Introduction of Highway Safety Enhancement Project

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Introduction of Highway safety status
Background

- Highway accidents rate in China is almost the highest in the world.
  - In 2002, 770,000 accidents occurred, with 109,000 people killed;
  - In 2003, 660,000 accidents occurred, with 105,000 people killed;
  - In 2004, 570,000 accidents occurred, with 99,000 people killed;
  - China, with only 1.9% of the world’s vehicles, has about 15% of global deaths.
Accident trends in recent years in China
Accident trends in recent years in China

fatalities and injured number per 100,000 population

fatalities and injured number per 10,000 vehicles
Accident distribution on various road types

<table>
<thead>
<tr>
<th></th>
<th>Expressway</th>
<th>I and II class highway</th>
<th>III class highway</th>
<th>IV class highway</th>
<th>Urban Principal Arterial</th>
<th>Urban Minor Arterial</th>
<th>Local Road and Streets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidents</td>
<td>2.41%</td>
<td>33.50%</td>
<td>21.76%</td>
<td>10.17%</td>
<td>1.86%</td>
<td>17.83%</td>
<td>12.48%</td>
</tr>
<tr>
<td>fatality</td>
<td>1.32%</td>
<td>37.72%</td>
<td>27.25%</td>
<td>13.84%</td>
<td>1.15%</td>
<td>10.39%</td>
<td>8.32%</td>
</tr>
<tr>
<td>Injury</td>
<td>1.40%</td>
<td>35.20%</td>
<td>25.92%</td>
<td>13.53%</td>
<td>1.18%</td>
<td>12.49%</td>
<td>10.28%</td>
</tr>
</tbody>
</table>
## Distribution of accident types

<table>
<thead>
<tr>
<th></th>
<th>Head-on</th>
<th>Angle</th>
<th>Rear-end</th>
<th>Side-wipe</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accidents</strong></td>
<td>24.01%</td>
<td>30.06%</td>
<td>18.22%</td>
<td>4.82%</td>
<td>22.89%</td>
</tr>
<tr>
<td><strong>Fatality</strong></td>
<td>31.05%</td>
<td>22.58%</td>
<td>11.23%</td>
<td>3.42%</td>
<td>31.71%</td>
</tr>
<tr>
<td><strong>Injury</strong></td>
<td>29.33%</td>
<td>28.30%</td>
<td>12.22%</td>
<td>5.08%</td>
<td>25.08%</td>
</tr>
</tbody>
</table>
Safety—Social Issue

- Safety—result of the social development
  - Decision of our central government
  - Requirements of the sustainable development
  - The sign of modern civilization
  - Main theme of WHO (8th, April) — "Highway safety"
Analysis of Safety problems
Road Conditions

• The total length of the operating highway reaches 1,850,000 Km.
• Most of the highway belong to low class, with II class and below accounting for 70%.
• Safety conditions need to be improved.
Typical Mountain Road
Potential Dangerous Conditions

Sharp Curve

U Curve

S Curve

Curve Combinations
Potential Dangerous Conditions

Long downgrade
Potential Dangerous Conditions

Steep Slope
Potential Dangerous Conditions

Insufficient Sight Distance
Potential Dangerous Conditions

Dangerous Roadside
Potential Dangerous Conditions

Insufficient Roadside Clear Zone
Potential Dangerous Conditions

Slippery pavement

Surface damage

Surface crack

Poor texture
Atrocious Weather Conditions

Snow and Ice
Heavy fog

Atrociuous Weather Conditions
Heavy trucks on the Highway
Safety improvement strategy—Highway Safety Enhancement Project
Defects in the highway system

- There are many dangerous factors in early-built Highway, such as long downgrades, steep hills, by the river and near the ravine, and insufficient safety protection facilities.
- Dissatisfactory Design
- Social’s drastic responses to the severe traffic accidents
Highway Safety Enhancement Project

• Decision of MOC

Launch “Highway Safety Enhancement Project” on the National highway system in 2004 to improve the traffic safety level

The project focuses on: National Road 210, 319, 202, 109, 105.
The Plan of Highway Safety Enhancement Project

- From 2004 to 2006, in the project, 17,000 potential hazards which adds up to 50,000 km will be eliminated.
- In 2004, 70,000 potential hazards was eliminated, adding up to 21,000 km.
- In 2005, 88,000 potential hazards was eliminated, adding up to 22,000 km.
- In 2006, the rest potential hazards will be eliminated and the acceptance of work will be organized.
Basic Principle and Concept

