

SE 27th St. Shared Use Path Analysis Memo

**Architectural and Engineering Services for Kincaid Loop Trail
RFP 23-414-DK
Alachua County, FL**

Prepared For:

**Alachua County Public Works
5620 N.W. 120th Lane
Gainesville, FL 32653**



Prepared By:

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BENTLEY

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1 Executive Summary

Alachua County Public Works has engaged Bentley Group, Inc. to perform an analysis for the shared use path (SUP) construction on SE 27th St. from SE 41st St. to SR 20 (Hawthorne Rd.) The western portion of the SUP project has already been determined. The purpose of the analysis memo is to evaluate two (2) alternatives for the SE 27th SUP construction.

Alternative 1 will propose the SUP on east side of SE 27th St., which is more densely populated and offers direct access for pedestrian and bicycle users in comparison to Alternative 2. Due to the number of driveway and side street connections on the east side of SE 27th St., Alternative 1 presents more motorists/pedestrian conflict points as well as a more robust drainage system design to maintain positive drainage. However, due to the existing 5 ft. sidewalk along the majority of the east side of SE 27th, the adjacent community is already accustomed to the existing pedestrian traffic. This alternative will require the side street crossing locations to be delineated with high-emphasis crosswalk markings and pedestrian crossing signing to bring attention to the upcoming crossing. Alternative 1 provides better access for both transit and school bus users and fewer utility impacts, compared to Alternative 2.

Alternative 2 will propose the SUP on the west side of SE 27th St. Alternative 2 does not offer direct access to the majority of potential path users, which are located on the east side of SE 27th St., as mentioned above. This alternative will require a crossing on SE 27th St. to allow users on the east side of the road to access the path. Another crossing will be required on SE 41st Ave. to bring users from the north side of the road, down to the south, which is the already determined connection point for the SUP. To meet standards for mid-block crossings, pedestrian lighting will be required at both of the above-mentioned crossings. Based on field measurements, the existing longitudinal grade of SE 27th St. is steep, which will limit the potential crossing locations to areas of adequate sight distance and meet ADA cross-slope criteria. Based on documented and observed speeding on SE 27th St., it is recommended that the potential crossing be located outside of the 45mph speed limit zone, which will restrict the crossing location to areas north of SE 19th Ave. It is also recommended to reduce the speed limit on SE 41st Ave. approaching SE 27th St. from 45 mph to 35 mph to increase pedestrian safety.

Based on an analysis of existing field conditions, data collection, and engineering judgement, Alternative 1 was selected as the safest and most economical alignment alternative.

See Appendix A and Appendix B for Alternative 1 and Alternative 2 Conceptual layouts, respectively.

2 Project Description and Analysis Objective

Project Description:

Alachua County Public Works will be constructing a 10 ft. wide, 3.34 mile long, SUP along Kincaid Loop in Alachua County. The project begins along the west side of SE 15th Street at the northern Boulware Springs entrance, then heads south to SE 41st Avenue. The path continues east along the south side of SE 41st Avenue to SE 27th Street. The path then heads north along SE 27th Street and ends at SR 20 (Hawthorne Road). **The side of SE 27th Street on which the SUP is recommended to be constructed is later discussed in sections 5 through 7 in this evaluation memo.** In addition to the proposed SUP mentioned above, the project will also include associated drainage improvements, pedestrian signing and pavement markings, pedestrian lighting, and various pedestrian and bicycle safety enhancements.



Figure 2-1 Project Location

Analysis Objective:

The objective of this Shared Use Path Analysis Memo is to evaluate providing a shared use path on either the east or west side of SE 27th St. from SE 41st St. to SE Hawthorne Rd. The SUP Analysis Memo will detail safety, motorists/pedestrian conflicts at side street and driveway connections, potential mid-block crossing locations and safety implications, right-of-way (ROW) availability, existing topography, drainage impacts, and shade/tree canopy considerations.

