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ROAD SAFETY  
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# ROAD TRAFFIC ACCIDENT DATA COLLECTION AND ANALYSIS WORKSHOP COUNTRY: TAJIKISTAN

**TA-6763 REG: Accelerating Innovation in Transport**

*Presented by*

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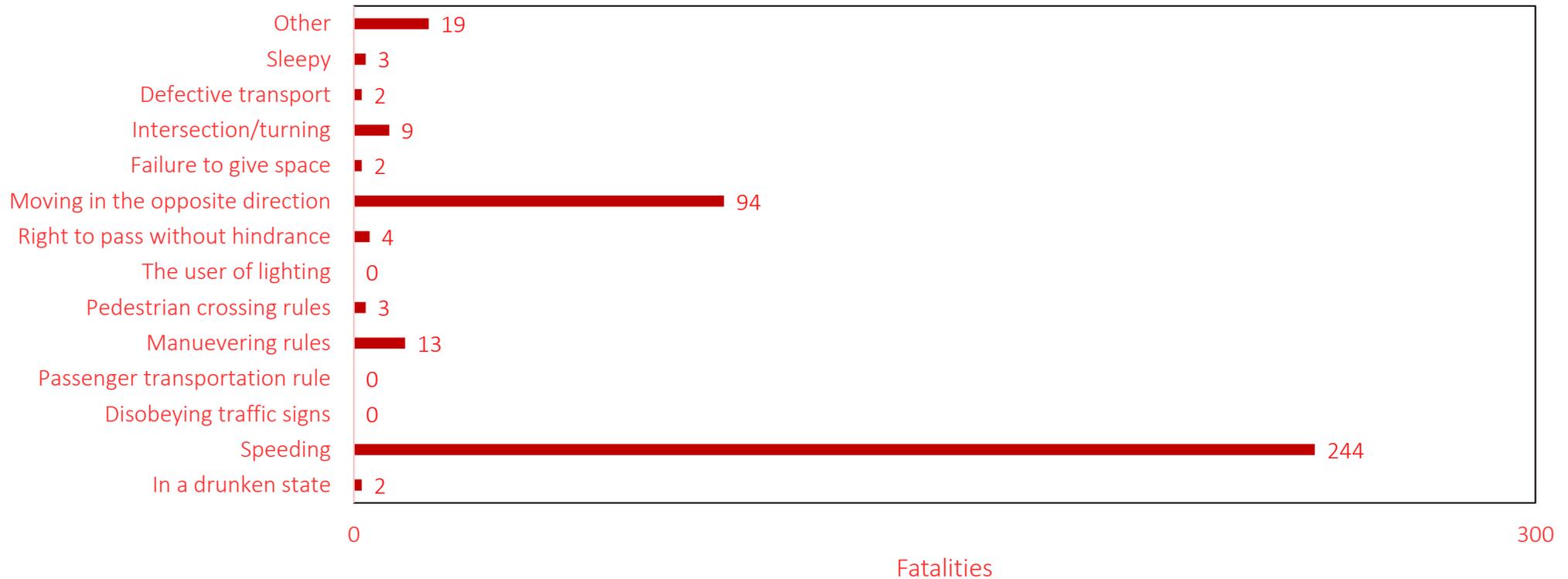


## PART 5:

# CRASH DATA ANALYSIS – HADDON MATRIX

Breaking down each crash to identify the contributing factors using the Haddon Matrix

