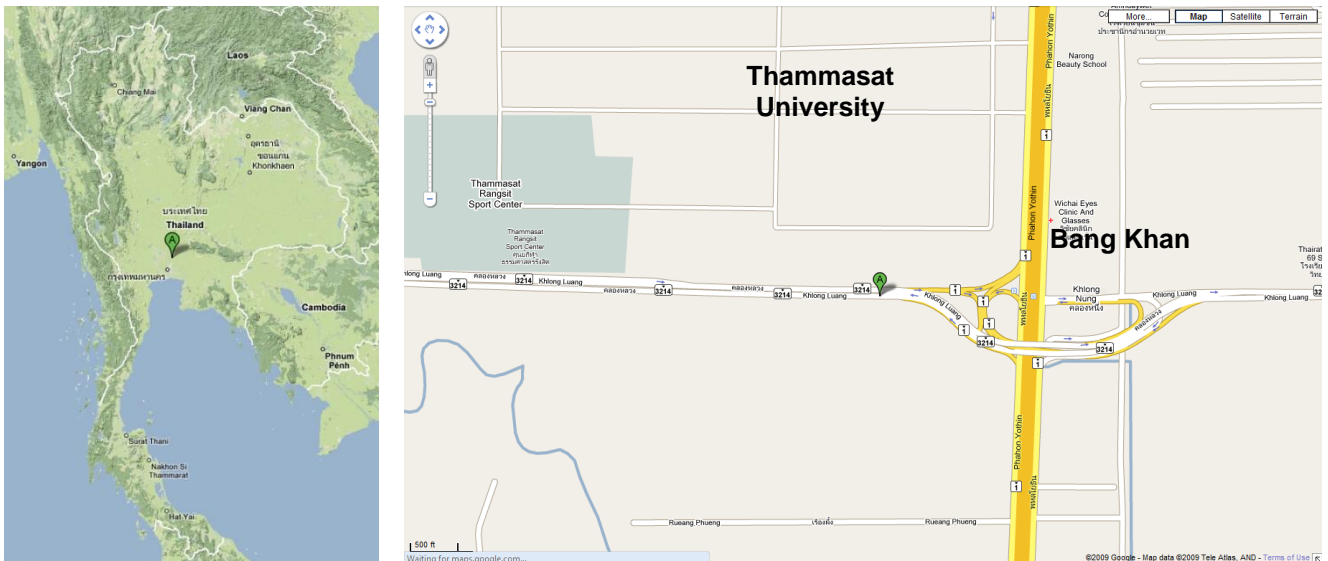


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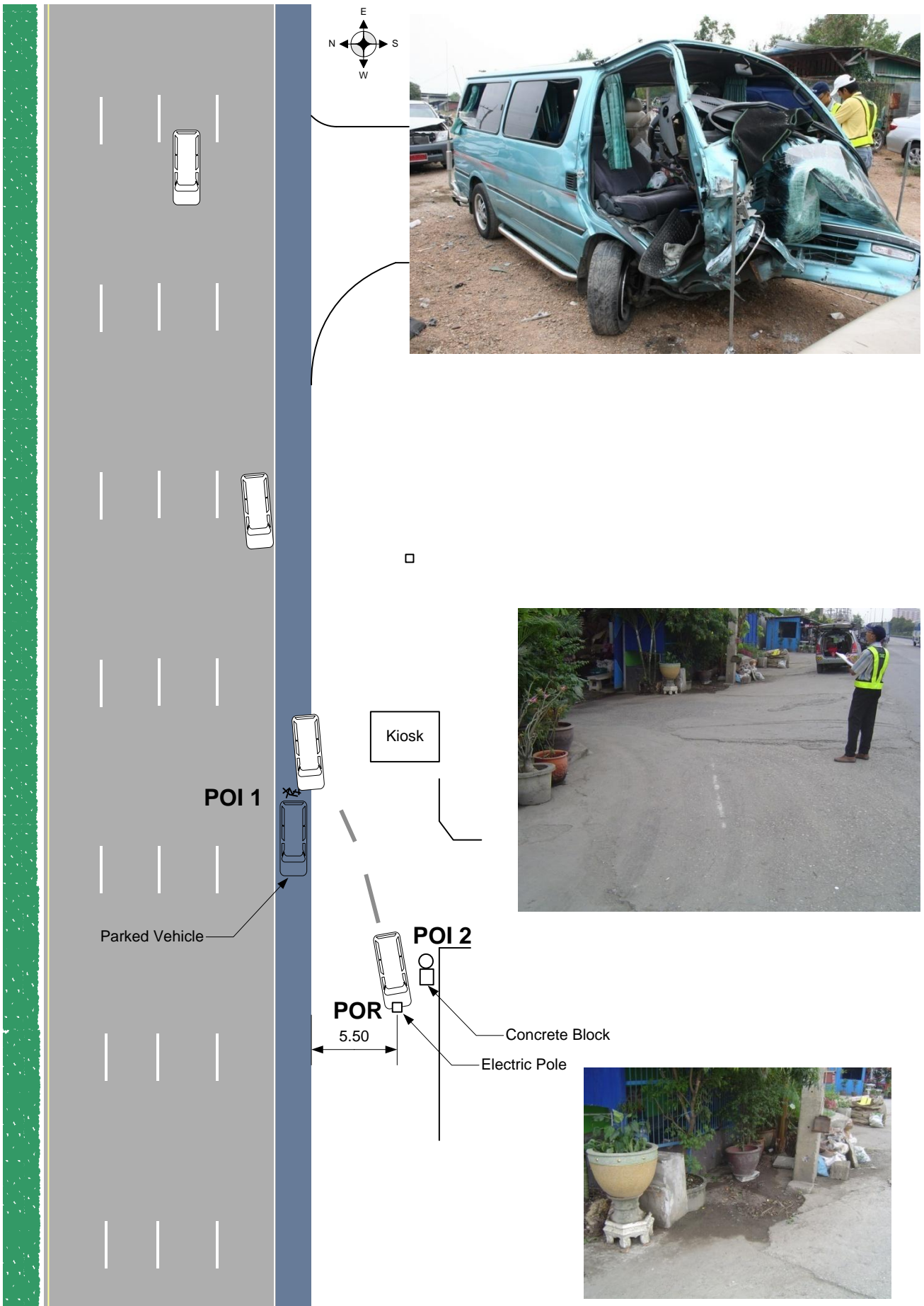
## Accident Narrative

After a long trip from Chiang Rai, at about 04:30 AM on 17 October 2008, a van lost control on Highway No. 3214, close to the Klong Luang Interchange (**Figure 3-1**). Immediately after leaving the traveling way, the vehicle hit the rear part of another van and crashed into the wall of a workshop's gate and successively hit an electric pole nearby before stopping. The front part of the van intruded into the occupant compartment with an apparent box-shaped deformation and the driver suffered serious leg injuries.



