

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
TECHNICAL REPORT COVERSHEET

PRELIMINARY ENGINEERING REPORT

Florida Department of Transportation District 6



**Ludlam Trail Corridor Project Development & Environment (PD&E)
Study**

From SW 80th Street to 400 feet north of NW 7th Street, between 69th and 70th Avenues
Miami-Dade County, Florida

Financial Management Number: 444236-1-22-01
ETDM Number: 14369

July 2021

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 December 14, 2016 and executed by FHWA and FDOT.

PROFESSIONAL ENGINEER CERTIFICATION

PRELIMINARY ENGINEERING REPORT

Project: Ludlam Trail Corridor from SW 80th Street to 400 feet North of NW 7th Street, between 69th and 70th Avenues

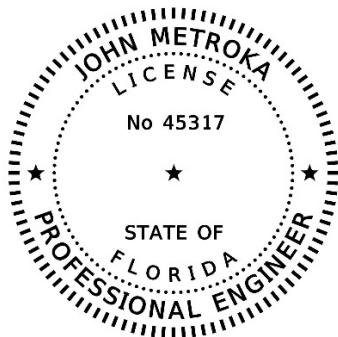
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Federal Aid Project Number: N/A

This preliminary engineering report contains engineering information that fulfills the purpose and need for the Ludlam Trail Corridor Project Development & Environment Study from SW 80th Street to 400 feet north of NW 7th Street, between 69th and 70th Avenues, in Miami-Dade County, Florida. 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 as applied through professional judgment and experience.

I hereby certify that I am a registered professional engineer in the State of Florida practicing with AECOM Technical Services, Inc., and that I have prepared or approved the evaluation, findings, opinions, conclusions, or technical advice for this project.



This item has been digitally signed and sealed by John Metroka, P.E. on the date adjacent to the seal.

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ACRONYMS AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
AASHTO	Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
APE	Area of Potential Effect
ASTM	American Society of Testing and Materials
AQTM	Air Quality Technical Memorandum
BEBR	Bureau of Economic and Business Research
BIR	Bridge Inspection Report
BLRR	Bridge Load Rating Report
BPAC	Bicycle and Pedestrian Advisory Committee
CARS	Crash Analysis Reporting System
CDMP	Comprehensive Development Master Plan
CFR	Code of Federal Regulations
CRAS	Cultural Resources Assessment Survey
CSER	Contamination Screening Evaluation Report
CSX	Seaboard Air Line Railroad
DERM	Division of Environmental Resources Management
DOA	Determination of Applicability
DRER	Department of Regulatory and Economic Resources
DTPW	Department of Transportation and Public Works
ECP	Engineering Control Plan
EFH	Essential Fish Habitat
EO	Executive Order
ESA	Endangered Species Act
EST	Environmental Screening Tool
ETDM	Efficient Transportation Decision Making
FAC	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDM	Florida Department of Transportation Design Manual
FDOT	Florida Department of Transportation
FEC	Florida East Coast
FFPC	Florida Fire Prevention Code
FGT	Florida Gas Transmission
FGTS	Florida Greenways and Trails System
FHWA	Federal Highway Administration
FLUCFCS	Florida Land Use, Cover and Forms Classification System
FMSF	Florida Master Site File
FOC	Fiber Optic Cable
FPL	Florida Power and Light
FS	Florida Statutes
FWC	Florida Fish and Wildlife Conservation Commission
FY	Fiscal Year
HAER	Historic American Engineering Record
ISD	Internal Services Department

LAP	Local Agency Program
LEP	Limited English Proficiency
LRE	Long-Range Estimate
L RTP	Long Range Transportation Plan
MDAD	Miami-Dade Aviation Department
MDC	Miami-Dade County
MDPROS	Miami-Dade County Parks, Recreation and Open Spaces
M-D WASD	Miami-Dade Water and Sewer Department
MUTCD	Manual on Uniform Traffic Control Devices
MOA	Memorandum of Agreement
MOT	Maintenance of Traffic
MPO	Metropolitan Planning Organization
NAAQS	National Ambient Air Quality Standards
NBI	National Bridge Inventory
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRE	Natural Resource Evaluation
NRHP	National Register of Historic Places
OEM	Office of Environmental Management
OGT	Office of Greenways and Trails
OSMP	Open Space Master Plan
PD&E	Project Development and Environment
PIM	Public Information Meeting
PLEMO	Planning and Environmental Management Office
ROW	Right-of-Way
SCE	Sociocultural Effects
SERPM	Southeast Regional Planning Model
SFWMD	South Florida Water Management District
SHPO	State Historic Preservation Office
SHH	State Historic Highway
SHS	State Highway System
SMART	Strategic Miami Area Rapid Transit
SSA	Sole Source Aquifer
STB	Surface Transportation Board
STIP	State Transportation Improvement Program
SUN	Shared-Use Nonmotorized
SW-	Surface Water
SWEPT	State-Wide Environmental Project Tracker
TARC	Transportation Aesthetics Review Committee
TIP	Transportation Improvement Program
TOD	Transit Oriented Development
TPC	Transportation Planning Council
TPO	Transportation Planning Organization

UAO	Utility Agency/Owner
UAP	Utility Assessment Package
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
USFWS	US Fish and Wildlife Service
vpd	Vehicles per Day
WQIE	Water Quality Impact Evaluation

1.0 PROJECT SUMMARY

1.1 Project Description

Miami-Dade Parks, Recreation and Open Spaces (MDPROS) is proposing to develop a 5.6-mile multi-use trail within a former railroad corridor (i.e., the Ludlam Trail Corridor, or the proposed project). As a priority paved land trail from the Florida Greenways and Trails System (FGTS) Priority Network and Shared-Use Nonmotorized (SUN) Trail Network, the proposed publicly accessible transportation corridor will serve bicyclists, pedestrians, and users of other types of non-motorized vehicles. In addition, the proposed project is anticipated to provide a safe, dedicated, and direct means of non-motorized transportation to and from areas of residences, transit, work, schools, parks, and shopping centers.

The proposed project limits extend along a segment of the former rail corridor from SW 80th Street to 400 feet north of NW 7th Street, between 69th and 70th Avenue (**Figure 1-1**). The project primarily occurs within the former railroad right-of-way (ROW) with the exception of proposed improvements at road and street crossings. The ROW for the proposed Ludlam Trail Corridor is approximately 100 feet wide for most of its length, although it narrows to between 75 and 80 feet in some areas and down to 18 feet in easement sections designated for mixed-use development. The project study area traverses sections of the City of Miami and unincorporated Miami-Dade County (MDC). The project is adjacent to the City of South Miami and proximate to the City of West Miami. The Ludlam Trail Corridor project location map is shown in **Figure 1-1**.

The proposed improvements generally consist of a 12-foot-wide, two-way, asphalt bike path, separated by a landscaped buffer from an 8-foot-wide concrete pedestrian path which has a 2-foot-wide soft natural jogging surface adjacent to it. The proposed trail will have 11 at-grade crossings, four grade-separated bridge crossings (at SR 976/SW 40th Street/Bird Road; SW 24th Street/Coral Way; US 41/SR 90/SW 8th Street/Tamiami Trail/Calle Ocho; and SR 968/W Flagler Street), and cross two existing South Florida Water Management District (SFWMD) canals (C-3/Coral Gables Canal and C-4/Tamiami Canal).

SECTION 1 – PROJECT SUMMARY

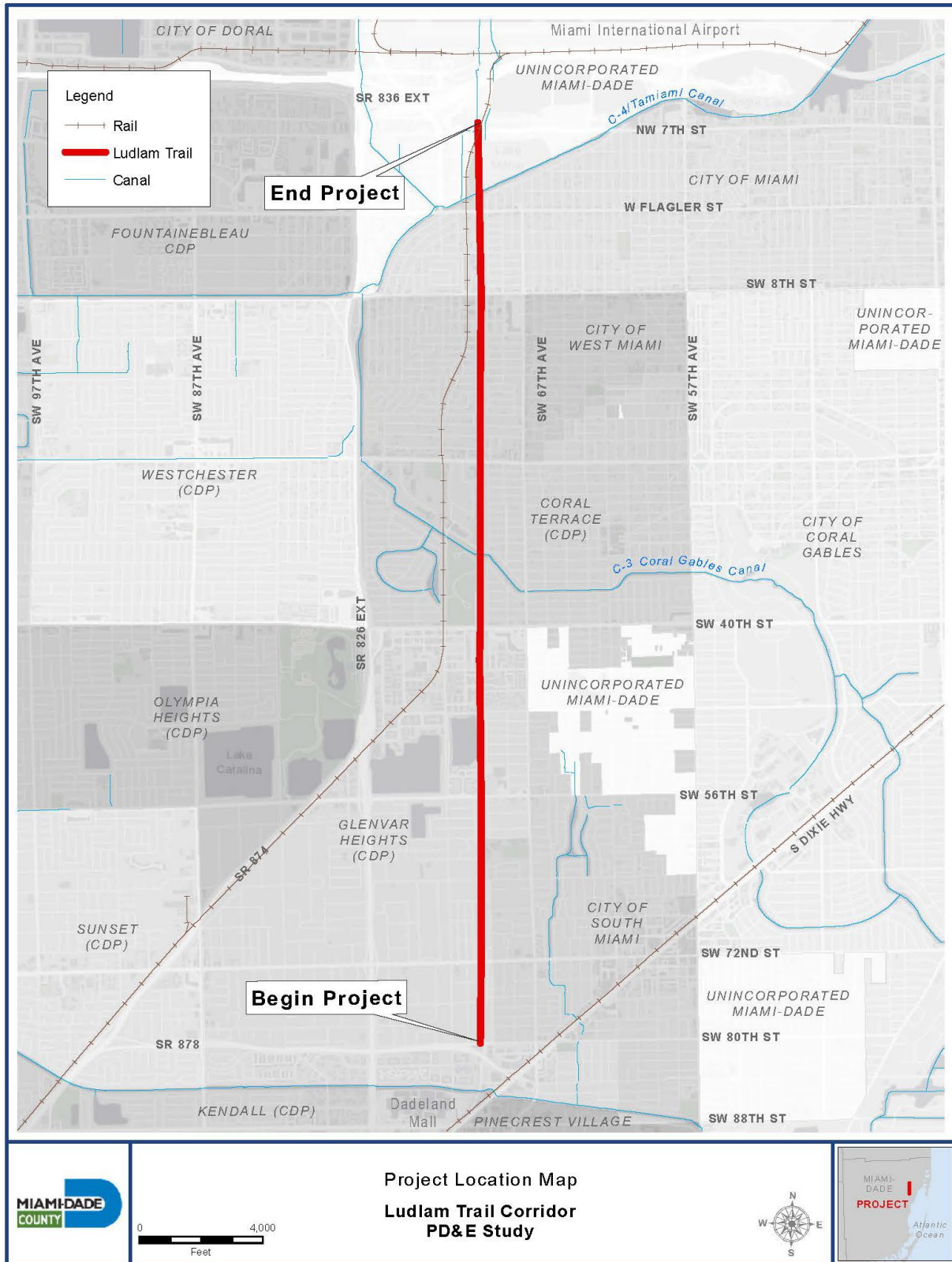


Figure 1-1 Project Location Map

Project Background

In December 2018, MDPROS acquired the land formerly used as a railroad corridor with Advanced Acquisition approval from the Florida Department of Transportation (FDOT). Approximately one mile of the northernmost section of the corridor has an Interim Trail Use designation by the United States Surface Transportation Board (STB) and, although the rails have been removed, this section of the corridor could be re-activated for railroad use in the future. The remaining approximate five-mile portion of the corridor has been fully abandoned from railroad use by the STB since 2006. A "Miami-Dade County Trail Benefits Study" was completed in 2011 (see **Appendix A**). MDPROS will develop the Ludlam Trail Corridor for public use, as a shared-use trail for non-motorized use. MDC intends to utilize a variety of funding sources (e.g., federal, state, local) for the project through Local Agency Program (LAP) agreements.

Consistent with the MDC Comprehensive Development Master Plan (CDMP) (2018)¹ and zoning approvals, certain parcels have been retained for mixed-use development along the proposed Ludlam Trail Corridor. The locations of these three development zones are: the north/south sides of SW 40th Street/Bird Road/SR 979; SW 24th Street/Coral Way/SR 972; and from SW 8th Street/Tamiami Trail/Calle Ocho/SR 90/US 41 to SW 12th Street. MDC acquired an 18-foot wide perpetual easement through the proposed development zones for continuity of the Ludlam Trail.

1.2 Purpose and Need

The purpose of the proposed Ludlam Trail Corridor Project is to encourage the use of alternate modes of transportation and enhance overall connectivity and accessibility to schools, parks, transit stations, and bus stops for more than 30,500 residents present within two miles of the proposed project corridor. The need for the proposed project is based on the criteria identified below.

1.2.1 Area Wide Network/System Linkage

The proposed project supports the vision of the MDPROS Open Space Master Plan (OSMP), a primary element of which is to “provide an interconnected trail system which offers transportation alternatives and reduces traffic congestion.” The OSMP provides a 50-year unifying vision for a livable and sustainable

1 Miami-Dade County Department of Regulatory and Economic Resources, 2018. Adopted Components Comprehensive Development Master Plan for Miami-Dade County, Florida. As adopted October 2, 2013 and as amended through February 28, 2018.

MDC, which involves the development of a seamless system of greenways, trails, and water trails. The Ludlam Trail will be a vital component of this network as it will link open spaces and civic institutions to neighborhoods, while offering a reliable transportation alternative. From a regional perspective, the proposed project will connect to the Metrorail Dadeland North Station via existing sidewalks along SW 70th Avenue from SW 80th Street to SW 85th Street; the proposed Strategic Miami Area Rapid Transit (SMART) Plan Corridor #2 (East-West Corridor) near NW 7th Street to the north; and to other planned trails including The Underline/East Coast Greenway, South Dade Trail, Snapper Creek Trail, East/West Trail, and Merrick Trail.

1.2.2 Social and Economic Demand

According to the *Miami-Dade County Trail Benefits Study – Ludlam Trail Case Study (2011)*,² development of the Ludlam Trail Corridor will improve public mobility for walking and biking to schools, parks, and transit stations, resulting in a reduction of daily vehicle trips in the project vicinity (see **Appendix A**). By providing additional non-motorized transportation options, fewer vehicles will likely travel on the surrounding roadway network, which will help to reduce traffic congestion on major arterials in the area. Furthermore, the proposed project will enhance mobility and strengthen connections to neighboring communities, providing increased opportunities for economic development as well as recreational opportunities.