# CRASH CAUSES IN TAJIKISTAN (2021)



# CRASH CAUSES IN TAJIKISTAN

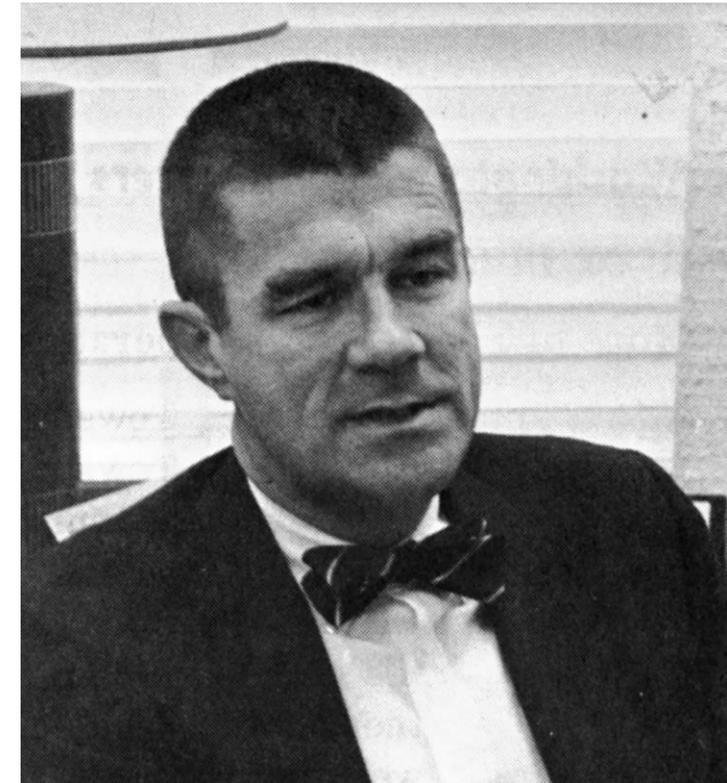
## *CRASH ANALYSIS ISSUES*

- Crashes are being analyzed for a single predominant factor and not for a combination of factors.
- Such an analysis predominantly holds drivers as responsible for crashes and impedes implementation of a safe system.

# DR. WILLIAM HADDON JR. (1926-1985)

- Dr. William Haddon, Jr., had degrees from the Massachusetts Institute of Technology, Harvard Medical School, Harvard School of Public Health, and devoted his career to highway safety.
- Appointed as head of the National Traffic Safety Agency and the National Highway Safety Agency of USA, on September 9, 1966.
- Created the Haddon Matrix in 1970s for understanding how injuries occur and developing strategies for intervention.

Source: [https://www.fhwa.dot.gov/highwayhistory/moment/highway\\_safety\\_breakthrough.cfm](https://www.fhwa.dot.gov/highwayhistory/moment/highway_safety_breakthrough.cfm)



# HADDON MATRIX APPROACH

*To understand how injuries occur and develop strategies for intervention.*

PHASES		FACTORS		
		HUMAN	VEHICLE	INFRASTRUCTURE
PRE-CRASH	Crash prevention	1 <ul style="list-style-type: none"> <li>Information</li> <li>Attitudes</li> <li>Impairment</li> <li>Police enforcement</li> </ul>	2 <ul style="list-style-type: none"> <li>Roadworthiness</li> <li>Working lights</li> <li>Good brakes</li> <li>Handling</li> <li>Speed control</li> </ul>	3 <ul style="list-style-type: none"> <li>Road design and layout</li> <li>Speed limits</li> <li>Pedestrian Facilities</li> </ul>
CRASH	Injury prevention during the crash	4 <ul style="list-style-type: none"> <li>Use of safety systems</li> </ul>	5 <ul style="list-style-type: none"> <li>Crash worthiness</li> <li>Crash protective design</li> <li>Occupant restraints</li> <li>Other Safety devices</li> </ul>	6 <ul style="list-style-type: none"> <li>Crash protective roadside objects</li> </ul>
POST-CRASH	Life Sustaining	7 <ul style="list-style-type: none"> <li>First-aid skill</li> <li>Access to medics</li> </ul>	8 <ul style="list-style-type: none"> <li>Ease of access</li> <li>Fire risk</li> </ul>	9 <ul style="list-style-type: none"> <li>Rescue facilities</li> <li>Congestion</li> </ul>

# 3 FACTORS OF THE HADDON MATRIX



HUMAN



VEHICLE



INFRASTRUCTURE / ENVIRONMENT

# 3 PHASES OF THE HADDON MATRIX



PRE-CRASH



CRASH



POST-CRASH

Source :

1. <https://www.facebook.com/Mongolia-like-share-302705686813290/videos/best-car-crash-accident-compilation-2017-idiot-driver-fails/303688233381702/>
2. [https://news.mn/wpcontent/uploads/2020/06/faa03f9105a4108321be098969ab260b\\_x3.jpg](https://news.mn/wpcontent/uploads/2020/06/faa03f9105a4108321be098969ab260b_x3.jpg)

# CASE STUDY : CAR COLLISION WITH TREE

Source: RASSI Database



Car with 4 occupants was travelling on a 2-lane undivided state highway. Unit 1 was travelling straight on the left lane of the road and the vehicle went off the roadway and collided with a tree.

