EXHIBIT "A"

Road Safety Audit Report

Spring Hill Drive from US 19 to east of Kenlake Avenue.

Hernando County, Florida

April 2025

Prepared for:

Hernando County Public Works

Engineering Division

Task Order No. 26 of 18-R00006

Engineer's Certification

I, Bijan Behzadi, P.E. No. 43868, certify that I currently hold an active Professional Engineer's license in the State of Florida and am competent through education, experience, and examination to provide professional engineering services in the civil and traffic engineering disciplines contained in this report. I further certify that this report was prepared by me and under my responsible charge as defined in Chapter 61G15-18.001 F.A.C., and that all statements, conclusions and recommendations made herein are true and correct to the best of my knowledge and ability.

Road Safety Audit and Study Location:

Spring Hill Drive from US 19 to east of Kenlake Avenue

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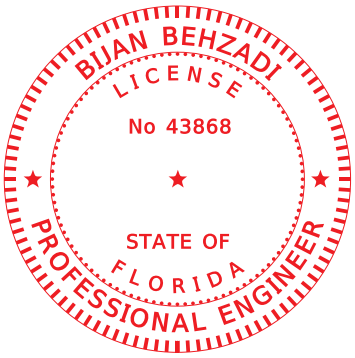

Bijan Behzadi, P.E.

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Executive Summary

Hernando County Public Works Department, Traffic Engineering Division, retained HDR engineering, Inc. to conduct a Road Safety Audit (RSA) to further enhance the overall safety performance of Spring Hill Drive from US 19 to East of Kenlake Avenue. The total project length is 0.42 mile. Research conducted by the Federal Highway Administration (FHWA) and the Florida Department of Transportation (FDOT) shows that RSAs are both effective and cost beneficial as a proactive safety improvement tool.

Objectives of the Road Safety Audit

The aim of the RSA is to answer the following questions:

- What elements of the road may present a safety concern and to what extent, to which road users, and under what circumstances?
- What opportunities exist to eliminate or mitigate the identified safety concerns?

Basis for Findings

The findings of the Spring Hill Drive RSA are based on the following analytical procedures:

- Selected the RSA team
- Conducted pre-audit meeting with the RSA team to review project information and receive input about the roadway conditions
- Performed field observations under various conditions
- Conducted audit analysis and prepared report of findings
- Presented the audit findings to the Project Manager and RSA Team, and received input
- Incorporated findings in the project report

A thorough review of the crash data by types from 2019 to 2023 (five years) as extracted from Signal Four Analytics Database was conducted to identify any crash patterns that could be mitigated through near-term, and long-term improvement strategies.

The following major safety issues describe the deficiencies in specific traffic control devices, the crash frequencies and root causes, and certain major design control elements on the segment of the corridor under investigation:

Safety Issue 1: Signing, Pavement Markings, Sidewalks, Drainage, and Intersection Lighting

- Signing

  There are two types of signs along this corridor that are defined by their function as follows:

  - Regulatory signs giving notice of traffic laws or regulations.
  - Warning signs giving notice of a situation that might not be readily apparent.

  Most of the signs have lost their retro-reflectivity values, which are one of several factors associated with maintaining nighttime sign visibility. The loss in the expected sign life and retro-reflectivity degradation is due to the age of the signs and the weather.

- Pavement Markings

  The following deficiencies were identified related to the pavement markings:

  - The pavement markings have a significant loss of retro-reflectivity ratings and Reflective Pavement Markers (RPM) were missing in several segments, and they lack the initial retro reflectivity of 450 mcd/m2 /lx and 350 mcd/m2 /lx for white and yellow, respectively.

- Drainage

  The current drainage system has deteriorated, leading to depressions in the roadway turning paths, shoulders, and open channels. Significant pavement edge drop-offs with elevation differential exist. Sidedrain pipes leading to ditch bottom inlets are buried with flow obstruction thus water is ponding because the outflow ditch has silted up.

  Ponded water can cause drivers to leave their lane, reduce braking ability or contribute to pavement deterioration. Unsafe edge drop-offs cause crashes. According to FHWA Resource Centers, an estimated 11,000 Americans suffer injuries and 160 die each year in crashes related to unsafe pavement edges, at a cost of $1.2 billion. In addition, tort liability claims resulting from pavement edge drop-offs cost highway agencies millions each year. In one case, the court awarded $6 million for injuries caused by a low, defective shoulder drop-off.

- Corridor and Intersection Lighting

  The corridor in general has poor lighting intensity levels with very low visibility. Luminaires are also old and outdated High Pressure Sodium (HPS). The existing lighting is owned and maintained by the local power company. In summary, the entire corridor along the project length and the signalized intersection of Kenlake Avenue lack adequate illumination.

Safety Issue 2: Access Management -Based Crash Analysis

Review of the results of the crashes analysis revealed that most crashes occurred at median openings and the roadway segment between US 19 (Commercial Way) and Pinehurst Dr (West Location).

Based on review of the crashes that occurred during the past five years (2019-2023) study period along Spring Hill Drive, the severity of the crashes is classified as:

- Fatal – 0 crash
- Injury – 29 crashes
- Property Damage Only – 111 crashes

The following three crash types were most predominant during the five years (2019-2023) study period:

1. Rear End – 49 crashes
2. Angle – 44 crashes
3. Sideswipe – 33 crashes

Safety Issue 3: Sight Distances

Intersection Sight Distance (ISD) and Stopping Sight Distance (SSD) are two important roadway design elements that affect safety and are defined by the functional classification, alignment, design speed, and the typical section of Spring Hill Drive.

- **Intersection Sight Distances** are the sight distances provided to a driver who enters Spring Hill Drive from a STOP-sign controlled intersecting road and are defined as:
    - Case B1 – Sight distance for the left turning drivers from the minor road.
    - Case B2 – Sight distance the right turning drivers from the minor road.
    - Case B3 – Sight distance the drivers crossing Spring Hill Drive from the minor road.

  The intersection where the sight distance needs to be improved is listed below:

    - Gas station Driveway 70 feet West of Kenlake Ave on EB direction of traffic

- **Stopping Sight Distances** are the sight distances provided on Spring Hill Drive so that the drivers can completely stop their vehicle to avoid a hazard ahead. The Stopping Sight Distance is affected by the horizontal and vertical alignments of the road and is defined by the design speed on the road, reaction time of the driver, and deceleration rate of the vehicle, and vertical curvature rate. According to the as-built plans of other segments of Spring Hill Drive, the design speed of Spring Hill Drive is 40 miles per hour (mph) and the posted speed limit is 40 mph.

  The location listed below was identified as location where the Stopping Sight Distance needs to be improved:

    - Existing crest vertical curve on Spring Hill Drive eastbound at Kenlake Avenue in downgrade alignment prior to the Parker Avenue median opening. The as-built plans of Spring Hill Drive were not available to verify the length of the crest vertical curve. However, field measurements showed a down grade of 3% east of Kenlake Road, and field observations showed that sight distance is a concern for eastbound vehicles that stop at Parker Avenue and block eastbound through traffic. The observation and test drives indicate further exploration of the existing geometric design element of this vertical curve is needed.

Recommendations

This Road Safety Audit Report (RSAR) is augmented with safety study analysis as a holistic approach in identifying comprehensive two-tiered improvements: near-term and long-term improvements.

1. Near-Term Improvements

The near-term improvements focus on solutions to the items listed under **Safety Issues 1** through **3.** The improvements encompass the following treatments that will correct the safety deficiencies:

➢ Safety Issue 1

☐ Signing

- ✓ Improving sign retro-reflectivity by replacing all existing R & W signs (Regulatory and Warning) to meet the retro-reflective sheeting system types

☐ Pavement & Pavement Markings

- ✓ Resurfacing Spring Hill Drive to correcting pavement markings, turning arrows, pavement messages and Reflective Pavement Markers (RPM). The resurfacing will correct existing pavement and shoulder edge drop-offs where there is a significant elevation change (uneven pavement) between travel lanes and the adjacent shoulders, at turning radii of the driveways, and intersections. This condition is a safety concern to motorists, particularly motorcycles, compact cars, and vehicles pulling trailers.

