IRF SAFER ROADS BY DESIGN®




expo 2012 vial Argentina

XVI ARGENTINE CONGRESS OF ROAD ADMINISTRATION AND TRAFFIC

7° EXPOVIAL ARGENTINA

OCTOBER 22nd to 26th, 2012

IX INTERNATIONAL CONGRESS OF ITS

XXXVII ASPHALT MEETING

INTERNATIONAL SEMINAR ON CONCRETE PAVEMENT

XXXVII REUNIÓN DEL ASFALTO

ICPA

COMPLEJO FERIAL CÓRDOBA - CITY OF CÓRDOBA- ARGENTINA

TRANSPORT CHALLENGES FACING GROWTH

IRF SAFER ROADS BY DESIGN®

THE ABC'S OF TMAS
OCTOBER, 2012
CORDOBA, ARGENTINA

TMAs can make almost any work truck safer

Some are bigger challenges than others!


TOYOTA


中国石油

TMAs

CAN PREVENT THIS CARNAGE


WHY?


WHY?


Crashlab
RUBBER TOUGH
80KPH - REAR IMPACT
03 MAY 2000
B00020


Crashlab
RUBBER TOUGH
80KPH – REAR IMPACT
03 MAY 2000
B00020


Crashlab
Crashlab
RUBBER TOUGH
03 MAY 2000
B00020
Crashlab
RUBBER TOUGH
80KPH – REAR IMPACT
03 MAY 2000
B00020


WHY?

Since the introduction of the TMA in the late 1970's...

Over 50,000 Units are in use

Thousands of lives have been saved

Mandatory in many states and countries for a variety of applications

Truck Mounted Attenuators (TMAs)…

Crash cushion attached to back of work vehicle
Reduce damage to impacting and protective vehicle
Improve protective vehicle effectiveness

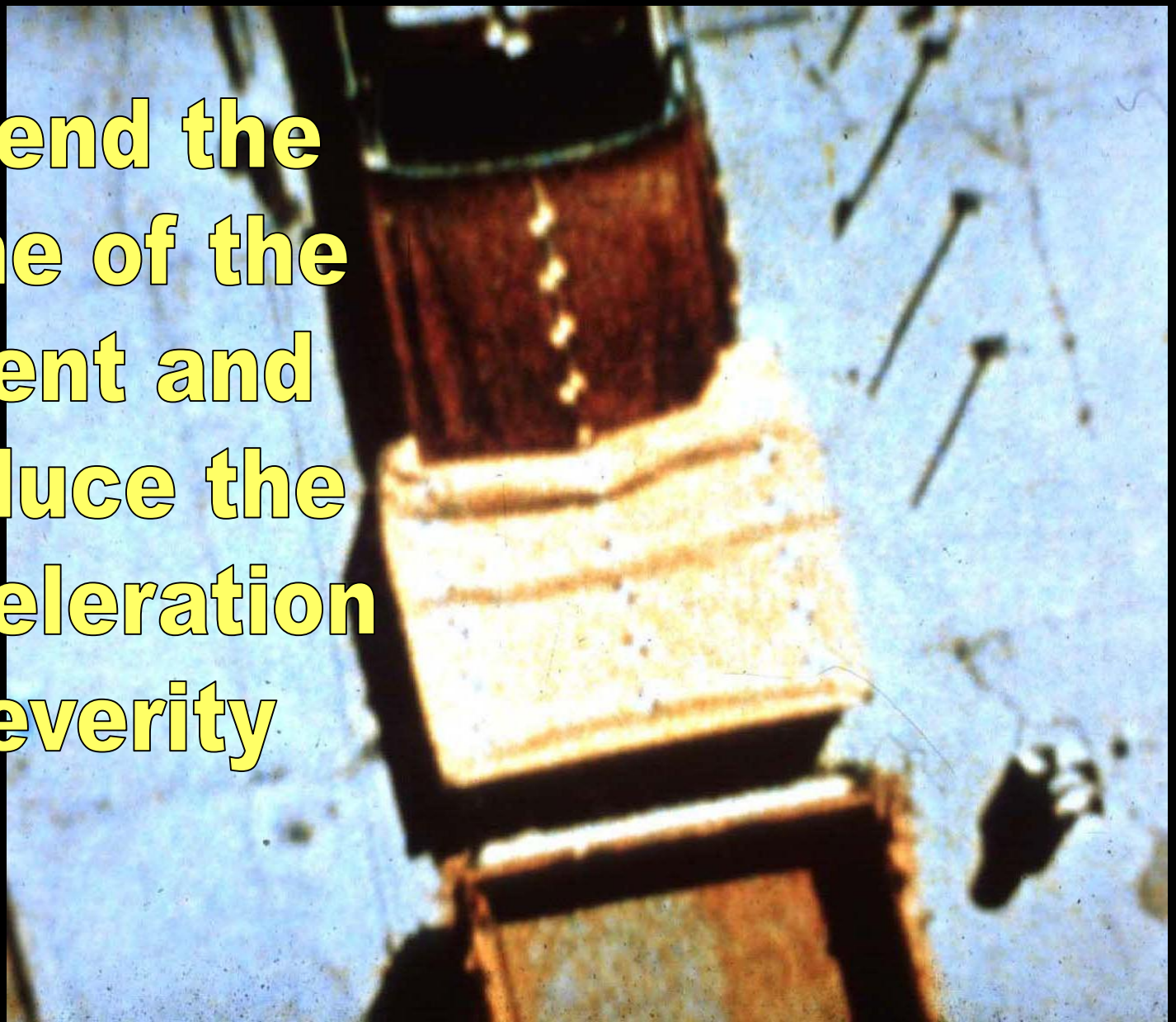
Truck Mounted Attenuators (TMAs)...

Same energy absorbing principles as stationary crash cushions

Evenly and gradually dissipate kinetic energy of impact

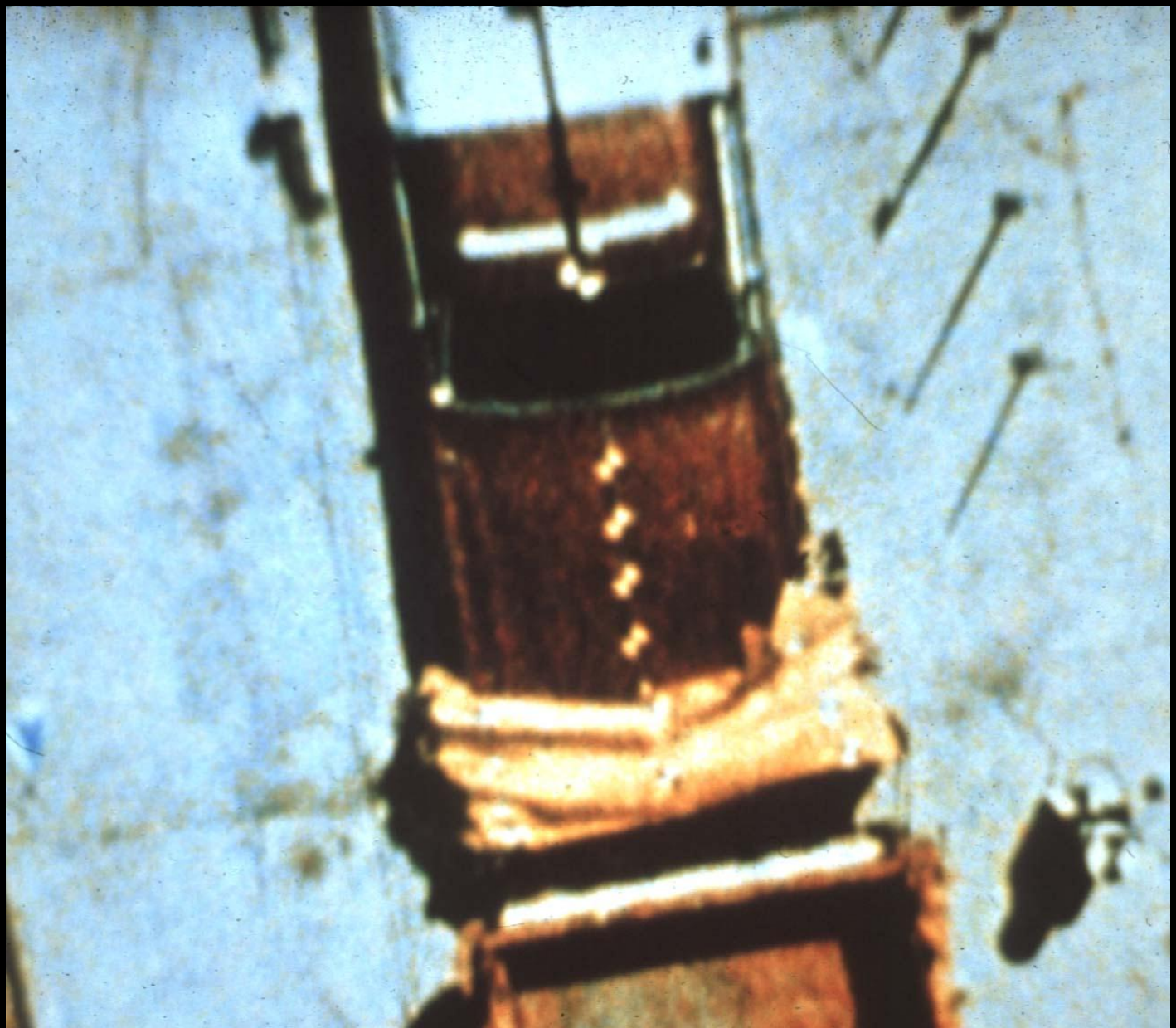
Prevent impacting vehicle from underriding truck

