NATIONAL TRANSPORTATION SAFETY BOARD

Office of Highway Safety
Washington, DC 20594-2000

Highway Group Chairman's Factual Report

HIGHWAY FACTORS

HWY22MH006

A. CRASH INFORMATION AND SUMMARY

For a summary of the crash, refer to the *Crash Information and Summary Report*, which can be found in the NTSB docket for this investigation.

B. HIGHWAY FACTORS GROUP

Group Chairman	Dan Walsh, P.E., Senior Highway Factors Investigator NTSB Office of Highway Safety 490 L'Enfant Plaza East, S.W. Washington, DC 20594
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C. DETAILS OF THE HIGHWAY FACTORS INVESTIGATION

The report begins with a discussion on prefatory data that includes the crash location, construction history of Farm-to-Market (FM) 1788, annual average daily traffic volumes, and crash data history. The report also focuses on roadway data that includes the history of speed limits on FM 1788, typical section, profile center line and edge line markings, raised pavement markers, highway lighting, horizontal alignment, passing and no-passing zones, and Texas Department of Transportation (TxDOT) traffic control after the crash. The report summarizes a TxDOT speed and vehicle classification study performed on March 22 – 23, 2022, after the crash. The report documents the speed limits on FM 1788 in the TxDOT Odessa District. Finally, the report concludes with a discussion regarding speed limit laws in Texas.

1.0 Prefatory Data

1.1 Crash Location

The crash occurred on Farm-to-Market (FM) 1788 at mile-point 10.547 near Andrews, in Andrews County, Texas. **Figure 1** is a crash map that illustrates the crash location was approximately 40 miles north of Odessa.

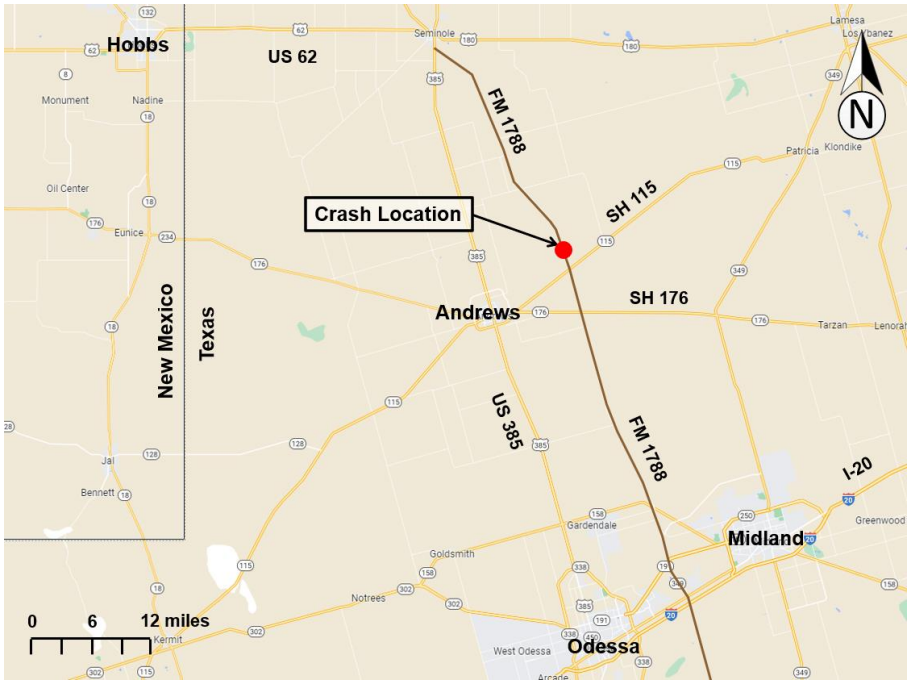

Figure 1 – Crash map (Source: Google Maps revised).

1.2 Construction History of Farm-to-Market (FM) 1788

The section of FM 1788 in the vicinity of the crash was originally constructed in 1968 with a flexible base and surface treatment (seal coat). FM 1788 was widened and rehabilitated with a 2-course asphalt surface treatment in 1988, and subsequently seal coated in 1996, 2003, and 2014. The pavement depth was approximately 1.5-inches over a 6-inch flex base.

1.3 Annual Average Daily Traffic Volumes

Table 1 summarizes the annual average daily traffic volumes on FM 1788 in the vicinity of the crash from 2009 to 2020.[1]

[1]See Highway Factors Attachment – Annual Average Daily Traffic Volumes on FM 1788.

Table 1 – Annual average daily traffic volumes in the vicinity of the crash.

Year	Total
2020	2,369
2019	2,679
2018	2,532
2017	2,341
2016	1,430
2015	1,427
2014	2,290
2013	2,303
2012	1,700
2011	1,300
2010	920
2009	850

1.4 Crash Data History

Table 2 summarizes the contributing factor and fatal crash summary on FM 1788 within a 5-mile radius of the crash for the last 10 years.

Table 2 – Contributing factor and fatal crash summary on FM 1788 within a 5-mile radius of the crash.