**Figure 3-1: Location of the Crash Site on Highway No.3214 near Klong Luang Interchange**

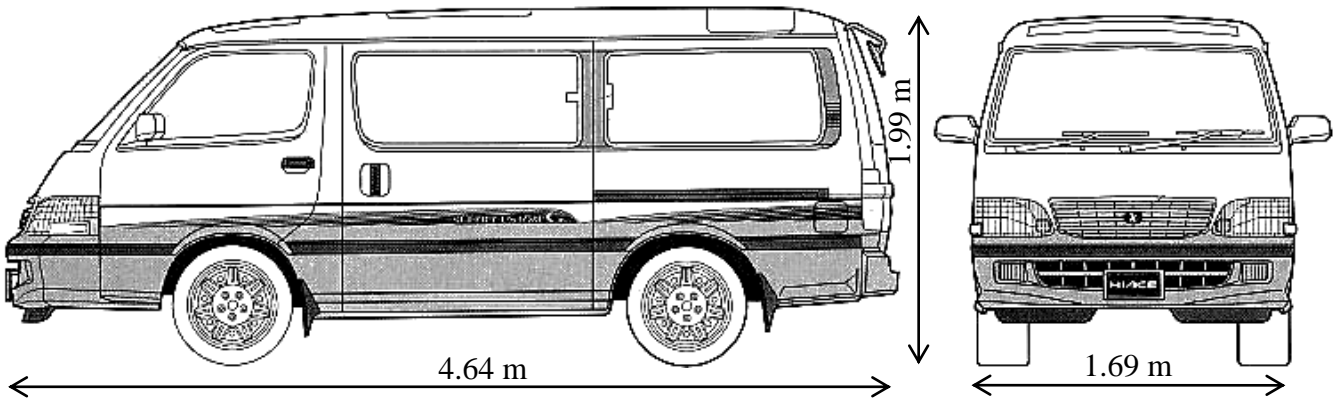
The building and electric pole were located on the roadside at 7.0 m. and 5.5 m. from the edge line, respectively. Some light damages were spotted on the concrete wall but no damage was located at the electric pole. As a result from the crash, the driver suffered leg injuries after being trapped inside the van. An emergency team took about 30 minutes to rescue him before being able to send him to Thammasat University Hospital.



