



IRF 918 - Novel School Zone Safety for Vulnerable Road Users

Transportation Safety Division

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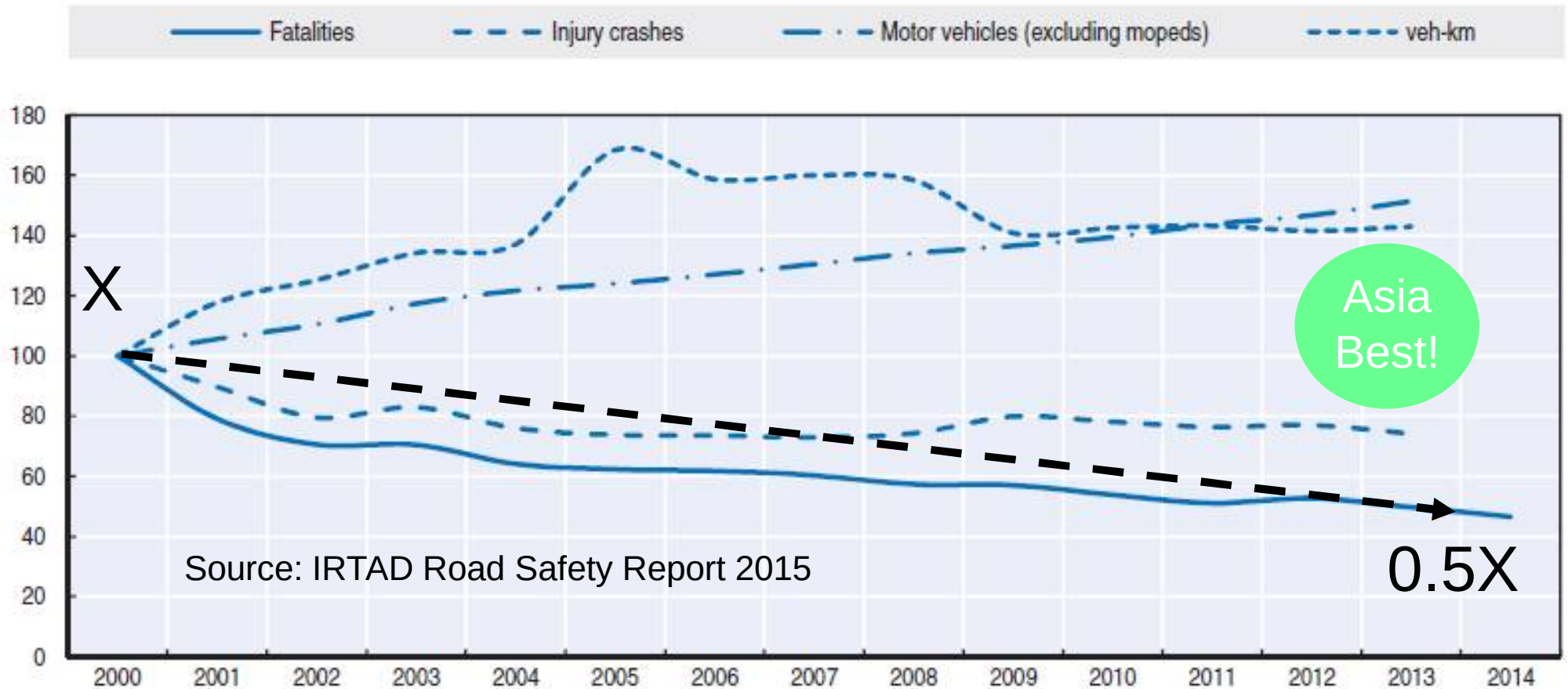
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Outline

1. Traffic Fatalities in Korea School Zone
2. Yellow Carpet Project
3. Safety by Increasing Visibility
4. Conclusion

Korea Road Fatality Records – 2000 to 2014 (14 years to halve #)

