U.S. Department of Transportation
National Highway Traffic Safety Administration

NHTSA

DOT HS 812 941

June 2020

Special Crash Investigations: On-Site Guardrail End Terminal Investigation; Vehicle: 2005 Nissan Maxima; Location: Missouri; Crash Date: August 2017

DISCLAIMER

Suggested APA Format Citation:

Indiana University Transportation Research Center. (2020, June). *Special Crash Investigations: On-Site Guardrail End Terminal Investigation; Vehicle: 2005 Nissan Maxima; Location: Missouri; Crash Date: August 2017* (Report No. DOT HS 812 941). National Highway Traffic Safety Administration.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
DOT HS 812 941			
4. Title and Subtitle Special Crash Investigations: On-Site Guardrail End Terminal Investigation; Vehicle: 2005 Nissan Maxima; Location: Missouri; Crash Date: August 2017		**5. Report Date:** June 2020 **6. Performing Organization Code**	
7. Author Indiana University Transportation Research Center		**8. Performing Organization Report No.** IN17026	
9. Performing Organization Name and Address Indiana University Transportation Research Center 501 South Madison Street, Suite 105 Bloomington, IN 47403		**10. Work Unit No. (TRAIS)** **11. Contract or Grant No.** DTNH22-12-C-00270	
12. Sponsoring Agency Name and Address National Highway Traffic Safety Administration National Center for Statistics and Analysis (NSA-110) 1200 New Jersey Avenue SE Washington, DC 20590		**13. Type of Report and Period Covered** Technical Report **14. Sponsoring Agency Code**	
15. Supplementary Notes Each crash represents a unique sequence of events, and generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was published.			
16. Abstract This report documents the on-site investigation of the crash of a passenger vehicle to a Soft Stop guardrail end terminal that is of interest to the Federal Highway Administration. The Nissan was a 4-door sedan equipped with frontal, front seat-mounted, and side-impact inflatable curtain air bags. The vehicle was not equipped with an Event Data Recorder (EDR) supported by the Bosch Crash Data Retrieval tool. An unbelted 37-year-old male was driving the vehicle in the right northbound lane when it departed the right side of the roadway and struck the end terminal (Event 1) with its front plane. The Nissan front plane struck two posts (Events 2 and 3) before rotating counterclockwise and separating from the guardrail. The vehicle initiated a right-side-leading, four-quarter-turn rollover (Event 4) over a distance of approximately 20 m (66 ft), coming to final rest on its wheels facing northwest. The driver sustained police-reported "B" (non-incapacitating) injuries and was transported by ambulance to a hospital where he was hospitalized for three days. The Nissan was towed from the crash scene due to damage.			
17. Key Words Soft Stop guardrail end terminal, motor vehicle traffic crash, moderate severity injury		**18. Distribution Statement** Document is available to the public from the National Technical Information Service, www.ntis.gov.	
19. Security Classif. (of this report) Unclassified	**20. Security Classif. (of this page)** Unclassified	**21. No. of Pages** 23	**22. Price**

Form DOT 1700.7 (8-72) Reproduction of completed page authorized

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Special Crash Investigation
On-Site Guardrail End Terminal Investigation
Case Number: IN17026
Vehicle: 2005 Nissan Maxima
Location: Missouri
Crash Date: August 2017

BACKGROUND

This report documents the investigation of the crash of a passenger vehicle to a Soft Stop guardrail end terminal (**Figure 1**) that is of interest to the Federal Highway Administration (FHWA). This crash was identified by an engineer with the Missouri Department of Transportation (MoDOT), who submitted photographs of the damaged end terminal to the FHWA. The FHWA determined that the guardrail end terminal and crash type were of interest. This crash investigation was then initiated by the National Highway Traffic Safety Administration in August 2017 and assigned to the Special Crash Investigation (SCI) team at the Indiana University Transportation Research Center. This single-vehicle crash involved a 2005 Nissan Maxima (**Figure 2**). The crash occurred in Missouri in August 2017 during the afternoon hours and was investigated by a local police agency. The guardrail, crash scene, and vehicle were inspected in August 2017.

Figure 1. Overhead view of the damaged end terminal and guardrail, view north.

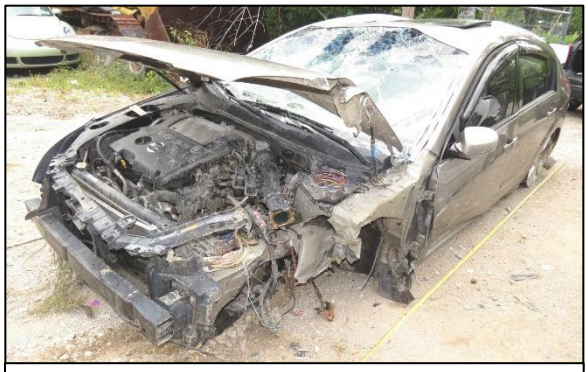


Figure 2. The damaged 2005 Nissan Maxima.

