

Visibility Model

Bob Carnaby

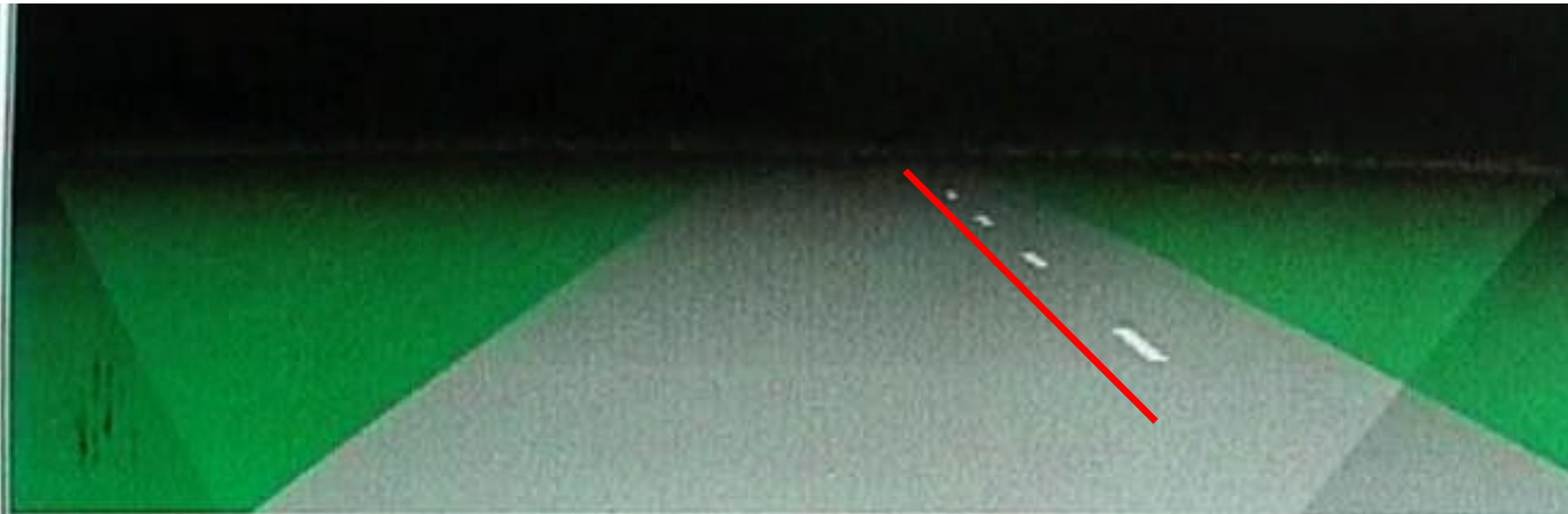
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European Visibility Model

- Road Preview Time (seconds)
- End of Line Detection Distance (metres)
- A Visual Display

- ✓ **3 Seconds of driver reaction time**
- ✓ **0.65 seconds of eye fixation time**
- ✓ **Total minimum road preview time of 3.65 Secs at highway speeds. (Zwalan and Schnell. Uni of Ohio, USA).**



Result
THE ROAD MARKING IS VISIBLE AT (VL=10) 61 m
(gives a preview time of 2.2 s at the speed of 100 km/h)