3 Existing Conditions

SE 27th St. is a two-lane two-way roadway with 10 ft. travel lanes, 2 ft. unpaved shoulders, and centered within an 80 ft. ROW width. The speed limit varies from 45 mph south of SE 19th Ave. to 35 mph north of SE 19th Ave. A 5 ft. wide sidewalk exists on the east side of SE 27th St. from 242 ft. north of SE 24th Place to Hawthorne Rd.

The existing drainage system consists of shallow roadside ditches/swales with side drains in isolated locations. There are three existing cross drains, including one 11ft. wide corrugated elliptical culvert that will require extension to accommodate the proposed SUP. All improvements associated with the three cross drains will be performed by Alachua County.

Based on an 811 ticket, Cox Cable, GRU (electric, gas, sewer, water, communications) AT&T Distribution, Uniti Fiber, and Gatorworks are all present within the corridor. The majority of the existing utilities are located on the west side of the road. Overhead electric exists on the west side of the SE 27th St. corridor, located approximately 8 ft. from the existing western ROW line. Corridor lighting exists on the west side of SE 27th St. from SE 15th Ave. to Hawthorne Rd. SE 27th St. predominantly serves residential houses that are more densely populated on the east side of SE 27th St. SE 27th St. is a transit route that serves Regional Transit System (RTS) route 7 and a school bus route that serves Lake Forest Elementary School, Lincoln Middle School, and Eastside High School.

4 Design Criteria and Design Principles

Analysis recommendations are based on design criteria for pedestrian facilities contained in the 2018 Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (commonly known as the Florida Greenbook), Alachua County Corridor Design Manual, FDOT Standard Plans FY 2024-25, and Manual on Uniform Traffic Control Devices, 2009 Edition (MUTCD).

Shared Use Paths

The Florida Greenbook defines shared uses paths as “paved facilities physically separated from motorized vehicular traffic by an open space or barrier.” These facilities may be within the highway ROW or an independent ROW. Typical users may include pedestrians, bicyclists, skaters, and others.

According to the Florida Greenbook, the minimum recommended width for a two-way path is 10 ft. Under constraints, reducing the trail to 8 ft. may be acceptable if bicycle and pedestrian traffic is anticipated to be low. A horizontal buffer of 2 ft. of mostly flat land should be provided adjacent to the shared use path, with 3 ft. preferred, if available. Additional clearance should be provided to adjacent ditches or steep slopes (5 ft. minimum) and fixed objects such as poles and fences (3 ft. minimum). A 5 ft. separation is recommended between the shared use path and the adjacent roadway.

In general, proper design of pedestrian crossings shall consider the following:

- Crossings should be placed at locations with ample sight distances.
- The entire length of the crosswalk shall be visible to drivers at a sufficient stopping sight distance.
- All crosswalks shall be easily identified and clearly delineated, in accordance with the MUTCD.
- Additionally, signs and markings should be utilized whenever possible to provide pedestrians with clear directions. The signs and markings should conform to the standards set forth in the MUTCD.

