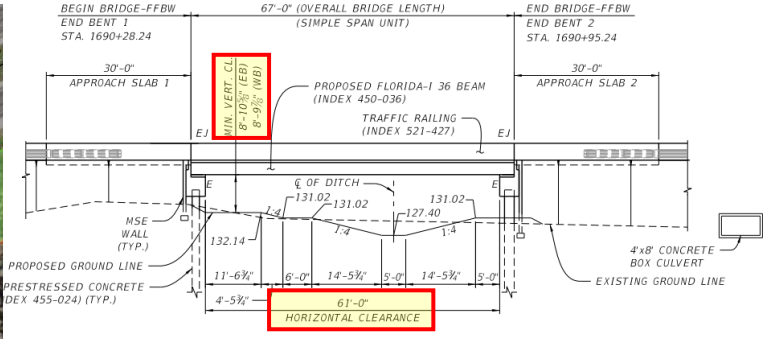


67

I-4 Western Green Swamp Crossing

- The Design-Build contractor selected a design which extended an existing box culvert and provides a separate wildlife crossing bridge structure.





68

69

70


29.79 inHg
77°F
09/23/2024 11:16PM FSTOPSH260

71


Racoon
Alligator

72

73

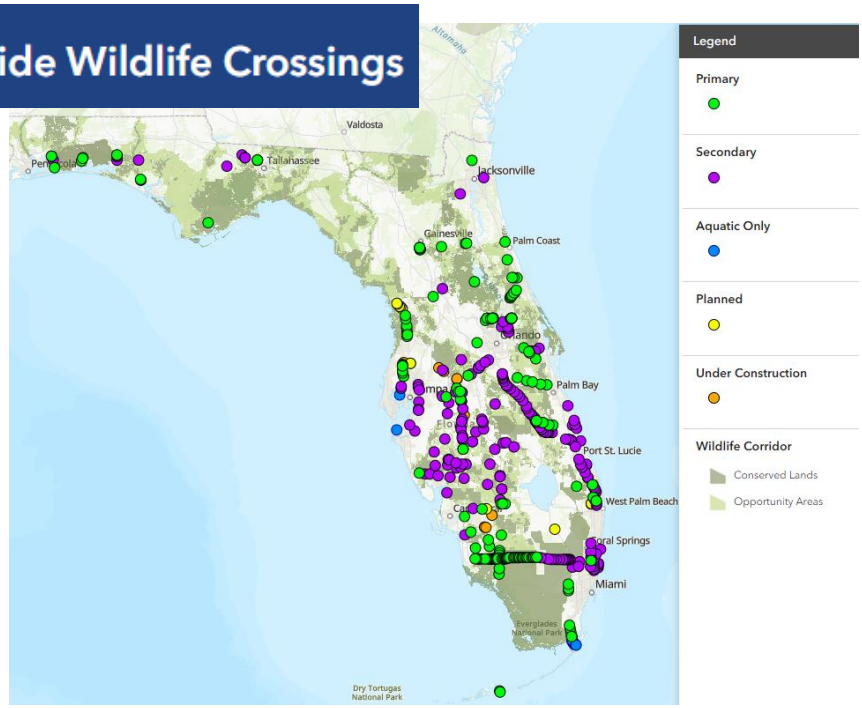
Resiliency & Wildlife Connectivity

- Bridges vs Culverts
  - Bridges offer better resiliency due to 2’ drift clearance requirement
    - Also provides better vertical clearance for wildlife
  - Trapezoidal bridge openings provide wider cross section as stages rise.
    - Provides larger openness ratio for wildlife
  - Wildlife shelves can be incorporated into bridge designs

74

Statewide Wildlife Crossings

[Statewide Wildlife Crossing GIS]



75

76