Figure 22.1. Road safety and traffic data index 2000 = 100



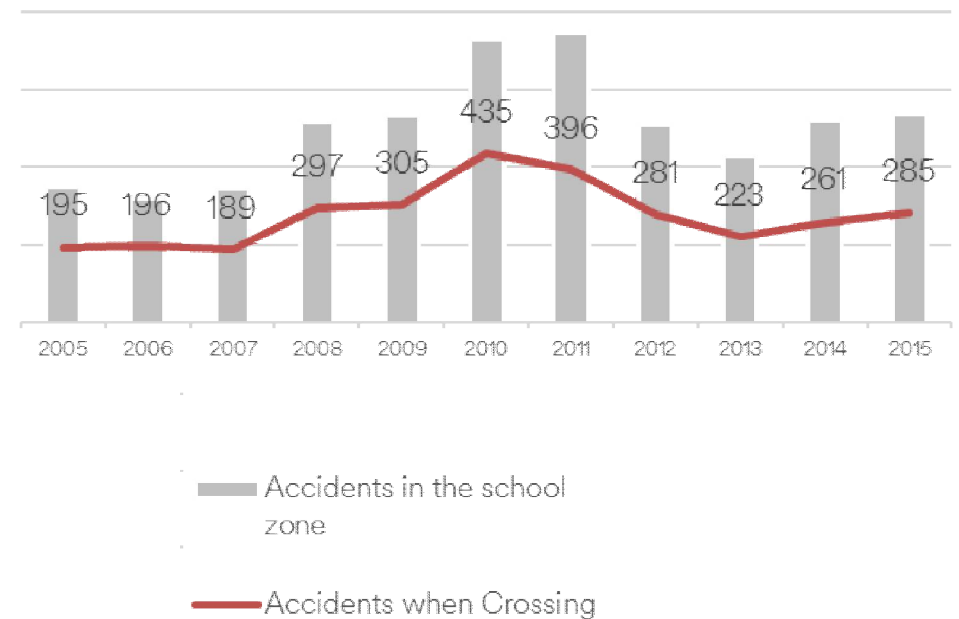
Korea School Zone Traffic Accident Statistics

Category	Total Traffic Accidents		Children Fatalities		Accidents within school zone	
	Accidents	Deaths	Accidents	Deaths	Accidents	Deaths
Average	223,262	5,019	12,317	72	551	6.8
2011	221,711	5,229	13,323	80	751	10
2012	223,656	5,392	12,230	83	511	6
2013	215,354	5,092	11,728	82	427	6
2014	223,552	4,762	12,110	52	523	4
2015	232,035	4,621	12,192	65	541	8

Nationwide fatality rates are down.

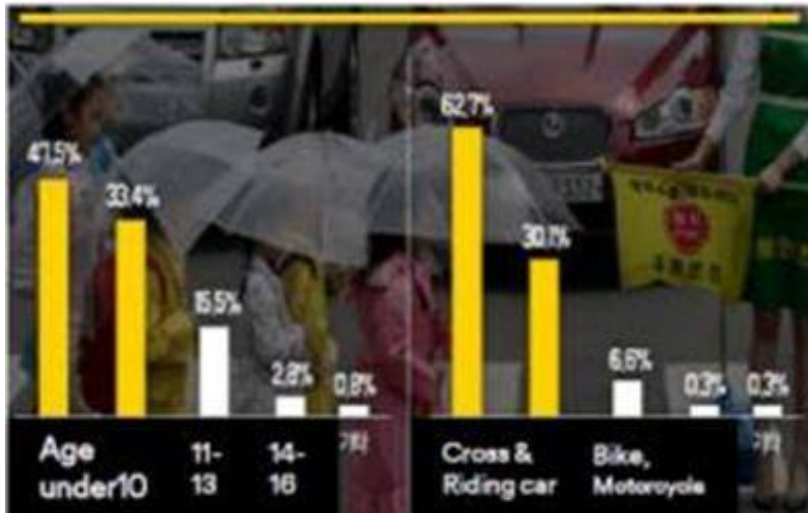
School zone accidents and fatality rates are up.

3M



About 60% of school zone accidents occur while crossing the road

Korean School Zone – Fatality Types



- Young school children under 10 years are the most vulnerable for school zone incidents, making up 80% of casualties.
- Late afternoon 2-6pm is the most critical period to address the high percentage (40~45%) of traffic accidents, fatalities and injuries.

Category	/Hour	00~02	02~04	04~06	06~08	08~10	10~12	12~14	14~16	16~18	18~20	20~22	22~24	Total
Accidents		118	20	29	151	1178	952	1327	2130	2788	1022	1022	418	11155
Deaths		2	0	0	0	6	8	12	5	20	1	1	3	58
Injuries		152	27	36	182	1508	1246	1688	2569	2447	1270	1270	566	12961
% of Accidents		1%	0%	0%	1%	11%	9%	12%	19%	25%	9%	9%	4%	100%

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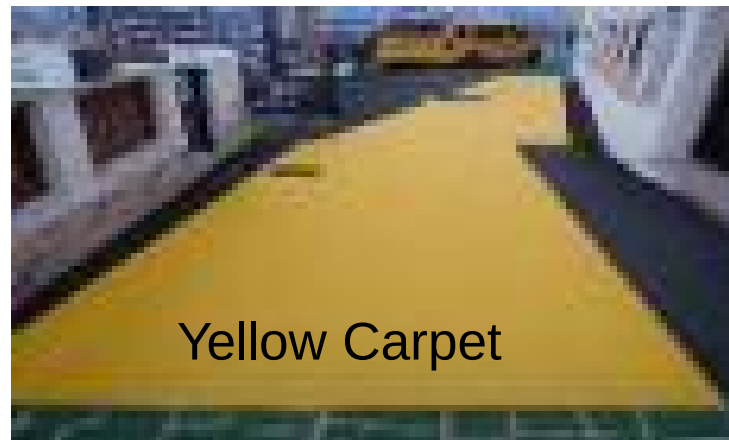
Novel School Zone Safety Solutions

Catching attention from both drivers and kids are necessary to reinvigorate school zone safety



Traditional
Solutions
Not Effective

New solution
model after
“Red Carpet”
Walk.



