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European Road Safety Partnership - Network Wide Road Safety Assessment
KA220-HED - Cooperation partnerships in higher education
Form ID: 2023-1-PL01-KA220-HED-000156844

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EUROPEAN ROAD SAFETY PARTNERSHIP

NETWORK WIDE ROAD SAFETY ASSESSMENT

SPRING SCHOOL – WEIMAR 25-27 MARCH 2026

PROACTIVE APPROACH – DATA COLLECTION



Università
di Catania

Bauhaus-
Universität
Weimar



Sveučilište u Zagrebu



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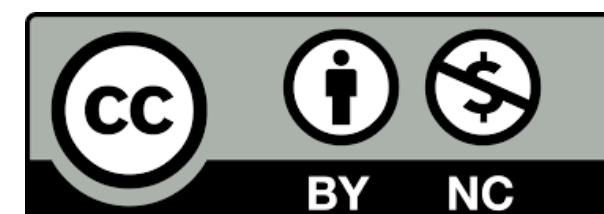
EuroS@P

EUROPEAN ROAD SAFETY PARTNERSHIP

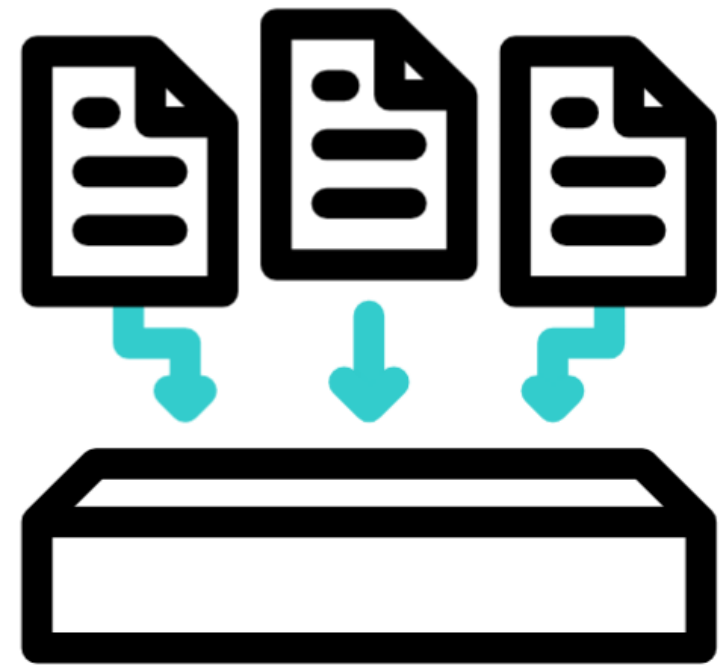
NETWORK WIDE ROAD SAFETY ASSESSMENT

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NWRSA - PROACTIVE APPROACH

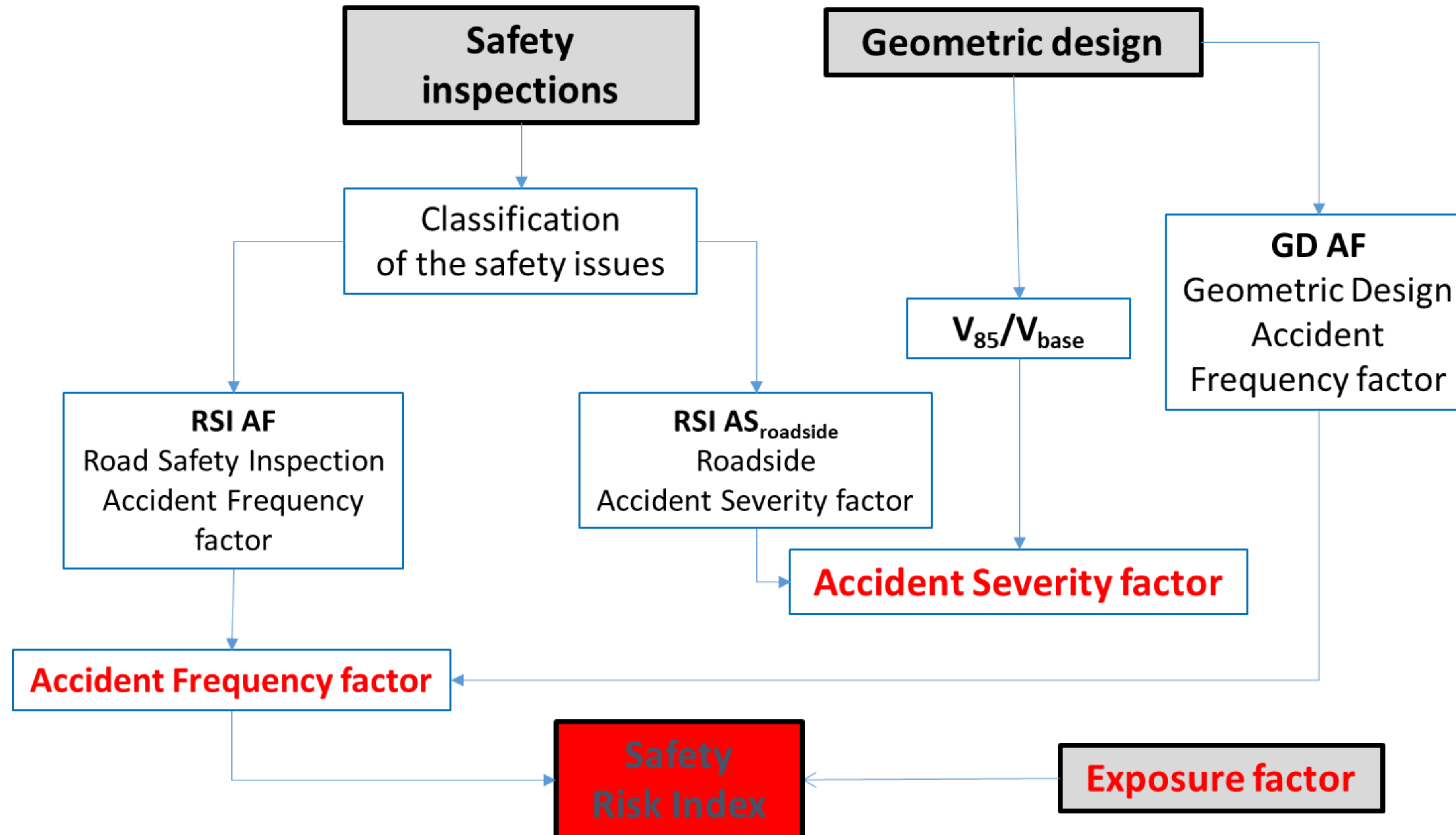


DATA COLLECTION

NWRSA - PROACTIVE APPROACH

- The safety index (SI) measures the relative safety performance of a road segment
- The SI is formulated by combining three components of risk:
 - 1) the exposure of road users to road hazards (**Exposure factor**)
 - 2) the likelihood of a vehicle being involved in an accident (**Accident Frequency factor**)
 - 3) the resulting consequences should an accident occur (**Accident Severity factor**)

Proactive Risk Index



NWRSA - PROACTIVE APPROACH

Various countries adopted safety inspection procedures which are defined in guidelines but, in the main, they are not operational in nature.

Basing both on the international literature and on the research experience

A safety inspection operative procedure has been defined as part of the EU IASP project

The procedure is aimed at improving the effectiveness and reliability of the inspection process

METHODOLOGY



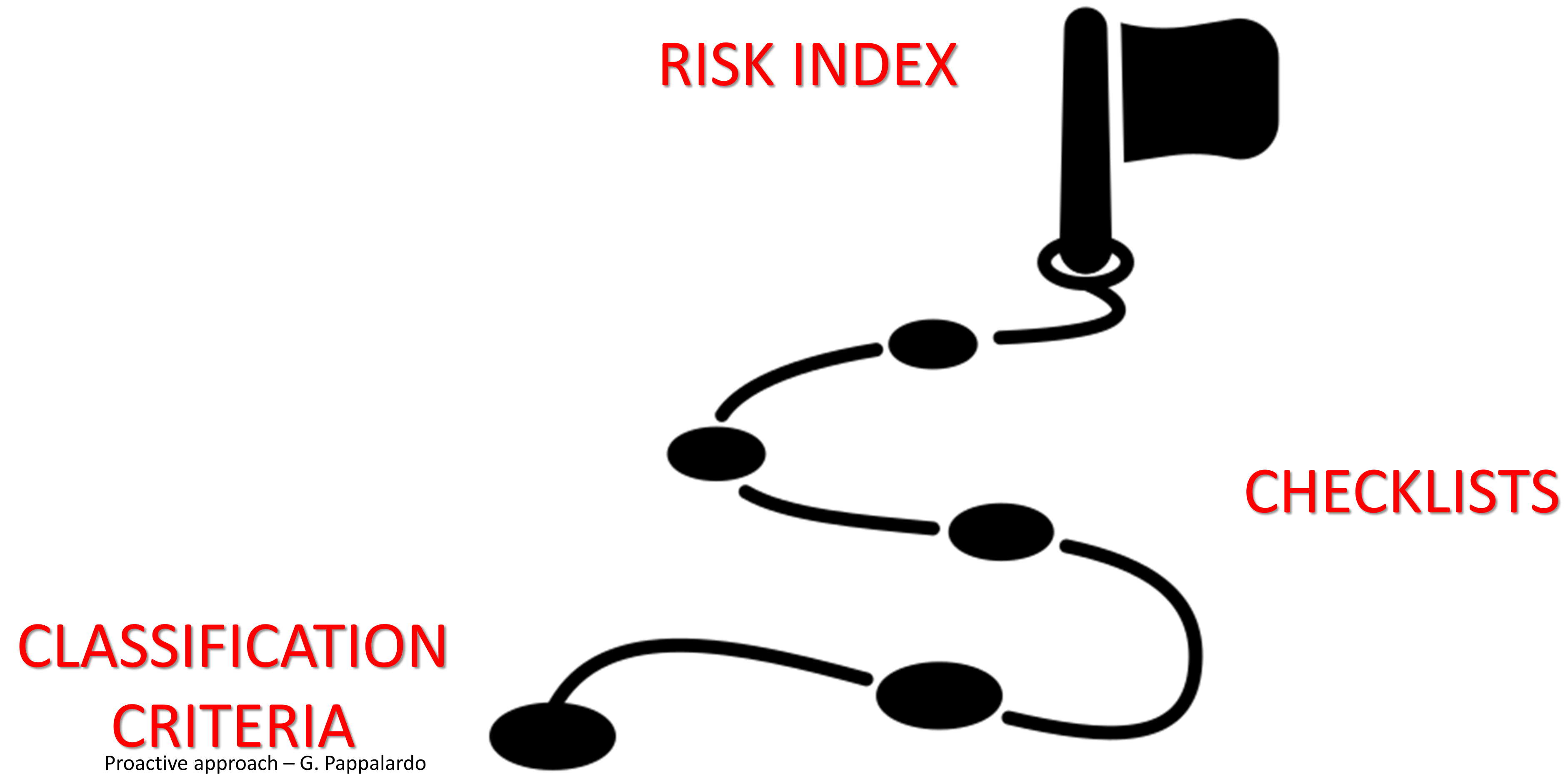
European Project

IASP: “Identification of Hazard Location and Ranking of Measures to Improve Safety on Local Rural Roads”
Scientific coordinator: S. Cafiso