1.3 Project Screening

FDOT uses the Efficient Transportation Decision Making (ETDM) process to obtain input from resource agencies and the public for projects are screened through the Environmental Screening Tool (EST). The screening events are known as Planning and Programming Screens. The EST brings together information about a project and provides analytical and visualization tools that help synthesize and communicate that information. Ludlam Trail has been screened through the ETDM Process (ETDM Project #14369) and the ETDM Summary Report (published July 2, 2019), including agency comments, is provided in **Appendix B**.

² Miami-Dade County Parks and Recreation Department, 2011. Miami-Dade County Trail Benefits Study, Ludlam Trail Case Study. Prepared by AECOM. January 2011.

1.4 Commitments

1. MDPROS is committed to coordinating with the Division of Environmental Resources Management (DERM) and Florida Department of Agriculture and Consumer Services (FDACS) during final design and construction to ensure the protection of the pine rockland community located within A.D. "Doug" Barnes Park.
2. Consistent with the recommendation by US Fish and Wildlife Service (USFWS) provided in the ETDM Summary Report, MDPROS will, to the maximum extent practicable, use native wildflowers, bushes, and trees in the landscaping of the trail to benefit fish and wildlife resources (including pollinators such as butterflies and bees).
3. MDPROS is committed to re-surveying for the Florida bonneted bat during final design, prior to construction activities. All surveys will be conducted in accordance with the most current USFWS survey guidelines, currently entitled Florida Bonneted Bat Consultation Guidelines, dated October 2019. If any signs of the Florida bonneted bat are observed, MDPROS is committed to reinitiating coordination through FDOT with the USFWS and consultation, as necessary.
4. MDPROS will incorporate the USFWS's most current protection guidelines for the eastern indigo snake, currently entitled Standard Protection Protocols for the Eastern Indigo Snake, into the final project design and will require that the construction contractor abide to the guidelines during construction.
5. During the construction phase of this project, MDPROS and their selected contractor will adhere to the Florida Fish and Wildlife Conservation Commission's (FWC) Standard Manatee Conditions for In-Water Work, 2011.
6. Should protected plant species be identified within the project impact area during the design and permitting phase, MDPROS is committed to reinitiating coordination through FDOT with DERM and FDACS, and/or other agencies as appropriate, to allow for relocation to adjacent habitats or other suitable protected lands prior to construction.
7. During the construction phase of this project, MDPROS and their selected contractor will adhere to the Florida stormwater management program per the Water Resources Implementation Rule (Chapter 62-40.431 FAC) and implement best management practices to avoid, where possible, and otherwise minimize adverse impacts to surface waters and water quality within the project limits.

1.5 Planning Consistency

The Ludlam Trail Corridor District was adopted as part of the Miami-Dade CDMP in 2017, establishing the trail as a district of countywide significance to enhance regional mobility, provide opportunities for

physical activity, and stimulate the economic vitality of the area. The former railway corridor is anticipated to be a publicly accessible, pedestrian and bicycle trail with certain nodes of responsible development that is sensitive and compatible to the adjacent areas. Furthermore, the project supports the vision of the MDPROS Parks and Open Space System Master Plan, which is to *“provide an interconnected trail system which offers transportation alternatives and reduces traffic congestion, creates new recreation opportunities, increases property values, protects natural resources, and encourages tourism and business development”*.

The project is identified in the Fiscal Year (FY) 2022-2026 FDOT Five Year Work Program and the State Transportation Improvement Program (STIP) with approximately \$9M for Preliminary Engineering and Final Design (2021-2025). Approximately \$11M has been used for Corridor Acquisition/ROW and approximately \$8M has been identified for Construction (2023-2024). The project is also included in the FY 2022-2026 Miami-Dade Transportation Planning Organization (TPO) Transportation Improvement Program (TIP) and the Miami-Dade TPO 2045 Long Range Transportation Plan (LRTP), pages 07-72 to 73.

The funding amounts noted in the STIP and TIP are generally consistent with each other. During future project phases, coordination between FDOT, MDC, and the Miami-Dade TPO will ensure required project funding is consistently identified in the TIP, LRTP, STIP, and Work Program.

1.6 Description of the Preferred Alternative

The Preferred Alternative for the Ludlam Trail is the Build Alternative which will consist of a 10-to-12-foot-wide bike path and a 5.5-to-10-foot-wide pedestrian path with an adjacent 2-foot wide soft natural surface path, separated in areas by a landscape buffer from 0 feet up to 14 feet wide. Generally, the paths will run along the center of the trail ROW. The Ludlam Trail will provide access to activity centers (i.e., schools, parks, and transit centers) via 10-foot-wide multi-use paths that can accommodate bicyclists and pedestrians. Connections to neighborhoods and parking facilities will be also be provided via 10-foot wide multi-use paths. The vertical profile of the proposed trail is close to the existing, flat, former railroad corridor profile, except at the four proposed grade-separated bridges (where it does not exceed Americans with Disabilities Act (ADA) criteria with a maximum of 5% grades).

Selection of the Preferred Alternative will occur after the Public Hearing and public comment period. A series of context maps showing the Preferred Alternative for Ludlam Trail in relation to area roadways, communities, parks, schools, transit, and development, as well as an overview of the trail crossings (at-grade, above-grade, and canal bridges) is provided in **Appendix C**. Concept plans of the Preferred Alternative for Ludlam Trail are included in **Appendix D**.

1.7 List of Related PD&E Technical Documents

Public Involvement

- Public Involvement Plan (Jun 2020)
- State Historic Highway Technical Memorandum (Jul 2021)

Engineering

- Bridge Assessments (Nov 2018)
- ETDM Summary Report (Jul 2019)
- Ludlam Trail PD&E Traffic Study (Aug 2019)
- Preliminary 15% Concept Plans (Jul 2021)
- Preliminary Report of Subsurface Exploration and Geotechnical Engineering Evaluations (Oct 2018)
- Preliminary Stormwater Management Report (Jul 2021)
- Utility Assessment Package (UAP) (Jul 2021)

Environmental

- Air Quality Technical Memorandum (AQTM) (Apr 2021)
- Contamination Screening Evaluation Report (CSER) (Dec 2020)
- Cultural Resource Assessment Survey (CRAS) (Aug 2020)
- Natural Resource Evaluation (NRE) (Mar 2021)
- Section 4(f) Determination of Applicability (DOA) (2018)
- Section 4(f) Exception/Exemption Forms (May 2021)
- Sociocultural Effects (SCE) Evaluation Technical Memorandum (May 2021)
- Sole Source Aquifer (SSA) / Water Quality Impact Evaluation (WQIE) (May 2021)
- Type 2 Categorical Exclusion (Jul 2021)

2.0 EXISTING CONDITIONS

The methodology utilized for evaluating existing conditions at the Ludlam Trail Corridor consists of data gathered in the areas of (1) trail and roadway characteristics, (2) bridge characteristics, and (3) environmental characteristics. This includes the collection and review of data pertaining to the existing facility through review of existing documents, on-site inventories, and collection of pertinent data that would serve as a basis for evaluation. The existing horizontal alignment and vertical profile throughout the corridor is generally straight and flat, being a former railroad corridor.

The key existing environmental features of the project corridor include:

- historic resources which have been identified in the corridor that meet the eligibility criteria for inclusion in the National Register of Historic Places (NRHP), including the Florida East Coast (FEC) railway itself and both wooden railroad canal bridges;
- three parks (Section 4(f) resources) adjacent to or in the vicinity of the corridor: Robert King High Park (City of Miami), Palmer Park (City of South Miami), and A.D. Barnes Park (MDPROS);
- the (low) potential for West Indian manatee occurrence, a federally threatened species, in the two existing "other surface waters" (the C-3/Coral Gables Canal and the C-4/Tamiami Canal);
- contamination of soil and groundwater within the entire project corridor (a former railroad corridor); and
- the location of two state historic highways (SHH) within the project limits, at SR 986/SW 72nd Street/Sunset Drive and at US 41/SR 90/SW 8th Street/Tamiami Trail/Calle Ocho (see **Section 6.1.5** at the end of this report).

No archeological resources or jurisdictional wetlands were found in the existing corridor and a noise analysis for the proposed trail project is not required. The existing environmental characteristics of the corridor and their analyses are summarized in the companion Type 2 Categorical Exclusion environmental review document for this PD&E Study; and are also noted in **Section 6.2** at the end of this report.

2.1 Trail Characteristics

2.1.1 Bicycle and Pedestrian Facilities

The Ludlam Trail is part of the Greenways and Trails Network that will provide pedestrians and bicyclists with the connections to nature and parks, local business, schools, communities, the Metrobus system and the Metrorail. **Table 2-1** shows existing and proposed trails that will connect with the Ludlam Trail, now or in the future. These connections will create a favorable environment for the trail to be used as a transportation alternative.

Table 2-1 Greenways and Trails Network

Connecting Trails			
	Location	Existing Trail	Proposed Trail
South	Dadeland North Station	Underline/East Coast Greenway	Snapper Creek Trail Segment B
Middle	SW 117 Ave.	Bike Route 6	-
Middle	N Waterway Dr.	-	Merrick Trail
North	Robert King High Park	-	East-West Trail

Figure 2-1 shows the points of connection between the Ludlam Trail and the Trails Network proposed on the North Dade Greenways Master Plan, prepared by the Miami-Dade TPO.

Currently there are no existing bicycle facilities along the Ludlam Trail Corridor. There are no designated existing bicycle lanes on the crossing roadways within the project limits. See **Table 2-2** below for existing sidewalk and bike lane accommodations.

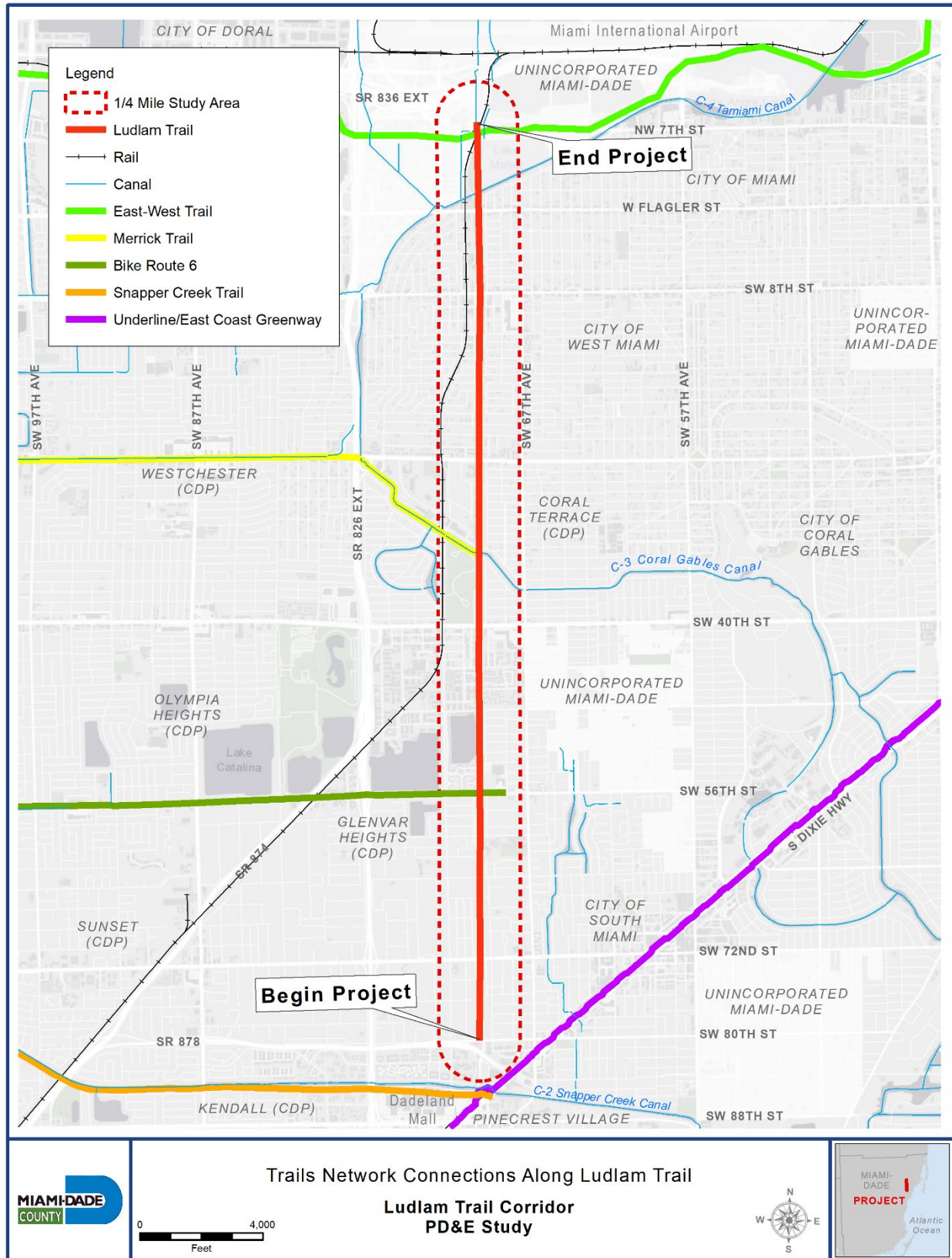


Figure 2-1 Trails Network Connections Along Ludlam Trail

Table 2-2 Existing Sidewalks and Bike Lanes Accommodations

Crossing Roadway		Sidewalks			Bike Lanes		
		Yes		No	Yes		No
		Eastbound	Westbound		Eastbound	Westbound	
1	SW 80th St.		x				x
2	SW 72nd St.	x	x				x
3	SW 64th St.			x			x
4	SW 60th St.			x			x
5	SW 56th St.	x	x				x
6	SW 40th St.	x	x				x
7	N Waterway Dr.			x			x
8	SW 24th St.	x	x				x
9	SW 22nd St.	x					x
10	SW 21st St.	x	x				x
11	SW 16th St.	x	x				x
12	SW 12th St.	x	x				x
13	SW 8th St.	x	x				x
14	SW 4th St.	x	x				x
15	W Flagler St.	x	x				x

2.1.2 Metrorail System and Transit Oriented Development (TOD)

The Ludlam Trail is envisioned to connect at the southern end with the Metrorail Dadeland North Station and the Motion at Dadeland TOD with existing sidewalks along SW 70th Avenue from SW 80th Street to SW 85th Street. The Ludlam Trail will provide an important link between the surrounding neighborhoods and the Metrorail System. The trail will provide enhanced mobility and connectivity to public transit such as the bus and Metrorail systems. Additionally, the trail will provide connectivity with the Underline which is part of the East Coast Greenway, which connects 15 states and 450 cities and towns for 3,000 miles from Maine to Florida.

