NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF HIGHWAY SAFETY
WASHINGTON, D.C.

HIGHWAY FACTORS GROUP CHAIRMAN'S FACTUAL REPORT

A. CRASH INFORMATION

Location:	Seabreeze Boulevard (State Route A1A) north of Harbor Beach Parkway, Broward County, Florida
Vehicle:	2014 Tesla, Model S, 4-door sedan
Operator:	Private Operator
Date:	May 8, 2018
Time:	Approximately 6:46 p.m. EDT
NTSB #:	**HWY18FH013**

B. HIGHWAY FACTORS GROUP

Robert Squire - Accident Investigator, Group Chairman
NTSB Office of Highway Safety
490 L'Enfant Plaza East, S.W., Washington, DC 20594

Florida Department of Transportation, District IV
3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

C. CRASH SUMMARY

For a summary of the crash, refer to the *Crash Summary Report* in the docket for this investigation.

D. DETAILS OF THE HIGHWAY FACTORS GROUP INVESTIGATION

The Highway Factors Group for this investigation was convened after NTSB Office of Highway Safety investigators initiated a field investigation of this crash and determined that certain highway data could provide additional investigative resources. The portion of the investigation undertaken by the Highway Factors Group was limited to analyzing data that was

received from the Florida Department of Transportation (FDOT) and Fort Lauderdale Police Department (FLPD).

1. Collision Description and Location

The crash involved single vehicle, a 2014 Tesla Model S, four-door sedan, that collided with several roadside fixed objects – masonry/concrete property barrier walls and a luminaire support pole - after it departed the roadway while negotiating a left curve while traveling southbound on Seabreeze Boulevard, Florida State Route A1A (SR-A1A). The initial collision with a roadside feature occurred about 590 feet north of the intersection with Harbor Beach Parkway.[1] The collision events occurred between the intersections of Holiday Drive and Harbor Beach Parkway.

The investigation revealed that the Tesla departed the southbound travel lane as it exited a left curve at a high rate of speed. The vehicle ascended a raised curb and sidewalk, then sideswiped a masonry/concrete wall that paralleled the highway and bordered the contiguous residential property. After crossing a driveway entrance opening, the vehicle sustained a significant impact with the wall on the opposing side of the driveway. The vehicle rotated off the wall and traveled southeastward across SR-A1A where it collided with a luminaire pole on the opposite side of the highway. The vehicle separated from the pole and came to rest further south atop the sidewalk. **Figure 1** depicts a Google Earth image of the location with certain facets of the collision events illustrated.

The collision occurred May 8, 2018, at approximately 6:46p.m. EDT, during daylight with dry road surface conditions.

2. Data Overview

The State of Florida, Department of Transportation (FDOT) provided documentation and data for use in this investigation. Specific data included:

- Relevant sections of the Final "As-Built" Roadway Plans for State Road A1A Resurfacing, Restoration and Rehabilitation "SR A1A east of Mercedes River Small Bridge to Sunrise Boulevard (SR 838). Project ID 430601-1-52-01, final date of June 2017. Those sections included: Signal and Pavement Marking plans; Signalization Plans; Lighting Plans; Lighting Fixture and Pole Detail sheets; and Typical Section Plans.

- Annual Average Daily Traffic (AADT) counts 2002-2017 as provided by the FDOT Transportation Statistics Office.

- FDOT Standard Specifications for Road and Bridge Construction manual, July 2015.

[1] Unless otherwise noted, reference to distances from intersections is based upon the reference station of the approximate center as indicated in the Final "As-Built" Roadway Plans for State Road A1A Resurfacing, Restoration and Rehabilitation "SR A1A east of Mercedes River Small Bridge to Sunrise Boulevard (SR 838). Project ID 430601-1-52-01, June 2017. See NTSB docket attachment titled "Highway Plan Sheets".

- Motor vehicle crash data for 2011-2015 as retained within the state Crash Analysis Reporting System between mile posts 1.833 and 2.172.