IASP Final **Report** and Safety Inspection Operative **Manual**

http://ec.europa.eu/transport/road_safety/projects/doc/iasp.pdf

OBJECTIVES



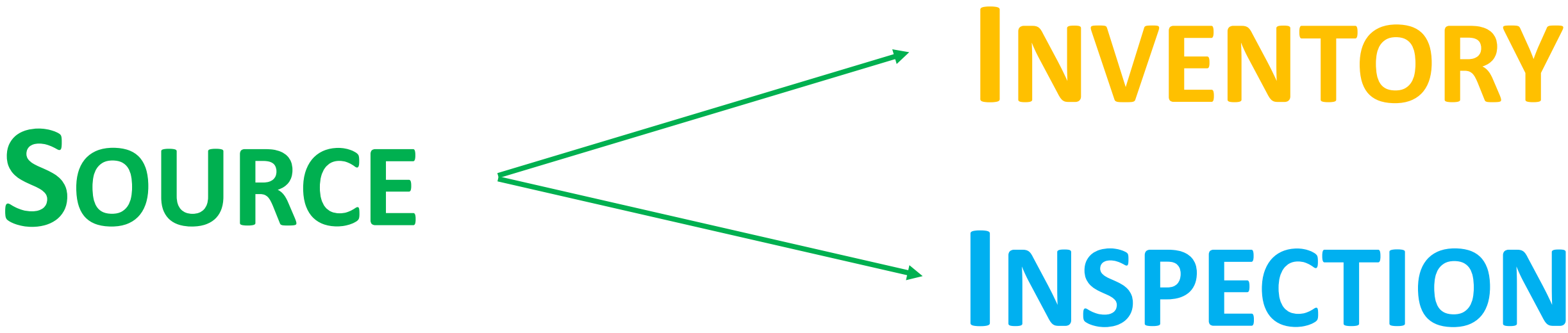
CLASSIFICATION CRITERIA



CLASSIFICATION CRITERIA

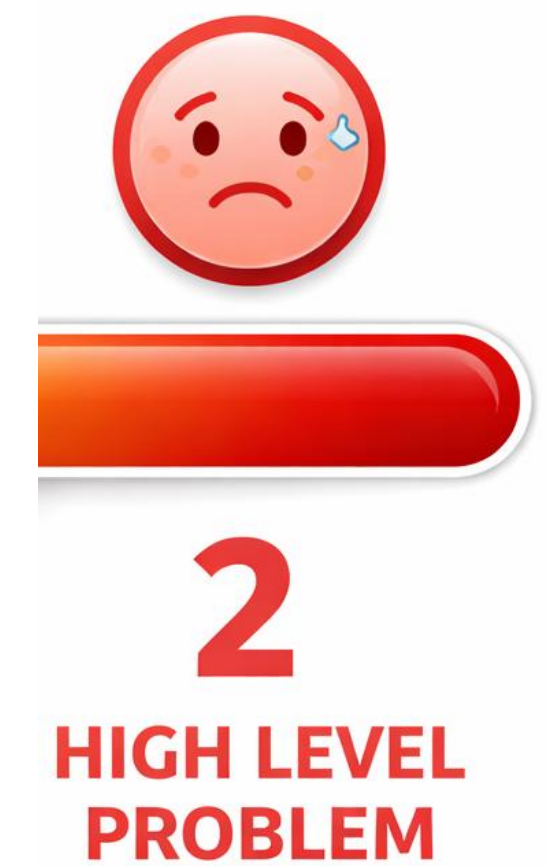
CROSS SECTION

High level problems	Low level problems
Lane width	
$L < 2,75\text{ m}$	$2,75 \leq L < 3,25\text{ m}$
$L > 4,50\text{ m}$	$3,75 < L \leq 4,50\text{ m}$
Shoulder width	
$L < 0,30\text{ m}$	$0,30 \leq L < 1,00\text{ m}$



CLASSIFICATION CRITERIA

CROSS SECTION LANE WIDTH

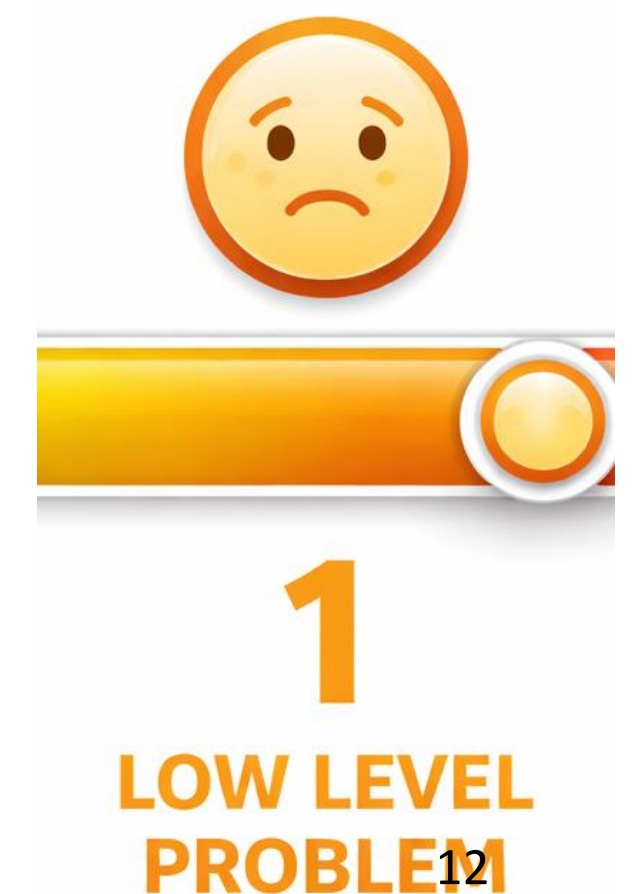


CLASSIFICATION CRITERIA

CROSS SECTION LANE WIDTH



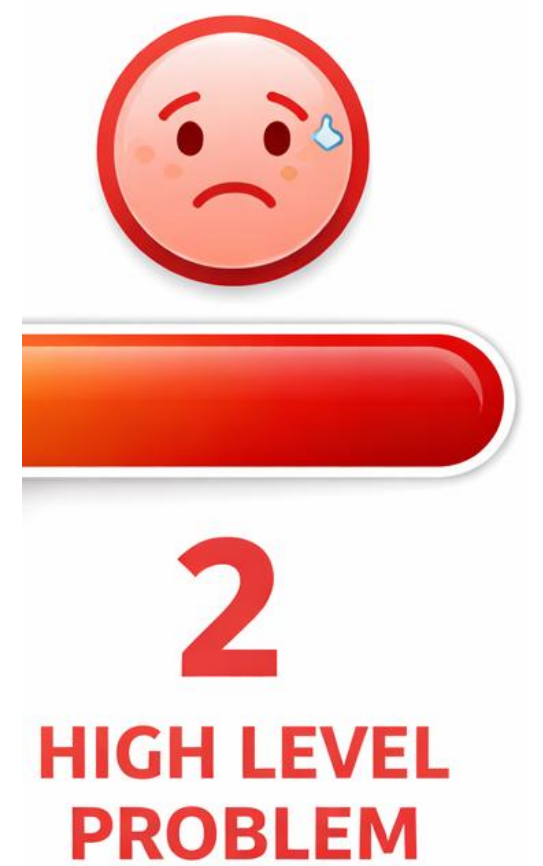
Proactive approach – G. Pappalardo



CLASSIFICATION CRITERIA

CROSS SECTION SHOULDER WIDTH

MISSING SHOULDERS



- Pavement inspection aims only at identifying safety problems and is not therefore carried out identifying the type and degree of deterioration which is necessary for the drawing up of a pavement maintenance programme

CLASSIFICATION CRITERIA

PAVEMENT-FRICTION

High level problem	Low level problem
Polished aggregate	
Bleeding	
Low macrotexture	
Raveling	