2.1.3 Metrobus System

Table 2-3 shows a list of the roadways that intersect the Ludlam Trail and are part of the Metrobus System routes. The Ludlam Trail will provide an important link between the surrounding neighborhoods and the Metrobus System, benefitting overall mobility and providing connectivity to the public transit system.

Table 2-3 Crossing Roadways with Metrobus System

Metrobus System	
East-West Local - Stop Service	
Locations	Bus Route Numbers
SW 72nd St	72 / 72A
SW 56th St	56
SW 40th St	40 / 40B
SW 24th St	24
SW 8th St	8 / 8A
W Flagler St	7, 11, 51
North-South Local - Stop Service	
Location	Bus Route Number
W Flagler St	73

2.2 Existing Traffic Analysis

A traffic study was conducted as part of the Ludlam Trail PD&E Study to determine existing conditions which were analyzed using Synchro microsimulation software. The analysis was based on existing collected data with a seasonal factor applied. It was observed that all of the intersections are performing under acceptable operational conditions during existing conditions. The Traffic Study is included in **Appendix E** and was approved by the MDC Department of Transportation and Public Works (DTPW) in 2019.

The trail alignment crosses six major arterials with 2017 Annual Average Daily Traffic (AADT) counts of over 20,000 vehicles per day (vpd) as follows:

-	W Flagler Street/SR 968	43,000
-	SW 8 th Street/Calle Ocho/SR 90/US 41	52,500
-	SW 24 th Street/Coral Way	22,500
-	SW 40 th Street/Bird Road/SR 976	75,000
-	SW 56 th Street/Miller Drive	22,500
-	SW 72 nd Street/Sunset Drive/SR 986	40,500

Additional crossings include ten local or neighborhood streets with annual daily traffic counts of less than 20,000 vpd, as follows:

- NW 7th Street (located on an overpass above Ludlam Trail)
- SW 4th Street
- SW 12th Street
- SW 16th Street
- SW 21st Street
- SW 22nd Street
- North Waterway Drive
- SW 60th Street
- SW 64th Street
- SW 80th Street

According to the 2017 FDOT Florida Traffic Online data, the highest existing AADT recorded for crossing streets within the project limits, was 75,000 vpd at SW 40th Street/Bird Road/SR 976. Many of the crossing streets have posted speed limits in excess of 30 miles per hour (MPH) which are not ideal for pedestrian and bicycle safety. Appropriate signing and pavement markings at the trail crossings will be provided as a part of the project, to address pedestrian and bicycle safety.

There are 16 intersections under consideration within the area of influence along the proposed trail path. These intersections are listed below and shown on **Figure 2-2**:

1. NW 69th Avenue and W Flagler Street
2. Robert King High Park and W Flagler Street
3. SW 69th Avenue and SW 4th Street

4. SW 70th Avenue and SW 8th Street
5. SW 69th Avenue and SW 8th Street
6. SW 70th Avenue and SW 12th Street
7. SW 69th Avenue and SW 12th Street
8. SW 70th Avenue and SW 16th Street
9. Plaza Driveway, SW 24th Street
10. SW 69th Avenue and SW 24th Street
11. SW 70th Avenue and SW 40th Street
12. SW 69th Avenue and SW 40th Street
13. SW 69th Avenue and SW 56th Street
14. SW 69th Court and SW 56th Street
15. SW 69th Avenue and SW 72nd Street
16. SW 70th Avenue and SW 80th Street

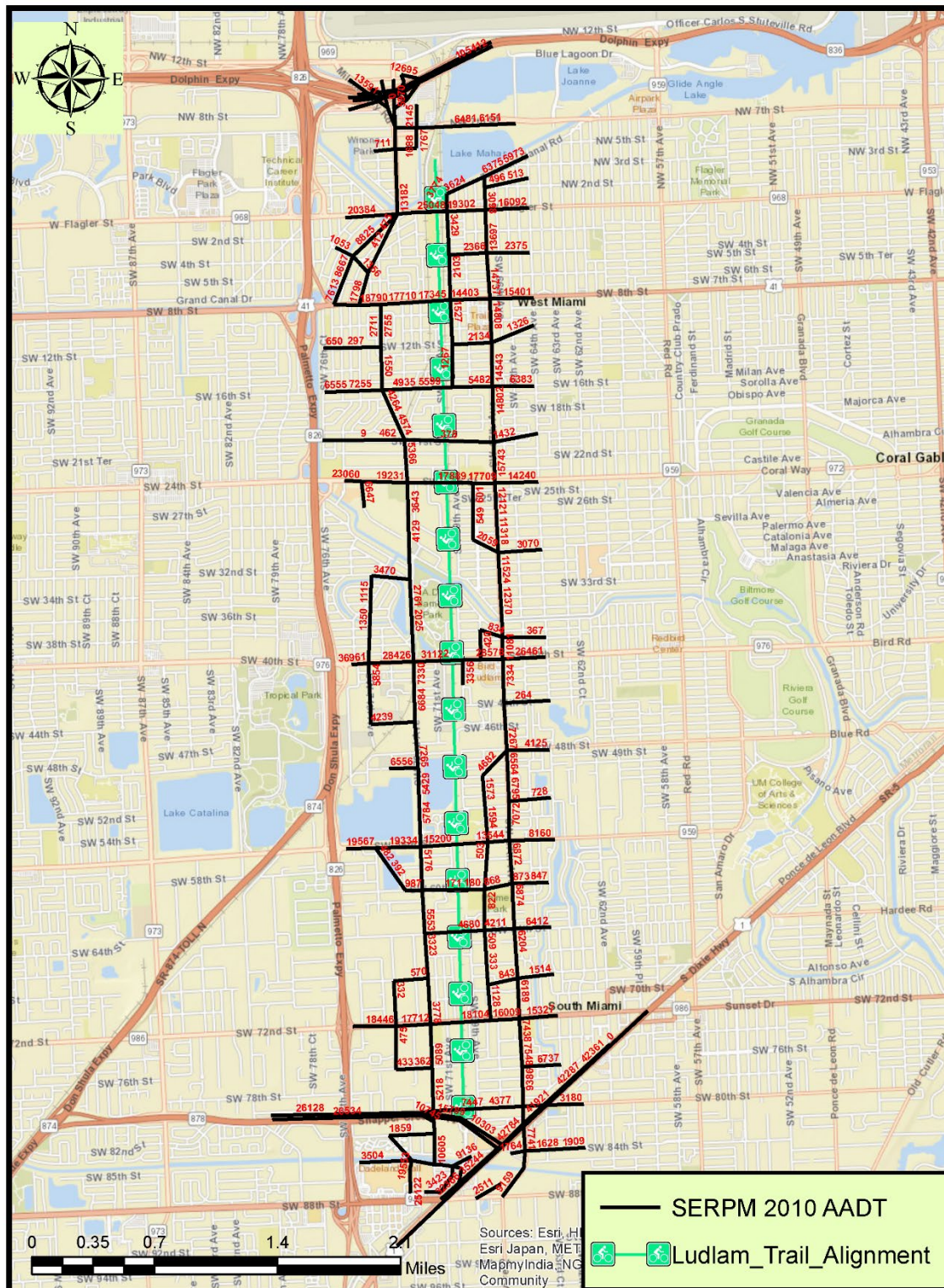


Figure 2-2 Estimated AADT (SERPM 2010) for Major Roads in the Vicinity of Trail

2.3 Right-Of-Way

MDC completed acquisition of the 5.6 mile Ludlam Trail project corridor via the Advanced Acquisition process with approval from FDOT in 2018. The proposed project limits extend along a segment of the former rail corridor from SW 80th Street to 400 feet north of NW 7th Street, between 69th and 70th Avenues (see **Appendix D**). The project occurs entirely within the Ludlam Trail ROW. The ROW for the proposed Ludlam Trail Corridor is approximately 100 feet wide for most of its length, although it narrows to between 75 or 80 feet in some areas. Further, at nine roadway locations, the ROW at the roadway crossing narrows to approximately 40 feet. These roadway locations are: SW 72nd Street/Sunset Drive/SR 986; SW 56th Street/Miller Drive; SW 40th Street/Bird Road/SR 976; SW 24th Street/Coral Way; SW 23rd Street; SW 22nd Street; SW 21st Street; SW 8th Street/Calle Ocho/Tamiami Trail/SR 90/US 41; and W Flagler Street/SR 968.

There are three private development nodes, or zones, along the trail corridor. The locations of the development zones are: the north/south sides of SW 40th Street/Bird Road/SR 976, SW 24th Street/Coral Way, and from SW 8th Street/Calle Ocho/Tamiami Trail/SR 90/US 41 to SW 12th Street. MDC has acquired an 18-foot wide perpetual easement through each of the development zones for continuity of the Ludlam Trail.

2.4 Adjacent Land Use

The proposed Ludlam Trail project is located within a highly developed area of MDC. The project area extends through sections of the City of Miami and unincorporated MDC, and is immediately adjacent to the City of South Miami and proximate to the City of West Miami. Adjacent lands along the former railway corridor are characterized by FDOT land use data as industrial, public/semi-public, recreational, residential, retail/office, vacant non-residential, and vacant residential. **Figure 2-3** shows the existing land use map.

The Florida Land Use, Cover and Forms Classification System (FLUCFCS) land use categories within the project include one upland classification and one surface water classification. USFWS's classification includes one surface water classification. **Table 2-4** lists the acreage and percentage of each land use category within the project.



Table 2-4 Existing Land Uses/Vegetative Cover

FLUCFCS Classification ⁽¹⁾		USFWS Classification ⁽²⁾	FLUCFCS Description	Preferred Alternative	
				Acres	Percent
Uplands, Transportation	810	N/A	Transportation	67.0	99.6%
Surface Water, Canals	512	R2UB2Hx	Upland-cut Canals	0.3	0.4%
Total Land Use/Vegetative Cover				67.3	100.0%

¹ FDOT, FLUCFCS (third edition), 1999.

² USFWS, Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al), 1979.

2.5 Access Management Classification

The roadways intersecting the Ludlam Trail were analyzed for compliance with FDOT's Access Management Classification System and Standards. The trail crosses 15 roadways of which four of them are part of the State Highway System (SHS) and are classified as Intrastate State Highway in the Transportation System. **Table 2-5** shows the list of roadways crossing the trail and their characteristics.

Table 2-5 Access Management Classification

Characteristics of Intersecting Roadways						
	Roadway	Control	Functional Classification	Posted Speed	Federal Designation	Access Management Classification
1	SW 72nd St.	State	Urban Minor Arterial	40	STP	5
2	SW 40th St.	State	Urban Principal Arterial	40	NHS	5
3	SW 8th St.	State	Urban Principal Arterial	45	NHS	7
4	W Flagler St.	State	Urban Minor Arterial	45	STP	7
5	SW 80th St.	MDC	Urban Major Collector	30	-	-
6	SW 64th St.	MDC	Urban Major Collector	30	-	-
7	SW 60th St.	MDC	No Data Available	30	-	-
8	SW 56th St.	MDC	Urban Minor Arterial	35	-	5*
9	N Waterway Dr.	MDC	No Data Available	30	-	-
10	SW 24th St.	MDC	Urban Minor Arterial	40	-	5*
11	SW 22nd St.	MDC	No Data Available	30	-	-
12	SW 21st St.	MDC	No Data Available	30	-	-
13	SW 16th St.	MDC	Urban Major Collector	30	-	-
14	SW 12th St.	MDC	No Data Available	30	-	-
15	SW 4th St.	City of Miami	No Data Available	30	-	-
Source: District 6 – Planning and Environmental Management Office and MDC GIS Services.						
MDC – Miami-Dade County						
STP – Surface Transportation Program						
NHS – National Highway System						
* Based on Field Observation						
- No Designation/Classification						

The minimum connection, median opening, and signal spacing for the six arterials that cross the Ludlam Trail are shown in **Table 2-6**.

Table 2-6 Arterial Access Classification and Standards

Rule 14-97 - Arterial Access Classification & Standards						
Access Class	Median Type	Connection Spacing (feet)		Median Opening Spacing (feet)		Signal Spacing (feet)
		>45 mph	≤45 mph	Directional	Full	
5	Restrictive	440	245	660	2640 > 45 mph 1320 ≤ 45 mph	
7	Both Median Types	125		330	660	1320
Notes:						
1. "Restrictive" physically prevent vehicle crossing.						
2. "Non-Restrictive" allow turns across at any point.						
3. Speeds shown in this table are posted Speeds.						

2.6 Crash Data and Safety Analysis

A five-year crash data analysis (from January 2012 to December 2016) using both the FDOT's Crash Analysis Reporting System (CARS) and Signal 4 Analytics databases, indicated that more 3,810 crashes were documented within the half-mile buffer around the proposed Ludlam Trail alignment (between NW 7th and SW 80th Streets), including five fatal crashes. In total, 51 pedestrian crashes were reported, which averages out to about one pedestrian crash each month over the five-year period (see **Appendix E**).

2.7 Drainage

The proposed Ludlam Trail Corridor is located within three SFWMD Drainage Basins:

- 1) From the Begin Project at SW 80th Street to SW 40th Street/Bird Road/SR 976 – within the C-2 Canal Basin
- 2) From SW 40th Street/Bird Road/SR 976 to SW 8th Street/Calle Ocho/Tamiami Trail/SR 90/US 41 – within the C-3 Coral Gables Basin
- 3) From SW 8th Street/Calle Ocho/Tamiami Trail/SR 90/US 41 to the End Project 400 feet north of NW 7th Street – within the C-4 Tamiami East Basin

There are two canals that the proposed trail will cross. The Coral Gables/C-3 Canal is located in the middle portion of the study area and the Tamiami Canal/C-4 is located in the north portion of the corridor near the End Project (see **Figure 1-1**).

There are currently no existing stormwater management systems within the Ludlam Trail Corridor. Stormwater runoff flows directly into the existing canals or onto adjacent green areas, where it eventually infiltrates into the ground.

The project is located within unincorporated MDC, within the jurisdictional boundaries of the SFWMD and Miami-Dade Regulatory and Economic Resources (DRER). SFWMD and DRER have established several criteria for water quality, depending on the proposed type of stormwater treatment facility. Currently, any treatment of runoff from the corridor is via overland flow and natural percolation to the surrounding areas. Existing soil infiltration rates range from good to excellent.