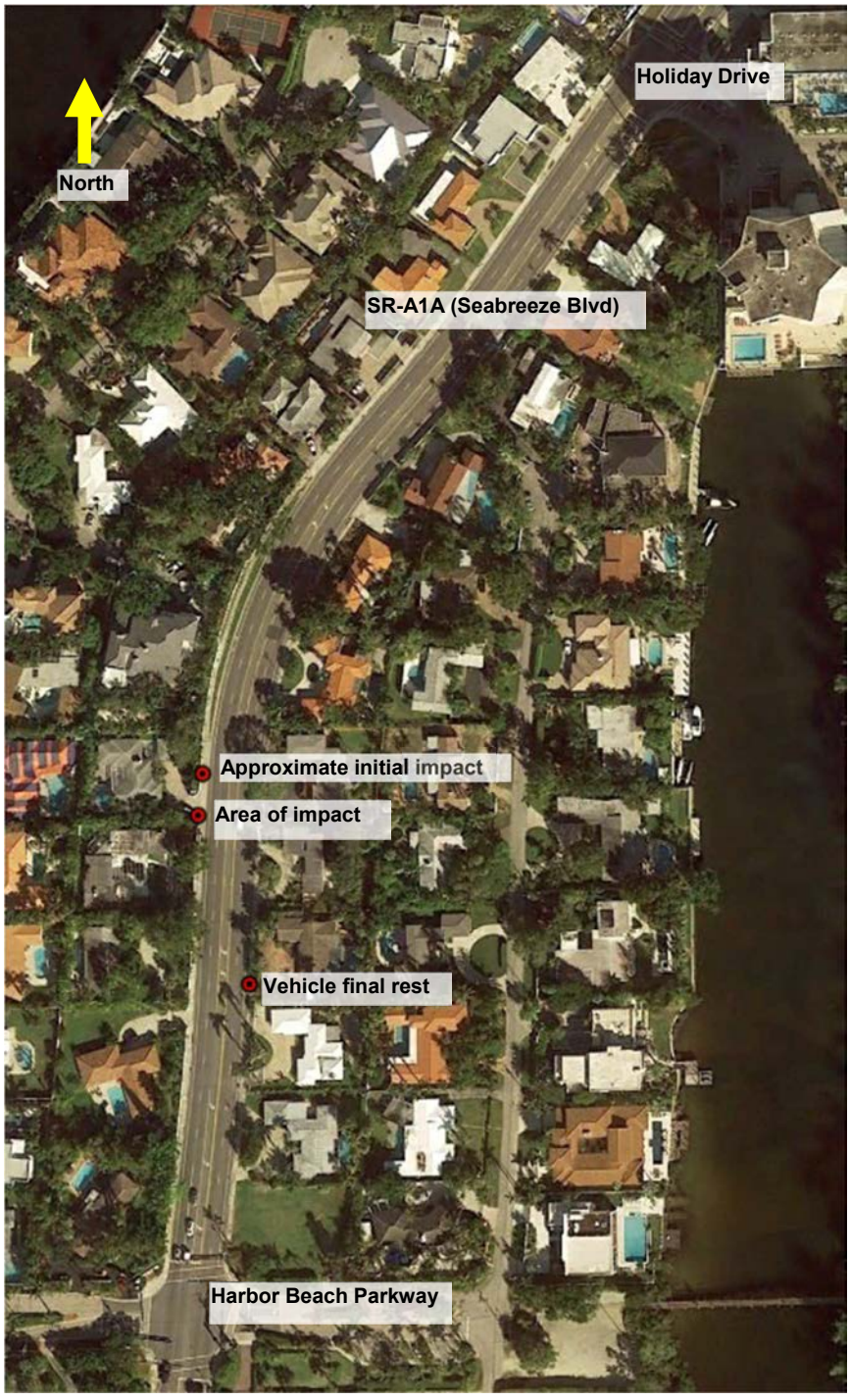

Figure 1: Modified Google Earth image depicting approximately position of collision events in relation to the nearest intersecting highways.

3. Highway Traffic Volume

FDOT provided AADT counts for SR-A1A from sites north and south of the crash site. The northern site was located at Las Olas Boulevard with the southern site located at the SE 17th Street Causeway Inter-Coastal Water Way (ICWW) Bridge.[2] The northern and southern measurement sites are located approximately one (1) and 0.45 miles from the crash site respectively. While FDOT provided 16 years of data, the most recent five-year period is reported in **Table 1**.

Table 1: Annual Average Daily Traffic counts for SR-A1A north and south of the crash site for years 2013-2017.