CLASSIFICATION CRITERIA PAVEMENT-FRICTION



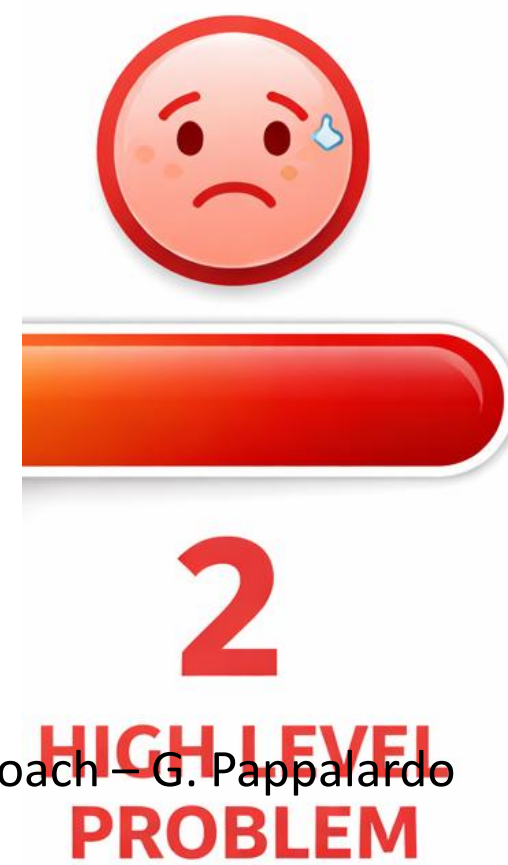
Polished aggregate



Bleeding



Low macrotexture and bleeding



Raveling

CLASSIFICATION CRITERIA

PAVEMENT- UNEVENNESS

High level problem	Low level problem
Steel grates in the roadway, raised manhole covers	Low shoving on tangent
Disrupted bridge joints	Shallow potholes on tangent
Potholes on curves or near intersections	Rutting on tangent
Deep potholes on tangents	Patches on tangent
Shoving on curves or near intersections	
High shoving on tangents	
Rutting on curves	
Patches on curves	

CLASSIFICATION CRITERIA

PAVEMENT- UNEVENNESS



Disrupted bridge joints





2

HIGH LEVEL
PROBLEM



Shoving on curve approach





2

HIGH LEVEL
PROBLEM



Superficial pothole on tangent





1

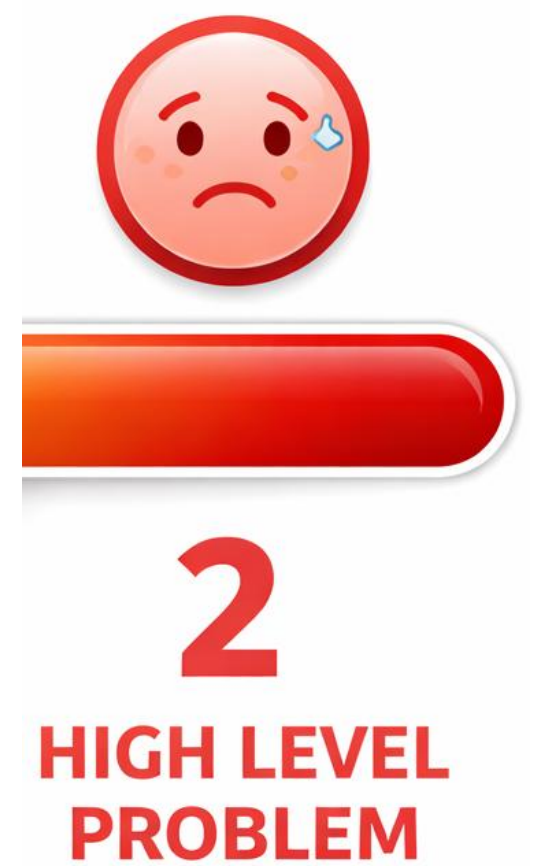
LOW LEVEL
PROBLEM

CLASSIFICATION CRITERIA **DELINEATION: CHEVRONS**

High level problems	High level problems
Missing chevrons on severe curves	Low reflective chevrons due to dirt or slight deterioration
Chevrons number inadequate to give correct perception of the total length of the curve	Missing chevrons on moderate curves
Chevrons placed in only one direction	Local discontinuity of chevrons
Ineffective chevrons due to a high level of deterioration	Chevrons spacing inadequate to give correct perception of the curve
Not reflective chevrons	Chevrons do not continue along the whole of the curve
Chevrons with directional arrows in the wrong direction	Sharp bend warning chevrons installed instead of chevrons of normal type (or vice – versa)
Chevrons obscured by vegetation	Chevrons partially obscured by vegetation

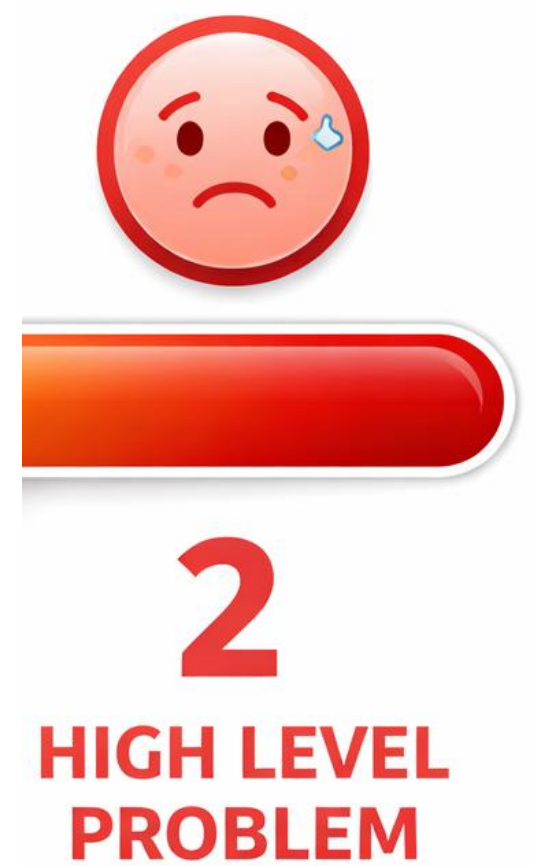
CLASSIFICATION CRITERIA **DELINEATION: CHEVRONS**

MISSING CHEVRONS ON SEVERE CURVE



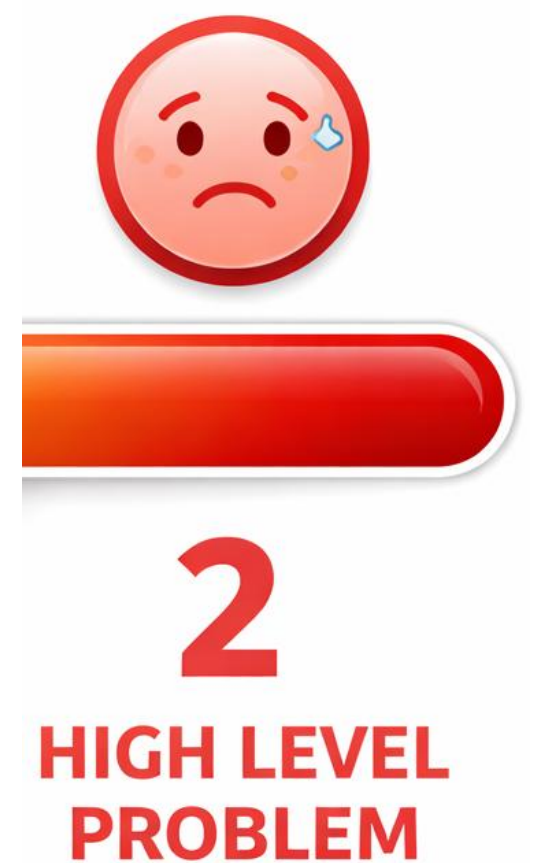
CLASSIFICATION CRITERIA **DELINEATION: CHEVRONS**

MISSING CHEVRONS ON SEVERE CURVE



CLASSIFICATION CRITERIA DELINEATION: CHEVRONS

CHEVRONS WITH DIRECTIONAL ARROWS IN THE WRONG DIRECTION



CLASSIFICATION CRITERIA

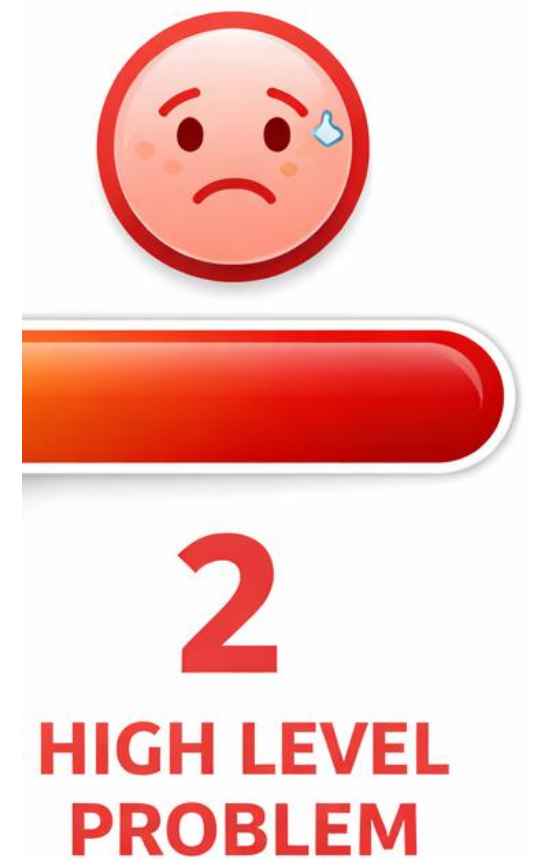
DELINEATION: ROADSIDE GUIDEPOSTS AND REFLECTORS

High level problems	Low level problems
Missing guideposts along the roadside	Variable height of reflectors along the road
Missing reflectors on roadside safety barriers	Local discontinuity in guideposts placing
Missing reflectors on walls or in other situations	Excessive spacing between guideposts
Missing or ineffective reflectors	Low reflectivity reflectors due to inadequate maintenance
Dangerous placement (e.g., inside ditches)	