5 Safety Analysis

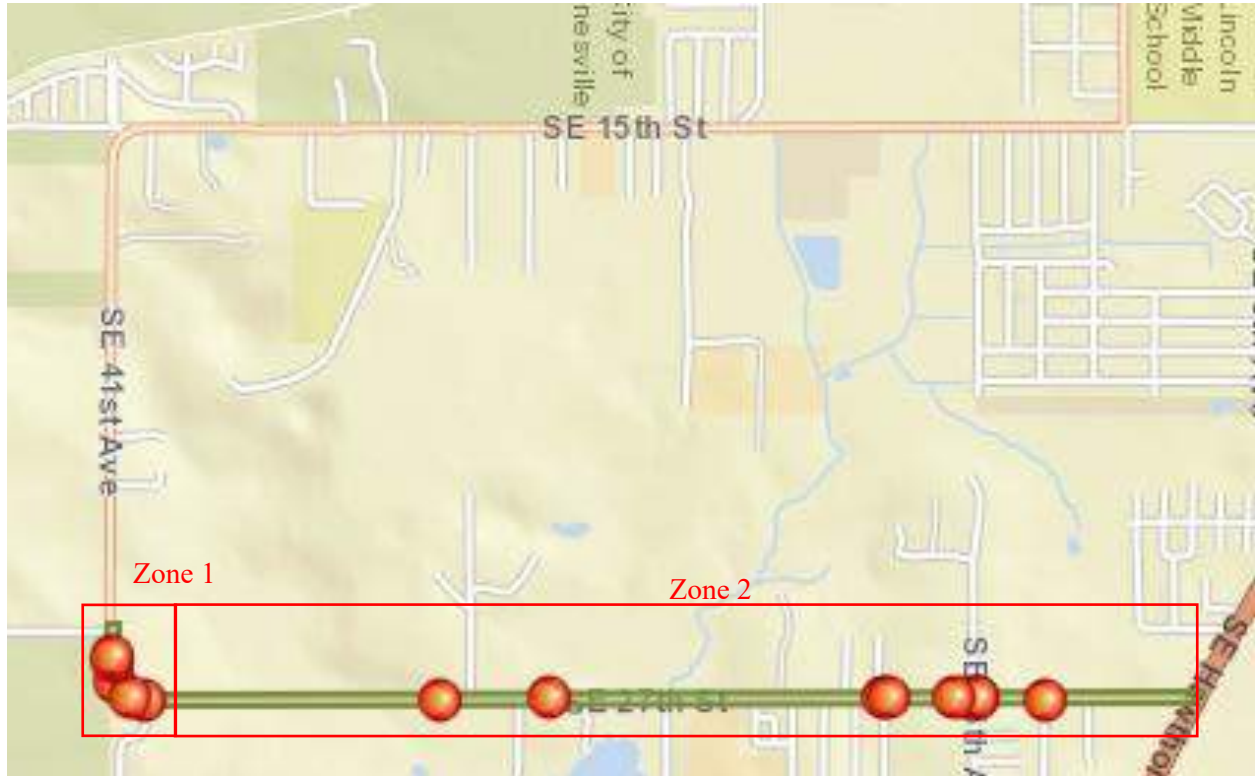


Figure 5-1 Crash Locations

Having a clear understanding of existing crash patterns will aid in the determination of the safest SUP alignment and/or consideration of a crossing location. Existing crash data was accessed between 2011 and 2019. The limits of the crash investigation began at the intersection of SE 41st Ave. and SE 27th St. and ended at the intersection of SE 27th St. and SE Hawthorne Rd. Between the investigation years, 15 crashes occurred with 7 injury crashes, and 0 fatalities. No pedestrian or bicycle related crashes were reported. Eight crashes occurred during night-time hours. Road surface or wet weather conditions were not a major contributing factor.

Zone 1: SE 41st Ave.

The majority of the crashes occurred in the northbound and eastbound direction and were classified as lane departure type crashes. This is evidence of speeding and/or distracted driving.

Zone 2: North of SE 41st Ave. to SE Hawthorne Rd.

The direction of crashes was relatively evenly distributed between the northbound and southbound directions. The contributing factors were mainly distracted driving, speeding, and careless driving.

6 Alternatives Analysis

For the purpose of this analysis, “Alternative 1” will refer to the SUP on the east side of SE 27th St. from SE 41st St. to Hawthorne Rd. “Alternative 2” will refer to the SUP on the west side of SE 27th St. from SE 41st St. to Hawthorne Rd.

6.1.1 Available Right-of-Way and Existing Topography:

Available Right-of-Way:

For existing ROW width is typically 80 ft. centered on SE 27th St.

Existing Topography:

The SE 27th St. corridor longitudinal grade consists largely of a rolling terrain which, based on field observations, has a profile grade approaching 12% in isolated locations. This observation will prove to be vitally important when considering proposed mid-block crossings. Dramatic changes in elevations, as seen on the SE 27th St. corridor can limit sight distance and visibility of the proposed mid-block crossing. This terrain can be seen below in Figure 6-1.

Further, per FDOT FDM 222.2.3.2, mid-block crossing locations where the roadway profile (cross-slope) exceed 5% are not recommended. Both the longitudinal grade and roadway cross-slope will play a significant role in the proposed crossing location.