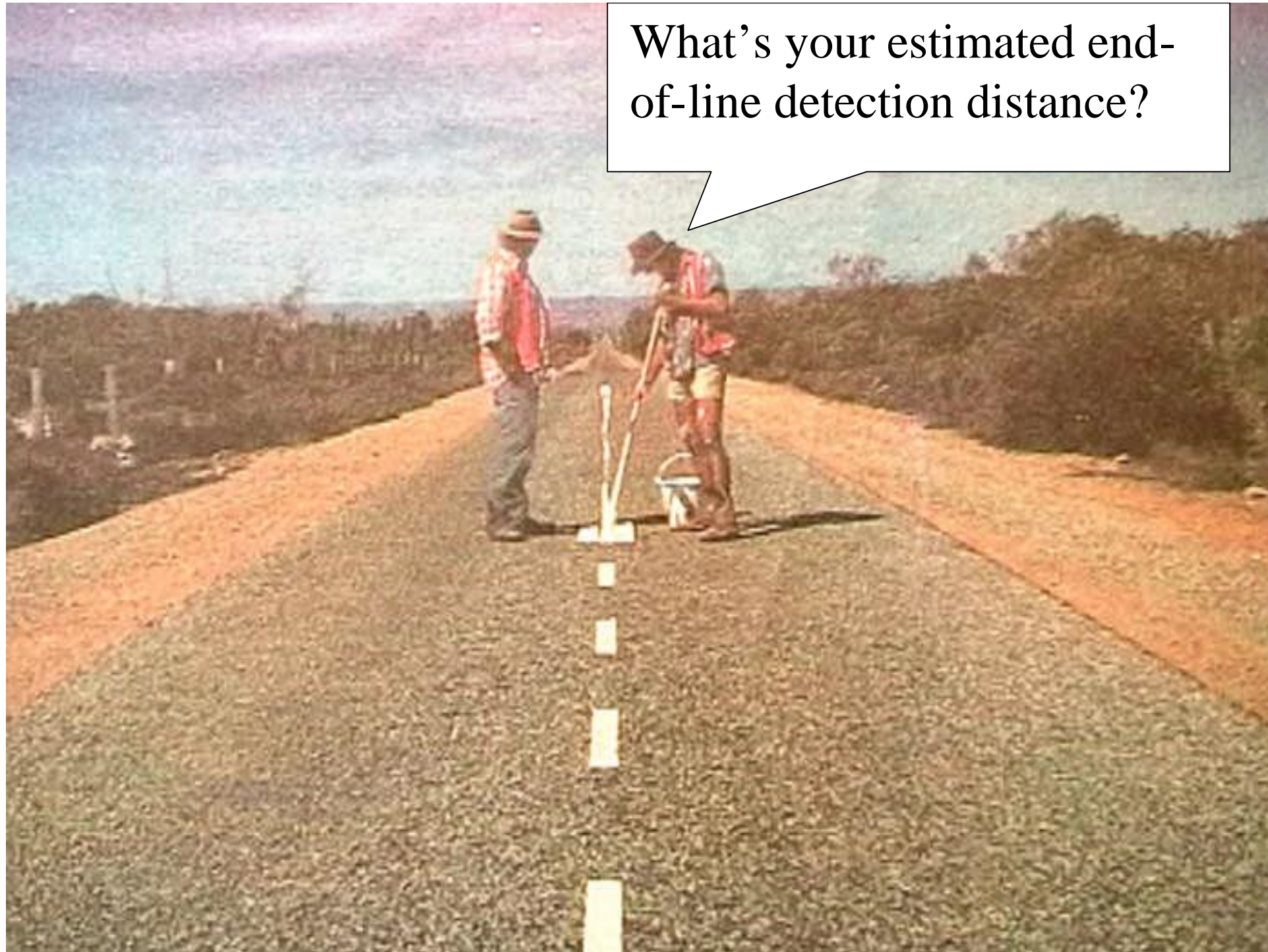
Driver and vehicle
40 years Traffic Left Right Vehicle Car Lorry MC
Speed [km/h] 100 Glare (Veiling luminance) 0 [cd/m²]

Curvature of road
Horizontal radius [m] Right Left Straight 625
Vertical radius [m] Up Down Flat 1000

Headlamp illumination
 Off Low High
Intensity factor 0.50
Surface RL [mcd/m²/lx] 10
Marking RL [mcd/m²/lx] 100

Marking lay-out
Type Continuous Broken Position Left Right
Lane width [m] 3.5 Marking length [m] 3
Marking width [m] 0.1 Gap length [m] 9
Effective marking width used in calculations: 0.025 m

What's your estimated end-of-line detection distance?