Date	Time	Surface Condition	Crash Contributing Factor[2]	Fatality (Yes or No)
2012 – 3 crashes				
03/08/2012	3:30 pm	Slush	Unsafe speed	No
05/07/2012	1:28 pm	Dry	Failed to pass to left safely	No
10/03/2012	4:13 pm	Dry	Failed to control speed	No
2013 – 4 crashes				
02/22/2013	10:23 am	Dry	Fatigued or asleep, faulty evasive action	No
06/03/2013	10:18 am	Dry	Wrong side – not passing, cell phone use	No
09/12/2013	1:54 pm	Dry	Disregard stop sign or light	No
10/01/2013	6:12 pm	Dry	Failed to control speed under influence drug	No
2014 – 5 crashes				
04/03/2014	6:40 am	Dry	Wrong side – not passing	Yes[3]
06/16/2014	2:22 pm	Dry	Failed to drive in single lane	No
10/30/2014	5:38 am	Dry	Animal on road – domestic	No
11/30/2014	7:44 am	Dry	Animal on road – wild	No
11/07/2014	11:20 am	Wet	None	No
2015 – 2 crashes				
02/06/2015	7:54 am	Dry	Failed to control speed	No

[2]Definitions of Crash Contributing Factors can be found on page 132 of the State of Texas Instructions to Police for Reporting Crashes, 2022 Edition, see PoliceInstructions.pdf (state.tx.us).
[3]See Table 4 for details of April 3, 2014, fatality crash.

10/09/2015	11:44 pm	Dry	Failed to drive in single lane	No
2016 – 1 crash				
06/14/2016	7:45 pm	Dry	Driver inattention, faulty evasive action	No
2017 – 1 crash				
11/19/2017	12:07 pm	Dry	Driver inattention, failed to control speed	No
2018 – 5 crashes				
04/27/2018	2:50 pm	Dry	Driver inattention, failed to drive in lane	No
04/28/2018	4:15 am	Dry	Other	No
06/02/2018	9:19 pm	Dry	Failed to drive in single lane, fatigued	No
08/29/2018	1:10 pm	Dry	Fatigued or asleep	No
10/03/2018	10:40 am	Dry	Followed too closely	No
2019 – 3 crashes				
09/08/2019	8:15 pm	Dry	Failed to control speed	No
11/26/2019	3:19 pm	Dry	Failed to drive in single lane	No
11/23/2019	3:37 pm	Dry	Failed to control speed	No
2020 – 3 crashes				
03/31/2020	1:43 pm	Dry	Other	No
07/19/2020	5:57 am	Dry	Fatigued or asleep	No
07/28/2020	3:50 am	Dry	Failed to drive in single lane	No
2021 – 3 crashes				
06/25/2021	5:55 am	Dry	Fatigued or asleep	No
08/28/2021	12:13 pm	Dry	Load not secured	No
11/19/2021	8:00 am	Dry	Turned when unsafe	No
2022 – 1 crash				
01/30/2022	9:30 am	Dry	Failed to drive in single lane	No

Table 3 summarizes the crash history of a selected group and the manner of collision. **Table 3** shows none of the crashes involved a vehicle crossing the center line and striking another vehicle. One crash involved a vehicle crossing the center line due to hail and slush roadway conditions; however, this was a single vehicle crash and did not involve striking another vehicle.

Table 3 – Crash history of a selected group and the manner of collision.

Date	Time	Crash Contributing Factor	Manner of Collision
2012			
03/08/2012	3:30 pm	Unsafe speed	Vehicle lost traction due to hail and slush roadway conditions and began to slide crossing the center line and continued off the roadway into the bar ditch rolling onto its right side.
10/03/2012	4:13 pm	Failed to control speed	Two vehicles going in same direction with one vehicle striking the rear end of another vehicle. Both vehicles came to rest on the shoulder.
2013			

10/01/2013	6:12 pm	Failed to control speed under influence drug	Driver under the influence of drugs struck the rear end of another vehicle that was stopped at a stop sign. Both vehicles came to rest in the roadway.
2015			
02/06/2015	7:54 am	Failed to control speed	Vehicle struck the rear end of a truck tractor towing a trailer that was stopped at a stop sign. Both the vehicle and truck tractor towing a trailer came to rest in the bar ditch.
2017			
11/19/2017	12:07 pm	Driver inattention, failed to control speed	Multi-vehicle rear end collision involving a pickup truck towing a trailer striking the rear end of a vehicle that was stopped in the travel lane while being escorted through a work area. Pickup truck towing a trailer came to rest in the bar ditch.
2019			
09/08/2019	8:15 pm	Failed to control speed	Two vehicles going in same direction with one vehicle striking the rear end of another vehicle who was slowing down for a stop sign. One vehicle came to rest in the bar ditch and the other vehicle did not stop and fled the scene.
11/23/2019	3:37 pm	Failed to control speed	Two vehicles going in same direction with one vehicle striking the rear end of another vehicle who was slowing because of traffic ahead.

Table 4 summarizes the crash history in which wrong side and failed to drive in a single lane was a contributing factor and the manner of collision.

Table 4 – Crash history in which wrong side / failed to drive in single lane was a contributing factor and the manner of collision.