This crash occurred on the east side of the northbound lanes of an interstate highway. The Nissan was a 4-door sedan equipped with frontal, front seat-mounted, and side-impact inflatable curtain (IC) air bags. The vehicle was not equipped with an Event Data Recorder (EDR) supported by the Bosch Crash Data retrieval (CDR) tool. An unbelted 37-year-old male drove the vehicle. The Nissan was traveling in the right northbound lane when the vehicle departed the right side of the roadway and the front plane struck the end terminal (Event 1). The front plane struck two posts (Events 2 and 3) prior to separating from the guardrail. The vehicle then rolled over (Event 4), right-side-leading, completing four quarter turns over a distance of approximately 20 m (66 ft), coming to final rest on its wheels facing northwest. The driver sustained police-reported “B” (non-incapacitating) injuries and was transported by ambulance to a hospital where he was hospitalized for three days. The Nissan was towed from the crash scene due to damage.

SUMMARY

Crash Site

This crash occurred during daytime hours on the east side of the northbound lanes of a four-lane, divided, interstate highway. The weather conditions were clear visibility, south-southeast winds at 11 km/h (7 mph), temperature of 27.8 °C (82 °F), and dew point of 21.1 °C (70 °F), according to local weather reports. The interstate highway traversed in a north/south direction and had two level bituminous through lanes in each direction bordered by rumble strips and bituminous shoulders. Both northbound lanes were 3.9 m (12.8 ft) wide. The east shoulder was 2.5 m (8.2 ft) wide and the median shoulder was 1.2 m (3.9 ft) wide. The roadside adjacent to the east shoulder consisted of a grassy area that transitioned to a drainage ditch. A cable guardrail system was located in the median. The right shoulder was bordered by a blocked-out W-beam guardrail equipped with a Soft Stop end terminal. The roadway pavement markings consisted of solid white edge lines, broken white centerline, and solid yellow median edge lines. The speed limit was 113 km/h (70 mph). The crash diagram is included at the end of this report.

Figure 3. Northbound approach of the Nissan to the end terminal.

Figure 4. The damaged end terminal, view north.

Pre-Crash

The Nissan was traveling in the right northbound lane at a driver-estimated speed of 105 to 113 km/h (65 to 70 mph). The vehicle drifted slightly into the left lane, then back to the right lane and departed the travel lane onto the east shoulder. The Nissan traversed the shoulder and the right side tires entered the grass roadside (**Figure 3**). The path of the vehicle's right side tires was found during the SCI crash scene inspection in the grass adjacent to the right shoulder. The rotating tire marks began 28.9 m (94.8 ft) prior to the Soft Stop end terminal. Projecting the path of the tire mark back along the approach of the vehicle indicated that the vehicle departed the roadway approximately 84 m (276 ft) prior to the end terminal. The witnesses reported seeing no brake lights on the vehicle prior to the impact. The driver admitted to police that he was under the influence of inhalants (unspecified type).

Figure 5. Damage to the Nissan from the impact with the end terminal.

Crash

The front plane of the Nissan struck the guardrail terminal (**Figure 4**, Event 1). The impact occurred at the left corner of the vehicle's front plane outboard of the bumper beam and left frame rail. Vehicle components involved in the crash were the left fender, hood, inner fender support, left front tire and wheel, suspension, and the drive axle. The left front wheel, strut, and axle assembly were fractured and displaced from the vehicle as result (**Figure 5**). The crash displaced six posts and extruded 3.8 m (12.5 ft) of guardrail from the end terminal. The force direction on the vehicle was in the 12 o'clock sector and the impact resulted in deployment of the driver's frontal air bag. The WinSMASH program could not be used to calculate delta V since an impact with a yielding object is out of scope for the program. A barrier equivalent speed could not be calculated because there was no crush to the bumper beam and the crash involved front, side, and undercarriage components. The severity of the damage was moderate based on the extent of damage to the vehicle.

Figure 6. The area where the Nissan tripped and rolled over, view north.

The offset left impact induced a counterclockwise rotation to the Nissan as its center of gravity continued in a northerly direction deforming15.3 m (50.2 ft) of the guardrail. The front bumper struck two posts (Events 2 and 3). The damage to the bumper beam was located at the left frame rail and immediately right of the centerline.

Figure 7. Extruded guardrail from the end terminal, view south.

The vehicle rotated approximately 60 degrees CCW onto the negative slope of the roadside and tripped into a right-side-leading rollover (Event 4/**Figure 6**). The Nissan rolled four quarter turns across a distance of approximately 20 m (66 ft), coming to final rest on its wheels facing northwest. The front right-seat-mounted side impact and right IC air bags deployed during the rollover.

Post-Crash

The driver exited the vehicle without assistance through the left front door. The police arrived on scene 17 minutes after notification. The driver sustained police-reported "B" (non-incapacitating) injuries and was transported by ambulance to a hospital where he was hospitalized for three days for treatment of moderate severity injuries. The vehicle was towed from the crash scene.