**Figure 3-2: The Damaged Van and its Two POIs and POR**

## Vehicle Information

The crashed vehicle was a Toyota Hiace Van 3,000 CC., diesel engine and 2,010 kg curb weight. It was 4.64 m. long, 1.69 m. wide, and 1.99 m. high. The wheelbase was 2.33 m. originally. There were two seats in front and 9 seats in 3 rows in the passengers compartment. All the seats were designed as bucket seats without seatbelt, except for the front row. **Table 3-1** presents the detail of the tires information.



**Figure 3-3: Vehicle Dimension**

**Table 3-1: Tires Detail**

Location	Damage	Bridgestone	Tire Name	Size	Load Index & Speed Symbol	Tread Depth (mm)	Pressure (psi)
1L	No	Bridgestone	Potenza G III	205/65 R 15	94 H	3	48
1R	Yes	Bridgestone	Potenza G III	205/65 R 15	94 H	3	-
2L	No	Bridgestone	Turanza ER60	205/65 R 15	94 V	3	48
2R	No	Bridgestone	Turanza ER60	205/65 R 15	94 V	3	48

The exterior damage from the crash shows particularly on the front right of the van (**Figure 3-4**). The front bumper was imprinted by the concrete column at the middle of the car. The front beam and axle was bended by the frontal intrusion. The windshield was shattered and dislodged from its position. The A-pillar and roof on the driver side was slightly bent while the driver's door was separated during the rescue. The detail of the frontal deformation is presented in **Table 3-2**. Another damage occurred on the left sliding door. There were scratch marks and a light deformation made by the impact with concrete objects.

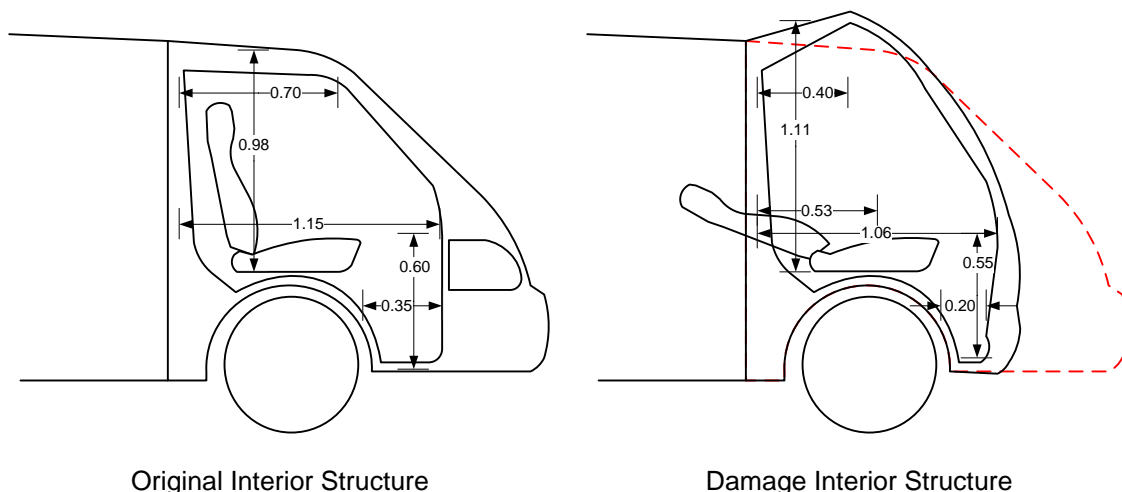


**Figure 3-4: Frontal Deformation of the Van**

**Table 3-2: Measured Deformation** (unit: cm)

Location	Width	Height	Depth Profile						Offset	CDC
			C1	C2	C3	C4	C5	C6		
Front	75	110	0	20	27	33	13	0	8	12FZ1EN6

The frontal intrusion pushed the console close into the driver seat. The deformed modified steering wheel possibly collided with the driver. All the control gauges were missing through the impact with the steering wheel. The lower part, including the pedals was almost displaced into the driver’s seat, only a small space was left underneath. Blood stains were found on the steering wheel, the console (near the music player and gear box) and the driver’s seat. There was no other damage to the other seats. **Figure 3-5** compares the interior dimension between original and crashed vehicle.

