



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

**SURVIVAL FACTORS GROUP CHAIRMAN'S
FACTUAL REPORT**

A. CRASH INFORMATION

Location: Northbound US Highway 83 (US-83) near milepost 553.4 in Uvalde County, 6.5 miles north of Concan, Texas

Vehicle #1: 2007 Dodge Ram quad-cab 3500 pickup truck

Operator #1: Private owner

Vehicle #2: 2004 Ford E350 cutaway chassis with a 13-passenger Turtle Top Vanterra medium-size bus body

Operator #2: First Baptist Church of New Braunfels

Date: Wednesday, March 29, 2017

Time: Approximately 12:20 p.m. Central Standard Time (CST)

NTSB #: **HWY17MH011**

B. SURVIVAL FACTORS GROUP

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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 SURVIVAL FACTORS INVESTIGATION

The Survival Factors Group investigation focused on the examination of damage sustained to the 2004 Ford E350 cutaway chassis 13-passenger medium-size bus and the 2007 Dodge Ram quad-cab 3500 pickup truck. Additionally, the available occupant protection and occupant seating areas of the medium-size bus were examined. The emergency response of the responding fire/rescue agencies were also reviewed.

1. 2007 Dodge Ram Quad-Cab 3500 Pickup Truck

Examination of the exterior and interior of the Dodge Ram pickup truck was conducted on April 1, 2017 at Gilberts Body Shop located at 1804 N. Getty avenue in Uvalde, Texas.

For uniform description, “left” will refer to the drivers side, and “right” will refer to the passenger side of the truck.

1.1. 2007 Dodge Ram Quad-Cab 3500 Pickup Truck Exterior Examination

The pickup truck sustained extensive damage to the front end with damage extending down the left side of the truck, as shown in **Figure 1**.¹ The truck’s front end was shifted to the left. The roof of the cab was buckled upwards approximately 10 inches. The front left wheel assembly was displaced aft of the drivers A-pillar. The drivers A-pillar was cut by first responders approximately 5 inches from the top of the dashboard. Post-crash the wheelbase on the drivers side measured 95 inches and 167 inches on the passenger side (the original wheelbase was 160.5 inches).² The drivers door was separated at the upper hinge and the door frame folded over/collapsed. First responders pried open both the front driver and passenger doors while extricating the driver. The rear door on the drivers side was displaced rearward and jammed closed.



Figure 1. Left side profile view of front end deformation to Dodge Ram.

¹ Refer to Survival Factors photos 1-2. Exterior photos of 2007 Dodge Ram Quad-cab 3500 Pickup truck.

² Refer to Vehicle Factors Group Chairman’s Factual Report for detailed vehicle specifications.

The windshield was found split in the center and laid open forward on the hood. No impact points were identified on the windshield. The drivers door window was broken out while the front right passenger door window remained intact. Interviews with first responders indicated that they broke out the rear passenger door window on the drivers side. The passenger side rear window was broken out by a passerby in an effort to assist prior to any first responders arriving on scene. The backlight with center slider remained intact.

The driver side outside rearview mirror and housing were broken away. The right side rearview mirror was displaced but remained intact. The driver side step rail was torn away while the step rail on the passenger side remained partially attached at the front attachment point.

1.2. 2007 Dodge Ram Quad-Cab 3500 Pickup Truck Interior Examination

The drivers compartment was severely compromised in the crash. The steering wheel, instrument panel, and footwell regions were all displaced aft into the drivers seating position. Post-crash, the distance from the drivers steering wheel to the drivers seatback was approximately 7 inches, as shown in **Figure 2**.³

The pickup truck had a 60/40 split bench with a fold down center armrest in the front row. The truck was equipped with lap/shoulder belts in the two front outboard seating positions with a lap only belt in the front center seating position. The pickup truck was equipped a fold-up split bench seat with lap/shoulder belts for the three rear seating positions. Both the driver and front passenger lap/shoulder belts were found locked in the stowed position.⁴ Blood was noted on the center instrument panel and above the left side drivers header near the B-pillar.



Figure 2. Close-up view showing drivers steering wheel approximately 7 inches from the center of the steering wheel to the drivers seatback.

³ Refer to Survival Factors photos 3-4 of Dodge drivers airbag and seating area.

⁴ Refer to Survival Factors photo 5. Interior view of driver seating area in 2007 Dodge Ram quad-cab 3500 pickup truck. NOTE: Drivers seat belt is in locked and stowed position.

The damaged steering wheel was rotated 180 degrees to right and measured 16 inches horizontally and 14 inches vertically. The truck was equipped with front driver and passenger airbags and both deployed during the crash. The driver airbag deployed from the steering wheel housing. The circular airbag was approximately 18 inches in diameter. The driver airbag had one vent hole that was located at the bottom of the airbag. A large amount of blood was located on the bottom of the airbag, with a small amount of blood documented on the top of the airbag. The front passenger airbag was a rectangular airbag and deployed from the top of the instrument panel. The passenger airbag measured 16 inches horizontally and 20 inches vertically. Two vents were present on each side of this airbag. No additional markings or damage were noted to the airbag.

1.3. Event Data Recorders

The truck, was equipped with Airbag Control Module (ACM) that had event data recording capabilities. The ACM was removed by Texas Department of Public Safety (DPS), and the data from the vehicle's ACM was downloaded.

The ACM showed that electrical power was disconnected in the crash and did not image any data; However, the impact still triggered the sensor deploying the driver airbag. The Airbag Module was removed from the vehicle and brought to the manufacturer for imaging. For additional information see the *Recorders Specialist's Factual Report*.

2. 2004 Ford E350 13-passenger Bus

The crash-involved bus was a 2004 Ford E350 cutaway chassis with 13-passenger Turtle Top Vanterra medium-size bus body.⁵ The bus had a driver seat and passenger seat in the front compartment. The passenger compartment had 4 rows of two-place passenger seats on driver side, a center aisle-way, and the passenger side had a loading door followed by 3 rows of passenger seats, the first two of which were single seats, followed by a double seat at the back.

For uniform description, “left” will refer to the drivers side, and “right” will refer to the passenger side, or loading door side, of the bus.

2.1. 2004 Ford E350 13-passenger Bus Exterior Examination

The bus sustained extensive front end damage that extended down the left side as the pickup truck overrode the bus bumper and frame resulting in extensive intrusion into the driver and passenger compartments. The entire drivers compartment collapsed such that the A-pillar on the drivers side was aligned with the B-pillar on the passenger side of the bus. Similarly, the B-pillar on the drivers side was displaced rearward such that it was aligned with the rear window bow of the first window on the passenger side of the bus. **Figures 3 and 4** show the damage to the

⁵ The 2004 Ford E350 13-passenger medium size bus was a Two Stage manufactured vehicle thus, Ford manufactured the chassis and power train while Turtle Top manufactured the bus body and did the final completion of the vehicle. Under the provisions of FMVSS 568, Vehicles Manufactured in Two or More Stages. Subpart 568.1 states: “*The purpose of this part is to prescribe the method by which manufacturers of vehicles manufactured in two or more stages shall ensure conformity of those vehicles with Federal motor vehicle safety standards (“standards”) and other regulations issued under the National Traffic and Motor Vehicle Safety Act*”.

front and left side of the bus and the accordion style deformation, marked with yellow arrow, to the bus's left sidewall structure.⁶



Figures 3 and 4. Photo on left is a frontal view and photo on right is a front left angle view of deformation to front end of Ford E350 bus. (Note; yellow arrow indicates area of accordion style crush to B-C pillars)

Both the drivers door and the front passenger door were removed by emergency responders. The windshield was destroyed by impact forces. On the left side of the bus, the drivers side window and the first two passenger windows on the left side were destroyed by impact forces. The forward window bow of the third window on the left side, which was the emergency exit window, was cut and the window broken out to provide access to the passengers in the rear of the bus. The fourth window on the left side was intact. The rear door was functional and a 12-inch x 48-inch section adjacent to the right side rear door frame was cut by emergency responders to provide better access and removal of occupants. On the right side of the bus, the front passenger window was broken. The large plexiglass side loading door was intact and was open upon examination. The first and third windows on the right side of the bus were intact. The second window on the right side of the bus, which was also the emergency exit window, was removed by emergency responders. First responders cut a 28-inch x 12-inch section of the sidewall directly below the emergency exit window to provide better access and removal of occupants.⁷

At final rest, the rear right bumper corner was on top of the guardrail. The resultant damage was a 5-inch x 11-inch section of the fiberglass rear right bumper corner facia being torn away that revealed that the underlying structure had been displaced.

