Session 2.5 Identification of Road Safety Risks

Conducting Road Safety Audits & Appraisals

Presented by: RTS & AGTT

January 2022

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Content

1. Background
2. The fallacy of auditing against standards
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4. The Role of Prompt Lists
5. Understand the context
6. Identifying risks

IDENTIFICATION OF ROAD SAFETY RISKS

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BACKGROUND

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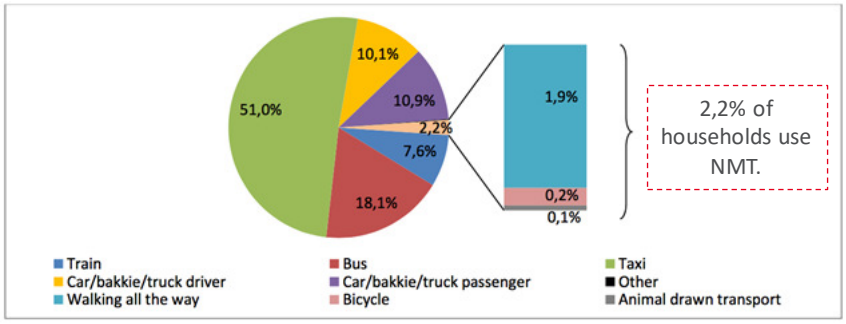
2013 Household travel survey - Main mode of transport of Households



Source: Transport series volume I: Profile of on-motorised transport users (In-depth analysis of the National Household Travel Survey date), 2013

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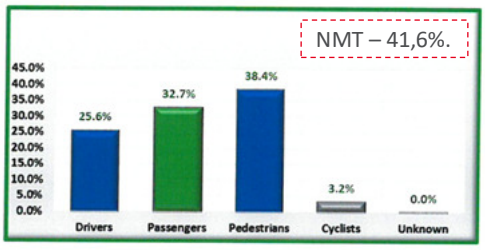
South African Road Fatalities - 2016

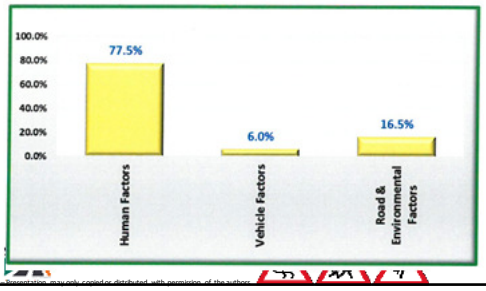
Fatalities per road user class - 2016



In 2016:
11 767 total crashes.
14 071 fatalities.

No of fatalities:
5 410 pedestrians.
451 cyclists.

Contributing factors to road fatalities - 2016



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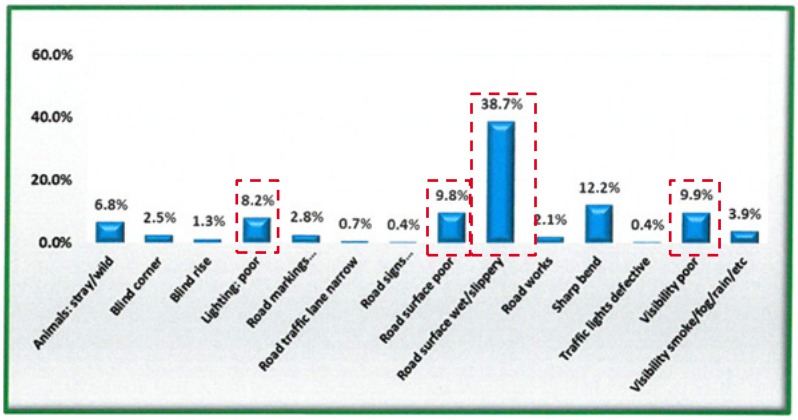
South African Road Fatalities - 2016

Causes of fatalities related to road and environmental factors - 2016



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Risk Factors Influencing Crash Involvement

Road user choices

- Inappropriate or excessive speed
- Travel in darkness
- Travel under influence/fatigued

Roads design factors maintenance

- Visibility,
- Radii,
- Crests/Sags (K-Values),
- Markings.

Vehicle factors

- Braking,
- Handling,
- Maintenance.

Road user factors

- Eyesight,
- Diabetes,
- Drugs, alcohol, medicine,
- Fatigue,
- Sex and age,
- Vulnerable users

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Likely Frequency and Severity of a Crash

Likelihood of a Crash	
Frequent	Once or more per week
Probable	Once or more per year (but less than once a week)
Occasional	Once every five to ten years
Improbable	Less often

Severity of Resulting Crash	
Catastrophic	Likely **multiple deaths**
Serious	Likely **death or serious injury**
Minor	Likely **minor injury**
Limited	Likely **trivial injury to property damage**

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Resulting Level of Risk

SEVERITY	FREQUENCY: Frequent	Probable	Occasional	Remote
Catastrophic	Intolerable	High	High	Medium
Serious	High	High	Medium	Medium
Minor	High	Medium	Medium	Low
Negligible	Medium	Medium	Low	Low

Risk	Suggested Treatment Action
Intolerable	The safety concern "must" be corrected, even if the cost is high
High	The safety concern "should" be corrected or the risk significantly reduced, even if the treatment cost is high
Medium	The safety concern "should" be corrected or the risk significantly reduced if the treatment cost is moderate, but not necessarily high
Low	The safety concern "should" be corrected or the risk reduced if the treatment cost is low

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Focus of risk identification

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THE FALLACY OF AUDITING AGAINST STANDARDS

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The fallacy of auditing against standards

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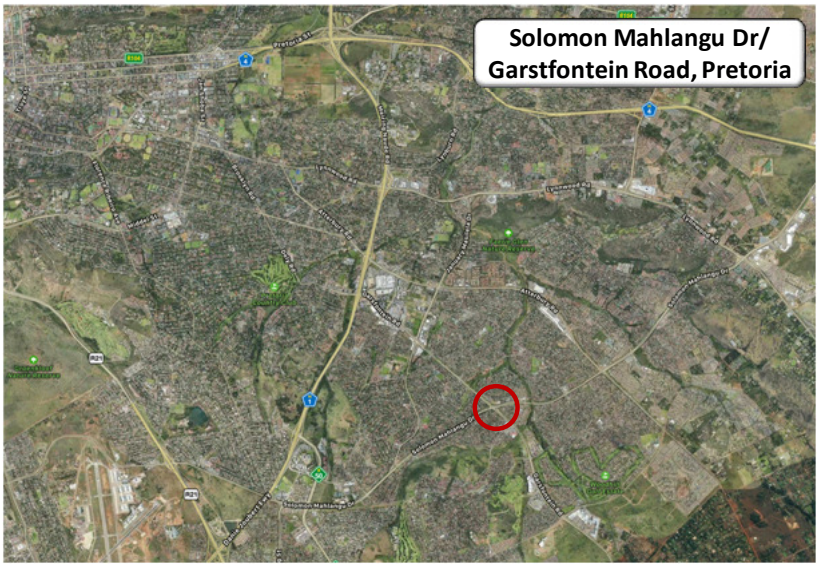
The fallacy of auditing against standards - example



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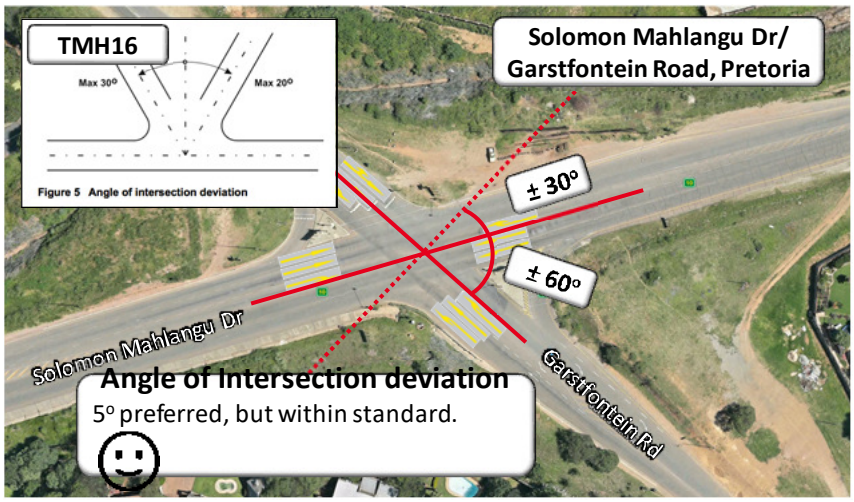
The fallacy of auditing against standards - example



