

**Investigation  
of the  
Elen - Thomas Collision**

By:

Steven Becker

Month 31, 20\*\*

## Investigation of the Elen - Thomas Collision

**Report**

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### **A. INTRODUCTION**

This two vehicle collision occurred at about 5:05 pm Month 5, 20\*\* on 2222 Street in Town, New York. The crash involved Thomas Thomas driving a 2004 Nissan Maxima and a 2002 Nissan Maxima driven by Elen Elen.

Elen claims injuries from the collision.

This investigation was performed to determine the severity of the collision.

### **B. MATERIALS AVAILABLE FOR REVIEW**

- Transcript of the \*\*/16/20\*\* deposition of Elen Elen
- Transcript of the \*\*/24/20\*\* deposition of Thomas Thomas
- Repair estimate for Thomas's 2004 Nissan Maxima prepared by Dom Dom \*\*/06/\*\*
- Repair estimate for Elen 1995 Nissan Maxima prepared by Sean Sean \*\*/10/\*\*
- 16 photographs of the two damaged vehicles
- Complaint

### **C. SITE**

2222 Street is a one way road generally oriented north-south, constructed of asphalt, with a speed limit of 30 mph. Between 1111 and 31<sup>st</sup> Avenues, the road has metered parking on both sides and two lanes of travel as seen in Photo 1. Traffic movement through the intersection with 1111 Avenue is controlled by traffic signals. The roadway is about 36 feet wide with each lane about 18 feet wide. Adjacent land use consists of both commercial and residential buildings.



**Photo 1:** Google Earth Street View of site<sup>1</sup>

#### **D. ANALYSIS**

Elen testified:

- The weather was dry, sunny, at the time (ET 10).
- The crash occurred on 2222 Street close to the traffic light on 1111 Avenue (ET 10).
- She was 3-4 car lengths from the light (ET 11).
- She was in the left lane, and had made left turn on 2222 from 31<sup>st</sup> Avenue (ET 12).
- The light was Red (ET 14).
- She felt a bump from the passenger side (ET 16).
- She brought the vehicle to a stop. It was a medium impact. She was going 5 mph. She was staying in the left lane (ET 19).
- She stopped at impact and felt one impact (ET 21).
- She did not see the black Maxima before impact (ET 22-23).
- After the collision they moved the vehicles to a side street to exchange information (ET 25).
- She saw a dent next to her right front tire. She took photos of the damage (ET 27).
- She was wearing her seatbelt. The airbags did not deploy (ET 32).
- Her left arm came in contact with the door (ET 33).
- She was in the left lane and Thomas in the right lane struck her suddenly (ET 84).
- He stopped against her car. The two cars were touching. Thomas backed up (ET 86).

<sup>1</sup> Google Earth Street View – 30-10 2222 street, Town, NY 11102, accessed August 24, 20\*\*

Thomas testified:

- He was driving home (TP 17,19).
- He traveled from 38<sup>th</sup> Avenue to the point of impact on 2222 Street (TP 25).
- He was in the right lane just before the collision (TP 28).
- He was stopped for a Red light before the collision within six cars from the front (TP 29).
- After the light turned Green, a cab in front of him started to go and then stopped for a fare. He reacted by turning to the left (TP 31).
- The cab stopped abruptly, and he does not think he could have stopped without hitting the cab (TP 32).
- He braked moderately. He was about one car length behind the cab (TP 33).
- He was going 5-10 mph (TP 35).
- He entered the left lane. The impact occurred while he was entering the left lane (TP 37).
- The front of his car was in the left lane, the impact was very light (TP 39).
- His damage was repaired, it was to the front driver's side fender (TP 40-41).
- There was no weather, it was light out, the road was flat and straight (TP 50).

As shown in Photos 2 & 3, Elen's Nissan had damage consisting of; a cracked right fog light and parking light, paint removed and black marks on the right side of the bumper cover, dents on the right front fender above the headlight and just forward of the wheel with paint removed to the top of the wheel well.



**Photos 2 & 3:** Elen's 1995 Nissan Maxima – Right side

The repair estimate for Elen's Nissan consisted of a new right fender, right fog lamp assembly, parking lamp, signal lamp assembly, bumper cover, and right bumper bracket.

As shown in Photos 4 & 5, Thomas's Maxima had damage that extended from the driver's door underneath the rearview mirror and extended forward on the front fender to the top of the wheel well, with scuff marks on the wheel rim.