⁶ Refer to Survival Factors Photo 6. Front left angle view of deformation to 2004 Ford E350 cutaway chassis with a 13-passenger Turtle Top Vanterra medium-size bus body. NOTE: Yellow arrow indicates area of accordion style crush.

⁷ Refer to Survival Factors photo 7. Exterior view from right side showing deformation and extraction damage to 2004 Ford E350 cutaway chassis with a 13-passenger Turtle Top Vanterra medium-size bus.

2.2. 2004 Ford E350 13-passenger Bus Interior Examination

Due to the severity of the intrusion, the drivers seat was displaced aft and toward the right side of the bus such that it was found adjacent to the right side loading door (in the first row of passenger seats). The drivers steering wheel was deformed and displaced aft and inward so that it was about 12 inches aft of the back of the front passenger seat's seatback (Refer to **Figure 5**).⁸ The steering wheel measured 16 inches horizontally and 14 inches wide. Approximately a quarter of the steering wheel was cut by first responders in the 7-5 o'clock position. Extrication of passengers resulted in the removal of the first row of 2-passenger seats behind the drivers seat. The second row aisle seat was also removed on the left side of the bus. The first and second row of 2-passenger seats were severely damaged by the intrusion and impact forces such that the seat backs were bent backwards and the sidewall attachment (for the first row) was torn away from the attachment point. (Note that the sidewall experienced the accordion style deformation pattern described above.) The seats and restraint systems are described further in the following sections.



Figure 5. Interior view of Ford E350 from rear looking forward at interior intrusion and deformation. NOTE: Row 1 cut out during extrication process. Above abbreviations, SW is Steering Wheel, Dr = Driver, and FR = Front right passenger.

2.2.1. Driver and Passenger Seats

The driver and front passenger seats were manufactured by Freedman Seating Co and were equipped with lap and shoulder belts with pretensioners.⁹ The bus was equipped with Freedman Mid-Hi Rigid seats in seat positions 1A and 2A and Freedman Featherweight midback passenger seats in rows 2-3.¹⁰ The inboard seats on the drivers side in rows 1-3 were equipped with the side

⁸ Refer to Survival Factors Photos 8 and 12 for driver and front right passenger seating area.

⁹ According to Freedman, the assembly of the seats and legs to the base frames was done by Turtle Top.

¹⁰ The seats in 2B-2D and row 3 were labeled Freedman Seating Co 344545.0 5/04.

slide seat mechanism, allowing the seat to slide laterally into the aisle.¹¹ (None of the seats were slid laterally into the aisle upon examination.) The seat backs were non-reclining (rigid). These seat frames are attached to a base frame with four attachment points. The base frame was attached to a sidewall seat track at two attachment points. The base frame was also attached to the leg, which was attached to the floor seat track at three attachment points (one forward and two aft). The cabin floor did not exhibit any damage aft of the main intrusion region.

The fourth row was equipped with 2-person fold down bench seats on each side of the bus, which can be folded up to allow for luggage storage.¹² These foldaway seats were attached to the sidewall track at two points and to the floor (not the same floor track as for rows 1-3) with four attachment points. These seats were labeled FSC Foldaway U.S. Pat. # 5,492,389 Freedman Seating Co.¹³

Descriptions of the bus seats and their attachments are presented in Table 1. For documentation purposes, the passenger seats were labeled based on the row (1-4) and the seat position (A-D starting on the left). Row 1 only had two seats (A and B), row 2 and 3 had three seats (A-C), and row 4 had four seats (A-D). The attachment points are also described.

Table 1. Accident Bus Seat Deformation Summary

ROW	DRIVER SIDE	PASSENGER SIDE
	Seat base attached at front left attachment point; all three other points separated. Seat cushion crushed in half from left rear to right front. Seat back tilt handle broken; armrest (on inboard side) intact. Seat crushed downward, rearward, and inboard. Seat displaced rearward and located in the middle of the aisle adjacent to the front loading door	Seatback in the upright position. Foot well intrusion such that the foot well touched the front edge of the seat cushion. Seat shifted outboard Rear floor anchors bent outboard but still attached Armrest in the up position
1	Seat 1A. Seat cushion bent downward and aft; seatback deformed rearward. Seat 1B. Seat back twisted rearward toward aisle; armrest bent toward aisle. Sidewall attachment: Track nut pulled from sidewall seat track. Aft attachment pulled from bolt in sidewall seat track. Floor attachment: Support leg cut by responders. Forward attachment of seat frame to base; Spring nut pulled from the Featherweight base frame. ¹⁴	No Seat (Loading Door)
2	Seat 2A was attached to the sidewall seat track; seat cushion was bent downward at the front edge due to the accordion sidewall deformation; seatback was twisted inboard; left (outboard) seatback frame partially cut by emergency	Seat 2D: The spring nut on the inboard aft position between the base frame and the leg should be turned 90 degrees and locked into the base frame; upon investigation, the spring nut was tight on the base frame but not turned to engage the seat frame

¹¹ The side slide seat mechanism allows passengers wider spacing between seats.

¹² The Vanterra bus can be equipped with a cargo net in front of the foldaway seats for luggage storage. The cargo net was not present on this bus and attachment points for the cargo net were not present. Most likely, the cargo net option was not chosen for this bus.

¹³ The foldaway seats were also labeled “Made in the USA 4545 W. Augusta Chicago, IL 60651 773-524-2440.”

¹⁴ Refer to Survival Factors Photos 13-14 for front and rear views of this extracted seat.

	response (when window bow was cut); seat back attachment to seat cushion cut on inboard side. Seat 2B was cut from seat 2A at base frame and leg; the armrest in seat 2B was bent toward the aisle; seat back appeared upright.	(see Figure 11) indicating it was not engaged pre-crash; as a result the seat frame and base frame pulled up at this corner; seat cushion is deformed down; armrest is deflected toward the window; seat deflected forward (possibly due to lack of attachment between base frame and leg).
3	Seat 3A was attached at the sidewall seat track; seatback and cushion were undeformed. Seat 3B was attached at the floor; armrest deflected toward aisle; seatback cut from seat cushion at aisle side.	Seat 3D base frame was cut from the sidewall seat track by responders; the aft portion of the leg was partially cut by responders; seat cushion, seatback, and armrest were intact.
4	Seats 4A and 4B (drivers side foldaway seat) were attached at the sidewall track and floor; seatback cut away by responders and separate from bus; seat cushion found angled down to the floor at the aisle side (this damage was not seen in the on-scene photos).	Seats 4C and 4D (passenger side foldaway seat) were attached at the sidewall track and floor; seatback cut away by responders and separate from bus.

2.3. Driver and Passenger Seat Belts

The driver and front right passenger seats were equipped with Shield/AmSafe Type 2 lap and shoulder belts. The passenger seats aft of the driver and front passenger were equipped with Type 1 seat belt assemblies (lap belts). The passenger lap belts for the first three rows were manufactured by Shield/AmSafe and were bolted to the seat frame and were equipped with what Shield/AmSafe refers to as a, “Web winder” or a traveling retractor system. The retractor housing moves with the latch portion of the seat belt (Refer to **Fig. 6** below). (Some retractor housings are mounted on the seat frame.) According to Shield/AmSafe, when the seatbelt was connected, the “web winder” retractor housing is designed to be positioned near the middle of the abdomen.



Figure 6. View of lap belt in seat 3A showing the “web winder” with latch and buckle.

For the fourth row passenger seats, the lap belts were bolted to the seat frame but the Shield/AmSafe lap belts were manual tightening/synching belts (no retractor). The lateral lap belt attachment points for the first three rows were spaced 11.5 inches apart on the base frame. For the

fourth row only, the lateral lap belt attachment points were 6.5 inches apart (see **Figure 7** below).¹⁵ The 6.5 inch (165 mm) spacing is allowable under Federal Motor Vehicle Safety Standards (FMVSS) 210.¹⁶ According to the Representative from Freedman Seating, as of October 1, 2017 Freedman will no longer be installing their lap belt anchors at the 6.5-inch lateral spacing. They have increased the lateral lap belt anchor spacing to an average of 10 inches, with spacing ranging from 8.5 to 12.5 inches.



Figure 7. Close-up view of lateral lap belt attachment points on seat frame in row four.

The length of the webbing and buckle on passenger lap belts were different for rows 1-3 and row 4. In rows 1-3, the buckle and webbing length was 17.5 inches. In row 4, the buckle and webbing length was 31.5 inches. **Table 2** details the condition of the seat belts at the time of the examination.