Result
THE ROAD MARKING IS VISIBLE AT (VL=10) **89 m**
(gives a preview time of **3.2 s** at the speed of 100 km/h)

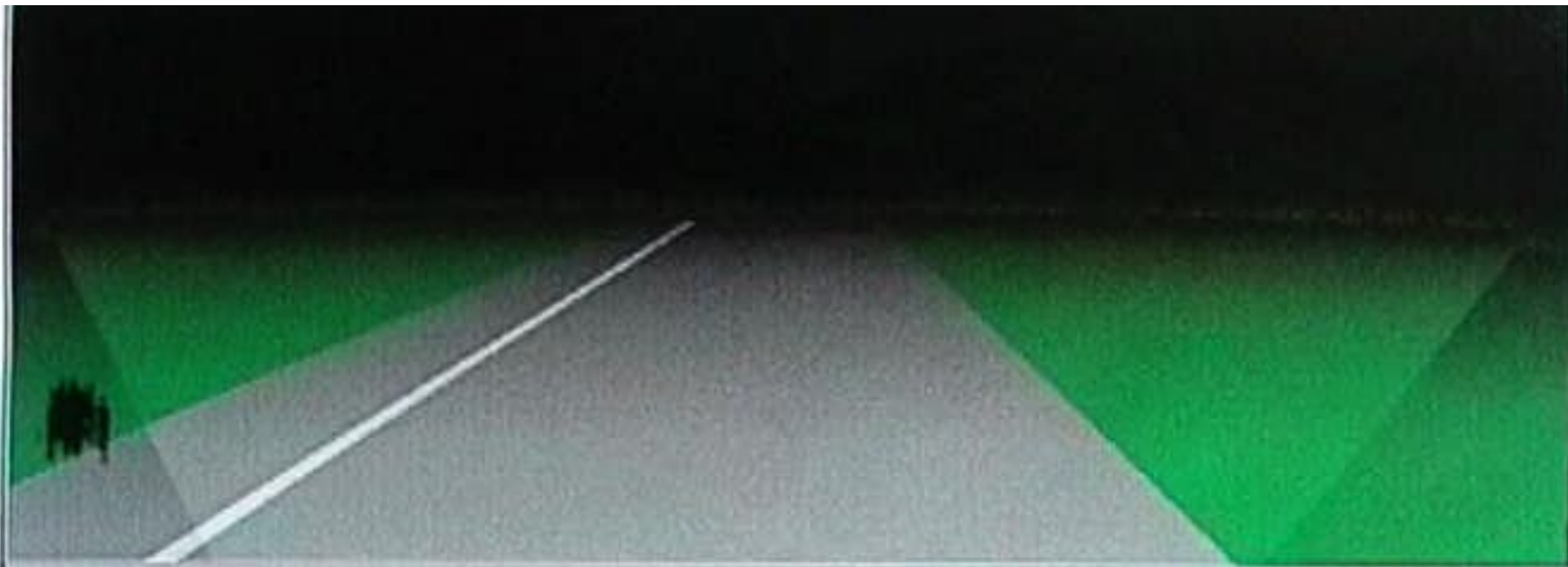
Headlamp illumination
 Off Low High

Driver and vehicle
Age: years
Traffic: Left Right
Vehicle: Car Lorry MC
Speed [km/h]: Glare (Veiling luminance) [cd/m²]

Intensity factor:
Surface RL [mcd/m²/lx]:
Marking RL [mcd/m²/lx]:

Curvature of road
Horizontal radius [m]:
 Right Left Straight
Vertical radius [m]:
 Up Down Flat

Marking lay-out
Type: Continuous Broken
Position: Left Right
Lane width [m]: Marking length [m]:
Marking width [m]: Gap length [m]:



Result
THE ROAD MARKING IS VISIBLE AT (VL=10): 78 m
(gives a preview time of 2.8 s at the speed of 100 km/h)