Yellow Carpet: Products, Application and Visibility

Objective: Visually attractive product, engaging parents and kids for application and contrasting with the background to draw drivers' attention of waiting pedestrians



Products



Applying on Pavement



Safety through Visibility

Yellow Carpet: Project Site

Objective: Improve visibility of pedestrians while waiting for the green traffic signal



Before Application

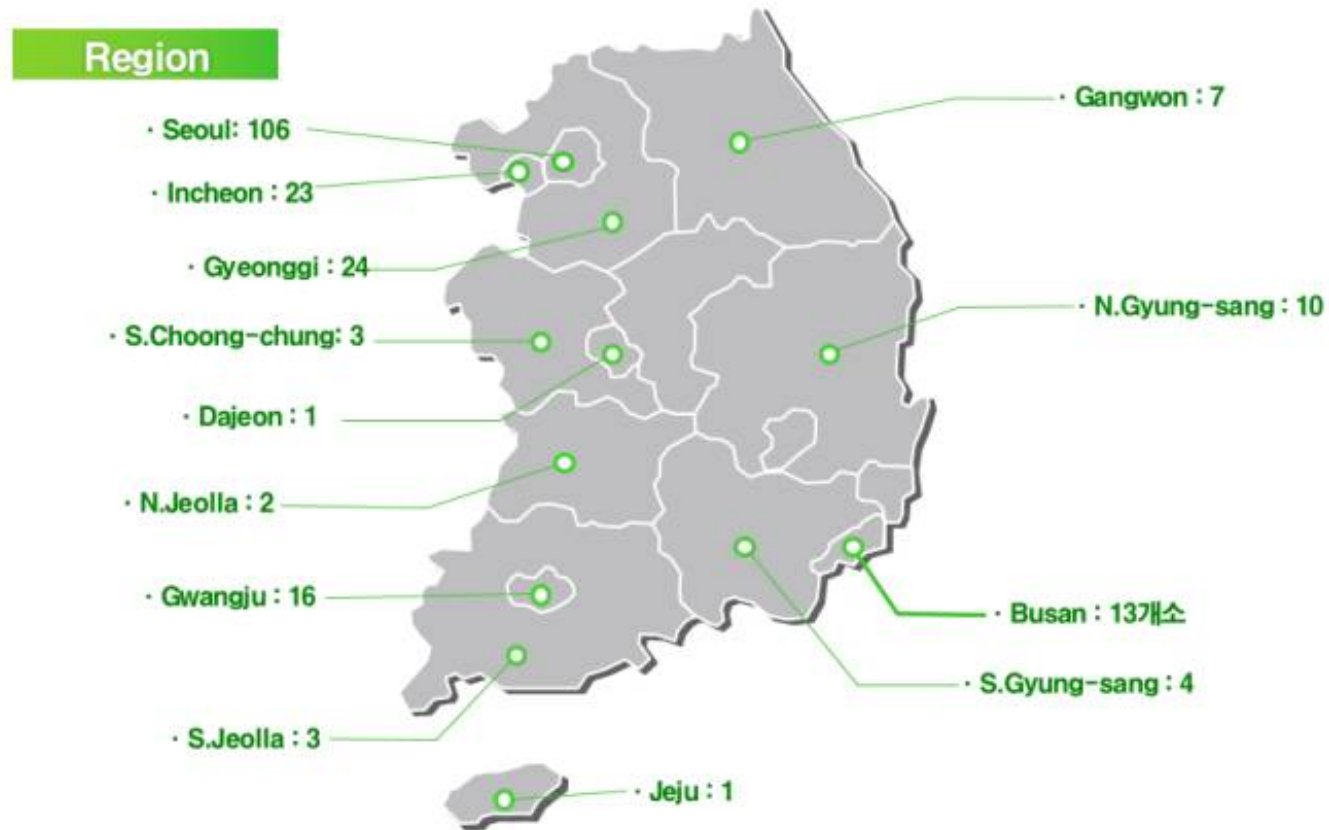


Yellow Carpet (Daytime)



Yellow Carpet (Nighttime)

Rolling out to the First Phase of 213 schools.