2.8 Soils and Geotechnical Data

A Geotechnical Study was completed in October 18, 2018 as part of the Ludlam Trail PD&E Study. The samples from the borings performed for the trail improvements were classified using the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System in general accordance with the American Society of Testing and Materials (ASTM) test designation D-3282, titled "Classification of Soils and Soils-Aggregate Mixtures for Highway Construction Purposes". Additionally, samples obtained for the canal crossings were classified using the Unified Soil Classification System (USCS) in general accordance with the ASTM test designation D-2488, titled "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)" and ASTM D-2487 titled "Standard Test Method for Classification of Soils for Engineering Purposes". The soil classification was based on visual observations with the aids of laboratory testing results, which consisted of grain-size analysis, percent passing the No. 200 sieve, natural moisture content, organic content, and Atterberg limits. The tests were performed on selected samples believed to be representative of the materials encountered. In addition, FDOT Environmental Classification testing was also performed on a select water samples obtained from test borings performed.

Based on the *United States Department of Agriculture (USDA) Web Soil Survey for Miami-Dade County*, the project area is comprised of three mapped soil units (**Figure 2-4**). Soil Maps and Geotechnical survey data can be found in the Preliminary Report of Subsurface Exploration and Geotechnical Engineering Evaluations in **Appendix F**.

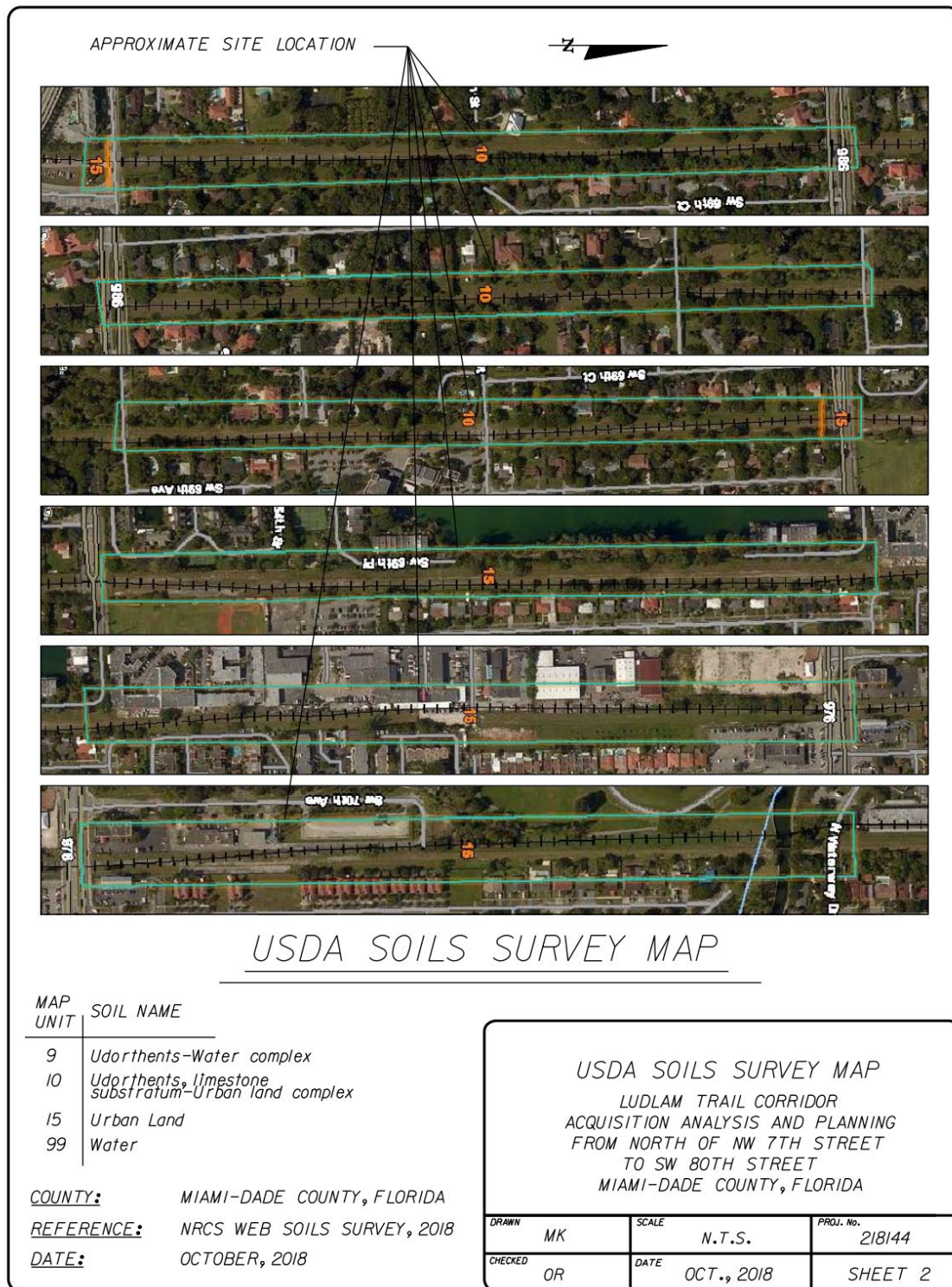


Figure 2-4 USDA Soils Survey Map (1 of 2)

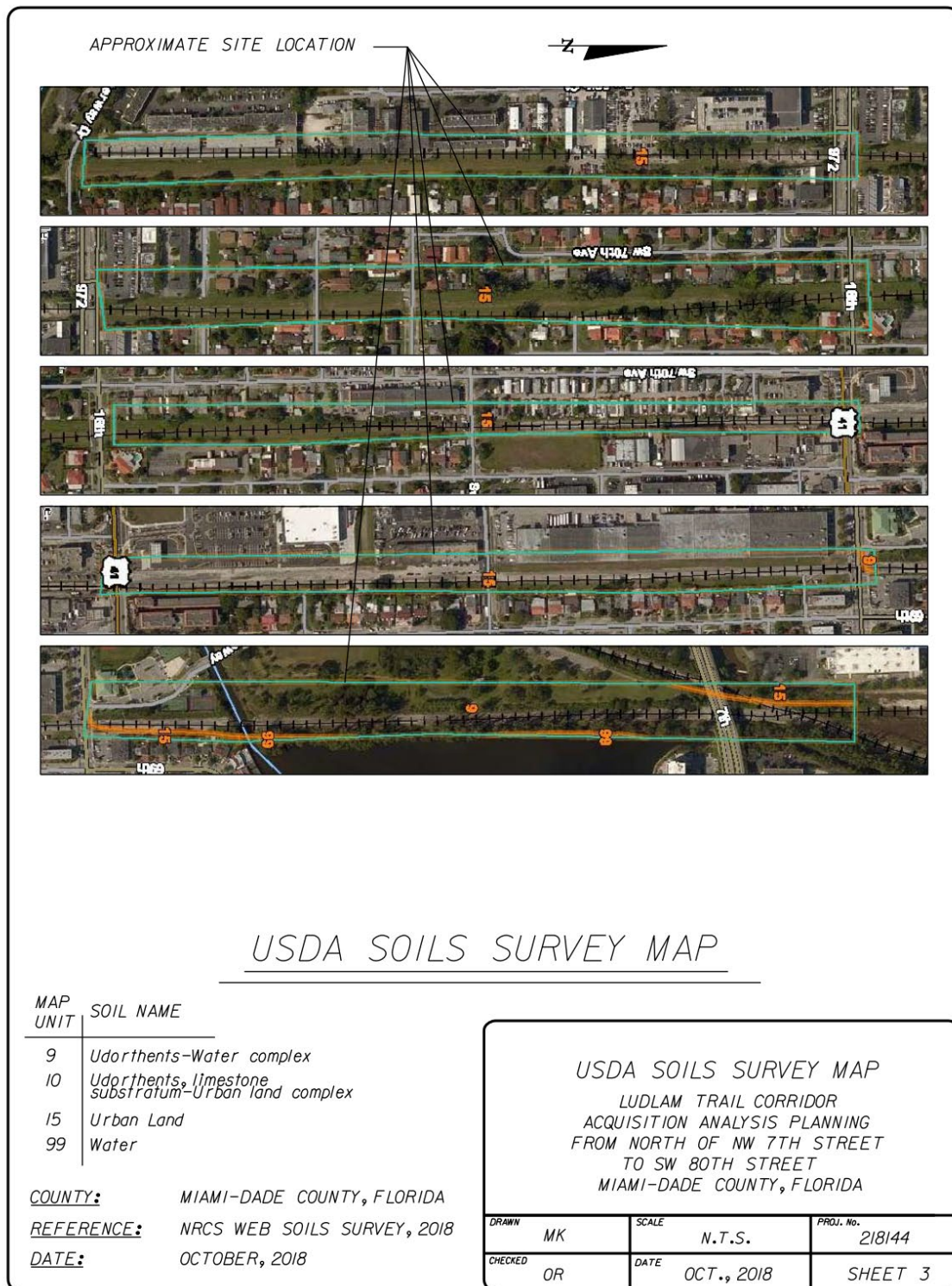


Figure 2-4 USDA Soils Survey Map (2 of 2)

Table 2-7 lists the acreage and percentage of each mapped soil type within the project study area. Descriptions of each mapped soil type are provided after the table.

Table 2-7 Soil Types and Coverage

Mapped Soil Type	Hydric (Y/N)	Preferred Alternative	
		Acres	Percent
9 – Udorthents – Water Complex	N	6.5	9.7%
10 – Udorthents, Limestone Substratum – Land Complex	N	18.2	27.0%
15 – Urban land	*	42.6	63.3%
Total		67.3	100.0%

* unranked

Soil Type 9 – Udorthents – Water Complex

Mapped Soil Type 9 consists of Udorthents and open bodies of water (see **Figure 2-4**). Udorthents are very shallow to deep, over limestone bedrock, and consist of unconsolidated material removed during the excavation of ditches, canals, lakes, ponds, and quarries and deposited along the banks. Soils are well-drained, with slopes of 15 to 60 percent. Under natural conditions, the seasonal high-water table is more than 80 inches throughout the year. The permeability is generally rapid. The available water capacity is very low. Udorthents is not hydric per the Hydric Soils of Florida Handbook (Hurt 2007). This soil unit is found in the northern portion of the corridor and comprises 6.5 acres (9.7%) of the total project study area.

Soil Type 10 – Udorthents, Limestone Substratum – Land Complex

This nearly level, somewhat poorly drained soil consists of approximately 40 to 70 percent of the map unit and has material that has been shaped and contoured mainly for golf courses, lawns, vacant lots, parks, playgrounds, and major highways (see **Figure 2-4**). Urban land comprises approximately 25 to 60 percent of the map unit. Udorthents and Urban land are intermixed or so small, mapping them separately is impractical. Nearly all areas are covered with fill to a depth of 55 inches or more. The permeability of this soil is moderate, and slopes are 0 to 2 percent. The available water capacity is low. Under natural conditions, the seasonal high-water table is at a depth of 20 to 50 inches for most of the year and is within the limestone bedrock. By itself, Udorthents is not hydric per the Hydric Soils of Florida Handbook (Hurt 2007). This soil unit is found in the southern portion of the corridor and comprises 18.2 acres (27.0%) of the total project study area.

Soil Type 15 – Urban land

Mapped Soil Type 15 consists of areas that are more than 85 percent covered by airports, shopping centers, parking lots, large buildings, streets and sidewalks, and other structures, so that the natural soil is not readily observable (see **Figure 2-4**). Unoccupied areas of this land type, mostly lawns, parks, vacant lots, and playgrounds, consist of Udorthents that have been altered by land grading and shaping or have been covered with approximately 18 inches of extremely stony, loamy fill material. These unoccupied areas are in tracts too small to be mapped separately. The fill is mostly sandy material, some of which contains limestone and shell fragments. This map unit is not assigned to a capability subclass and is not ranked by the Hydric Soils of Florida Handbook (Hurt 2007). This soil unit is found throughout the central portion of the project corridor and comprises 42.6 acres (63.3%) of the total project study area.

2.9 Utilities

To evaluate potential utility conflicts associated with the most feasible improvement alternative, available information was obtained with respect to the location and characteristics of the major existing or planned/proposed utilities within the Ludlam Trail Corridor. The utility agencies/owners (UAOs) within the Ludlam Trail Corridor (which include utility companies, municipalities, and government agencies), were contacted and requested to provide information regarding their utility facilities within the project area. The information is organized in accordance with the FDOT PD&E Manual, Part 2, Chapter 21.

Utility owners within the Ludlam Trail Corridor were provided aerial photography base maps depicting the project corridor. Each UAO was asked to indicate their existing and proposed utilities as well as any easements that may affect their reimbursement rights for relocations. The utility owners, including address and contact person, are listed in **Table 2-8**. A copy of the letter sent to the UAOs is included in **Appendix G**. The UAOs within the corridor responded via written communications. The utility owners provided the requested information concerning their facilities using either the base map or by providing reference documentation.