Table 2. Accident Bus Seat Belt Examination Summary

ROW	Driver	Front Passenger Seat
	Seat belt found buckled. Shoulder harness and lap belt webbing cut. Shoulder harness extended to maximum length and locked in position. Heavy loading at D-ring and latch. Buckle housing missing. Heavy blood staining on shoulder harness webbing. Retractor housing and outboard lap belt attachment points located in the crush zone. Fraying of shoulder harness webbing. Pinching of webbing through the latch.	Seat belt found buckled. Shoulder harness and lap belt webbing cut. Shoulder harness webbing in locked position. Blood staining on shoulder harness webbing. Possible D-ring load mark but unable to document position due to cut webbing.
Row 1	1A	1B
	Seat frame removed from bus by emergency responders. Retractor webbing cut. Buckle webbing not cut. Retractor housing cracked. Tissue in retractor housing. Blood stain on	Seat frame removed from bus by emergency responders. Seat belt found buckled. Buckle and retractor webbing cut (missing portion of retractor webbing)

¹⁵ Refer to Survival Factors Photo 20. Close-up view of 6.5-inch lateral seat belt anchors in seat 4C. NOTE. Belt removed by first responders during extrication of passenger.

¹⁶ FMVSS 210 S4.3.1.4 reads; Anchorages for an individual seat belt assembly shall be located at least 165 mm apart laterally, measured between the vertical center line of the bolt holes or, for designs using other means of attachment to the vehicle structure, between the centroid of such means.

	buckle webbing. Retractor webbing exhibits cupping and stretching but no obvious load mark.	Retractor housing cracked; Tissue in/on retractor webbing. Retractor webbing exhibiting cupping and stretching and load mark (not able to measure location of load mark due to missing webbing)		
Row 2	2A	2B	2D	
	Buckle webbing found intact. Latch webbing cut above stitching near connection point. Webbing rotated inside retractor preventing webbing from being fully extended. Webbing on latch plate showed cupping and blood evidence with a load mark.75 inches in width at 26.5 -27.25 inches from stitching. ¹⁷	Seat frame removed from bus by emergency responders; Buckle and retractor webbing cut. Tissue on buckle housing and buckle webbing. Blood on retractor webbing. Abrasion on retractor webbing about 1.5 inches long, starts 19 inches from top of webbing stitching ¹⁸	Seat belt found buckled. Buckle and retractor webbing cut. Small amount of tissue on buckle housing. Retractor housing cracked and circular crazing noted on housing Retractor webbing shows cupping with abrasions and load mark; abrasion starting at 15 inches from stitching and extending 3 inches. Load mark starting at 28.75 inches and extending about .75 inches.	
Row 3	3A	3B	3D	
	Buckle and retractor webbing not cut. ¹⁹ Blood on buckle housing. Retractor webbing shows cupping and load mark. load mark starts at 34 ½ inches and is about 1-inch long. Retractor webbing torn about 3.5 inches from base of webbing; tear extends for 1.5 inches.	Buckle and retractor webbing not cut. Buckle webbing has blood staining; Tissue found on buckle housing. Retractor housing and webbing has blood drops and stain; Retractor webbing shows cupping, abrasion, and load mark; abrasion is located above stitching near the attachment point; load mark is 22.5 inches from stitching and extends for .75 inch.	Seat belt found buckled. Buckle webbing not cut. retractor webbing cut; Blood on buckle webbing. Retractor webbing shows cupping and load mark; load mark located 23.25 inches from stitching.	
Row 4	4A	4B	4C	4D
(Note that the buckle webbing is longer for the seats in row 4).	Seat belt found buckled; Buckle and latch webbing cut (row 4 has manual lap belts; no retractors). Blood on buckle webbing. Latch webbing shows blood, cupping and load mark. Load mark located 19.25 inches from stitching. ²⁰ Latch housing cover missing; Load bar on buckle portion was bent.	Buckle webbing cut; latch webbing not cut. Blood on buckle and latch webbing; load mark on latch webbing starting at 21.5 inches and extending 1 inch. ²¹	No buckle or latch or webbing; All cut and removed while still on deceased passenger. Blood stain on buckle webbing toward attachment points.	Latch webbing cut. Buckle webbing not cut. Latch and webbing not present.

¹⁷ Refer to Survival Factors Photo 15. Interior view of seat 2A with seat 2B removed during extrication. NOTE: Sidewall intrusion.

¹⁸ Base of webbing to the top of the stitching is approximately 3 inches. `

¹⁹ Refer to Survival Factors Photo 17. Interior view of seat 3A in 2004 Ford E350 showing “web winder” also known as a traveling retractor.

²⁰ Refer to Survival Factors Photo 19. Close-up view of loading mark found on webbing in seat 4A in 2004 Ford E350. Similar loading marks were found on 3 of the 4 self-tightening/synching lap belts across the fourth row.

²¹ Refer to Survival Factors Photo 18. Interior view of row 4 folding bench seats A & B with self-tightening/synching lap belts.

There were several issues found during the examination of both the crash involved bus and an exemplar vehicle. For example, the positioning of the lap belt attachment points, as shown in Figure 8, did not line up with the seat especially when the seat slider was utilized.²² However, none of the slider seats in the crash involved bus were slid over at the time of inspection.



Figure 8. View of belt positioning to side (highlighted in red) in sister vehicle when side slide mechanism is utilized.

The second issue that was found on both vehicles was the difficulty in tightening/synching the lap belts enough for a full range of occupant sizes due to the length of the webbing. In the sister vehicle rows 1-3, the buckle and webbing length was 17.5 inches. In row 4 the buckle and webbing length was 31.5 inches. This was especially difficult for passengers seated along the right sidewall. There was no room to fit a hand between the sidewall and seat frame to pull the lap belt tight enough across the hips. This issue was also found in the bus but only in the 4th row.

Additional information was gathered to better understand the choice and design of the passenger seat belts at the time of bus manufacture and purchase. According to a Turtle Top Representative, at the time the 2004 Vanterra bus was purchased, the customer would go through the bus configuration with a salesperson using Dealer Price List & Order Form.²³ The four-page price list and order form had a list of options regarding date of delivery, interior and exterior trim options, chassis information and options, options for doors and windows, storage, flooring, electrical, and seating and accessory options in addition to accessories which included types of seats and seat belts. The price list had four seat belt options that included;

- Lap, Non-retracting 74 inch (\$9.00),
- Lap, Retractable, 2-Point (\$28.00)²⁴
- Lap, Under-seat Retractor (\$60.00
- Lap/shoulder, Retractable, 3-Point belt (\$56.00)

²² In FMVSS Standard 571.210 S4.3, lateral placement of seat belt anchorages is not specified.

²³ Refer to Vehicle Factors Attachment - 2004 VanTERRA Dealer Price List & Order Form

²⁴ This option has the “Web winder” or traveling retractor, that when the belt is worn the retractor housing rest in the middle of the occupant’s abdomen.

The customer would select what options they would want and the salesperson would figure out the final sales price. Turtle Top installed the Shield/AmSafe Type 1 lap belts into the seat frames of the Freedman seats. The rear passenger belts were not original equipment and were purchased and installed by Turtle Top according to the customer's request.

2.4. Driver and Passenger Airbags

Both the front driver and passenger frontal airbags deployed during the crash. The front driver airbag deployed and was found with its steering wheel housing separated from the steering wheel.²⁵ Emergency responders indicated that it was found on the ground near the bus's engine compartment. This circular airbag measured about 14 inches in diameter and sustained significant damage. In the upper left quadrant, the airbag was soaked in a pink fluid. The airbag also had blood in the lower right and left quadrants. A black asphalt-like material with small rocks was on the airbag fabric in the center and bottom of the airbag. Multiple small tears were seen all around the drivers airbag.

The passenger airbag deployed from the upper instrument panel and did not separate from its' mounting. The passenger airbag was rectangular shaped and measured 18 inches horizontally and 23 inches vertically. Two circular side vents approximately 2.25 inches in diameter were located on each side of the passenger airbag. The vent on the right side showed minor fraying of the surrounding threads. Small spots of blood were noted on the upper left quadrant on the front of the airbag (about 1.75 inches above the center stitching and 3.5 inches from the left stitching) and scuffing marks in the lower left of the bottom of the airbag (about 5.5 by 4 inches).

