

Transmitted by the expert
from Hungary

Informal document No. **GRSG-91-7**
(91st GRSG, 17-20 October 2006
agenda item 1.2.5.)

ROLLOVER ACCIDENT WITH EJECTION OF OCCUPANTS

Date: 15.12.2005 early morning, gloom
Place: Pécsdevecser, south Hungary

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GRSG, 91st session

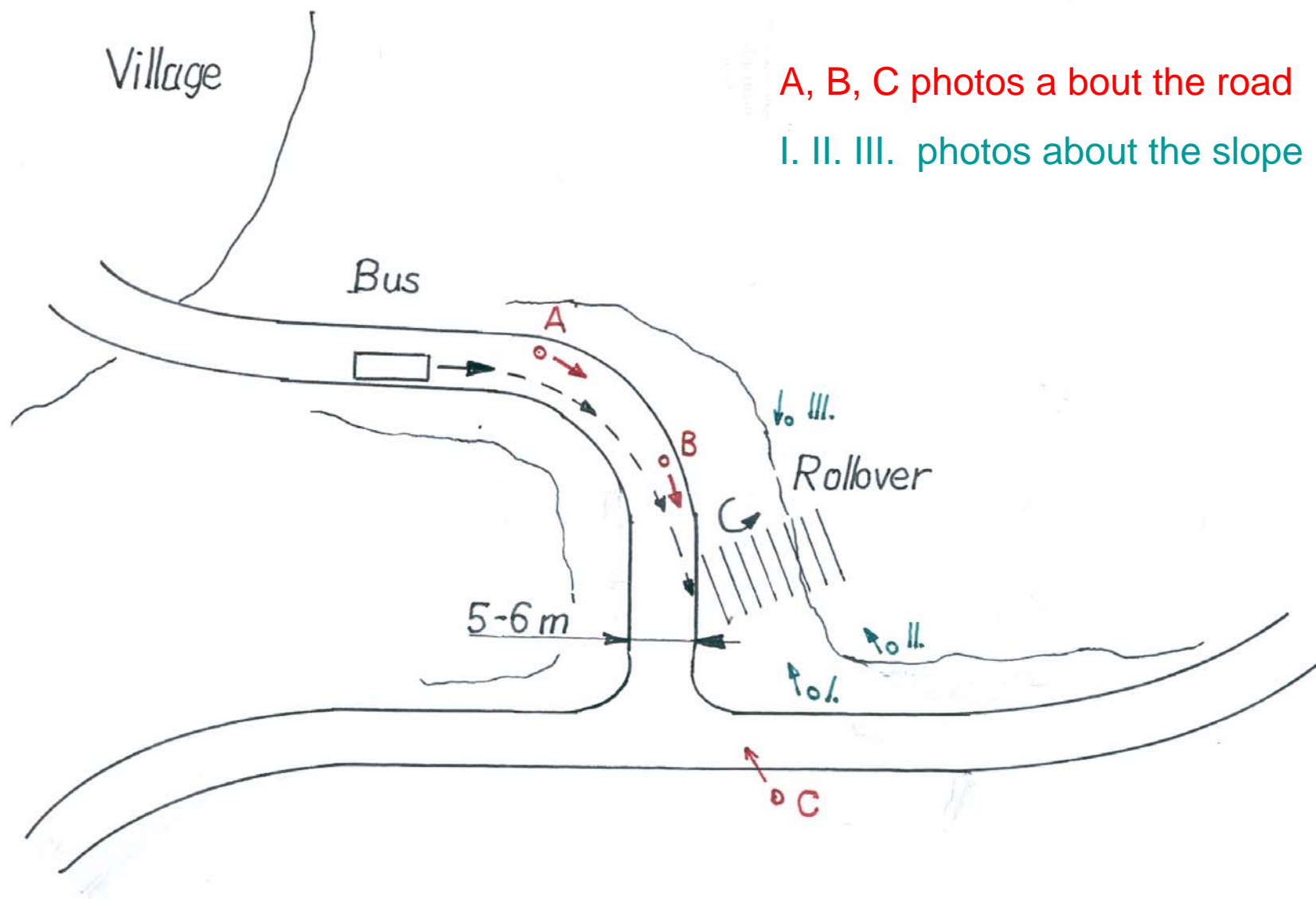
Geneva, October, 2006

THE COACH

Type: IKARUS C56
Class: local, intercity class II
Mass: 16,5 tons
Length/height: 12m/3m
Age: 6 years old, good technical conditions
Occupants: 15+1 on board
Approved: according to R.66



THE ROAD



A, B, C photos about the road

I. II. III. photos about the slope

THE ROAD

- Narrow hilly road
- 5-10 cm fresh snow on it, it was snowing
- Stone guard on roadside
- The bus drove slightly upwards with a speed of 30-40 km/h
- Sharp right curve (90°)



Position „A”