3 occupants including driver of the unit 1 were fatal on the spot & one occupant succumbed to death after 8 days of hospitalization.

Accident Time: 8:30 PM

# VEHICLE PHOTOGRAPHY

## 8-ANGLE PICTURES

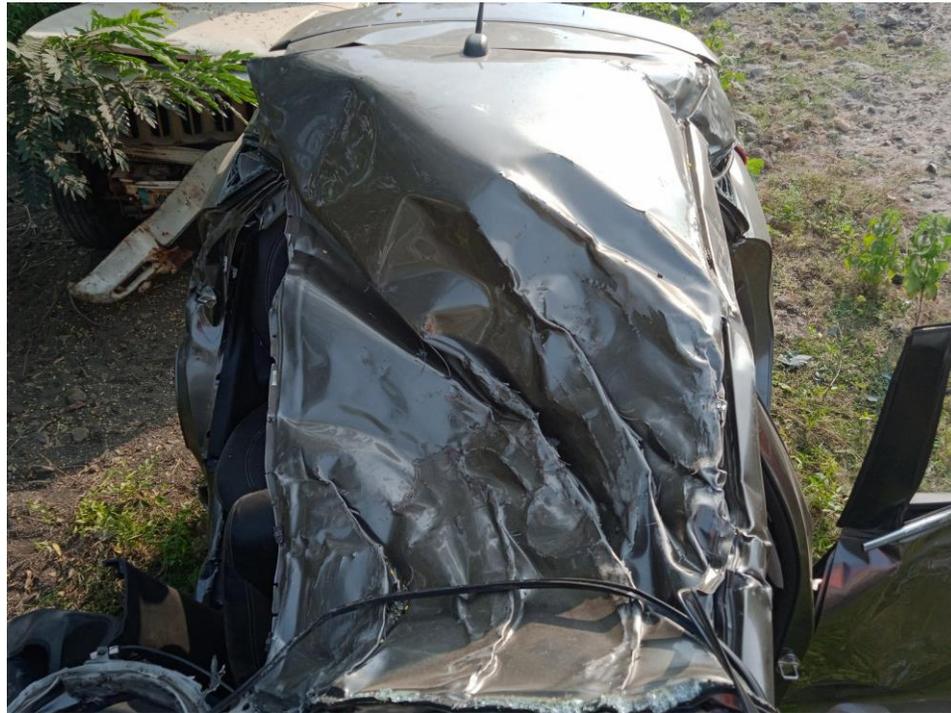
Source: RASSI Database



Collision damage mainly on the right side of vehicle.  
Other damages related to extrication and towing.