☐ Sidewalks

- ✓ Correct the sidewalk discontinuity on both sides of Spring Hill Drive (north and south sides) within this project limits, and connect to US 19 NE and SE corners

- ✓ Replacing truncated domes at the curb ramps for ADA compliance

☐ Drainage

Correcting drainage conditions on Spring Hill Drive EB at the following locations:

- ✓ Pinehurst Drive
- ✓ Vermillion Enterprises
- ✓ Subway Driveway
- ✓ Palm Tree Dentistry
- ✓ Sunoco Gas Station

Correcting drainage conditions on Spring Hill Drive WB at the following locations:

- ✓ Bank of America Access Drive
- ✓ Sunrise Plaza West Access Drive

☐ Corridor & Intersection Lighting

- Improving ISDs at several intersections by relocating and/or installing STOP bars and STOP signs, and by trimming trees and shrubs
- Correcting the deficient auxiliary lanes condition associated with storage and brake to stop distances
- Correcting clear zones for the above ground structures mainly lighting poles
- Access management and median opening modifications

2. Long-Term Improvements

The long-term improvement of Spring Hill Drive encompasses capacity improvement, such as widening Spring Hill Drive approaching US 19 in the westbound direction to provide for longer auxiliary lanes storages. This is a partial intersection improvement to extend the westbound auxiliary lanes and achieve enhanced capacity and operational benefits.

We identified by field observation during various times of the day that formation of queue for the right turn and left turn movements overlap each other and create shockwave conditions in traffic stream on Spring Hill Drive in the westbound direction. The cause of the queuing, and vehicles trying to compete for entry into the respective auxiliary lanes is associated with inadequate queue lengths.

Construction Cost Estimates

The cost to construct each phased implementation, including near-term and long-term improvements were estimated using the FDOT Basis of Estimates Manual and statewide average unit prices.

The estimated cost for the mid-term and long-term improvements does not include the cost of right-of-way acquisition. Appendix C provides the detailed cost estimate for each implementation phase. The summary of the estimated costs for each phased implementation is shown below:

Construction Cost Estimates

Near-Term Improvements	Long-Term Improvements
$350,000.00	$750,000.00*

** The right-of-way acquisition cost is not included.*
Cost per Mile (CpM) models are conceptual and are based on FDOT planning values.

1.0 Introduction

The citizens, as well as other users of this roadway residing on the crossroads and adjacent properties of Spring Hill Drive, have expressed concerns regarding difficulties navigating certain segments, identifying the intersections as they approach them, the pavement conditions, absence of continuous sidewalk and signing and pavement marking deficiencies.

Hernando County has retained HDR Engineering Inc. to undertake a Road Safety Audit (RSA) to review safety aspects for Spring Hill Drive from US 19 (Commercial Way) to east of Kenlake Avenue. The total project length is 0.42 miles. **Figure 1-1** depicts the project location and the limits.

Over the years, road safety has become a principal concern of many transportation agencies. The rapid growth of the land development on the highway network, mix of vehicle types on the roads (smaller vehicles sharing the road with larger trucks), number and age of drivers, economic constraints in road construction, and technological advances have contributed to an environment of increased crash potential.

An RSA is the formal safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team. It qualitatively estimates and reports potential road safety issues and identifies opportunities for improvements in safety for all road users. RSAs help to ensure that issues associated with road safety are specifically addressed and are given equal importance as the other factors in a design project. In cases where the facility is already in service, an RSA can identify problems that, if properly addressed by the highway agency, will improve the safety of that facility.

The following intersections are included in the RSA study:

- US 19
- Kenlake Avenue
- Private Access Driveways

Figure 1-1. Project Location Map

Study Intersection

1.1 RSA Study Objective

The objectives of this RSA study are to identify significant crash patterns and general safety issues, and to recommend remedial near-term and long-term improvements that would enhance safety along the limits of the project. The recommendations are presented in this report.

1.2 RSA Process

The flowchart of the RSA process is depicted in **Figure 1-2**. As shown, the RSA process consists of several stages including crash data analyses, selecting the RSA Team, field reviews, development of safety improvement recommendations and documentation.

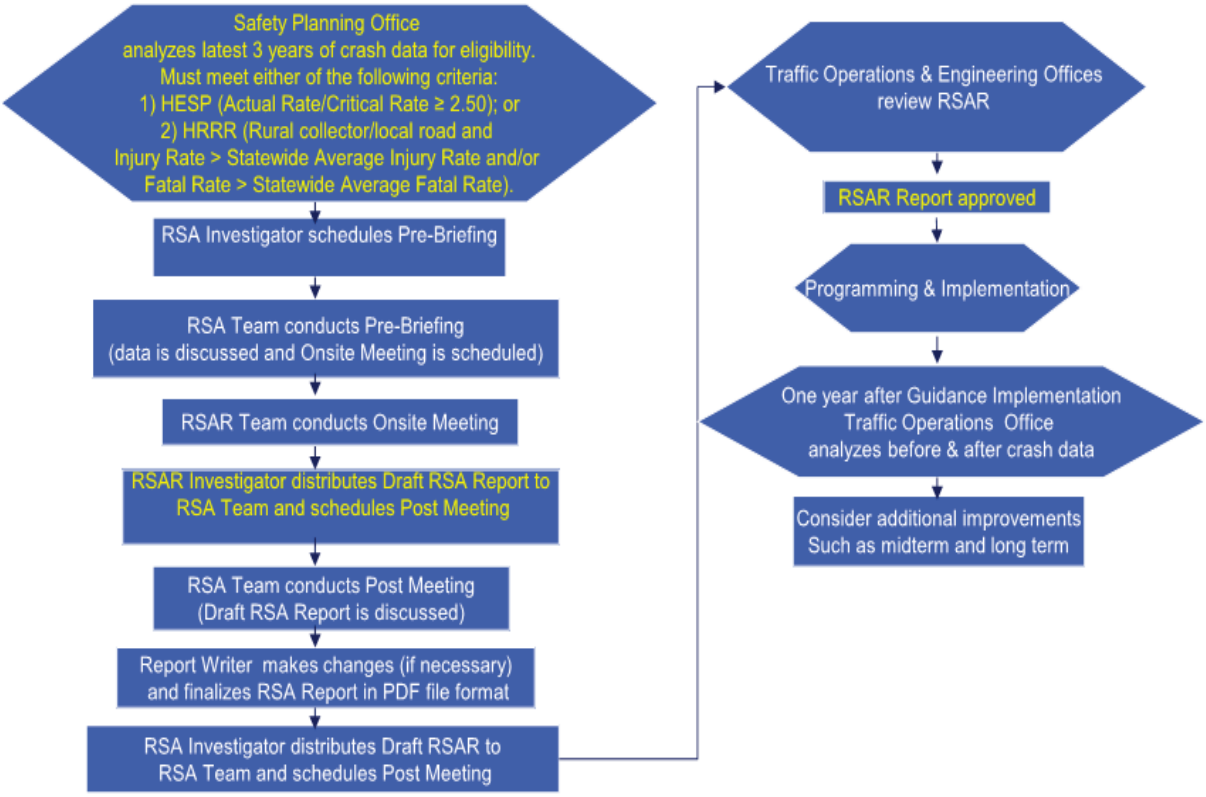
1.3 RSA Team

The core RSA Team included technical experts from HDR and various stakeholders from Hernando County. **Table 1-1** provides the RSA Team members.

Table 1-1. RSA Team Members

Name	Agency/Department	Title
Laura Borgesi, P.E., PSM, MPA	Hernando County /Public Works/Engineering Division	County Traffic Engineer
Bijan Behzadi, P.E., PTOE	HDR/ Project Management	Principal Investigator
Michael Oates, PE, PTOE	HDR RSA Support Staff	Lead Investigator
Jagrav Pandya, PE	HDR RSA Support Staff	Safety Analyst
Stevenson Morency	HDR RSA Support Staff	Accident Analyst

Figure 1-2. Process for Conducting Road Safety Audit



The core skills of the RSA Team included the following main mix of expertise:

- Traffic Operations
- Geometric Design
- Road Safety

Supplementary skills of the RSA Team included:

- Positive Guidance/Human Factors
- Area Specific Specialist Skills (i.e. Public Works Maintenance)
- Traffic Operations
- Geometric Design

1.4 RSA Team Meetings

The RSA Team met on January 6th, 2025, to discuss the RSA goals and objectives. At the meeting, the members of the RSA Team contributed their knowledge on safety issues for the corridor.

On January 7th, 2025, the RSA Team visited the corridor to review traffic operations, identify safety issues and develop preliminary solutions. Before the field visit, the RSA Team met in the office to review maps and roadway concepts where the crashes were depicted, so that the field visit would be more organized and focused. After the field visit, the RSA Team reconvened in the office to summarize the field observations and safety improvement options.