Figure 6-1 SE 27th St. Rolling Terrain

The roadside slopes on both the east and west side of SE 27th St. consist primarily of shallow swales.

On the west side, the bottom of the swale is located approximately 20 ft. from the edge of pavement. Isolated locations show the absence of a swale but instead, water sheet flows off the county ROW into adjacent properties. There are a few areas that have steep slopes and drainage features that will require ditch re-grading and drainage structure extensions to keep the SUP within the ROW. From SE 29th Blvd. to SE 30th Pl. the existing roadside slopes flatten out, as shown below in Figure 6-2.



Figure 6-2 SE 30th Pl. Roadside Slope (Looking NW)

On the east side, roadside slopes tend to sheet flow to the east, outside the county ROW. A shallow swale begins at roughly SE 29th Blvd. and continues to SE Hawthorne Rd. with the bottom located roughly 20 ft. from the edge of pavement. Isolated locations show a rise in existing ground adjacent to the County ROW. This is presented at SE 22nd Rd. to SE 20th Ave., as seen below in Figure 6-3.



Figure 6-3 SE 22nd Rd. Roadside Slope (Looking NE)

In regard to impacts to existing topography, both Alternative 1 and Alternative 2 are anticipated to have similar impacts as both will require side slope re-grading to keep the SUP within the existing ROW.

Alternative 1, however, is anticipated to have a lesser impact on existing utilities and thus a more favorable approach.

6.1.2 Transit / School Bus Stop Access

Regional Transit System (RTS) route 7 services the SE 27th St. corridor with 4 bus stop locations. See Figure 6-4 below.

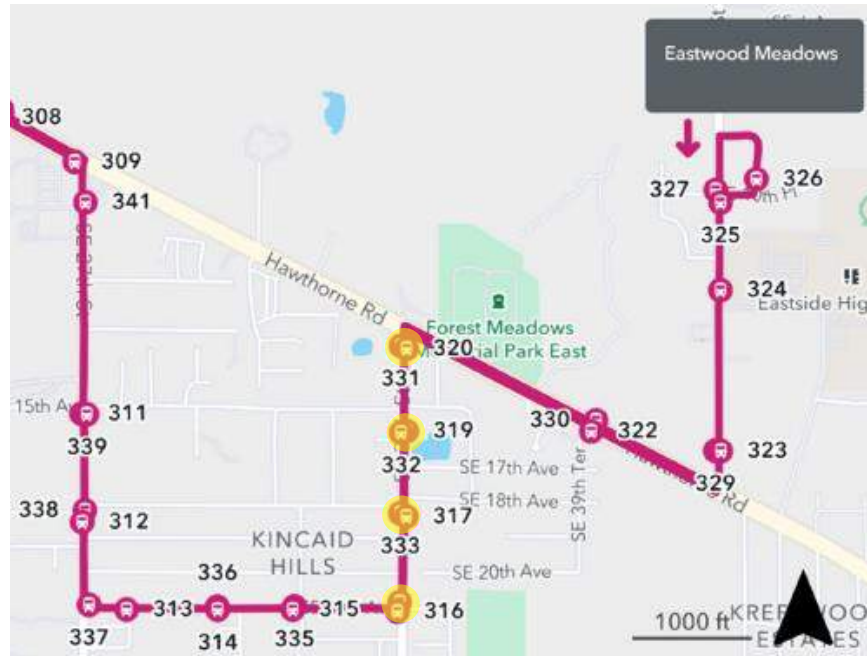


Figure 6-4 Transit Stops

Lake Forest Elementary School, Lincoln Middle School, and Eastside High School are zoned to service the SE 27th Street corridor. Currently the only school bus stop is located on the east side of SE 27th St. at SE 18th Ave. See Figure 6-5 below.



Figure 6-5 School Bus Stop

In regard to providing access to transit and school bus stops, **Alternative 1** is a more favorable approach.