CLASSIFICATION CRITERIA

DELINEATION: ROADSIDE GUIDEPOSTS AND REFLECTORS

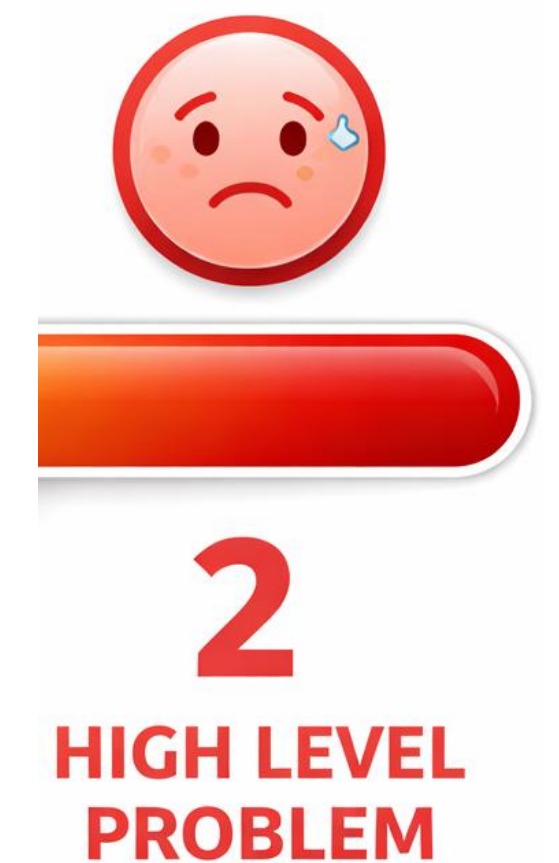
MISSING ROADSIDE GUIDEPOSTS



CLASSIFICATION CRITERIA

DELINEATION: ROADSIDE GUIDEPOSTS AND REFLECTORS

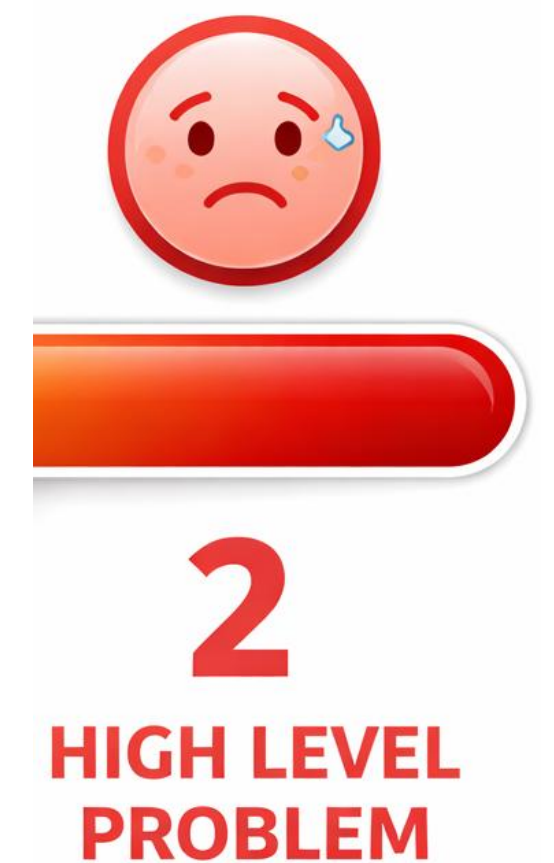
MISSING REFLECTORS ON SAFETY BARRIERS



CLASSIFICATION CRITERIA

DELINEATION: ROADSIDE GUIDEPOSTS AND REFLECTORS

GUIDEPOSTS DANGEROUS PLACED IN A RECTANGULAR DITCH

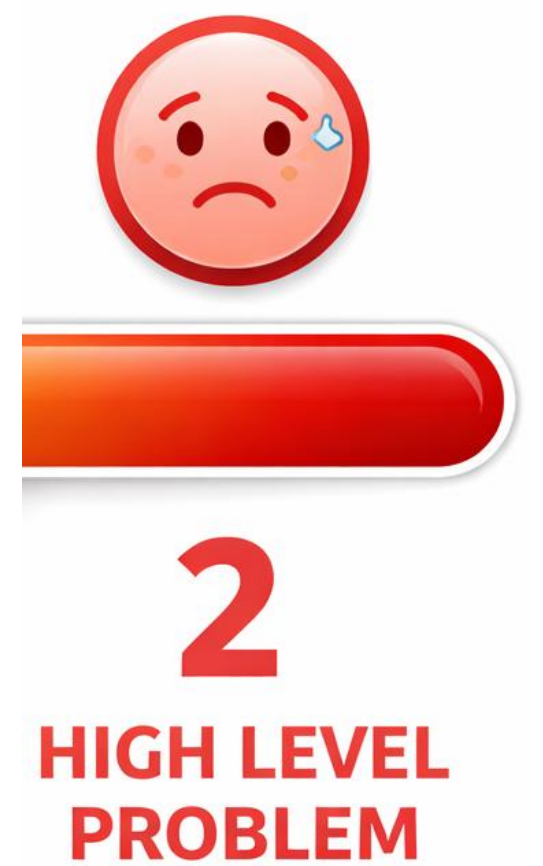


CLASSIFICATION CRITERIA

TRAFFIC SIGNS

High level problems	Low level problems
Missing or not visible warning sing for severe curve	Curve warning sign faded or with low visibility
Missing or not visible warning sing for crest curve	Crest warning sign faded or with low visibility
Missing or not visible warning sing in dangerous situations	Yield sign missing, faded or with low visibility
	Advertisement located so as to disturb road users
	Indication signs incomplete or with low legibility
	Speed limits not consistent with road features
	Unclear signs
	Wrong height signs

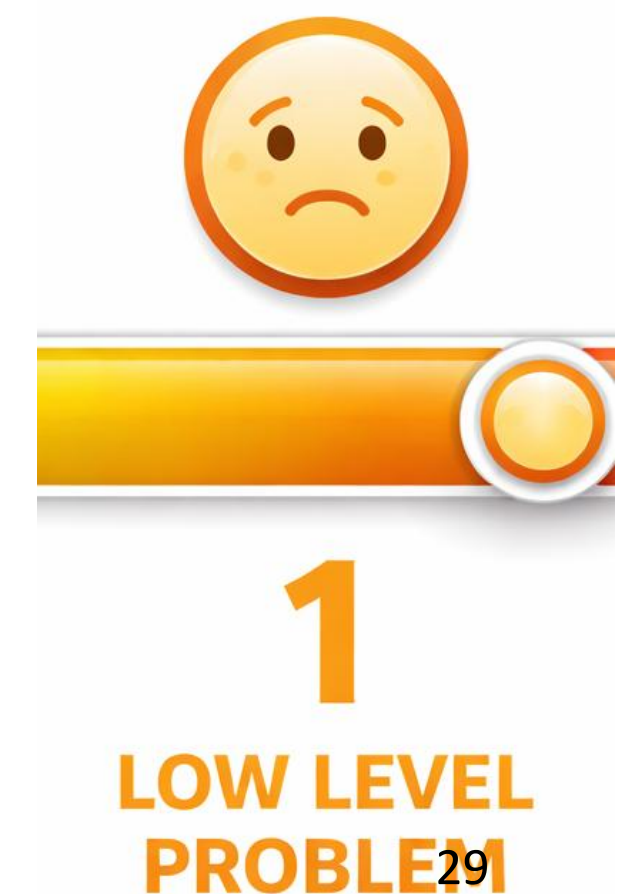
WARNING SIGN NOT VISIBLE



CLASSIFICATION CRITERIA

TRAFFIC SIGNS

TOO MANY SIGNS TOGETHER CREATE CONFUSION



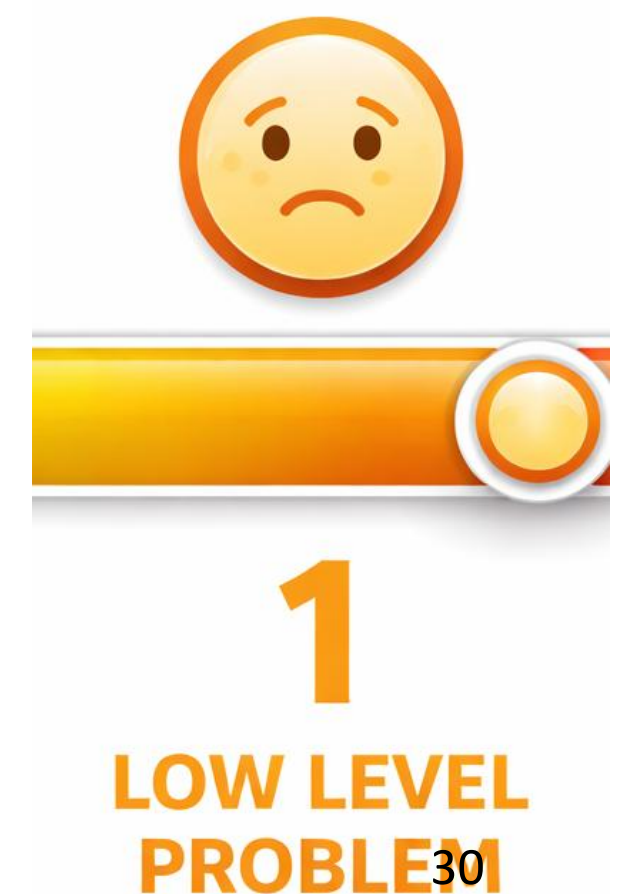
CLASSIFICATION CRITERIA

TRAFFIC SIGNS

SIGNS INSTALLED AT WRONG HEIGHT



Proactive approach – G. Pappalardo



CLASSIFICATION CRITERIA

ROAD MARKINGS

High level problems	Low level problems
Edge lines	
Missing edge lines	Low faded edge lines
Very faded edge lines	Edge lines partially by vegetation or debris
Center line	
Missing center line	Low faded center line
Very faded center line	
Discontinuous line with no overtaking sight distance	