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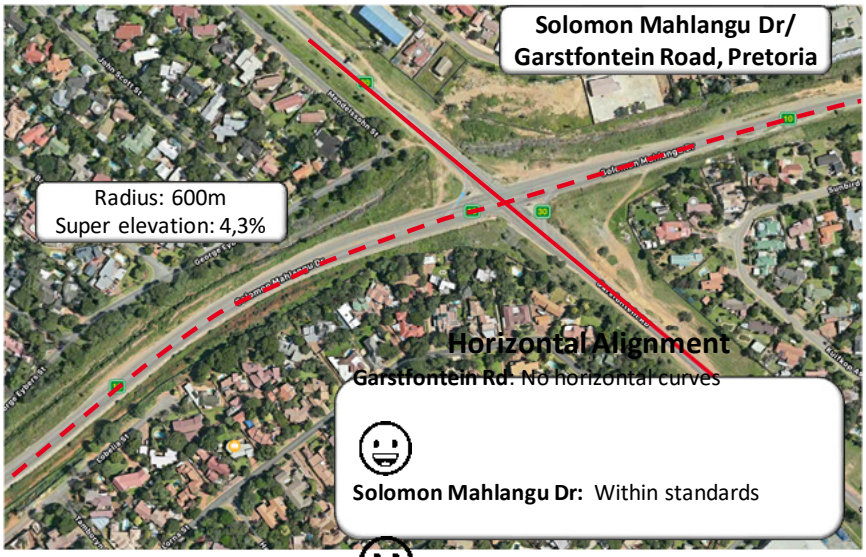

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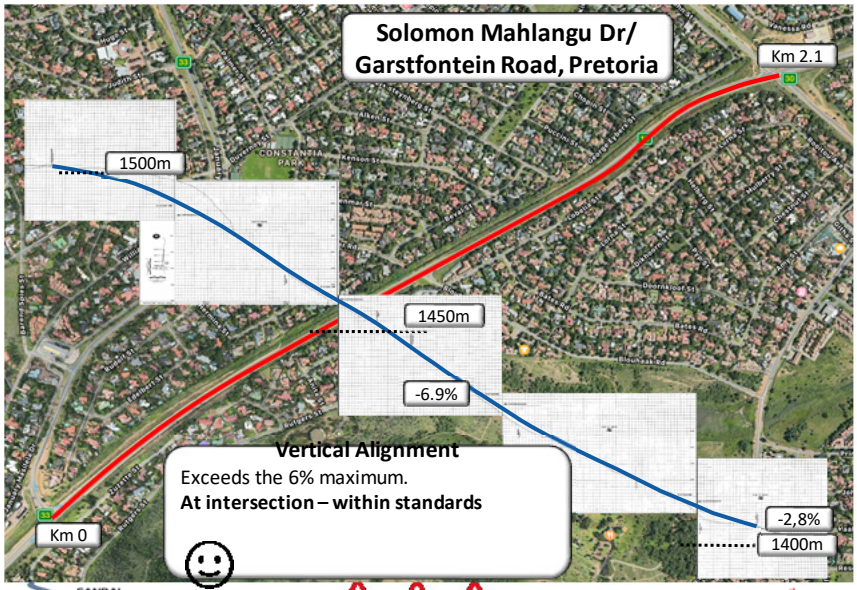

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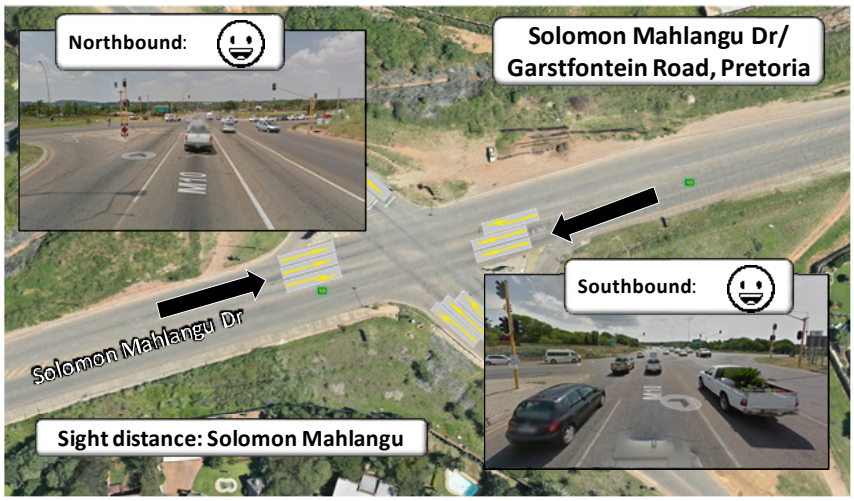

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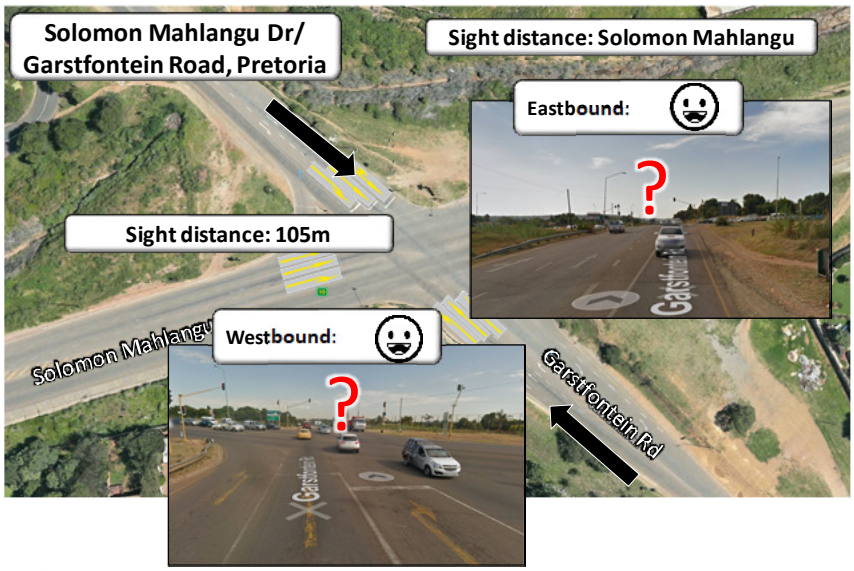

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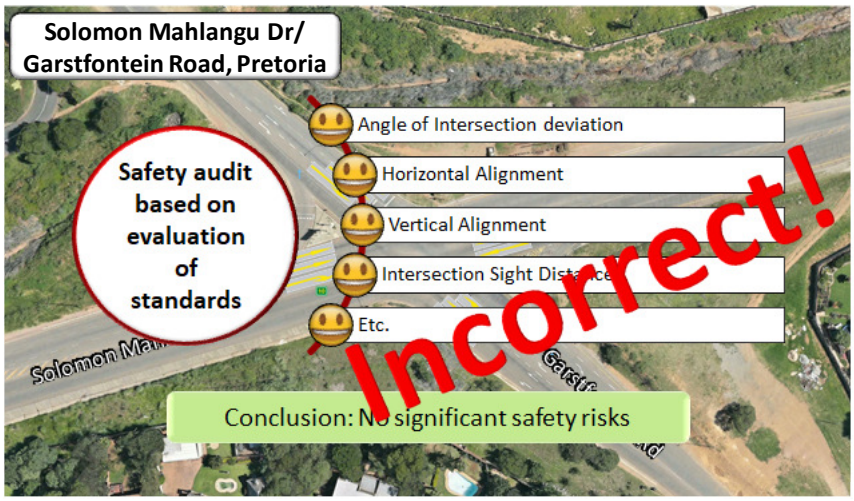

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The fallacy of auditing against standards - example

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Solomon Mahlangu Dr/ Garstfontein Road, Pretoria

news24 archives
Breaking News. First.

2 accidents in same Pta spot

2006-05-12 19:06

Pretoria - Three people were killed and five injured in two accidents on Friday at the same intersection in Pretoria within half an hour, Tshwane emergency services said.

Pretoria.