TMAs



Extend the Time of the Event and Reduce the Deceleration Severity

TMAs




horizont
horizont
horizont


MÜLLER-KIPPER
horizont
horizont

TMAS PROTECT

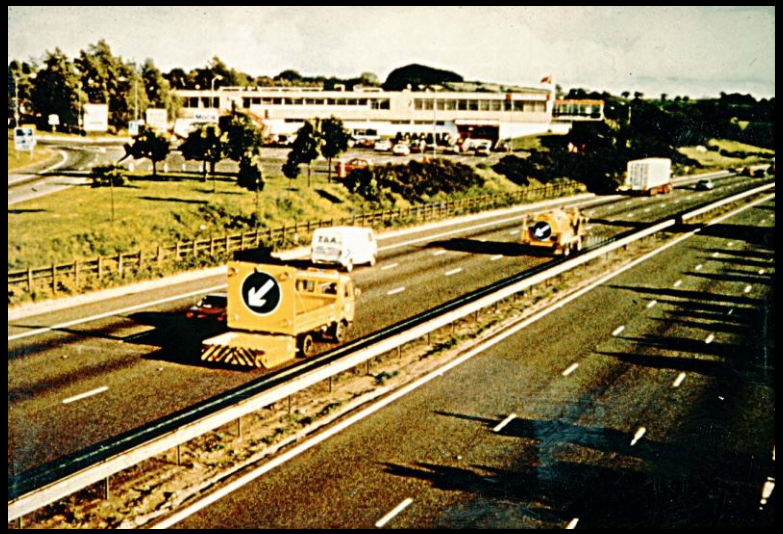
THE MOTORIST

THE TRUCK DRIVER

THE TRUCK

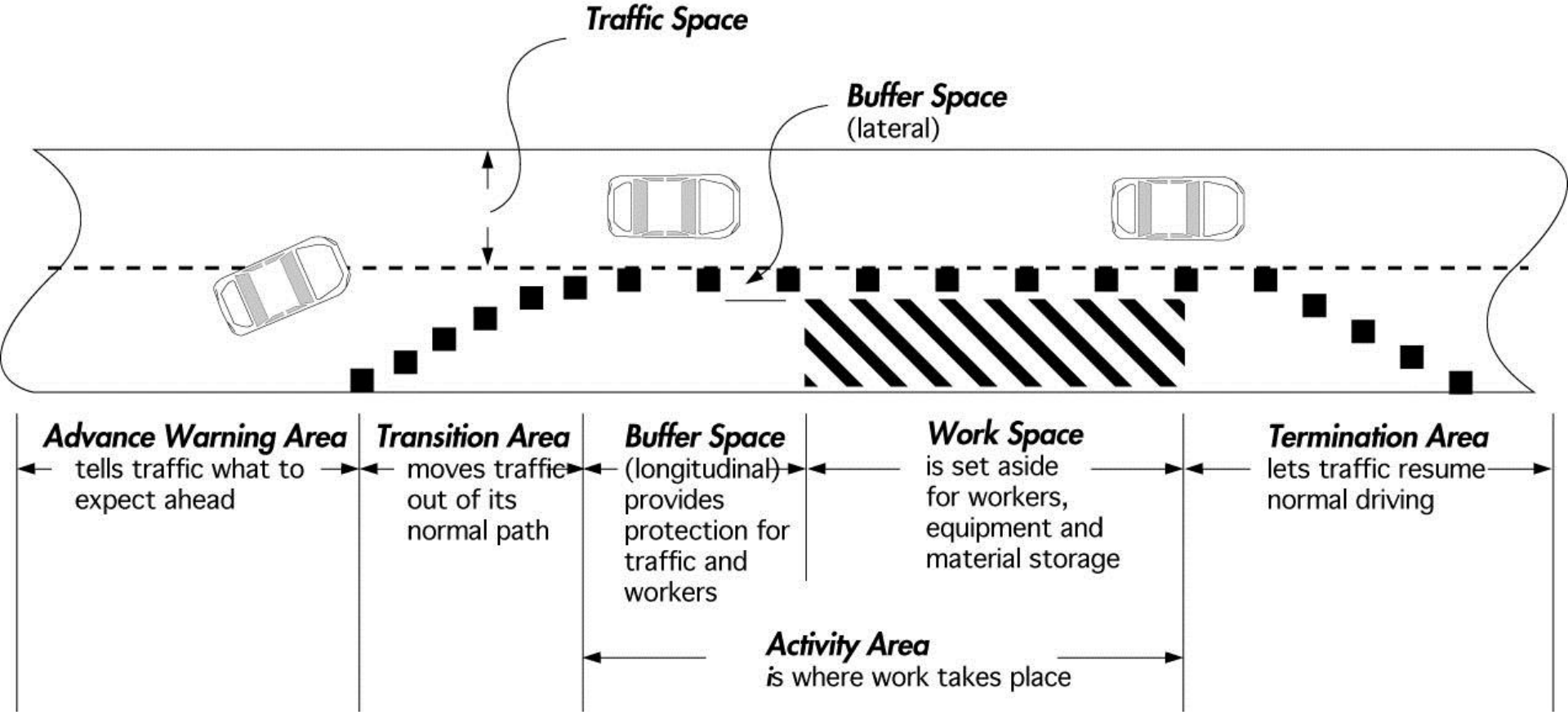
TMA Applications

TMAs ARE USED FOR A VARIETY OF APPLICATIONS AROUND THE WORLD



over 50,000 currently in use

Work Zone Elements



Protective Vehicles

Used to shield workers and equipment in work area

Protective Vehicles

When these vehicles are used in a stationary operation, they are called

Barrier Vehicles

Stationary Work Area
Outside Lane Closure

Short duration
project (< 1 hour)

Work Space

Intervening Space

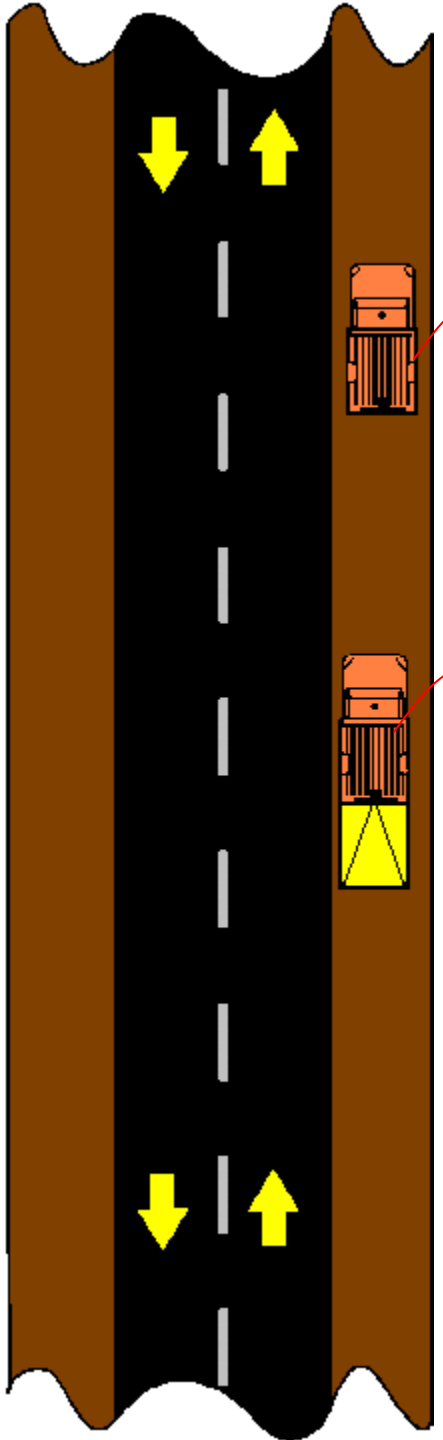
Barrier Vehicle
with Attenuator


Nor-stikk
018
ENERGY ABSORPTION

Protective Vehicles

When these vehicles are used in a mobile operation, they are called

Shadow Vehicles

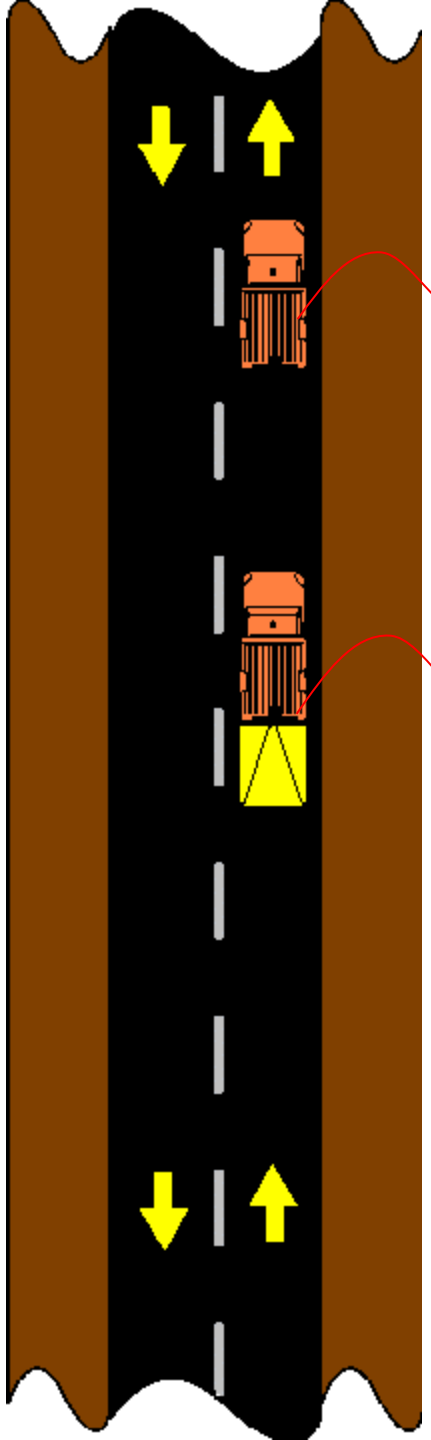


Mobile Operation
On Shoulder

Work Vehicle

Shadow Vehicle
with Attenuator


SCHMIDT
SCHMIDT



Mobile Operation
On Two Lane Road

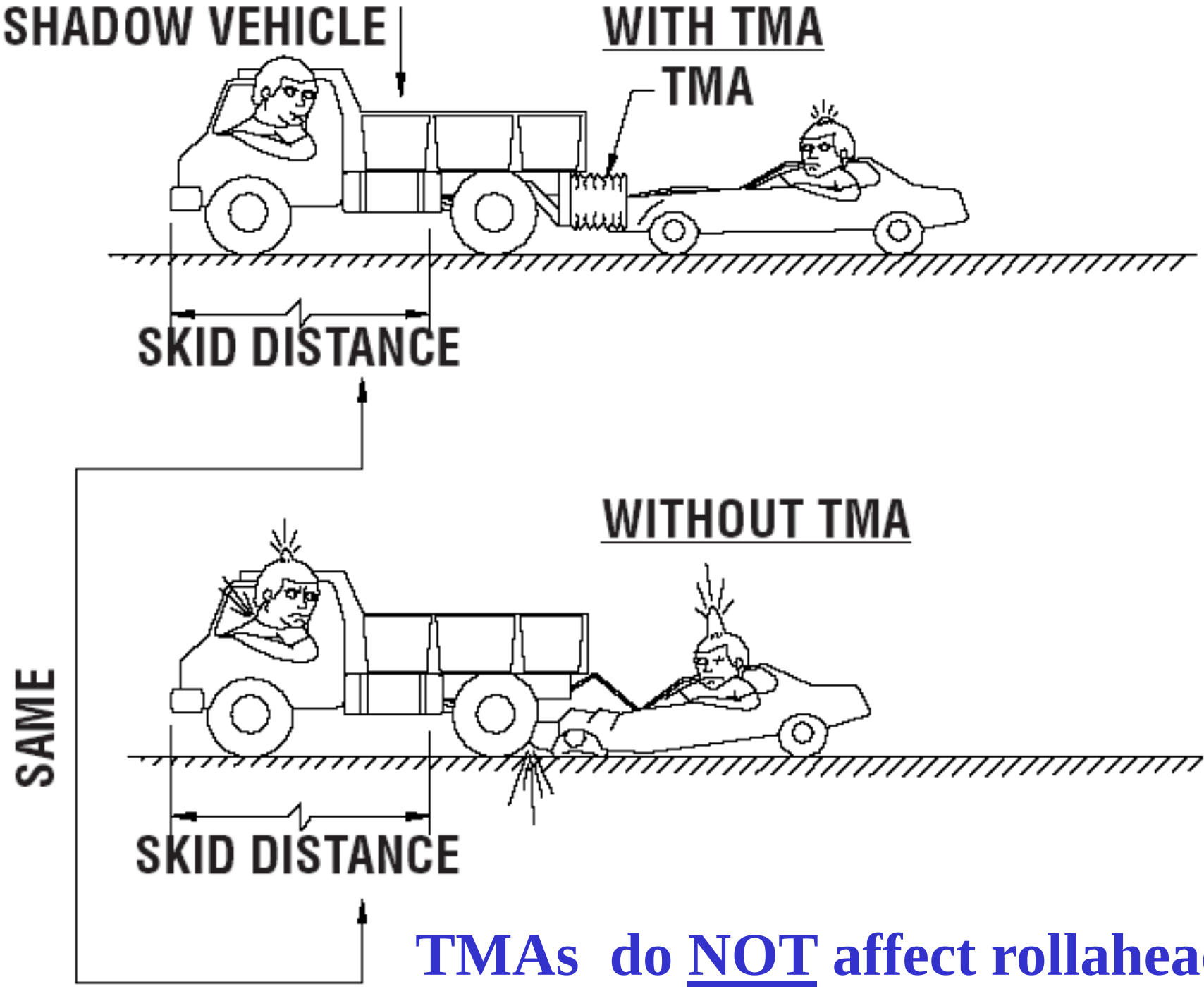
Work Vehicle

Shadow Vehicle
with Attenuator


WOLTERS
ROAD-SECURITY-EQUIPMENT
N.V. WOLTERS
60

Regardless of the type of truck or the application, work zone workers should always take ROLLAHEAD into consideration.

So what is ROLLAHEAD ?