	SR A1A at 17th Street Causeway ICWW Bridge			SR A1A south of Las Olas Blvd		
Year	Total	East / North	West / South	Total	North	South
2017	34,000	16,500	17,500	26,500	13,000	13,500
2016	33,000	16,000	17,000	27,000	13,500	13,500
2015	34,500	16,500	18,000	31,000	14,500	16,500
2014	29,000	14,000	15,000	26,000	13,500	12,500
2013	28,500	13,500	15,000	29,000	12,000	17,000

The AADT was observed to be relatively consistent during the years reported. During the 16-year report period, the greatest traffic volume was reported in 2002 with 40,000 vehicles at the SE 17th Street Causeway Bridge site and 39,500 vehicles at the Las Olas Boulevard site.

4. Highway Crash History

FDOT supplied crash data for a segment of SR-A1A between mileposts 1.833 and 2.172 for a five-year period that spanned the years 2011-2015. This segment of SR-A1A included the area of the collision as the initial impact was determined to have occurred at about milepost 1.969.[3] The data include the intersections with Holiday Drive to the north (~ center at milepost 2.160) and Harbor Beach Parkway to the south (~ center at milepost 1.872). The date range for the crash data preceded the SR-A1A resurfacing project that concluded in June 2017 that included the area of the collision.

As summarized in **Table 2**, a total of 52 crashes were reported over the approximate 0.34 miles of SR-A1A covered by the data. That total represented 13 injury crashes and 39 property damage-only crashes. No fatal crashes were reported. A total of 28 persons were reported as injured.

[2] SR-A1A is named SE 17th Street west/south of the ICWW bridge. The highway name becomes Seabreeze Boulevard about 0.3 miles east/north of the ICWW Bridge. The bridge is also identified as the SE 17th Street Causeway Bridge.
[3] Milepost locations were calculated based upon the milepost references and station measurements found in the As-Built Roadway Plans for State Road A1A Resurfacing, Restoration and Rehabilitation project dated June 2017. Per the Florida Road Characteristics Inventory Data Handbook, the distance tolerance between mileposts in an urban area is ± 53 feet.

A more detailed review of the data provided yielded the following conclusions.

- 51.9% of the collisions occurred during the 1st quarter months of the year – January through April.
- 65.4 % of the collisions occurred between the hours of 6:00a.m. and 6:00p.m. where 23.1% were between 6:00a.m. and 12:00p.m. and 42.3% between 12:01p.m. and 6:00p.m.
- 69.2% of the collisions occurred during daylight conditions.
- 88.5% of the collisions occurred during clear (76.9%) or cloudy (11.5%) conditions. 11.5% reportedly occurred during conditions of rain.
- 86.5% were reported to involve two (2) vehicles, while the remaining 13.5 % involved a single vehicle crash.
- 84.6% of the collisions were classified as involving another vehicle in transport for the first harmful event;
- 65.4% of the collisions were reported *at* (51.9%) or *influenced by* (13.5%) an intersection. Another 3.8% were categorized as at a driveway access. About a third, 30.8%, were categorized as not at an intersection or crossing.
- 53.8% of the collisions cited the manner of collision as front to rear with another 15.4% as an angled impact.
- 22% of the at-fault driver maneuvers were categorized as *following too closely*.

Table 2: Summary of reported motor vehicle crashes on SR-A1A between mileposts 1.833 and 2.172 for calendar years 2011 through 2015.

Crash Summary Milepost 1.833-2.172					
Year	Total Crashes	Fatal	Injury	Number Injured	Property Damage Only
2015	16	0	3	14	13
2014	10	0	0	0	10
2013	12	0	3	3	9
2012	7	0	5	9	2
2011	7	0	2	2	5
	52	0	13	28	39

Since the crash data identified the location of each crash by milepost reference, it was possible to identify the crashes that occurred within the curve where the Tesla crash initiated. Of the 52 total crashes, three (3) were identified as having occurred in the curve. The three crashes occurred during different calendar years.

Two of the three crashes involved two vehicles where the manner of collision was reported as *front to rear* indicating those collisions were likely colinear rear-end impacts. Those collisions occurred during daylight on a dry road surface. In these crashes all vehicles were traveling southbound.