New Traffic Safety Solutions - Creating Public Interests

Yellow Carpet: Creating a Buzz with Press



2,023 (number of blog posting) & **1,700**
(number of PR, incl. 3 Public TV news)



Testimonial from End Users



"I used to run when crossing the road, but I stop at the yellow carpet to step on. So, it's safer than before"



"I become more careful while driving due to yellow carpet"

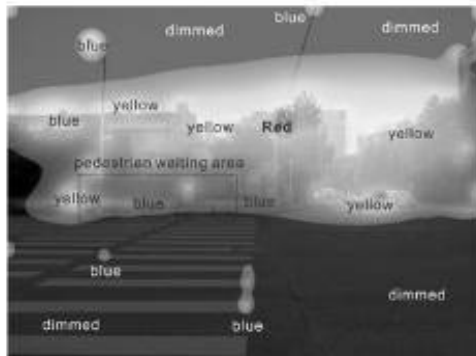


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Study on Driver's Attention Object

W/o YC: Driver's gaze was focused on the top of the tree

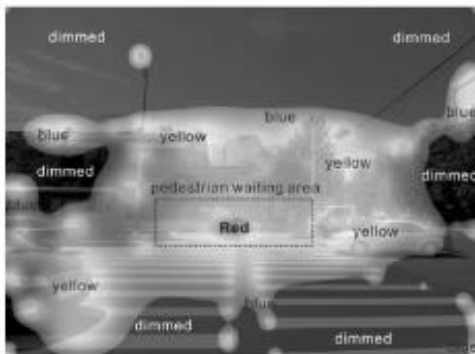


(a) before installation of Yellow Carpet



(a) before installation of Yellow Carpet

W/YC: Waiting area of the pedestrian crossing is viewed first



(b) after installation of Yellow Carpet



(b) after installation of Yellow Carpet

13 field sites

Site ID	Before	After	Percent increase
A-1	34	85	150.00
A-2	28	70	150.00
B-1	52	51	-1.92
B-2	46	66	43.48
B-3	54	63	16.67
C-1	34	95	179.41
C-2	61	98	60.66
D-1	39	76	94.87
D-2	30	62	106.67
D-3	51	61	19.61
E	36	25	-30.56
F	30	68	126.67
G	42	47	11.90
Average	41.31	66.69	71.34

1) 100×the expected probability of drivers' visual attention during the first 3~5 seconds.

Effects of Yellow Carpet Installations

Age	Crosswalk installed yellow carpet					Crosswalk uninstalled yellow carpet				
	Inside		Outside		Total	Inside		Outside		Total
	Frequency	%	Frequency	%	Frequency	Frequency	%	Frequency	%	Frequency
Over 13	169	90.9	17	9.1	186	541	86.3	86	13.7	627
Under 13	96	91.4	9	8.6	105	28	66.7	14	33.3	42
Total	265	91.1	26	8.9	291	569	85.1	100	14.9	669

265 (91.1%) out of the total 291 waiting staffs on the crosswalk with Yellow Carpets were crossing in the Yellow Carpet

Deceleration effect on the crosswalk where the Yellow Carpet was installed

Category		Average speed immediately before entering. (variation)		Event Spot Average Speed	Average speed after entering (variation)	
Yellow Carpet	1 st round	19.8	(19.2% ▼)	16.0	17.4	(8.7% △)
	2 nd round	18.9	(15.9% ▼)	15.9	16.3	(2.5% △)
	Avg.	19.4	(17.5% ▼)	16.0	16.0	(0.0% ▯)
Across from the yellow carpet		22.2	(14.0% ▼)	19.1	19.7	(3.1% △)
Crosswalk	1 st round	34.5	(6.1% △)	36.6	38.7	(5.7% △)
	2 nd round	31.9	(4.1% ▼)	30.6	30.9	(1.0% △)
	Avg.	33.2	(1.2% △)	33.6	34.8	(3.6% △)

Conclusions

- **Children** fatalities in KR traffic accidents
 - Crossing the road in 2015 was **29.2%**.
- The traditional solution are not effective:
 - **Fluorescent yellow-green** signs
 - Drivers' **Feedback** System
 - **Color** pavement marking.
- 3M Korea has introduced a **novel tape**
 - Colorful, called Yellow Carpet
 - Retro-reflective for nighttime visibility
 - Contrast between school kids and the background during the day.
- Programs involve NGOs, students and parent volunteers to build the pedestrian crosswalk safety.
- Drivers see the pedestrian waiting space first, and at higher contrast, which allows them to concentrate and watch out for pedestrians.
 - Drivers see the pedestrian within Yellow Carpet improved by 71%.
- The majority of pedestrians, some 91% of them will use the Yellow Carpet when present.
- Further, drivers will slow down seeing the Yellow Carpet and be alert for the potential of a school child popping onto the road.

Questions?

Thank you!