Table 2-8 UAO Contact List

Utility Agency/Owner	Facility	Contact Information	
AT&T - Transmission	Communications/ Fiber Optic	Craig Petrie P.E.A. of Florida 6000 Metro West Blvd., #201 Orlando, FL 32835	407-578-8000 x-10 Office 407-341-5722 Cell cpetrie@pea-inc.net peafl@pea-inc.net
AT&T - Florida	Telephone	Steve Low 9101 SW 24 th Street Miami, FL 33165	305-222-8745 Office 305-221-0974 Fax 305-987-7351 Cell sl4504@att.com
American Traffic Solutions	Communications/ Electric	Santiago Martinez 1150 N Alma School Road Mesa, AZ 85201	480-596-4595 santiago.martinez@atsol.com
Atlantic Broadband	Cable TV	Pete Freytag 1681 Kennedy Causeway North Bay Village, FL 33141	305-861-8069 x-5208 Office 305-865-9845 Fax 786.251.5989 Cell pfreytag@atlanticbb.com
CenturyLink is now Lumen (CenturyLink) (Formerly Qwest Communications)	Fiber Optic	Xan Rypkema	Relocations@Lumen.com xan.rypkema@lumen.com
Comcast Cable	Cable TV & Fiber	Leonard Maxwell-Newbold 2601 SW 145 th Ave. Miramar, FL 33027	954-447-8405 Office 954-447-8445 Fax 954-444-5113 Cell Leonard_Maxwell-Newbold@cable.comcast.com
Crown Castle Fiber	Fiber	Danny Haskett 1601 NW 136 Ave. Suite A-200 Sunrise, FL 33323	786-610-7073 Office 786-246-7827 Cell danny.haskett@crowncc.com
Dade County Public Works	Traffic/Street Lights	Octavio Vidal	305-412-0891 Ext. 201 786-345-0986 octavio.vidal@miamidade.gov
Fiberlight, LLC. is now Atlantic Broadband	Fiber Optic	Wayne Kramer 602 South Military Trail Deerfield Beach, FL 33442	754-227-4345 Office 954-596-2569 Fax 786-535-0730 Cell wkramer@atlanticbb.com
Florida City Gas	Natural Gas Distribution Sys.	Maria Paula Lopez 4045 NW 97 Ave. Doral, FL 33178	305-835-3638 Office 786-332-8913 Cell maria.lopez@nexteraenergy.com
Florida Gas Transmission	Gas Pipeline-Coral Springs	Joe Sanchez 2405 Lucien Way Suite 200 Maitland, FL 32751	407-838-7171 Office 407-838-7101 Fax 407-808-4607 Cell joseph.e.sanchez@energytransfer.com

Table 2-8 UAO Contact List (continued)

Florida Power & Light Distribution	Electric	John Giraldo 4200 W. Flagler Street Miami, FL 33134	305-442-5172 Office 305-442-5123 Fax 305-798-8914 Cell John.Giraldo@fpl.com
Florida Power & Light Transmission	Electric	Michael Foley 700 Universe Blvd TS4/JW Juno Beach, FL 33408	561-904-3640 Office 561-523-9896 Cell Michael.Foley@fpl.com
Level 3 is now Lumen (Level 3) (same as Centurylink)	Fiber Optic	Xan Rypkema	Relocations@Lumen.com xan.rypkema@centurylink.com
MCI / Verizon	Communications / Fiber Optic	Attn: Investigations MCI - Verizon Business 2400 N. Glenville Dr. Richardson, TX 75082	972-729-6322 Investigations@Verizon.com
Miami-Dade ITD	Fiber Optic	Frank Dopico	305-275-7813 Office 786-208-5658 Cell Frank.Dopico@miamidade.gov
Miami-Dade DTPW	Street Lighting	Octavio Marin/ Julio Navarro	(305) 375-4664 Office Octavio.Marin@miamidade.gov Julio.Navarro@miamidade.gov
Miami-Dade DTPW	Traffic Signals	Octavio Marin/ Evelin Legcevic	(305) 375-4664 Office Octavio.Marin@miamidade.gov Evelin.Legcevic@miamidade.gov
Miami-Dade Water & Sewer	Water & Sewer	Patrick Chong/ Edith Nogueira 3501 NW 46 ST Miami, FL 33142	786-552-4416 Office Patrick.Chong@miamidade.gov 786-552-4417 Office Edith.Noqueira@miamidade.gov
Hotwire Communications, LLC.	Fiber, Telephone, Cable TV, Coax	Phil Gallub 10360 USA Today Way Miramar, FL 33025	954-248-7396 Cell 954-241-1263 Fax pgallub@hotwirecommunication.com walter.sancho-davila@hotwirecommunication.com
Miami-Dade County Public Schools	Sewer	Fernando Albueme Department of Planning, Design and Sustainability 1450 NE 2 Avenue, Room 525 Miami, FL 33132	(305) 995-7286 fabueme@dadeschools.net
Florida Department of Transportation D6 Drainage Department	Drainage facilities	Mario Dominguez 1000 NW 111 th Ave Room 6211 Miami, FL 33172	Phone: 305-470-5482 Fax: 305-470-5293 mario.dominguez@dot.state.fl.us

Notes: The UAO contact list above was developed based on letters sent to each UAO or via responses received from the UAO within the Ludlam Trail Corridor.

Table 2-8 UAO Contact List (continued)

UTILITIES IDENTIFIED IN SUNSHINE 811 RESEARCH (NOT CONTACTED)			
Miami Dade Expressway Authority -MDX	Fiber, Electric	John Reese	John Reeseday (305) 637 - 3277 X2144
Mastec Inc	Fiber		Julio Marques Day: (305) 431 - 6014

Refer to **Appendix G** for the Existing Utilities Base Map Plans showing the specific location of existing utilities within the project area. Find a description of the existing facilities in the following sections below.

AT&T FLORIDA

AT&T provided the approximate locations of their buried telephone cables within the project. The duct banks are located at the following locations:

- Crossing at SW 72nd Street – Buried telephone abandon.
- Along SW 12th Street – Duct Bank with 18-4" PVC buried telephone copper cable.
- Along W Flagler Street – Duct Bank with 12-4" PVC buried telephone copper cable.

Additional markups from MDC Internal Services Department (ISD) were received showing cables identified as Bellsouth DBA AT&T in the following locations:

- Crossing at SW 72nd Street – 4-4" buried duct
- Crossing at SW 40th Street – 4-4" buried cables in 12" galvanized steel pipe
- Crossing the Ludlam Trail approximately 150 feet north of SW 21st Street – 4" galvanized steel pipe in 4" casing.
- Crossing at SW 4th Street – 100 feet 6" steel casing

AT&T TRANSMISSION

According to the review conducted by AT&T Transmission (PEA), the UAO does not have existing facilities within the limits of this project.

AMERICAN TRAFFIC SOLUTIONS

According to the review conducted by American Traffic Solutions, the UAO does not have any existing facilities within the limits of this project.

ATLANTIC BROADBAND

Atlantic Broadband provided the approximate locations of their facilities within the proposed project. It includes buried and aerial lines. The aerial lines are attached to the Florida Power and Light (FPL) power poles and are located at the following locations:

- SW 80th Street, SW 72nd Street, SW 60th Street, from SW 56th Street to SW 48th Street, SW 44th Street, and from SW 22nd Street to SW 21st Street. The buried line is located at SW 16th Street.
- Both buried and aerial lines traverse or run parallel to the proposed project.

CENTURYLINK (LUMEN)/LEVEL 3 COMMUNICATIONS (LUMEN)

According to the review conducted by Lumen/CenturyLink and Lumen/Level 3 Communications, the UAO does not have existing facilities within the limits of this project.

COMCAST

Comcast provided the approximate locations of their facilities within the study corridor. It includes subgrade and aerial lines. The following are the locations of buried and aerial cables:

- SW 80th Street – buried cable
- Aerial cable along Ludlam Trail from north of SR 78th Terrace to SW 72nd Street.
- Aerial cable along Ludlam Trail from north of SR 60th Street to SW 48th Street.
- Buried cable along Ludlam Trail near SW 45th Lane.
- SW 40th Street – future buried cable

- Aerial cable along Ludlam Trail from N Waterway Drive to SW 24th Street.
- SW 24th Street – buried cable
- Aerial cable along Ludlam Trail from SW 22nd Street to SW 21st Street.
- Aerial cable along Ludlam Trail from north of SW 21st Street to north of SW 16th Street.
- SW 8th Street – future buried cable
- SW 4th Street – buried cable and aerial cables
- W Flagler Street – buried cable

Additional markups from MDC ISD were received showing cables identified in the following locations:

- SW 16th Street – 2 cables in 2" galvanized pipe
- SW 8th Street – Miami TELE-COMM, Comcast FNA Media One 60' CATV

CROWN CASTLE

Fibernet Direct Florida, LLC, an affiliate of Crown Castle Fiber, has aerial and underground fiber optic facilities within the limits of the project. The fiber optic facilities are located approximately at the following locations:

- Aerial fiber optic – SW 72nd Street
- Buried fiber optic – SE 40th Street
- Buried fiber optic – SE 24th Street
- Aerial and buried fiber optic – SW 16th Street
- Buried fiber optic – SW 8th Street
- Buried fiber optic – SW 4th Street
- Aerial and buried fiber optic – W Flagler Street

FIBERLIGHT LLC (ATLANTIC BROADBAND)

Fiberlight LLC provided the approximate location of their facility within study's limits and it is located north of the proposed improvements along NW 7th Street. There is no conflict between the proposed project and their facility.

FLORIDA CITY GAS

Florida City Gas provided the approximate locations of their gas mains within the project. The gas mains facilities are located at the following locations:

- Crossing at SW 80th Street – 2" STL 60 psig MAOP Gas Main
- Along Ludlam Trail/SW 69th Avenue from SW 80th Street to SW 78th Terrace – 2" PE 60 psig MAOP Gas Main. No records are available for this segment.
- Crossing at SW 64th Street – 2" STL 60 psig MAOP Gas Main.
- Crossing at Bird Road – 4" STL psig MAOP Gas Main.
- Crossing at Coral Way – 6" STL psig MAOP Gas Main
- Along Ludlam Trail from SW 8th Street to NW 7th Street – 6" STL 450 psig MAOP Gas Main

FLORIDA GAS TRANSMISSION

Florida Gas Transmission (FGT) provided the approximate location of their natural gas transmission pipeline and it is located crossing the project limits on the south side of US 41/SR 90/SW 8th Street.

FLORIDA POWER AND LIGHT

FPL provided documentation of the approximate location of existing transmission and distribution facilities within the study limits of the PD&E Study. FPL's facilities are overhead and underground lines within the study limits. The following notes were provided by FPL addressing working in the vicinity of FPL's existing facilities:

1. Contractors must maintain clearances, as required by OSHA, when working in the proximity of FPL's high-voltage transmission conductors and lower voltage distribution conductors.
2. The roadway contractor must maintain access to all FPL facilities at all times during construction.
3. All existing facilities must remain energized during road construction.

The following are the locations of FPL's transmission lines:

- Overhead 138 kV power line at SW 80th Street.
- Overhead 138 kV power line at SW 56th Street.
- Overhead 230 kV and 138 kV power lines crossing Ludlam Trail at SW 12th Street.
- Overhead 230 kV power line crossing Ludlam Trail at SW 4th Street.
- Overhead 138 kV power line crossing Ludlam Trail at SW 4th Street.
- Buried 240kV power line at SW 4th Street.
- Overhead 138 kV power line at W Flagler Street.
- Overhead 138 kV power line north of W Flagler Street.

The following are the locations of FPL's distribution lines:

- Underground 13 kV power line and overhead power line crossing Ludlam Trail along SR 80th Street.
- Overhead 13 kV power line crossing Ludlam Trail north of SR 78th Terrace.
- Overhead 13 kV power line along Ludlam Trail from north of SR 78th Terrace to SW 72nd Street.
- Overhead 120 V power line crossing Ludlam Trail at SW 72nd Street.
- Overhead 13 kV power line along Ludlam Trail from north of SR 66th Street to SW 64th Street.
- Overhead 13 kV power line along Ludlam Trail from north of SR 60th Street to SW 48th Street.
- Overhead 13 kV power line crossing Ludlam Trail at SW 44th Street.
- Overhead 13 kV power line crossing Ludlam Trail north of SR 40th Street.
- Underground 13 kV power line crossing Ludlam Trail at N Waterway Drive.
- Overhead 13 kV power line along Ludlam Trail from N Waterway Drive to SW 24th Street.

- Overhead 120 V power line crossing Ludlam Trail north of SW 24th Street.
- Overhead 13 kV power line crossing Ludlam Trail at SW 22nd Street.
- Overhead 13 kV power line along Ludlam Trail from SW 22nd Street to SW 21st Street.
- Overhead 13 kV power line crossing Ludlam Trail at SW 21st Street.
- Overhead 13 kV power line along Ludlam Trail from north of SW 21st Street to north of SW 16th Street.
- Overhead 13 kV power line crossing Ludlam Trail at SW 16th Street.
- Overhead 13 kV power line crossing Ludlam Trail at SW 12th Street.
- Underground 25 kV power line crossing Ludlam Trail at SW 8th Street.
- Overhead 13 kV power line along Ludlam Trail from north of SW 8th Street to north of W Flagler Street.

HOTWIRE COMMUNICATIONS

Hotwire Communications provided the approximate location of their overhead fiber optic cable (FOC) and it is located crossing the Ludlam Trail attached to FPL poles at SW 72nd Street.

MCI/VERIZON BUSINESS

Verizon and MCI provided documentation of their FOC network within the study limits. The overhead FOCs are crossing the Ludlam Trail at SW 72nd Street and SW 16th Street.

MIAMI-DADE INFORMATION TECHNOLOGY DEPARTMENT (ITD)

MDC ITD provided documentation of their FOC within the study limits. The underground FOCs are crossing the Ludlam Trail at SW 80th Street and SW 64th Street

MIAMI-DADE COUNTY DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS (MDC DTPW)

MDC DTPW provided documentation of their interconnect conduits within the study limits. The underground interconnect conduits are crossing the Ludlam Trail at SW 80th Street and SW 56th Street.

MIAMI-DADE COUNTY ROADWAY LIGHTING FACILITIES

Any proposed construction near street lighting need to be coordinated with Julio Navarro when plans are further developed.

MIAMI-DADE COUNTY SIGNAL DEPARTMENT

Any proposed construction near traffic signals will need to be coordinated with Evelin Legcevic (Traffic Signals and Signs Division) when plans are further developed.

MIAMI-DADE WATER AND SEWER DEPARTMENT (M-D WASD)

M-D WASD provided utility records showing water and sanitary sewer mains the study limits. The following are the approximate locations of M-D WASD's water mains:

- Distribution 12" water main crossing the Ludlam Trail at SW 80th Street.
- Transmission 36" water main crossing the Ludlam Trail at SW 72nd Street.
- Distribution 4" water main crossing the Ludlam Trail at SW 56th Street.
- Transmission 48" water main crossing the Ludlam Trail at SW 56th Street.
- Distribution 16" water main crossing the Ludlam Trail at SW 40th Street.
- Transmission 48" water main crossing the Ludlam Trail at SW 40th Street.
- Abandoned water main crossing Ludlam Trail at SW 40th Street.
- Distribution 12" water main crossing the Ludlam Trail at N Waterway Drive.
- Distribution 16" water main crossing the Ludlam Trail at SW 24th Street.
- Distribution 8" water main crossing the Ludlam Trail at SW 21st Street.
- Distribution 8" water main crossing the Ludlam Trail at SW 16th Street.

- Distribution 12" water main crossing the Ludlam Trail at SW 8th Street.
- Distribution 4" water main crossing the Ludlam Trail at SW 4th Street.
- Distribution 8" water main crossing the Ludlam Trail at W Flagler Street.
- Transmission 20" water main crossing the Ludlam Trail at W Flagler Street.