MISSING EDGE LINES



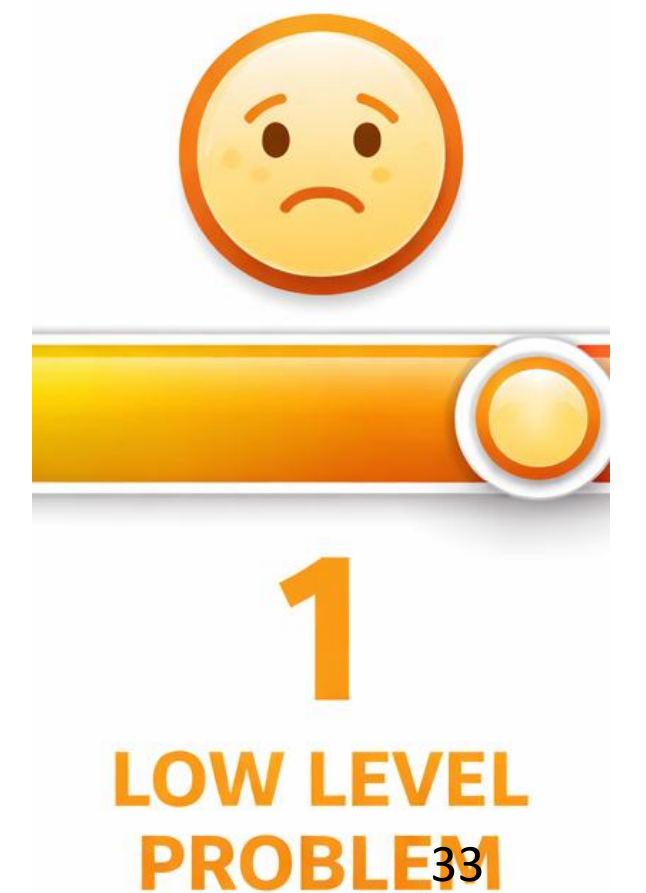
2

**HIGH LEVEL
PROBLEM**

CLASSIFICATION CRITERIA

ROAD MARKINGS

LOW FADED EDGE LINES

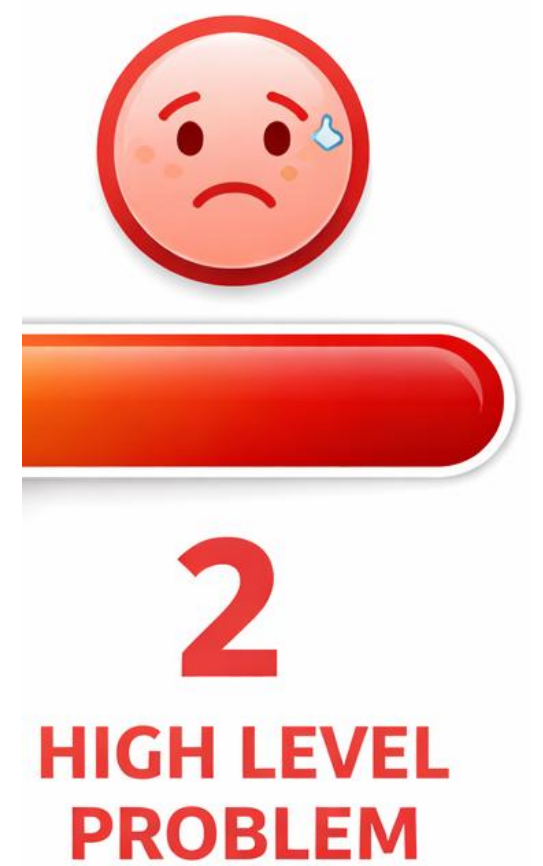


CLASSIFICATION CRITERIA

ACCESS

High level problems	Low level problems
Dangerous accesses	
Accesses located on horizontal curves	Narrow accesses
Accesses located on crest curves	Accesses without road markings
Accesses located on sites with poor visibility	Accesses without delineators
Accesses located close to intersections	Unpaved accesses
Presence of accesses	
High number of accesses (> three accesses over a 200 m segment)	One or two accesses over the 200 m segment

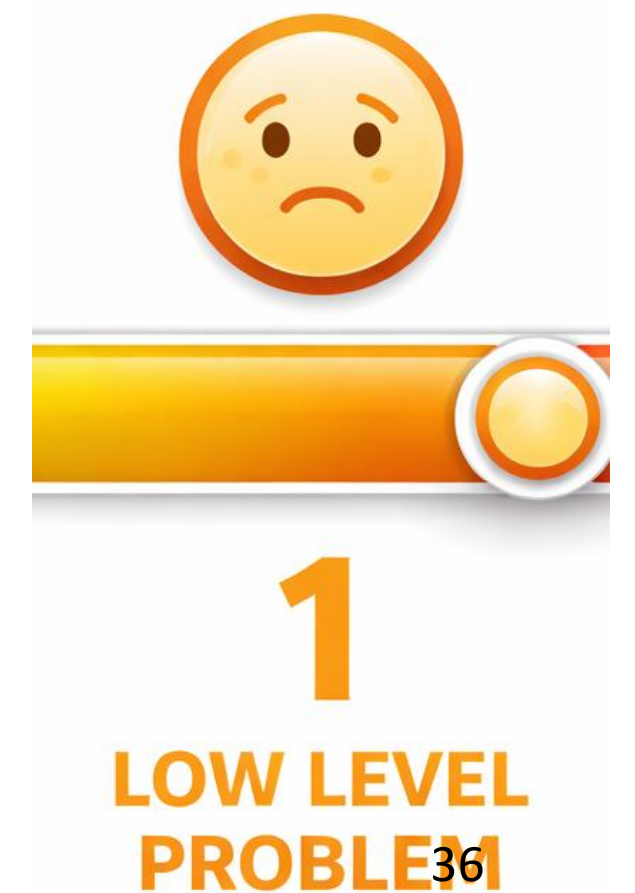
ACCESSES LOCATED ON NARROW HORIZONTAL CURVE



CLASSIFICATION CRITERIA

ACCESS

UNPAVED ACCESS WITHOUT MARKINGS

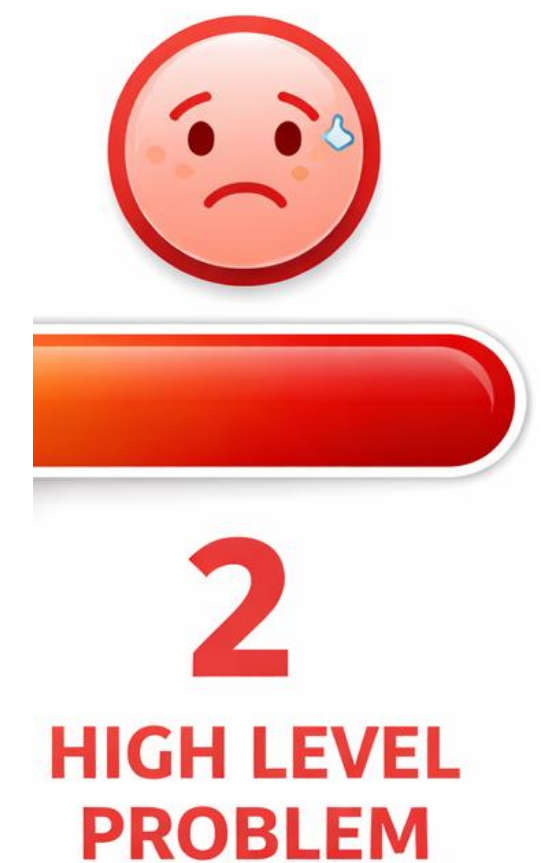


CLASSIFICATION CRITERIA

SIGHT DISTANCE

High level problems	Low level problems
Sight distance on horizontal curves	
Available sight distance less than about 50 m due to the presence of obstacles along the whole inside of the curve	Available sight distance greater than 50 m but smaller than Stopping Sight Distance or inadequate to give the correct road perception
	Presence of discontinuous obstructions to visibility on the inside of the curve (for example, isolated trees)
Sight distance on vertical curves	
Presence of a crest with available sight distance of less than 50 m	Available sight distance greater than 50 m but smaller than Stopping Sight Distance or inadequate to give the correct road perception

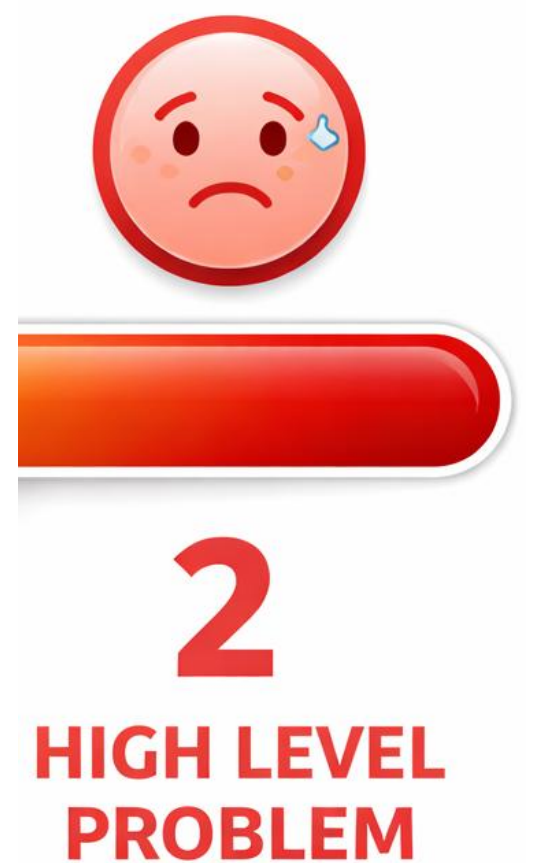
INADEQUATE SIGHT DISTANCE ON THE HORIZONTAL CURVE



CLASSIFICATION CRITERIA

SIGHT DISTANCE

INADEQUATE SIGHT DISTANCE ON THE CREST

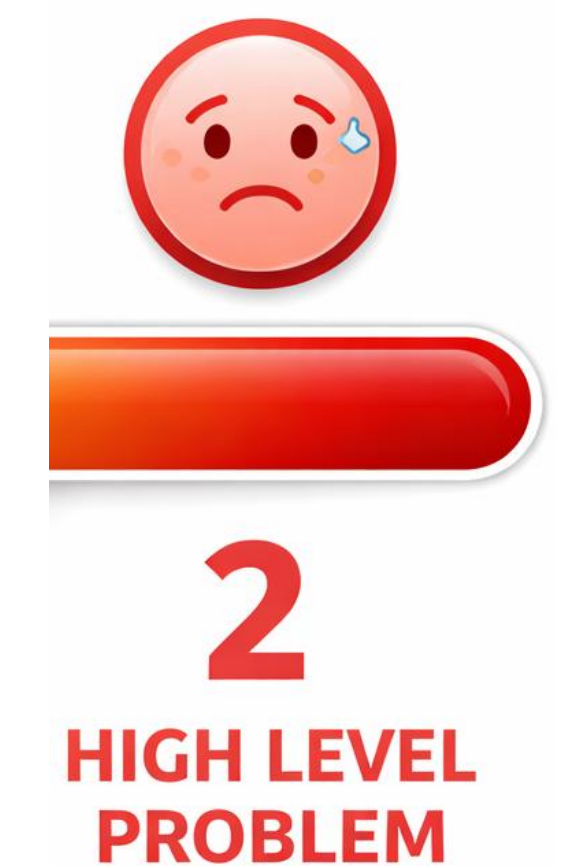


CLASSIFICATION CRITERIA ROADSIDES: EMBANKMENTS

High level problems	Low level problems
Embankments with height more than 5 m unshielded or shielded with ineffective barriers	Unshielded embankments with height between 1 and 3 m and steep slopes or shielded with ineffective barriers
Embankments with height more than 3 m and steep slopes unshielded or shielded with ineffective barriers	Embankments with height more than 3 m but less than 5 m shielded by low containment safety barriers, if there is a high level of commercial – vehicle traffic
Embankments with height more than 3 m and steep slopes unshielded by low containment safety barriers, when there are dangerous obstacles at the foot of the embankment	Embankments with height more than 3 m and less than 5 m shielded with discontinuous barriers