TMAs do NOT affect rollahead

Roll-Ahead Distance Factors

NOTE: TMA DOES NOT AFFECT ROLLAHEAD DISTANCE

Roll-Ahead Distance Factors

NOTE: TMA DOES NOT AFFECT ROLLAHEAD DISTANCE

BUT THESE FACTORS DO

- Angle of impact
- Vehicle weight & speed
- Pavement conditions
- Brake engagement

Roll-Ahead Distances for Shadow Vehicles - Metric

Weight of Shadow Vehicle (moving)	Prevailing speed (km/h)	Weight of Impacting Vehicle to be Contained*			
		2,040 kg	4,536 kg	6,804 kg	10,886 kg
4,536 kg	96-105	30 m	53 m	69 m	84 m
	80-88	30 m	46 m	53 m	60 m
	72	23 m	36 m	38 m	46 m
6,804 kg	96-105	23 m	46 m	53 m	69 m
	80-88	23 m	38 m	46 m	53 m
	72	15 m	30 m	30 m	30 m
10,886 kg	96 -105	23 m	30 m	46 m	53 m
	80 -88	15 m	23 m	30 m	46 m
	72	15 m	23 m	23 m	30 m

Note: Distances are appropriate for shadow vehicles speeds up to 25 km/h

***Weights of typical vehicles:**

Mid-size automobile — 2,250 lbs
Full-size automobile — 3,500 lbs
Loaded 3/4-ton pickup truck — 6,000 lbs
Loaded 1-ton cargo truck — 10,000 lbs
Loaded 4-yard dump truck — 24,000 lbs

Source Note: Humphrey/Sullivan Report

Roll-Ahead Distances for Barrier Vehicles - Metric

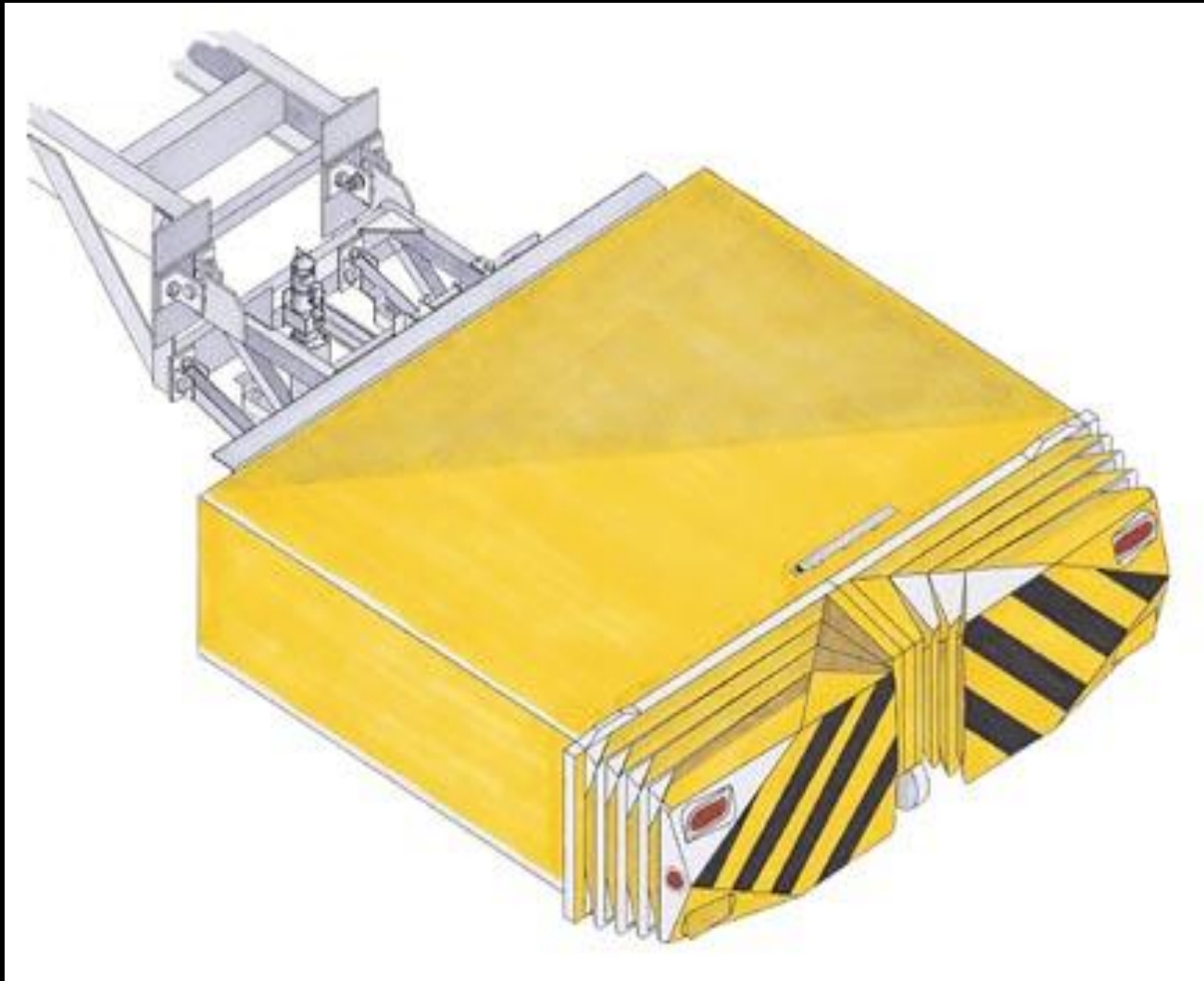
Weight of Barrier Vehicle (stationery)	Prevailing speed (km/h)	Weight of Impacting Vehicle to be Contained*			
		2,040 kg	4,536 kg	6,804 kg	10,886 kg
4,536 kg	96-105	15 m	30 m	46 m	60 m
	80-88	8 m	23 m	30 m	46 m
	72	8 m	15 m	23 m	30 m
6,804 kg	96-105	8 m	23 m	30 m	46 m
	80-88	8 m	15 m	23 m	30 m
	72	8 m	8 m	15 m	23 m
10,886 kg	96-105	8 m	15 m	23 m	30 m
	80-88	8 m	8 m	15 m	23 m
	72	8 m	8 m	8 m	15 m

***Weights of typical vehicles:**

Mid-size automobile — 1,020 kg
Full-size automobile — 1,500 kg
Loaded 3/4-ton pickup truck — 2,750 kg
Loaded 1-ton cargo truck — 4,500 kg
Loaded 4-yard dump truck — 11,000 kg