"Three people died and five were walking wounded following the first accident at the intersection at around 10:30," said emergency services spokesperson Johan Pieterse.

The accident occurred when a truck crashed into three cars, dragging one of them for about 40m, he said.

"Three of the occupants in the car that was pinned under the truck and dragged died at the scene. One of them was taken to Pretoria Academic hospital in a critical state," said Pieterse.

The truck driver was among the five injured, he said.

"As emergency personnel were clearing up the scene, another truck came through the intersection and collided into two cars.

"Personnel had to scatter."

One person died and two people, including the truck driver, were slightly injured.

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The fallacy of auditing against standards - example

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Solomon Mahlangu Dr/ Garstfontein Road, Pretoria

news24 archives
Breaking News. First.

Truck hits 8 cars at intersection

2011-04-15 13:19

Johannesburg - Eight people were injured when a truck hit eight cars at the intersection of Hans Strijdom and Garsfontein roads in Pretoria on Friday, said Netcare 911.

Spokesperson Jeff Wicks said the truck driver was critically injured and had to be freed from the wreckage before being taken to the Steve Biko Academic Hospital.

Seven occupants of the cars were seriously injured and were treated at the scene before being taken to state and private medical facilities, he said.

-Were you there? **Send us your photos**

Johannesburg - Eight people were injured when a truck hit eight cars at the intersection of Hans Strijdom and Garsfontein roads in Pretoria on Friday, said Netcare 911.

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IDENTIFYING RISK – KEY QUESTIONS

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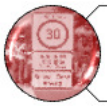
Key questions which the auditor has to ask

Correct application of a standards must be checked.
However, in the context of the standard/ design/ solution ask:

"Who can be hurt in a crash on this part of the road/ project and how might that happen?"



"Does the road environment convey the correct message to the road users?"

"What can be done to reduce the potential for that crash, or to limit its consequences?"

Experience and competence of the Audit Leader and Team are critical.

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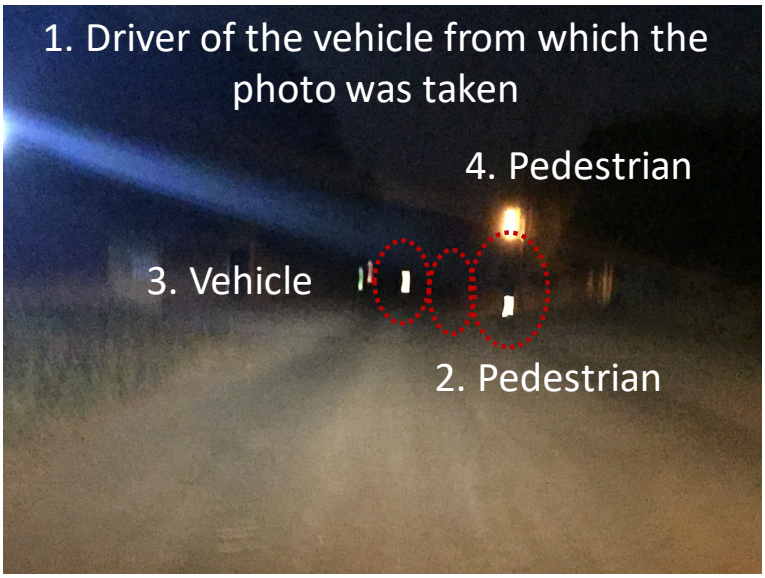

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Key questions which the auditor has to ask

"Who can be hurt in a crash on this part of ... t"

Pedestrians when visibility is poor.

"... ect"

No

"W... ntial for ... es?"

Improve street lighting, NMT facilities

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The Role of Prompt Lists

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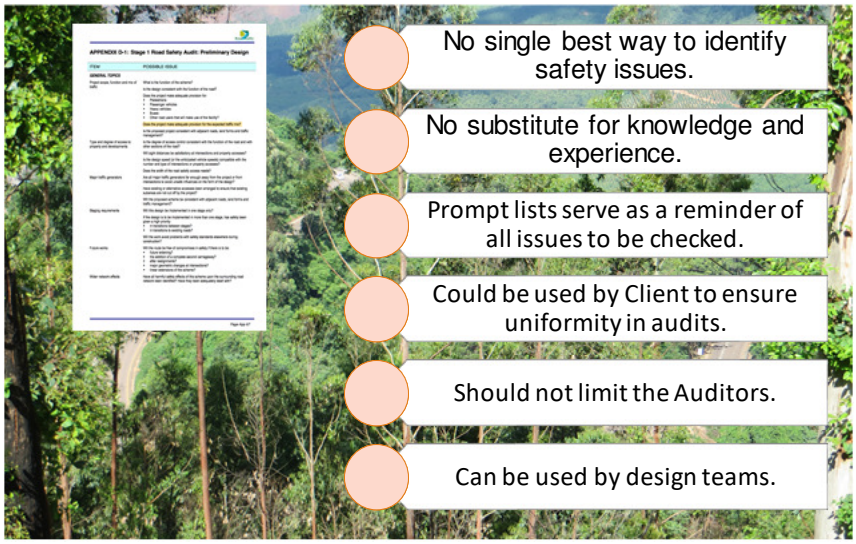
The Role of Prompt Lists



- No single best way to identify safety issues.
- No substitute for knowledge and experience.
- Prompt lists serve as a reminder of all issues to be checked.
- Could be used by Client to ensure uniformity in audits.
- Should not limit the Auditors.
- Can be used by design teams.

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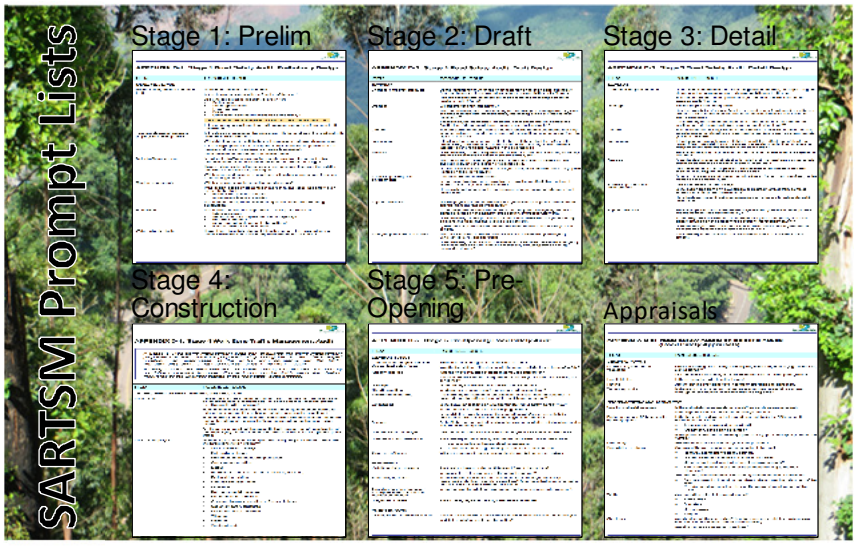
The Role of Prompt Lists



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UNDERSTAND THE CONTEXT

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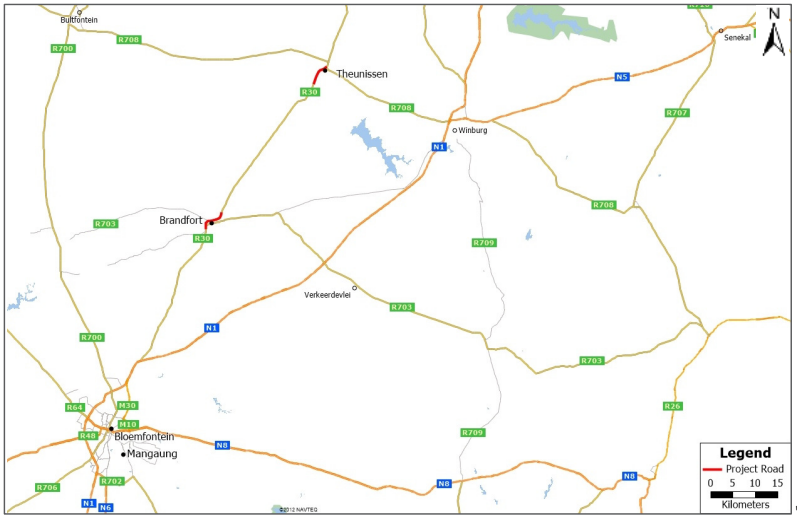
Understand the Context