The remaining crash that occurred on the curve was a single vehicle collision that reportedly involved a sport utility vehicle type that struck a curb. The collision occurred during daylight hours under cloudy conditions, although the road surface was reported as wet. The driver action was coded as *ran off roadway*. No additional actions were coded, although this crash was coded as an injury collision. The vehicle in this crash was also identified as traveling southbound.

4.1. FDOT Safety Review – March 2013

FDOT provided a copy of a contracted safety review that had been submitted to the department in March 2013. The report was titled Safety Reviews: SR A1A\Fort Lauderdale Beach Blvd. from Mercedes River Small Bridge to SR 838 (Sunrise Boulevard).[4] For this report the contractor reviewed crash data between January 2008 and December 2010, which preceded the crash data reviewed in the previous section. Over the 2.75-mile segment of highway, findings offered by the report authors included, but were not limited to the following.

- The most frequent crash types are rear-end (38 percent) and sideswipe (17 percent). There was no *run off road* type, but 4% of the collisions involved contact with a fixed object.
- Four (4) fatal crashes were reported. All were pedestrians.
- 54% of the collisions occurred during daylight.
- 89% of crashes occurred when the roadway surface was dry.
- Crashes were reportedly spread throughout the corridor, instead of a few locations with high frequency. Proximity to the beach and the presence of tourists may contribute to widespread crash occurrences noted within the study limits.

The earlier crash data noted in the safety study appeared relatively consistent with the more recent data provided by FDOT with the exception of pedestrian collisions. The more recent crash data reported no pedestrian collisions during the five-year period reviewed.

[4] Report was authored by Kimley-Horn and Associates for the Florida Department of Transportation Traffic Operations Office.

4.2. Speed Study

FDOT provided a copy of speed study titled Traffic Operations General Engineering Consultant, Spot Speed Study - SR-A1A From Mayan Drive to Bahia Mar, dated August 2015.[5] In the study, the contractor reported that automatic traffic recorder (ATR) machines were used to collect northbound and southbound 24-hour vehicle speeds at three (3) locations along SR-A1A between Mayan Drive and Bahia Mar, a total distance of about one mile that encompassed the curve on which the investigation crash occurred. The data was collected on Thursday, August 13, 2015, with the results conveyed in **Table 3**. A map of the site locations as conveyed in the study is depicted in Appendix 1 of this report.

Table 3: Speed study results table as presented in the report Traffic Operations General Engineering Consultant, Spot Speed Study - SR-A1A From Mayan Drive to Bahia Mar, dated August 2015

Location		Posted Speed Limit (MPH)	Direction	Sample Size	85th Percentile Speed (MPH)	Average Speed (MPH)	10 MPH Pace Speed (MPH)
No.	Street						
1	SR-A1A (N. of Mayan Drive)	30	Northbound	9,729	46	41	36-45
			Southbound	10,769	46	41	36-45
2	SR-A1A (N. of Harbor Beach Pkwy)	30	Northbound	9,726	38	31	29-38
			Southbound	11,765	40	36	31-40
3	SR-A1A (N. of Harbor Drive)	30	Northbound	10,051	40	33	30-39
			Southbound	10,566	41	34	31-40

As conveyed in the report, sites 2 and 3 would cover the southbound approach to and through the accident curve. The 85th percentile speeds were reported as 40 and 41 MPH at sites 2 and 3 respectively. The northbound approach to and through the accident curve would be covered by sites 1 and 2 where the 85th percentile speeds were reported as 46 and 38 MPH respectively. At the time of the study, the roadway had a posted speed limit of 30 MPH – identical to that posted at the time of the crash.

5. Highway Design

SR-A1A (Seabreeze Boulevard) around the collision site is an urban minor arterial with a posted speed limit of 30 MPH. The area is primarily residential, although hotel land use exists northward of Holiday Drive. This section of SR-A1A is a four-lane, undivided roadway with a center two-way left-turn lane that extends between Mayan Drive and Harbor Drive (excluding dedicated left turn lanes at intersections), a distance of about 0.68 miles. SR-A1A is considered a north-south highway and is generally oriented as such. South of Harbor Beach Parkway the

[5] Study was authored by McMahon Associates, Inc. for the Florida Department of Transportation, District 4.

highway exhibits a sweeping westward curvature, whereupon it becomes oriented in an east-west direction. As Seabreeze Boulevard becomes SE 17th Street, SR-A1A is oriented east-west.