SAFETY

COST-EFFICIENCY

ENVIRONMENT PROTECTION

ADJUSTMENT TO LOCAL CONDITIONS
Activities on highway safety improvement

• Enlarge the number and style of traffic sign
• Add the facilities of sight enhancement
• Delineate more highway markings
• Improve the safety protection level, set different level barriers
• Implement speed limit at specific spot
• Increase the surface friction, set adaptive superelevation at curve
• Set the emergency escape ramp
• At the sharp curve, we took a series treatments to improve road safety, such as speed limits facilities, markings, seperator, ect.
Different guardrail used in different sites according to the environments.
针对路左
侧危险程度明显
高于路右的情
cu，分别采用水
泥混凝土和钢护
can。既经济又安
全。

将原示警墩，
改造为“城垛式”钢
筋混凝土防撞护
can，辅以（太阳
能）发光视线诱导
设施。安全又美
观。
防护设施篇

既能起到防护作用，又不破坏路侧竹林景观的树桩型护栏。

轻便、通透的高强度防撞护栏。
为了保障安全，使用废旧轮胎减轻事故程度。利用警示墩，既提高了防撞等级，又不显生硬。
防护设施篇
示警墩
造型不再呆板、生硬。

安全与绿化相接合。
大型图形标志 通过醒目的颜色和图案提示驾驶员注意驾驶。
振动标线的应用。车辆跨线时将产生轻微振动和警示噪声，从而引起驾驶员的警觉。

利用视觉特点，使标线具有立体感，对控制车速有一定积极作用。
改造后的“碟型”边沟，辅以必要的安全净空。减轻驶出路侧车辆的事故严重程度。

利用球面反光镜提高弯道行车视距。
其他设施篇

在穿越村镇路段设置“比利时”路面，通过路面的轻微颠簸提醒驾驶员降低行驶速度。

充分利用地形条件，在急弯外侧设置简易的避险车道。
在相对宽阔的山顶设置小型的停车休息区，为驾乘人员提供一个小型观景和休息场所，使公路更显人性化。

在长下坡中间路段设置紧急停车区，为驾驶员提供检查车辆和临时休息的场所。
通过节能环保的太阳能标志提高标志夜间的视认性。
综合整治篇
修剪植被，清理边坡
提高弯道视距。
弯道内侧采用青草和低矮灌木进行绿化，保证行车视距。

弯道内侧边沟设置盖板。

道路中心施划禁止超车标线。

设置视线诱导标志。

视距不良路段综合整治图解。
综合整治篇

清理边坡，并采用低矮灌木进行绿化，保证行车视距

弯道前设置必要的标志

减速标线，提醒驾驶员减速

设置护栏，保证行车安全

连续急转弯路段综合整治图解
综合整治篇

大型警告标志

限速标志

视线诱导

震动防滑薄层铺装

震动标线结合分离式突起路标

清理弯道内侧杂乱植被

急弯路段综合整治图解
Effects of Highway Safety Enhancement Project
Effects

• In 2004, the fatalities in traffic accidents is less than 100,000.
• According to the facts, traffic accidents happened in 2004 is 20.5% less than that in 2003, with 23.2%, 20.6%, 14.5% happening in highway Class II, III and IV respectively. **HSEP plays an important role.**
The escape ramp saved the drivers and the vehicle. The drivers said that HSEP gave them the second life.
The concrete guardrail protected the bus which contained more than 40 passengers on it at that time!
2004年5月22日，一辆从石泉发往西安的大客车在210国道K1107+500处。由于司机疲劳驾驶，操作不当，车辆冲向路外并与钢筋砼护栏相撞，碰翻两个护栏墩，客车右侧外壳受损，车上18名乘客经历了一场虚惊之后，体会到了安保设施的“救命”作用。
2004年9月29日，一满载汽油的油罐车（车号为辽H07155）途径河北207国道张家口路段时，由于雨天路滑、车辆失控，冲入k388+030避险车道，避免了一起严重的交通和环境污染事故。
2004年10月16日晚间，一辆牌照为津A77112的集装箱货车在河北207国道张家口路段上由于刹车失灵，冲入K285＋570处避险车道，随即10月17日凌晨，先后有牌照为鲁Q45515和冀HP0616两辆车辆，由于同样原因先后冲入此避险车道。该恶性交通事故重伤1人，轻伤2人，该避险车道直接挽救了三车上10名驾乘人员的生命。
Highway class in China is low and the safety level is still far from the expectation, so we need to further develop the Highway Safety Enhancement Project.
THANK YOU!