Date	Time	Crash Contributing Factor	Manner of Collision
2012			
05/07/2012	1:28 pm	Failed to pass to left safely	Two vehicles going in same direction with front vehicle slowing down to make a left turn onto a lease road. As front vehicle began to turn left, back vehicle began to pass on the left. Back vehicle failed to pass to the left safely, striking front vehicle in the left front quarter with its right front quarter causing damage. Both vehicles then continued off the roadway striking the fence line.
2013			
06/03/2013	10:18 am	Wrong side – not passing,	Driver may have been using cell phone was coming out of a curve and crossed the center line onto the

		cell phone use	wrong side of the roadway. The on-coming vehicle veered to the left to avoid the vehicle on the wrong side of the roadway. The vehicle who drove onto the wrong side of the roadway struck the on-coming vehicle in the right side with its right front causing damage.
2014			
04/03/2014	6:40 am	Wrong side – not passing	Vehicle drove onto the wrong side of the roadway and struck another vehicle head-on causing both units to receive front distributed damage. The driver of the vehicle who drove onto the wrong side of the roadway was ejected and pronounced dead at the scene.
06/16/2014	2:22 pm	Failed to drive in single lane	Vehicle veered off the road onto the right shoulder and over-corrected causing the vehicle to go into a broad side skid traveling across the roadway and into a field where the vehicle began to roll.
2015			
10/09/2015	11:44 pm	Failed to drive in single lane	Vehicle veered off the road onto the right shoulder and over-corrected causing the vehicle to go into a broad side skid traveling across the roadway until the vehicle struck a dirt berm.
2018			
04/27/2018	2:50 pm	Driver inattention, failed to drive in lane	Driver of vehicle stated that he had fallen asleep at the wheel. Vehicle veered off the road onto the right shoulder and continued through a fence.
06/02/2018	9:19 pm	Failed to drive in single lane, fatigued	Driver stated that he fell asleep due to overworking. Truck tractor towing a trailer veered off the road onto the right shoulder and struck a barb wire fence.
2019			
11/26/2019	3:19 pm	Failed to drive in single lane	Vehicle veered to the left and crossed the center line and over-corrected to the right entering the barrow ditch and then veered back onto the roadway and then veering back into the barrow ditch, continuing into a side skid and rolling right over top.
2020			
07/28/2020	3:50 am	Failed to drive in single lane	Driver stated that he fell asleep while driving to work. Vehicle was traveling through a slight uphill curve in the road and continued across the center line into the bar ditch and over-corrected steering to the right traveling across both lanes and into the bar ditch striking a barbed wire fence and utility pole.
2022			

01/30/2022	9:30 am	Failed to drive in single lane	Vehicle lost control crossing the center line into the bar ditch and over-corrected steering to the right traveling across both lanes and into the bar ditch when its front left made contact with the raised portion of the bar ditch causing the vehicle to roll left over right.

2.0 Roadway Data

2.1 Speed Limit

The posted regulatory speed limit for FM 1788 in the vicinity of the crash was 75 miles per hour (mph) per Texas Transportation Commission Minute Order 109960, dated January 27, 2005.[4]

2.2 History of Speed Limits on FM 1788

Table 5 summarizes the history of speed limits on FM 1788.

Table 5 – History of speed limits on FM 1788.

Year	History of Speed Limits on FM 1788
1974	President signed the Emergency Highway Energy Act that set a national maximum speed limit of 55-mph.
1995	National maximum speed limit of 55-mph was repealed and speed limit for FM 1788 reverted back to 70-mph.
2001	Texas House Bill 299 allowed TxDOT to establish maximum speed limits of 75-mph for daytime only in counties with population density less than 10 persons per square mile. Texas House Bill 299 established nighttime restriction of 65-mph for passenger vehicles, daytime maximum speed limit of 60-mph for trucks, and nighttime restriction of 55-mph for trucks.[5]
2004	TxDOT performs 85th percentile speed study on FM 1788 that confirms the 75-mph maximum speed limit for daytime only.[6]
2005	TxDOT Minute Order establishes 75-mph maximum speed limit for daytime only on FM 1788.
2011	Texas House Bill 1353 removed the nighttime and truck speed limit restrictions and established only one speed limit for roadways.[7] Additionally, TxDOT was granted the ability to establish 75-mph speed limits for any road in which that speed is determined to be reasonable and safe, population density requirements were removed from the criteria. The maximum speed limit on FM 1788 remains 75-mph with removal of the nighttime and truck speed limit signs.

2.3 Typical Section

The typical section for FM 1788 in the vicinity of the crash site consisted of one northbound travel lane approximately 11-feet and 9-inches wide and one southbound travel lane approximately

[4]See Highway Factors Attachment – Texas Transportation Commission Minute Order 109960 dated January 27, 2005, establishing 75 mph as the posted regulatory speed limit for FM 1788.
[5]See Highway Factors Attachment – Texas House Bill 299.
[6]The 85th percentile speed is the speed at which 85% of the vehicle traffic is traveling either at or below that speed or, 15% of the vehicle traffic is traveling above that speed.
[7]See Highway Factors Attachment – Texas House Bill 1353.