The following are the locations of M-D WASD's force mains and gravity mains:

- 8" force main crossing the Ludlam Trail at SW 60th Street.
- 4" gravity main along Ludlam Trail near SW 45th Lane.
- 12" force main crossing the Ludlam Trail at SW 44th Street.
- 12" force main crossing the Ludlam Trail at N Waterway Drive.
- 12" force main crossing the Ludlam Trail at SW 24th Street.
- 16" gravity main crossing the Ludlam Trail at SW 4th Street.
- 54" force main crossing the Ludlam Trail at W Flagler Street.
- 60" force main crossing the Ludlam Trail at W Flagler Street.
- 6" gravity main crossing the Ludlam Trail north of W Flagler Street.

SERVICE POINTS

The utility owners within the Ludlam Trail Corridor were provided aerial photography base maps depicting the project corridor requesting potential service point locations for their facilities. Copies of the correspondence provided to the UAOs along with their responses are included in **Appendix G**.

2.10 Lighting

The Ludlam Trail corridor currently does not have luminaires within its limits. There is existing lighting along some of the cross streets where the proposed trail intersects.

2.11 Aesthetic Features

Aesthetic issues during the transportation planning process incorporate how the community is affected visually by a project. Aesthetic issues are subjective and are best defined by the collective community

vision of what constitutes a pleasing environment. It includes actual or perceived impacts to noise/vibration, viewsheds, including above-grade crossings and compatibility of the project with the surrounding area.

Land use surrounding the proposed Ludlam Trail project corridor is identified primarily as residential, with pockets of commercial and industrial uses located at or near major arterial roadway crossings. Community features associated with aesthetics reported within the SCE Study Area include: five (5) census designated places (South Miami, West Miami, Glenvar Heights, Coral Terrace, and Miami); five (5) brownfields; 21 homeowner and condominium associations; 21 group care facilities; two (2) mobile home and RV parks; five (5) local parks/recreational facility boundaries, one (1) Florida Department of Environmental Protection (FDEP) Office of Greenways and Trails (OGT) multi-use trail opportunity/hiking trail priority - which includes the same trail identified as part of the SUN Trail Priority Trail Network in Florida (Ludlam Trail Corridor [this project]) - and one (1) existing recreational trail (Bike Route 6), as well as historic features and numerous residential areas. The project is anticipated to improve the visual appeal of the area by replacing an abandoned railroad corridor with an active, well-maintained, and aesthetically pleasing trail. In addition, amenities such as public art, pocket parks, benches, fountains, shade trees, and landscaped buffer areas could be provided. As such, proposed project improvements are anticipated to enhance the aesthetic character of the corridor and surrounding areas.

2.12 Bridges and Structures

There are two, canal-crossing bridges within the Ludlam Trail Corridor. The Ludlam Trail project proposes to replace both of these existing wooden railroad structures, as discussed below. The bridge assessments are provided in **Appendix H**. No piles are expected to be placed in the water for the proposed replacement bridges and clear span type bridges are anticipated to be sufficient to cross each canal; all of which will be confirmed during the final design phase of the project.

Bridge 1 is located 0.5 miles north of SR 976/SW 40th Street/Bird Road, just south of North Waterway Drive. Bridge 1 crosses over the C-3/Coral Gables Canal (refer to **Figure 2-5, Figure 2-6, and Figure 2-7** at the end of this section). The bridge superstructure consists of railroad timber ties on steel beams, supported on a substructure consisting of steel pier caps and steel abutments, supported on timber piles.

The most recent Bridge Inspection Report (BIR) and Bridge Load Rating Report (BLRR), dated November 3, 2018 and November 8, 2018, respectively, are provided in **Appendix H**. The existing bridge has a satisfactory Load Rating however, based on the latest inspection report, Bridge 1 has a National Bridge Inventory (NBI) Rating of 4-Poor.

Bridge 2 is located 0.1 miles north of SR 968/W Flagler Street, east of Robert King High Park. Bridge 2 crosses over the C-4/Tamiami Canal, near Lake Mahar (refer to **Figure 2-8**, **Figure 2-9**, and **Figure 2-10** at the end of this section). The bridge superstructure consists of railroad timber ties on steel beams, supported on a substructure consisting of steel pier caps and steel abutments, supported on timber piles. The most recent BIR and BLRR, dated November 3, 2018 and November 8, 2018, respectively, are provided in **Appendix H**. The existing bridge has a satisfactory Load Rating however, based on the latest inspection report, Bridge 2 also has an NBI Rating of 4-Poor.

The BIRs recommend the replacement of each bridge given the poor condition of all bridge elements. **Table 2-9**, Existing Bridge Characteristics, summarizes the findings and recommendations from the BIRs. The existing level of deterioration of each bridge would result in a higher cost to restore the existing bridge elements on each bridge, than to replace both bridges in their entirety. Therefore, it is recommended to replace both bridges with new bridges suitable for the proposed shared-use path along the proposed Ludlam Trail alignment.



Figure 2-5 Elevation (Looking West) Bridge 1 over C-3/Coral Gables Canal



Figure 2-6 Aerial View of Bridge 1 over C-3/Coral Gables Canal



Figure 2-7 Deck View of Bridge 1 over C-3/Coral Gables Canal



Figure 2-8 Elevation (Looking West) Bridge 2 over C-4/Tamiami Canal



Figure 2-9 Aerial View of Bridge 2 over C-4/Tamiami Canal



Figure 2-10 Deck View of Bridge 2 over C-4/Tamiami Canal

Table 2-9 Existing Bridge Characteristics

Existing Bridge Characteristics																
Location			Geometrics		Structural						Condition					
Bridge ID No.	Bridge Location	Milepost	Structure Length (ft)	Deck Width (ft)	Number of Spans	Max. Span (ft)	Superstructure Type	Traffic Railing	Exp. Joint Type	Substructure Type	Year Built/ Modified	Sufficiency Rating (%)	Health Index (%)	Inspection Date	Load Rating Status	Significant Deficiencies
Bridge 1	Over Coral Gables (C-3) Canal	N/A	82	22	7	12	Steel Girders	N/A	N/A	Steel/Timber	Not Available	N/A	N/A	9/19/2018	Available	Poor Superstructure Poor Substructure
Bridge 2	Over Tamiami (C-4) Canal	N/A	106.2	22	9	31	Steel Girders	N/A	N/A	Steel/Timber	Not Available	N/A	N/A	9/20/2018	Available	Poor Superstructure Poor Substructure

3.0 PROJECT DESIGN CONTROLS AND CRITERIA

3.1 Geometric Design Elements

Design control and standards used to develop typical sections, horizontal and vertical alignments, and other design features for Ludlam Trail are summarized in the following sections. The criteria are those specified by the FDOT for state roadways. Design criteria presented in this section are based on the design parameters outlined in the following references:

- *2011 AASHTO, A Policy on Geometric Design of Highways and Streets, Sixth Edition*
- *2016 FDOT Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways (commonly known as the “Florida Green Book”)*
- *2021-2022 FDOT Standards Plans for Road Construction*
- *2020 FDOT Design Manual (FDM)*
- *2021 FDOT Standard Specifications for Road and Bridge Construction*
- *2009 Federal Highway Administration (FHWA), Manual on Uniform Traffic Control Devices (MUTCD)*
- *2020 AASHTO Guide for Development of Bicycle Facilities*

3.1.1 Trail Design Elements

Design elements and applicable design standards considered in the design of the typical sections for the study corridor are summarized in **Table 3-1**.

3.1.2 Horizontal and Vertical Alignment

Design elements and applicable design standards considered in the design of horizontal and vertical alignments such as profiles, curves, and vertical clearances are also summarized in **Table 3-1**.

Table 3-1 Design Criteria

Ludlam Trail Corridor PD&E Study (From SW 80th Street to 400 feet North of NW 7th Street)		
FM Number: 444236-1-22-01		
Design Element	Design Criteria	Source
Design Speed	18 mph (for longitudinal grades ≤ 4%) 30 mph (with downhill longitudinal grades > 4%)	FDM (2020) Section 224.9 Design Speed
Context Classification	C3R - Suburban Residential	FDM (2020) Table 200.4.1 Context Classifications FDM (2020) Section 224.1 General
Design Vehicle	Pedestrian/Bicycle	AASHTO (2020) Guide for the Development of Bicycle Facilities Section 5.2 Elements of Design
Trail Typical Section		
Shared Used Path Width (Bicycle Lanes)	From min. 10' to 14'	FDM (2020) Section 224.4 Widths
Shared Used Path along Bridge (Bicycle Lanes)	5' min.	FDM (2020) Section 260.2.2 Widths
Concrete Sidewalk	4"-6" thickness (where applicable)	FDOT (2021-2022) Standard Plans Index 522-001
Cross Slope	2%	FDM (2020) Section 224.5 Cross Slopes
Longitudinal Slope	5% (max); if grades are greater than 5%, refer to Table 224.6.1.	FDM (2020) Section 224.6 Longitudinal Grades FDM (2020) Table 224.6.1 Maximum Grade Lengths
Horizontal Clearance (H.C.)	1.) 4-foot clear area adjacent to both sides of path; 2.) 2-foot wide graded area with a max. 1:6 slope adjacent to both sides of path; 3.) For restricted conditions, bridge abutments, sign posts, fencing, and railing may be located within 4-feet of edge of pavement, but not less than 2-feet. 4.) For drop-off hazards, refer to FDM Section 224.15.	FDM (2020) Section 224.7 Horizontal Clearance FDM (2020) Section 224.15 Drop-Off Hazards
Vertical Clearance (V.C.)	1.) 10-foot V.C. from the bottom lowest edge of an overhead obstruction to any portion of the path under the obstruction. 2.) 8-foot V.C. allowed for overhead signs and for other overhead obstructions under constrained conditions. 3.) 12-foot V.C. as follows: a.) Accommodation of equestrians or maintenance and emergency vehicles. b.) Underpasses and tunnels. c.) SUN Trail 4.) Minimum V.C. for Bridges: a.) Pedestrian Bridge over Roadways: 17.5 feet (New Construction/New Bridge) b.) Pedestrian Bridge over Roadways: 17.0 feet (New Construction/Construction Affecting Existing Bridge) c.) Pedestrian Bridge over Railroad: 23.5 feet d.) Pedestrian Bridge over Electrified Railroad: 24.25 feet	FDM (2020) Section 224.8 Vertical Clearance FDM (2020) Table 260.6.1 Minimum Vertical Clearances for Bridges
Horizontal Alignment		
Min. Radius Horizontal Curves on Shared Use Paths	Design Speed 18 mph; cross slope 2%; Min. Radius = 74 feet Design Speed 18 mph; cross slope -2%; Min. Radius = 86 feet Design Speed 30 mph; cross slope 2%; Min. Radius = 261 feet Design Speed 30 mph ; cross slope -2%; Min. Radius = 316 feet Note: For paths with two-way traffic use min. radius given for cross slope of -2%.	FDM (2020) Table 224.10.1 Minimum Radius Horizontal Curves on Shared Use Paths
Minimum Stopping Sight Distance	134 feet (flat conditions); adjust based on grades per Table 224.10.2 Note: Stopping sight distance based on an object height of 0.0 feet and an eye height of 4.5 feet.	FDM (2020) Table 224.10.2 Minimum Stopping Sight Distances

Table 3-1 Design Criteria (continued)

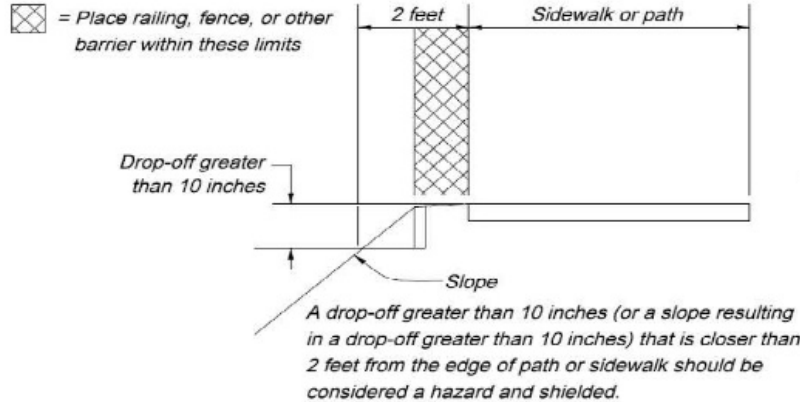
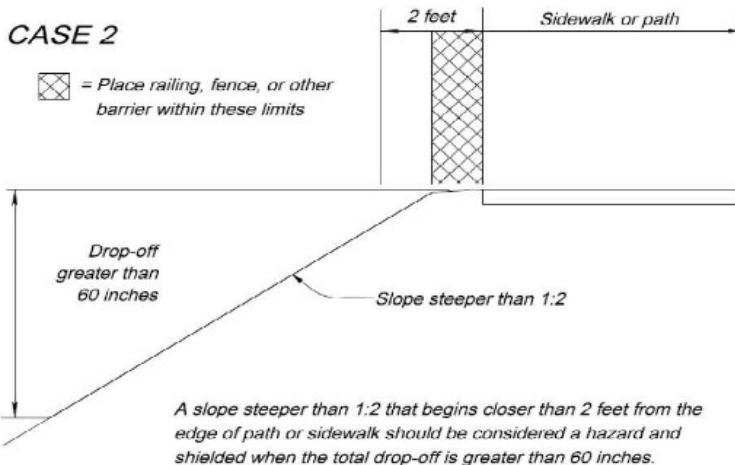
Ludlam Trail Corridor PD&E Study (From SW 80th Street to 400 feet North of NW 7th Street)		
FM Number: 444236-1-22-01		
Design Element	Design Criteria	Source
Vertical Geometry		
Maximum Grade	5% (max); if grades are greater than 5%, refer to Table 224.6.1.	FDM (2020) Section 224.6 Longitudinal Grades FDM (2020) Table 224.6.1 Maximum Grade Lengths
Minimum Length of Vertical Curve	Formula Based: When S > L: L= 2S - (900/A) When S < L: L= AS ² /900 L= Min. Length of Vertical Curve (ft.) A= Algebraic Grade Difference (%) S= Stopping Sight Distance (ft.)	FDM (2020) Section 224.11 Vertical Alignment
Separation from Roadway		
Provide a separation between a shared use path and the roadway when they are located adjacent to each other. This demonstrates to both path users and motorists that the shared use path is a separate facility. Minimum separation is as follows:		
Flush Shoulder Roadways with design speed 45 mph or less	Edge of the path to be <u>at least 5 feet</u> from edge of the paved shoulder	FDM (2020) Section 224.12 Separation from Roadway
On Curbed roadways with design speed 45 mph or less	Edge of the path is to be <u>at least 4 feet</u> from the back of curb, with consideration of other roadside obstructions.	
On all roadways with design speed 50 mph or greater	Edge of the path is to be <u>at least 5 feet</u> from the shoulder break.	
Drop-off Hazards		
Depending on the depth of the drop-off and severity of the conditions, shielding may be necessary for conditions other than Cases 1 or 2. Refer to FDM (2018) Section 224.15 Drop-Off Hazards.		
<p>CASE 1</p> <p></p>	Drop-off greater than 10 inches (or a slope resulting in a drop off greater than 10 inches) that is closer than 2 feet from the edge of path should be considered a hazard and shielded.	FDM (2020) Section 224.15 Drop-Off Hazards