2.0 Existing Conditions

The existing conditions of Spring Hill Drive, within the limits of this study, are as follows:

- Spring Hill Drive is a four-lane divided suburban road with lane widths varying from 11 to 12 feet; there are no paved shoulders along this roadway.
- The design speed is 40 miles per hour (mph).
- The posted speed limit on Spring Hill Drive is 40 mph.
- The Annual Average Daily Traffic (AADT) 24,500 vehicles per day.
- Substandard street lighting is provided at the intersections and throughout the corridor.

2.1 Roadway Functional Classification

Spring Hill Drive is currently classified as a collector distributed roadway. As the land use changes, the functional classification of this road could be transitioned to a higher level, such as an urban collector facility.

2.1.1 Horizontal and Vertical Alignments

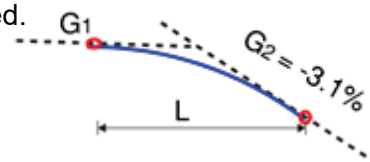
There is one vertical curve along Spring Hill Drive immediately after Kenlake Ave intersection.

The roadway is mostly on a level terrain. The length and steepness of the grades are in conformance with the maximum allowable grade based on the design speed of Spring Hill Drive.

Table 2-1. Curve Information

Location	Curve Type	Design Speed (mph)	Compliance with FDOT Green Book
Spring Hill Drive and Kenlake Avenue	Vertical	40	No

Although, the roadway as-built plans were not available, field measurement for the grade on Spring Hill Drive east of Kenlake Avenue revealed that the Stopping Sight Distance (SSD) is slightly less than the value in the FDOT Green Book. The grade was measured as 3.1%. for the crest vertical curve. The required SSD is 300 feet based on the design speed.



2.1.2 Pavement Conditions, Signs and Markings

The existing pavement conditions and ride quality (roughness) are fair (surface distress beginning to show). It is anticipated that the strength characteristics of the pavement materials will begin to deteriorate over the next five years.

The signing and pavement markings need to be improved.

The following observations associated with the drop-off conditions were made on the longitudinal segments and at the return radii of the side streets:

- Outside of wheel paths
- Water ponding
- Noticeable drop-offs at the edges of the pavement

2.1.3 Pedestrian and Bicycle Facilities

Pedestrian sidewalks and bicycle facilities do not exist along Spring Hill Drive between US 19 and Kenlake Avenue. There are curb cut ramps at the signalized intersection of US 19. Also, there are curb cut ramps at the signalized intersection of Kenlake Avenue and there is a sidewalk on the south side of Springhill Drive east of Kenlake.

2.2 Traffic Data Collection

The daily traffic volumes, traffic directional split, and turning movement counts were provided by the subcontractor. The traffic volume data is depicted below.

Figure 2-1. Existing Year (2024) Traffic Volumes

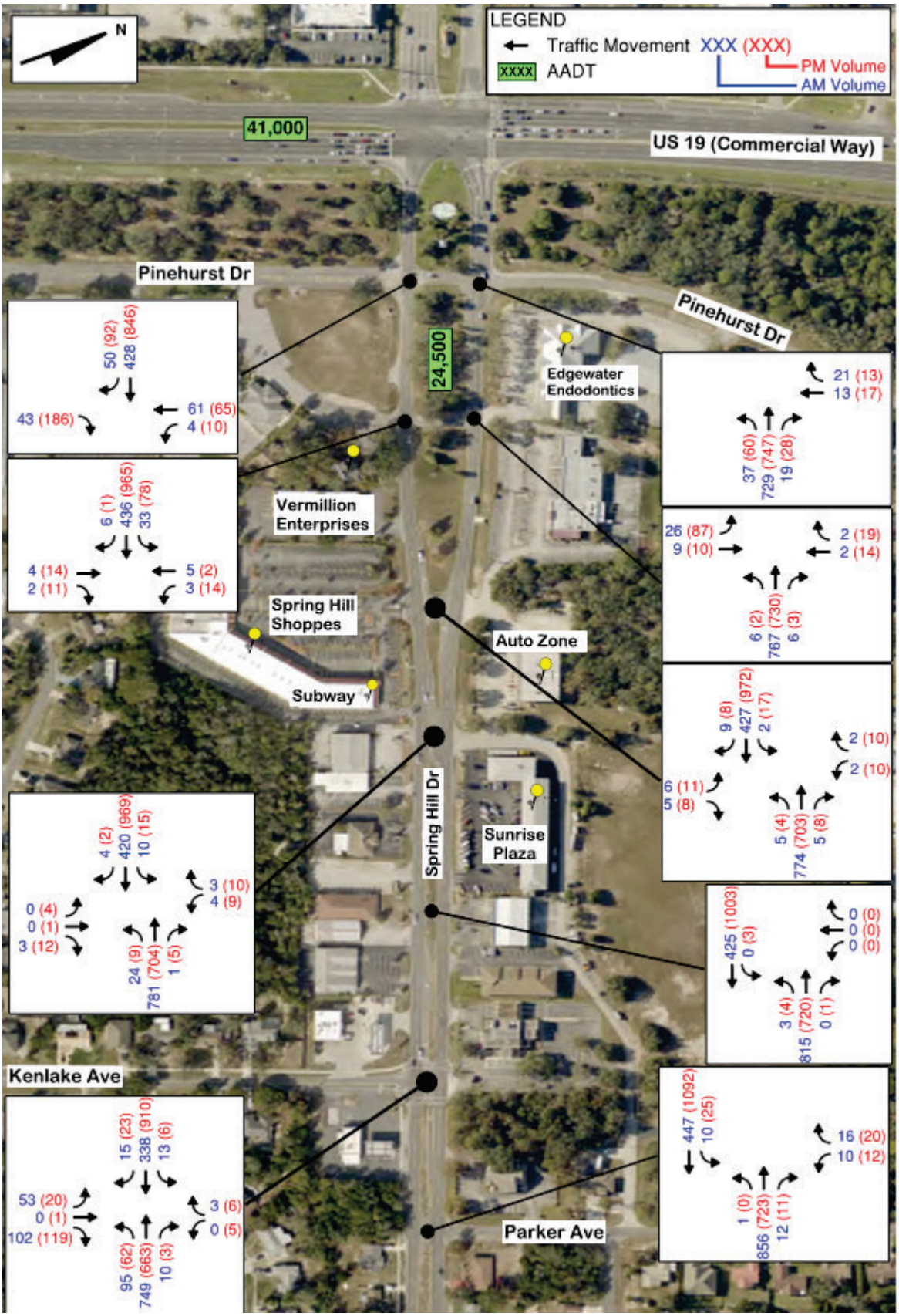
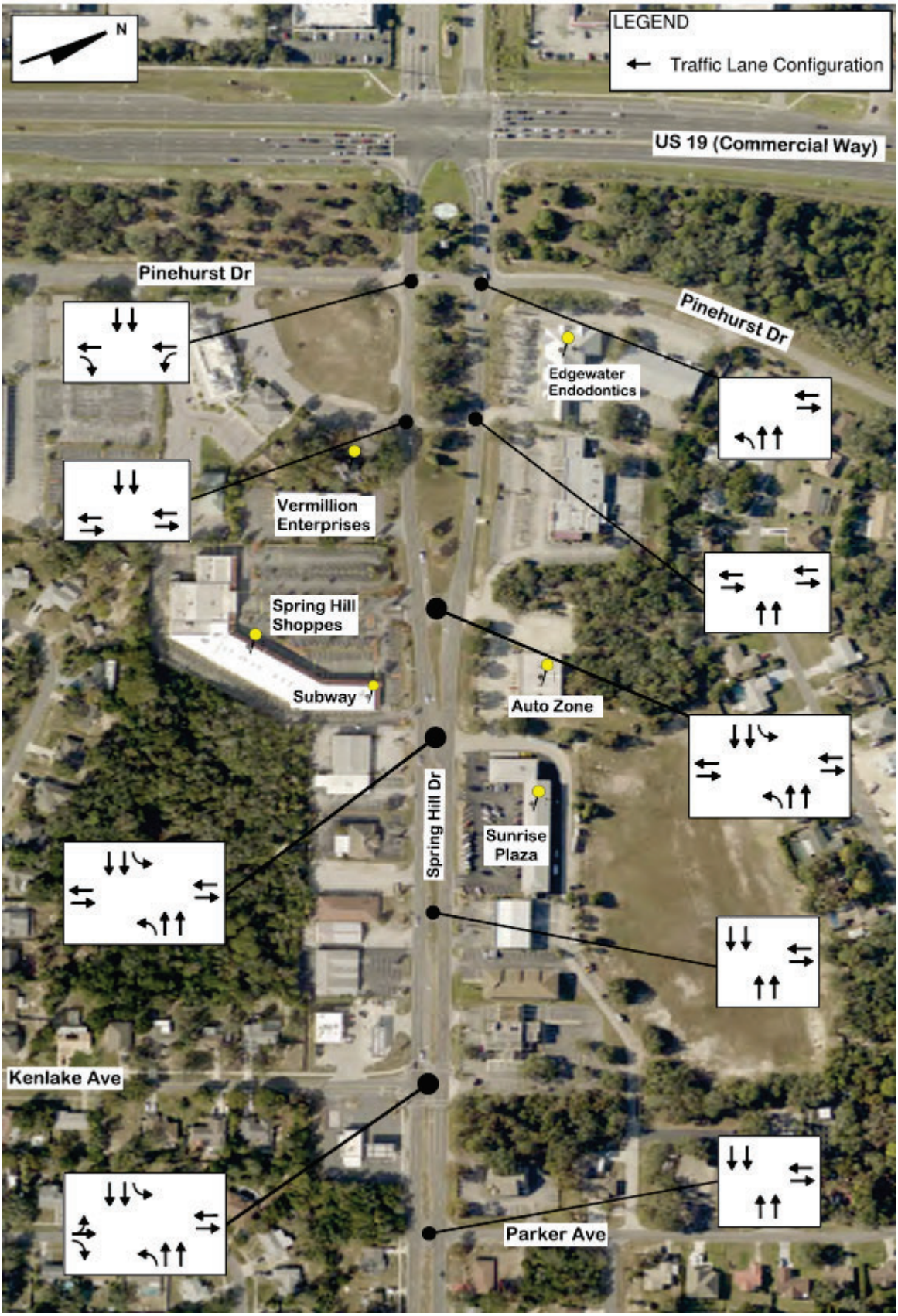