12-feet wide.[8] A 6-feet wide paved shoulder existed adjacent to the southbound travel lane and a 5-feet wide paved shoulder existed adjacent to the northbound travel lane. A bar ditch existed beyond the paved shoulder and clear zone.[9]

2.4 Profile Center Line and Edge Line Markings

Profile center line markings existed along the center line of FM 1788 in the vicinity of the crash.[10] The profile center line markings were raised from the pavement approximately a half-inch and were approximately 4-inches wide made of preformed thermoplastic strips that were spaced approximately 12-inches on center. In addition, profile edge line markings existed along the edge of the northbound and southbound lanes with the above stated dimensions.[11] **Figures 2 and 3** illustrate the location of the half-inch raised profile center line markings in the vicinity of the crash.

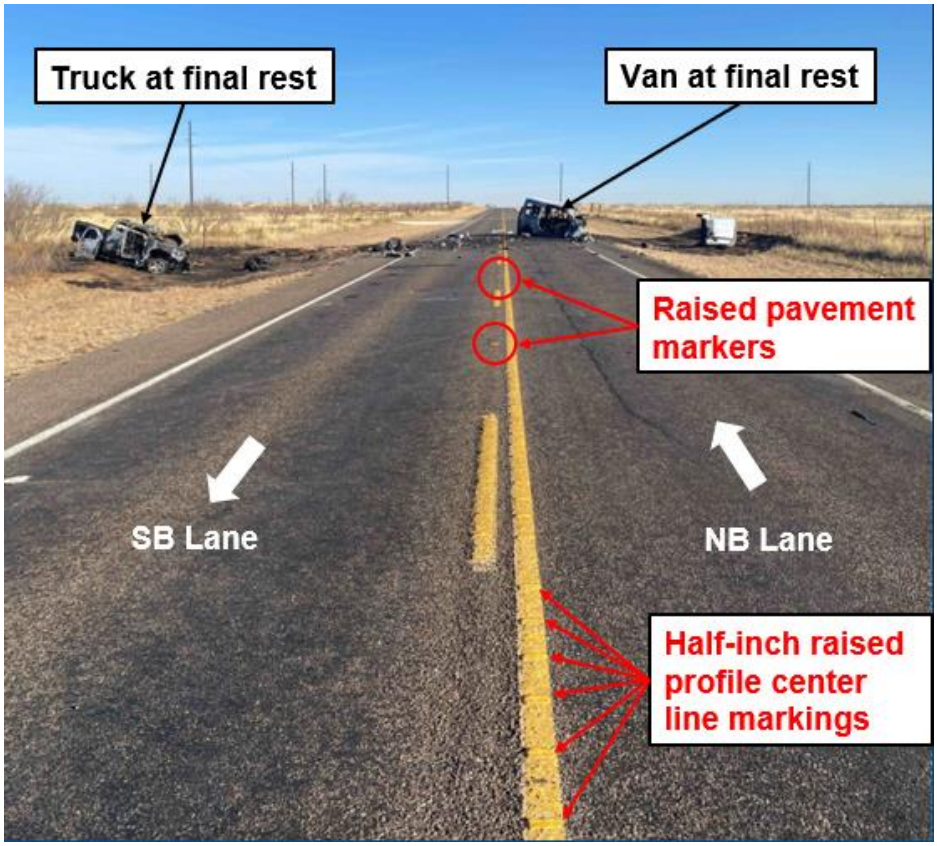

Figure 2 – Location of the half-inch raised profile center line markings and raised pavement markers in the vicinity of the crash looking to the north (Source: TxDOT revised).

[8]See Highway Factors Attachment – Typical Section for FM 1788 in the vicinity of the crash.
[9]A bar ditch is a ditch or channel dug to aid in roadside drainage. A clear zone is an unobstructed, traversable roadside area that allows a driver to stop safely or regain control of a vehicle that has left the roadway.
[10]See Highway Factors Attachment – TxDOT Detail of Profile Centerline Markings on Two Lane Highways.
[11]See Highway Factors Attachment – TxDOT Detail of Profile Edge Line Markings on Two Lane Highways.