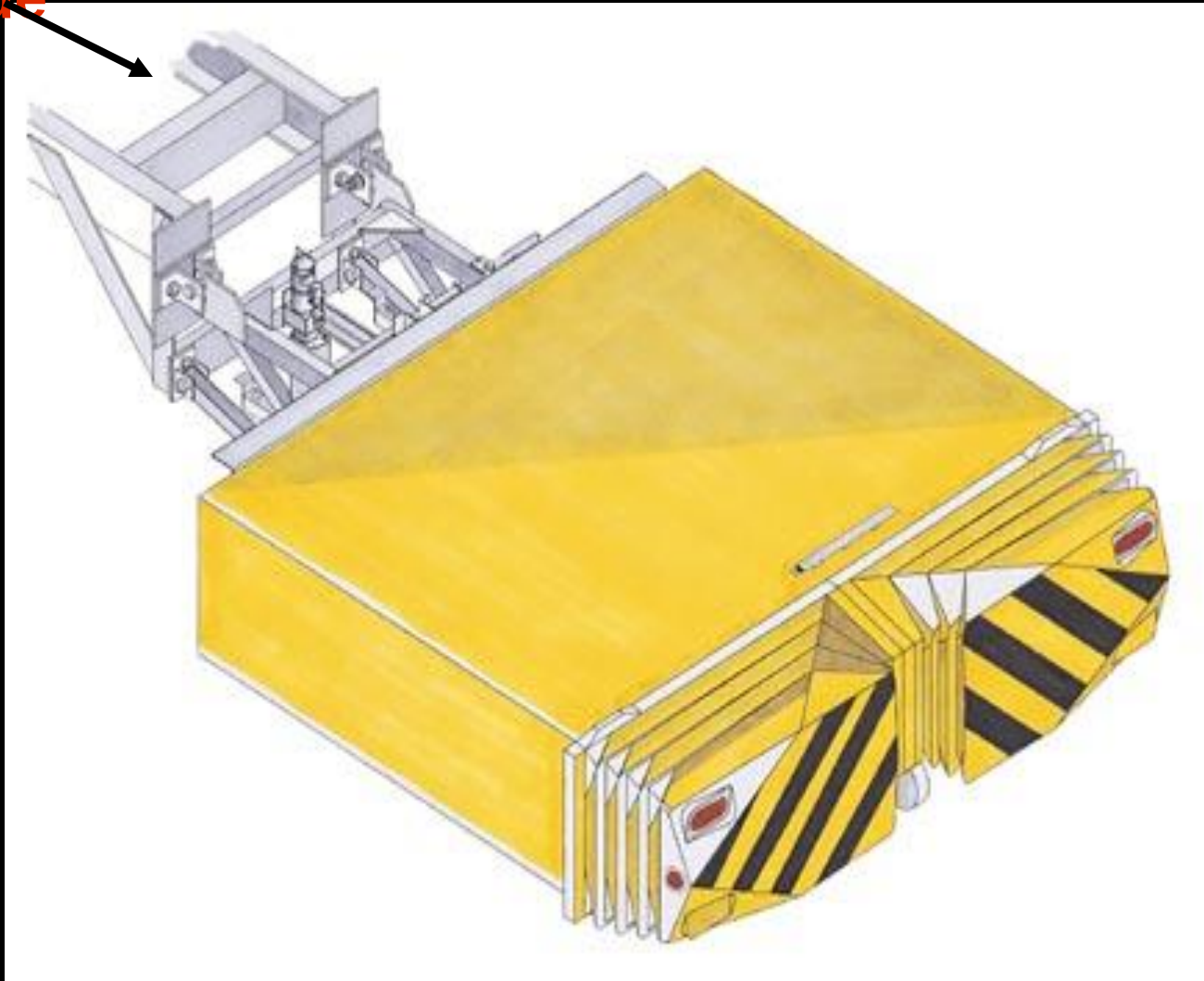
Source Note: Humphrey/Sullivan Report

TMA DESIGN 101



TYPICAL TMA COMPONENTS

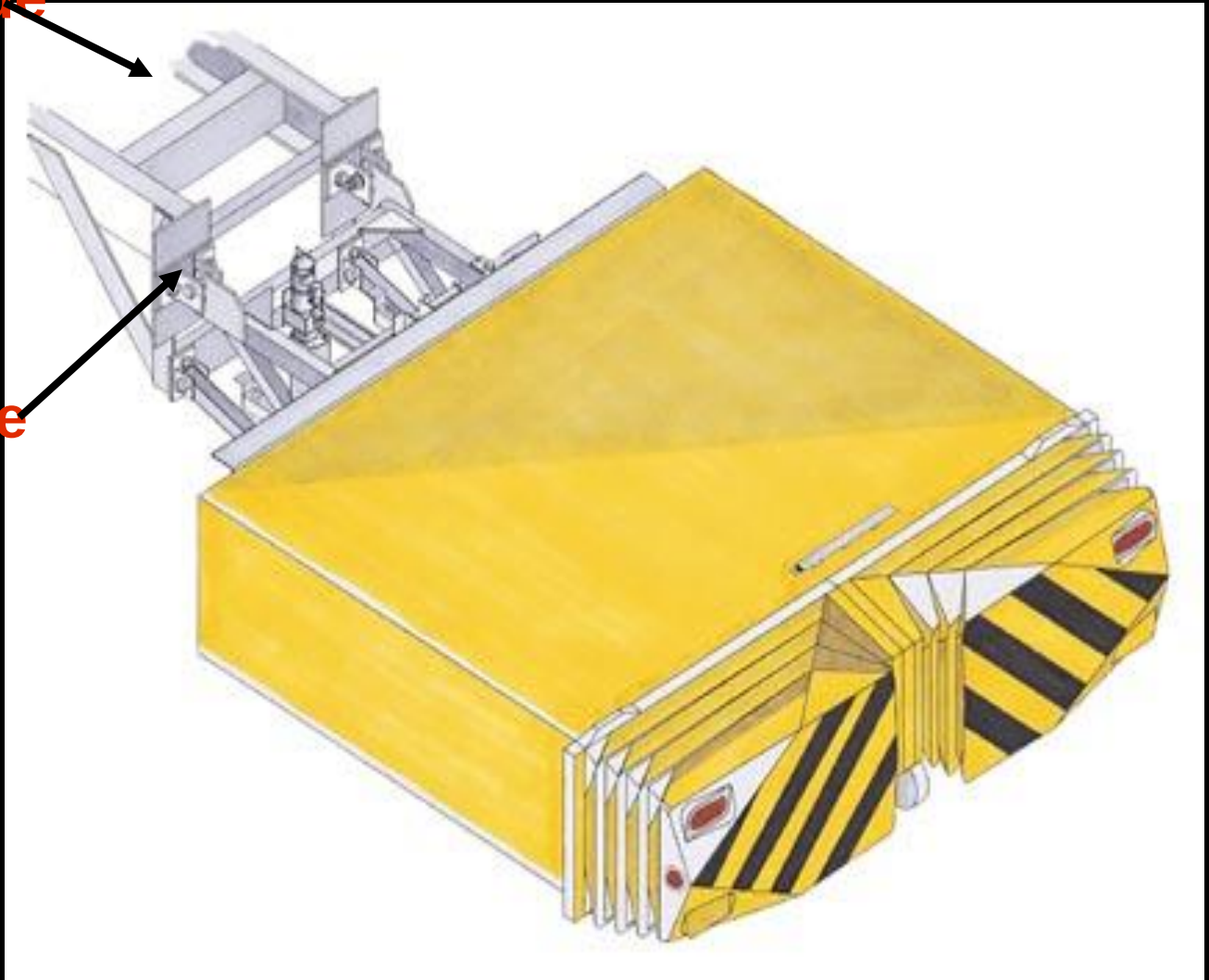
Underride



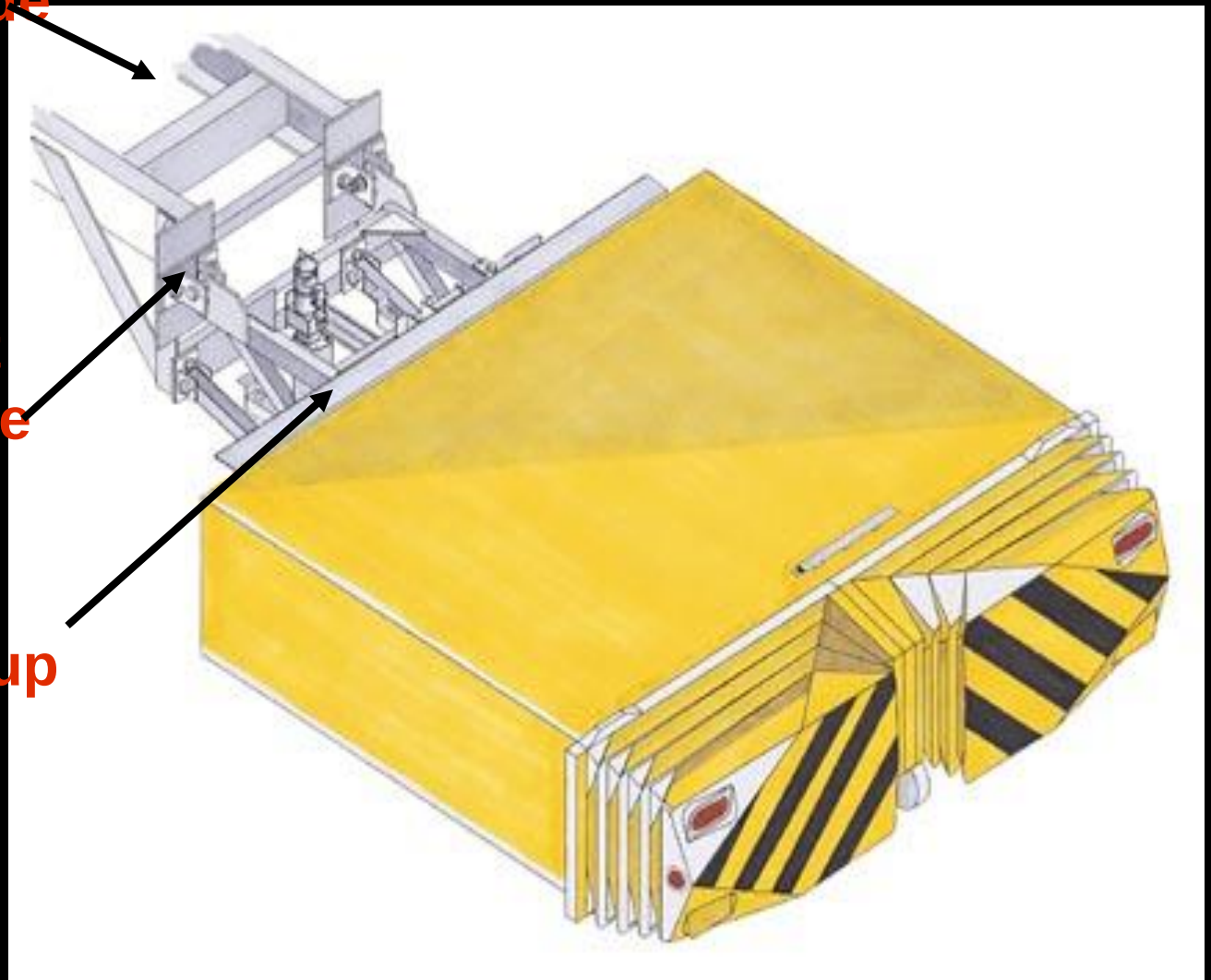
TYPICAL TMA COMPONENTS

Underride

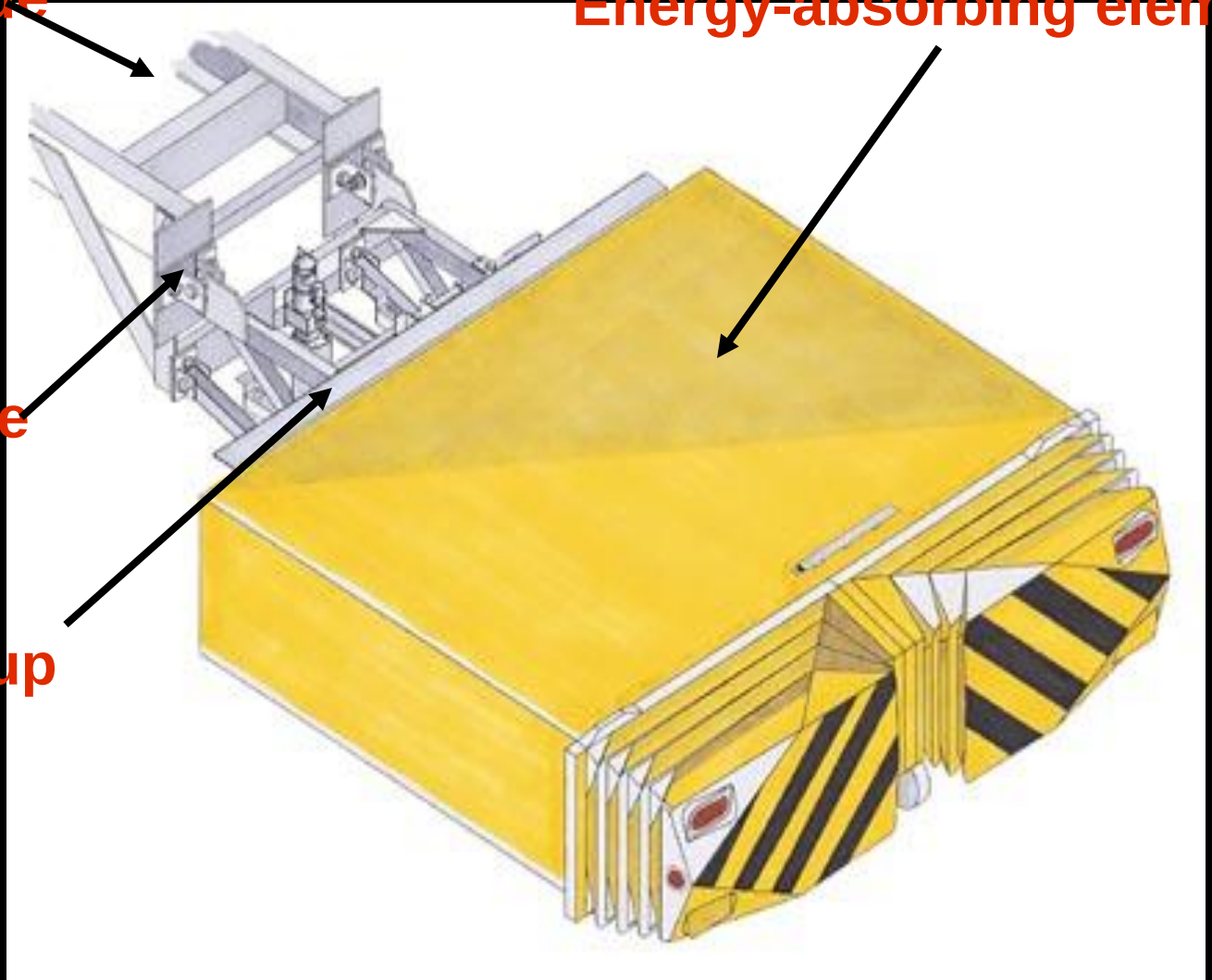
Support structure



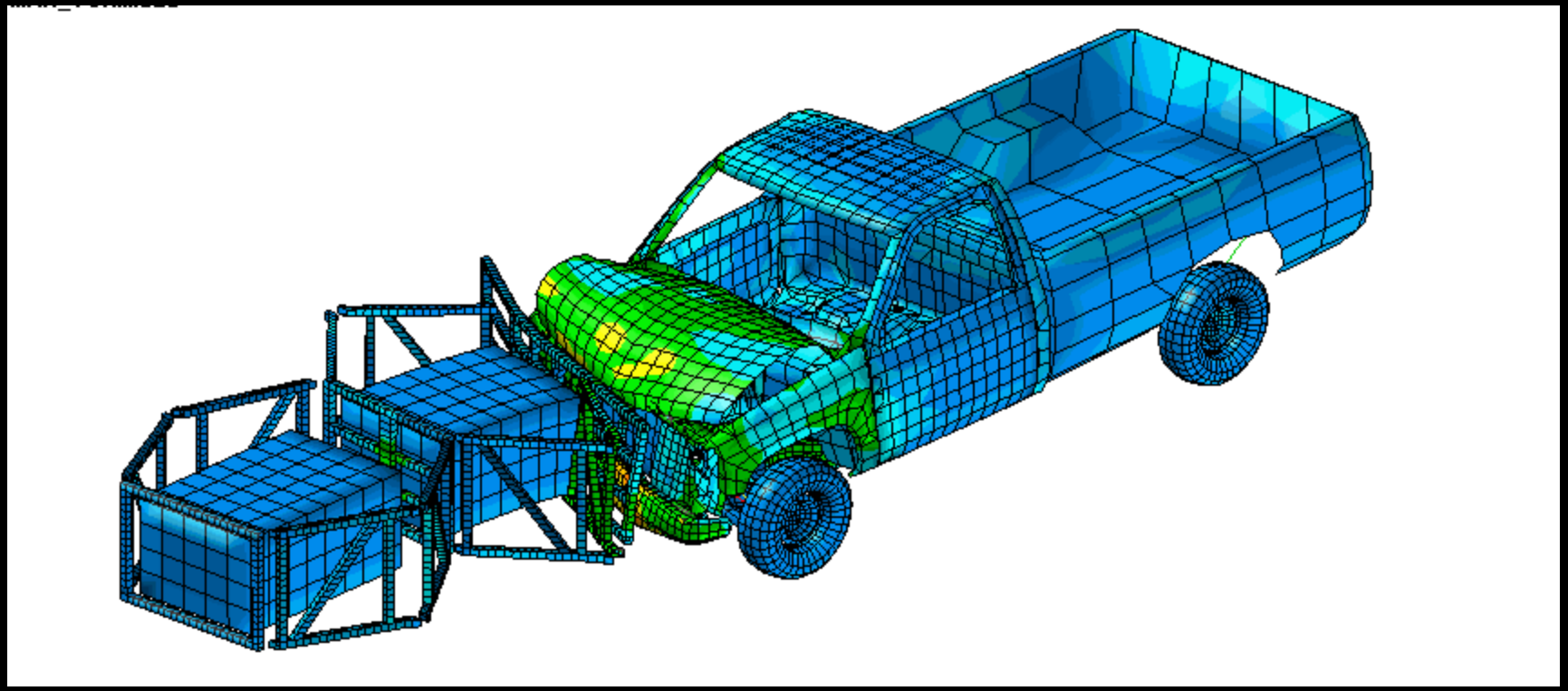
TYPICAL TMA COMPONENTS



TYPICAL TMA COMPONENTS



ANY QUESTIONS?