6.1.3 Pedestrian and Bicycle Conflict Points:

When considering the alternatives for the SUP, reducing the number of vehicular/pedestrian conflicts is a priority, as is evaluating the severity of the conflict points in relation to safety.

Alternative 1 will cross 13 unsignalized side street connections and 18 driveway connections on the east side of SE 27th St. In contrast, Alternative 2 will cross 4 unsignalized side street connections and 8 driveway connections on the west side of SE 27th St.

Though Alternative 1 does present more pedestrian conflict points, it's important to note that a 5 ft. wide sidewalk already exists on the east side of SE 27th St. from roughly SE 24th Pl. to Hawthorne Rd., roughly half of the SE 27th St. corridor. The community using these side street and driveway connections are accustomed to pedestrian traffic, and further, no pedestrian or bicycle-related crashes were reported within the previously discussed crash data. Another item for consideration is the fact that SE 27th St. is more densely populated on the east side, meaning potential SUP users will have direct access to the SUP without needing to cross SE 27th St. This alternative will require adequate crossing delineation on the side street connections to bring attention to the SUP. High emphasis crosswalk markings and pedestrian crossing signing will be proposed to alert motorists and pedestrians alike to the upcoming conflict.

In contrast, Alternative 2 will construct the SUP on the west side of SE 27th St., thus a mid-block crossing will be required for the existing community located on the east side of SE 27th St. to gain access to the SUP on the west. This presents its own potential safety concerns. Based on evidence of speeding identified in the crash data, field observations and noted by the community, as well as the higher 45 mph posted speed limit, south of SE 19th Ave., it is recommended that the potential crossing location be placed north of SE 19th Ave., which is the beginning of the 35 mph posted speed limit.

With Alternative 2, it is anticipated that 2 mid-block crossing locations will be required. One location on SE 27th St., north of SE 19th Ave., as mentioned above, and another crossing west of the curve at the intersection of on SE 41st Ave. and SE 27th St. This crossing location will bring SUP users from the north side of SE 41st Ave. to the south, where the SUP has previously been determined to be located. With only these 2 crossings, access, and safety for potential trail users (residents) on the east side would be compromised. For example, residents of Live Oak Acres would have to walk over 3,000 ft. to access the SUP, which is unlikely to happen. Rather, users are likely to cross using the shortest path, which, as previously explained, presents additional safety concerns (slope, sightlines, speed, etc.).

Mid-block crossing visibility for both motorists and pedestrians will be a priority. Many pedestrian safety treatments are available to enhance the visibility of a mid-block crossing. Treatments such as Rectangular Rapid Flashing Beacons (RRFB's) or raised crosswalks can be included however, it should be noted that RRFB's and raised crosswalks are restricted to posted speed limits of 35 mph or less. To implement the above-mentioned treatments, a speed reduction on SE 41st Ave. from 45 mph to 35 mph will be required. Another item of consideration is, per FDOT FDM 231.3.4, pedestrian lighting will be required where mid-block crosswalks are utilized. An example of pedestrian lighting is seen below in Figure 6-6.

See Appendix A and Appendix B for Alternative 1 and Alternative 2 Conceptual layouts, respectively.

Though Alternative 1 does have more motorist/pedestrian conflict points, the severity of these conflict points is considered to be lower compared to Alternative 2. Thus, **Alternative 1** is a more favorable approach to ensuring pedestrian safety.



Figure 6-6 Pedestrian Lighting

6.1.4 Drainage:

In several areas along the SE 27th Avenue corridor, between SE 41st Ave to SR 20 (SE Hawthorne Rd), there is a lack of defined drainage conveyance with runoff either sheet flowing along the edge of pavement or out of the right of way entirely. Generally speaking, however, the roadway drains via shallow roadside swales to one of three cross drains. In some locations there is off site runoff sheet flowing into the right of way that is comingled and conveyed with the roadway runoff. The intent with the SUP design will be to maintain existing drainage patterns to the greatest extent possible.