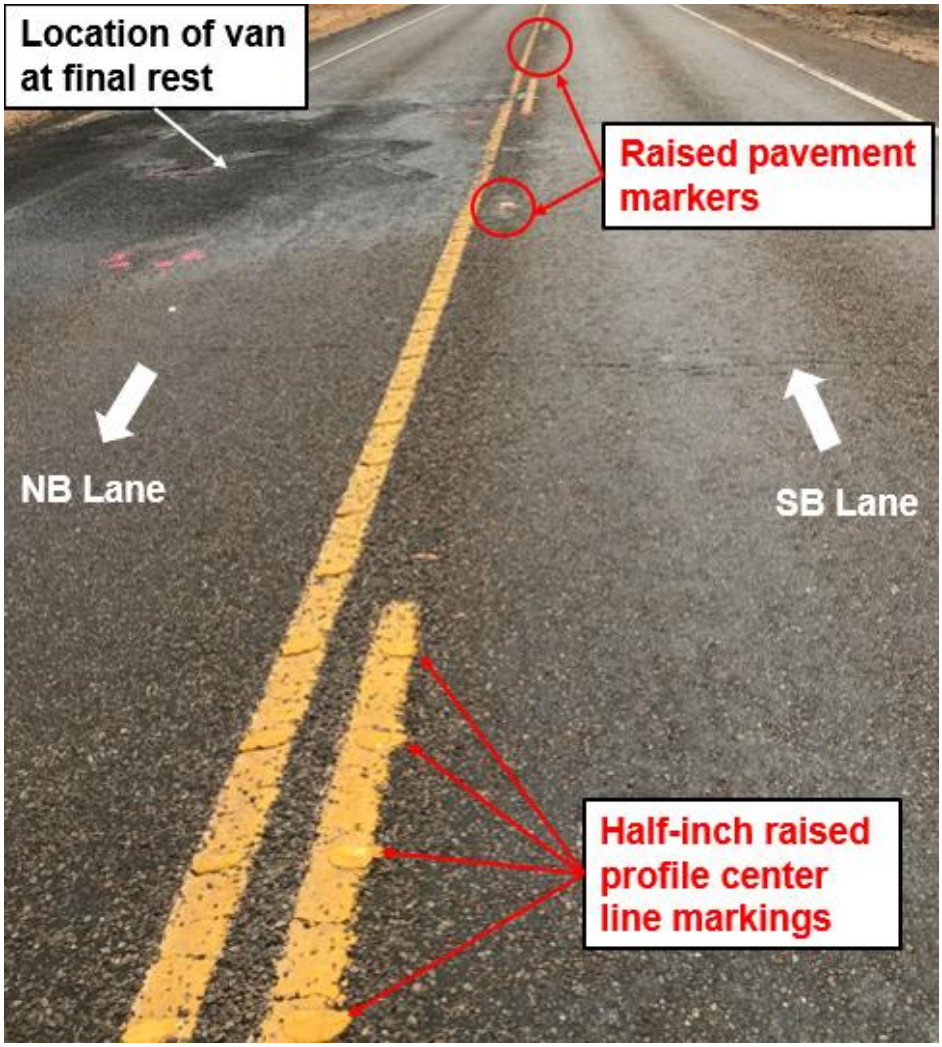

Figure 3 – Location of the half-inch raised profile center line markings and raised pavement markers in the vicinity of the crash looking to the south (Source: TxDOT revised).

TxDOT indicated the following regarding the justification for raised profile markings on FM 1788 in the vicinity of the crash as documented in an email to NTSB investigators:[12]

> *"The section of FM 1788 from Gaines County line south to SH 115 has raised profile markings for both centerline and edgeline. The section of FM 1788 from SH 115 south to SH 176 has depressed milled rumble strips[13] for both centerline and edgeline. Yes, the* [TxDOT] *Odessa District uses depressed milled rumble strips on state and interstate highways. Milled rumble strips are preferred when adequate pavement depth is available. Adequate pavement depth is recommended of 2"* [inches] *or more. The section of FM 1788 from Gaines County line south to SH 115*

[12]See Highway Factors Attachment – Email from TxDOT to NTSB Investigators dated April 21, 2022.
[13]Milled rumble strips are made by a machine with a rotary cutting head, compared to rolled or grooved rumble stripes that are pressed into hot asphalt pavements when constructed.

[the section in which the crash occurred] *does not have adequate pavement depth to support the milled rumble strips."*

FHWA indicated the following regarding profiled pavement markings:[14]

"Profiled pavement markings (e.g., raised thermoplastic, very thick epoxy or tape) are not meant to alert a distracted or drowsy driver like a rumble strip. They are meant to improve visibility under wet nighttime conditions."

FHWA's State of the Practice for Shoulder and Center Line Rumble Strip Implementation on Non-Freeway Facilities indicated the following regarding raised rumble strips:[15]

"Although research suggests that milled rumble strips are the most effective application type, raised rumble strips (or rumble stripes) have been applied in States with warmer climates or where milled rumble strips cannot be installed. Raised rumble strips include side-by-side raised pavement markers, rumble bars, or plastic inserts within thermoplastic pavement markings. Profile thermoplastic pavement markings have been developed to help with nighttime wet pavement visibility and may have some very limited rumble characteristics……Locations without snowplowing activities may use profiled thermoplastic pavement markings or other raised rumble strips; however, milled rumble strips are preferred. Raised rumble strips may be considered in areas where milled rumble strips are not practical, such as bridge decks or on thin surface courses (e.g., chip seals)."

2.5 Raised Pavement Markers

Raised pavement markers existed along the centerline of FM 1788 in the vicinity of the crash.[16] The raised pavement markers contained reflectorized surfaces on both sides of the markers pointing towards motorists travelling in the northbound and southbound lanes. The raised pavement markers were spaced at intervals of 40-feet and were designed to reflect yellow light back to the driver (see **Figures 2 and 3** illustrating the location of the raised pavement markers in the vicinity of the crash).