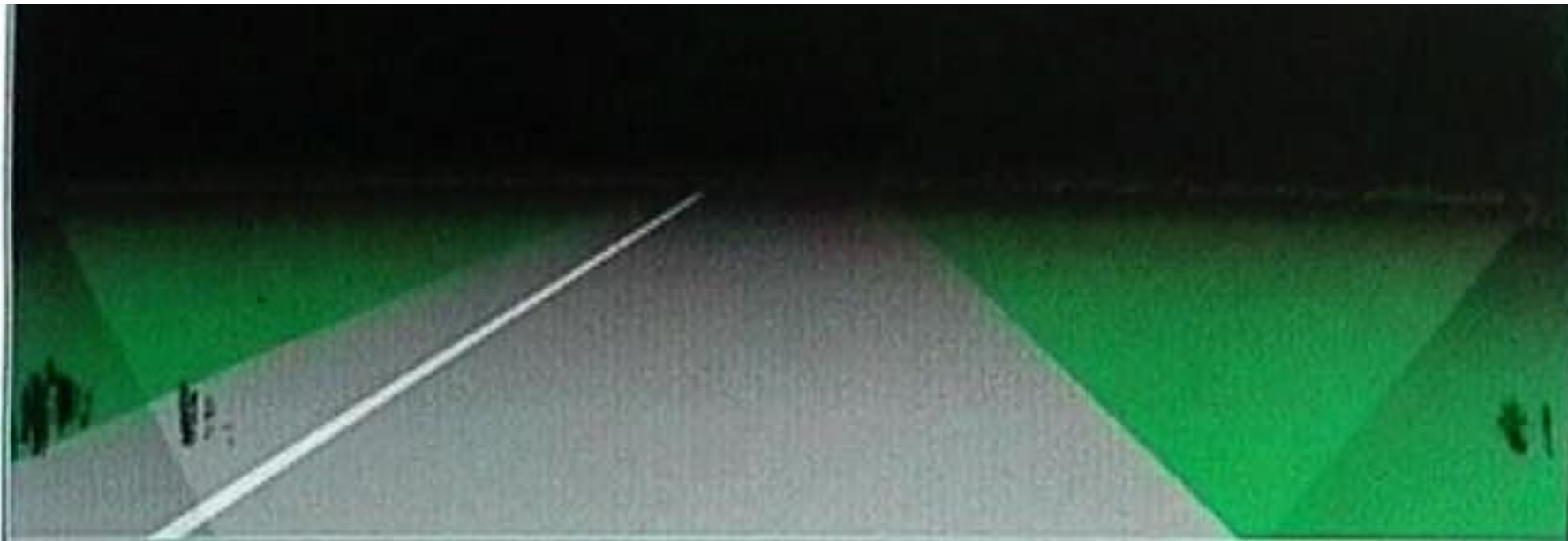
Driver and vehicle
60 years Traffic: Left Right Vehicle: Car Lorry MC
Speed [km/h] 100 Glare (Veiling luminance) 0 [cd/m²]

Headlamp illumination
 Off Low High
Intensity factor 0.50
Surface RL [mcd/m²/lx] 10
Marking RL [mcd/m²/lx] 100

Diffuse
 On
Illumin
Surface
Marking

Curvature of road
Horizontal radius [m]: Right Left Straight 625
Vertical radius [m]: Up Down Flat 1000

Marking lay-out
Type: Continuous Broken Position: Left Right
Lane width [m] 3.5 Marking length [m] 3
Marking width [m] 0.1 Gap length [m] 9



Result
THE ROAD MARKING IS VISIBLE AT (VL=10): 85 m
(gives a preview time of 3.1 s at the speed of 100 km/h)