END TERMINAL AND GUARDRAIL DAMAGE

The Nissan's front plane impact to the end terminal extruded 3.8 m (12.5 ft) of guardrail (**Figure 7**) and damaged six posts (**Figures 7** and **8**). The full height and width, 72.0 x 18.0 cm (28.3 x 7.1 in), of the face of the Soft Stop was directly damaged. The guardrail remained attached to the anchor at post zero and was displaced from posts 1 to 6. Posts 1 and 2 fractured and separated at the pre-drilled holes and were displaced downstream to the ground. Post 2 typically is equipped with a composite offset block; however, one was not located at the crash scene. Post 3 was bent downstream approximately 70 degrees from vertical and the bolt pulled through the guardrail. The post was slightly twisted toward the traffic side and the composite offset block was damaged and separated from the post. Post 4 was bent downstream approximately 45 degrees from vertical and the bolt pulled through the guardrail. The post was twisted toward the traffic side and the composite offset block remained attached to the post. Post 5 was bent downstream approximately 25 degrees from vertical and the bolt pulled through the guardrail. The post was twisted toward the traffic side. The composite offset block remained attached to the post and was undamaged. Post 6 was bent downstream approximately 30 degrees from vertical and the bolt pulled through the guardrail. The composite offset block was damaged and separated from the post. The guardrail was not kinked but an approximate 109 cm (42.9 in) long middle section of the guardrail was sliced when it contacted the cross-brace at the entrance to the feeder channel (**Figure 9**). The guide chute exit height was cm 13.8 cm (5.5 in). The connection to the feeder channel was not damaged. The height of the guardrail was 78.7 cm (31.0 in). The total length of damaged guardrail was 15.2 m (50.0 ft). The FHWA guardrail form is attached at the end of this report as **Appendix A**.

Figure 8. Damaged posts and guardrail, view north.

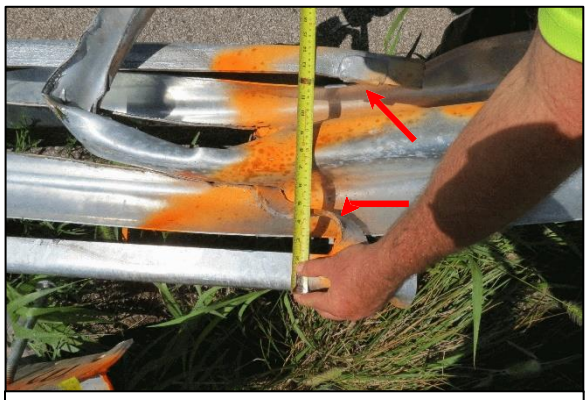


Figure 9. Sliced section of the guardrail and fractured cross-brace (arrows) at the entrance to the feeder channel.

2005 NISSAN MAXIMA

Description

The Nissan Maxima SL was a front-wheel-drive, 4-door sedan manufactured in November 2004 and identified by Vehicle Identification Number 1N4BA41E45Cxxxxxx. The vehicle was powered by a 3.5-liter, V-6 engine linked to a 5-speed automatic transmission, 4-wheel antilock brakes with electronic brake force distribution, brake assist, and traction control. The vehicle was also equipped with dual-stage frontal air bags, front-seat-mounted side-impact air bags, side-

impact IC air bags, active front head restraints, and a tilt steering column adjusted to the center position. The specified wheelbase was 284 cm (111.8 in).

The vehicle manufacturer's recommended tire size was P225/55R17. The vehicle was equipped with Continental Contact Tour A/S tires size of the recommended size. The manufacturer's recommended cold tire pressure for the front and rear tires was 228 kPa (30 psi). All the tires were in good condition prior to the crash. The left-front tire was heavily damaged during the crash and was separated from the wheel.

The front row was configured with driver and passenger leather-covered bucket seats with adjustable head restraints. The second row was equipped with a leather-covered bench seat with folding backs and adjustable head restraints. The driver's seat track was adjusted to the rear-most position and the head restraint was in the full-down position. The seatback was reclined 38 degrees aft of vertical. The remaining seats were unoccupied at the time of the crash.

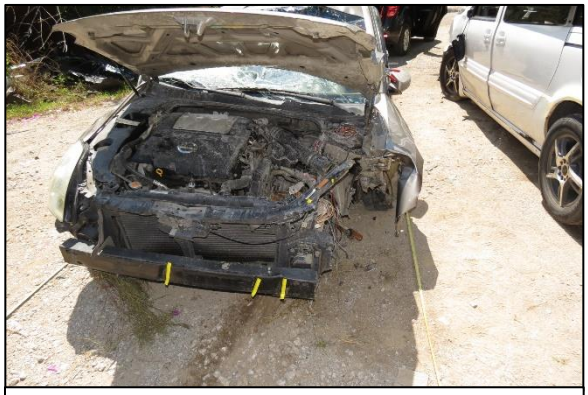


Figure 10. Front view of the Nissan depicting the damage of Events 1 to 3.

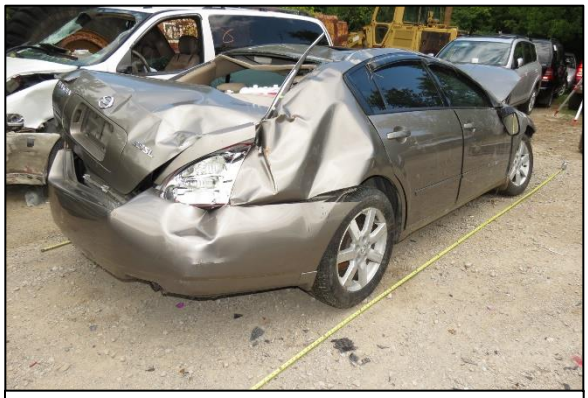


Figure 11. Right-rear oblique view depicting the Event 4 rollover damage.