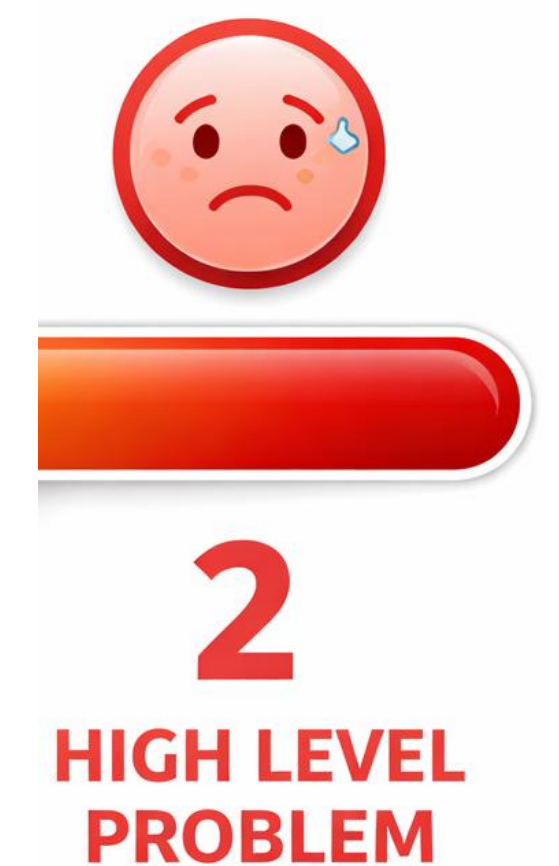
CLASSIFICATION CRITERIA **ROADSIDES: EMBANKMENTS**

UNSHIELDED EMBANKMENT OF MEDIUM HEIGHT



CLASSIFICATION CRITERIA **ROADSIDES: EMBANKMENTS**

UNSHIELDED EMBANKMENT OF HIGH HEIGHT WITH INEFFECTIVE BARRIER

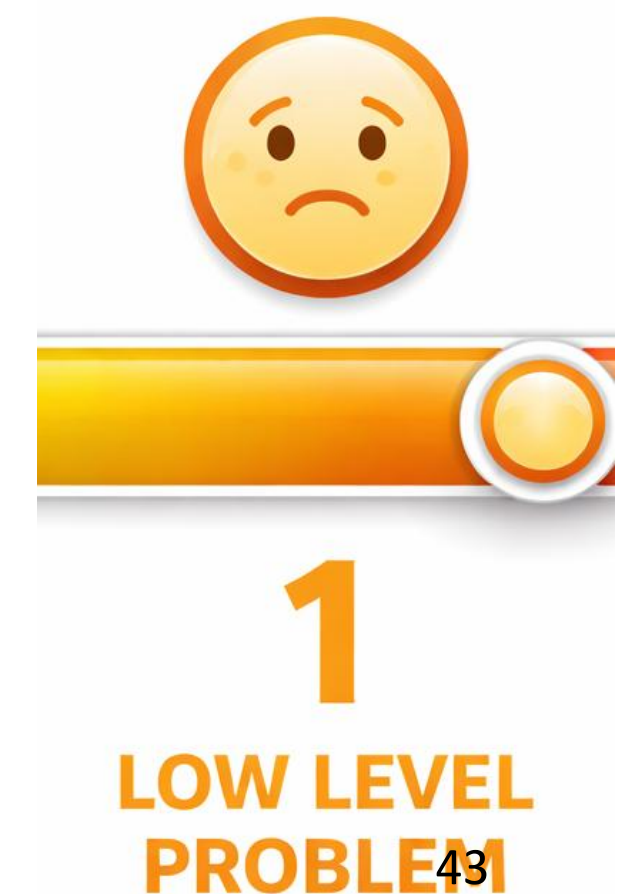


CLASSIFICATION CRITERIA **ROADSIDES: EMBANKMENTS**

UNSHIELDED EMBANKMENT OF LOW HEIGHT



Proactive approach – G. Pappalardo



CLASSIFICATION CRITERIA

ROADSIDES:BRIDGES

High level problems	Low level problems
Unshielded bridges or bridges shielded with ineffective barriers	Bridge barriers incorrectly installed
Bridges with low containment safety barriers if there is a high level of commercial – vehicle traffic	Medium containment safety barriers if the bridge goes over roads, railways or built-up areas

CLASSIFICATION CRITERIA **ROADSIDES:BRIDGES**

INEFFECTIVE BRIDGE BARRIERS

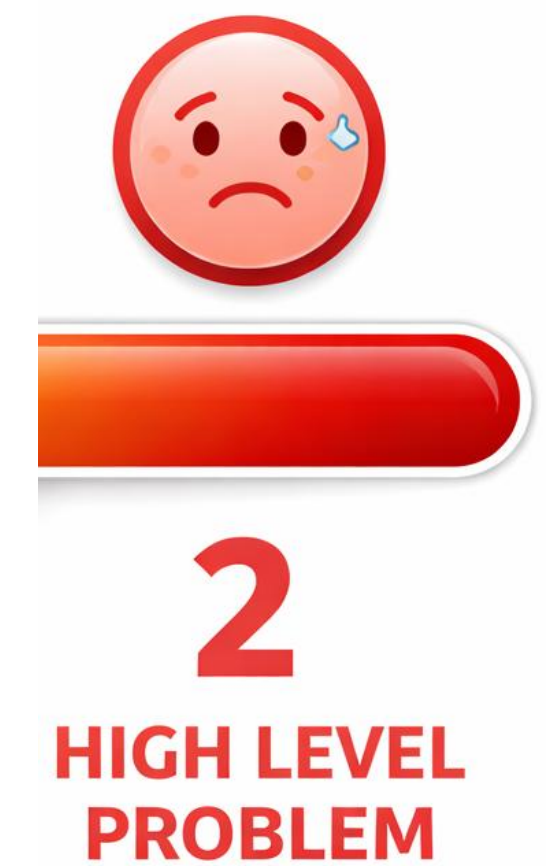


2

**HIGH LEVEL
PROBLEM**

CLASSIFICATION CRITERIA **ROADSIDES:BRIDGES**

LOW CONTAINMENT SAFETY BARRIER



CLASSIFICATION CRITERIA

ROADSIDES:TERMINALS AND TRANSITIONS

High level problems	Low level problems
Roadside barriers with no breakaway terminals	Inadequate transitions connecting steel barriers of different types
Bridge barriers with no breakaway terminals	
Terminals buried in the ground	
Roadside barriers not connected to concrete walls	
Roadside barriers not connected to stone walls	
Roadside barriers not connected to bridge barriers	
Roadside and bridge barriers connected without transitions	
Unconnected roadside barriers	