Figure 2-2. Existing Lane Configurations



3.0 Crash Analysis

Crash data from January 1, 2019, to December 31, 2023, as extracted from the Signal Four Analytics Database, were reviewed to identify any crash patterns that could be mitigated as part of the phased implementation of near-term, and long-term improvements.

3.1 Crash Patterns

Table 3-2, in the next page, presents a summary of the crash data analysis for Spring Hill Drive from US 19 to east of Kenlake Avenue. The study intersections and mid-block locations were analyzed by the type of crash, pavement condition during the crash, lighting condition during the crash, and the severity of the crash. As shown in the table:

- A total of 153 crashes occurred during the 5-year period from January 1, 2019 to December 31, 2023.
- Of these crashes, 91 crashes (59%) occurred at all the study intersections and the remainder of the crashes occurred along Spring Hill Drive between intersections (on segments).
- A total of 33 crashes (22%) occurred within the roadway segment between US 19 at Pinehurst Dr (West Location)
- The intersections of Spring Hill Drive with the highest crash frequency were at Pinehurst Dr (West Location) (40 crashes), Parker Ave (15 crashes), Pinehurst Dr (East Location) (13 crashes) and Kenlake Ave (11 crashes).
- The most predominant type of crashes was the Rear End collisions (49 crashes), followed by Angle-type collisions (44 crashes) and then the Sideswipe (33 crashes).

Table 3-1 summarizes the crash trends that were identified within the corridor.

Table 3-1. Crash Patterns

Crash Trends for Spring Hill Drive (January 2019 – July 2023)			
Rear End (RE)	**Angle**	**Sideswipe**	**Alcohol / DUI**
32% of Total Crashes	29% of Total Crashes	22% of Total Crashes	3% of Total Crashes
13% Injury Crashes of all RE	33% Injury Crashes of all Angle	9% Injury Crashes of all Sideswipe	0% Injury Crashes of all Alcohol
10% Nighttime of all RE	13% Nighttime of all Angle	15% Nighttime of all Sideswipe	50% Nighttime of all Alcohol
2% Wet Pavement of all RE	0% Wet Pavement of all Angle	0% Wet Pavement of all Sideswipe	0% Wet Pavement of all Alcohol

Table 3-2. Crash Summary

Number of Crashes (January 2019 – July 2023)														
Intersection/Segment	Type of Crash						Pavement Condition		Light Condition		Crash Severity			TOTAL CRASHES
	Angle	Rear End	Run Off Road	Side-swipe	PED/ Bike	Other**	Dry	Wet	Day	Night	PDO*	Injury	Fatal	
Between US 19 and Pinehurst Dr (West)	0	19	1	12	0	1	33	0	32	1	32	1	0	33
Pinehurst Dr (West)	23	10	2	3	1	1	40	0	30	10	27	13	0	40
Between Pinehurst Dr	0	0	0	3	0	0	3	0	3	0	3	0	0	3
Pinehurst Dr (East)	7	0	0	5	0	1	11	2	12	1	9	4	0	13
Between Pinehurst Dr (East) and Autozone Median Opening	0	0	0	2	0	0	2	0	2	0	2	0	0	2
Autozone Median Opening	3	1	0	0	0	1	5	0	5	0	5	0	0	5
Between Autozone and Subway Median Opening	0	0	0	0	2	0	2	0	1	1	0	2	0	2
Subway Median Opening	1	1	0	2	0	1	5	0	5	0	2	3	0	5
Between Subway and Palm Tree Dentistry Median Opening	0	1	1	0	0	0	1	1	2	0	2	0	0	2
Palm Tree Dentistry Median Opening	3	1	0	0	0	0	4	0	4	0	4	0	0	4
Between Palm Tree Dentistry Median Opening and Kenlake Ave	1	0	0	1	0	0	2	0	1	1	1	1	0	2
Kenlake Ave	2	6	1	1	0	1	11	0	11	0	9	2	0	11
Between Kenlake Ave and Parker Ave Median Opening	0	2	0	1	0	0	3	0	2	1	3	0	0	3
Parker Ave	4	8	0	3	0	0	15	0	13	2	12	3	0	15
Parking Lot	-	-	-	-	-	13	-	-	-	-	-	-	-	13
TOTAL CRASHES	**44**	**49**	**5**	**33**	**3**	**19**	**137**	**3**	**123**	**17**	**111**	**29**	**0**	**153**

* PDO: Property Damage Only ** Minor impacts with head-on, parked vehicles, and left turns

3.1.1 Rear-End Crash Patterns

Most of these crashes are attributed to inattentive driver behavior and/or the absence of left-turn lanes at median openings. Most of the rear-end crashes occurred between US 19 and Pinehurst Dr (West Location) (19 Crashes), Pinehurst Dr (West Location) (10 Crashes), Parker Ave (8 Crashes), and Kenlake Ave (6 Crashes). Most of the crashes between US 19 and Pinehurst Dr (West Location) and Kenlake Ave were because they are signalized controlled intersections. The trend for these crashes were drivers reporting not stopping in time for the vehicle in front of them during a red signal indication.

Some of the crashes that occurred at Pinehurst Dr (West Location) and Parker Ave were because of the lack of a left turn lane at the median openings.

3.1.2 Angle Crash Patterns

There were three patterns observed for the angle crashes. The first pattern was related to a possible sight distance issue for southbound vehicles located in the median opening of Pinehurst Dr (West Location). This road segment in the median is in such proximity to US 19 (Commercial Way) that vehicles might not react quick enough to incoming traffic making a southbound left turn from US 19. The second pattern was related to vehicles in the outside lane attempting to make a left turn into the median at both Pinehurst Dr openings. The third pattern was related to drivers failing to yield the right of way throughout the project limits.