Maintenance oversight for this segment of SR-A1A is provided by the Florida Department of Transportation, District 4.

5.1. Typical Section

For the analysis of this collision, the highway as-built plans were reviewed for the segment of SR-A1A between the intersections of Holiday Drive and Harbor Beach Parkway. Outboard of the right travel lanes in both the north- and southbound direction were bike lanes as designated by pavement striping. Contiguous with the bike lane on both roadways was a concrete gutter, estimated to be approximately one foot in width. The curbing was elevated above the roadway and abutted either the concrete sidewalk or a narrow grassy median that offset the curb from the sidewalk. Typical section dimensions were conveyed as follows:

- Highway right-of-way width - 70-100 feet. Through the curve on which the collision events occurred the right-of-way was 70 feet.
- Travel lane widths — 10 feet.
- Center two-way left turn lane width — 9 feet.
- Bike lane width — 4 feet.
- Sidewalk width — 4.5–5.0 feet
- Cross slope superelevation — left lane 0.01-0.04% / right lane 0.01-0.06%

Crash scene mapping data provided by the Ft. Lauderdale Police Department corroborated the lane widths cited in the highway plans with the actual roadway conditions.

5.2. Pavement Marking and Striping

The highway travel lanes were delineated by pavement striping and retroreflective raised roadway markers. The two-way center left turn lane was delineated by parallel normal broken yellow line and a normal solid yellow line at both lane edges. Two retroreflective yellow raised roadway markers straddled the striping and were placed at 40-foot intervals.

Travel lanes for each roadway were delineated by a normal broken white line. Striping segments were 10 feet in length and placed at 30-foot intervals. White and red (opposing direction) retroreflective roadway markers were installed in line with the striping and placed at 40-foot intervals.

Highway plans specified that all lane line striping was to be six inches in width.

A bike lane was contiguous with the right lane of both the north- and southbound roadways. The bike lane was delineated from the travel lane by a normal solid white line. The *Helmeted*

Bicyclist symbol and directional arrow pavement markings were applied within the designated bike lane.

As observed by on-scene NTSB investigators and depicted in photographs, pavement striping and markings were unobstructed, visible and appeared to be in good condition.

5.3. Highway Alignment

Traveling southbound between intersections of Holiday Drive and Harbor Beach Parkway intersection, SR-A1A exhibits three horizontal curves. Two of the curves, just south of Holiday Drive, are relatively minor curves. The third curve further south is where the collision events initiated. Overall, this section of SR-A1A is essentially level and exhibits no notable change in vertical alignment.

Southward from Holiday Drive, the first curve begins about 98 feet south of the Holiday Drive intersection (center). This is a left curve exhibiting a radius of 332.11 feet (17.2°)with a length of 47.59 feet. The angular offset between the approach to and departure from the curve (central angle) is 8.2°.[6]

A tangent segment of about 61.48 feet in length separates the first curve from the second. The second curve begins about 207 feet south of the Holiday Drive intersection. This is a right curve exhibiting a radius of 818.83 feet (6.9°) with a length of 199.82 feet. The curve central angle is 13.9°.

A tangent segment of about 142 feet in length separates the second curve from the third, accident, curve. The third curve begins about 549 feet south of the Holiday Drive intersection. This is a left curve exhibiting a radius of 488.10 feet (11.7°) with a length of 340.17 feet. The curve central angle is 39.8°. Information from FDOT indicates that the maximum cross slope (superelevation) of the curve was about 3.4% near the intersection of the back and forward tangents of the curve (near the curve midpoint). The superelevation decreases to about 2.0% at the south end of the curve.

Southward from the end of the third curve the highway exhibits a tangent segment for approximately 631 feet to the Harbor Beach Parkway intersection. There is a slight, three-degree, rightward offset in the tangent about 350 feet after the curve (281 feet before the intersection).

5.4. Highway Signage

5.4.1. Speed Limit

SR-A1A through the area of the collision has a posted speed limit of 30 MPH. In the southbound direction there were two (2) speed limit signs in proximity to the curve. One sign was located approximately 422 feet before (north of) the Holiday Drive intersection. The second speed

[6] The central angle of a curve defines the degree of curvature and is the angle between the ends of an arc or a chord of agreed length. It also describes the change in forward direction as that portion of the curve is traveled. The length of curve is the distance from the Point of Curvature to the Point of Tangent measured along the curve.

limit sign was located about 75 feet after (south of) Holiday Drive or 474 feet before (north of) the curve.