Table 3-1 Design Criteria (continued)

Ludlam Trail Corridor PD&E Study (From SW 80th Street to 400 feet North of NW 7th Street)																																																												
FM Number: 444236-1-22-01																																																												
Design Element	Design Criteria	Source																																																										
<div><p>CASE 2</p></div>	<p>A slope steeper than 1:2 that begins closer than 2 feet from the edge of path should be considered a hazard and shielded when the total drop-off is greater than 60 inches.</p>	FDM (2020) Section 224.15 Drop-Off Hazards																																																										
Provide a pavement design equivalent to standard shoulder pavement.																																																												
Structural Course	1.5 inch	FDM (2020) Section 224.17.1 Pavement Design FDOT Flexible Pavement Design Manual (2020) Table 5.5 Required Minimum Thickness for New Construction or Reconstruction FDOT Flexible Pavement Design Manual (2020) Table 5.6 General Use Optional Base Groups and Structural Numbers																																																										
Base Group	Base Group 1																																																											
<table><tr><th colspan="11">BASE THICKNESS AND OPTION CODES</th></tr><tr><th rowspan="4">Base Group</th><th rowspan="4">Structural Range</th><th rowspan="4">Base Group Pay Item Number</th><th colspan="8">Base Options</th></tr><tr><th>Limerock, LBR 100</th><th>Cemented Coquina, LBR 100</th><th>Shell Rock, LBR 100</th><th>Bank Run Shell, LBR 100</th><th>Recycled Concrete Aggregate, LBR 150 **</th><th>Graded Aggregate Base, LBR 100</th><th>Type B-12.5</th><th>B-12.5 And 4" Granular Subbase, LBR 100 *</th><th>RAP Base</th></tr><tr><th colspan="8">Structural Number (Per. in.)</th></tr><tr><th>(0.18)</th><th>(0.18)</th><th>(0.18)</th><th>(0.18)</th><th>(0.18)</th><th>(0.15)</th><th>(0.30)</th><th>(0.30 & 0.15)</th><th>(NA)</th></tr><tr><td>1</td><td>0.65-0.75</td><td>701</td><td>4"</td><td>4"</td><td>4"</td><td>4"</td><td>4"</td><td>4½"</td><td>△ 4"</td><td>□ 5"</td></tr></table>			BASE THICKNESS AND OPTION CODES											Base Group	Structural Range	Base Group Pay Item Number	Base Options								Limerock, LBR 100	Cemented Coquina, LBR 100	Shell Rock, LBR 100	Bank Run Shell, LBR 100	Recycled Concrete Aggregate, LBR 150 **	Graded Aggregate Base, LBR 100	Type B-12.5	B-12.5 And 4" Granular Subbase, LBR 100 *	RAP Base	Structural Number (Per. in.)								(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.15)	(0.30)	(0.30 & 0.15)	(NA)	1	0.65-0.75	701	4"	4"	4"	4"	4"	4½"	△ 4"
BASE THICKNESS AND OPTION CODES																																																												
Base Group	Structural Range	Base Group Pay Item Number	Base Options																																																									
			Limerock, LBR 100	Cemented Coquina, LBR 100	Shell Rock, LBR 100	Bank Run Shell, LBR 100	Recycled Concrete Aggregate, LBR 150 **	Graded Aggregate Base, LBR 100	Type B-12.5	B-12.5 And 4" Granular Subbase, LBR 100 *	RAP Base																																																	
			Structural Number (Per. in.)																																																									
			(0.18)	(0.18)	(0.18)	(0.18)	(0.18)	(0.15)	(0.30)	(0.30 & 0.15)	(NA)																																																	
1	0.65-0.75	701	4"	4"	4"	4"	4"	4½"	△ 4"	□ 5"																																																		
Stabilized Subgrade	12 inch																																																											

4.0 ALTERNATIVES ANALYSIS

4.1 Previous Planning Efforts

The Ludlam Trail has been envisioned since the early 2000s with extensive planning studies and support by the FDOT, MDPROS, the TPO, community residents, and other stakeholders. The former rail corridor has a community-supported charrette plan for a trail through the length of the corridor, with mixed-use development concentrated in nodes at the major intersections. After a series of public involvement and charrettes spanning many years, in 2017 the Ludlam Trail Corridor District was established via amendment to the CDMP. Zoning of the land within the former railroad corridor to the Corridor District classification was completed in 2019.

Several studies have identified the opportunity for a regionally significant trail and greenway along the corridor. Ludlam Trail has been listed as a Priority Trail by the FDEP – OGT. In 2002, FDOT completed the *Ludlam Trail Research Memorandum*, which recommended that further studies be conducted to assess the opportunities and constraints of the corridor. In 2003, FDOT District 6 initiated the *Ludlam Trail Non-Motorized Corridor Study Planning & Environmental Study (Phase 1)*, which included presentations to the TPO, committees, well attended public workshops, and FHWA. In 2011, MDPROS completed the *Miami-Dade County Trail Design Guidelines and Standards: Ludlam Trail Case Study* report, which included additional presentations to the TPO and committees.

4.2 No Build (No-Action) Alternative

The No Build Alternative assumes that no improvements will be implemented within the project corridor. It serves as a baseline for comparison against the Build Alternative. Under the No Build Alternative, the Ludlam Trail Corridor project will not be constructed, and existing conditions will continue.

The advantage of the No Build Alternative is that it requires no expenditure of public funds for design, construction, or any utility relocation. In addition, there will be no disruptions due to construction and no direct or indirect impacts to the environment and/or the socio-economic characteristics of the project. However, the No Build Alternative does not address the purpose and need of the project nor will it provide the benefits of a regional and local non-motorized transportation trail.

4.3 Build (Preferred) Alternative

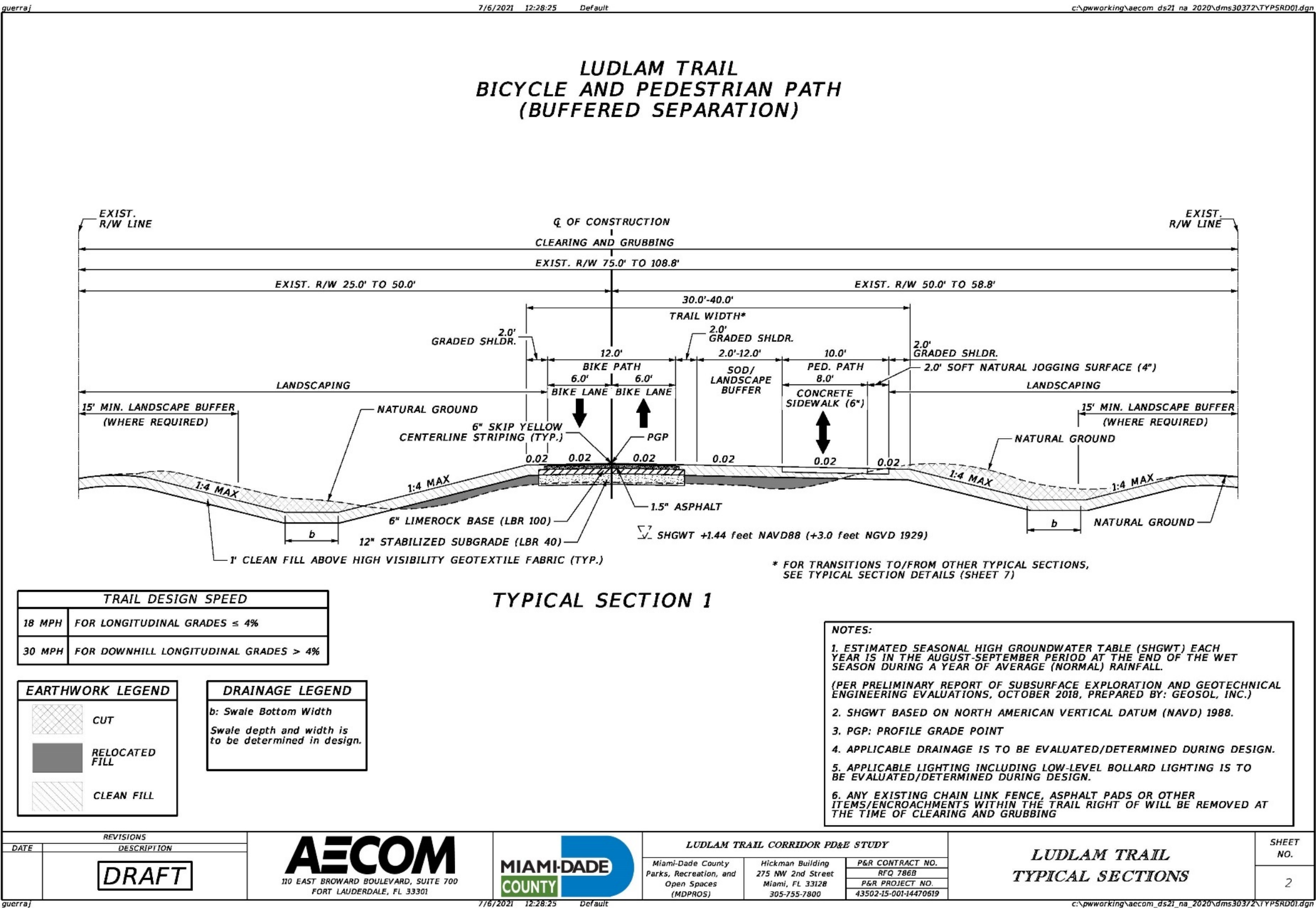
Ludlam Trail will typically consist of a 12-foot-wide bike path and 8-foot-wide pedestrian path with an adjacent 2-foot wide soft, natural surface path, separated in areas by a landscape buffer up to 14 feet wide. Generally, the paths will run along the center of the trail ROW. The Ludlam Trail will provide access to activity centers (i.e., schools, parks, and transit centers) via 10-foot-wide multi-use paths that can accommodate bicyclists and pedestrians. Connections to neighborhoods and parking facilities will be also be provided via 10-foot-wide multi-use paths. See **Appendix D** for concept plans of the Build Alternative.

There will be two general configurations for the Ludlam Trail (see **Figure 4-1** and **Figure 4-2** for Proposed Typical Cross Section configurations):

- **Scenario 1 / Buffered Separation:** The trail consists of a 12-foot-wide bike trail and an 8-foot-wide pedestrian trail separated by a landscape buffer that varies in width from 4 to 14 feet, with a 2-foot-wide soft natural surface path adjacent to the pedestrian trail.
- **Scenario 2 / No Separation:** The trail consists of a 12-foot-wide bike trail and a 5.5- to 8-foot-wide pedestrian trail immediately adjacent to one another with pavement markings, with up to a 2-foot-wide soft natural surface path adjacent to the pedestrian trail.

There also will be two other configurations for the Ludlam Trail; refined details of Scenario 2, with limited applications throughout the corridor. One will be used within the constrained perpetual easements where the trail crosses through the three development zones; and one includes a landscaped buffer where the trail will have at-grade road crossings. See **Section 6.1.1** later in this report, **Figure 6-1** and **Figure 6-2**, for these refined detail configurations, respectively:

- **Scenario 3 / No Separation (Development Zones):** In the three, development zone, 18-foot-wide perpetual easements, the trail will consist of a 10-foot- to 12-foot-wide bike trail and a 5.5-foot-wide pedestrian trail immediately adjacent to one another with pavement markings.
- **Scenario 4 / Landscape Divider Separation:** For short segments on either side of and adjacent to at-grade road crossings, the trail will consist of a 12-foot-wide bike trail and an 8-foot- to 10-foot-wide pedestrian trail that will be separated by a 4-foot-wide curbed landscaped divider buffer, with up to a 2-foot-wide soft natural surface path adjacent to the pedestrian trail.



