

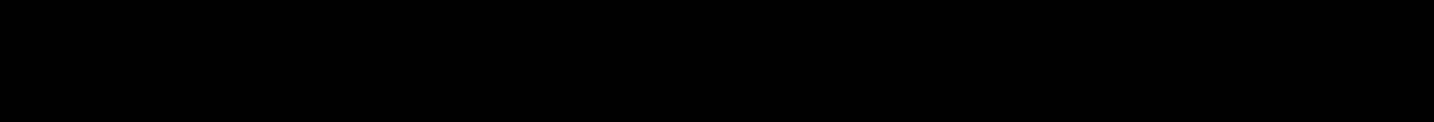


MISSOURI STATE HIGHWAY PATROL CRASH RECONSTRUCTION REPORT

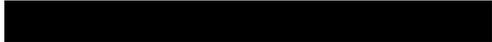
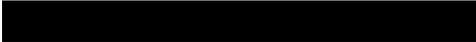


All Drivers Involved:

Driver #:	First Name	Middle	Last Name
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Original Investigating Officer:	Trooper Q. D. Bland,
Troop Reconstructionist(s):	
Assisting Officer(s):	Sergeant G. Q. Billings
Assisting Agency(ies):	
Level IV Reconstructionist(s):	Corporal G. D. Ward
Date of Report:	April 5, 2013



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[REDACTED]

[REDACTED]

Section I - Synopsis

[REDACTED], Team 1, was notified of a fatality motor vehicle crash which had occurred in St. Clair County wherein three persons were killed, necessitating a reconstruction per general order. Corporal G. D. Ward was assigned to the investigation, which had been initiated by Trooper Q. D. Bland, who submitted the original crash report indicating it occurred on [REDACTED], at approximately 2335 hours, on Southwest 430 Road. The collision involved a single vehicle and resulted in fatal injuries to three persons, and lesser injury to another.

On [REDACTED] Sergeant G. Q. Billings and I responded to the crash scene and met with Trooper Bland. After my scene investigation, we responded to Steward Wrecker Service in El Dorado Springs to conduct a vehicle inspection.

[REDACTED]

[REDACTED]

Section II -Environmental Factors

This [REDACTED], a single undivided gravel roadway measuring roughly 14 feet wide and classed as part of the St. Clair County road system. The roadway is in a rural setting in the southwestern portion of the county. The roadway is without shoulders and modest grass ditches and trees adjoin the road. [REDACTED]



DSC_0040.JPG - View looking southeast



DSC_0046.JPG - View looking at bridge approach

On [REDACTED] I determined the frictional characteristics of the roadway through the use of a drag sled of 31 pounds. Pulls averaging 19.4 pounds were required to maintain motion of the sled in the area and direction of Vehicle #1 as it approached the bridge, rendering a frictional coefficient of 62 percent (.62) of the constant force of gravity. [REDACTED], the roadway was dry. The dry roadway would render a higher frictional coefficient than what was present on the night of the crash since the original report lists the roadway condition as being wet and snow.

The center of the roadway radius of the curve approaching the bridge contained a radius of approximately 135 feet, rendering a "critical speed" for the curve when dry of about 35 miles per hour. The center of the roadway was determined by measuring the center of the roadway at the southwest edge of the bridge structure and the center of the main travel portion of the roadway, as created by the vehicle tire marks and displaced gravel.

The crash occurred during the late evening hours of darkness, the skies were clear and the roadway was wet and snow covered, according to the original report submitted by Trooper Bland. There were no atmospheric conditions present that would adversely affect driver visibility.

[REDACTED] [REDACTED]

Southwest 430 is maintained by the St. Clair County Road and Bridge Department, Osceola, Missouri, and has a speed limit of 50 miles per hour. [REDACTED]

[REDACTED]

Section III - Mechanical Factors

I examined and photographed Vehicle #1 on [REDACTED] at Steward Wrecker Service in El Dorado Springs, where it had been removed from the scene.