2.6 Highway Lighting

No highway lighting was available nor required in the northbound and southbound direction of FM 1788 in the vicinity of the crash. Partial interchange lighting did exist at the FM 1788 and SH 115 interchange located approximately 0.75 miles south of the crash site.

TxDOT defines two basic types of roadway lighting systems, continuous lighting, and safety lighting.[17]

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[14]FHWA website accessed on April 20, 2022, at the following link **Frequently Asked Questions - Safety | Federal Highway Administration (dot.gov)**.

[15]State of the Practice for Shoulder and Center Line Rumble Strip Implementation on Non-Freeway Facilities, Federal Highway Administration, Publication No. FHWA-HRT-17-026, March 2017, pages 7 and 8.

[16]See Highway Factors Attachment – TxDOT Detail of Raised Pavement Markers on Two Lane Highways.

[17]Highway Illumination Manual, Texas Department of Transportation, January 2018, Chapter 2 – Lighting Systems, Eligibility, and Warrants.

"A continuous lighting system provides relatively uniform lighting on main lanes, direct connections, ramp terminals, and complete interchange lighting of all interchanges…

The lighting assemblies may be luminaires on conventional poles, high mast assemblies, or a combination.

Safety lighting may be installed at any interchange, highway intersection, or other decision-making point or points of nighttime hazard. Safety lighting may be used to the extent necessary to provide for safety enhancement and the orderly movement of traffic.

There are three kinds of safety lighting: partial interchange/intersection, complete interchange/intersection, and spot…

Partial interchange/intersection lighting covers acceleration and deceleration lanes, ramp terminals, crossroads at frontage road or ramp intersections, and other areas of nighttime hazard.

Complete interchange/intersection lighting covers the limits of the interchange, including main lanes, direct connections, ramp terminals, and frontage road or crossroad intersections.

Spot lighting is another kind of safety lighting. Spot lighting usually consists of one to five units intended to illuminate a nighttime hazard, such as sections with complex geometry or raised channelization."

2.7 Horizontal and Vertical Alignment

The horizontal alignment in the vicinity of the crash was on a straight tangent. The vertical alignment consisted of a crest vertical curve located approximately 1,369 feet north of the crash site.[18]

[18]See Highway Factors Attachment – Vertical Alignment for FM 1788 in the vicinity of the crash.

2.8 Passing and No-Passing Zones

Figure 4 illustrates the passing and no-passing zones approximately one-half mile north and south of the crash location. TxDOT indicated to NTSB investigators the passing and no-passing zones were established based on the vertical grade changes that effect sight distance.[19] In the vicinity of the crash location, a passing zone existed in the southbound direction of travel and a no-passing zone existed in the northbound direction of travel.

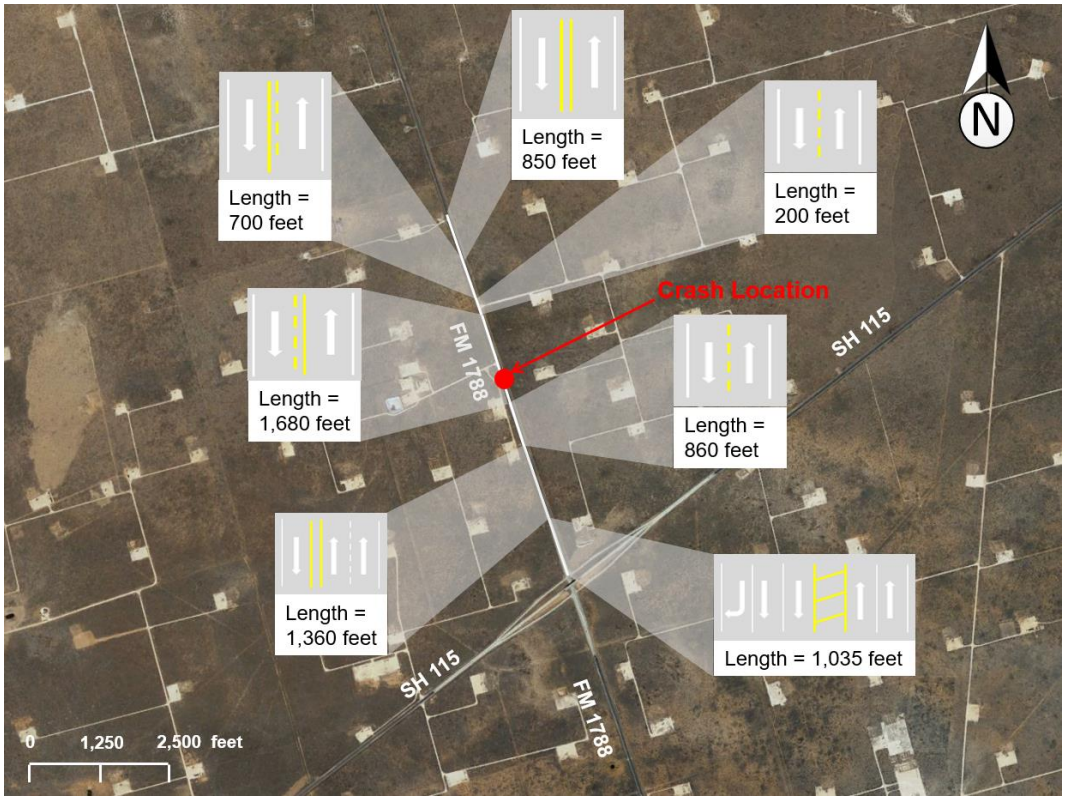

Figure 4 – Passing and no-passing zones approximately one-half mile north and south of the crash location. White arrows are for illustration purposes only (Source: Google Earth revised).