Exterior Damage

Exterior Damage Event 1: The Nissan (**Figure 10**) sustained direct and induced damage to the front plane during the impact with the end terminal. The initial engagement with the end terminal occurred at the left corner of the front plane resulting in a direct damage width of 20 cm (7.9 in) on the bumper fascia. The impact was located outboard of the bumper beam and the engagement with the end terminal involved the left front fender, hood, and left front tire and wheel resulting in fracture and displacement of the wheel, strut, and axle assembly from the vehicle. During the crash, a loose component of the guardrail system (possible offset block) struck and fractured the right aspect of the Nissan's windshield. The Collision Deformation Classification (CDC) was 12FLEE6 (0 degrees). The severity of the damage was moderate based on the fracture and displacement of the left-front wheel, strut, and axle assembly from the vehicle.

*Exterior Damage Event 2 and 3**:*** The front plane struck two posts as the guardrail was deformed. The post impacts dented the bumper beam directly forward of the left frame rail and immediately right of the Nissan's centerline resulting in a total length of direct contact of 75 cm (29.5 in). Although crush measurements were taken on the bumper beam, there was no residual crush. The CDC for the post impacts were 12FLEN1 and 12FCEN1.

Exterior Damage Event 4: The right, top, and left planes sustained direct and induced damage during the four-quarter turn rollover (**Figure 11**). The roof and right trunk area of the vehicle sustained the primary crush during the rollover. The maximum vertical crush was 10 cm (3.9 in) occurring to the roof immediately forward of the right C-pillar. The maximum lateral crush was 3 cm (1.2 in) occurring to the right roof-side rail in the mid-right front door area. The CDC was 00TDDO3. The severity of the damage was moderate.

Event Data Recorder

The Nissan was not equipped with an EDR supported by the Bosch Crash data retrieval tool.

Interior Damage

The interior of the Nissan (**Figures 12** and **13**) sustained minor damage from intrusion of the roof. The most severe roof intrusion was approximately 10 cm (3.9 in) occurring in the second row right seating position. The right front and right rear doors were jammed shut. The left front and left rear doors remained closed and operational. The right aspect of the windshield was cracked from exterior impact forces and contact from an unknown object (possible offset block). The right A-pillar trim was scuffed on the forward aspect, but this was not considered an occupant contact. The backlight was disintegrated from impact forces. The remaining glazing, inclusive of the sunroof, was undamaged.

Figure 12. Left interior view of the Nissan.

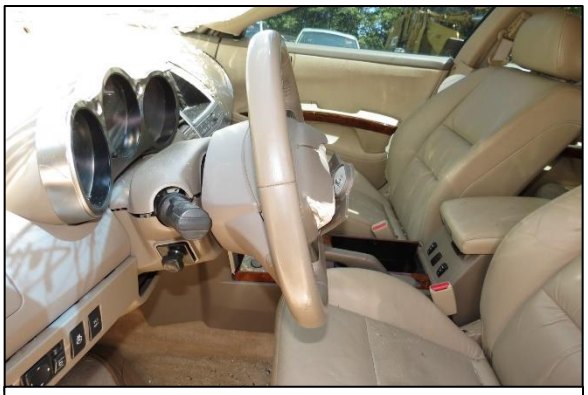


Figure 13. Left lateral view of the steering wheel rim.

Manual Restraint Systems

The front and second row seating positions were equipped with three-point lap and shoulder seat belts with sliding latch plates. The front row seat belts had adjustable upper anchors and the driver's upper anchor was adjusted to the full-up position. The driver was not belted as evidenced by the seat belt webbing pulled tautly into the retractor from pretensioner actuation. Also, the driver head contact evidence on the right side of the windshield and right A-pillar supported the lack of belt usage by the driver.

Supplemental Restraint Systems

The Nissan was equipped with dual-stage front, front-seat-mounted side impact, and side impact IC air bags. The driver's frontal, right IC, and right-front seat-mounted side-impact air bags deployed during the crash.

The driver's frontal air bag was located in the steering wheel hub and the module cover was a three-flap configuration constructed of pliable vinyl. Each top flap was 6.5 cm (2.6 in) wide and

4 cm (1.6 in) in height. The bottom flap was trapezoidal in shape, 13 cm (5.1 in) wide at the top and 10 cm (3.9 in) on the bottom, and was 9 cm (3.5) in height. The deflated air bag was 61 cm (24.0 in) in diameter There were blood stains on the front and back of the right side, but there was no discernable evidence of occupant contact and no damage to the air bag.

The right seat-mounted, side-impact air bag was located in the outboard side of the seat back and deployed through a tear seam. The deflated air bag was 50 cm (19.7 in) high and was 26 cm (10.2 in) wide at the top and 15 cm (5.9 in) wide at the bottom. There was no discernable evidence of occupant contact and there was no damage to the air bag.