Vehicle #1, identified in Section I, was a white 1982 Chevrolet Scottsdale (K10) 4X4 1/2 ton truck with 46,731 miles registered on its odometer at the time of examination. It was equipped with integrated lap and shoulder seat belts for the driver and front right seat position occupied at the time of the crash. The front center seat position was equipped with lap seat belt occupied at the time of the crash. The driver seat belt was trapped between the seat and crushed vehicle body, indicating a lack of usage. The front right seat belt extended and latched when checked for operability. The front center seat belt was adjustable in length and latched when checked for operability. Vehicle #1 exhibited rollover and water damage.



DSC_0009.JPG - Rollover Damage



DSC_0016.JPG - Water Damage and Debris

The Vehicle #1 front bumper was partially detached, as was the right marker light. Both sides of the truck and its hood were crumpled. The roof was crumpled and forced downward. The frame was bent as was obvious by the large gap between the bed and cab on the right side of the vehicle. The truck's right tail light cover was completely detached. The front left wheel and suspension system were bent and pushed rearward into contact with the vehicle body. The front left tire was deflated and displayed a large rip in the outside sidewall of the tire, attributable to striking the bridge rail end. All other tires remained inflated. Both front tires were worn smooth near the center of the tire tread pattern. All of the truck's glass was gone except for the right door glass.



DSC_0004.JPG - Gap Indicating Bent Frame



DSC_0018.JPG - Wheel Assembly Pushed Rearward

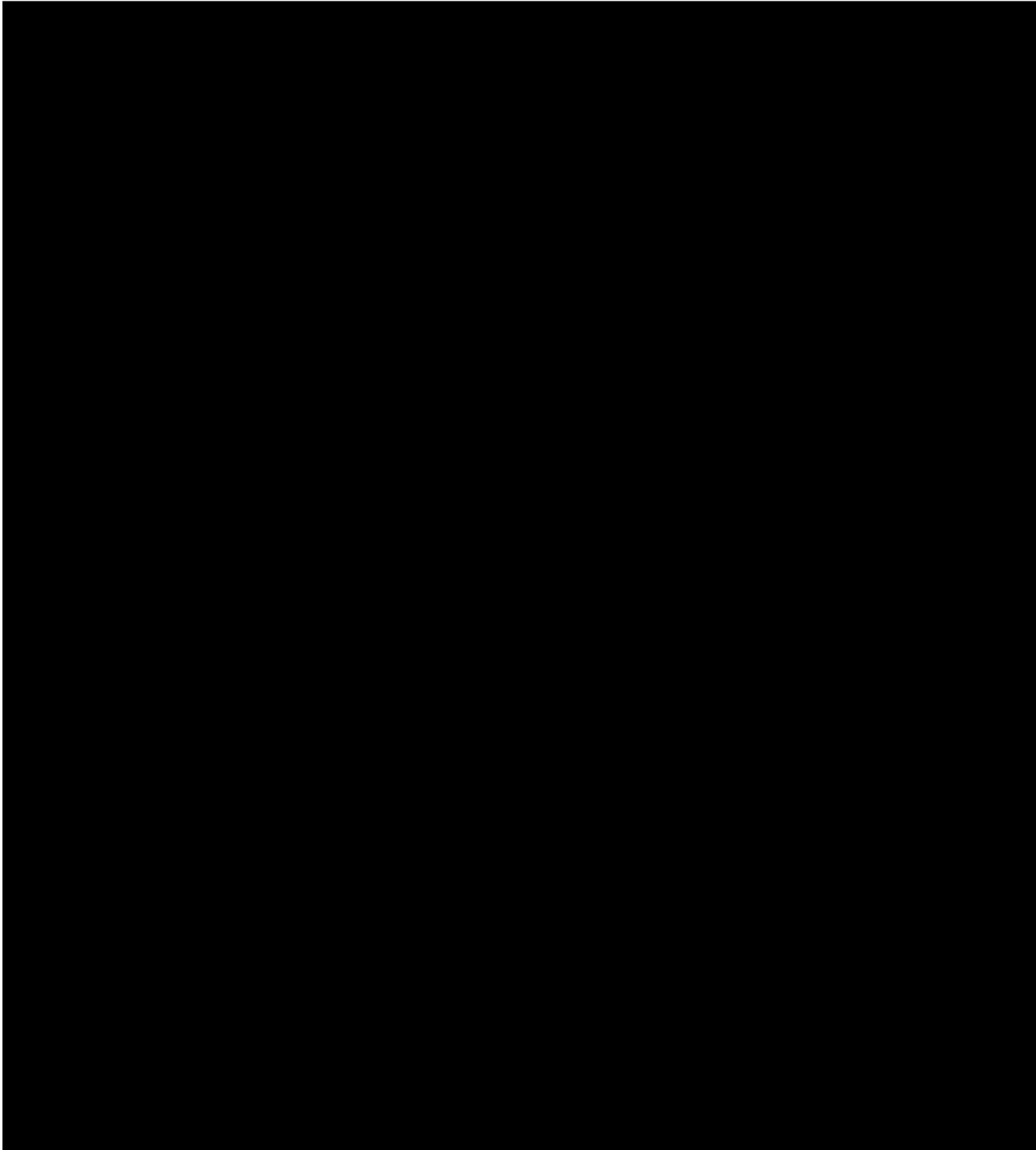
A measurement was taken at the right front bumper which revealed the bumper height was approximately 24 inches.