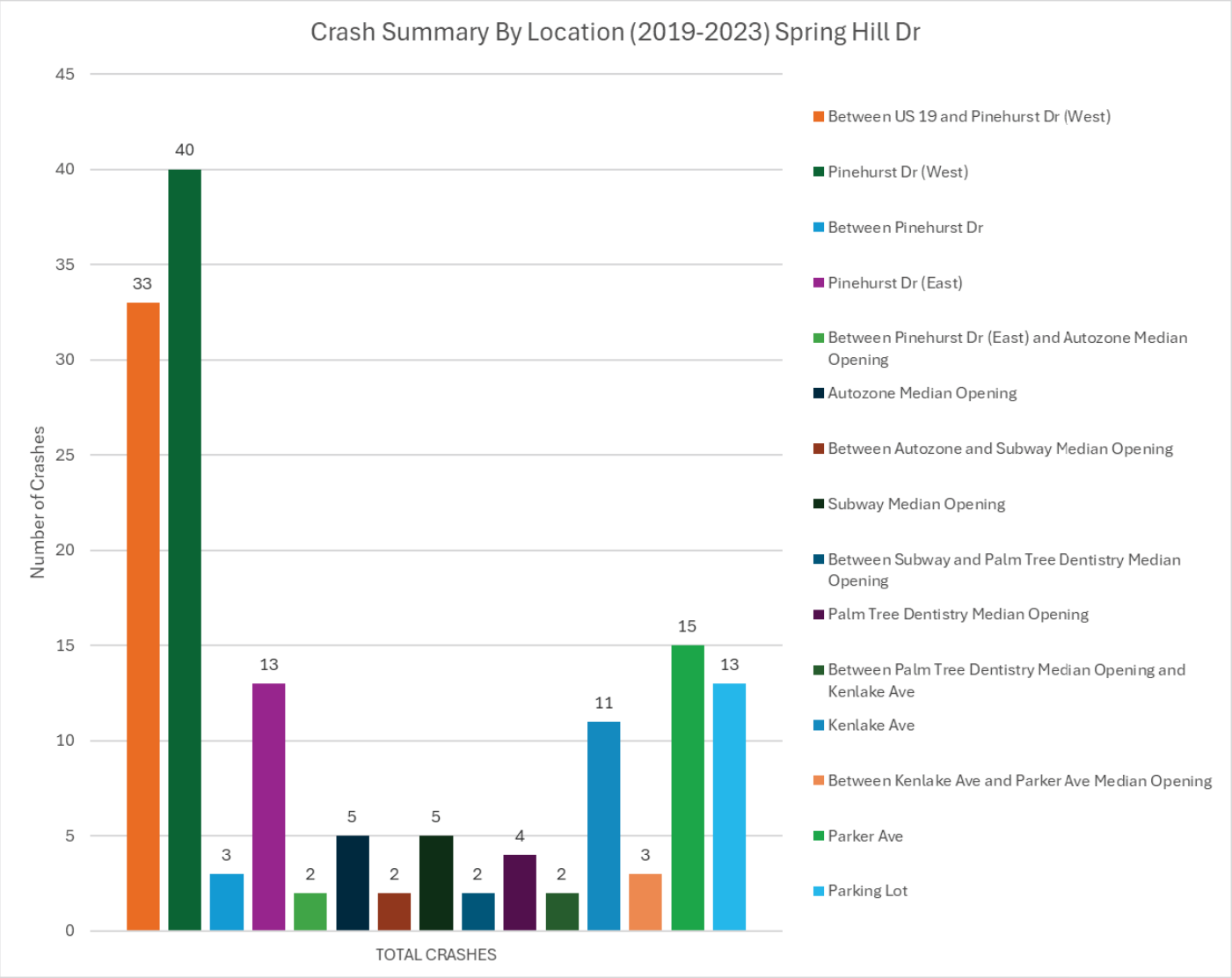
3.1.3 Sideswipe Patterns

There were two patterns observed with sideswipe crashes. The first pattern occurred near the Pinehurst Dr median openings. Vehicles traveling in the outside lane attempted to turn left into one of the median openings. There was also a greater number of sideswipe crashes that results from vehicles changing lanes from the outside lane to the inside lane, near the Pinehurst Dr median openings. The second pattern was related to drivers being inattentive and failing to ensure the adjacent was clear from incoming traffic.

3.1.4 Crash Frequency by Intersection

The crash frequencies by location, as shown in **Figure 3-1**, indicate that most of the crashes occurred Between US 19 and Pinehurst Dr (West Location), Pinehurst Dr (West Location), Parker Ave, Pinehurst Dr (East Location) and Kenlake Ave.

Figure 3-1. Crashes by Intersection



3.1.5 Crash Frequency by Year

The crash frequency and severity by year are shown in **Figure 3-2** and **Figure 3-3**. The number of crashes has been on the rise over the study period:

Figure 3-2. Crashes by Year

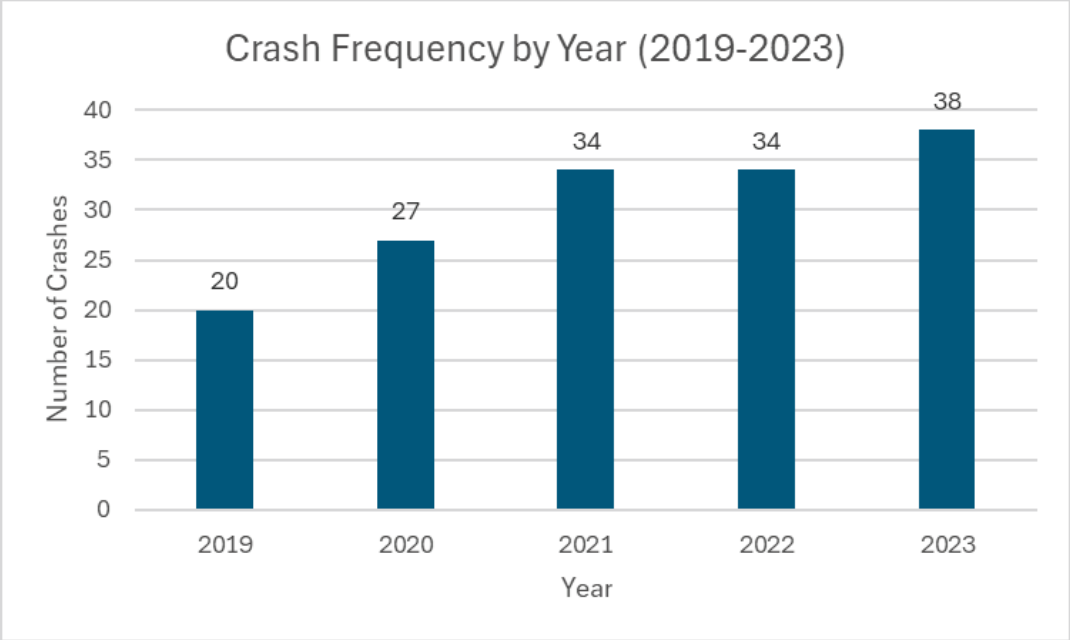
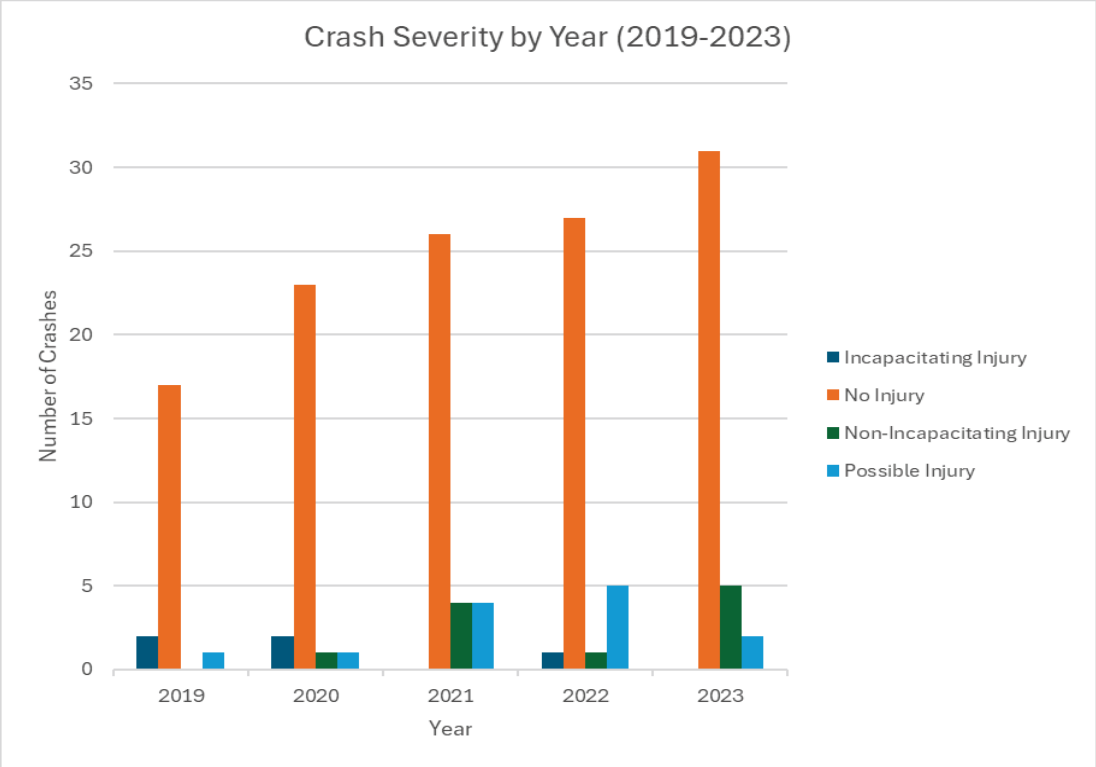