With both alternative alignments, the drainage challenges will be ensuring offsite flow patterns are not blocked and reestablishing the onsite drainage, impacts to the roadside swales, and the associated side drains. The grading challenges associated with maintaining existing offsite flows appear to be similar between Alternative 1 and Alternative 2. However, the existing roadside swales, particularly in the portion between SE 18th Ave and the end of the project, appear to be better defined, often with already steep side slopes, on the east side of the road compared to the west side of the road.

There are approximately 6 side drains on the west side of the roadway and 27 side drains on the east side, 15 of which are located between SE 18th Ave and the end of the project. Given the tight right of way, reestablishing the drainage will result in higher costs associated with the relocation of side drain pipes and may also require either closed drainage systems or a narrower trail width with Alternative 1 versus Alternative 2. Thus *Alternative 2 is a more favorable approach for drainage design.*

6.1.5 Shade/Tree Canopy:

Shading along an SUP is desirable and can play a significant role in the users' comfort. Adequate tree plantings can provide the necessary protection to shade trail users from the hot sun. Both the west and east side of SE 27th St. provide similar potential shade accommodations for the SUP users for the majority of the corridor. North of SE 22nd Rd. trees are more prevalent on the east side of SE 27th St., outside the drainage swale and to the inside of the existing sidewalk. This is mostly likely due to the denser population on the east side of SE 27th St.

In regard to shade accommodation, Alternative 1 will provide a slightly more comfortable experience for the SUP users.

6.1.6 Opinion of Probable Cost:

Below provides a planning level Opinion of Probable Cost (OPC) to construct the proposed alternatives.

ALTERNATIVE 1					
		Quantity	Unit	Unit price	Total Price
0110 11	CLEARING AND GRUBBING	6.20	AC	\$ 82,000.00	\$ 508,400.00
0160 4	TYPE B STABILIZATION	16,091.60	SY	\$ 8.00	\$ 128,732.80
0285701	OPTIONAL BASE, BASE GROUP 01	11,494.00	SY	\$ 27.00	\$ 310,338.00
0334 1 12	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	948.00	TN	\$ 154.00	\$ 145,992.00
0430175118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"S/CD	1,620.00	LF	\$ 185.00	\$ 299,700.00
0430982125	MITERED END SECTION, OPTIONAL ROUND, 18" CD	54.00	EA	\$ 3,000.00	\$ 162,000.00
0570 1 2	PERFORMANCE TURF, SOD	22,256.00	SY	\$ 5.00	\$ 111,280.00
0711 11123	THERMOPLASTIC, STD, WHITE, SOLID, 12"	560.00	LF	\$ 4.00	\$ 2,240.00
0711 14125	THERMOPLASTIC, PREFORM, WHITE, SOLID, 24"	600.00	LF	\$ 17.00	\$ 10,200.00
0711 16101	THERMOPLASTIC, STANDARD-OTHER SURFACES, WHITE, SOLID, 6"	0.28	GM	\$ 5,500.00	\$ 1,540.00
0700 1111	SINGLE COLUMN GROUND SIGN ASSEMBLY	28.00	EA	\$ 2,000.00	\$ 56,000.00
COMPENENT SUB-TOTAL					\$ 1,736,422.80
0102 1	MAINTENANCE OF TRAFFIC			10%	\$ 173,642.28
SUB-TOTAL					\$ 1,910,065.08
0101 1	MOBILIZATION			10%	\$ 191,006.51
SUB-TOTAL					\$ 2,101,071.59
	PROJECT UNKNOWNNS			15%	\$ 315,160.74
SUB-TOTAL					\$ 2,416,232.33