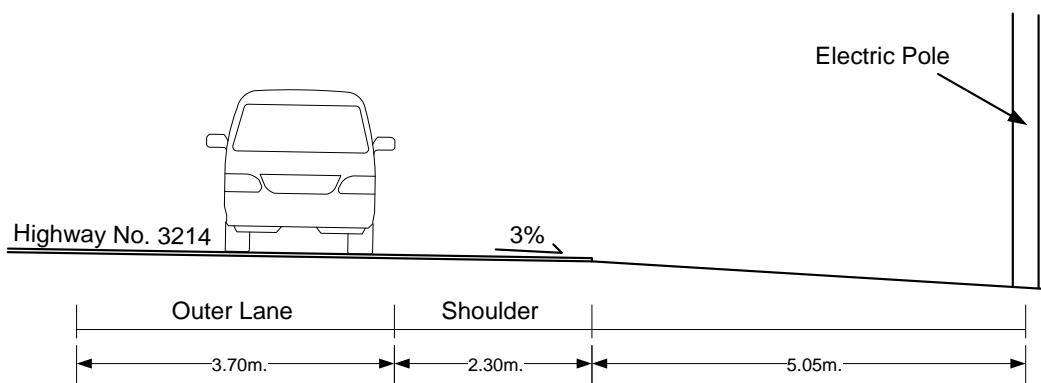


**Figure 3-5: Interior Damage**

## Highway Information

Highway No.3214, 15 km. long, connects the East-West corridor between Highway No. 347 and Highway No.3010 in Klong Luang, Pathumthani. The crash occurred in the area of the Klong Luang Interchange. It was an 8-lane divided road, 3.7 m. lane width concrete pavement and 2.3 m. shoulder asphaltic concrete. There was a 3% crown slope with a 0.6 coefficient of friction. **Figure 3-6** shows the cross section of Highway No.3214 at the area of crash.

On the left of the road, the garbage workshop is located about 8 m. from the shoulder edge. The space between the shoulder and the shop was paved with asphaltic concrete material. There were concrete sculptures and tree pots close to the gate while an electric pole was installed 5.05 m from the shoulder edge.



## Figure 3-6: Cross Section of Highway No.3214

### Physical Evidence

According to the witness, there was another van parked along the shoulder in front of the garbage workshop. The van traveled from the interchange, ran off the roadway and hit the rear of the parked van. It then swayed to the left. At this stage, the van left a 7.8 m. scratch mark on the ground, probably resulting from the solid part underneath. The van continued towards the gate of the shop and hit the concrete tree pot, 38 cm. in radius and a concrete sculpture causing damage to the left sliding door. The van then rebounded into the 30x30 cm. electric concrete post considered as Point of Rest (POR) causing massive damage to the front. It got stuck at this POR and required a rescue team to evacuate the driver to the hospital.

### Injury Information

The driver suffered serious injuries to his legs and toes and superficial ones to the cheek and chin (**Table 3-3**). He was stuck in the car for about half an hour before the rescue team brought him to Thammasart University Hospital.