DSC_0032.JPG - Measurement of Bumper (24 inches)

Vehicle #1 was not weighed. However, its weight is estimated at about 4510 pounds, based upon Expert AutoStats manufacturer specifications, and listed weights of the driver and passengers according to computerized driver license files maintained by the Department of Revenue.

Section IV - Human Factors



Section V - Scene Investigation

The scene of the crash was photographed at the time of initial response on [REDACTED] by Trooper Q. D. Bland and St. Clair County Deputy G. Esser. I photographed and examined the scene of the crash upon my response on [REDACTED]. I measured the scene at the time of my response through the use of a roll-a-tape measuring device, 100 foot tape measure, 25 foot tape measure and string and plumb bob. Measurements referred to in this report regarding the crash scene are from measurements taken at the scene and from computer graphics generated when I created a scale diagram through the use of a computer mapping program.

A measurement reference line was established across and perpendicular to [REDACTED] at the location of the southwest bridge rail face. The outside edge of the bridge rail serves as a supplemental reference line in descriptions below.

Vehicle #1 came to rest on its roof in a northeast facing partially submerged in [REDACTED]. Trooper Bland used spray paint to mark the approximate location of the right rear wheel in reference to the bridge rail and creek bank. Its right rear wheel was approximately 24 feet northeast of the reference line and about 23 feet southeast of the bridge rail. Its center of gravity, based upon photos taken by Trooper Bland, was approximately 30 feet northeast of the reference line and about 23 feet southeast of the bridge rail.

A large tire scuff attributable to Vehicle #1's impact with the end of the bridge rail was observed. The scuff mark began at the southwest bridge rail at the point of reference. A measurement to determine the height of the bridge rail revealed the rail was 21 inches.



P1010010.JPG - Vehicle #1 at Rest



DSC_0032.JPG - [REDACTED] Bridge Rail (21 inches)

Section VI - Findings

Using computer generated graphics of the crash, along with evidence observed during examination of the scene and of damaged Vehicle #1, determinations were reached regarding the collision situation, also depicted in the attached scale diagram.

Vehicle damage indicates Vehicle #1 departed the roadway. The front left bumper cleared the top of the southwest bridge rail face by approximately 3 inches. The front left tire of Vehicle #1 impacted the southwest bridge rail face. Vehicle #1 overturned and came to rest on its top in Clear Creek.

Inspection of the Vehicle #1 taillights indicated the brake lights were not activated at the time of the crash, due to the lack of hot shock in the brake light filament considered in conjunction with the lack of skid marks at the approach to the bridge.



DSC_0024.JPG - Left Rear Taillight Bulb

DSC_0021.JPG - Right Rear Taillight Bulb

Inspection of the Vehicle #1 dashboard indicates the headlight switch was pulled out, suggesting the lights were activated at the time of the crash.