# IMPACT DAMAGE

Source: RASSI Database



# IMPACT DAMAGE DIRECTION



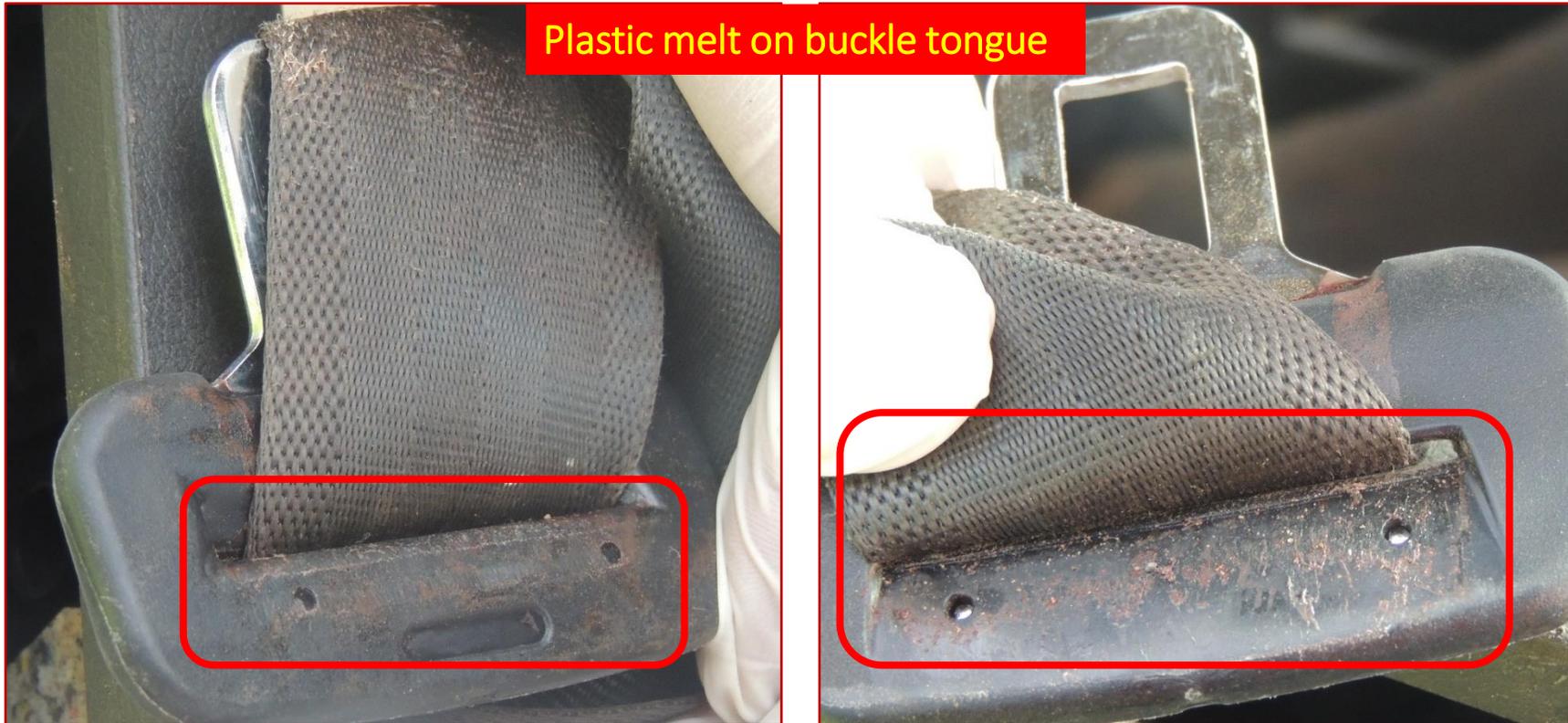
Source: RASSI Database

# OCCUPANT SEATING POSITION AND BELT USE DETERMINATION

Source: RASSI Database



# SEAT BELT INSPECTION



Source: RASSI Database

Source: RASSI Database

# SEAT BELT INSPECTION

Source: RASSI Database