Figure 3-3. Crash Severity by Year



3.1.6 Crash Frequencies for Nighttime and Daylight

Table 3-3 summarizes the crash frequencies for the daylight and nighttime periods of the day:

Table 3-3. Nighttime and Daylight Crash Statistics

Night-to-Day Time Crashes (2019-2023)			
Day / Night	**Crashes**	**Percent %**	**Night-to-Day Ratio**
Daylight	132	86%	0.16
Nighttime	21	14%	
Total Number of Crashes	153		

3.1.7 Crash Frequencies by Weather Condition

Table 3-4 summarizes the crash frequencies for the wet and dry pavement conditions:

Table 3-4. Weather Condition Statistics

Weather Condition (2019-2023)		
Condition	**Crashes**	**%**
Wet	4	3%
Dry	149	97%
Total Number of Crashes	153	

4.0 Road Safety Audit Findings

4.1 Spring Hill Drive & US 19 (Commercial Way)

Description of Safety Issues:

- No sidewalk connections to Spring Hill Drive in NE and SE corners of the intersection.

4.2 Between US 19 (Commercial Way) and Kenlake Avenue

Description of Safety Issues:

- The ADA detectable warning surfaces are deteriorating and peeling off.
- The post mounted delineators on the existing raised traffic separators are missing.
- All existing signs are old and have lost reflectivity on the sheeting. All signs need to be replaced for better reflectivity and visibility for the drivers.
- Access management and median opening are not up to DOT standards.
- Light poles are within clear zone and lighting condition along the corridor is very poor. Also, several lights are not working.
- The crosswalks at the side streets need to be upgraded to high emphasis crosswalks for better visibility and to conform with the 2025 edition of the FDOT's Standard Plans.

For the recommended near-term improvements at this location see **Appendix A**.

4.3 Spring Hill Drive & 7-Eleven Driveway

Description of Safety Issues:

- The sight distance for drivers turning right on to Spring Hill Dr is being blocked by a palm tree which should be removed.

For the recommended near-term improvements at this location see **Appendix A**.

4.4 Spring Hill Drive & Kenlake Avenue Intersection

Description of Safety Issue:

- The crosswalks at this location need to be upgraded to high emphasis crosswalks for better visibility and to conform with the 2025-26 edition of the FDOT's Standard Plans.
- Pedestrian Push Button Stations need to be upgraded to be ADA compliant.
- The current street name signs at this intersection are not internally illuminated. Although this follows the MUTCD, it is recommended that the signs be internally illuminated for improved visibility. This will also match the signs at signalized intersection of Spring Hill Drive and US 19 (Commercial Way).
- Yellow retro-reflective backplates need to be added to the signal head auxiliaries.

5.0 Safety Improvements

The road safety improvements were classified into a two-phased implementation: near-term and long-term improvements.

1. The near-term improvements are low-cost improvements that can be implemented quickly with minimum design efforts and low construction cost. The near-term improvements do not require any right-of-way acquisition. **Appendix A** depicts the improvements.
2. The long-term improvements involve the resurfacing, safety edge addition, intersection auxiliary lanes extension of Spring Hill Drive and median opening modifications. These improvements will require the performance of intersection analysis and preliminary engineering to define the most suitable typical section of the road as well as the cost. **Appendix B** depicts the improvements.

5.1 Proposed Improvements

The recommended improvements are described herein with a cost estimate for consideration by the County. The focus of the road safety improvements is related to the following deficiencies:

- Traffic control devices, such as signing, pavement markings, and signal apparatus
- High frequency of crashes
- Geometric design improvements to enhance intersection sight distance and stopping sight distance
- Pavement preservation and minor drainage improvements and elimination of drop-offs
- Sidewalk continuity for pedestrians on both sides of the facility

5.1.1 Near-Term Improvements

The near-term improvements were previously identified and described in **Section 4**.

The cost to construct the near-term improvements is itemized using the FDOT Basis of Estimates Manual and procedures and is depicted in **Appendix C**.

5.1.2 Long-Term Improvements

The maximum capacity of a four-lane roadway is 35,000 vehicles per day. The long-term improvement is comprised of resurfacing, rehabilitation, restoration of pavement integrity and widening Spring Hill Drive approaching US 19 in the westbound direction to provide for longer auxiliary lanes storages.

The cost to construct the long-term improvements is based on using the FDOT Basis of Estimates manual and procedures and is depicted in **Appendix C**. This cost value does not include the right-of-way acquisition.

6.0 Conclusions

HDR Engineering, Inc. performed a Road Safety Audit and Study (RSA) for Spring Hill Drive from US 19 (Commercial Way) to East of Kenlake Avenue; 0.42 miles.

The Spring Hill Drive RSA efforts encompassed a holistic approach to identify and improve safety deficiencies along this facility. The study found that some existing roadway conditions are contributing to several crashes that are motor vehicle related. This report recommends several solutions – some that are low-cost and could be readily implemented and some that are more complex and costly – that could help make the roadway safer for the users. These improvements include geometric changes such as adding or widening shoulders, improving roadway alignment, reducing pavement drop offs, provisions for sidewalk continuity, access management by median opening modification.

This report has identified near-term and long-term improvements as described in sections 4 and 5 of this report.

7.0 Recommendations

Hernando County reviewed this RSAR and provided input on how the project will be programmed as Capital Improvement Project to address the findings of this RSAR. The phased implementation of the RSAR recommendations are as follows:

- Program a Design Project to be completed in FY 2025/2026 to prepare the plans, and specifications
- Program a Construction project to be let in FY 2026/2027 to construct the following roadway safety elements:
  - ✓ Improvements include providing sidewalk connectivity between US 19 and Ken Lake Avenue on both sides of the Spring Hill Drive.
  - ✓ Preserving the integrity of the Spring Hill Drive by milling 1 1/2" and resurfacing 1 1/2" of the roadway from US 19 to Ken Lake with a paved safety edge
  - ✓ Regrade the open channel drainage system to provide better stormwater management / optional grated inlet and cross drain-pipes installation depending on the cost.
  - ✓ Close the Pinehurst median opening
  - ✓ Extend the left turn lane storages where space is available

Appendix A

Near-Term Improvements

Location:	NE and SE corners at US 19 and Spring Hill Drive
Issue Description:	Absence of sidewalk continuity connecting to US 19 sidewalk

Existing	Proposed
	
	

Description of Safety Issue:	Absence of sidewalk continuity connecting to US 19 For Pedestrian Crossing		
Safety Risk:			
Exposure:	☐ Low	☐ Medium	☒ High
Probability:	☐ Low	☐ Medium	☒ High
Consequence:	☐ Low	☐ Medium	☒ High
Resulting Road Safety Risk:	☐ Low	☒ Medium	☐ High
Suggestions for Consideration:			
Near-Term:	Construct 5' wide concrete sidewalk on Spring Hill Drive.		
Improvement Type:	Pedestrian Safety		

Location:	Spring Hill Drive and side streets
Issue Description:	Pavement damage

Existing

Description of Safety Issue:	Pavement damage was observed due to higher turning movement traffic exiting side streets and median U-turns.		
Safety Risk:			
Exposure:	☐ Low	☒ Medium	☒ High
Probability:	☐ Low	☒ Medium	☐ High
Consequence:	☐ Low	☒ Medium	☐ High
Resulting Road Safety Risk:	☐ Low	☒ Medium	☐ High
Suggestions for Consideration:			
Near-Term:	Resurface and provide safety edge to accommodate turning radius.		
Improvement Type:	Pavement and Shoulder Drop-off Corrections		

Location:	SW and SE corners of Spring Hill Dr and Pinehurst Dr
Issue Description:	Repair or replace drainage

Description of Safety Issue:	The drainage is majority blocked with overgrown vegetation and dirt build up over time. The turning path gets flooded during rainfall and does not drain adequately. The side drainpipe is sumped and does not function on both ends.		
Safety Risk:			
Exposure:	☐ Low	☐ Medium	☒ High
Probability:	☐ Low	☐ Medium	☒ High
Consequence:	☐ Low	☐ Medium	☒ High
Resulting Road Safety Risk:	☐ Low	☐ Medium	☒ High
Suggestions for Consideration:			
Near-Term:	Regrade the drainage channels on each end of the cross drain, correct the swept path and the cross slope to drain properly and reset the cross drainpipe by replacing it. This grated inlet can be used to prevent water ponding at access points.		
Improvement Type:	Drainage		

Location:	Spring Hill Drive corridor
Issue Description:	Ground Mounted signs

Existing

Description of Safety Issue:	Existing signs have lost reflectivity in their panel sheeting and some sign posts are damaged and do not meet the height clearances as recommended in MUTCD and FDOT Standard Plans.