DSC_0015.JPG - Headlight Switch in "On" Position

[REDACTED]

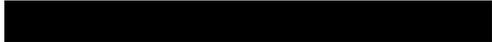
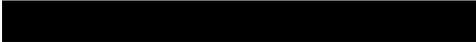
[REDACTED]

Section VII - Event Analysis

According to determinations reached in this report, this collision occurred as the result of the loss of control of Vehicle #1 by Driver #1 [REDACTED]
[REDACTED]

On April 5, 2013, at 1142 hours, I spoke with St. Clair County Coroner Sheldon.

[REDACTED]



Section VIII - Attachments

1. Photo Log
2. Scale Diagram
3. Math Computations
4. Expert AutoStats manufacturer specifications for 1982 Chevrolet Scottsdale (K10)

/S/ Corporal G. D. Ward
Reporting Officer

/S/ Sergeant G. Q. Billings
Reviewing Officer

[REDACTED] [REDACTED]

Photo Log

Digital images P1010009 through P1010011 were taken at the [REDACTED] by Trooper Bland. Digital images DSCN0321 through DSCN0340 were taken at the crash scene on [REDACTED] by St. Clair County Deputy Esser. I took digital images DSC_0001 through DSC_0039 at Steward's Wrecker Service in El Dorado Springs, Missouri on [REDACTED]. I took digital images DSC_0040 through DSC_0061 at the crash scene on [REDACTED].

Photographs taken by Trooper Bland at the scene of the crash on [REDACTED]:

- P1010009. View looking southeast from bridge of vehicle in the water.
- P1010010. View looking southeast from bridge of vehicle in the water.
- P1010011. View looking southeast from bridge of vehicle in the water.

Photographs taken by St. Clair County Deputy Esser at the scene of [REDACTED]:

- 321. View looking east from river bank of vehicle in water.
- 324. View looking east from river bank of vehicle in the water after being turned over.
- 327. View of vehicle cargo bed.
- 328. View looking north from river bank as vehicle was being removed from water.
- 331. Progressive view from previous.
- 333. View looking south from river bank as vehicle was being removed from water.
- 334. Progressive view from previous.
- 336. View looking north from river bank of as vehicle was removed from water.
- 340. View from the passenger side of vehicle interior.

Photographs I took of the vehicle at Steward's Wrecker Service on [REDACTED]:

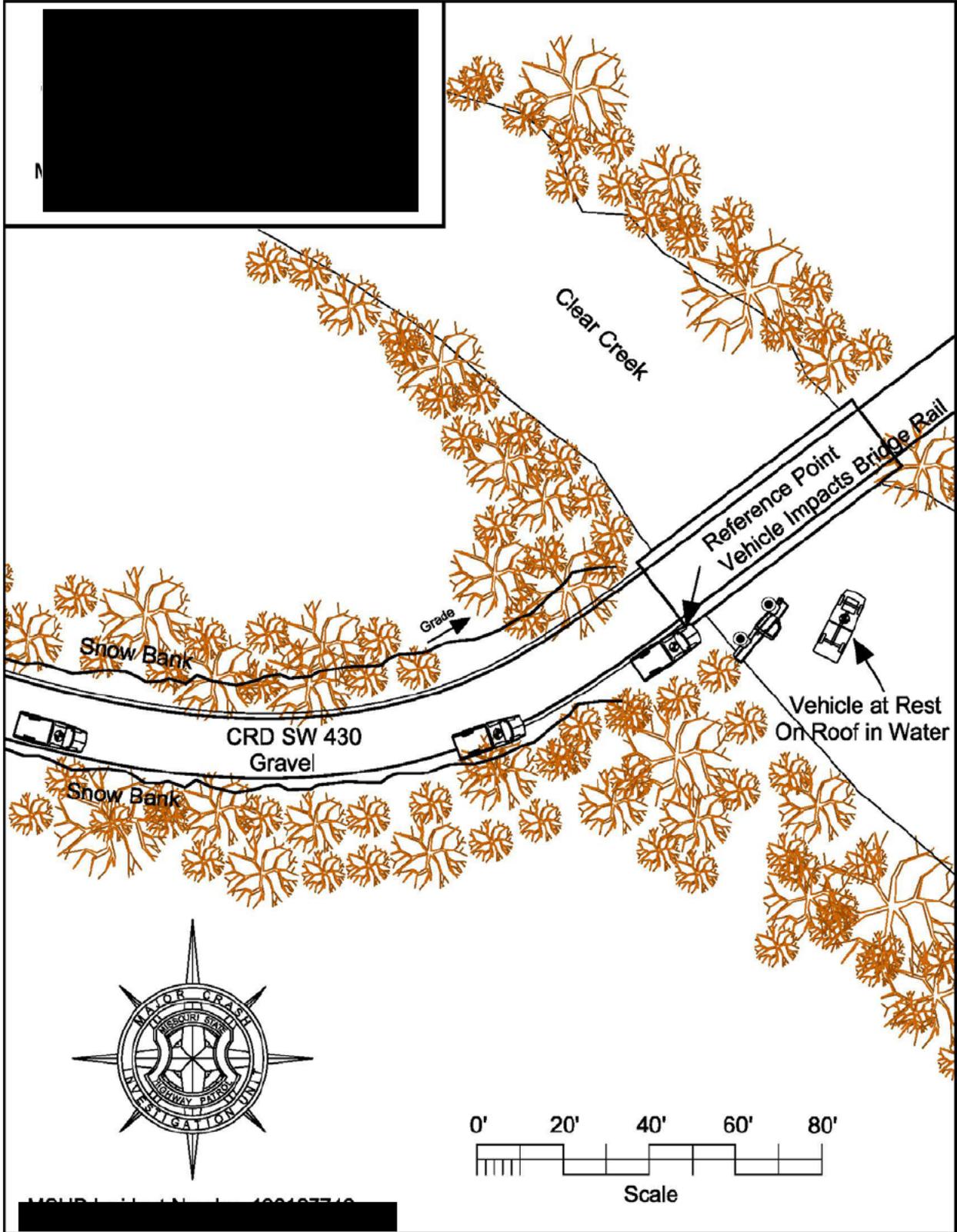
- 1. View of the front of the vehicle.
- 2. View of the front license plate on the vehicle.
- 3. View of the right front of the vehicle.
- 4. View of the right of the vehicle.
- 5. View of the right rear of the vehicle.
- 6. View of the rear of the vehicle.
- 7. View of the left rear of the vehicle.
- 8. View of the left of the vehicle.
- 9. View of the left front of the vehicle.
- 10. View of the front of the vehicle hood and roof.
- 11. View of the vehicle identification number.
- 12. Similar as previous photo in better focus.
- 13. View of the vehicle odometer with 46,731 miles.
- 14. Similar as previous photo.
- 15. View of the vehicle headlamp switch in the on position.
- 16. View of vehicle interior from the driver's side window.
- 17. View of vehicle interior from the driver's side window.
- 18. View of the left front vehicle suspension and wheel.
- 19. View of the driver side seatbelt from the passenger side windshield.

20. View of the right rear taillamp. (Note: Red lense cover was broken.)
21. View of the right rear taillamp. (Note: Filaments are intact.)
22. View of the left rear taillamp. (Note: Red lense cover was intact.)
23. View of the left rear taillamp. (Note: I removed red lense cover.)
24. View of the left rear taillamp. (Note: Brake light filament shows a cold shock.)
25. View of the right front tire. (Note: Super Swamper)
26. View of the right front tire. (Note: Size - 15/38.5-16LT)
27. View of the right front tire. (Note: TSL BOGGER)
28. View of the interior center seatbelt buckles from driver side window.
29. View of the damaged left front tire. (Note: Gouge at bottom of tire.)
30. View of the damaged left front tire. (Note: Gouge at bottom of tire.)
31. View of the right front bumper with tape measure.
32. View of the right front bumper with tape measure. (Note: Bottom of bumper near 24 inches.)
33. View of the passenger side seatbelt from passenger side door.
34. View of the center seatbelt from passenger side door.
35. View of the right of the vehicle. (Note: Gap between cargo bed and passenger compartment.)
36. View of the right front tire. (Note: Lack of tread near the center of the tire.)
37. View of the right front tire. (Note: Lack of tread near the center of the tire.)
38. View of the left front axle hub. (Note: The 4-wheel drive axle hub is in the locked position.)
39. View of the right front axle hub. (Note: The 4-wheel drive axle hub is in the locked position.)