Stretch marks on webbing

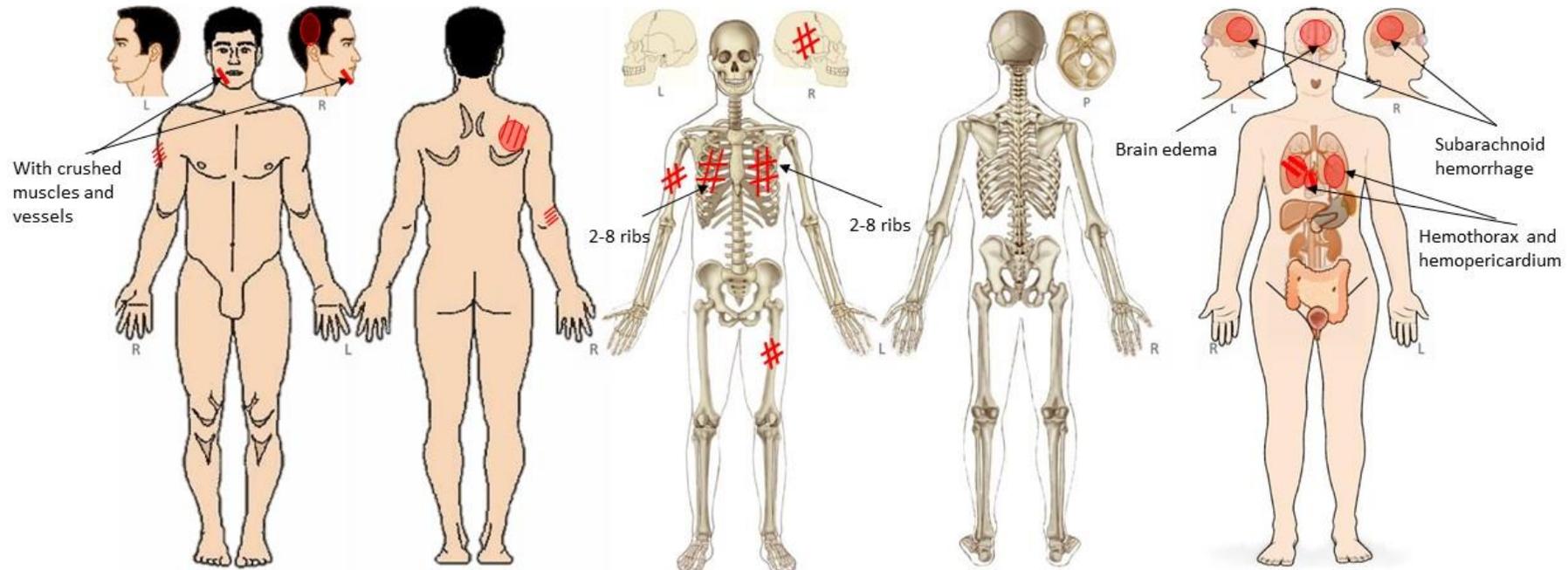


# DRIVER INJURIES

## INJURY SKETCH

CASE NUMBER	UNIT NUMBER	OCCUPANT NUMBER	OCCUPANT GENDER	OCCUPANT AGE	HISP	MAIS
91-2020-015-0001	1	1	Male	33	Fatal	9

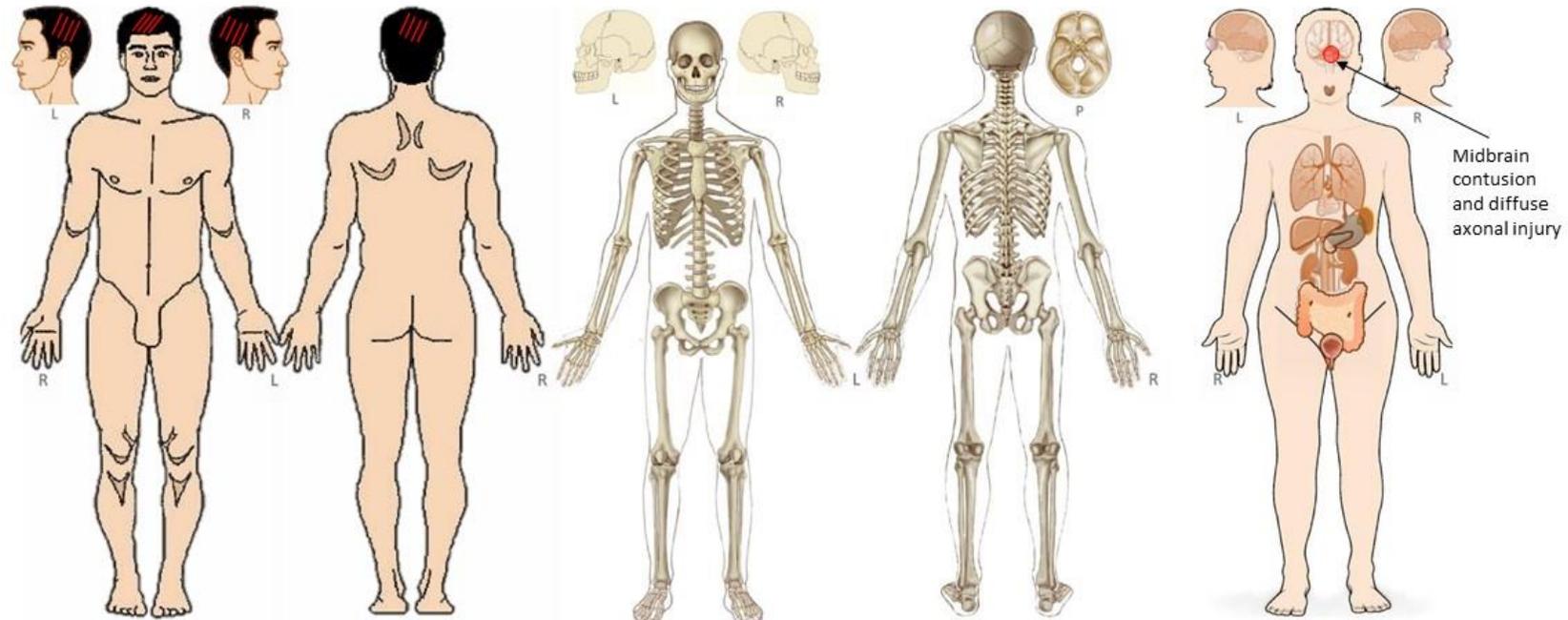
ABRASION    
 LACERATION    
 CONTUSION\HAEMORRHAGE    
 FRACTURE    
 DISLOCATION    
 CRUSH