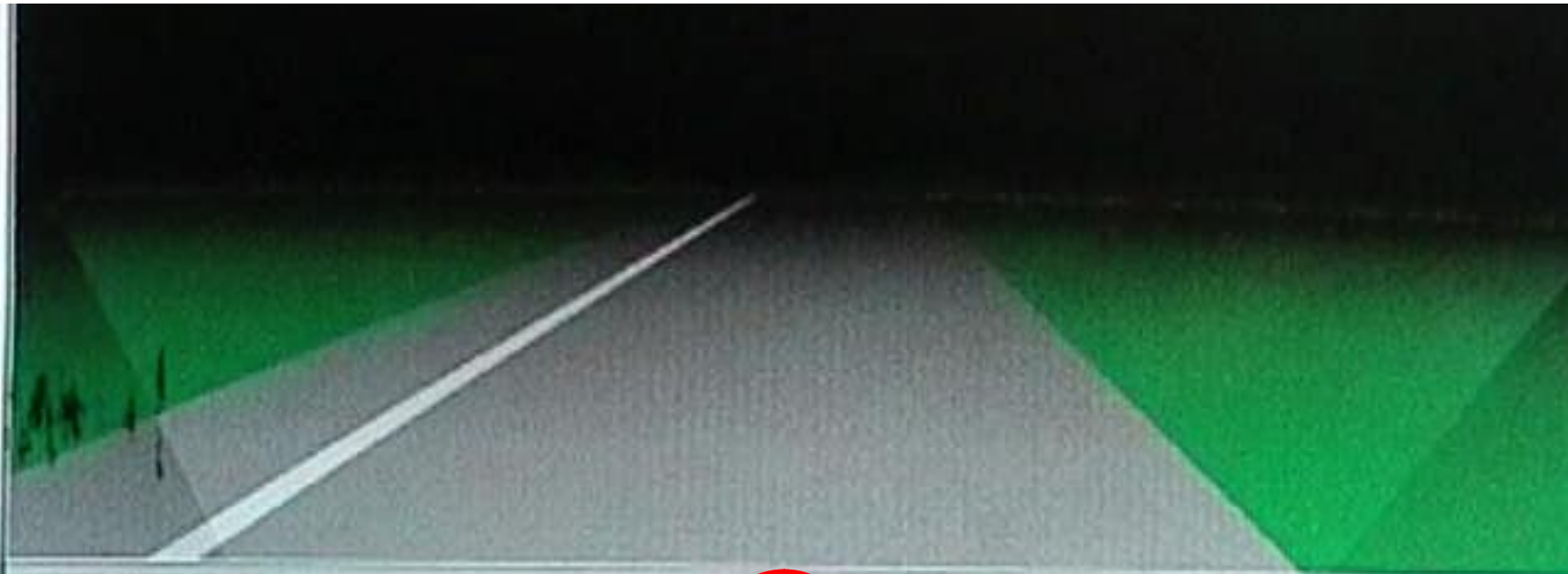
Driver and vehicle
40 years Traffic: Left Right Vehicle: Car Lorry MC
Speed [km/h] 100 Glare (Veiling luminance) 0 [cd/m²]

Headlamp illumination
 Off Low High
Intensity factor 0.50
Surface RL [mcd/m²/lx] 10
Marking RL [mcd/m²/lx] 100

Diffuse i
 Off
Illuminan
Surface
Marking

Curvature of road
Horizontal radius [m] Right Left Straight 625
Vertical radius [m] Up Down Flat 1000

Marking lay-out
Type: Continuous Broken Position: Left Right
Lane width [m] 3.5 Marking length [m] 3
Marking width [m] 0.1 Gap length [m] 0



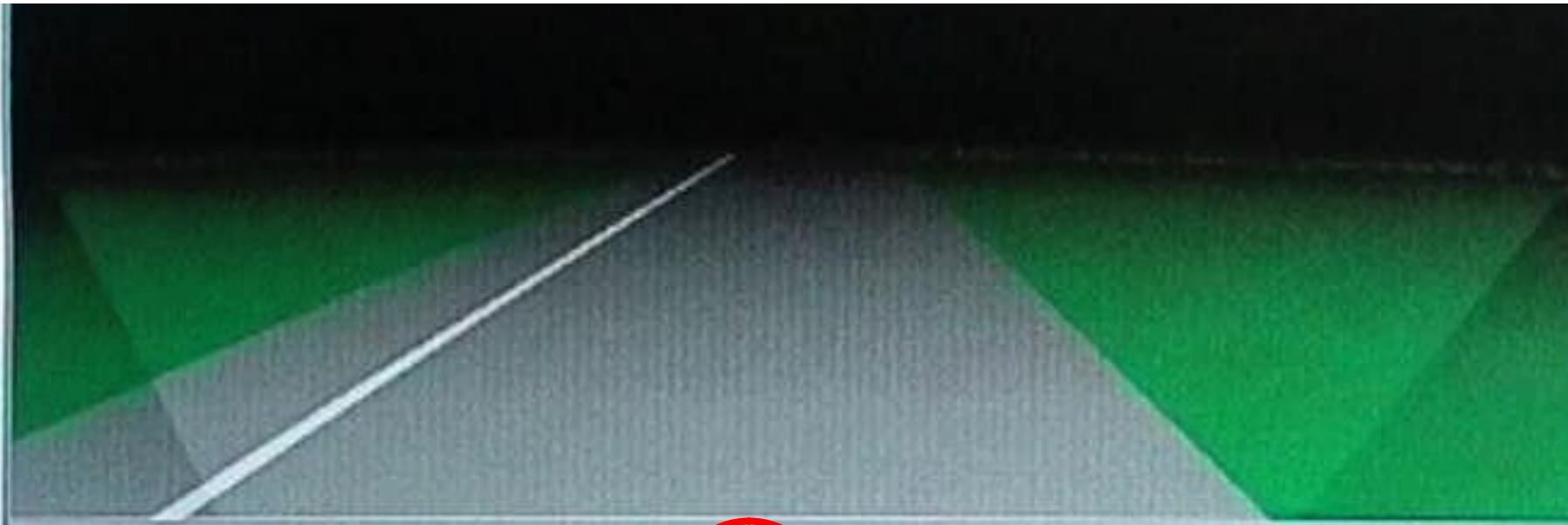
Result
THE ROAD MARKING IS VISIBLE AT (VL=10) 94 m
(gives a preview time of 3.4 s at the speed of 100 km/h)