Safety Risk:			
Exposure:	☐ Low	☐ Medium	☒ High
Probability:	☐ Low	☐ Medium	☒ High
Consequence:	☐ Low	☐ Medium	☒ High
Resulting Road Safety Risk:	☐ Low	☐ Medium	☒ High

Suggestions for Consideration:	
Near-Term:	Replace all signs with new assemblies in accordance with DOT standards.
Improvement Type:	Signing

Location:	Spring Hill Dr at Kenlake Ave		
Issue Description:	Static Street Name Signs		

Existing

Description of Safety Issue:	Static Street Name Signs are old, faded and has lost their retroreflectivity. Recommend using Internally Illuminated Street Name Signs for better visibility and to conform with current county standards.		
Safety Risk:			
Exposure:	☐ Low	☐ Medium	☒ High
Probability:	☐ Low	☐ Medium	☒ High
Consequence:	☐ Low	☐ Medium	☒ High
Resulting Road Safety Risk:	☐ Low	☐ Medium	☒ High
Suggestions for Consideration:			
Near-Term:	Install Internally Illuminated Street Name Signs on mast arms according to Traffic Engineering Manual and FDOT Standards.		
Improvement Type:	Signal		

Location:	Spring Hill Dr at Kenlake Ave
Issue Description:	Missing Retro-reflective Backplates for N-S heads

Existing

Proposed

Description of Safety Issue:	Signal heads at this intersection are missing retro-reflective backplates on N-S heads. Also, heads on E-W direction are missing retro-reflective border. This will increase signal visibility at night and during low-visibility conditions and comply with the current design standards.		
Safety Risk:			
Exposure:	☐ Low	☒ Medium	☐ High
Probability:	☐ Low	☒ Medium	☐ High
Consequence:	☐ Low	☐ Medium	☒ High
Resulting Road Safety Risk:	☐ Low	☒ Medium	☐ High
Suggestions for Consideration:			
Near-Term:	Install retro-reflective backplate borders on traffic signals for all approaches per FDM 232.1.5 and FDOT Standard Specification for Road and Bridge Construction Section 650. The backplates could be flexible type which does not contribute to the structural loading on the mast arm.		
Improvement Type:	Signal		

Location:	Spring Hill Dr and Kenlake Ave Intersection
Issue Description:	ADA Truncated Domes are in poor condition or missing

Existing

Description of Safety Issue:	ADA detectable warning surface is deteriorating and peeling off in SW corner and rest of the 3 corners are missing the warning surface. They should be replaced to ensure that visually impaired pedestrians can safely enter the sidewalk without difficulties.		
Safety Risk:			
Exposure:	☐ Low	☐ Medium	☒ High
Probability:	☐ Low	☐ Medium	☒ High
Consequence:	☐ Low	☐ Medium	☒ High
Resulting Road Safety Risk:	☐ Low	☐ Medium	☒ High
Suggestions for Consideration:			
Near-Term:	Replace all detectable warning surfaces per FDM 222.1.1 and FDOT Standard Index 522-002.		
Improvement Type:	Curb Ramp & ADA		

Location:	Spring Hill Dr and Kenlake Ave Intersection
Issue Description:	Pedestrian push buttons are not ADA compliant

Existing

Description of Safety Issue:	Pedestrian push buttons are not ADA compliant. Each button is required to have 48" x 30" level area of sidewalk in front of the button within 10" for access.

Safety Risk:			
Exposure:	☐ Low	☐ Medium	☒ High
Probability:	☐ Low	☐ Medium	☒ High
Consequence:	☐ Low	☐ Medium	☒ High
Resulting Road Safety Risk:	☐ Low	☐ Medium	☒ High

Suggestions for Consideration:	
Near-Term:	Replace and locate the push buttons in compliance with ADA Standards determined by the FDOT and County standards.
Improvement Type:	Pedestrian Signal

Location:	Spring Hill Dr and Kenlake Ave Intersection
Issue Description:	Missing High Emphasis Crosswalks

Existing

Description of Safety Issue:	The existing intersection crosswalk design is missing High Emphasis marking which helps enhance the visibility and increases pedestrian safety.

Safety Risk:			
Exposure:	☐ Low	☐ Medium	☒ High
Probability:	☐ Low	☐ Medium	☒ High
Consequence:	☐ Low	☐ Medium	☒ High
Resulting Road Safety Risk:	☐ Low	☐ Medium	☒ High

Suggestions for Consideration:	
Near-Term:	Resurface the intersection and replace the crosswalk markings in accordance to FDOT Standard Plans Index 711-001.
Improvement Type:	Pavement Marking

Location:	Spring Hill Drive Corridor Lighting
Issue Description:	Upgrade and replace lighting

Existing

Description of Safety Issue:	Existing luminaire heads are older 100 watt high pressure sodium (HPS) and therefore project low lighting photometric levels onto the roadway. Also, several luminaire heads are not operational and create dark spots in these areas. While none of the light poles showed any evidence of being hit, some of them were located close to the travel lanes.		
Safety Risk:			
Exposure:	☐ Low	☐ Medium	☒ High
Probability:	☐ Low	☐ Medium	☒ High
Consequence:	☐ Low	☐ Medium	☒ High
Resulting Road Safety Risk:	☐ Low	☐ Medium	☒ High
Suggestions for Consideration:			
Near-Term:	Improve Lighting levels throughout the corridor by replacing the older HPS luminaire heads with new Light Emitting Diode (LED) heads. Adhere to criteria in accordance with FDM Chapter 231 and FDOT Standard Plans Index 715-001. Consider moving poles further from the travel lanes where feasible.		
Improvement Type:	Lighting		

Location:	Spring Hill Drive Corridor Lighting
Issue Description:	Upgrade and replace lighting

Existing

Description of Safety Issue:	Light poles are located 5 feet from Edge of Traveled Way which is within the minimum lateral offset required by the FDOT. The speed limit is 40 MPH and roadway type is Flush Shoulder for which the lateral offset requirement is 18 feet.

Safety Risk:			
Exposure:	☐ Low	☐ Medium	☒ High
Probability:	☐ Low	☐ Medium	☒ High
Consequence:	☐ Low	☐ Medium	☒ High
Resulting Road Safety Risk:	☐ Low	☐ Medium	☒ High

Suggestions for Consideration:	
Near-Term:	Locate light poles outside minimum lateral offset criteria to improve safety for drivers. Follow FDM Chapter 215 for Roadside Safety
Improvement Type:	Lighting

Location:	Spring Hill Drive and side streets
Issue Description:	Drainage drop-off and water ponding

Existing

Description of Safety Issue:	Due to pavement deformity and worn off pavement over time, there are drainage drop offs and water ponding throughout the corridor. It is a safety concern for drivers, pedestrians and bicyclists.