Photographs I took at the crash scene on [REDACTED]

40. View of Southwest 430 looking southeast, west of the crash scene.
41. Progressive view from the previous view.
42. Progressive view from the previous view.
43. Progressive view from the previous view.
44. Progressive view from the previous view.
45. Progressive view from the previous view.
46. Progressive view from the previous view.
47. View of Southwest 430 looking northeast, west of the crash scene.
48. Progressive view from the previous view.
49. Progressive view from the previous view.
50. Progressive view from the previous view.
51. Progressive view from the previous view.
52. View looking west, east of the crash scene.
53. Progressive view from the previous view.

54. View looking east, west of the crash site. (Note: Area of impact is visible painted orange at near end of bridge structure.)
55. Progressive view from the previous view.
56. Progressive view from the previous view.
57. Close up view of the area of impact on the southwest corner of the bridge structure.
58. View looking north east of the southwest corner of the bridge structure and area of impact.
59. View of the area the vehicle came to rest in the water, taken from the southwest corner of the bridge structure.
60. View of tape measure held against the southwest corner of the bridge structure and area of impact.
61. Close up view of the tape measure showing the top of the bridge structure as 21 inches.



Math Computations:

Item I:

Computations to determine the frictional coefficient of the Southwest 430 dry roadway for eastbound traffic, using the following generally accepted formula:

$$f = \frac{F}{W}$$

Where F is the force in pounds necessary to maintain movement of the drag sled once motion is achieved, and W is the weight of the sled, 31 pounds.

Pulls averaging 19.4 pounds were recorded on the gravel roadway in the direction of the Vehicle #1 path of travel.

Inserting values:

$$f = \frac{19.4}{31}$$
$$f = .625$$

Item II:

Computation to determine the radius of the curve on [REDACTED] for the center of the roadway, using the following generally accepted formula:

$$R = \frac{C^2}{8 \times M} + \frac{M}{2}$$

Where C is the chord distance measured along the center of the roadway, 100 feet; 8 is a mathematical constant; M is the middle ordinate measured along the center of the roadway, 9.58 feet; and 2 is a mathematical constant.

Inserting values:

$$\begin{aligned} R &= \frac{100^2}{8 \times 9.58} + \frac{9.58}{2} \\ &= \frac{10000}{76.64} + 4.79 \\ &= 130.480167 + 4.79 \\ &= 135.270167 \\ &\approx 135 \text{ feet} \end{aligned}$$

Item III:

Computation to determine the critical speed of the curve on [REDACTED] for the center of the roadway, using the following generally accepted formula:

$$S = 3.86\sqrt{R \times f}$$

Where 3.86 is a mathematical constant; R is the radius of the curve, 135 feet; and f is the frictional coefficient of the dry roadway, $.62$.

Inserting values:

$$\begin{aligned} S &= 3.86\sqrt{135 \times .62} \\ &= 3.86\sqrt{83.7} \\ &= 3.86 \times 9.148770409 \\ &= 35.31425378 \\ &\approx 35.3 \text{ mph} \end{aligned}$$

The following generally accepted ranges, $.25$ to $.55$, were substituted for the frictional coefficients of the roadway as it was partially covered with snow at the time of the crash and was not upon my arrival on March 6, 2013. These substituted values render a critical speed range of 22 to 33 miles per hour for the curve.