The right IC air bag was located along the roof side rail inside the headliner and extended from the A-pillar to nearly the C-pillar. The IC measured 150 cm (59.1 in) in length and 33 cm (13.0 in) in height and the vertical excursion below the belt line was 13 cm (5.1 in). There was no discernable evidence of occupant and there was no damage to the IC.

2005 NISSAN MAXIMA OCCUPANT

Driver Demographics

Age/sex:	37 years/male
Height:	183 cm (72 in)
Weight:	75 kg (165 lb)
Eyewear:	None
Seat type:	Bucket
Seat track position:	Rear-most
Manual restraint usage:	None
Usage source:	Vehicle inspection
Air bags:	Driver air bag, deployed; seat-mounted and left IC, not deployed
Alcohol/drug data:	No alcohol; positive for THC, driver reported an unspecified inhalant use
Egress from vehicle:	Exited without assistance through left-front door
Transport from scene:	Ambulance
Medical treatment:	Hospitalized for 3 days

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Contusion to lower lobe of left lung, small	441407.2	Tandem IPC Left Air Bag Steering wheel rim/hub	Possible Probable
2	Small anterior left pneumothorax	442202.2	Tandem IPC Left Air Bag Steering wheel rim/hub	Possible Probable
3	Small 1.8 cm spleen laceration, superior/lateral	544222.2	Tandem IPC Left Air Bag Steering wheel rim/hub	Possible Probable

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
4	Left lateral 6th and 7th rib fractures	450202.2	Tandem IPC Left Air Bag Steering wheel rim/hub	Possible Probable
5	Fracture of right lateral sternum	450804.2	Tandem IPC Left Air Bag Steering wheel rim/hub	Possible Probable
6	Contusion to right chest	410402.1	Isolated Unknown Source	Unknown
7	Abrasion to posterior scalp	110202.1	Isolated Unknown Source	Unknown
8	Abrasion to chin	210202.1	Isolated Left Air Bag	Probable
9	Abrasion to left shoulder	710202.1	Isolated Left Door Panel - Left forward upper quadrant	Probable
10	Abrasion to left forearm	710202.1	Isolated Left Door Panel - Left forward upper quadrant	Probable
11	Abrasion to left knee	810202.1	Isolated Knee bolster	Certain
12	Abrasion to left lower leg	810202.1	Isolated Knee bolster	Certain

Source: hospital records.