Safety Risk:			
Exposure:	☐ Low	☒ Medium	☒ High
Probability:	☐ Low	☒ Medium	☐ High
Consequence:	☐ Low	☒ Medium	☐ High
Resulting Road Safety Risk:	☐ Low	☒ Medium	☐ High

Suggestions for Consideration:	
Near-Term:	Resurface and regrade the pavement according to FDOT and County standards.
Improvement Type:	Drainage

Appendix B

Long-Term Improvements

HERNANDO COUNTY
DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION
1525 E. JEFFERSON STREET
BROOKSVILLE, FL 34601-4423

REVISIONS	
DATE	DESCRIPTION

Biljan Behzadi, P.E.
P.E. License Number 43868
HDR Engineering, Inc.
4830 W Kennedy Blvd, Suite 400
Tampa, FL 33609-2548

ROAD SAFETY AUDIT REVIEW
SPRING HILL DR FROM US 19 TO EAST OF KENLAKE AVE

PROPOSED DESIGN

SHEET NO. 1

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

HERNANDO COUNTY
DEPARTMENT OF PUBLIC WORKS

ENGINEERING DIVISION
1525 E. JEFFERSON STREET
BROOKSVILLE, FL 34601-4423

REVISIONS	
DATE	DESCRIPTION

Biljan Behzadi, P.E.
P.E. License Number 43868
HDR Engineering, Inc.
4830 W Kennedy Blvd, Suite 400
Tampa, FL 33609-2548

ROAD SAFETY AUDIT REVIEW
SPRING HILL DR FROM US 19 TO EAST OF KENLAKE AVE

PROPOSED DESIGN

SHEET NO. 2

Appendix C

Construction Cost Estimates

Roadway

ITEM NO.	FDOT PAY ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	AMOUNT
3	104-10-3	SEDIMENT BARRIER	LF	$ 3.25	11,000	$ 35,750.00
4	104-15	SOIL TRACKING PREVENTION DEVICE	EA	$ 6,000.00	4	$ 24,000.00
5	104-18	INLET PROTECTION SYSTEM	EA	$ 210.00	16	$ 3,360.00
6	107-1	LITTER REMOVAL AND DISPOSAL	AC	$ 25.00	30.00	$ 750.00
7	107-2	MOWING	AC	$ 35.00	25.00	$ 875.00
8	110-1-1	CLEARING AND GRUBBING (2.05 AC)	LS	$ 82,000.00	1	$ 82,000.00
9	120-1	REGULAR EXCAVATION	CY	$ 10.50	4,000.0	$ 42,000.00
10	120-6	EMBANKMENT	CY	$ 10.50	300.0	$ 3,150.00
11	160-4	TYPE B STABILIZATION	SY	$ 6.25	6,500	$ 40,625.00
12	285-701	OPTIONAL BASE, BASE GROUP 01	SY	$ 21.00	2,500	$ 52,500.00
13	285-706	OPTIONAL BASE, BASE GROUP 06	SY	$ 20.00	4,000	$ 80,000.00
14	327-70-6	MILLING EXIST ASPH PAVT, 1 1/2" AVG DEPTH	SY	$ 5.00	17,000	$ 85,000.00
15	334-1-53	SUPERPAVE ASPHALTIC CONCRETE, TRAFFIC C, PG76-22	TN	$ 175.00	500.0	$ 87,500.00
16	337-7-83	ASPHALT CONCRETE FRITCTION COURSE, TRAFFIC C, FC-12.5, PG 76-22	TN	$ 170.00	1,800.0	$ 306,000.00
17	430-174-118	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 18" SD	LF	$ 165.00	43	$ 7,095.00
18	430-174-124	PIPE CULVERT, OPTIONAL MATERIAL, ROUND, 24" SD	LF	$ 200.00	23	$ 4,600.00
19	430-984-125	MITERED END SECTION, OPTIONAL ROUND, 18" SD	EA	$ 3,200.00	3	$ 9,600.00
20	430-984-129	MITERED END SECTION, OPTIONAL ROUND, 24" SD	EA	$ 4,000.00	1	$ 4,000.00
21	570-1-2	PERFORMANCE TURF (SOD)	SY	$ 2.00	14,117	$ 28,234.00
22	1050-15-004	UTILITY PIPE, ADJUST/MODIFY, 8-19.9"	LF	$ 275.00	32	$ 8,800.00
23	1080-21-500	UTILITY FIXTURE, VALVE/METER BOX, ADJSUT	EA	$ 650.00	14	$ 9,100.00
	Total Roadway Cost:					**$ 897,039.00**

Signing & Pavement Markings

ITEM NO.	FDOT PAY ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	AMOUNT
22	700-1-11	SINGLE POST SIGN, F&I GROUND MOUNT, UP TO 12 SF	AS	$ 550.00	8	$ 4,400.00
23	700-1-50	SINGLE POST SIGN, RELOCATE	AS	$ 200.00	4	$ 800.00
24	700-1-60	SINGLE POST SIGN, REMOVE	AS	$ 70.00	4	$ 280.00
25	706-1-3	RAISED PAVEMENT MARKER, TYPE B	EA	$ 4.00	312	$ 1,248.00
26	710-90	PAINTED PAVEMENT MARKINGS, FINAL SURFACE	LS	$ 3,510.00	1	$ 3,510.00
	*	PAINTED PAVEMENT MARKINGS, STD., WHITE, SOLID, 6"	GM		0.721	
	*	PAINTED PAVEMENT MARKINGS, STD., WHITE, SOLID FOR STOP LINE, 24"	LF		53	
	*	PAINTED PAVEMENT MARKINGS, STD., WHITE, SKIP, 10-30 OR 3-9 SKIP, 6" WIDE	GM		0.518	
	*	PAINTED PAVEMENT MARKINGS, STD., WHITE, 2-4 DOTTED GUIDELINE/ 6-10 DOTTED EXT., 6"	GM		0.078	
	*	PAINTED PAVEMENT MARKINGS, STD., WHITE, ARROWS	EA		18	
	*	PAINTED PAVEMENT MARKINGS, STD., YELLOW, SOLID, 6"	GM		0.908	
	*	PAINTED PAVEMENT MARKINGS, STD., YELLOW, SOLID FOR DIAGONAL OR CHEVRON, 18"	LF		145	
	*	PAINTED PAVEMENT MARKINGS, STD., YELLOW, 2-4 DOTTED GUIDELINE/ 6-10 DOTTED EXT., 6"	GM		0.079	
27	711-11-125	THERMOPLASTIC, STD., WHITE, SOLID, 24" FOR STOP LINE	LF	$ 6.50	53	$ 344.50
28	711-11-141	THERMOPLASTIC, STD., WHITE, 2-4 DOTTED GUIDELINE/ 6-10 GAP EXTENSION, 6"	GM	$ 2,150.00	0.178	$ 382.70
29	711-11-170	THERMOPLASTIC, STD., WHITE, ARROW	EA	$ 80.00	18	$ 1,440.00
30	711-11-224	THERMOPLASTIC, STD., YELLOW, SOLID, 18" FOR DIAGONAL OR CHEVRON	LF	$ 5.00	145	$ 725.00
31	711-11-241	THERMOPLASTIC, STD., YELLOW, 2-4 DOTTED GUIDE LINE /6-10 DOTTED EXTENSION LINE, 6"	GM	$ 3,000.00	0.179	$ 537.00
32	711-16-101	THERMOPLASTIC, STD.-OTHER SURFACES, WHITE, SOLID, 6"	GM	$ 5,800.00	1.721	$ 9,981.80
33	711-16-131	THERMOPLASTIC, STD.-OTHER SURFACES, WHITE, SKIP, 6",10-30 SKIP OR 3-9 LANE DROP	GM	$ 1,500.00	1.518	$ 2,277.00
34	711-16-201	THERMOPLASTIC, STD.-OTHER SURFACES, YELLOW, SOLID, 6"	GM	$ 5,800.00	1.908	$ 11,066.40
	Total Signing & Pavement Markings Cost:					**$ 36,992.40**

Mobilization and Traffic Control

ITEM NO.	FDOT PAY ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	AMOUNT
1	101-1	MOBILIZATION	LS	8% OF OVERALL & MOT	1	$74,722.51
2	102-1	MAINTENANCE OF TRAFFIC	LS	8% OF OVERALL	1	$74,722.51
	Total Mobilization and Traffic Control Cost:					**$149,445.02**

	SUBTOTAL ESTIMATED COSTS INCLUDING MOBILIZATION AND TRAFFIC CONTROL		**$**	**1,083,476**
	PROJECT GRAND TOTAL		**$**	**1,084,000**
	CONTINGENCY FOR CONSTRUCTION OVERRUNS/CLAIMS NOT INCLUDING MOT	5% of Subtotal	**$**	**46,728**
	TOTAL ESTIMATED COSTS INCLUDING CONTINGENCY		**$**	**1,131,000**

OPINION OF PROBABLE COST DOES NOT INCLUDE ANY RIGHT-OF-WAY OR EASEMENT COSTS
ESTIMATED UNIT COSTS BASED ON FDOT HISTORICAL COSTS; CURRENT 12 MONTH AREA 07 (2022/03/01 TO 2023/02/28) AVERAGES