Driver and vehicle
40 years Traffic Vehicle
 Left Right Car Lorry MC
Speed [km/h] 100 Glare (Veiling luminance) 0 [cd/m²]

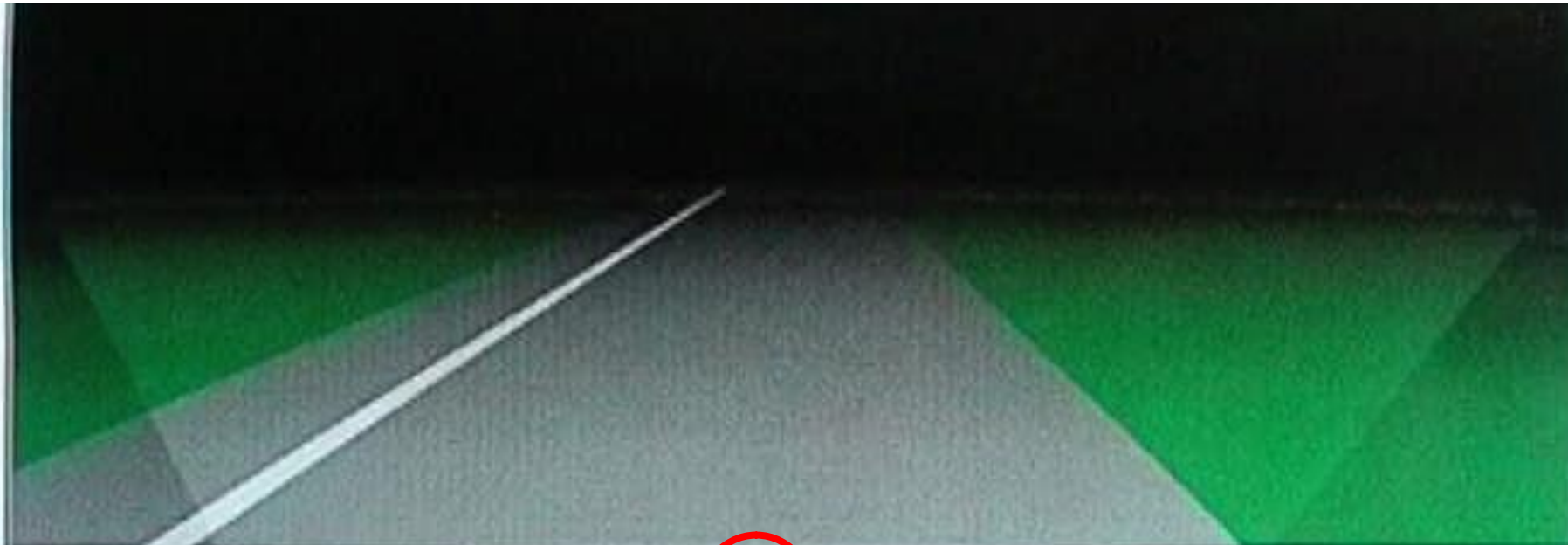
Headlamp illumination
 Off Low High
Intensity factor 0.50
Surface RL [mcd/m²/lx] 10
Marking RL [mcd/m²/lx] 100

Curvature of road
Horizontal radius [m]
 Right Left Straight 625
Vertical radius [m]
 Up Down Flat 1000