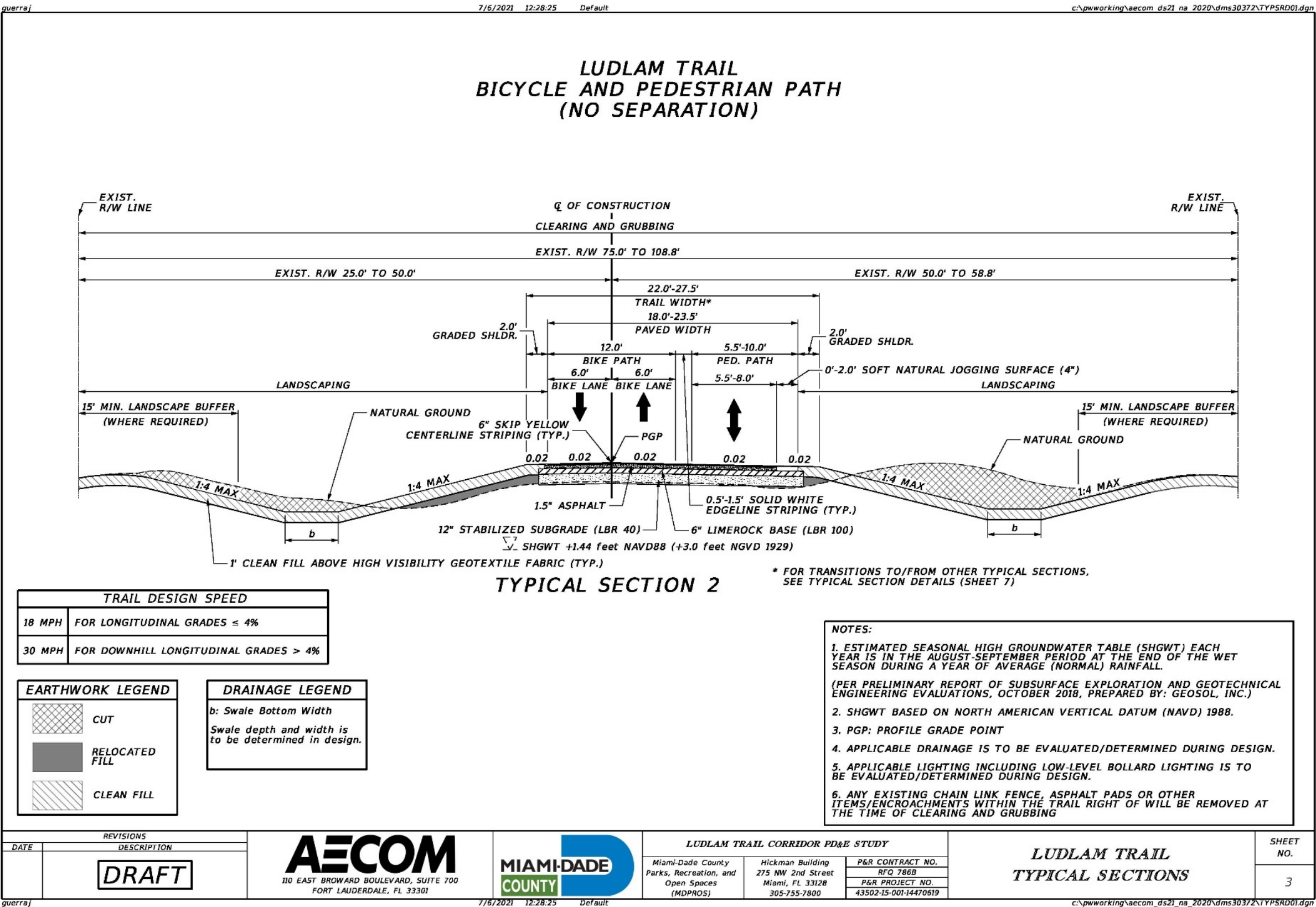


Figure 4-2 Proposed Typical Cross Section for Ludlam Trail (No Separation)

4.3.1 Roadway Crossings

The Ludlam Trail will cross several major roadways, closely aligned to the center point of the trail ROW (see the concept plans in **Appendix D**). All crossings will be compliant with the ADA. Additionally, trail signs that indicate points of interest, such as information signs or kiosks, may be installed as appropriate.

There will be two options for roadway crossings along the Ludlam Trail:

- **At-Grade Crossings:** At these 11 crossings, Ludlam Trail will be divided by a raised landscaped divider median into bicycle and pedestrian paths. The crossing will include ADA tactile warning strips and curb cuts, a lean bar, and an area to turn around between the curbed median and the roadway. Each crossing will have signage for both the trail users and street traffic, a green bike crossing for bikes, a high emphasis crosswalk for pedestrians, and cut-off pedestrian safety lighting. Mid-crossing refuge islands will be provided at multi-lane road crossings. Where appropriate, crossings can potentially include a half intersection traffic signal, or Rectangular Rapid Flashing beacon (RRFB), also known as High-intensity Activated Crosswalk (HAWK), and a push button actuator for the crossing.
- **Above-Grade Crossings:** These crossings will include an elevated (above-grade or grade separated) crossing that will carry the Ludlam Trail over the existing roadway on a bridge structure. This type of above-grade crossing is proposed at four locations: SW 40th Street/Bird Road/SR 976, SW 24th Street/Coral Way, SW 8th Street/Calle Ocho/Tamiami Trail/SR 90/US 41, and W Flagler Street/SR 968.

Site specific conditions, such as volume of vehicle traffic, signal proximity, and driveway access points were considered to determine the specific type of roadway crossing most appropriate for each roadway crossing location, per the recommendations in the DTPW-approved Ludlam Trail PD&E Traffic Study. In addition to those recommendations, an at-grade crossing improvement has been proposed along with the proposed overpass bridge at the SW 40th Street/Bird Road/SR 976 crossing. The FDOT has noted that the added at-grade crossing will require MDPROS to apply for a Design Variation for Turn Lane Deceleration Length from FDOT District Six during the final design phase. As proposed, the at-grade crossing (under the proposed overpass bridge) will require the modification of the eastbound left turn lane storage length from SW 40th Street/Bird Road/SR 976 onto SW 69th Avenue, reducing it by approximately 105 feet. The resulting turn lane would only be approximately 120 feet long in total, which will not comply with deceleration length requirements per FDM Exhibit 212-1 (for a design speed 45 mph).

During the final design phase, intersection sight distance will be determined for selecting the appropriate control at each mid-block-roadway intersection of the trail. Approvals for sign placement will be obtained as necessary prior to construction.

4.3.2 Bridges

The proposed project corridor crosses two canals – the Coral Gables/C-3 Canal and the Tamiami/C-4 Canal. Each of these canals are managed by the SFWMD. The existing bridge across the C-3 Canal is located approximately 0.5 mile north of SW 40th Street, in the northeast corner of A.D. “Doug” Barnes Park. The existing bridge across the C-4 Canal is located approximately 0.1 mile north of W Flagler Street. The existing bridges spanning each canal were originally part of a former rail line. As part of the proposed Ludlam Trail project, the bridges will be removed and replaced (see the concept plans in **Appendix D**). The existing bridges currently consist of in-water pilings that will be removed as part of this project. It is anticipated that the new replacement bridges will each be clear span without any structural elements (e.g., pilings, columns, foundations, etc.) placed in the canal. Details regarding the removal and replacement of each of the bridges will be determined in the final design phase of this project.

4.3.3 Development Zones

There are three zones of private development along the Ludlam Trail corridor at three major roadway crossings: SW 40th Street/Bird Road/SR 976, SW 24th Street/Coral Way, and from SW 8th Street/Calle Ocho/Tamiami Trail/SR 90/US 41 to SW 12th Street. Per the CDMP and zoning requirements, the development nodes will be sensitive to and compatible with the adjacent areas (e.g., a neighborhood mixed-use development fronting the trail corridor, which will serve the specific needs of trail users, such as bike/skate shops, outdoor cafes, flexible office space, and multi-family residential areas). MDC has 18-foot-wide perpetual easement agreements through each of the three private development zones to ensure continuity of the trail. The proposed trail has a paved width within the development nodes that varies from 16 to 18 feet, which is detailed in the concept plans in **Appendix D**.

4.3.4 Trail Improvements

Tree plantings and other forms of landscaping will surround the proposed Ludlam Trail, providing users with shade, improving aesthetics, and providing a landscaped buffer to adjacent single-family residences. It is anticipated that pedestrian rest areas will be located throughout the trail corridor and may offer trail

amenities (e.g., information signs or kiosks, shaded benches or outdoor seating areas, trash receptacles, drinking fountains or spigots, bike racks and bike repair stations, security lighting). Proposed trailheads may also contain aesthetic features (e.g., decorative display fountains, opportunities for public artwork displays). Details of the trail improvements will be developed during the final design phase of this project.

4.3.5 Construction Costs

Long Range Estimates (LRE) of the construction costs for Ludlam Trail are included in **Appendix I** based on the 15% Concept Plans and the current statewide FDOT planning level cost database. The project construction cost has been estimated at \$26,363,000. The maintenance of traffic (MOT), mobilization, and contingency costs have been estimated to be \$13,511,000, combined. MDC has preliminarily estimated a contamination remediation cost for the project corridor of approximately \$5,500,000. The overall Total Construction Cost for the Ludlam Trail project is an estimated \$45,374,000. The cost estimates are based on preliminary information available at the time of printing and are anticipated to be refined as the project progresses. These costs do not include administrative costs, general conditions, or insurance/bonds.

4.4 Comparative Alternatives Evaluation

An evaluation matrix comparing the No Build (Do Nothing, No-Action) Alternative with the Build (Preferred) for Ludlam Trail is provided below. **Table 4-1** compares the Cost, Socio-Economic, Environmental, and Engineering impacts between the two alternatives. The Build Alternative will significantly enhance the overall safety, mobility, and operations within the study area when compared to the No Build Alternative.

4.5 Selection of the Preferred Alternative

Selection of the Preferred Alternative will occur after the Public Hearing and public comment period.

Table 4-1 Evaluation Matrix

Parameters		Study Alternatives	
		No Build	Build
Cost	Construction Costs	\$0	\$26,363,000
	MOT, Mobilization, Contingency	\$0	\$13,511,000
	Contamination Remediation Cost	\$0	\$5,500,000
	Total Estimated Project Cost	\$0	\$45,374,000
	Revenue Potential	No	Yes
Socio-Economic	Right-of-Way Impacts	No Impact	Minimal
	Mobility	None	Enhanced
	Economic Impacts	No Impact	Enhanced
Environmental	Historic Sites/Districts	No Impact	No Impact
	Section 4(f)	No Impact	Enhanced
	Wetlands and Surface Waters	No Impact	No Impact
	Water Quality and Quantity	No Impact	Enhanced
	Floodplains	No Impact	Minimal
	Outstanding Florida Waters	No Impact	No Impact
	Aquatic Preserves	No Impact	No Impact
	Threatened and Endangered Species	No Impact	No Impact
	Air Quality	No Impact	No Impact
	Noise Impacts	No Impact	No Impact
	Contamination	No Impact	Minimal
Engineering	Pedestrian/Bike Provisions	None	Enhanced
	Utility Impact Potential	None	Minimal
	Design Variations	No	Yes

5.0 PROJECT COORDINATION AND PUBLIC INVOLVEMENT

5.1 Agency Coordination

Ludlam Trail is anticipated to serve as a mobility option to accommodate potential non-motorized travel demand related to area growth. Per review of the Advance Notification Package issued in October 2018, the Miami-Dade Transit (MDT) Division of Miami-Dade DTPW stated that the Ludlam Trail Corridor will improve bicycle and pedestrian mobility and access to the multitude of existing transit services that traverse the project corridor at major intersections. MDPROS requested to be included in all project phases to assist FDOT with potential shared-use trail connections. These connections are critical in closing first-mile and last-mile gaps; improving mobility and access to and from transit hubs; and increasing use within the Ludlam Trail Corridor. The Miami-Dade Fire Rescue Department (MDFR) requested that a general site plan for the entirety of the Ludlam Trail Corridor be submitted to MDFR to assure that dedicated emergency passages comply with the MDFR Access Road Requirements. MDFR noted that during the platting and permitting stages, the project plans will be reviewed by the Fire Engineering & Water Supply Bureau to assure compliance with the Florida Fire Prevention Code (FFPC) and National Fire Protection Association (NFPA) standards. MDFR stated that by providing non-motorized transportation options, fewer vehicles will travel on the surrounding roadway network which will help to reduce traffic congestion on major arterials and enhance emergency response times. The Miami-Dade Aviation Department (MDAD) indicated that there is no objection to the proposed trail if there are no conflicts with aviation regulations and MDC's Code. The MDC Seaport Department indicated no objection to the project. The Miami-Dade Police Department indicated no comment but stated that specific comments would be provided on the project, as needed, during the permitting phase.

During the course of the *Miami-Dade County Trail Design Guidelines and Standards: Ludlam Trail Case Study*, presentations were made to the following committees:

- Metropolitan Planning Organization (MPO) Transportation Aesthetics Review Committee (TARC) – February 3, 2010 Resolution #2-10
- MPO Bicycle and Pedestrian Advisory Committee (BPAC) – February 24, 2010 Resolution #5-2010
- MPO Transportation Planning Council (TPC) – March 15, 2010 Information Item

5.2 Public Involvement

The public involvement phase of the Ludlam Trail PD&E Study is a critically important aspect of the process. MDPROS has incorporated public outreach techniques, described below, that include a high degree of citizen participation into this project. MDPROS currently maintains a list of elected and appointed local, state, regional, and federal officials, municipal sub-committees, technical staff, agencies, municipalities, and community groups.

Throughout the process, public participation has been and will continue to be solicited without regard to race, color, creed, religion, sex, age, national origin, familial status, or disability. Solicitation for public participation may be made by MDPROS through direct mail, at group meetings, and dissemination of project information collaterals, as needed. Public solicitation for this project is also made available by MDPROS using plain language and in English, Spanish, and Creole for those with limited English proficiency (LEP). The notification documents may include, but not be limited to, direct mailings, project information brochures, project fact sheets, meeting flyers, and hearing handouts. The specific community outreach techniques used by MDPROS to notify the public and solicit input into the project development process include:

- Media
- Project Fact Sheets/Flyers
- Press Releases
- Legal Display Ads
- Public Announcements
- Invitational Letters/Direct Mail List
- Presentations to Local Officials
- Informational Public Meetings
- Advertised Public Hearings
- Informal Meetings
- Special Interest Group Meetings
- One-On-One Meetings
- Advance Notification and the ETDM Process
- Coordination with Major Activity Centers
- Project Information Contact Number
- Website and Email

Upon completion of the PD&E study process, throughout the final design process, it is anticipated that a MDPROS Design Project Manager will maintain the appropriate level of public involvement activities for the project. These public involvement activities may include additional coordination meetings with local government and environmental permitting agencies, stakeholders, work sessions, and small group meetings, as needed, or directed by MDPROS, in coordination with FDOT.

A Public Information Meeting (PIM) for the Ludlam Trail PD&E Study was held on Thursday, November 19, 2020, from 6:00 pm to 8:00 pm. The PIM was a virtual meeting hosted via Zoom. Project information, including the meeting invitation, a list of Frequently Asked Questions (FAQ), conceptual renderings, and a comprehensive set of 15% conceptual engineering plans, was posted on the project website at www.miamidade.gov/ludlamtrail in advance of the meeting. An interactive, colored roll plot of the entire 5.6-mile project corridor that the public could zoom into for details was also provided on the website. During the PIM, a PowerPoint presentation was made followed by a question and answer session. The virtual meeting was attended by 421 participants, inclusive of MDPROS staff and the project team. Representatives from the offices of Mayor Sally Phillips, City of South Miami, Councilmember Anna Hochkammer, Village of Pinecrest, and MDC Commissioner Rebecca Sosa also participated in the PIM. A total of 296 comments were provided during the 21-day PIM comment period, which ended on December 10, 2020. A PIM Summary Memo and a recording of the PIM were posted to the project website following the meeting.

A Public Hearing for the Ludlam Trail PD&E Study has been scheduled for late August 2021. Additional public involvement details can be found in the associated Public Involvement Plan, a companion report in this PD&E Study.