**Photos 4 & 5:** Thomas's 2004 Nissan Maxima – Left side

The repair estimate for Thomas's Maxima consisted of a new left fender, fender liner, left rocker panel molding, wheel, and labor to repair the door.

The damage to both vehicles indicates relative motion between the vehicles with no structural involvement. Both vehicles exhibit a contact damage length of about 20 inches. This minor damage is confined to the sheet metal. The fog light is induced damage from the impact to the bumper cover. Without structural damage, little energy was dissipated while damaging the non-structural fenders and door panel. The damage from the photos and repair estimates are consistent with a sideswipe collision.

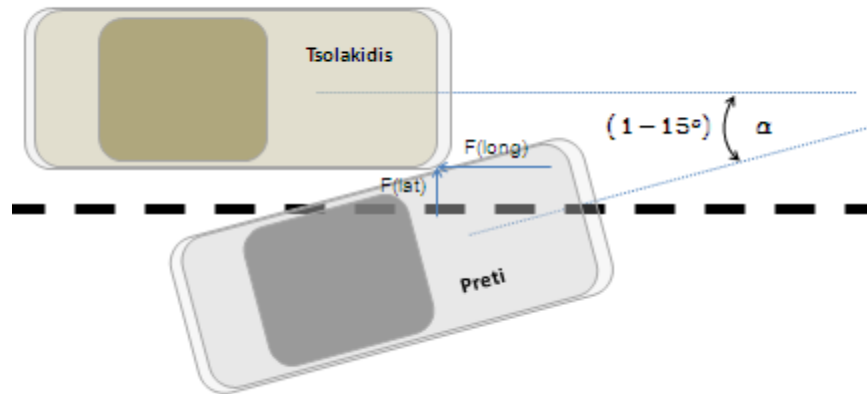
Newton's laws of physics apply to all vehicle crashes. Newton's Three laws are:

- Inertia. A body at rest or in motion with a constant velocity remains so unless acted upon by an external force.
- $F=ma$ . A body acted upon by a force moves with constant acceleration proportional to the mass of the body.
- For every action there is an equal and opposite reaction.

As the collision occurred, Elen's Nissan would experience a change in velocity laterally and longitudinally. As there is no impact damage on the front of Elen's Nissan, the impact angle between the two vehicles was a shallow angle (between 1 and 15 degrees)<sup>2</sup> and is shown in Figure 1.

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<sup>2</sup> Funk, Cornier, & Bain "Analytical Model for Investigating Low-Speed Sideswipe Collisions", SAE 2004-01-1185



**Figure 1** – Estimated first contact and Elen’s Nissan force diagram

Elen testified her forward speed was about 5 mph. Using; a 0.7 coefficient of drag<sup>3</sup> of dry asphalt with braking alone, an initial velocity of 5 mph, an end velocity of 0 mph, and equations of motion<sup>4</sup>, she could stop in about 1.2 feet taking about 0.33 seconds.

A comparison of damage from side-swipe crash testing<sup>1,5,6</sup> shows similar damage on Elen’s Nissan. Comparing the damage to this testing, a conservative estimate of Elen’s longitudinal speed change would be less than 5 mph. This side-swipe crash testing<sup>1,4,5</sup> indicates the total change in time for the force of a side-swipe type collision ranges from about 0.75 to about 1.4 seconds. As the Elen Nissan has about 20 inches of damage, comparing damage to this testing, a conservative estimate of the total change in time would be about 0.75 seconds.

<sup>3</sup> Fricke, Traffic Crash Reconstruction, 2010, pg 142

<sup>4</sup> Fricke, Traffic Crash Reconstruction, 2010, pgs 643-645

<sup>5</sup> Toor, Roenitz, Johal, Overgaard, Happer, & Araszewski “Practical Analysis Technique for Quantifying Sideswipe Collisions”, SAE 1999-01-0094

<sup>6</sup> Bailey, Wong, & Lawrence “Data and Methods for Estimating the Severity of Minor Impacts”, SAE 950352.

## E. FINDINGS

Within the bounds of reasonable professional and scientific certainty, and subject to change if additional information becomes available, it is my professional opinion that:

1. Elen experienced a longitudinal change in velocity of less than 5 mph and duration of about 0.75 seconds.



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Steven Becker  
Vehicle Expert  
Robson Forensic, Inc.