2.9 TxDOT Traffic Control

Table 6 summarizes the TxDOT traffic control after the crash.

Table 6 – TxDOT traffic control after the crash.

Date and Time	TxDOT Traffic Control
Tuesday, March 15, 2022	
20:17	Time of crash.
20:28	TxDOT Andrews Maintenance staff notified of crash by Andrews County Sheriff Office.
20:37	TxDOT Andrews Maintenance staff notified TxDOT Andrews Maintenance supervisor.

[19]Email from TxDOT to NTSB investigators dated April 21, 2022.

20:42	TxDOT Andrews Maintenance staff notified Barricades Unlimited to mobilize crews for traffic control.
21:10	TxDOT Andrews Maintenance staff arrived to crash site and began closure of northbound FM 1788 at SH 115.
21:33	TxDOT Andrews Maintenance staff arrived to crash site and began closure of southbound FM 1788 at County Road 7100.
22:19	Barricades Unlimited arrived to take over traffic control.
Wednesday, March 16, 2022	
0:00 – 7:00	TxDOT Andrews Maintenance staff arrived on scene to relieve other staff.
11:00	TxDOT Odessa Maintenance staff arrived to crash site to repair roadway prior to opening (roadway repairs included some minor scraping of pavement surface and sweeping).
12:00	FM 1788 roadway opened.

3.0 TxDOT Speed and Vehicle Classification Study performed on March 22-24, 2022

At the request of NTSB investigators, TxDOT conducted a speed and vehicle classification study on FM 1788 in the vicinity of the crash on March 22 – 24, 2022.[20] **Table 7** summarizes the TxDOT speed study on FM 1788 in the vicinity of the crash on March 22 – 24, 2022.

Table 7 – TxDOT speed study on FM 1788 in the vicinity of the crash on March 22 – 24, 2022.

Speed Ranges	Northbound (NB)	NB %		Southbound (SB)	SB %		Total
101-105 mph	0	0%		1	0.1%		1
96-100 mph	0	0%		1	0.1%		1
91–95 mph	1	0.1%	39%	11	0.6%	53%	12
86–90 mph	8	0.6%		50	2.8%		58
81-85 mph	87	6.2%		195	11.0%		282
76-80 mph	450	32.1%		679	38.3%		1,129
71-75 mph	476	33.9%		483	27.3%		959
66–70 mph	221	15.7%		223	12.6%		444
61-65 mph	109	7.7%		84	4.7%		193
56-60 mph	34	2.4%		18	1.0%		52
51-55 mph	9	0.6%		8	0.5%		17
46-50 mph	1	0.1%		1	0.1%		2
41-45 mph	0	0%		1	0.1%		1
36-40 mph	5	0.4%	61%	0	0%	47%	5
31-35 mph	0	0%		1	0.1%		1
26-30 mph	0	0%		1	0.1%		1
21-25 mph	1	0.1%		4	0.2%		5
16-20 mph	2	0.1%		1	0.1%		3
11-15 mph	0	0%		5	0.3%		5

[20]See Highway Factors Attachment – TxDOT Speed Study performed on March 22 – 24, 2022 on FM 1788 in the vicinity of the crash.

6-10 mph	0	0%		5	0.3%		5
0-5 mph	0	0%		0	0%		0
Total	**1,404**	**100%**		**1,772**	**100%**		**3,176**

Table 8 summarizes the TxDOT vehicle classification count on FM 1788 in the vicinity of the crash on March 22 – 24, 2022.

Table 8 – TxDOT vehicle classification count on FM 1788 in the vicinity of the crash on March 22 – 24, 2022.

Vehicle Classification	Northbound (NB)	NB %	Southbound (SB)	SB %	Total
Passenger Vehicles	353	25.1%	266	15.0%	619
Single Unit Vehicles	825	58.8%	1,271	71.7%	2,096
Combination Vehicles	154	11.0%	195	11.0%	349
Multi-Trailer Vehicles	72	5.1%	40	2.3%	112
Total	**1,404**	**100%**	**1,772**	**100%**	**3,176**

4.0 Speed Limits on FM 1788 in the TxDOT Odessa District

Table 9 summarizes the posted speed limits on FM 1788 in the TxDOT Odessa District.

Table 9 – Posted speed limits on FM 1788 in the TxDOT Odessa District.