Marking lay-out
Type Portion
 Continuous Broken Left Right
Lane width [m] 3.5 Marking length [m] 3
Marking width [m] 0.15 Gap length [m] 3



Result THE ROAD MARKING IS VISIBLE AT (VL=10): 97 m (gives a preview time of 3.5 s at the speed of 100 km/h)		Headlamp illumination		Diff	
Driver and vehicle		<input type="radio"/> Off <input type="radio"/> Low <input checked="" type="radio"/> High		<input checked="" type="radio"/>	
<input checked="" type="radio"/> 40 years	Traffic <input checked="" type="radio"/> Left <input type="radio"/> Right	Vehicle <input checked="" type="radio"/> Car <input type="radio"/> Lorry <input type="radio"/> MC	Intensity factor	<input type="text" value="0.50"/>	Illu
Speed [km/h]	<input type="text" value="100"/>	Glare (Veiling luminance)	<input type="text" value="0"/>	[cd/m ²]	Surf
Curvature of road		Surface RL [mcd/m ² /lx]		<input type="text" value="10"/>	Mar
Horizontal radius [m]		Marking RL [mcd/m ² /lx]		<input type="text" value="150"/>	
<input type="radio"/> Right <input type="radio"/> Left <input checked="" type="radio"/> Straight	<input type="text" value="625"/>	Marking lay-out			
Vertical radius [m]		Type	Position		
<input type="radio"/> Up <input type="radio"/> Down <input checked="" type="radio"/> Flat	<input type="text" value="1000"/>	<input checked="" type="radio"/> Continuous <input type="radio"/> Broken	<input checked="" type="radio"/> Left <input type="radio"/> Right		
		Lane width [m]	<input type="text" value="3.5"/>	Marking length [m]	<input type="text" value="3"/>
		Marking width [m]	<input type="text" value="0.1"/>	Gap length [m]	<input type="text" value="0"/>



Result
THE ROAD MARKING IS VISIBLE AT (VL=10): 107 m
(gives a preview time of 3.9 s at the speed of 100 km/h)

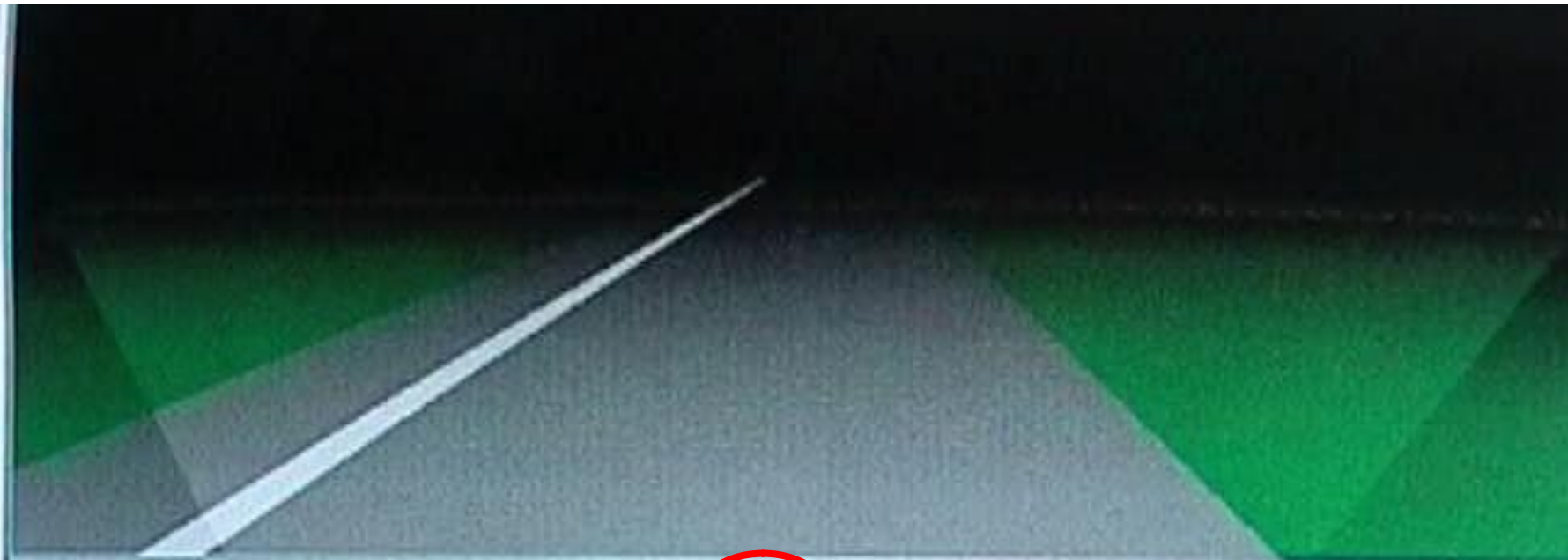
Driver and vehicle
40 years Traffic Vehicle
 Left Right Car Lorry MC
Speed [km/h] 100 Glare (Veiling luminance) 0 [cd/m²]