CLASSIFICATION CRITERIA

ROADSIDES: TERMINALS AND TRANSITIONS

ROADSIDE BARRIERS WITH NO BREAKAWAY TERMINAL



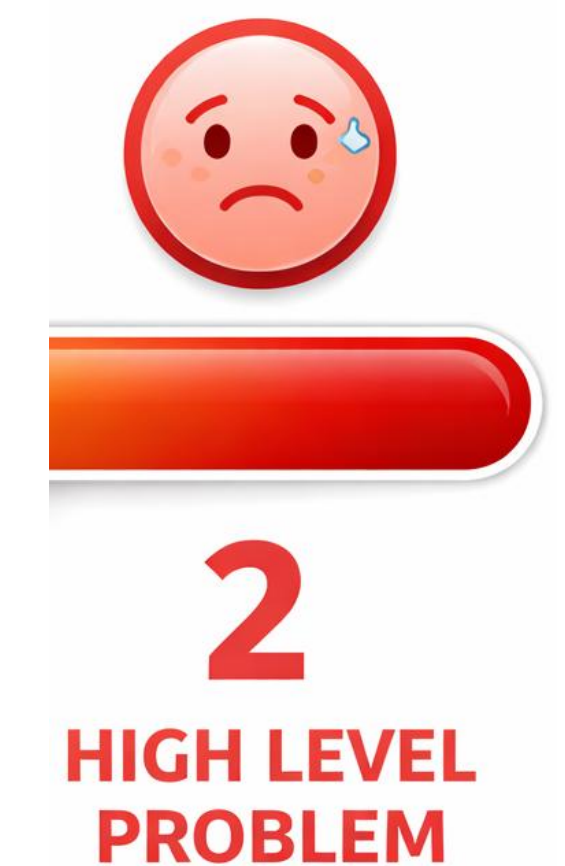
2

HIGH LEVEL
PROBLEM

CLASSIFICATION CRITERIA

ROADSIDES: TERMINALS AND TRANSITIONS

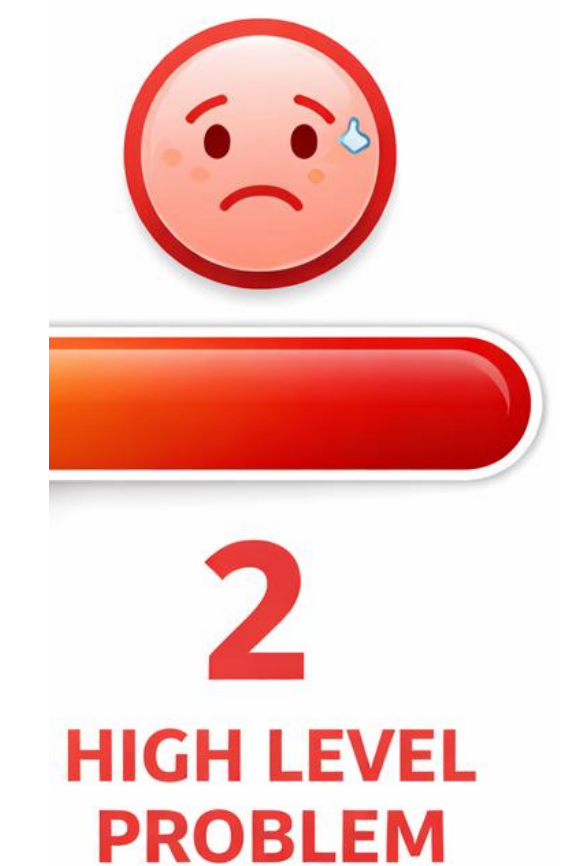
TERMINAL BURIED IN THE GROUND



CLASSIFICATION CRITERIA

ROADSIDES: TERMINALS AND TRANSITIONS

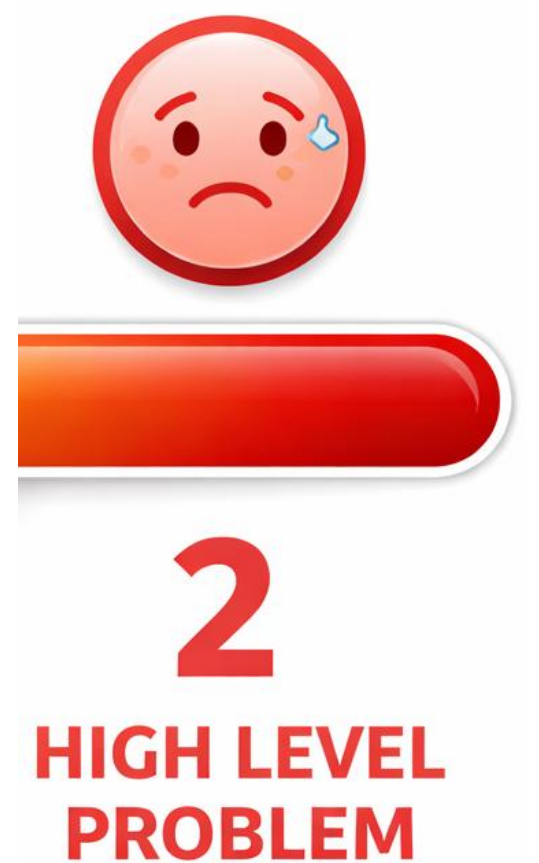
ROADSIDE BARRIERS NOT CONNECTED TO CONCRETE WALL



CLASSIFICATION CRITERIA

ROADSIDES: TERMINALS AND TRANSITIONS

ROADSIDE AND BRIDGE BARRIERS CONNECTED WITHOUT TRANSITION



CLASSIFICATION CRITERIA

ROADSIDES: TERMINALS AND TRANSITIONS

INADEQUATE TRANSITIONS CONNECTING STEEL BARRIERS OF DIFFERENT TYPES



CLASSIFICATION CRITERIA

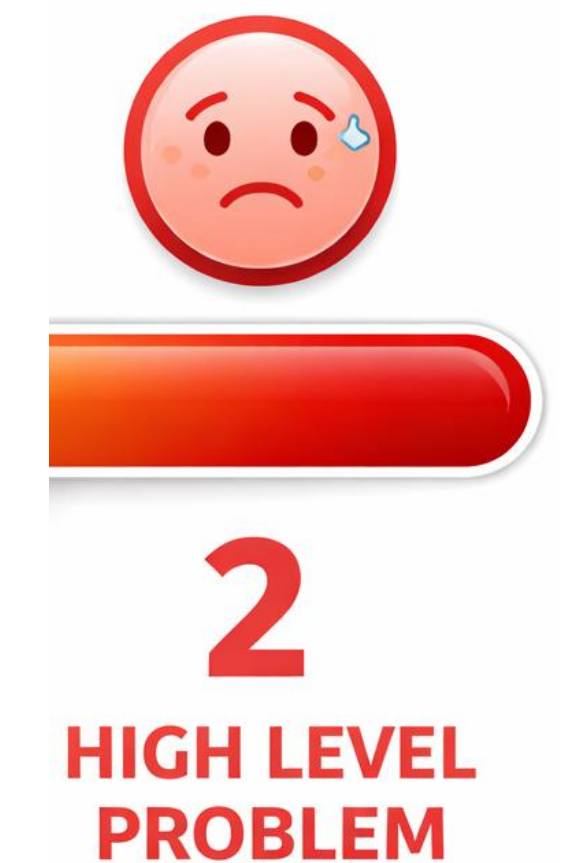
ROADSIDES: TREES, UTILITY POLES AND OTHER OBSTACLES

High level problem	Low level problem
High diameter trees less the 3 m from the roadway	High diameter trees between 3 and 8 m from the roadway
Rows of trees	Low diameter trees less than 3 m from the roadway
Concrete utility poles than 3 m from the roadway	Concrete poles between 3 and 8 m from roadway
High diameter utility poles less the 3 m from the roadway	High diameter metal poles between 3 and 8 m from the roadway
Rigid obstacles with exposed front face or corner less than 3 m the roadway	Low diameter metal poles less than 3 m from the roadway
	Rigid obstacles with exposed front face or corner between 3 and 8 m from the roadway
	Isolated trees or obstacles