Road Safety Appraisal: Brandfort R30



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Understand the Context

Road Safety Appraisal: Brandfort R30

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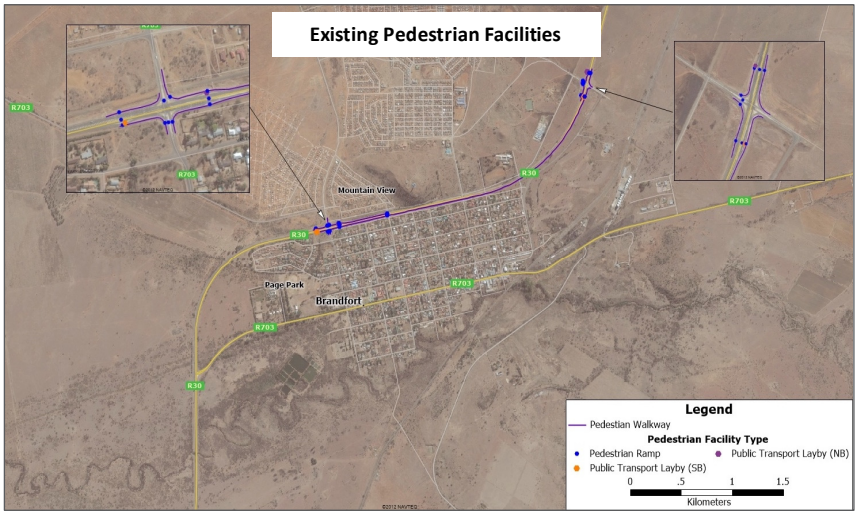
Understand the Context

Road Safety Appraisal: Brandfort R30



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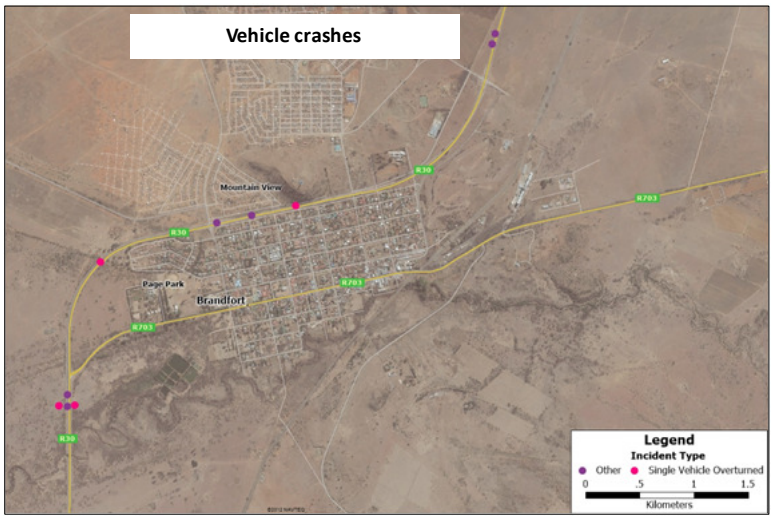
Understand the Context

Road Safety Appraisal: Brandfort R30



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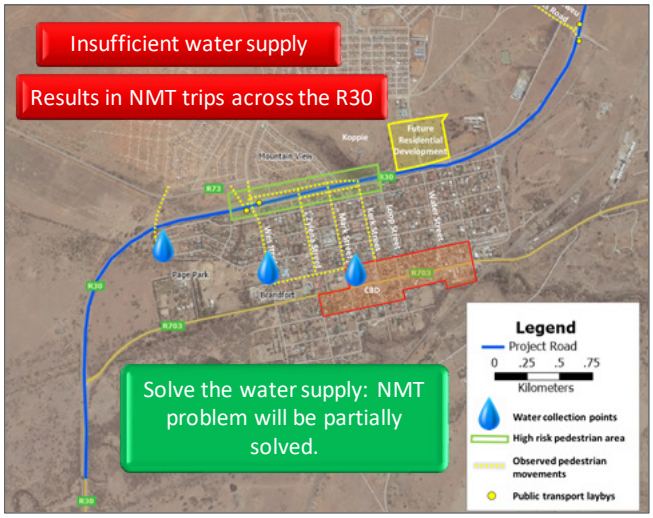
Understand the Context

Road Safety Appraisal: Brandfort R30



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TYPICAL ROAD SAFETY APPRAISAL RISKS

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TYPICAL ROAD SAFETY APPRAISAL RISKS

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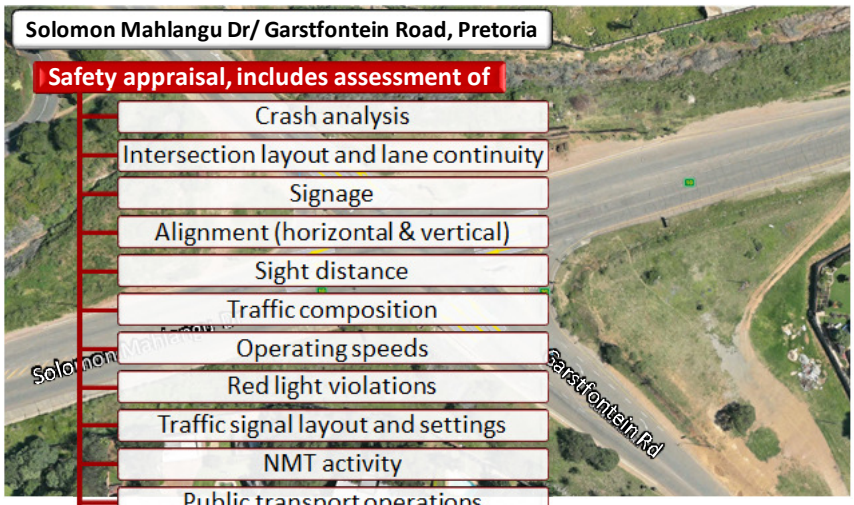
Typical Road Safety Appraisal Risks – understanding the context



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Typical Road Safety Appraisal Risks

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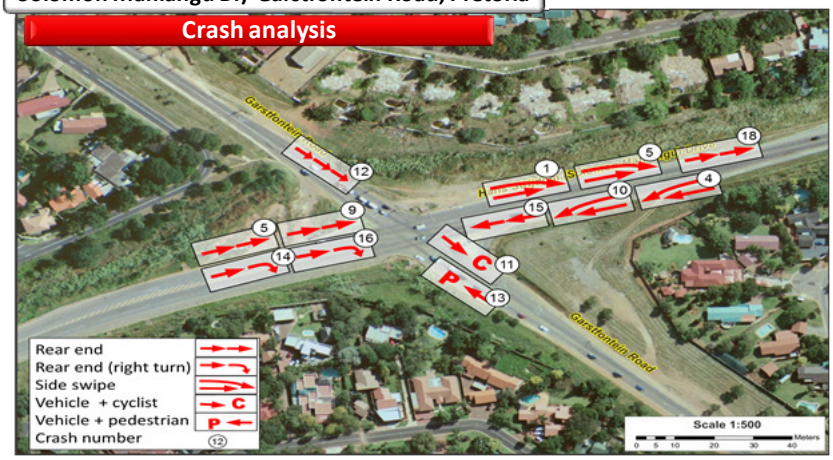
Solomon Mahlangu Dr/ Garstfontein Road, Pretoria

Crash analysis



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Typical Road Safety Appraisal Risks

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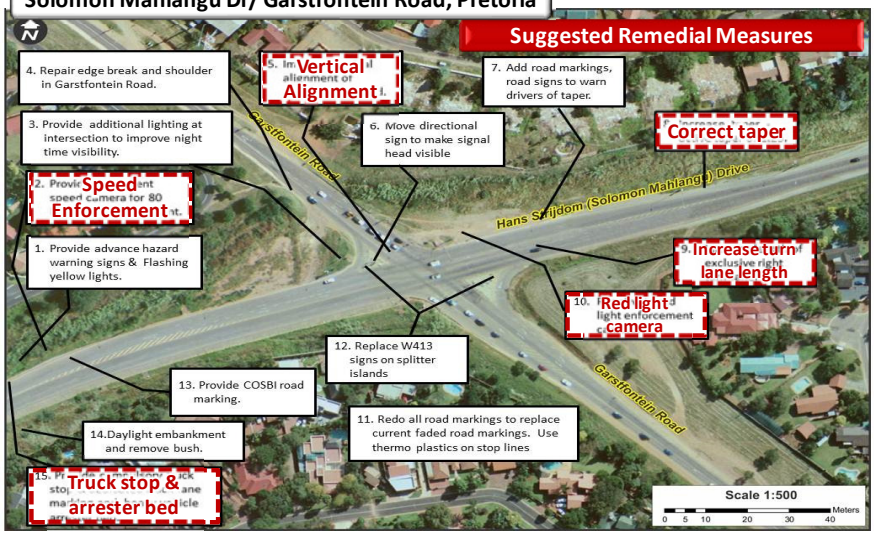
Solomon Mahlangu Dr/ Garstfontein Road, Pretoria