Emergency equipment found on the floor of the bus consisted of: a James King & CO. Triangle Flare kit Model 1005; a 5 lb. Pem-All dry chemical fire extinguisher Model PA 50 BC-C #WG-773473 that expired May 2014; and an ANSI First Aid Kit.

The interior examination found numerous areas of contact with body fluids, tissue, hair, and cloth transfers on numerous seatbacks, seat cushions, sidewalls, all seat belts, and the floor. The loading door vertical grab rail in front of seat 2D was bent at its lower half and dislodge from its roof mounting bracket.²⁶

2.4.1. Vehicle Electronic Data²⁷

The bus Airbag Control Module (ACM) was found and removed by the Texas Department of Public Safety and a download attempt was made using the Bosch Crash Data Retrieval (CDR) system.²⁸ However, the bus ACM was not supported by the system due to the make and model year of the vehicle. The ACM was then sent to the manufacturer, Continental Automotive Systems,

²⁵ Refer to Survival Factors Photo 10. View of drivers air bag module that was found outside vehicle.

²⁶ Refer to Survival Factors Photo 16. Interior view of loading door area in 2004 Ford E350 showing dislodged vertical grab pole.

²⁷ Factual reports prepared by the Recorders Specialists with the NTSB Office of Research and Engineering should be consulted for additional information regarding the various electronic data systems.

²⁸ The ACM was found in the vehicle by TxDPS, hanging by wires with the attachment bolts sheared off.

Inc., by the NTSB Recorders specialist. For additional information see *Recorders Specialist Factual Report*.

3. Injury Information

The pickup truck driver and two surviving passengers were transported by Medivac helicopter from the scene to Brooke Army Medical Center and University Hospital in San Antonio. One of the transported passengers went into cardiac arrest just prior to reaching the hospital in San Antonio, Texas and was later pronounced deceased in the hospital. The twelve deceased passengers in the bus were taken to a temporary morgue set-up at Rushing-Estes-Knowles Mortuary in Uvalde, Texas. The deceased passengers were later transferred to the Bexar County Medical Examiners’ office.

This crash resulted in the driver and twelve passengers sustaining fatal injuries in the bus. The pickup truck driver and one passenger from the bus sustained serious injuries. In this crash, the average age of the medium-size bus occupants was 77 years old with a range between 61 to 87 years old. Further, 6 occupants had a BMI between 25-30, two bus occupants had a BMI of over 30, and three bus occupants had a BMI over 35.²⁹

The occupant injuries are summarized in **Table 3**.

Table 3. Summary of Occupant Injuries

<i>Vehicles and Occupants (15 Total)</i>	Injury Information*		
	Minor	Serious	Fatal
2007 Dodge Ram quad-cab 3500 pickup truck			
<i>Driver (1)</i>	0	1	0
2004 Ford E350 cutaway chassis with a 13-passenger Turtle Top Vanterra medium-size Bus			
<i>Driver (1)</i>	0	0	1
<i>Passengers (13)</i>	0	1	12
TOTAL	0	2	13

* The injury levels were evaluated according to 49 *Code of Federal Regulations* (CFR) 830.2, which defines fatal injury as “any injury which results in death within 30 days of the accident” and serious injury as “any injury which: (1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, or tendon damage; (4) involves any internal organ; or (5) involves second- or third-degree burns, or any burn affecting more than 5 percent of the body surface.”

Autopsies were performed on all thirteen fatally injured occupants of the bus. Injuries sustained by the deceased were as follows;

²⁹ A BMI between 25.0 and 29.9 is considered overweight, between 30.0 and 34.9 is considered obese, and a BMI over 35 is considered severely obese.

Driver:

- A. Transected brainstem with disarticulated atlanto-occipital joint
- B. Bilateral rib, sternum and pelvic fractures
- C. Lacerations of the heart, aorta, left lung, liver, mesentery and right kidney
- D. Left hemothorax, hemopericardium and hemoperitoneum
- E. Fractures of the left humerus, left radius and ulna, right femur, right knee, right tibia and fibula, right foot, left femur and left tibia and fibula
- F. Lacerations, abrasions and contusions of the head, trunk and extremities

Front right passenger:

- A. Splenic laceration
- B. Subdural and subarachnoid hemorrhage with intraventricular hemorrhage
- C. Multiple rib and thoracic spine fractures
- D. Bilateral small hemothoraces
- E. Left diaphragmatic rupture with gastric displacement
- F. Partial thoracic aortic tear
- G. Hepatic laceration
- H. Multiple abrasions, contusions, and lacerations of head, trunk, and extremities

Passenger in seat 1A:

- A. Left femoral fracture
- B. Extensive crushing to the trunk, with fractures to ribs, spine, and pelvis
- C. Extensive laceration of all thoracoabdominal viscera
- D. Bilateral radius and ulna fractures
- E. Bilateral tibia and fibula fractures
- F. Multiple abrasions, lacerations, and contusions of head, trunk, and extremities

Passenger in Seat 1B:

- A. Subarachnoid hemorrhage
- B. Skull fractures
- C. Atlanto-occipital joint ligament with brainstem injuries
- D. Complex bilateral rib fractures of the anterior lateral 2-10 ribs and displaced fractures of the posterior left 4-8 ribs
- E. Rupture of the heart
- F. Pericardial laceration
- G. Thoracic aorta, partial transection with hemothoraces
- H. Thoracic vertebral body fracture at T9 with spinal cord transection
- I. Rupture of the diaphragm with herniation of the stomach
- J. Liver and spleen lacerations
- K. Pubic symphysis fracture
- L. Fractures of the right wrist and right femur
- M. Bilateral fractures of tibia and fibula
- N. Multiple abrasions, lacerations and contusions of the head, trunk and extremities

Passenger seated in 2A:

- A. Splenic lacerations
- B. Basilar skull fracture

- C. Subdural and subarachnoid hemorrhage with intraventricular hemorrhage.
- D. Multiple rib fractures, the right ribs 2-7 are fractured anterolaterally with left ribs 2-9 fractured anterolaterally with 5-11 fractured posteriorly
- E. Multiple pelvic fractures
- F. Bilateral hemothoraces
- G. Compound fractures of bilateral tibia and fibula
- H. Fractures of right radius and ulna
- I. Lacerations, abrasions, and contusions of face, trunk, and extremities

Passenger seated in 2B:

- A. Basilar skull fracture involving right petrous ridge, sella turcica, and left anterior fossa with displaced left orbital roof and transection of optic nerves
- B. Fractures through right and left temporal bones of cranial vault
- C. Mild right-sided subarachnoid hemorrhage and subdural hemorrhage
- D. Palpable fractures of nasal bone and left orbit
- E. Fractures of right ribs 3-10 and left ribs 2-10
- F. Displaced fracture of thoracic spinal column (T3-T4) with complete transection of underlying spinal cord
- G. Aortic transection distal to left subclavian takeoff with periadventitial hemorrhage
- H. Ruptures of pericardial sac and left hemidiaphragm
- I. Hemothoraces
- J. Fractures of right and left distal femurs

Passenger seated in 2D (Right side window seat):

- A. Subdural and intraventricular hemorrhage
- B. Cervical fracture at C6 with underlying spinal cord injury
- C. 8-cm gaping laceration to the right side of her face that exposed the underlying intact facial bones
- D. Multiple bilateral displaced rib fractures were present to the left 2-5th and the right 2-6, anteriorly the right 1-11 and the left 1 and 7, posteriorly, and the left 6 laterally with left hemothorax
- E. Left pulmonary contusions
- F. Splenic laceration with small hemoperitoneum
- G. Left pelvic fracture
- H. Right humerus and elbow fractures
- I. Multiple contusions, abrasions and lacerations of body

Passenger seated in 3A:

- A. Intracranial subarachnoid hemorrhage
- B. The left 6th -9th and right 7th -9th ribs were fractured anteriorly
- C. The left sacroiliac joint was fractured
- D. Mesenteric and mediastinal hemorrhage
- E. Multiple contusions, abrasions and lacerations of body

Passenger seated in 3B:

- A. Right leg fracture
- B. Intracranial hemorrhage

- C. Fracture through the anterior portion of the 6th cervical vertebral. The 6th thoracic vertebral body has a fully transecting fracture with corresponding fractures of the heads of both 7th ribs
- D. The pubic symphysis is fractured and displaced
- E. Bilateral hemothoraces with hepatic and pulmonic lacerations
- E. Abrasions, contusions and lacerations of the head, trunk and extremities

Passenger seated in 3D (Right side window seat):