In June 2017, a resurfacing and rehabilitation project along SR-A1A that included the section of highway on which the collision occurred was completed.[7] Within that project, the signing and pavement marking plans directed the installation of the 30 MPH speed limit signs to replace 35 MPH signage. The 35 MPH speed limit signs appeared in a preceding resurfacing project that was completed in May 2001.

5.4.2. Horizontal Alignment and Advisory Speed Signage

Both the north- and southbound directions of travel exhibit horizontal alignment warning upon approach to the curve. Both directions of travel exhibit either a curve warning (W1-2) or turn warning (W1-1) sign mounted in conjunction with an amber flashing warning beacon.[8] As specified in the most recent rehabilitation project completed in 2017 (see footnote 6), a Turn Warning sign replaced the previous Curve Warning sign along the southbound roadway. The Curve Warning sign remained in place for the northbound roadway. At the time of the on-scene investigation, NTSB investigators confirmed that the electrically-powered warning beacons were functioning.

The flashing warning beacon and installed warning signs are depicted in **Figure 2**. The photograph on the left is the warning beacon with a W1-2 Curve Warning sign in place on the northbound roadway, while the photograph on the right is the southbound warning beacon and W1-1 Turn Warning sign.

[7] See State Road A1A Resurfacing, Restoration and Rehabilitation "SR A1A east of Mercedes River Small Bridge to Sunrise Boulevard (SR 838), Project ID 430601-1-52-01. Final date June 2, 2017. See NTSB docket attachment titled "Highway Plan Sheets".

[8] See Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), Section 4L.03 Warning Beacon for additional information.

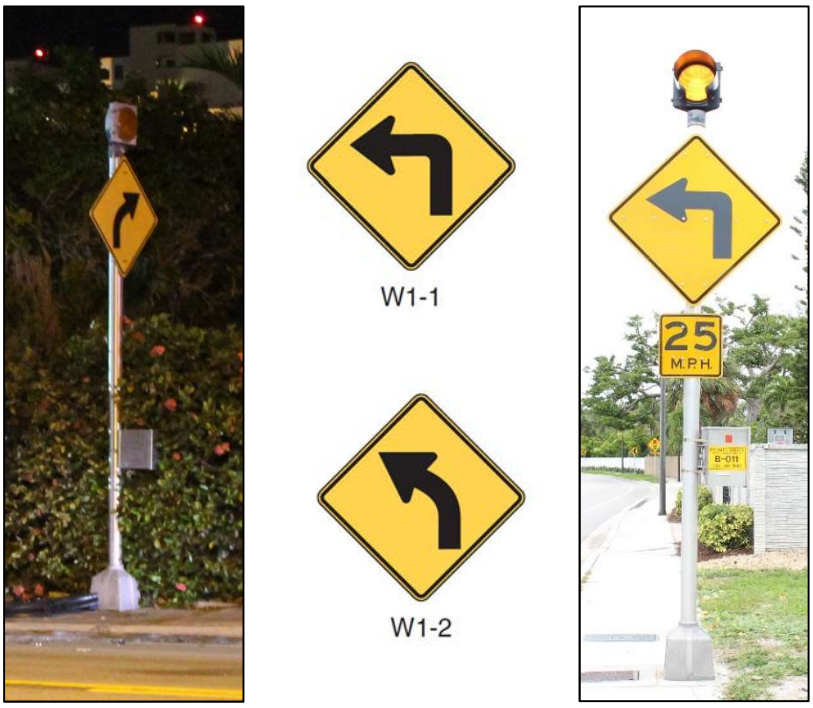

Figure 2: Depicted above are photographs and illustrations of the horizontal alignment warning provided in advance of the curve. The left image (provided by FLPD investigators) faces northbound traffic, while the right image (provided by NTSB investigators) faces southbound traffic.

The south- and northbound beacon and warning signs were located approximately 171 and 287 feet before the start of the curve respective to the directions of travel.