TMA TESTING

TMA Testing

NCHRP 350

MASH

UK "LMCC"TESTS

EN 1317

TMA Testing

NCHRP 350

MASH

UK "LMCC" TESTS

EN 1317

NCHRP 350 TMA Tests

Uses same Occupant Risk criteria

NCHRP 350 TMA Tests

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Tests are run at 70 km/h (TL-2)
or 100 km/h (TL-3)

NCHRP 350 TMA Tests

Uses same Occupant Risk criteria

Tests are run at 70 km/h (TL-2)
or 100 km/h (TL-3)

Protective Test Vehicle must weigh
19,842 lbs (9,000 kg) +/- 5%


Crashlab
Crashlab
B00021

NCHRP 350 TMA Tests

Uses same Occupant Risk criteria

Tests are run at 70 km/h (TL-2)
or 100 km/h (TL-3)

Protective Test Vehicle must weigh
19,842 lbs (9,000 kg) +/- 5%

Two mandatory tests (50 & 51)

TESTS 50 & 51

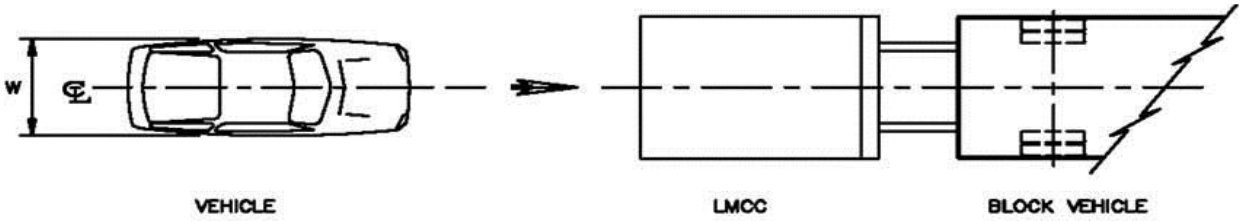
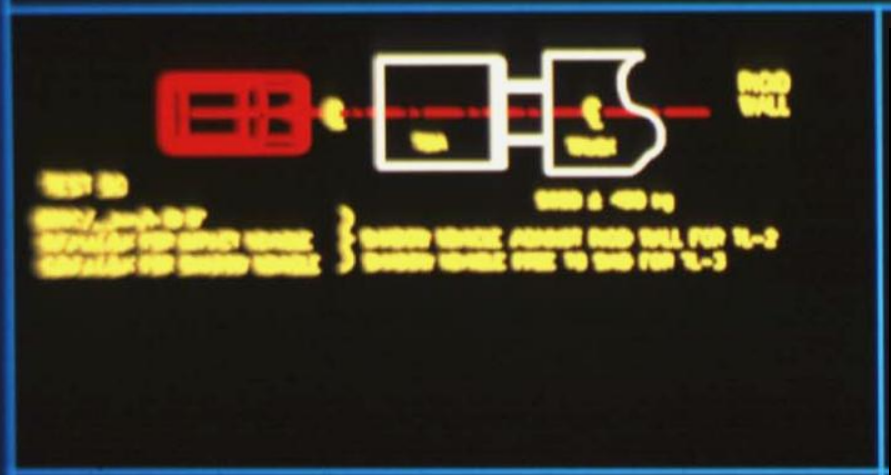
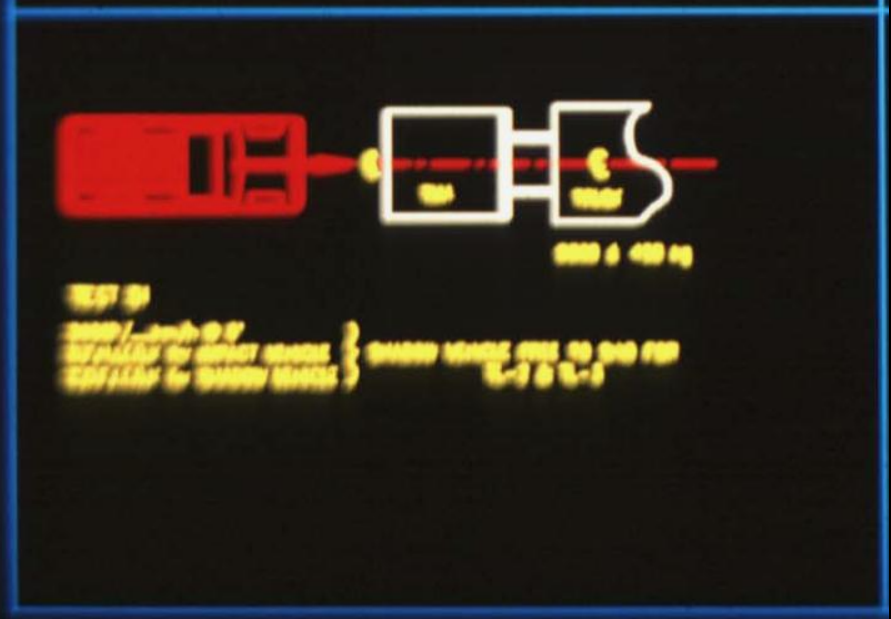


Figure 2-1(a). Head-on Centre Impact

NCHRP 350





Test 50

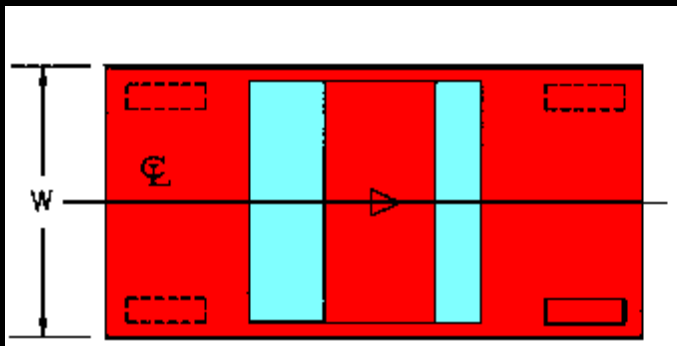
820 kg vehicle-head on

Protective vehicle up against concrete wall

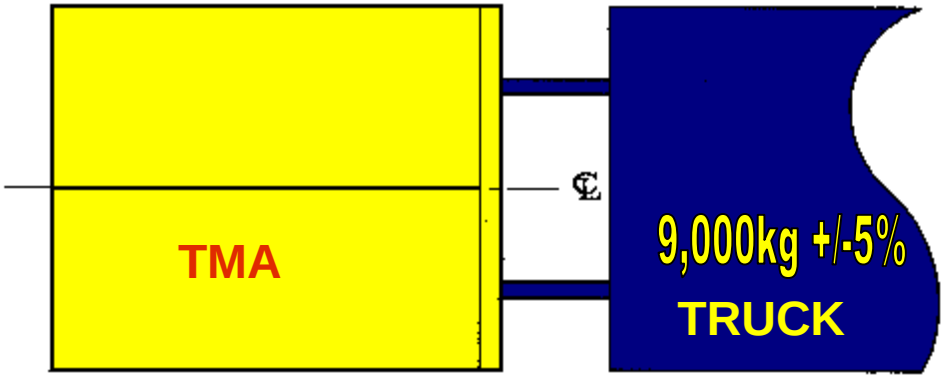
Test 51

2000 kg pick up truck-head on

NCHRP 350 TMA Tests



0 = 0 DEG.
OFFSET = 0



TEST NOS. 50 AND 51

Note: TMA vehicle is up against a concrete wall during light car test

Test simulates impacts into very large vehicles

Small car impact is the worst case scenario

NCHRP 350, TL-2 Testing

Test 2-50

(820 kg, 70 km/h, 0 degrees, Ctr.)

NCHRP 350, TL-2 Testing

Test 2-51

(2000 kg, 70 km/h, 0 degrees, Ctr.)

NCHRP 350 TMA Tests

Uses same Occupant Risk criteria

Tests are run at 70 km/h (TL-2)
or 100 km/h (TL-3)

Protective Test Vehicle must weigh
19,842 lbs (9,000 kg) +/- 5%

Two mandatory tests (50 & 51)