# CO-PASSENGER INJURY SKETCH

CASE NUMBER	UNIT NUMBER	OCCUPANT NUMBER	OCCUPANT GENDER	OCCUPANT AGE	HISP	MAIS
91-2020-015-0001	1	2	Male	31	Fatal	5

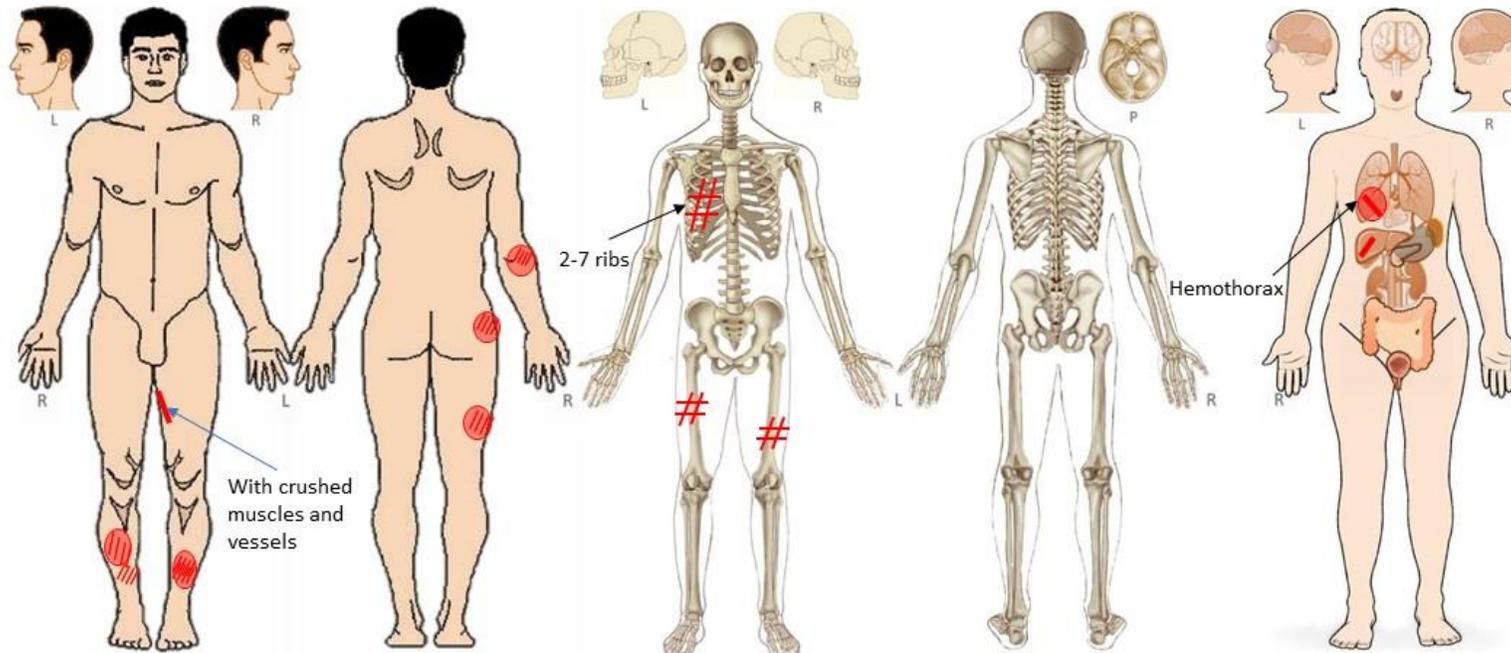
 ABRASION    
  LACERATION    
  CONTUSION\HAEMORRHAGE    
  FRACTURE    
  DISLOCATION    
  CRUSH