As depicted in Figure 2, the horizontal alignment warning sign facing southbound traffic featured the Turn Warning (W1-1) sign along with a 25 MPH Advisory Speed Plaque (W13-1P). The resurfacing plans dated May 2001 depict the replacement of the existing beacon assembly in combination with the Curve Warning sign (W1-2) and the 25 MPH Advisory Speed Plaque (W13-1P) and moving the assembly about 54 feet south (closer to the curve). FDOT staff advised that during the resurfacing project that concluded in 2017, the curve warning sign was replaced with the W1-1 Turn Warning sign as specified by current MUTCD practice.[9]

While the 25 MPH Advisory Speed Plaque (W13-1P) for the southbound roadway is referenced in the various resurfacing plans and was posted, a similar plaque was referenced in the 2001 plans for the northbound roadway. Reference to the northbound roadway plaque did not appear in the 2017 plans.

[9] See MUTCD, Section 2C.07 (02) Horizontal Alignment Signs, which provides that "a Turn (W1-1) sign shall be used instead of a Curve sign in advance of curves that have advisory speeds of 30 mph or less." Also see Section 2C.10 Combination Horizontal Alignment/Advisory Speed Signs (W1-1a, W1-2a).

5.4.3. Chevron Alignment Signage

The southbound direction of travel through the curve also faced a total of three (3) Chevron Alignment signs (W1-8) that provided additional delineation of the curve (see **Figure 3**).[10] No additional alignment warning was posted for the northbound direction of travel. As indicated on the 2017 As-Built resurfacing plans, the chevron signs were placed along the right roadside at approximately 114-foot intervals beginning about 84 feet south of (past) the start of the curve. The final chevron was located approximately 318 feet from the start of the curve (about 28 feet before the end of the curve).

The highway resurfacing plans dated May 2001 depict the installation of seven chevron alignment signs that were more closely spaced. At that time the signs began about 98 feet before the start of the curve and ended about 12 feet before the end of the curve.

Figure 3: Example of Chevron Alignment Sign (W1-8) as specified by the MUTCD.

5.5. Advance Traffic Control (Signal) Ahead Warning Signage

An Advance Traffic Signal Ahead warning sign (W3-1) was installed in the southbound direction in advance of the signal-controlled intersection with Harbor Beach Parkway. The sign was located about 617 feet before (north of) the intersection (~68 feet into the curve). See **Figure 4**.

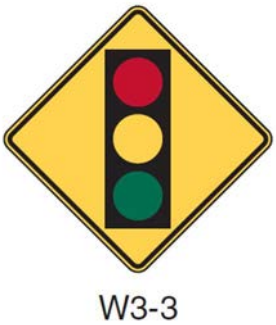

Figure 4: Traffic Signal Ahead warning sign - MUTCD W3-3

[10] See MUTCD, Section 2C.09 Chevron Alignment Sign (W1-8).

Figure 5 is a photograph taken by NTSB investigators depicting the layout of the southbound warning signs as viewed from the sidewalk area approaching the accident curve.

Figure 5: Photograph depicting arrangement of southbound warning signs preceding the curve on which the collision occurred. Image has been cropped.

5.6. Highway Lighting

While this collision occurred during daylight hours and highway lighting was not an issue, one of the roadside fixed objects struck by the vehicle was a luminaire support. Data provided by FDOT indicates that the luminaire was located about 251 feet south of the end of the curve. FDOT data described the support as a single piece spun, prestressed concrete octangle-shaped pole. The pole diameter tapered from approximately 4.92 inches (125mm) at the top to 7.36 inches (187mm) at the base. The weight of the pole was about 685 pounds and the vertical height to luminaires was 18 feet. The Lighting Fixture and Pole Detail plans from the 2017 resurfacing project states "the pole shale be formed in accordance with ASTM-1089, "Standard Specifications for Spun Concrete Poles"."

Figure 6 depicts a photographic image of an exemplar luminaire and support pole. The image was cropped from an on-scene investigation photograph provided by FLPD investigators.

Figure 6: Exemplar luminaire and support pole. Image cropped from an on-scene photograph provided by FLPD investigators.

5.7. Roadside Fixed Objects Struck by Vehicle

As noted in Section 1, after the vehicle departed the highway, it collided with a masonry/concrete wall that bordered the contiguous private property on the opposite side of the sidewalk. Specifications for the wall were not available, although photographs depict evidence of material transfer (paint and black marks) and superficial damage (surface scrapes and gouging) where the vehicle contacted the face of the wall.