Tests 52 & 53 are optional

TESTS 50 & 51

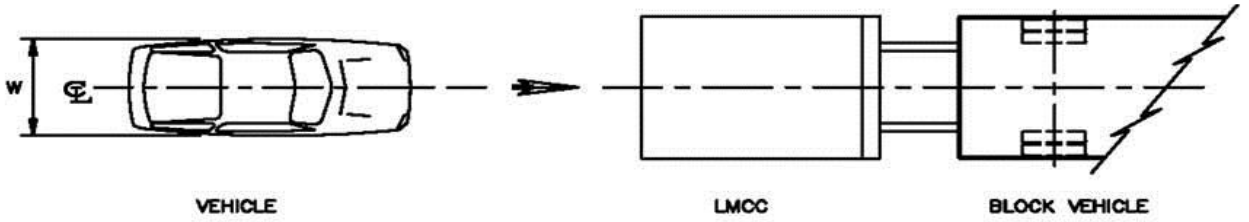


Figure 2-1(a). Head-on Centre Impact

TEST 52 OPTIONAL

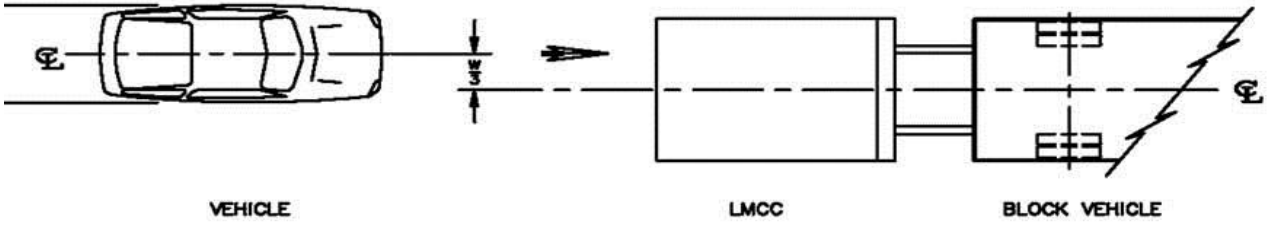


Figure 2-1(b). Head-on, ⅓ Vehicle Offset

TEST 53 OPTIONAL

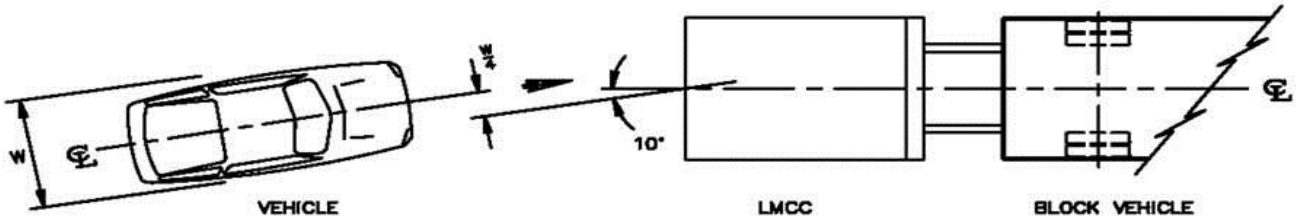
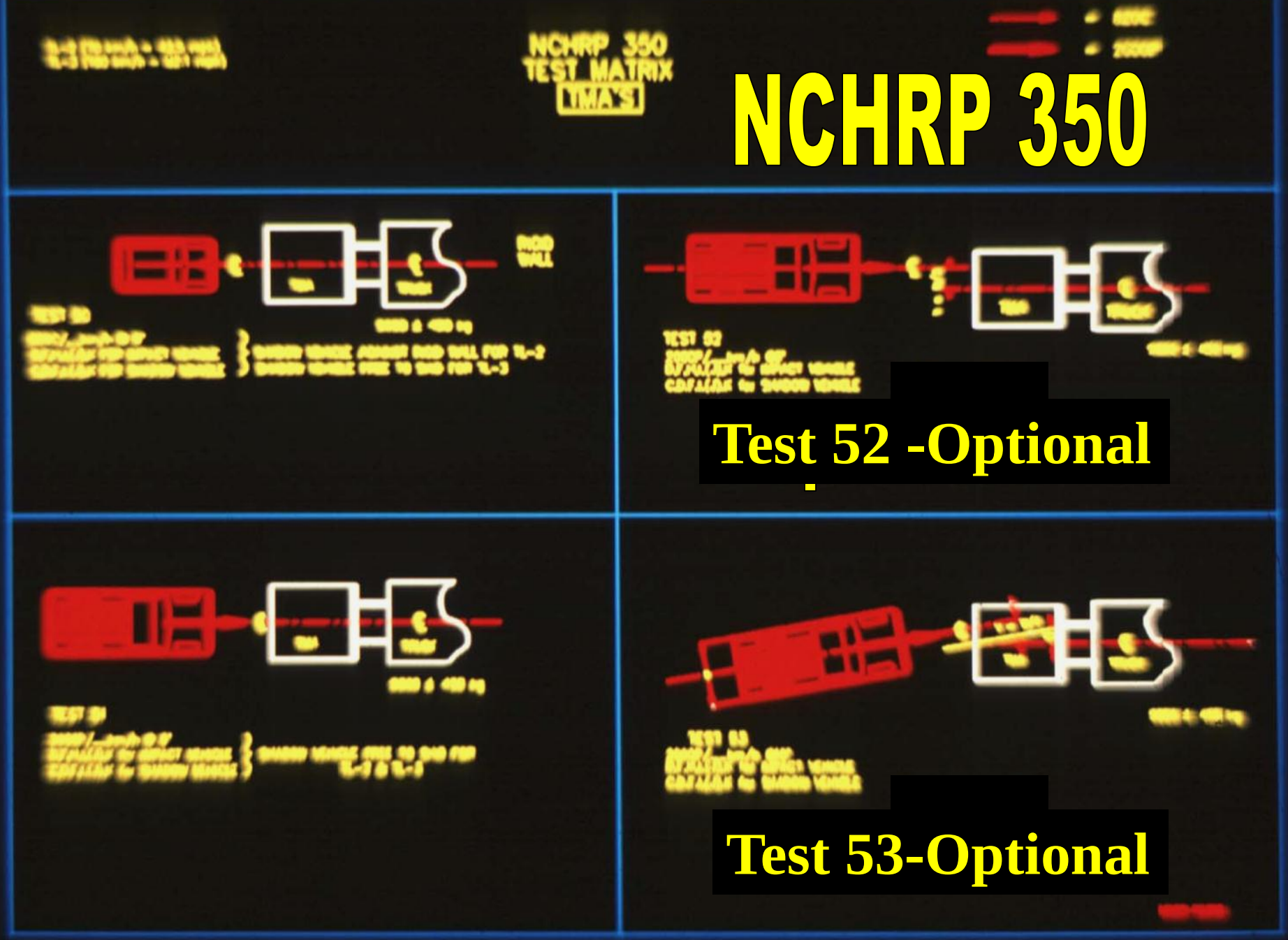


Figure 2-1(c). Nose ¼ Offset, at 10°

NCHRP 350



ANY QUESTIONS?

TMA Testing

NCHRP 350

MASH

UK "LMCC"TESTS

EN 1317

MASH TMA Tests

Will use same tests as NCHRP 350 plus 1500 kg test for staged TMA Systems

MASH TMA Tests

Will use same tests as NCHRP 350 plus 1500 kg test for staged TMA Systems

Tests are run at 70 km/h (TL-2) or 100 km/h (TL-3)

MASH TMA Tests

Will use same tests as NCHRP 350 plus 1500 kg test for staged TMA Systems

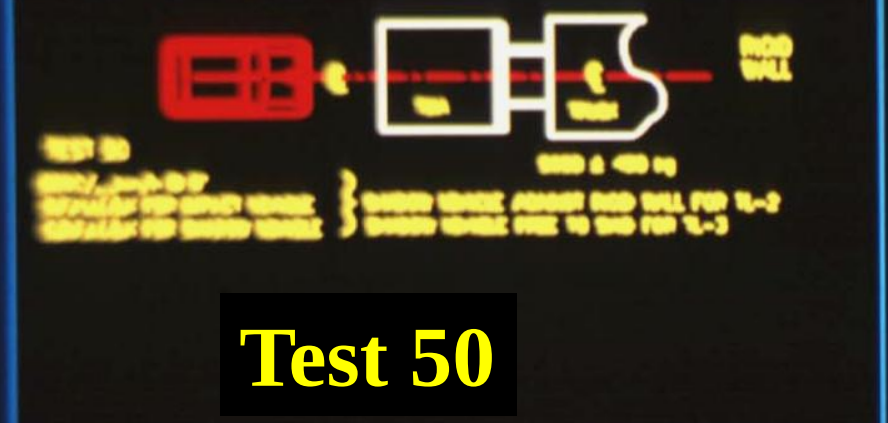
Tests are run at 70 km/h (TL-2) or 100 km/h (TL-3)

All tests are mandatory

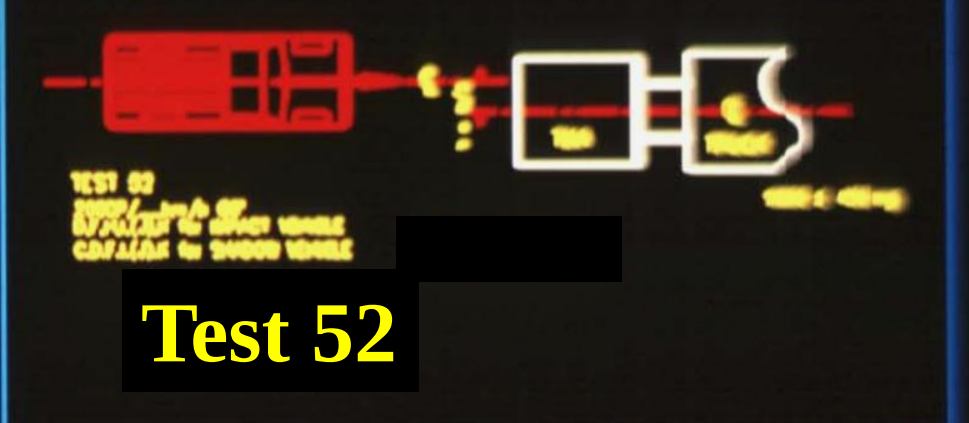
MASH TMA Tests

Manufacturer will decide weight for heaviest and lightest host truck for Test 50, 51 and 52

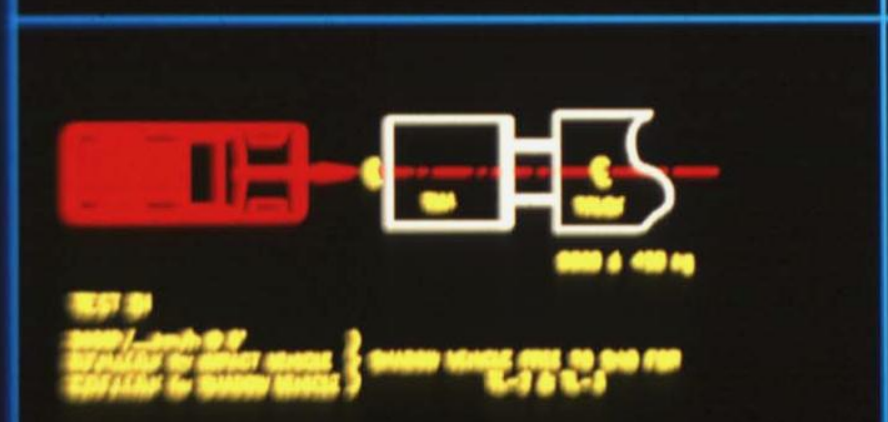
MASH



Test 50



Test 52



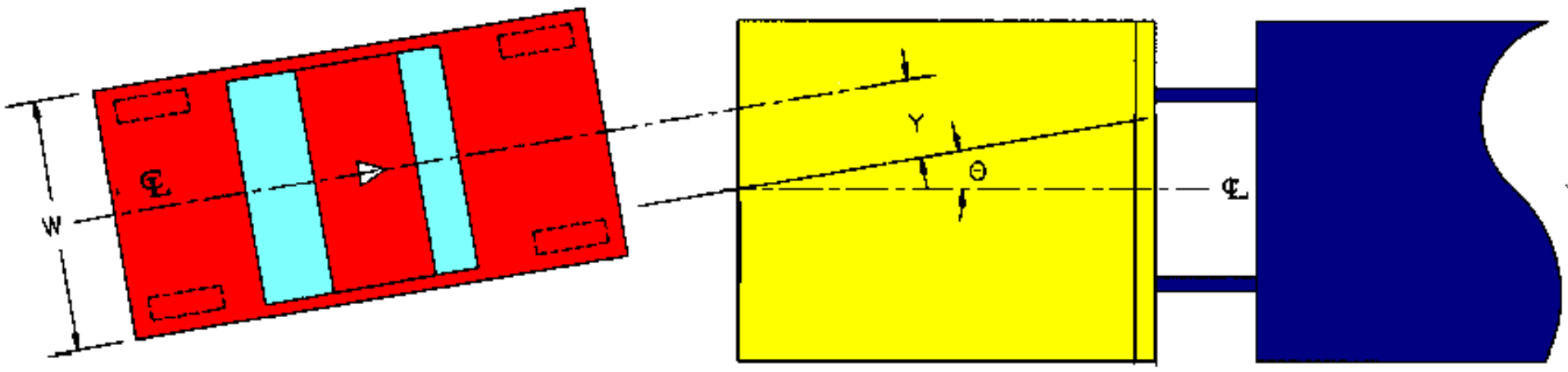
Test 51

MASH TMA Tests

Manufacturer will decide weight for heaviest and lightest host truck for Tests 50, 51 and 52

Test 53 will be run with lightest weight host vehicle

MASH TMA Test



O = 10 DEG.
Y = OFFSET = W/4

TEST NO. 53

Run with lightest weight host vehicle

ANY QUESTIONS?

TMA Testing

NCHRP 350

MASH

UK "LMCC" TESTS

EN-1317

UK "LMCC" Tests

Protective Test Vehicle must weigh minimum 10,000 kg (22,500 lbs)

UK "LMCC" Tests

Test Level 2 tests required:

2-50.UK 900C 80km/h head-on, centre
2-51.UK 1,500C 80 km/h head-on, centre
2-52.UK 1,500C 80 km/h head-on, 1/3 vehicle offset
2-53.UK 1,500C 80 km/h nose ¼ offset, at 10o

UK "LMCC" Tests

Test Level 2 tests required:

2-50.UK 900C 80km/h head-on, centre
2-51.UK 1,500C 80 km/h head-on, centre
2-52.UK 1,500C 80 km/h head-on, 1/3 vehicle offset
2-53.UK 1,500C 80 km/h nose ¼ offset, at 10o

Or:

Complete ALL NCHRP 350 Tests at 70 km/h (TL-2)
PLUS
2-51.UK 1,500C 80 km/h head-on, centre

UK "LMCC" Tests

Test Level 3 tests required:

2-50.UK 900C 100 km/h head-on, centre
2-51.UK 1,500C 110 km/h head-on, centre
2-52.UK 1,500C 110 km/h head-on, 1/3 vehicle offset
2-53.UK 1,500C 110 km/h nose ¼ offset, at 10o

Or:

Complete ALL NCHRP 350 Tests at 100 km/h (TL-3)
PLUS
2-51.UK 1,500C 110 km/h head-on, centre

UK "LMCC" Tests

Uses NCHRP 350 Occupant Risk Criteria

ANY QUESTIONS?