Suggested Remedial Measures



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Typical Road Safety Appraisal Risks

IDENTIFICATION OF ROAD SAFETY RISKS

Solomon Mahlangu Dr/ Garstfontein Road, Pretoria

Short Term Interventions

1	Provide advance southern approac
2	Provide permane downhill southern
3	Enhance lighting time visibility
4	Repair edge break and shoulder in G
6	Move directional sign obstructing the Mahlangu
7	Advance warning signs & road markings of lane merge at taper on Solomon Mahlangu
10	Re-activate the existing red light enforcement camera
11	Replace all intersection lane road markings & mark all stop lines with thermo plastic
12	Replace W413 signs on splitter islands
13	Provide COSBI road marking
14	Daylight embankment by removing bush to improve visibility on Solomon Mahlangu southern approach

Medium Term Interventions

8	Imp
9	Incr (sub

Long Term Interventions

	pproach
5	Improve vertical alignment to enhance visibility on Garstfontein west approach
15	Provide a compulsory truck stop and dedicated truck lane marking & construct heavy vehicle arrester bed

No risk assessment was done – should be included.

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Typical Road Safety Audit Risks

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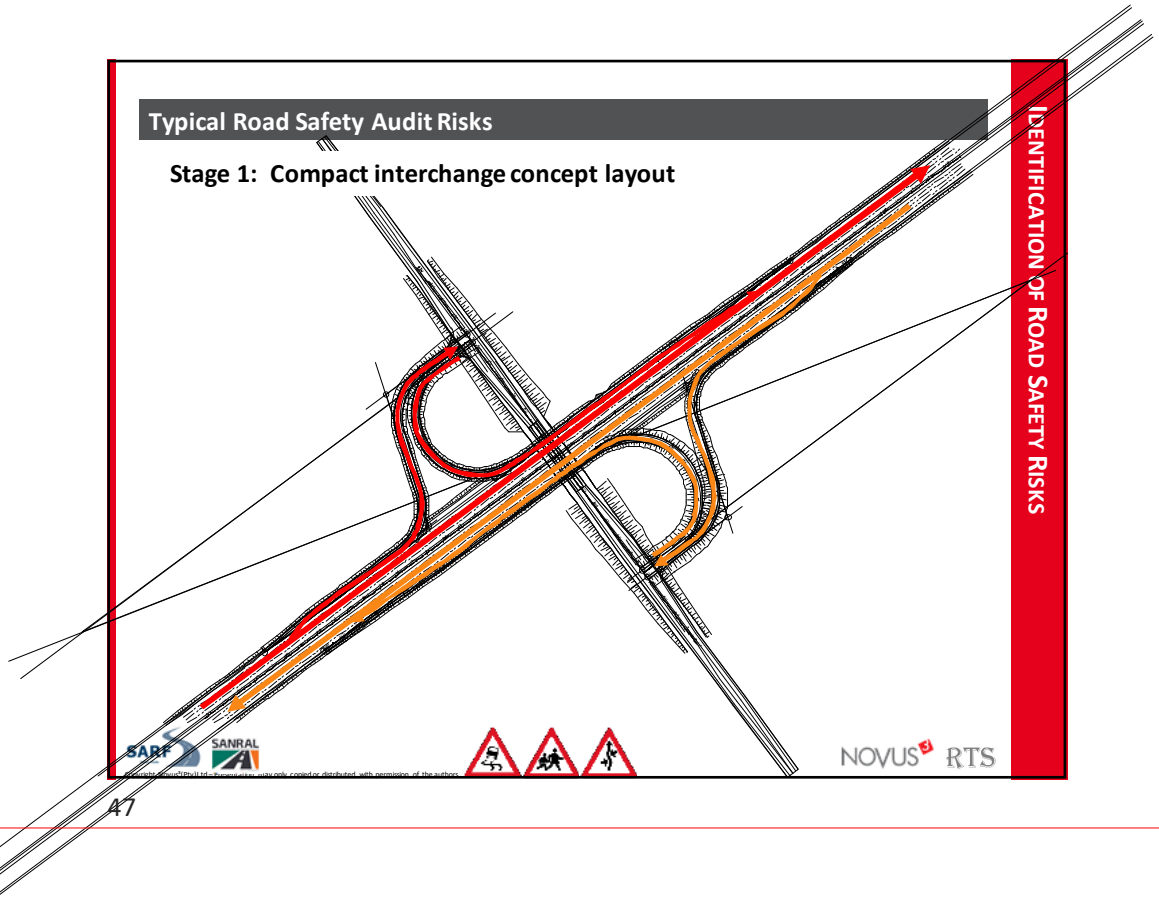
Typical Road Safety Audit Risks

Stage 1: Compact interchange concept layout



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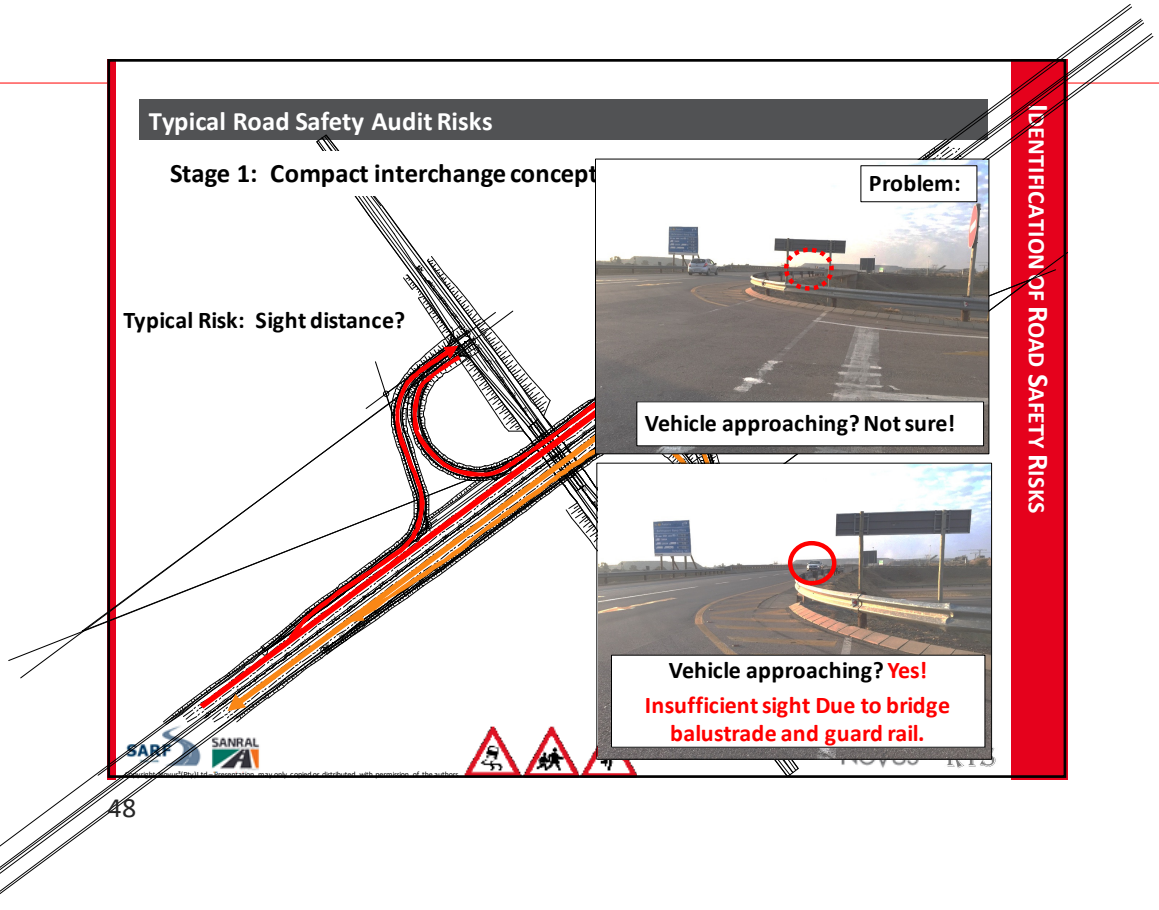
Typical Road Safety Audit Risks

Stage 1: Compact interchange concept

Typical Risk: Sight distance?