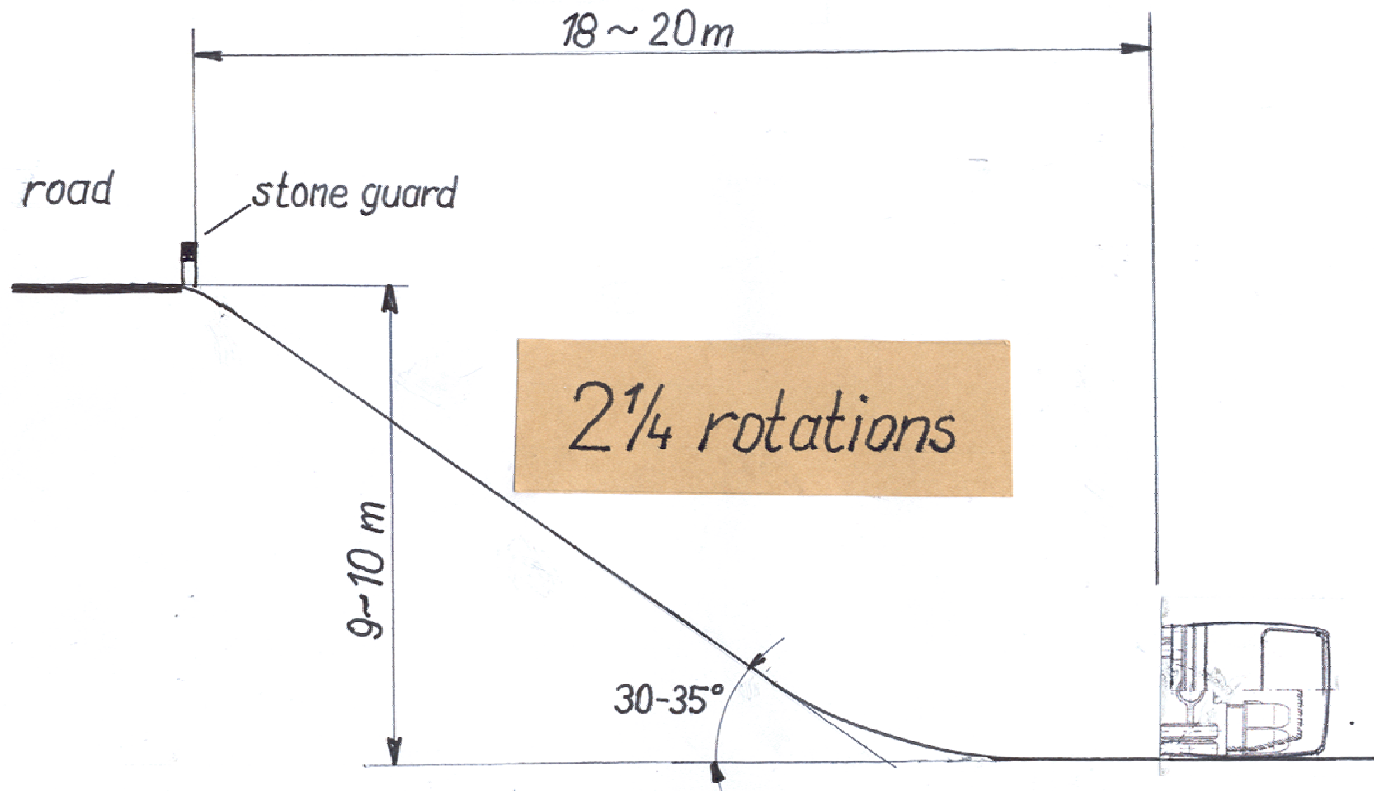


Position „B”



Position „C”

THE SCENE OF THE ACCIDENT



The scene

- Slope with an inclination $\approx 30-35^\circ$ small trees, bushes on the slope
- 5-10 cm snow on the slope
- Soft ground, grass under the snow

THE SCENE OF THE ACCIDENT



Position „I”



Position „II”



Position „III”

THE SCENE OF THE ACCIDENT



Taken from position „B” (both)



Taken from position „II”

THE SCENE OF THE ACCIDENT



THE ROLLOVER PROCESS

- The bus drove on the narrow snowy road upwards, slight inclination
- In a sharp right curve (90°) the bus slipped
- Broke through the stone guard on the other side and the rollover started
- It was a slow process, the driver cried „keep yourself!”
- 2 ¼ rotation and finally it stopped on its left side (the passengers mentioned 2-3, 3, 3-4 rotations)

THE SUPERSTRUCTURE

- No considerable deformation on the superstructure
- The survival space remained intact
- Both windscreen and rear window were fallen out without breaking (installation with rubber profile)
- On the left all: side windows were fallen out
- On the right: two side windows were fallen out, 3 remained



CASUALTIES

Casualties:

8 serious injuries

8 light injuries, but 7 of them were hospitalized

Ejected:

3 occupants (among them the driver)

- the driver was ejected through the windscreen getting slight injury
- The driver helped to the occupants to leave the bus through the emergency escape hatches
- One woman said she was ejected in „the second round” (slight injury)

Partially ejected:

3 occupants

- They were partially under the bus
- They were ejected in the „second round”
- They had very serious injuries
- It took one hour for the firemen to escape these passengers

SOME CONCLUSIONS

- The approved superstructure (R.66) was strong enough in a rollover accident having 2 ¼ rotation on a slope (9-10 m level difference)
- The requirements in R.66 are good enough – for traditional, large buses – to protect the occupants in protectable rollover accidents (PRA)
- If the superstructure is strong enough, the ejection of the occupants is the most severe danger.
- Both total and partial ejections could be dangerous