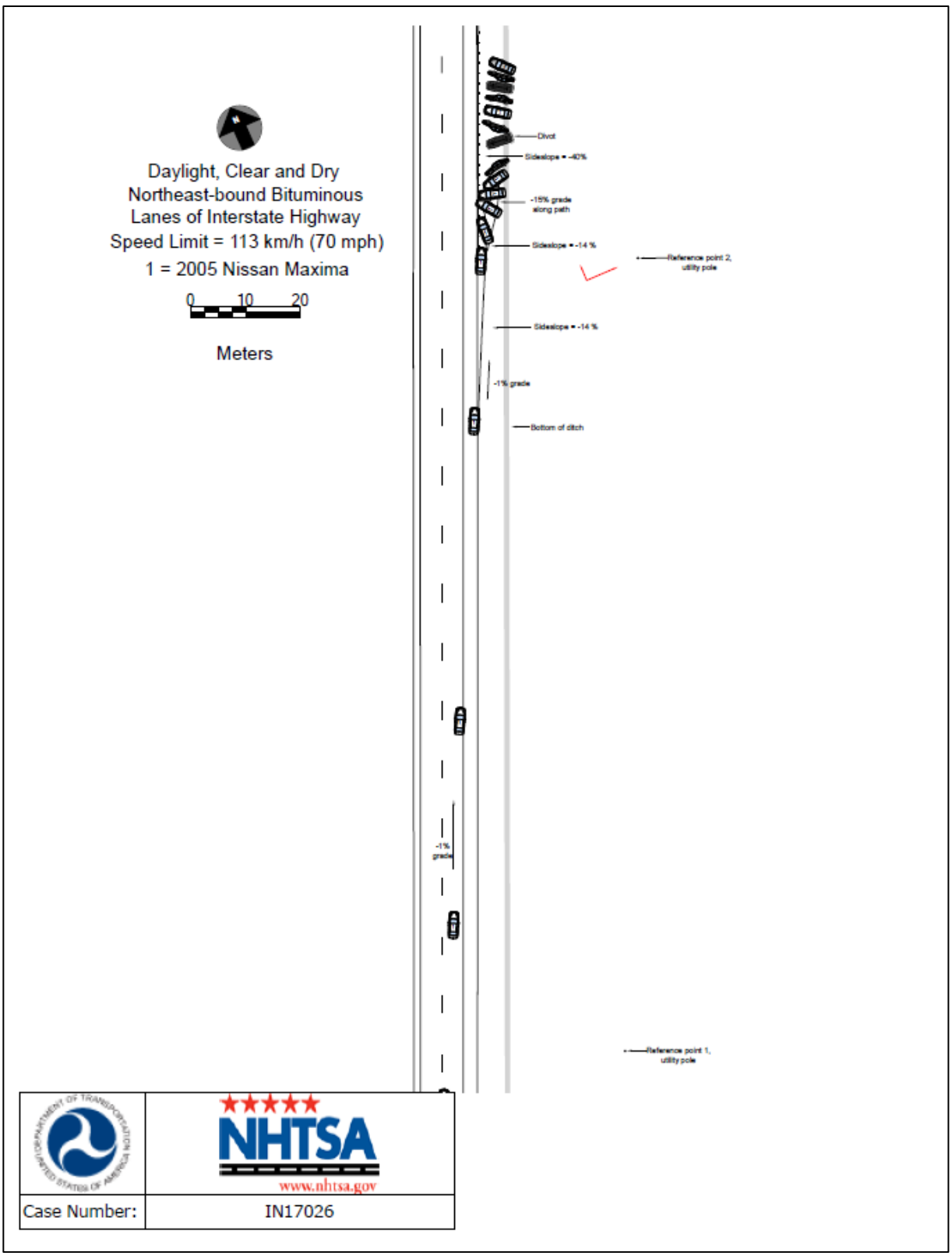
Driver Kinematics

The driver was seated in a rear-most track position with the seat back reclined 38 degrees aft of vertical. He was not restrained by the manual seat belt system. The driver was under the influence of unspecified inhalants when the Nissan departed the right side of the roadway. The front plane of the Nissan struck the end terminal resulting in deployment of the driver's frontal air bag. Due to the corner-type impact event, the driver initiated a forward trajectory in response to the 12 o'clock direction of force and he loaded the deployed air bag, which produced an abrasion to his chin. The combination of his forward trajectory and the vehicle's counterclockwise rotation resulted in an asymmetrical loading of the air bag. The driver loaded through the air bag and engaged the left aspect of the steering wheel rim. This loading of the steering wheel rim/hub resulted in a contusion of the lower lobe of the left lung with pneumothorax, a small spleen laceration, and fractures of the sternum and left ribs 6 and 7. His left arm and shoulder probably contacted the upper forward aspect of the left front door panel causing abrasions of the shoulder and arm. The driver's left knee and lower leg contacted the left lower instrument panel resulting in abrasions.

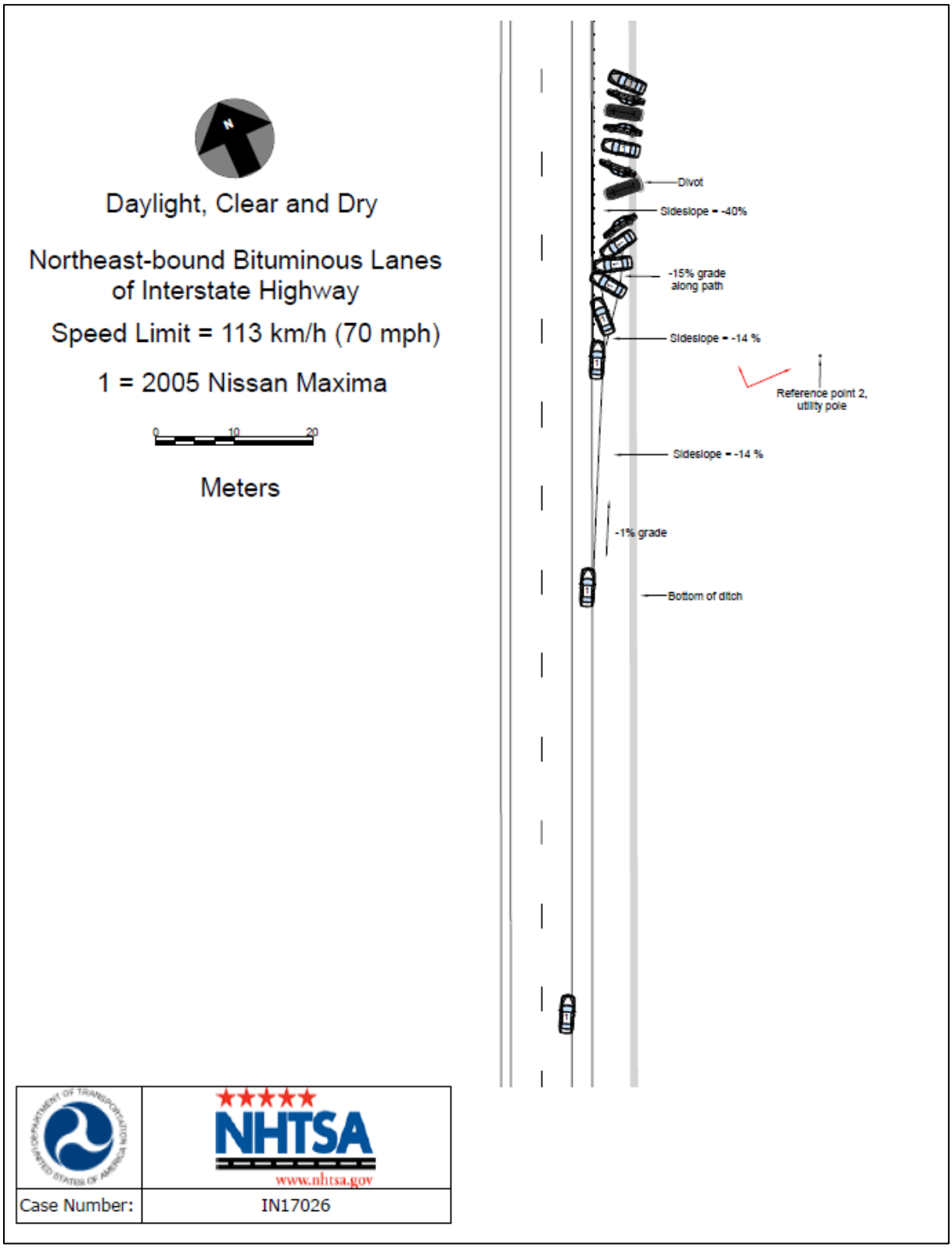
As the Nissan rotated counterclockwise and initiated the right-side-leading rollover, the driver probably slid across the seat cushion with his right hip and right lateral thigh engaging the shifter and console. This contact did not produce injury, but rotated the driver in a counterclockwise