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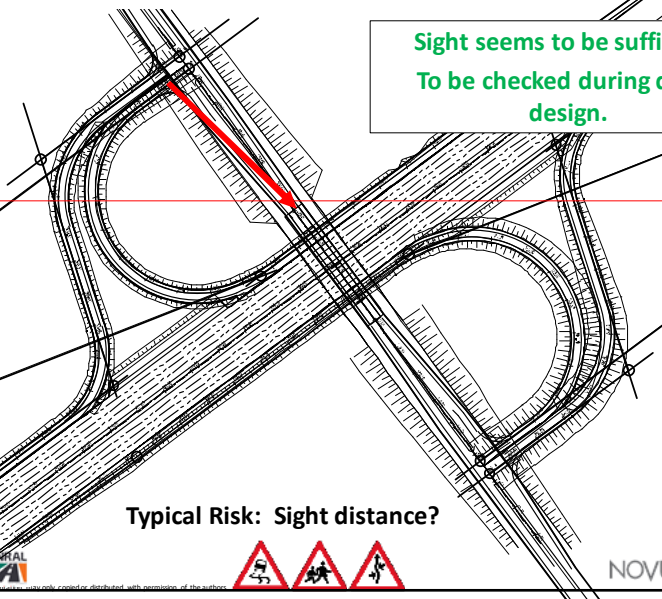
Typical Road Safety Audit Risks

Stage 1: Compact interchange concept layout



Sight seems to be sufficient.
To be checked during detail design.

Typical Risk: Sight distance?

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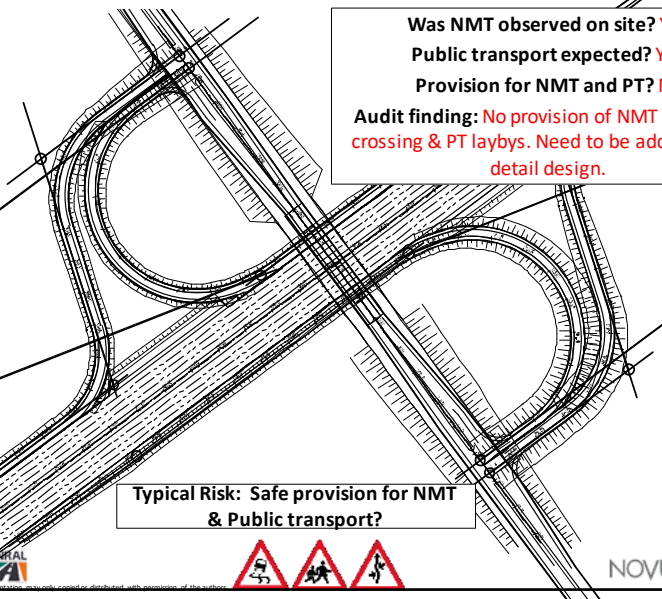
Typical Road Safety Audit Risks

Stage 1: Compact interchange concept layout



Was NMT observed on site? Yes
Public transport expected? Yes
Provision for NMT and PT? No
Audit finding: No provision of NMT walkway, crossing & PT laybys. Need to be addressed in detail design.

Typical Risk: Safe provision for NMT & Public transport?

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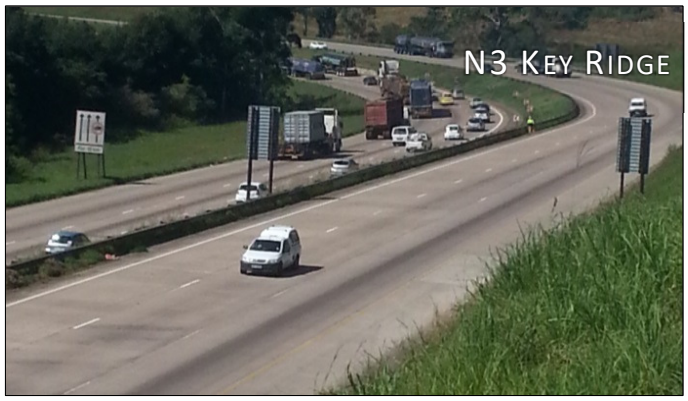

TYPICAL ROAD SAFETY APPRAISAL RISKS

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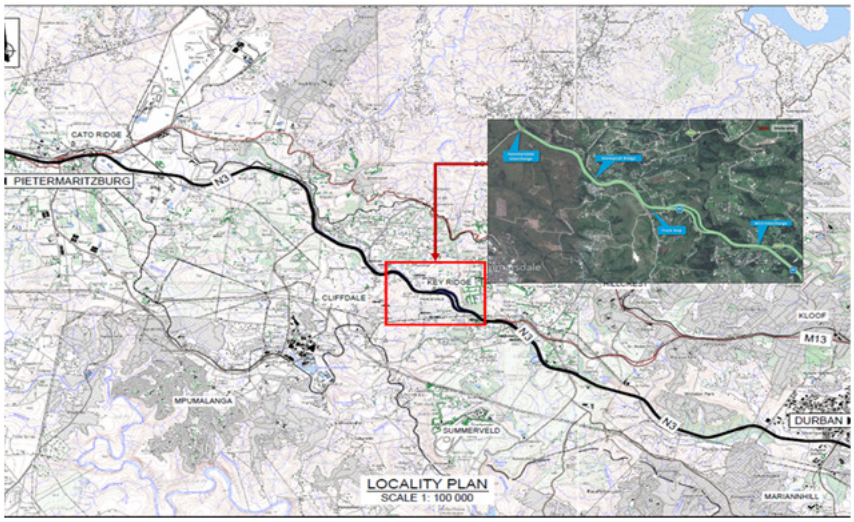
Typical Road Safety Audit Risks

Stage 2: N3 upgrade alternative



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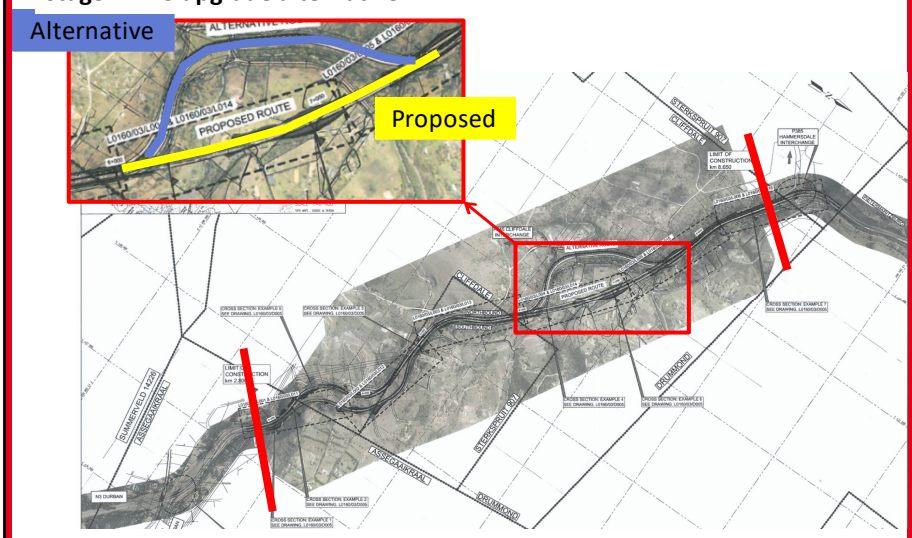
Typical Road Safety Audit Risks