TMA Testing

NCHRP 350
MASH
UK "LMCC" TESTS
EN 1317

EN 1317 TMA Tests

Criteria is still in development.

Plan is to have criteria in place by end of 2012

ANY QUESTIONS?

NON CRASH TMA Tests

- **Corrosion Test (Salt Spray)**


CASCADE

NON CRASH TMA Tests

- Corrosion Test (Salt Spray)
- Moisture Test

NON CRASH TMA Tests

- **Corrosion Test (Salt Spray)**
- **Moisture Test**
- **Vibration Test (40 hours up/40 hours down)**

NON CRASH TMA Tests

- **Corrosion Test (Salt Spray)**
- **Moisture Test**
- **Vibration Test (40 hours up/40 hours down)**
- **Field Testing (Durability)**

Typical TMA in-field testing

ANY QUESTIONS?


This will be finished in about five more minutes...


Well, maybe
six!

A variety of TMAs are available today

A variety of TMAs are available today


REGENERATIVE AIR SYSTEMS
TYMCO
WACO, TEXAS
600
AIRSWEEPER
Scorpion


Nor-skilt
"Skorpionen"

MANY OF THE NEW TMA DESIGNS ARE TRAILER MOUNTED TMAS


STATE OF NEBRASKA 841
TTMA-4


6
TREES, INC.
Scorpion


U-MAD

HOW DOES A CUSTOMER KNOW IF A TMA WILL WORK ON HIS TRUCK?

Worksheet for U-MAD TMA

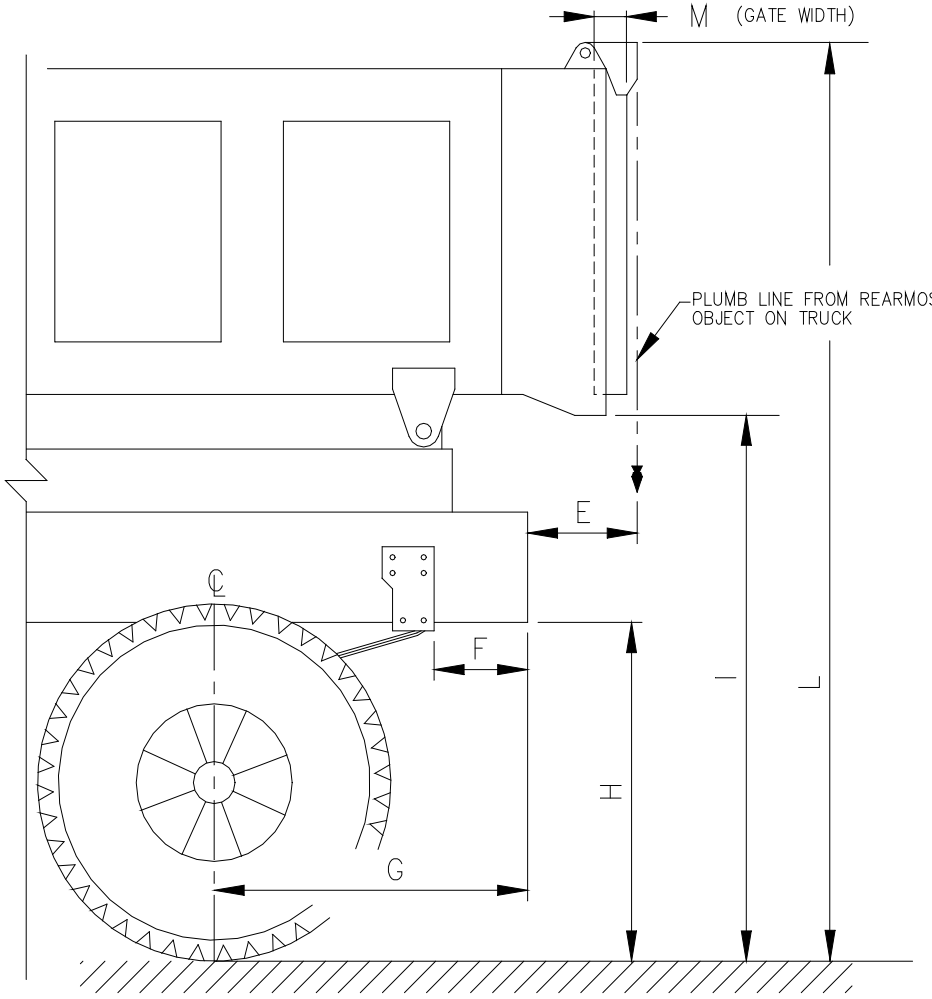
DESCRIBE MODEL/STYLE/TYPE? (IF KNOWN) _____

UNDERRIDE STYLE? (IF KNOWN) _____

COMPANY _____

BY _____

PHONE: _____



SIDE VIEW

Air Chambers, Pintle Hitches, Solid Plates, Frame Tapers & so forth may affect TMA Installation – Consider the implications

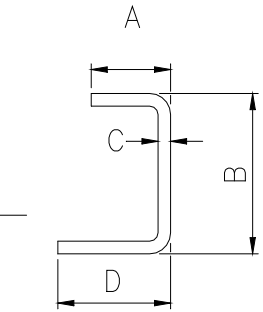
PLEASE PROVIDE:

A _____
B _____
C _____
D _____
E _____
F _____
G _____
H _____
I _____
J _____
K _____
L _____
M _____

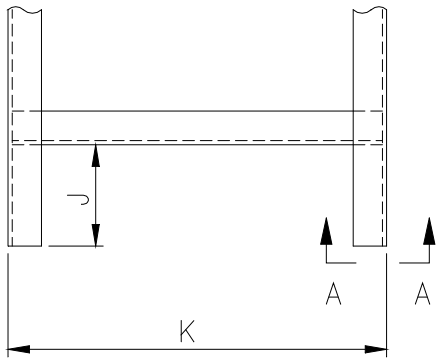
TRUCK MAKE _____

TRUCK YEAR _____

TRUCK G.V.W. _____



VIEW A–A
(TRUCK FRAME RAIL)



TOP VIEW OF FRAME

BARRIER SYSTEMS

The weight of the host vehicle is important

To get NCHRP 350 performance, a vehicle should be 19,842 pounds (9,000 kg) +/- 5%

By testing the light weight car with the truck up against the wall, a TMA passing NCHRP 350 has shown that it will perform with heavier vehicles


It is possible to attach a TMA
to lighter weight vehicles

If a lighter weight truck is used, the occupant risk criteria can be improved. However, the light weight truck could affect maneuverability.

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ANY QUESTIONS?

Together we can save millions of lives.

DECADE OF ACTION FOR ROAD SAFETY 2011-2020

www.decadeofaction.org

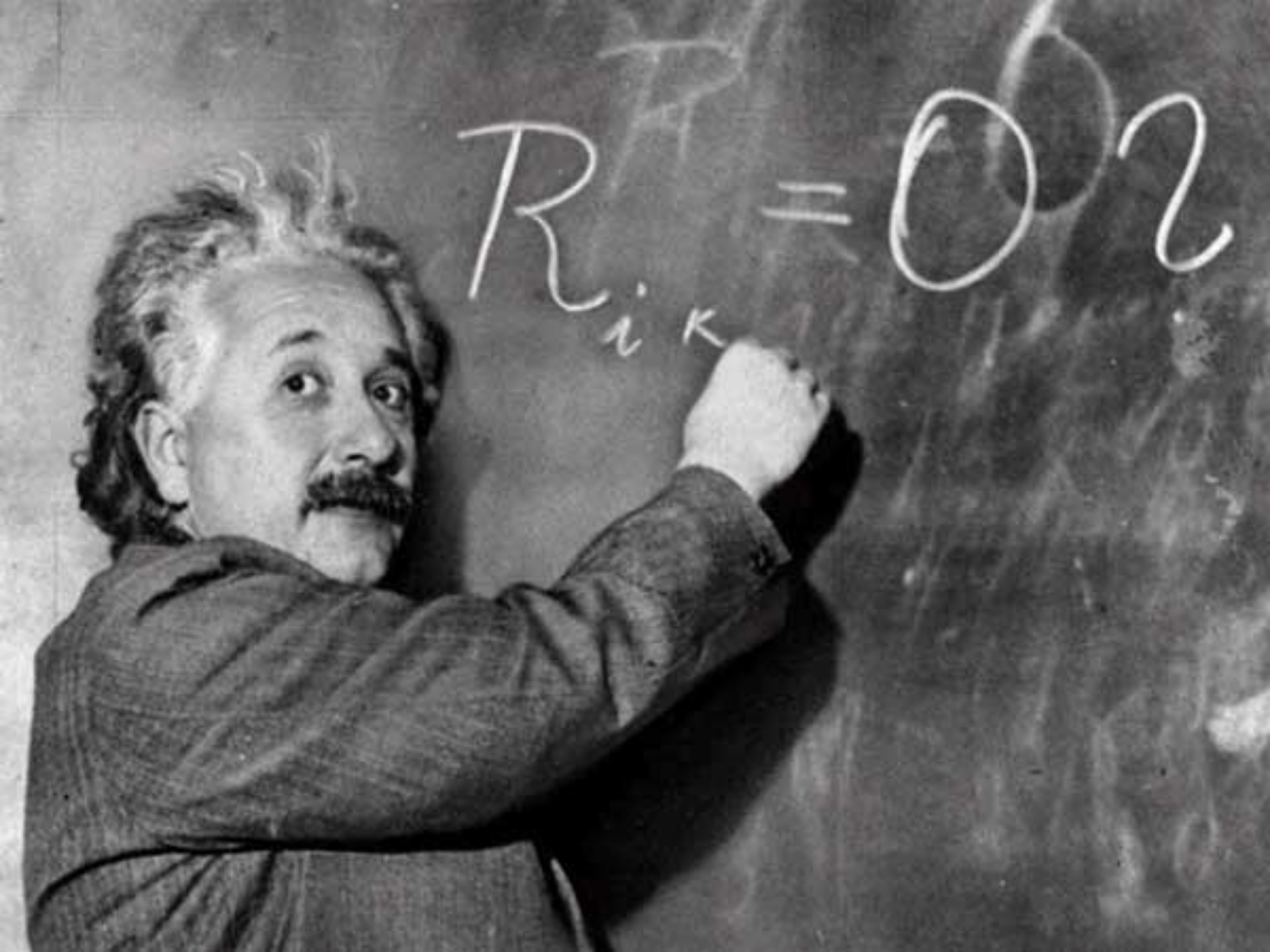
WEAR. BELIEVE. ACT.