Item IV:

Computation to determine the speed of Vehicle #1 when it became airborne just off the south side of the roadway prior to impacting the water, using the following generally accepted formula:

$$S = \frac{2.73 \times D}{\sqrt{h}}$$

Where 2.73 is a mathematical constant; D is the horizontal distance Vehicle #1 traveled while airborne, 43.5 feet; h is the vertical distance traveled by Vehicle #1, 18 feet.

Inserting values:

$$\begin{aligned} S &= \frac{2.73 \times 43.5}{\sqrt{18}} \\ &= \frac{118.755}{4.242640687} \\ &= 27.99082193 \\ &\approx 28 \text{ miles per hour} \end{aligned}$$

Expert AutoStats®

Version 5.1.1

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MISSOURI STATE HIGHWAY PATROL - CRASH TEAM 1
 HHC P.O. BOX 517
 HIGGINSVILLE MO 64037

1982 CHEVROLET K10 SWB 2 DOOR 4X4 PICKUP

Curb Weight: lbs. kg.
 Curb Weight Distribution - Front: % Rear: %
 Gross Vehicle Weight Rating: lbs. kg.
 Number of Tires on Vehicle:
 Drive wheels:

Horizontal Dimensions

	Inches	Feet	Meters
Total Length	<input type="text" value="192"/>	<input type="text" value="16.00"/>	<input type="text" value="4.88"/>
wheelbase:	<input type="text" value="117"/>	<input type="text" value="9.75"/>	<input type="text" value="2.97"/>
Front Bumper to Front Axle:	<input type="text" value="34"/>	<input type="text" value="2.83"/>	<input type="text" value="0.86"/>
Front Bumper to Front of Front Well:	<input type="text" value="16"/>	<input type="text" value="1.33"/>	<input type="text" value="0.41"/>
Front Bumper to Front of Hood:	<input type="text" value="4"/>	<input type="text" value="0.33"/>	<input type="text" value="0.10"/>
Front Bumper to Base of Windshield:	<input type="text" value="55"/>	<input type="text" value="4.58"/>	<input type="text" value="1.40"/>
Front Bumper to Top of Windshield:	<input type="text" value="82"/>	<input type="text" value="6.83"/>	<input type="text" value="2.08"/>
Rear Bumper to Rear Axle:	<input type="text" value="41"/>	<input type="text" value="3.42"/>	<input type="text" value="1.04"/>
Rear Bumper to Rear of Rear Well:	<input type="text" value="29"/>	<input type="text" value="2.42"/>	<input type="text" value="0.74"/>
Rear Bumper to Rear of Trunk:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Rear Bumper to Base of Rear Window:	<input type="text"/>	<input type="text"/>	<input type="text"/>

Width Dimensions

Maximum Width:	<input type="text" value="79"/>	<input type="text" value="6.58"/>	<input type="text" value="2.01"/>
Front Track:	<input type="text" value="65"/>	<input type="text" value="5.42"/>	<input type="text" value="1.65"/>
Rear Track:	<input type="text" value="65"/>	<input type="text" value="5.42"/>	<input type="text" value="1.65"/>

Vertical Dimensions

Height:	<input type="text" value="71"/>	<input type="text" value="5.92"/>	<input type="text" value="1.80"/>
Ground to -			
Front Bumper (Top)	<input type="text" value="24"/>	<input type="text" value="2.00"/>	<input type="text" value="0.61"/>
Headlight - center	<input type="text" value="38"/>	<input type="text" value="3.17"/>	<input type="text" value="0.97"/>
Hood - top front:	<input type="text" value="43"/>	<input type="text" value="3.58"/>	<input type="text" value="1.09"/>
Base of Windshield	<input type="text" value="51"/>	<input type="text" value="4.25"/>	<input type="text" value="1.30"/>
Rear Bumper - top:	<input type="text" value="24"/>	<input type="text" value="2.00"/>	<input type="text" value="0.61"/>
Trunk - top rear:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Base of Rear Window:	<input type="text"/>	<input type="text"/>	<input type="text"/>