Stage 2: N3 upgrade alternative



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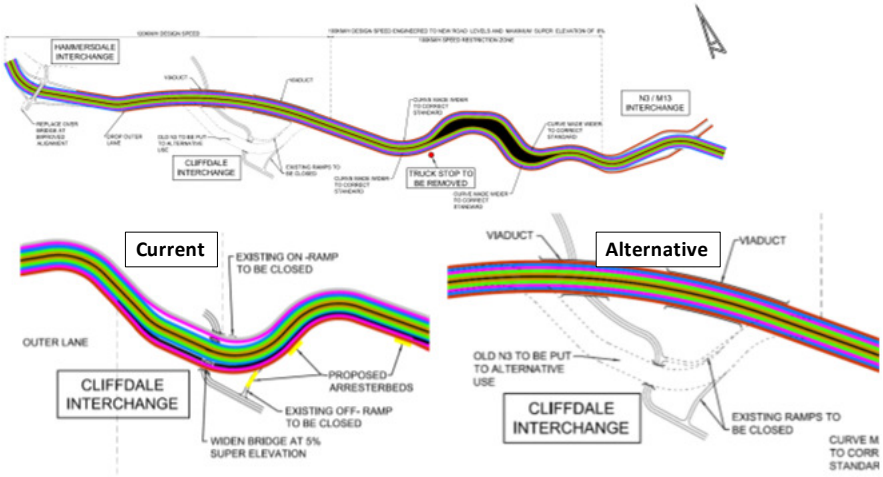
Typical Road Safety Audit Risks

Stage 2: N3 upgrade alternative



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Typical Road Safety Audit Risks

Stage 2: N3 upgrade alternative

Risk: Speed differentials

2. Speed differential between heavy and light vehicles		
Risk	The horizontal and vertical geometry suggests that heavy vehicles would travel slower than cars. Designs imply two most left lanes are to be designated as truck lanes. Should trucks be allowed to mix with general traffic, the following may occur: • Heavy vehicles travel slowly may obstruct outer right fast lanes • Cars may weave excessively around slower moving trucks • Drivers may not be able to judge gaps	
Likelihood	**Severity**	**Risk**
Probable	Serious	Intolerable
Recommendation: • Designate two most left lanes as truck lanes for both directions • Separate truck lanes from general traffic with a painted median at least 1.2m wide • Prohibit heavy vehicles from the general traffic lanes • Apply a reduced speed limit along the truck lanes		

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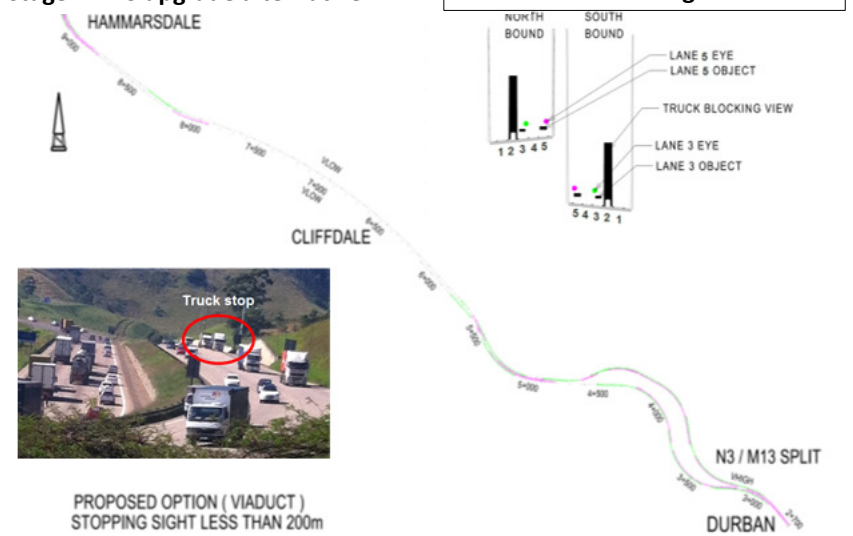
Typical Road Safety Audit Risks

Stage 2: N3 upgrade alternative

Risk: Insufficient sight distance



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Typical Road Safety Audit Risks

Stage 2: N3 upgrade alternative

Risk: Insufficient sight distance

15. Inadequate sight distance		
Likelihood	**Severity**	**Risk**
Probable	Serious	Intolerable

Recommendation:
- Decrease speed limit
- Introduce a painted median separating heavy and light vehicles
- Improve horizontal alignment on the inside of horizontal curves, especially where carriageways are separated by retaining walls or embankments

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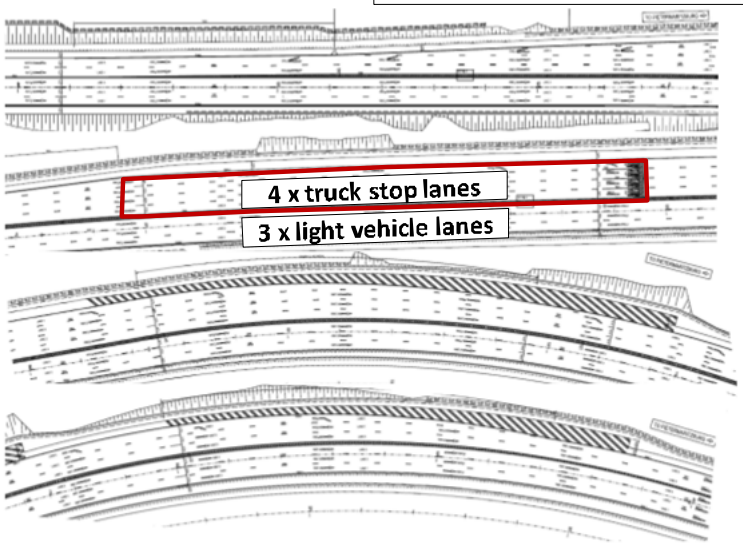
Typical Road Safety Audit Risks

Stage 2: N3 upgrade alternative

Risk: Insufficient sight distance



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Typical Road Safety Audit Risks

Stage 2: N3 upgrade alternative | **Risk: Police officer safety at truck stop**

16. Vehicles colliding with police officer, parked police vehicle or truck at the truck stop		
Risk	• The current plans do not show any provision for police presence at the truck stop. • Policing and enforcement of four parallel stopping lanes will be difficult. • No location for a police car to park, police officers to monitor trucks stopping and trucks to be pulled over	
Likelihood	**Severity**	**Risk**
Occasional	Catastrophic	Intolerable
Recommendation: Provide a designated location/s for: • Police vehicles to park • Police officers to observe truck stop operation (median island for protection) • Trucks to be pulled over for inspection		

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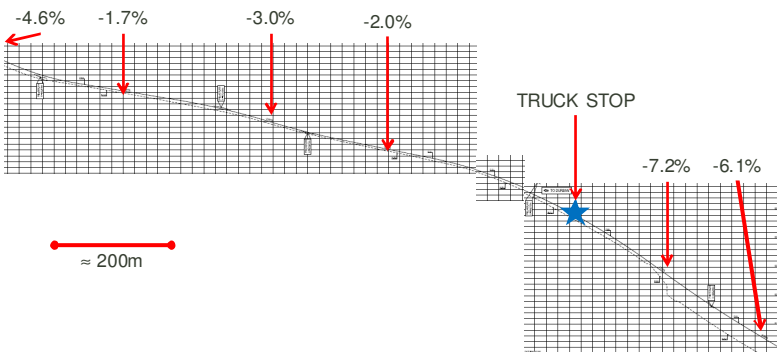
Typical Road Safety Audit Risks

Stage 2: N3 upgrade alternative | **Risk: Gradient at truck stop location**



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Stage 2: N3 upgrade alternative

Risk: Gradient at truck stop location

19. Location of truck stop on steep gradient		
Risk	• The current plans indicate that the truck stop line is located on a gradient of ≈6-7% • Trucks with faulty or no brakes would not be able to negotiate this gradient	
Likelihood	**Severity**	**Risk**
Occasional	Catastrophic	Intolerable
Recommendation: Relocate the truck stop and associated queuing areas east of the current proposed area (maximum 3%).		