CLASSIFICATION CRITERIA

ROADSIDES: TREES, UTILITY POLES AND OTHER OBSTACLES

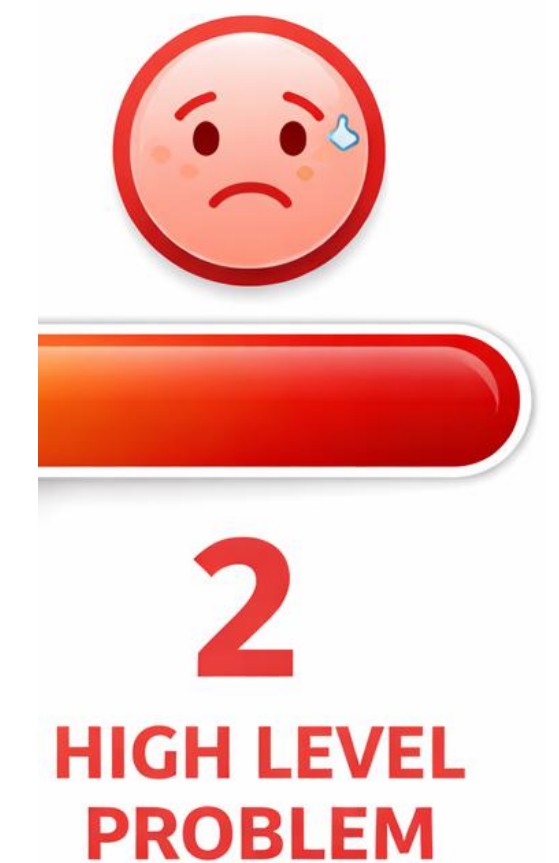
HIGH DIAMETER TREE NEAR THE ROADWAY



CLASSIFICATION CRITERIA

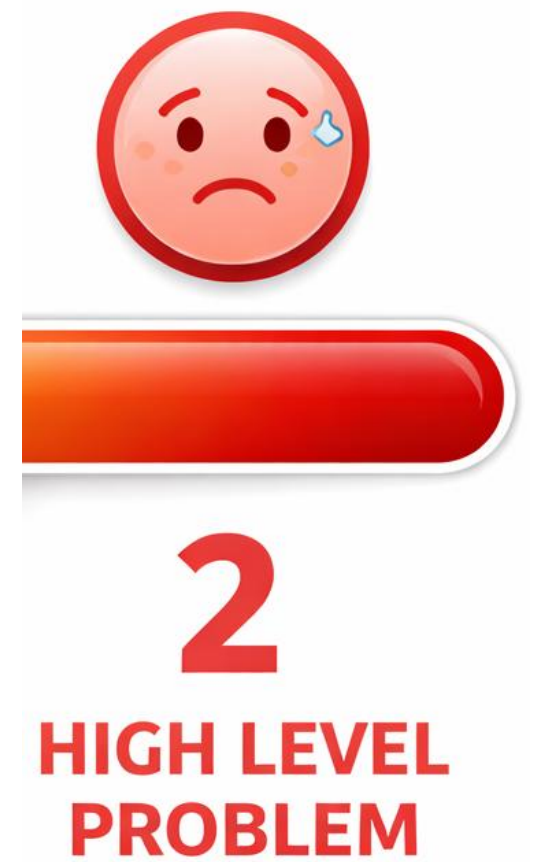
ROADSIDES: TREES, UTILITY POLES AND OTHER OBSTACLES

CONCRETE UTILITY POLE NEAR THE ROADWAY



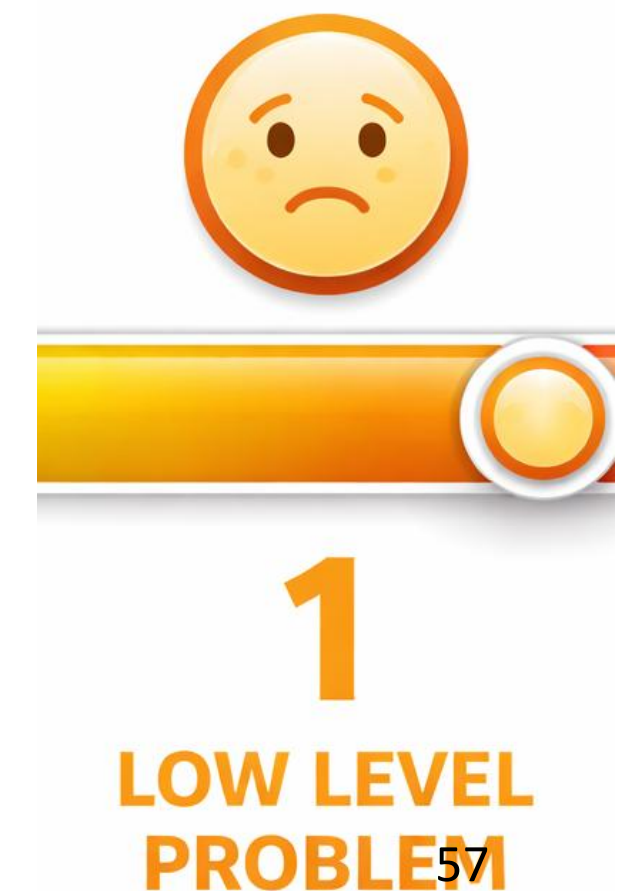
ROADSIDES: TREES, UTILITY CLASSIFICATION CRITERIA POLES AND OTHER OBSTACLES

STONE WALL



ROADSIDES: TREES, UTILITY CLASSIFICATION CRITERIA POLES AND OTHER OBSTACLES

LOW DIAMETER METAL POST



CLASSIFICATION CRITERIA

ROADSIDES: RECTANGULAR AND TRAPEZOIDAL DITCHES

High level problems	Low level problems
Rectangular and trapezoidal ditches less than 3 m from the roadway	Rectangular and trapezoidal ditches between 3 and 5 m from the roadway

ROADSIDES: RECTANGULAR CLASSIFICATION CRITERIA AND TRAPEZOIDAL DITCHES

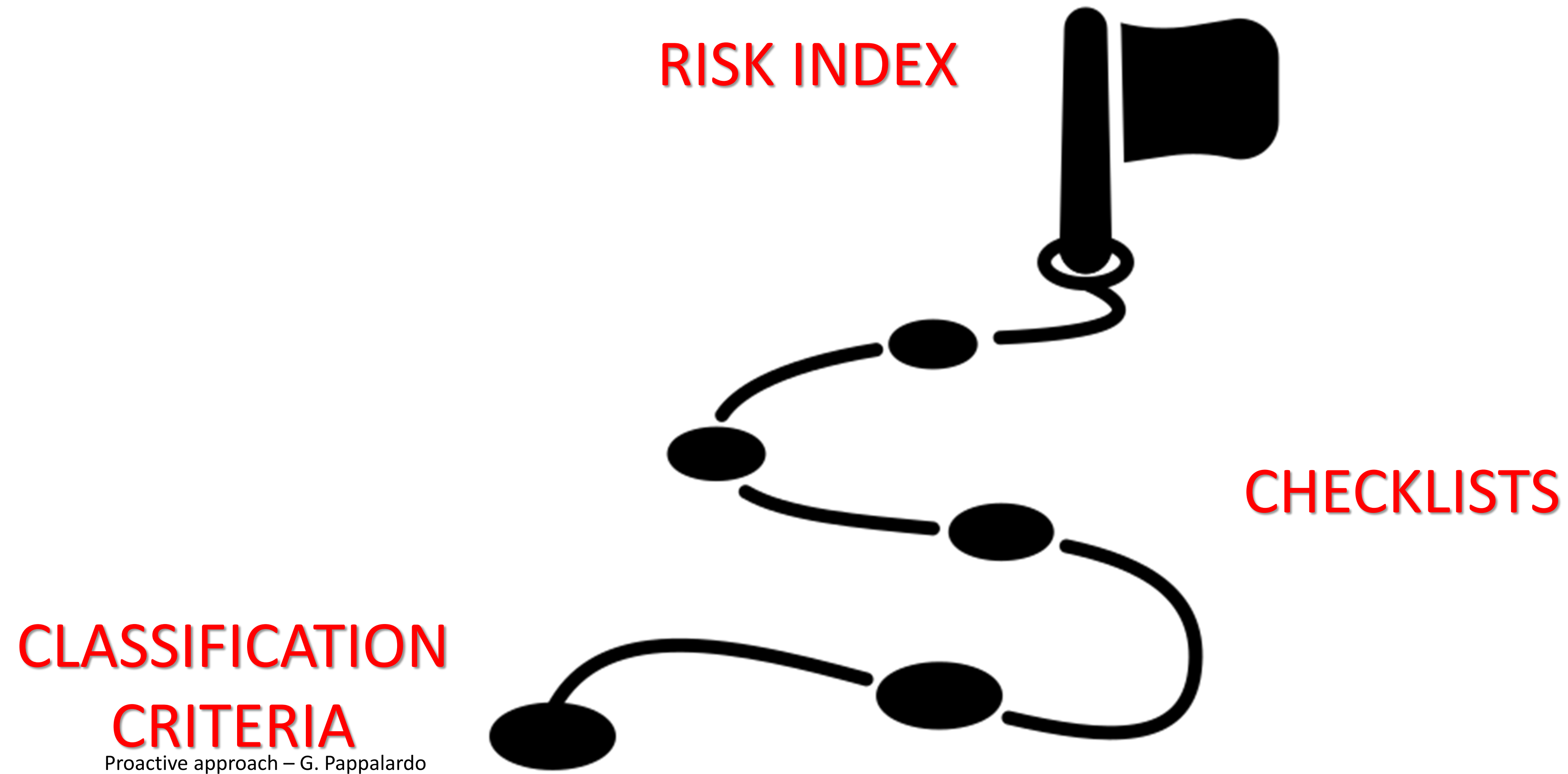
UNSHIELDED TRAPEZOIDAL DITCH



2

HIGH LEVEL
PROBLEM

OBJECTIVES



CHECKLISTS

- During general inspections, the checklists are filled for both runs in both directions
- Checklists are differentiated according to the position of the inspector
 - ✓ In the front seat
 - ✓ In the back seat
- Safety issues are ranked as high level problem and low level problem and for each problem the inspector can insert a tick against different levels
- If no problem exists then no sign is inserted

CHECKLISTS

- The checklist evaluations are recorded for each 200 m segment (every 24 s at a speed of 30 km/h)
- This interval is a compromise between
 - ✓ the possibility of easily expressing a reliable evaluation, which requires observation periods of limited length
 - ✓ the possibility of having a sufficient amount of time available to compile the checklist, which requires periods that are not too short

CHECKLISTS

- The tasks of the front-seat and back-seat inspectors are separated in order to distribute the effort for the completion of the checklists, also bearing in mind that the road environment is perceived differently according to their positions inside the car:
 - ✓ the **front-seat inspector** is interested in aspects linked to roadside, alignment and accesses
 - ✓ the **back-seat inspector** is interested in the aspects linked to cross-section, pavement delineation, road signs and road markings

CHECKLISTS

- The checklists are divided into two parts
 - ✓ **Part A** contains elements that must be completed during the inspection in order to have a correct evaluation
 - ✓ **Part B** contains elements that can also be evaluated in the office using the video recording

CHECKLISTS

	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
PART A										
Roadside										
Embankments										
Bridges										
Dangerous terminals and transitions										
Trees, utility poles and rigid obstacles										
Ditches										
Alignment										
Inadequate sight distance on horizontal curve										
Inadequate sight distance on vertical curve										
PART B										
Accesses										
Dangerous accesses										
Presence of accesses										

CHECKLISTS

	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
PART A										
Cross section										
Lane width	■	□	■	□	■	□	■	□	■	□
Shoulder width	■	□	■	□	■	□	■	□	■	□
Pavement										
Friction	■									
Unevenness	■	□	■	□	■	□	■	□	■	□
Delineation										
Chevrons	■	□	■	□	■	□	■	□	■	□
Guideposts and barrier reflectors	■	□	■	□	■	□	■	□	■	□
PART B										
Signs										
Warning signs, regulation signs	■	□	■	□	■	□	■	□	■	□
Markings										
Edge lines	■	□	■	□	■	□	■	□	■	□
Center line	■	□	■	□	■	□	■	□	■	□

CHECKLISTS



CHECKLISTS

SHEET	MODULE FOR FRONT-SEAT INSPECTOR									MODULE FOR BACK-SEAT INSPECTOR								
	Roadside					Accesses		Alignment		Markings		Cross sections		Pavement		Signs	Delineation	
A	Embankment s	Bridges	Dangerous terminal and transitions	Trees,utility poles and rigid obstacles	Ditches	Dangerous accesses	Presence of accesses	Inadequate sight distance on horizontal curve	Inadequate sight distance on vertical curve	Edge lines	Center lines	Line width	Shoulder width	Friction	Unevenness	Warning signs, regulation signs	Chevrons	Guide posts and barrier reflectors
48	1	0	0	1	0	0	0	1	0	1	0	0	2	0	0	0	2	2

CHECKLISTS



CHECKLISTS

SHEET	MODULE FOR FRONT-SEAT INSPECTOR									MODULE FOR BACK-SEAT INSPECTOR								
	Roadside					Accesses		Alignment		Markings		Cross sections		Pavement		Signs	Delineation	
R	Embankment s	Bridges	Dangerous terminal and transitions	Trees,utility poles and rigid obstacles	Ditches	Dangerous accesses	Presence of accesses	Inadequate sight distance on horizontal curve	Inadequate sight distance on vertical curve	Edge lines	Center lines	Line width	Shoulder width	Friction	Unevenness	Warning signs, regulation signs	Chevrons	Guide posts and barrier reflectors
48	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	1



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EUROPEAN ROAD SAFETY PARTNERSHIP

NETWORK WIDE ROAD SAFETY ASSESSMENT



Università
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Weimar



Sveučilište u Zagrebu



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