Begin Mile-Point[21]	End Mile-Point	Total Miles	Speed Limit	Comments	Limits
0	15.58	15.58	75	Rural segment	Andrews/Gaines County Line to SH 176 (***Section in which the crash occurred***)
0	17.48	17.48	75	Rural segment	SH 176 to Andrews/Ector County Line
5	6.52	1.52	70	Rural segment	Andrews/Ector County Line to Midland/Ector County Line
0.75	2.82	2.07	70	Rural segment turning to industrial	Midland/Ector County Line to 0.5 miles south of SH 158
2.43	5.65	3.22	65	Industrial segment	0.5 miles south of SH 158 to SH 349 (concurrent)
5.65	7.42	1.77	65	Industrial segment with residential	SH 349 (concurrent) to 0.5 miles north of SH 191
7.42	10.62	3.20	60	Industrial segment	0.5 miles north of SH 191 to 870 feet north of N SL 40
10.62	12.16	1.54	55	Industrial segment	870 feet north of N SL 40 to BI 20

[21]The mile-points for each segment are not continuous and thus do not represent a sequential order.

12.16	13.02	0.86	55	Industrial segment	BI 20 to IH 20 SFR
13.02	15.89	2.87	55	Industrial segment with residential	IH 20 SFR to 2 miles south of IH 20 SFR
15.89	17.13	1.24	60	Industrial segment	3 miles south of IH 20 SFR for 3.2 miles south of IH 20 SFR
17.13	32.37	15.24	75	Rural segment	3 miles south of IH 20 SFR to FM 1787
0.5	2.28	1.78	75	Rural segment	FM 1787 to End of FM 1788

5.0 Speed Limit Laws in Texas

TxDOT is a statutory agency, created by the Texas Legislature through statute and having only the powers delegated to it through statute. Speed limits are set by statute according to the type of road (Texas Transportation Code Chapter 545, Subchapter H, Section 545.352).[22] TxDOT is granted authority to alter those speed limits through the Texas Transportation Commission only after conducting an engineering and traffic investigation. The engineering and traffic investigation shall follow TxDOT's Procedures for Establishing Speed Zones as adopted by the commission.[23]

TxDOT's Procedures for Establishing Speed Zones indicated the following:

*"**Section 2 – Determining the 85th Percentile Speed***

General Concepts

The maximum speed limits posted as the result of a study should be based primarily on the 85th percentile speed, when adequate speed samples can be secured. The 85th percentile speed is a value that is used by many states and cities for establishing regulatory speed zones.

Speed checks should be made as quickly as possible, but it is not necessary to check the speed of every car. In many cases, traffic will be much too heavy for the observer to check all cars.

Theory

Use of the 85th percentile speed concept is based on the theory that:

- *most drivers:*
    - *are reasonable and prudent*
    - *do not want to have a crash*

[22] https://statutes.capitol.texas.gov/Docs/TN/htm/TN.545.htm.
[23] Procedures for Establishing Speed Zones, Texas Department of Transportation, revised August 2015.

- *desire to reach their destination in the shortest possible time*

- *a speed at or below which 85 percent of people drive at any given location under good weather and visibility conditions may be considered as the maximum safe speed for that location."*

D. DOCKET MATERIAL

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

LIST OF ATTACHMENTS

Highway Factors Attachment – Annual Average Daily Traffic Volumes on FM 1788

Highway Factors Attachment – Texas Transportation Commission Minute Order 109960 dated January 27, 2005, establishing 75 mph as the posted regulatory speed limit for FM 1788

Highway Factors Attachment – Texas House Bill 299

Highway Factors Attachment – Texas House Bill 1353

Highway Factors Attachment – Typical Section for FM 1788 in the vicinity of the crash

Highway Factors Attachment – TxDOT Detail of Profile Centerline Markings on Two Lane Highways

Highway Factors Attachment – TxDOT Detail of Profile Edge Line Markings on Two Lane Highways

Highway Factors Attachment – Email from TxDOT to NTSB Investigators dated April 21, 2022

Highway Factors Attachment – TxDOT Detail of Raised Pavement Markers on Two Lane Highways

Highway Factors Attachment – Vertical Alignment for FM 1788 in the vicinity of the crash

Highway Factors Attachment – TxDOT Speed Study performed on March 22 – 24, 2022 on FM 1788 in the vicinity of the crash

LIST OF PHOTOGRAPHS

Highway Factors Photo 1 – View of crash scene looking to the north on FM 1788 (Source: TxDOT)

Highway Factors Photo 2 – View of crash location looking to the south on FM 1788 (Source: TxDOT)

Highway Factors Photo 3 – View of crash location looking to the south on FM 1788 with SH 115 overpass in the background (Source: TxDOT)

Highway Factors Photo 4 – View of crash location looking to the north on FM 1788 (Source: TxDOT)

Highway Factors Photo 5 – View of 75 miles per hour speed limit sign in the northbound direction of travel on FM 1788 located approximately 3,009 feet from the crash location (Source: TxDOT)

Highway Factors Photo 6 – View of 75 miles per hour speed limit sign in the southbound direction of travel on FM 1788 located approximately 8.60 miles from the crash location (Source: TxDOT)

Highway Factors Photo 7 – View of 75 miles per hour speed limit sign in the southbound direction of travel on FM 1788 located approximately 10.53 miles from the crash location (Source: TxDOT)

Submitted by:

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