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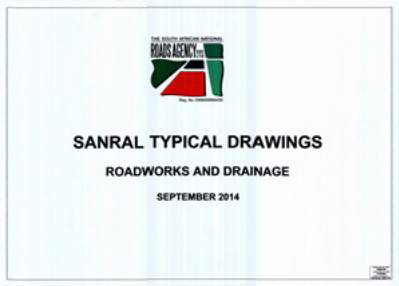
DRAINAGE STRUCTURES



TYPICAL ROAD SAFETY APPRAISAL RISKS

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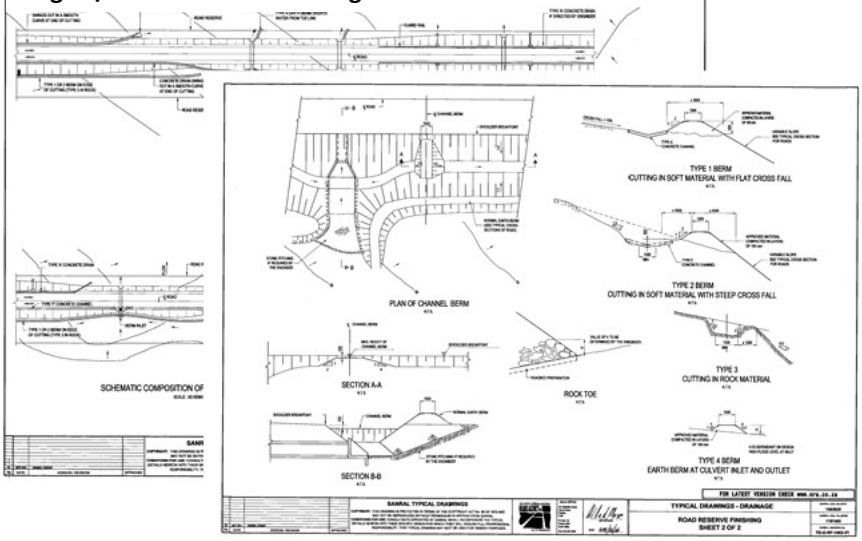
Typical Road Safety Audit Risks

Stage 2/3: Stormwater drainage details



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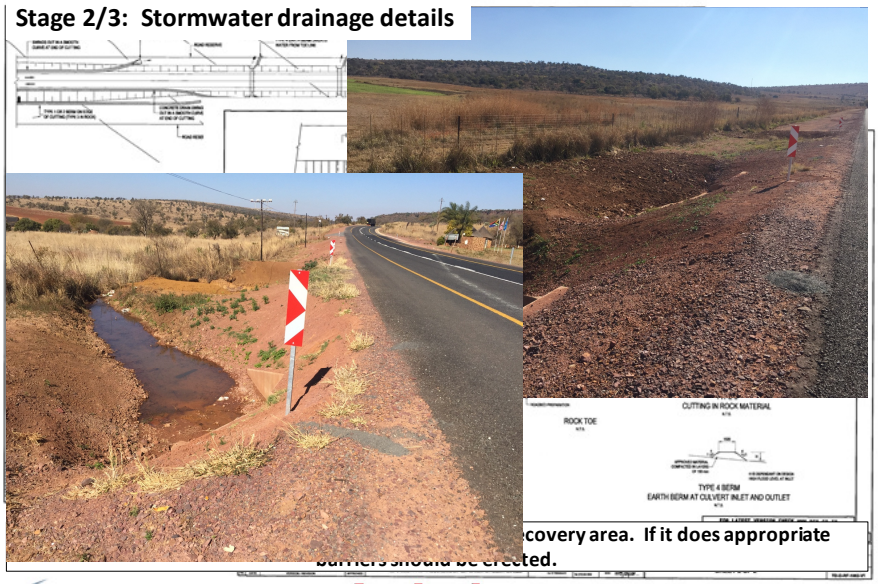
Stage 2/3: Stormwater drainage details



ecovery area. If it does appropriate
arriers should be erected.

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Stage 2/3: Stormwater drainage details

Drainage structures are a significant risk, if not considered during the design stage

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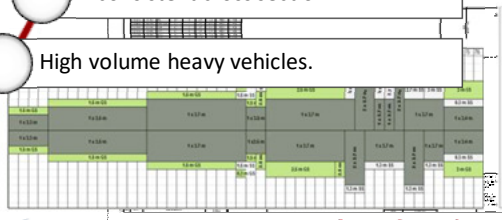
Typical Road Safety Audit Risks

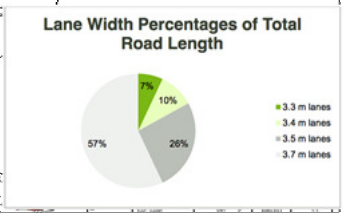
Stage 3: Rehab project scope

- Project scope included pavement rehab only.
- Upgrading, i.e. widening not allowed.
- Insufficient vertical sight at numerous locations.
- Narrow traffic lanes.
- Inconsistent cross section
- High volume heavy vehicles.

Combination of factors – significant safety risk.

Recommended change in project scope to allow upgrade – accepted by client.





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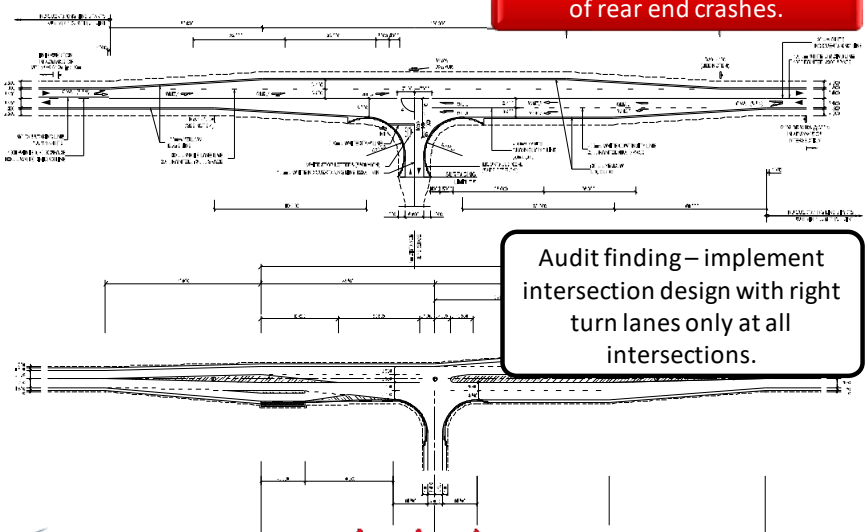
Stage 3: Unprotected right turns

Unprotected right turns – risk of rear end crashes.



Audit finding – implement intersection design with right turn lanes only at all intersections.

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of rear end crashes.

intersection desig
turn lanes on
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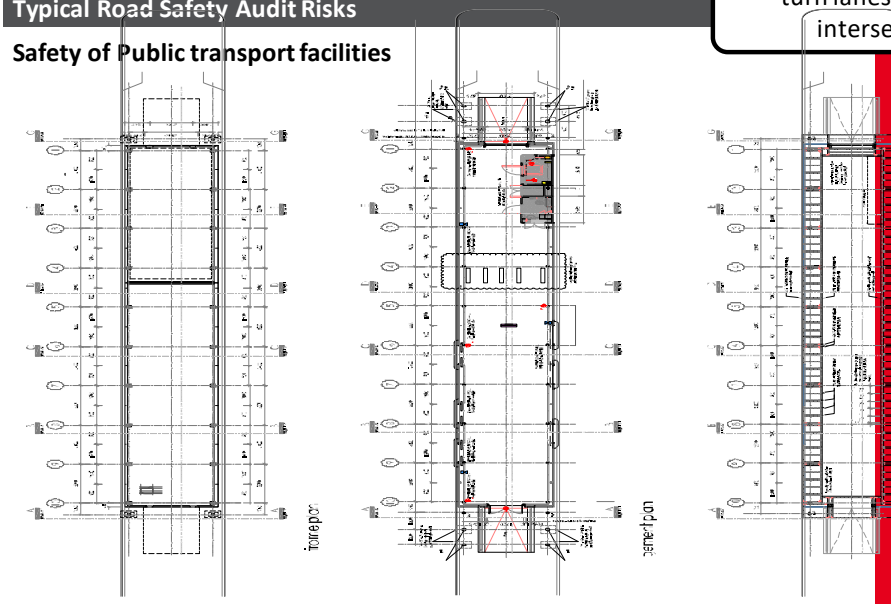
Typical Road Safety Audit Risks

Safety of Public transport facilities



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of rear end crashes.

intersection desig
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Safety of Public transport facilities

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of rear end crashes.

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Typical Road Safety Audit Risks

Safety of Public transport facilities

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END OF LECTURE

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