- A. Fracture of left radius and ulna, distal
- B. Subdural hemorrhage
- C. Laxity with hemorrhage of atlanto-occipital ligament
- D. Softening of upper cervical spinal cord between the 1st and 3rd cervical vertebrae
- E. Ecchymosis over both iliac crests
- F. Right sacroiliac fracture
- G. All anterior ribs are fractured
- H. Gaping spinal fracture of T10 with exposure of the underlying spinal canal
- I. Lacerations, contusions, and abrasions of face, head, and extremities

Passenger seated in 4A:

- A. Right acetabular fracture
- B. Possible stretch tear of midbrain
- C. Small left hemothorax
- D. Overriding fracture of spine at T8
- E. Lacerations, contusions, and abrasions of face, trunk, and extremities

Passenger seated in 4B:

- A. Intracranial subdural hemorrhage
- B. Fracture of T5 thoracic vertebral body with underlying spinal cord injury
- C. Bilateral hemothoraces and pulmonary contusions
- D. The right 4th -11th and left 4th and 5th ribs were fractured laterally
- E. A complex near transecting laceration involving the proximal descending aorta
- F. Left pelvic ramus fractured just lateral to the symphysis pubis
- G. Multiple contusions, abrasions and lacerations of body

Passenger seated in 4C:

- A. Near complete transection of trunk at lower abdomen and back
- B. Fractures of right ribs 2-8 anteriorly and left ribs 2-8 anteriorly
- C. The spine was completely severed and displaced at approximately the T10 and L2 levels
- D. The aorta was transected near the bifurcation of the iliac vessels
- E. A partial ponto-medullary junction tear was evident, without associated hemorrhage
- F. Hepatic lacerations

The seriously injured 64-year-old female bus passenger that was seated in the last row against the sidewall on the right side (4D) sustained a laceration to chin, abrasions to abdomen, right superior and inferior pubic ramus fractures, nondisplaced left inferior pubic ramus fracture,

nondisplaced left iliac crest fracture, mid and distal comminuted right humeral fractures extending to elbow joint, nondisplaced proximal left fibular head fracture, and proximal left tibia fracture.

The seriously injured 20-year-old pickup truck driver sustained a closed avulsion fracture of right acetabulum with a right hip dislocation, fracture to his right tibia, multiple bilateral rib fractures (Right 4-7, Left 2-7), a nasal bone fracture, fractures to his right 2nd and 3rd metacarpals, a gaping left forearm laceration with injury to finger tendons and muscle, and multiple abrasions.

3.1. Occupant Seating Chart

A seating chart was established based on the numbering system developed by a volunteer firefighter and mortician who responded to the crash as a firefighter. This volunteer numbered the fatalities based on their seating position and identified those occupants who initially survived the crash and were worked on by emergency responders. The seating chart is shown in **Figure 9**.

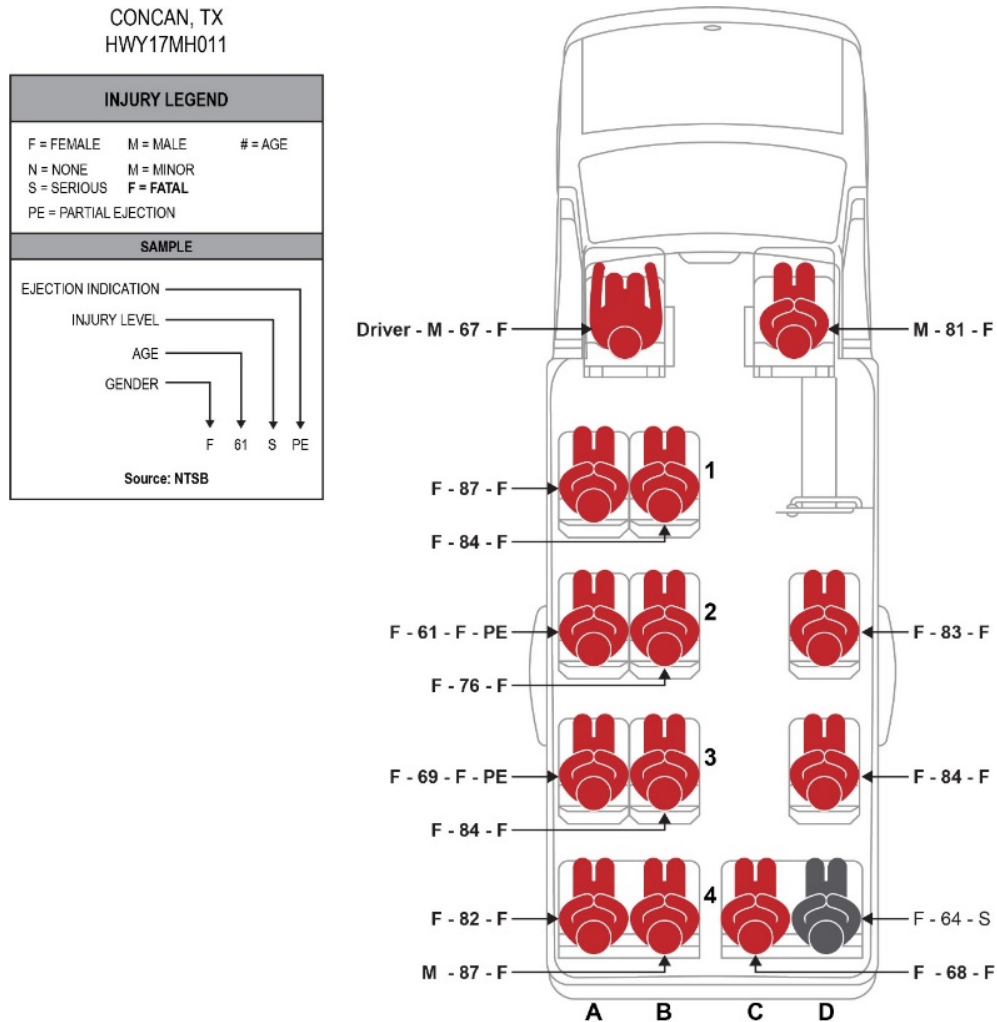


Figure 9. Seating Chart

3.2. Partial Ejections

According to first responders and witnesses, at final rest two passengers seated in 2A and 3A had their arms and a portion of their heads hanging partially outside the broken left side windows.

3.3. Egress

All fourteen of the bus occupants were removed by backboard either through the rear door or through the emergency exit windows on either side.

3.4. Seat Belt Use

According to interviews with first responders and physical evidence on all the occupants, and all the seat belts, both the driver and front right seat passenger were restrained using their Type 2 lap and shoulder belts. Additionally, all twelve passengers seated in the rear bus section were restrained with the available Type 1 lap belts. The surviving bus passenger stated in her interview that the bus driver instructed everyone to wear their lap belts prior to their departure from every stop.³⁰

4. Compliance and Federal Motor Vehicle Safety standards

The bus's weight rating and bus classification dictate applicable FMVSS for each vehicle. For example, the occupant crash protection standard states that a bus with a (Gross Vehicle Weight Rating (GVWR) over 10,000 lbs. but not greater than 26,000 lbs. must provide either a complete passenger protection system for the driver only or a belt system for the driver only.³¹ No other requirements for passenger protection, other than the driver, are required for buses in this weight range, unless they meet the National Highway Traffic Safety Administration (NHTSA) definitions for a school bus or an over-the-road bus. If the bus GVWR is less than 10,000 lbs. or greater than 26,000 lbs., then the bus would be required to have similar occupant protection as heavier or lighter buses in the drivers position and a lap/shoulder belt at all other occupant seating positions (except side facing positions which can have a lap or a lap/shoulder belt).³² The belt system for the drivers position and the belt systems, if installed, in other positions then have to comply with the seating systems³³ standard, the seat belt assemblies³⁴ standard and the seat belt assembly anchorages³⁵ standard. If a bus is classified as a school bus, then the bus has to comply with several additional

³⁰ Human Performance Attachment – Interview with surviving bus passenger

³¹ FMVSS 571.208 S4.4.4

³² https://www.nhtsa.gov/staticfiles/rulemaking/pdf/Motorcoaches-Belts_FR_11202013.pdf Effective November 28, 2016.

³³ FMVSS 207 This standard establishes requirements for seats, their attachment assemblies, and their installation to minimize the possibility of their failure by forces acting on them as a result of vehicle impact.