Table 6-1 Alternative 1 OPC

ALTERNATIVE 2					
		Quantity	Unit	Unit price	Total Price
0110 11	CLEARING AND GRUBBING	7.50	AC	\$ 82,000.00	\$ 615,000.00
0160 4	TYPE B STABILIZATION	16,500.00	SY	\$ 8.00	\$ 132,000.00
0285701	OPTIONAL BASE, BASE GROUP 01	11,692.00	SY	\$ 27.00	\$ 315,684.00
0334 1 12	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	965.00	TN	\$ 154.00	\$ 148,610.00
0430175118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18"S/CD	360.00	LF	\$ 185.00	\$ 66,600.00
0430982125	MITERED END SECTION, OPTIONAL ROUND, 18" CD	12.00	EA	\$ 3,000.00	\$ 36,000.00
0570 1 2	PERFORMANCE TURF, SOD	22,222.00	SY	\$ 5.00	\$ 111,110.00
0711 11123	THERMOPLASTIC, STD, WHITE, SOLID, 12"	320.00	LF	\$ 4.00	\$ 1,280.00
0711 14125	THERMOPLASTIC, PREFORM, WHITE, SOLID, 24"	340.00	LF	\$ 17.00	\$ 5,780.00
0711 16101	THERMOPLASTIC, STANDARD-OTHER SURFACES, WHITE, SOLID, 6"	0.17	GM	\$ 5,500.00	\$ 935.00
0700 1111	SINGLE COLUMN GROUND SIGN ASSEMBLY	21.00	EA	\$ 2,000.00	\$ 42,000.00
	MIDBLOCK CROSSING (LIGHTING, CONDUIT, PULLBOXES)	2.00	LS	\$ 150,000.00	\$ 300,000.00
COMPENENT SUB-TOTAL					\$ 1,774,999.00
0102 1	MAINTENANCE OF TRAFFIC			10%	\$ 177,499.90
SUB-TOTAL					\$ 1,952,498.90
0101 1	MOBILIZATION			10%	\$ 195,249.89
SUB-TOTAL					\$ 2,147,748.79
	PROJECT UNKNOWNNS			15%	\$ 322,162.32
SUB-TOTAL					\$ 2,469,911.11

Table 6-2 Alternative 2 OPC

Notes:

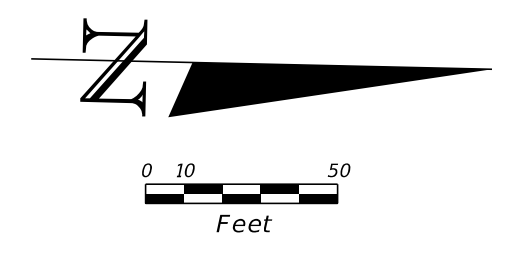
1. The above OPCs are based on conceptual design.
2. The above OPCs reflect major controlling items and do not represent the total construction cost in its entirety, actual construction costs will vary.
3. The above OPCs are based on historical cost information made available by FDOT.
4. Embankment (120 6) and Excavation (120 1) quantities are assumed to be equivalent with both alternatives and omitted from the above OPCs.
5. Utility relocation and permitting costs are omitted from the above OPCs.

7 Conclusion

The purpose of this analysis memo was to conduct a limited analysis of 2 alternatives for the alignment of the SUP along SE 27th St. Alternative 1, will construct the proposed SUP on the east side of SE 27th St. Alternative 2, will construct the proposed SUP on the west side of SE 27th St. Based on an analysis of existing field conditions, data collection, and engineering judgement, *Alternative 1 was selected as the safest, and most economical alignment alternative that would provide the adjacent community with the most direct access to the proposed path while decreasing impacts to the existing infrastructure.*

See Appendix A and Appendix B for Alternative 1 and Alternative 2 Conceptual layouts, respectively.

Appendix A – Alternative 1 Conceptual Layout



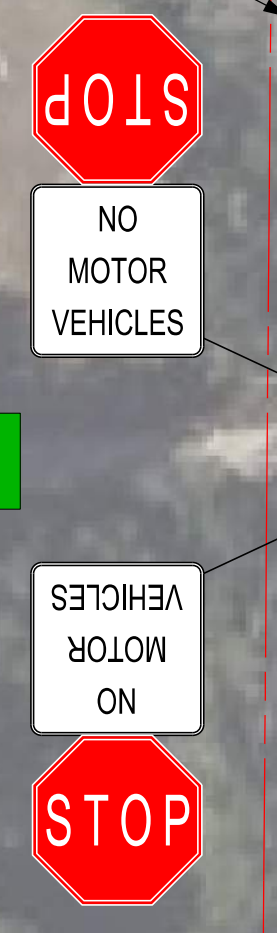
LEGEND

PROPOSED SHARED USE PATH 

PROPOSED SHARED USE PATH
(ALIGNMENT ALREADY DETERMINED)

BEGIN SE 27TH ST.
SHARED USE PATH ANALYSIS

SE 26TH ST.