direction. He sustained a right chest contusion and a posterior scalp abrasion from unknown sources. The Nissan came to final rest on its wheels. The driver opened the left-front door and exited the vehicle without assistance. He was subsequently transported by ambulance to a local hospital where he was treated in the emergency room and then hospitalized for three days for treatment of his injuries.

CRASH DIAGRAM



CRASH DIAGRAM: A DETAILED VIEW



APPENDIX A: FHWA Guardrail Form

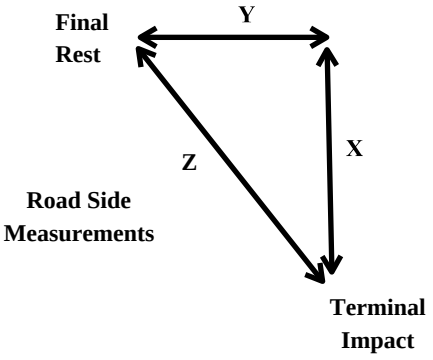
Case No.: IN17026

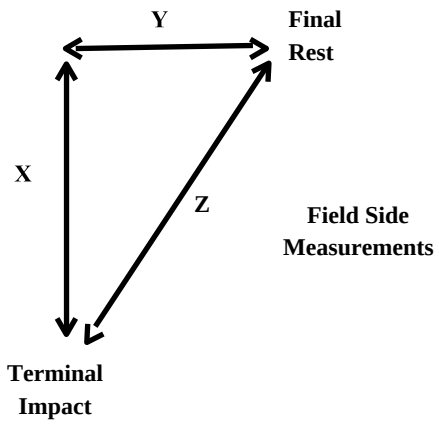
PREPOPULATED DATA (BY OTHERS)			
Date of Crash	August 2017	**TIME OF CRASH (MILITARY)**	Afternoon
Case Number	IN17026	**State**	Missouri
Traffic Route	Interstate	**Direction (Southbound = SB)**	NEB
Ambient Conditions (at time of crash)			
Temperature (°F)	82	**Lighting**	Daylight
Atmospheric	Clear		

SCENE INFORMATION	
Type of area where crash occurred	❒Urban ☒Rural ❒Suburban
Terminal on a horizontal curve?	❒No ❒Curve/LT ☒Curve/RT
Estimated or Reconstructed Speed at Impact (MPH)	60 – 65 mph
Est. distance (straight line) from terminal impact to COM final rest position (ft.)	Z = 109.6 ft
Est. distance (longitudinal) along guardrail from terminal impact to COM final resting location (ft.)	X = 110.2 ft
Est. distance (normal) from either 1. the white paint line; or 2. roadway/shoulder/pavement edge to COM rest position (ft.)	Y = 24.6 ft
Super elevation	❒+2% ❒-2% ☒ NONE or FLAT
Curve Radius (ft.)	N/A

KEY:

- COM - Center of Mass of Vehicle
- Distance Measurements





Case No.: IN17026

ON-SCENE INFORMATION		
End Treatment Type	☒ Vertical Loader	☒ SOFT STOP
	❒ Extruder	❒ ET2000 ❒ ET-PLUS 4in ❒ ET-PLUS 5in ❒ SKT ❒ FLEAT
	❒ Telescope	❒ X-LITE ❒ X-TENSION
Curb?	☒ No ❒ Yes	❒ AASHTO Type A ❒ AASHTO Type B ❒ AASHTO Type C ❒ AASHTO Type D ❒ AASHTO Type E ❒ AASHTO Type F ❒ AASHTO Type G ❒ AASHTO Type H
Curb Height:		

GUARDRAIL INSTALLATION									
Post No.	Post		Offset Block		Pre-Existing Damage		Offset to Post or Post Hole (ft.)		Spacing to Next Post (ft. -in.)
	Type	Dim.	Type	Dim.	Yes No Unknown	Describe	Travel Way	Curb	
	Steel Wood Other	D x W (in.) or Dia. (in.)	Steel Wood Composite	D x W (in.)					
0	Steel	7.5 x 7.25	N/A	N/A	Unk	Unknown	8.7	N/A	4’ 10”
1	Steel	6 x 4	N/A	N/A	Unk	Unknown	8.7	N/A	5’ 10”
2	Steel	6 x 4	Unk	Unk	Unk	Unknown	9.5	N/A	6’ 3”