Headlamp illumination
 Off Low High
Intensity factor 0.50
Surface RL [mcd/m²/lx] 10
Marking RL [mcd/m²/lx] 150

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Markin

Curvature of road
Horizontal radius [m]
 Right Left Straight 625
Vertical radius [m]
 Up Down Flat 1000

Marking lay-out
Type Position
 Continuous Broken Left Right
Lane width [m] 3.5 Marking length [m] 3
Marking width [m] 0.15 Gap length [m] 9



Result THE ROAD MARKING IS VISIBLE AT (VL=10): 124 m (gives a preview time of 4.5 s at the speed of 100 km/h)		Headlamp illumination	
Driver and vehicle		<input type="radio"/> Off <input type="radio"/> Low <input checked="" type="radio"/> High	
<input checked="" type="radio"/> 40 years	Traffic <input checked="" type="radio"/> Left <input type="radio"/> Right	Intensity factor <input type="text" value="0.50"/>	
Speed [km/h] <input type="text" value="100"/>	Vehicle <input checked="" type="radio"/> Car <input type="radio"/> Lorry <input type="radio"/> MC	Surface RL [mcd/m ² /lx] <input type="text" value="10"/>	
Glare (Veiling luminance) <input type="text" value="0"/> [cd/m ²]		Marking RL [mcd/m ² /lx] <input type="text" value="200"/>	
Curvature of road		Marking lay-out	
Horizontal radius [m] <input type="radio"/> Right <input type="radio"/> Left <input checked="" type="radio"/> Straight <input type="text" value="625"/>		Type <input checked="" type="radio"/> Continuous <input type="radio"/> Broken	
Vertical radius [m] <input type="radio"/> Up <input type="radio"/> Down <input checked="" type="radio"/> Flat <input type="text" value="1000"/>		Position <input checked="" type="radio"/> Left <input type="radio"/> Right	
		Lane width [m] <input type="text" value="3.5"/> Marking length [m] <input type="text" value="3"/>	
		Marking width [m] <input type="text" value="0.2"/> Gap length [m] <input type="text" value="9"/>	



Result
THE ROAD MARKING IS VISIBLE AT (VL=10): 61 m
(gives a preview time of 2.2 s at the speed of 100 km/h)

Driver and vehicle
40 years Traffic: Left Right Vehicle: Car Lorry MC
Speed [km/h] 100 Glare (Veiling luminance) 0 [cd/m²]

Headlamp illumination
 Off Low High
Intensity factor 0.50
Surface RL [mcd/m²/lx] 10
Marking RL [mcd/m²/lx] 100

Curvature of road
Horizontal radius [m]: Right Left Straight 625
Vertical radius [m]: Up Down Flat 1000

Marking lay-out
Type: Continuous Broken Position: Left Right
Lane width [m] 3.5 Marking length [m] 3
Marking width [m] 0.1 Gap length [m] 9
Effective marking width used in calculations: 0.025 m

Min 3.65 secs

Visibility Model						
Exercise No.	Line width mm	Retroreflectivity mcd/lux/m2	Driver Age	Line Pattern	End of Line (m) Detection Distance	Road Preview Time (Secs.)
1	100	100	20	EL	89	3.2
2	100	100	60	EL	78	2.8
3	100	100	40	EL	85	3.1
4	150	100	40	EL	94	3.4
5	100	150	40	EL	97	3.5
6	150	150	40	EL	107	3.9
7	200	200	40	EL	124	4.5
8	100	100	40	broken CL	61	2.2