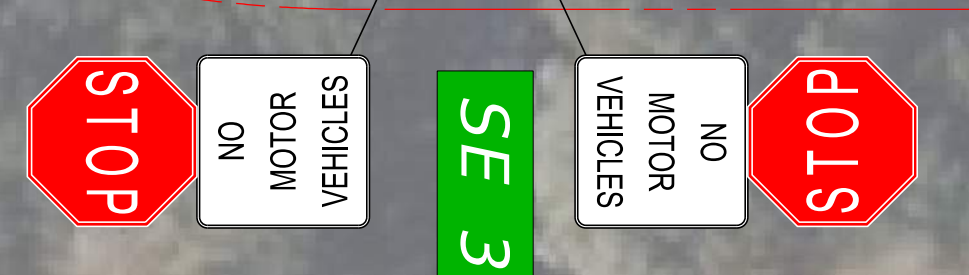


SE 41ST AVE.

EXIST. RIGHT OF WAY

SE 27TH AVE.

EXIST. RIGHT OF WAY



SE 39TH PL.


SE 39TH PL.

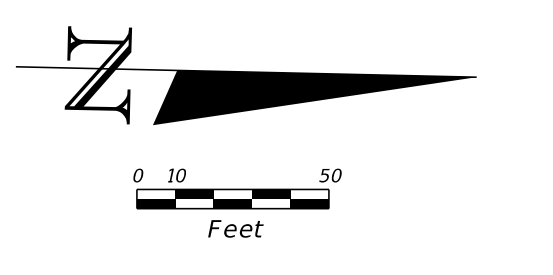


SE 29TH BLVD.





LEGEND

PROPOSED SHARED USE PATH 




LEGEND

PROPOSED SHARED USE PATH 

EXISTING SIDEWALK 

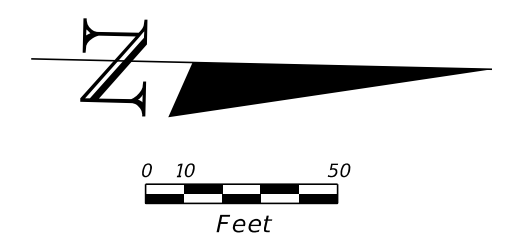


END SE 27TH ST.
SHARED USE PATH
ANALYSIS

SE HAWTHORNE RD.

Appendix B – Alternative 2 Conceptual Layout

SPEED
LIMIT
35



LEGEND

PROPOSED SHARED USE PATH

PROPOSED SHARED USE PATH
(ALIGNMENT ALREADY
DETERMINED)

AHEAD



AHEAD



BEGIN SE 27TH ST.
SHARED USE PATH
ANALYSIS

SE 26TH ST.



AHEAD

SE 41ST AVE.

SPEED
LIMIT
35

EXIST. RIGHT OF WAY


SE 27TH AVE.


EXIST. RIGHT OF WAY

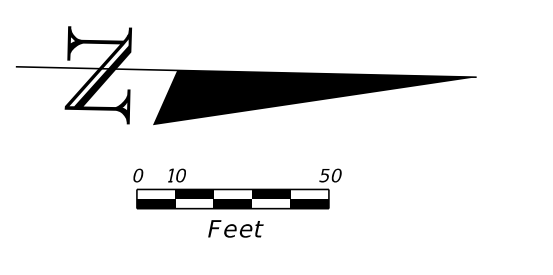
SE 39TH PL.

SE 29TH BLD.


LEGEND

PROPOSED SHARED USE PATH 

EXISTING SIDEWALK 




LEGEND

PROPOSED SHARED USE PATH 

EXISTING SIDEWALK 