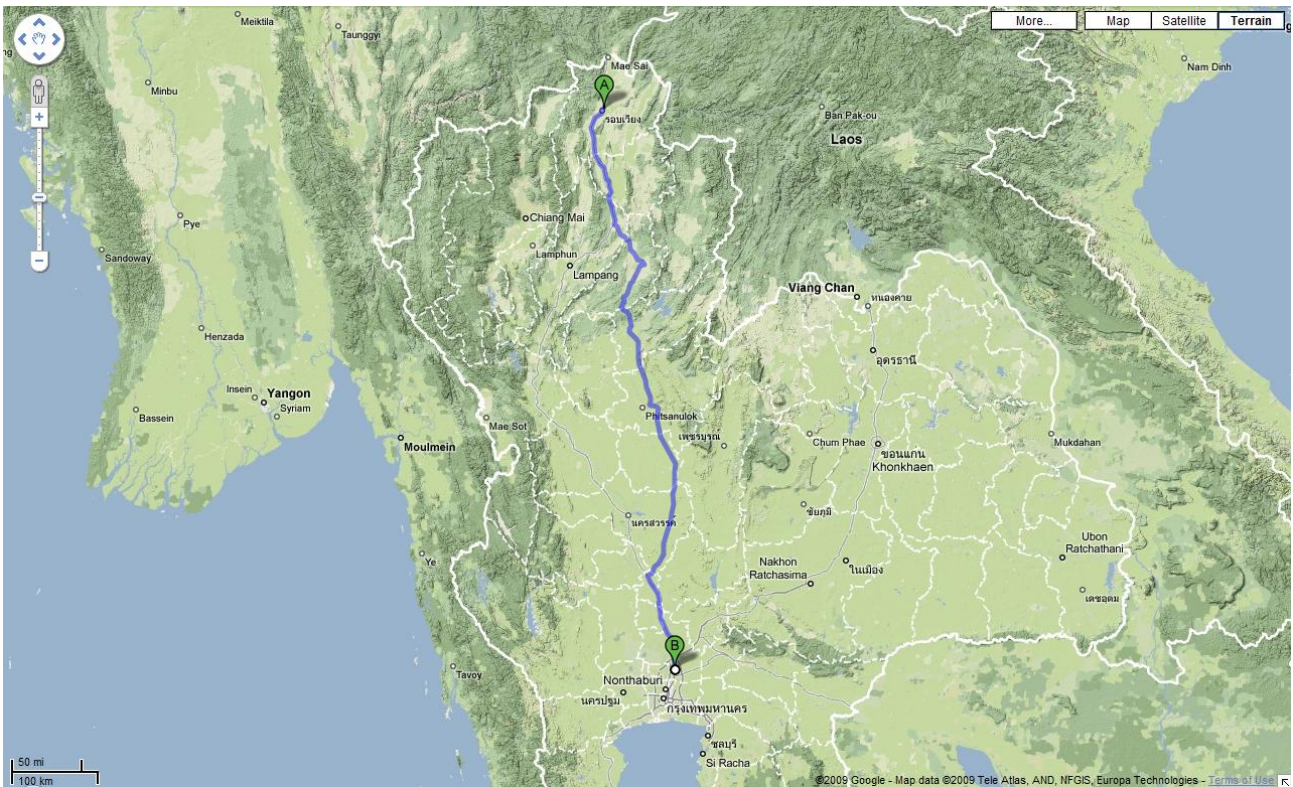
**Table 3-3: Summary of Occupant Injuries**

Person	Gender	Age	Level of Injury	Seat belt	Injury	ICD 10
1	Male	33	Slight	N/A	Superficial injury to the cheek	S00.8
					Superficial injury to the chin	S00.8
					Fracture of lower leg	S82.9
					Fracture of other toe	S92.5

### Accident Contributing Factors

#### Long Hour Drive

This trip started from Chiang Rai, a city in the Northern region, about 750 km. from the crash scene. The driver insisted to the police that the customer offered him to Chiang Rai trip. On the way back, he suddenly fell asleep thus initiating the crash. The driver was not reported for alcohol use, according to the police, rescue team or hospital records. Witnesses made no mention of other vehicles involved in the crash.



**Figure 3-7: Traveled Route**

### Roadside Object – Electric Post

The electric post was unprotected and standing 7.35 m. away from the traveling way. The collision with the post was considered as a part of the chain of events therefore increasing the level of severity accordingly. There was a little scratch mark without any major damage printed on the post, meaning that all the impact force transferred to another van. The impact speed can also be calculated from the damage profile to determine the crush energy. In this case, the stiffness coefficient derived from the visual statement database showing that;  $A = 85,445 \text{ N/m}$  and  $B = 1,229 \text{ kN/m}^2$ . Since it was a full frontal impact, the impact angle is considered as zero. The crush energy is determined to be 76,536 N-m. Therefore, the Equivalent Barrier Speed (EBS) is equal to 80 km/h.

### Significant Factors

TARC determined that the probable cause of the 081017-01 crash occurrence by the recognition error of the driver by falling asleep after driving for many hours. The severity of the crash consequences was increased by the lack of a sufficient roadside protection system.