DECADE OF ACTION FOR ROAD SAFETY 2011–2020

ENSURING THE DECADE OF ACTION

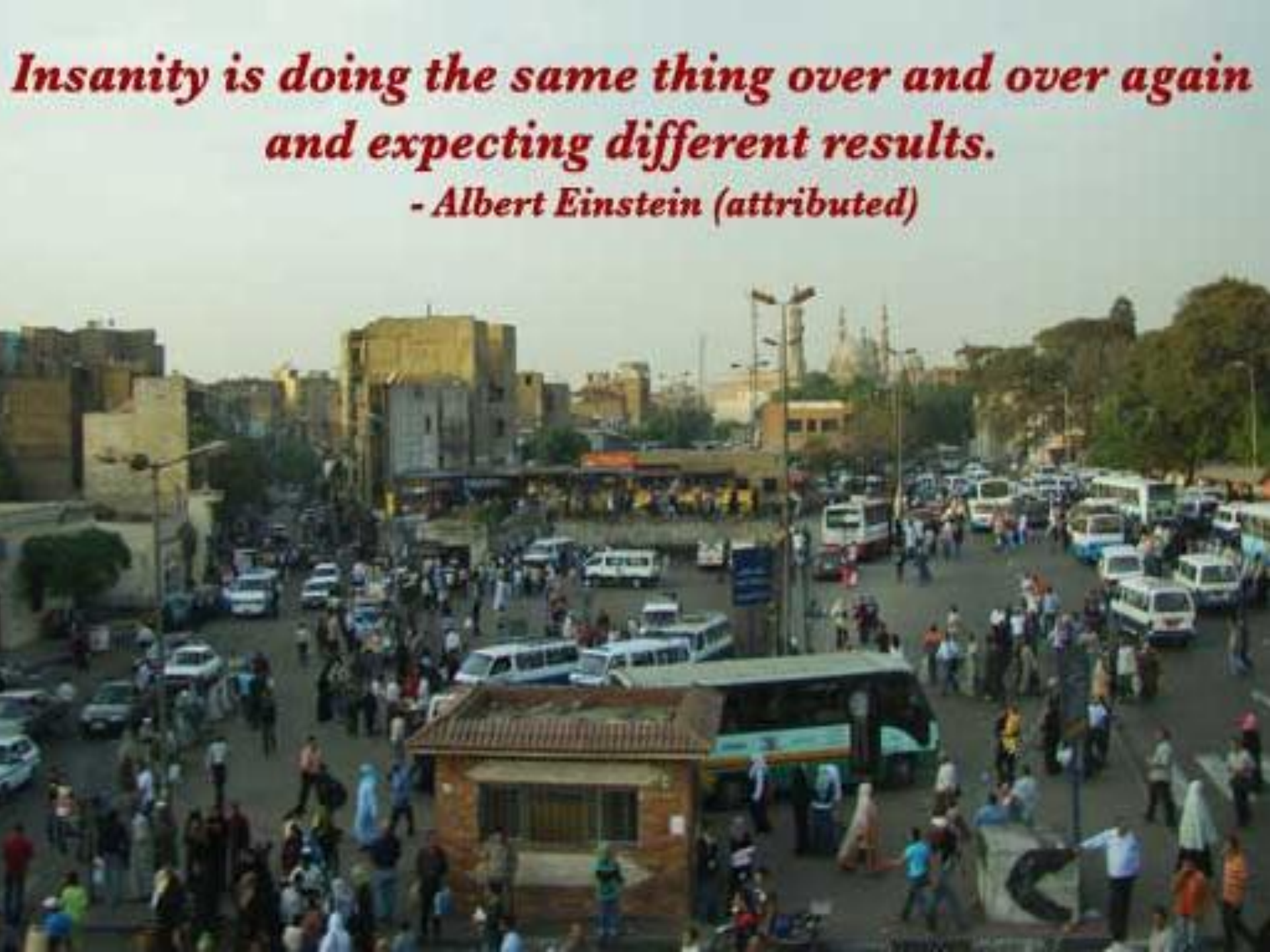
UN Decade of Action for Road Safety 2011-2020

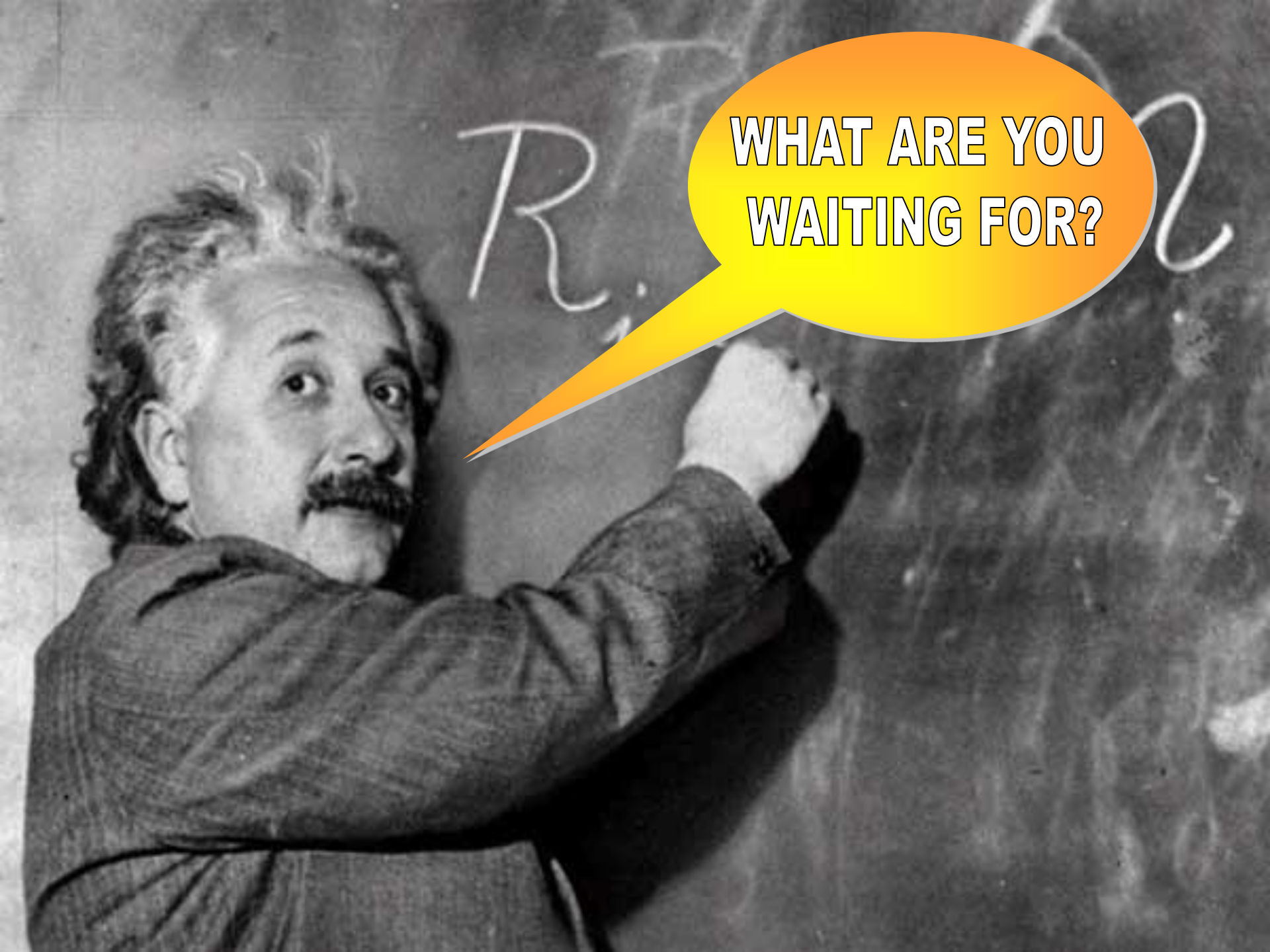
MAKE ROADS SAFE
The Campaign for Global Road Safety


$R_{ik} = 0$

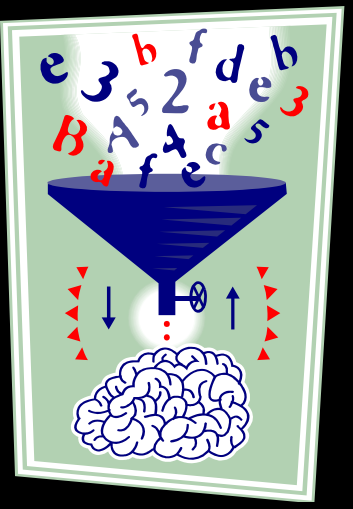
Insanity is doing the same thing over and over again and expecting different results.

- Albert Einstein (attributed)




WHAT ARE YOU
WAITING FOR?

KNOWLEDGE



plus

PRUDENCE

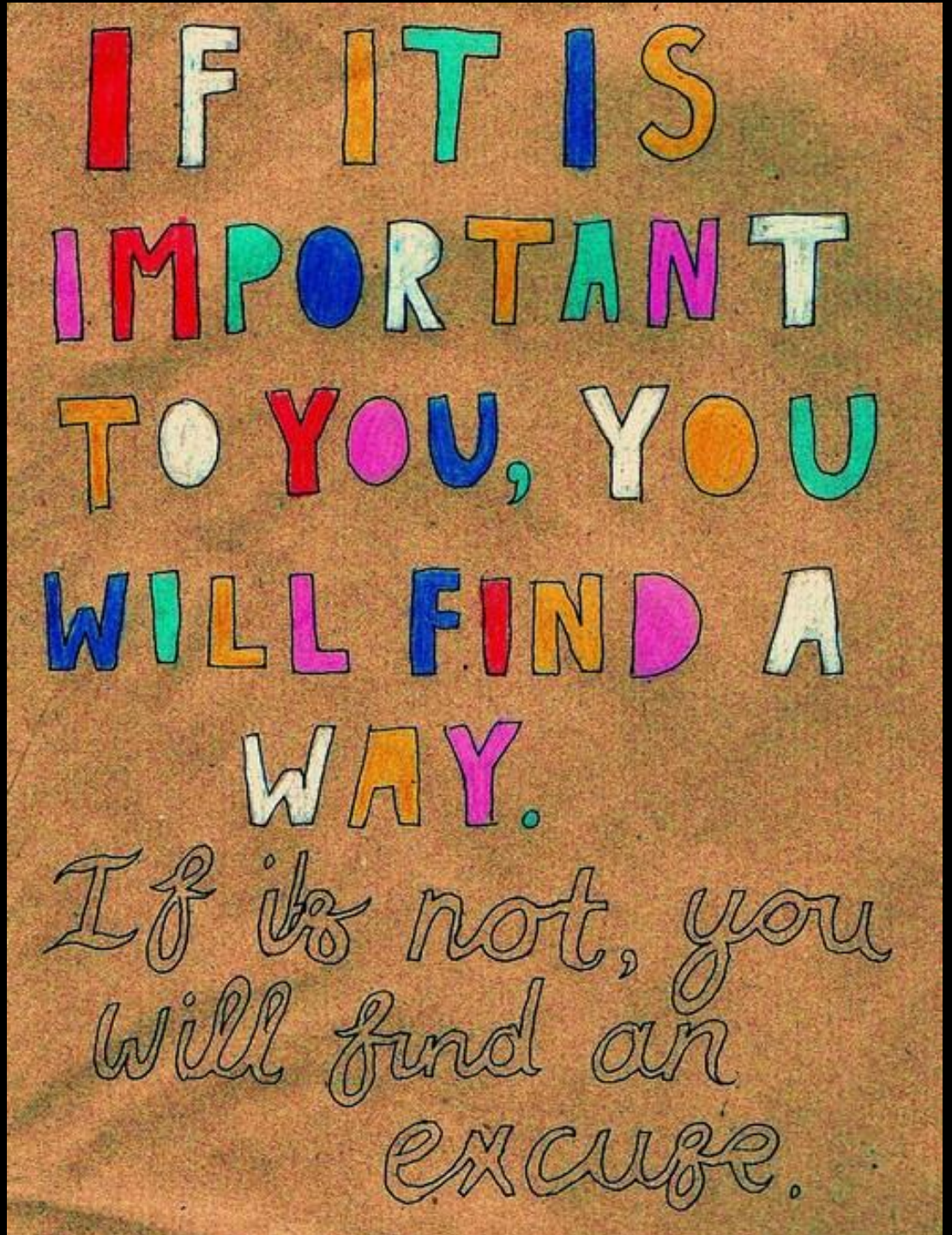
equals

WISDOM

THE PEOPLE DRINKING WATER FROM THE WELL SHOULD ALWAYS REMEMBER TO THANK THE PEOPLE WHO DUG THE WELL

CHINESE PROVERB


When you know what you want, and you want
it badly enough, you'll find a way to get it.
Jim Rohn


IF IT IS
IMPORTANT
TO YOU, YOU
WILL FIND A
WAY.
If it's not, you
will find an
excuse.


FIND
A WAY

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IX INTERNATIONAL CONGRESS OF ITS

XXXVII ASPHALT MEETING

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XXXVII REUNIÓN DEL ASFALTO

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