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Interior Dimensions

	Inches	Feet	Meters
Front Seat Shoulder Width	66	5.50	1.68
Front Seat to Headliner	41	3.42	1.04
Front Leg Room - seatback to floor (max)	42	3.50	1.07
Rear seat shoulder width			
Rear Seat to Headliner			
Front Leg Room - seatback to floor (min)			
Seatbelts:	3pt LAP & SHOULDER - front, None or Unknown - rear		
Airbags:	NO AIRBAGS		

Steering Data

Turning Circle (Diameter)	504	42.00	12.80
Steering Ratio:	24.00:1		
Wheel Radius:	14	1.17	0.36
Tire Size (OEM):	H78X15B		

Acceleration & Braking Information

Brake Type:	FRONT DISC - REAR DRUM
ABS System:	NO ABS

Braking, 60 mph to 0 (Hard pedal, no skid, dry pavement):

d = 220.0 ft t = 5.0 sec a = -17.6 ft/sec² G-force = -0.55

Acceleration:

0 to 30mph t = 5.4 sec a = 8.1 ft/sec² G-force = 0.25
 0 to 60mph t = 14.8 sec a = 5.9 ft/sec² G-force = 0.18
 45 to 65mph t = 9.8 sec a = 3.0 ft/sec² G-force = 0.09

Transmission Type: 3spd MANUAL

Notes:

Federal Bumper Standard Requirements: No Requirement

N.S.D.C = 1978 - 1986

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1982 CHEVROLET K10 SWB 2 DOOR 4X4 PICKUP

Other Information

Tip-Over Stability Ratio =	1.19	Reasonably Stable
NHTSA Star Rating (calculated)		***

Center of Gravity (No Load):

Inches behind front axle	=	46.80
Inches in front of rear axle	=	70.20
Inches from side of vehicle	=	39.50
Inches from ground	=	27.30
Inches from front corner	=	89.94
Inches from rear corner	=	118.01
Inches from front bumper	=	80.80
Inches from rear bumper	=	111.20

Moments of Inertia Approximations (No Load):

Yaw Moment of Inertia	=	2674.00	lb*ft*sec ²
Pitch Moment of Inertia	=	2711.00	lb*ft*sec ²
Roll Moment of Inertia	=	623.00	lb*ft*sec ²

Front Profile Information

Angle Front Bumper to Hood Front	=	78.1	deg
Angle Front of Hood to windshield Base	=	8.9	deg
Angle Front of Hood to Windshield Top	=	18.4	deg
Angle of windshield	=	33.7	deg
Angle of Steering Tires at Max Turn	=	26.6	deg

First Approximation Crush Factors:

Speed Equivalent (mph) of Kinetic Energy (KE) used in causing crush of indentation may be evaluated using the following formula, the appropriated Crush Factor (CF), and Maximum Indentation Depth (MID), in feet:

$$V(\text{mph}) = \sqrt{30 * CF * \text{MID}}$$

KE Equivalent Speed (Front/Rear/Side)	=	21	CF
Bullet vehicle IMPACT SPEED estimation based on TARGET VEHICLE damage ONLY (Tested for Rear/Side Impact only)	=	27	CF

These CF values are based upon analysis of NHTSA Barrier Crash data, and from over 1000 vehicle accidents where independent evaluation of speed was possible. (These are NOT 'A', 'B', 'C', or 'G' values)

The rear Impact data with more than 2-3 inches of crush damage should be looked at carefully, since some vehicles have very weak trunk & fender strength. Therefore, on some cars, especially GM, you estimate from the rear crush data may be high by as much as 4-5 mph (on a crush of 18 inches).









10
SCOTTSDALE





















35

45

55

25

50

70

90

65

15

30

MPH

km/h

110

75

57316

130

85

RND 2



LIGHTS













GUINDET SAE RTIARDI 73







GUIDED BY KIRBY'S



15/38.5-16LT
SPECIFIED RIM SIZE 10-12JUX16

TUBELESS































MAJOR CRASH
INVESTIGATION UNIT





MAJOR CRASH
INVESTIGATION UNIT



























We love you
Ashley J We Will
Always Miss You
Love your
So close friend
and sister



































Exposed bridge rail

Caused

Rollover

Unpaved, low-volume road