³⁴ FMVSS 571.209 This standard specifies requirements for seat belt assemblies. Seat belt assemblies are devices such as straps, webbing, or similar material, as well as to all necessary buckles and other fasteners and all hardware designed for installing the assembly in a motor vehicle, and to the installation, usage, and maintenance instructions for the assembly. The purpose of this standard is to ensure that the hardware of seat belt assemblies shall be designed to prevent attachment bolts and other parts from becoming disengaged from the vehicle while in service.

³⁵ FMVSS 571.210 This standard establishes requirements for seat belt assembly anchorages to ensure their proper location for effective occupant restraint and to reduce the likelihood of their failure during a vehicle impact.

standards pertaining to the joint strength,³⁶ roof strength,³⁷ and passenger seating and crash protection.³⁸

At the time of manufacture in 2004, the crash-involved bus was only required to provide occupant crash protection for the drivers position because it was between 10,000 and 26,000 pounds GVWR and not defined as an over-the-road bus. Although not required to be equipped with restraint systems for the passengers, the accident bus was equipped with Type 1 seat belt assemblies (lap belts) at all rear passenger seating locations and a Type 2 lap and shoulder belt for the driver and front passenger seat. According to Turtle Top, the bus also met regulations addressing the seating systems standard, the seat belt assemblies' standard, and the anchorages standard (FMVSS 207, 209, and 210).³⁹

5. Previous NTSB Investigations

The NTSB has investigated several accidents involving medium-size buses. These accidents include: Hampshire, IL,⁴⁰ Dolan Springs, AZ,⁴¹ Bethesda, MD,⁴² Lake Placid, FL,⁴³ and Davis, OK.⁴⁴ In each of these accidents, the lack of federal requirements for medium-size buses resulted in negative outcomes for the passengers. As a result of the Dolan Springs, AZ accident in 2009, the NTSB recommended that NHTSA, in its rulemaking to improve motorcoach roof strength, occupant protection, and window glazing standards include all buses with a GVWR above 10,000 pounds, other than school buses (H-10-03)⁴⁵. Unfortunately, these medium-size buses (GVWR 26,000 lbs. and under) are not included in the recent NHTSA proposed rulemaking concerning rollover structural integrity and final rulemaking on occupant crash protection and therefore, are only required to provide occupant protection for the drivers seating location. For both of these rulemakings, the NTSB's response expressed concern that all buses, between 10,001 lbs. and 26,000, were not required to meet the applicable standards.

On August 6, 2014, the NHTSA published a Notice of Proposed Rulemaking (NPRM), "Federal Motor Vehicle Safety Standards; Bus Rollover Structural Integrity, Motorcoach Safety

³⁶ FMVSS 517.220 This standard establishes performance requirements for school bus rollover protection. The purpose of this standard is to reduce the number of deaths and the severity of injuries that result from failure of the school bus body structure to withstand forces encountered in rollover crashes.

³⁷ FMVSS 517.221 This standard establishes requirements for the strength of the body panel joints in school bus bodies. The purpose of this standard is to reduce deaths and injuries resulting from the structural collapse of school bus bodies during crashes.

³⁸ FMVSS 517.222 This standard establishes occupant protection requirements for school bus passenger seating, restraining barriers, and wheelchair anchorages. The purpose of this standard is to reduce the number of deaths and the severity of injuries that result from the impact of school bus occupants against structures within the vehicle during crashes and sudden driving maneuvers.

³⁹ Survival Factors Attachment - Turtle Top Compliance Summary for Model year 2004

⁴⁰ HWY04MH-001 Hampshire, IL

⁴¹ HWY09MH009 Dolan Springs, AZ

⁴² HWY10MH022 Bethesda, MD

⁴³ HWY10FH009 Lake Placid, FL

⁴⁴ HWY14MH014 Davis, OK

⁴⁵ H-10-03 Recommendation to the National Highway Traffic Safety Administration (NHTSA) asking that rulemaking addressing motorcoach roof strength, occupant protection, and window glazing apply to all buses, including medium-size buses. The recommendation is currently classified as "Open- Unacceptable Action".

Plan; Proposed Rule” at 79 Federal Register 46090. The proposed rule for buses over 26,000 lb. GVWR includes performance standards intended to ensure a sufficient level of survival space for restrained occupants in rollover crashes, provides for performance standards that require that seats and overhead luggage racks remain secured, window glazing remains attached to its mounting during and after a rollover crash and emergency exits remain closed during the rollover crash and operable after the crash. Under this proposed rule, buses such as the one in this accident would not be required to provide their passengers any of the proposed safety standards for occupant crash protection and address bus rollover structural integrity as it was not over 26,000 lbs. GVWR.

6. Emergency Response

The Texas Department of Public Safety (TxDPS) and Real County Sheriff’s Department dispatchers were notified of the crash through the 911 system at 12:20 p.m. and were notified that it was a crash that involved a white pick-up truck and a church bus or van. Another witness called the Uvalde County 911 dispatcher and reported the crash and gave the same vehicle description. The Utopia Volunteer Fire Department (UtVFD) and Utopia Volunteer EMS (UtEMS) were dispatched at 12:23 p.m. and 12:24 p.m. respectively and were told by Uvalde Dispatch that it was a two-vehicle head-on crash with three injured persons, entrapments, and two fatalities. The UtVFD and UtEMS departed their facility at 12:35 and 12:27 p.m. respectively and immediately requested that dispatch send out 1 medical helicopter.^{46,47}

Almost immediately following the crash, paramedics in an EMS ambulance from Frio Canyon who were transporting a patient to Uvalde Hospital and stopped to render aid. According to the Frio Canyon Paramedic, who was also the Frio Canyon EMS Administrator, after doing her scene assessment, she reported to her dispatch that she had numerous entrapments and four viable passengers in the bus plus the pick-up driver.

A Uvalde County Sheriff’s deputy that was dispatched earlier to try and intercept the pick-up driver, arrived on scene at 12:41 p.m. with a second unit arriving at 12:44 p.m. A Real County Sheriff’s Deputy waiting at the county line for the truck driver, self-dispatched after hearing Frio Canyon’s call to Real County Sheriff’s dispatch informing dispatch that they just pulled up to the crash scene.

The first TxDPS Trooper arrived on scene at 12:48 p.m. followed by several other units and the TxDPS Reconstruction Team.

While listening to all the radio traffic from the Frio Canyon ambulance on scene, the UtEMS EMT requested 2 more medical helicopters be put on standby. The UtEMS unit arrived on scene at 12:40 p.m. The UtVFD further responded at 12:49 p.m. with a rescue truck and three personnel. Two additional Utopia firemen were picked up by the rescue truck on their way to the crash scene. While in route, the UtVFD fire chief requested that the Concan Volunteer Fire

⁴⁶ Utopia is approximately 16.3 miles away from the crash scene and has trained and certified EMT’s and an ambulance for transport.

⁴⁷ According to the Incident Commander, from the description of the accident, with the number of injured and deceased in the vehicles, plus the type of trauma involved, under the CONOPS, this crash qualified for the dispatch of a medivac helicopter.

Department (CCVFD) respond if they had not already been dispatched.⁴⁸ The CCVFD was dispatched at 12:37 p.m. and arrived on scene with three responders and rescue equipment at 12:48 p.m.

After the UtEMS arrived at 12:40 p.m. they were met by the Frio Canyon EMS Administrator who briefed them on the current situation and patient conditions. After doing a rapid scene assessment the UtEMS EMT assumed Incident Command (IC) and proceeded to request additional help through the Uvalde Dispatch that included sending the Uvalde Volunteer Fire Department (UVFD) and 2 more medivac helicopters to the scene.

The IC directed his attention to the bus passengers and climbed in the bus. The IC found that there were 10 deceased patients and 4 viable ones. He also saw that the 4 patients were trapped and needed to be extricated.

Upon their arrival, after stabilizing the vehicles and disabling their batteries, the majority of UtVFD and CCVFD firefighters started on the extrication of the seriously injured passengers in the bus. Once the UVFD arrived, the truck driver was quickly extricated and all attention was shifted back to extrication of the bus passengers. According to first responders, there was minimal room to access the bus interior due to intrusion and deformation of the seats. Consequently, sections of the bus body below the passenger side emergency window and vertically along the rear exit door were cut open to better access seat attachments and remove viable passengers.

The UVFD were dispatched to the scene at 12:52 p.m. UVFD Chief responded in the Fire Chief's vehicle at 1:10 p.m. The UVFD Engine 2 responded at 1:20 p.m. and their Rescue unit 4 arrived at 1:32 p.m. A total of eighteen UVFD firefighters responded to the scene 26 miles north of Uvalde to help with extrication. An Uvalde EMS unit was dispatched to the scene at 1:28 p.m. and arrived at 1:57 p.m.