# RIGHT REAR PASSENGER INJURY SKETCH

CASE NUMBER	UNIT NUMBER	OCCUPANT NUMBER	OCCUPANT GENDER	OCCUPANT AGE	HISP	MAIS
91-2020-015-0001	1	3	Male	29	Fatal	9

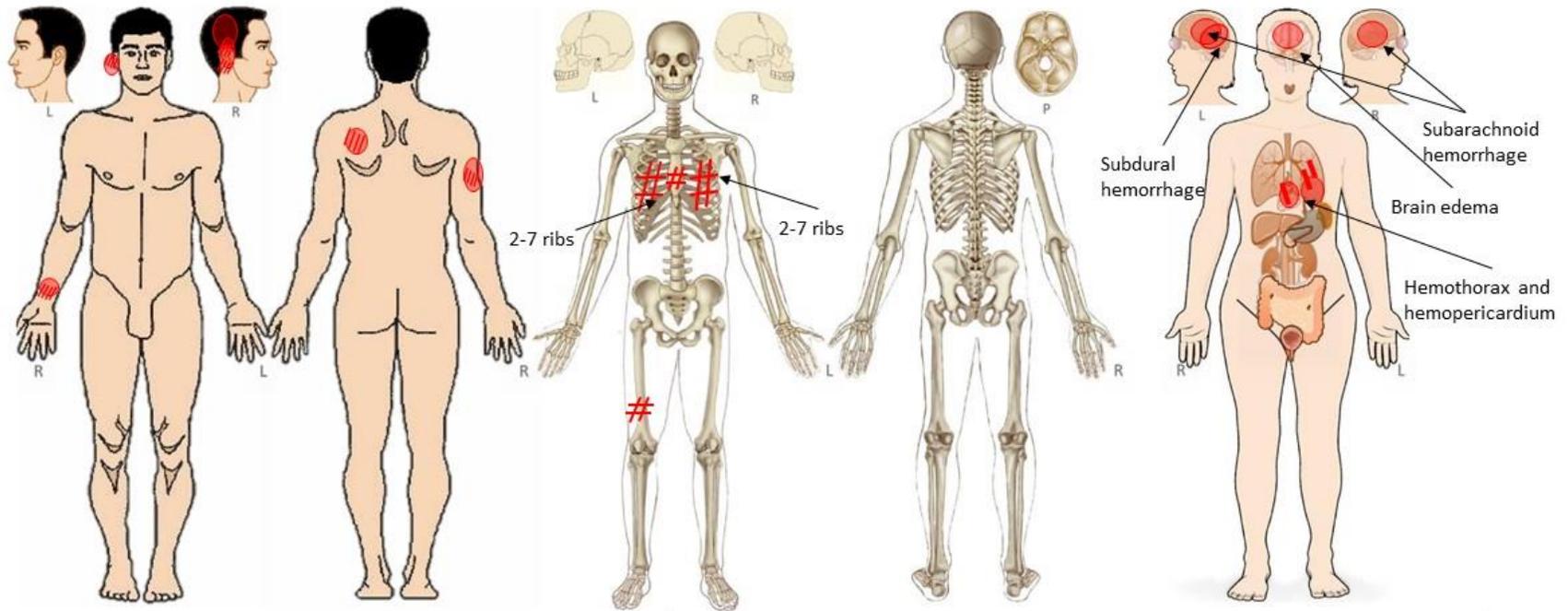
 ABRASION    
  LACERATION    
  CONTUSION\HAEMORRHAGE    
  FRACTURE    
  DISLOCATION    
  CRUSH