Case No.: IN17026

Post No.	Post		Offset Block		Pre-Existing Damage		Offset to Post or Post Hole (ft.)		Spacing to Next Post (ft. -in.)
	Type	Dim.	Type	Dim.	Yes No Unknown	Describe	Travel Way	Curb	
	Steel Wood Other	D x W (in.) or Dia. (in.)	Steel Wood Composite	D x W (in.)					
3	Steel	6 x 3.75	Composite	7.5 x 3.75	Unk	Unknown	9.5	N/A	6’ 1”
4	Steel	6 x 3.75	Composite	7.5 x 3.75	Unk	Unknown	9.4	N/A	6’ 3”
5	Steel	6 x 7.75	Composite	7.5 x 4	Unk	Unknown	9.7	N/A	6’ 4”
6	Steel	6 x 3.75	Composite	7.5 x 4	No		9.7	N/A	6’ 3”
7	Steel	6 x 4	Composite	7.5 x 4	No		9.5	N/A	5’ 4”
8	Steel	6 x 3.75	Composite	7.5 x 4	No		9.5	N/A	6’ 4”

Case No.: IN17026

Post No.	Post		Offset Block		Pre-Existing Damage		Offset to Post or Post Hole (ft.)		Spacing to Next Post (ft. -in.)
	Type	Dim.	Type	Dim.	Yes No Unknown	Describe	Travel Way	Curb	
	Steel Wood Other	D x W (in.) or Dia. (in.)	Steel Wood Composite	D x W (in.)					
9	Steel	6 x 3.75	Composite	7.5 x 4	No		9.5	N/A	3’ 0”
10	Steel	6 x 4	Composite	7.5 x 4	No		9.4	N/A	6’ 4”
11	Steel	6 x 4	Composite	7.5 x 4	No		9.5	N/A	6’ 3”
12	Steel	6 x 3.75	Composite	7.5 x 4	No		9.5	N/A	6’ 3”

Additional Comments:

Case No.: IN17026

EXTRUDER			
Feeder Channel Width at impact head	❒4inches ❒5 inches ❒Other _Unknown		
Guide Chute Exit Height (in.)	5.5”		
Connection of feeder channels to head damaged?	☒No ❒Yes	Are Welds Broken?	☒No ❒Yes
Anchor Cable Present?	❒No ☒Yes	N/A	❒No ❒Yes
Rail Extrusion?	❒No ☒Yes	Length (ft. in.)	12’ 7”
Rail Extrusion Direction	❒Traffic Side ❒Field Side N/A		
Total Length of Rail Damaged (ft.) [total length would include extruded rail plus damaged rail downstream from head.]	50’		

TELESCOPE				
Rail Displacement	❒No	❒Yes; Length:	No of Panels Displaced	❒1 ❒2 ❒3 ❒4 ❒5 ❒6

ALL-SYSTEM PERFORMANCE			
Railkinks Downstream of Head?	☒No	❒Yes;	No. of Kinks in Rail:
Was there intrusion into the Occupant Compartment by foreign object (guardrail)?	☒No ❒Yes		
Did vehicle impact other objects after impact with terminal?	❒No ☒Yes		
Object Contacted	Ground (Rollover)		

ALL-SYSTEM PERFORMANCE ENVIRONMENT			
SIDESLOPE	**50 ft in advance of Post 1**	**At Post 1**	**50 ft Past Post 1**
Percent - %	-14%	-14%	-40%
Adjacent Lane Width (ft)	12.8		
Lane Type (NAS EDS Variable: Sur. Type)	Bituminous		
Shoulder Type	Bituminous		
Shoulder Width (ft)	8.2		

Guardrail Height (in)	31

VEHICLE INFORMATION		
Vehicle Type (NHTSA Input)	Four-door sedan	
Vehicle Identification Number (VIN)	1N4BA41E45Cxxxxxx	
Vehicle Mass (NASS var.: veh.wgt)	3,463	
Vehicle orientation upon impact	☒Case Type 1 ❒ Case Type 2 ❒Case Type 3 ❒ Case Type 4 ❒ Case Type 5 ❒ Case Type 6 ❒ Case Type 7 ❒ Case Type 8 ❒ Other	
If "Other," describe		
Collision Deformation Classification	12FLEE6	
Delta-V	Unknown	
Occupant Compartment Penetration of rail	☒No	❒Yes
Quarter Turns (NASS EDS variable: Rollover)	❒1 ❒2 ❒3 ❒4 ❒5 ❒6 ❒7 ☒8 ❒9 ❒10 ❒11 ❒12 ❒13 ❒14 ❒15 ❒16 ❒17+	
Object Precipitating Rollover, (NASS EDS variable: Rollobj)	Ground	
Rollover Type, Terhune Scale, (NASS EDS variable: rolintyp)	Trip Over	

DOT HS 812 941
June 2020

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

14786-051920-v1a