Upon his arrival, the UVFD Chief assumed Incident Command from the UtEMS EMT and directed the rescue of the remaining bus passengers. According to the IC, the 2 most seriously injured patients expired shortly after being extricated from the bus and the third expired while in route to the hospital on a Medivac helicopter.

A total of 5 Medevac helicopters were dispatched to the crash scene with 4 landing and 3 departing with patients. There was poor radio and cellular reception in the immediate area so first responders used hand signals to help land the Medivacs north of the crash scene, on the roadway up the incline.

The roadway was closed at 12:37 p.m. and re-opened at 12:07 a.m. the following morning.

The Utopia EMS activated a Critical Debriefing with Alamo Crisis Team the following day and had personnel attend from four other responding agencies.

A timeline was created to document the emergency response of this crash. This crash occurred in Uvalde County and because the County Seat of Uvalde City was approximately 27

⁴⁸ Concan is approximately 6.5 miles away from the crash scene and has a volunteer fire department but did not have a certified and trained EMT at the time of the crash and does not have an ambulance for transport.

miles away, Volunteer agencies from three of the surrounding cities (Utopia, Concan, and Reagan Wells) sent additional resources. A summary of important events was extracted from numerous responding agency and organization dispatch logs.^{49, 50} These events are provided in **Table 4**.

Table 4. Emergency Response Timeline

Time	Event Narrative
12:02 p.m.	Witness 1 calls Uvalde PD to report Dodge Ram drivers erratic driving and tells Uvalde Dispatch that they are recording it.
12:04	Uvalde County Deputy dispatched to locate reckless driver on N/B 83.
12:07	Witness 1 calls Real County Sheriff’s Office to report Dodge Ram drivers erratic driving.
12:10	Real County Sheriff’s Office calls Uvalde PD dispatch to report Dodge Ram drivers erratic driving. Uvalde responds that they have a deputy responding.
12:19	Witness 1 calls Real County Sheriff’s Office to report crash saying the Dodge pickup struck a busload of elderly people and he has it all on tape.
12:20:20	Frio Canyon EMS calls into Real County to report crash that they drove up on.
12:20:37	Witness 2 calls Uvalde County 911 to report crash saying it is between a Dodge dually and a church van. Witness 2 tells the dispatcher, “you’ll need more than 1 ambulance”.
12:20:47	Real County Sheriff’s Office calls Uvalde County dispatch to report the crash and Uvalde responds that they have already been notified.
12:20:57	Witness 3 calls Uvalde County 911 to report crash saying it is a head-on between a white bus or van and a pickup truck.
12:21:22	Real County Sheriff’s deputy calls Real County dispatch and self-dispatches
12:23	Uvalde dispatch contacts Texas DPS
12:24	Utopia Volunteer EMS Unit 26 dispatched to crash scene by Uvalde County Dispatch
12:27	Utopia EMS request San Antonio AirLife 5, based out of Uvalde airport, be put on standby
12:27	AirLife 5 notified
12:31	Garner State Park Police notified
12:32	Real County Sheriff’s Office calls Uvalde informing them 2 deceased and 3 injured. Need traffic control and jaws of life. Uvalde responds that they are on the way.
12:34	Texas DPS informs Uvalde dispatch that they are sending 2 units to crash site
12:36	Utopia EMS request 2 additional Medivac helicopters be placed on standby
12:37	Uvalde deputy advising that U.S. Highway 83 will be closed south of crash site and traffic detoured to CR 350
12:37	Uvalde dispatch notifies Reagan Wells VFD and Concan VFD to respond
12:38	Concan VFD in route to scene
12:38	Utopia EMS request 2 additional Medivac helicopters to respond
12:38	Uvalde dispatch calls San Antonio AirLife to send additional helicopter
12:39	San Antonio AirLife 5 departs to crash scene with 15-minute ETA, tells Uvalde dispatch they don’t have any more available
12:39	Uvalde dispatch calls Reach Air-Medical to inquire about medivac availability and are told they do not have any but connects Uvalde dispatch with AirEvac
12:40	San Antonio AirLife calls Uvalde dispatch to see if they still need helicopter since AirLife 4 has become available. 38-40 minute ETA

⁴⁹ Refer to Survival Factors Attachment - Responding Police Agency Dispatch Logs

⁵⁰ Refer to Survival Factors Attachment - Responding Fire Departments and EMS Logs and Reports

12:40	Utopia Volunteer EMS Unit 26 arrives on scene
12:42	Route 83 is closed north of crash site and traffic is being detoured at Garner State Park
12:43	AirEvac 71 dispatched
12:45	Uvalde dispatch calls San Antonio AirLife and request they launch AirLife 4
12:47	Reagan Wells VFD calls Uvalde dispatch to inform them that they are in route with 2 on board
12:48	Concan VFD Rescue 1 arrives on scene
12:49	Utopia VFD arrives on scene
12:50	Uvalde Volunteer Fire Department dispatched and instructed to bring “Jaws of Life”
12:53	AirEvac 71 departs for crash scene with 28-minute ETA
12:54	Utopia VFD Rescue 1 arrives on scene to start extrication
12:57	San Antonio AirLife 5 arrives on scene
12:58	Uvalde EMS called to cancel Med Air 1
1:01	Concan Rescue 2 arrives on scene to help with extrication
1:01	Reagan Wells VFD arrives on scene to help with extrication
1:10	Uvalde Fire Chief arrives on scene and assumes Incident Command
1:20	Uvalde VFD Engine 2 arrives on scene
1:20	TxDPS request TxDPS air support to take overhead photos at crash scene
1:27	Uvaldi EMS dispatched to crash scene
1:28	San Antonio AirLife 5 departs crash scene with 84-year-old female patient to University hospital in San Antonio
1:30	AirLife 4 arrives on scene
1:32	Uvalde VFD Rescue 4 arrives on scene with more tools to help with extrication
1:33	AirEvac 71 arrives on scene
1:36	Uvalde Med Air 1 departs for scene
1:50	AirLife 4 departs crash scene with 20-year-old truck driver to University hospital in San Antonio
1:57	84-year-old female patient being transported in San Antonio AirLife 5 to University hospital in San Antonio goes into cardiac arrest prior to arriving at 14:02 and expires at 14:25
1:57	Uvalde EMS arrives on scene
1:59	AirEvac 71 departs with 64-year-old female to Brooks Army Hospital in San Antonio
2:01	Additional AirLife and MedAir medivac helicopters cancelled
2:04 pm	Uvalde Med Air 1 arrives and is told to return to Base
12:07 am 3/30/17	U.S. Highway 83 re-opens

Sixteen local and State emergency service agencies responded to the scene of the crash. **Table 5** lists the responding agencies. Six ambulance units responded to the crash although none were utilized to transport the injured. The victims were taken by four funeral home vehicles to Rushing-Estes-Knowles Mortuary in Uvalde. The deceased were held at Rushing-Estes-Knowles Mortuary until being transported to the Bexar County Medical Examiner in San Antonio for autopsies.

Table 5. Responding Agencies

Texas Department of Public Safety	Texas Department of Public Safety Reconstruction Team
Utopia Volunteer EMS	Utopia Volunteer Fire Department
Uvalde EMS	Uvalde Volunteer Fire Department
Concan Volunteer Fire Department	Reagan Wells Volunteer Fire Department

Real County Sheriff's Department	Uvalde County Sheriff's Department
Leaky Volunteer Fire Department	Garner State Park Police
Texas Parks and Wildlife Police	AirLife Medical Helicopter
PHI Medical Helicopter	Southwest Texas Regional Advisory Council (STRAC)

6.1. Uvalde County

Uvalde County covers an area of 1,552 square miles and is located in the Southwest part of Texas. As of the 2010 census, its population was 26,405. Its county seat is the city of Uvalde. There are two Trauma Level IV hospitals in Uvalde County. Uvalde Memorial Hospital is a Trauma Level IV hospital and is located in the City of Uvalde. Medina Regional Hospital is also a Trauma Level IV hospital and is located in Hondo, Texas. There are two U.S. Highways and two State Highways that run through Uvalde County. U.S. Highway 83 runs north and south and U.S. Highway 90 runs east and west. State Highway 55 runs Northwest from the City of Uvalde and State Highway 127 runs Northwest from Sabinal and ends in Concan at U.S. Highway 83. Due to the size of Uvalde County and distance an ambulance has to travel to and from a medical facility, the majority of serious crashes involve the response of a medivac helicopter.