Based on documentation provided by FLPD investigators and the as-built plans, the vehicle initially contacted the wall about 44 feet south of the end of the curve, although it had begun to depart the travel lane further north of this location. The vehicle struck the wall segment opposite the driveway about 81 feet south of the end of the curve. After separating from the wall and traveling southeast across the highway, the vehicle struck the luminaire pole.

6. Highway Resurfacing Projects

FDOT provided information on two pavement resurfacing plans that covered SR-A1A through the collision area. The most recent project (referenced previously) was completed in June 2017. That project, identified as "State Road A1A Resurfacing, Restoration and Rehabilitation - SR A1A east of Mercedes River Small Bridge to Sunrise Boulevard (SR 838), Project ID 430601-1-52-01" began in April 2016 and involved milling, resurfacing and restriping of about four (4) miles of SR-A1A. With regard to pavement restoration, the project involved milling two (2) inches of existing pavement and applying two, one-inch "lifts" that included one inch of "Superpave" asphalt and one inch of Friction Course material.[11] Additionally, a small portion of the curb (approximately 342 feet) was replaced within the project limits and tied into existing curbing.

Regarding the curve on which the collision occurred, FDOT advised that the Friction Course overlay was installed on the dates of February 6, 7, 23 and March 2, 2017.

For additional reference, some limited information regarding an earlier resurfacing project was also acquired. That project had a completion date of May 2001 and was identified from the information as "State Project No 86180-3501 - State Road A1A Mercedes River Bridge to Seabreeze Blvd." The project covered about one mile (5,764 feet) of SR-A1A between Haskins Avenue to just north of Bahia Mar. Information acquired for that project included certain contract plan sheets, signing and marking plan sheets and lighting plan sheets. This project material assisted with the identification and placement of older roadway signage and roadside features.

E. REFERENCES

- A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2011

- Manual on Uniform Traffic Control devices for Streets and Highways, U.S. Department of Transportation, Federal Highway Administration, 2009

[11] FDOT advised that additional information regarding the materials used for resurfacing can be found the Florida Department of Transportation Standard Specifications for Road and Bridge Construction manual.

F. DOCKET MATERIAL

The following attachments and photographs are included in the docket for this investigation:

LIST OF ATTACHMENTS

- NTSB docket attachment titled "Highway Plan Sheets" includes relevant sections of the Final "As-Built" Roadway Plans for State Road A1A Resurfacing, Restoration and Rehabilitation "SR A1A east of Mercedes River Small Bridge to Sunrise Boulevard (SR 838). Project ID 430601-1-52-01, final date of June 2017, in addition to relevant sections of the Signal and Pavement Marking plans, Signalization Plans, Lighting Plans, Lighting Fixture and Pole Detail sheets, and Typical Section Plans, dated June 2017 and August 2000.

- NTSB docket attachment titled "Highway AADT Count Data" includes Annual Average Daily Traffic (AADT) counts 2002-2017 as provided by the FDOT Transportation Statistics Office.

- NTSB docket attachment titled "Highway Crash Data" includes Motor vehicle crash data for 2011-2015 as retained within the state Crash Analysis Reporting System between mile posts 1.833 and 2.172.

- NTSB docket attachment titled "SRA1A Safety Review Study" is a copy of the report Safety Reviews: SR A1A\Fort Lauderdale Beach Blvd. from Mercedes River Small Bridge to SR 838 (Sunrise Boulevard), authored by Kimley-Horn and Associates for the Florida Department of Transportation Traffic Operations Office.

- NTSB docket attachment titled "SRA1A Safety Review Study" is a copy of the report Traffic Operations General Engineering Consultant, Spot Speed Study - SR-A1A From Mayan Drive to Bahia Mar, dated August 2015 and authored by McMahon Associates, Inc. for the Florida Department of Transportation, District 4.

LIST OF PHOTOGRAPHS

None

END OF REPORT

Robert Squire
Highway Accident Investigator

Appendix 1 Speed Study Location Map

Figure 7: Image depicting spot speed study locations as reported in Traffic Operations General Engineering Consultant, Spot Speed Study - SR-A1A From Mayan Drive to Bahia Mar, dated August 2015. Image was extracted from the report.