# LEFT REAR PASSENGER INJURY SKETCH

CASE NUMBER	UNIT NUMBER	OCCUPANT NUMBER	OCCUPANT GENDER	OCCUPANT AGE	HISP	MAIS
91-2020-015-0001	1	4	Male	33	Fatal	4

 ABRASION    
  LACERATION    
  CONTUSION\HAEMORRHAGE    
  FRACTURE    
  DISLOCATION    
  CRUSH



# SCENE EXAMINATION

## GPS: 21.21574, 78.94901



- Undivided 2-lane highway
- Poor road surface
- No road markings
- No speed limit signage
- Overtaking on oncoming lane
- Road side trees
- Road side shops/parking
- Road side bus stops

# SCENE EXAMINATION

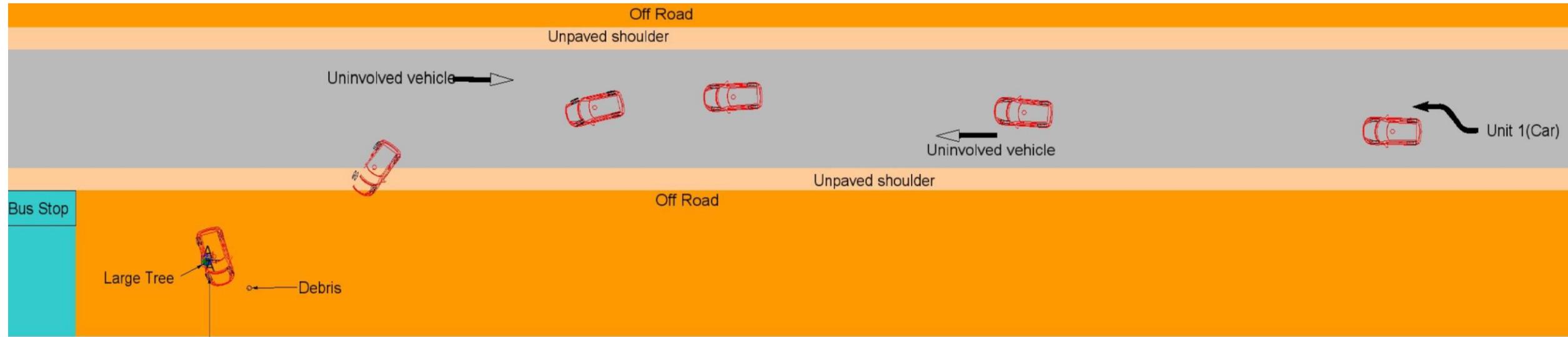


Approximate Car Direction

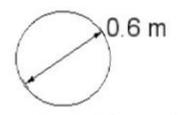
# CRASH SCENE EXAMINATION



# SCENE DIAGRAM



Point of impact & Final Rest position of Unit 1



Cross section of large tree



# ACCIDENT RECONSTRUCTION

## *CAR SPEED 80 ( $\pm 10$ ) KPH*



# APPLYING HADDON MATRIX APPROACH

PHASES		FACTORS		
		HUMAN	VEHICLE	INFRASTRUCTURE
PRE-CRASH	Crash prevention	<u>Car:</u> Overtaking on undivided road Speeding???	None Found	<u>Car:</u> <ul style="list-style-type: none"> <li>Poor road surface</li> <li>No marking/signage</li> <li>Undivided road</li> <li>No lighting</li> </ul>
CRASH	Injury prevention during the crash	<u>Car:</u> Seatbelt not used	<u>Car:</u> Passenger Compartment Intrusion	<u>Car:</u> Impact with road side tree
POST-CRASH	Life Sustaining	None Found	<u>Car:</u> Occupant Entrapment	<u>Car:</u> Delay in extrication



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## PART 5:

# CRASH DATA ANALYSIS – HADDON MATRIX

For any queries or feedback, please contact:

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