Utopia is a small community located in the Northeastern corner of Uvalde County. The population was 227 as of the 2010 census. Utopia Volunteer Fire and EMS have a service area that covers approximately 457 square miles and includes two major Texas State Parks, multiple RV Parks and private campsites, two major rivers and includes parts of four counties, Uvalde, Bandera, Medina and Real. Utopia has a rural health clinic that can take care of minor emergencies as walk in patients and has limited capabilities and would be used for patient stabilization only. There are two hospitals within a one hour drive from Utopia. Uvalde Memorial Hospital and Medina Regional Hospital have a fully staffed ER Department around the clock. Trauma Level I and II hospitals are located in San Antonio and are approximately a two hour drive from Utopia.

6.1.1. Uvalde County Emergency Management

Although the first arriving Utopia EMT assumed incident command, he never officially declared this accident an MCI; However, the IC's request for multiple medivac helicopters to respond to the crash alerted dispatch and other responding area agencies that this was a major event based on criteria described in the Regional Mass Fatality Management Concept of Operations (CONOPS).

According to the Preparedness Manager for Region 8 of the Texas Department of State Health Services (DSHS), their region identified a need for a mass fatality response plan and noted that the majority of the 28 counties within their region would need outside assistance to handle a large event.⁵¹ It was determined that a regional plan would be written and used by all of the counties in their region either as the primary plan or an annex to an existing plan. Uvalde County uses the Regional Mass Fatality Management Concept of Operations (CONOPS) as their main response plan.

The Mass Fatality Management (MFM) CONOPS plan exists to aid in the creation of a uniform, comprehensive strategy for regional Mass Fatality Incident (MFI) response in the HSR-

⁵¹ <http://www.dshs.texas.gov/region8/preparednessbioterror.aspx?terms=mass%20casualty%20plan>

8 Region, the 28-county region in south Texas. It does not supersede existing jurisdictional mass fatality management plans, but rather integrates these plans into a coordinated regional response.

CONOPS outlines an integration strategy that describes a scalable and flexible response, beginning with the use of local mutual aid, followed by state resources and federal resources. This document stresses the importance of mutual collaboration and engagement between the federal, state, county, and municipal governments, in addition to the private sector and non-governmental organizations within the region in response to a MFI.

This plan was developed in accordance with the U.S. Department of Homeland Security's National Response Plan (NRP). The NRP is an all-discipline, all-hazards plan intended to establish a single comprehensive framework for managing domestic incidents. Additionally, the NRP can be scaled to accommodate an event of any magnitude and ensures that primary incident management occurs at the lowest geographic, organizational, and jurisdictional level. The NRP establishes a National Response Framework (NRF); the NRF incorporates best practices and procedures from incident management, law enforcement, fire, public health, emergency medical, and the private sector and integrates them into a unified structure. The NRF establish how federal, state, and local agencies should coordinate with one another and provides common protocols to ensure various agencies work together toward a common goal. If a mass fatality event were to occur, compatibility with the NRP and the NRF guarantees that the capabilities of all levels of government and stakeholders are ready and able to deploy and operate as a unified team.⁵²

6.1.2. Utopia EMS Mass Casualty Annex

The Utopia EMS has an Annex to the Uvalde County CONOPS Plan but it does not supersede the authority of any other agency within the Emergency Management area of Uvalde County. The Utopia EMS plan serves to inform other agencies of Utopia Volunteer EMS responsibilities and capabilities.

7. Interviews

Interviews were obtained with numerous fire department and EMS responders. In addition, the initial DPS Trooper that responded and two witnesses were also interviewed.

7.1. First Responders Statements⁵³

- Initial call-out was for a two-vehicle head-on crash with 2 injured and 3 fatalities
- A Frio Canyon EMT called me (CCVFD) asking for help saying she had bodies everywhere then several minutes later I received a call from an Uvalde Deputy telling me about the crash and we (CCVFD) had still not been notified.
- CVFD is the closest to the crash scene but we were called out last.
- UFD was dispatched to help with extrication

⁵² https://www.fema.gov/pdf/emergency/nrf/NRF_FAQ.pdf

⁵³ Survival Factors Attachment - First Responder Interviews

- Initially found 4 viable patients in bus, all towards the middle and rear, plus the truck driver
- All the passengers were found belted with lap belts except the driver and front right passenger who were wearing lap and shoulder belts
- The radio and cellphone communication at the scene is in a dead zone (No Service)
- Nobody was really in-charge until the Uvalde Fire Chief arrived on scene

7.2. Witness Statements (Following bus)⁵⁴

- We were going southbound crested the hill and we saw the bus ahead of us
- We had the cruise control set at 64 m.p.h. and seemed to be gaining on the bus
- Saw the pick-up truck cross centerline into the southbound lane and he just kept going and never corrected back
- The pick-up veered into the southbound lane and just kept coming
- I expected the bus to swerve away but he never did
- I yelled to stop and we skidded to a stop just behind the bus
- I didn't see any brake lights on the bus.

7.3. DPS Statement⁵⁵

- When I arrived on-scene I approached the driver of the bus and could see that he had passed so I went to the pick-up truck driver
- The pick-up truck driver stated to me that he was texting when he crashed

E. DOCKET MATERIAL

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

LIST OF ATTACHMENTS

Survival Factors Attachment -	Turtle Top Compliance Summary for Model Year 2004
Survival Factors Attachment -	Responding Police Agency Dispatch Logs
Survival Factors Attachment -	Responding Volunteer Fire Department and EMS Logs and Reports
Survival Factors Attachment -	First Responders Interviews

⁵⁴ Survival Factors Attachment - Witness interviews

⁵⁵ Survival Factors Attachment - First Responder Interviews

LIST OF PHOTOGRAPHS

- Survival Factors Photo 1 - Frontal view of deformation to 2007 Dodge Ram quad-cab 3500 pickup truck.
- Survival Factors Photo 2 - Left side profile view of deformation to 2007 Dodge Ram quad-cab 3500 pickup truck.
- Survival Factors Photo 3 - Interior view of intrusion into driver seating area in 2007 Dodge Ram quad-cab 3500 pickup truck.
- Survival Factors Photo 4 - Interior view from left side showing distance from steering wheel hub to driver seatback.
- Survival Factors Photo 5 - Interior view of driver seating area in 2007 Dodge Ram quad-cab 3500 pickup truck. NOTE: Drivers seat belt is in locked and stowed position.
- Survival Factors Photo 6 - Front left angle view of deformation to 2004 Ford E350 cutaway chassis with a 13-passenger Turtle Top Vanterra medium-size bus body. NOTE: Yellow arrow indicates area of accordion style crush.
- Survival Factors Photo 7 - Exterior view from right side showing deformation and extraction damage to 2004 Ford E350 cutaway chassis with a 13-passenger Turtle Top Vanterra medium-size bus body.
- Survival Factors Photo 8 - View from left side looking into drivers seating area showing extent of intrusion.
- Survival Factors Photo 9 - Close-up view of drivers severed lap and shoulder belt in 2004 Ford E350 cutaway chassis.
- Survival Factors Photo 10 - View of drivers air bag module that was found outside vehicle.
- Survival Factors Photo 11 - Interior view from rear looking forward showing extent of intrusion and extrication damage to 2004 Ford E350 cutaway chassis.
- Survival Factors Photo 12 - Closer-up interior view of 2004 Ford E350 showing extent of damage and intrusion into driver and front right passenger area.
- Survival Factors Photo 13 - View of front of seat row 1A and 1B that were removed during extrication.

- Survival Factors Photo 14 - View of backside of seat row 1A and 1B that were removed during extrication.
- Survival Factors Photo 15 - Interior view of seat 2A with seat 2B removed during extrication. NOTE: Sidewall intrusion.
- Survival Factors Photo 16 - Interior view of loading door area in 2004 Ford E350 showing dislodged vertical grab pole.
- Survival Factors Photo 17 - Interior view of seat 3A in 2004 Ford E350 showing “web winder” also known as a traveling retractor.
- Survival Factors Photo 18 - Interior view of row 4 folding bench seats A & B with self-tightening/synching lap belts.
- Survival Factors Photo 19 - Close-up view of loading mark found on webbing in seat 4A in 2004 Ford E350. Similar loading marks were found on 3 of the 4 self-tightening/synching lap belts across the fourth row.
- Survival Factors Photo 20 - Close-up view of 6.5-inch lateral seat belt anchors in seat 4C. NOTE. Belt removed by first responders during extrication of passenger.

END OF REPORT

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