Road Safety Facilities in Korea

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Contents

- Road Network of Korea
- Standards for RSFs in Korea
- Features of RSFs
## Roads of Korea

<table>
<thead>
<tr>
<th>Classification</th>
<th>Authority</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Expressway</td>
<td>KEC <em>Korea Expressway Corporation</em></td>
<td>4,193 km</td>
</tr>
<tr>
<td>(as of Dec 2015)</td>
<td>460 km by PPP scheme (11%) included</td>
<td></td>
</tr>
<tr>
<td>National Highway</td>
<td>MOLIT <em>Ministry of Land, Infrastructure &amp; Transport</em></td>
<td>13,948 km</td>
</tr>
<tr>
<td>Metropolitan City Road</td>
<td>Local Government (Metropolitan Cities)</td>
<td>4,727 km</td>
</tr>
<tr>
<td>Provincial Road</td>
<td>Local Government (Provinces, or Cities)</td>
<td>18,058 km</td>
</tr>
<tr>
<td>City/County/District Road</td>
<td>Local Government (Cities, or Counties)</td>
<td>66,572 km</td>
</tr>
<tr>
<td>(as of Dec 2015)</td>
<td></td>
<td>107,498 km</td>
</tr>
</tbody>
</table>

※ Expressway Length : Jun 2016

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107,498 km
(4,193km of Expressway)

National Expressway No.1: Gyeongbu Expressway
N. Expressway → 32 Routes
N. Highway → 51 Routes

Seoul Metropolitan Road No.88

Provincial Road No.56

National Highway No.3

National Highway No.6

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National Expressways of Korea

**Synonym** Motorway, Freeway

- Controlled-access Highway
- High-speed traffic (max 110 km/h) & exclusively by motor vehicles
- The highest-grade road and hierarchy arterial routes of national road networks
- Toll roads managed by KEC

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• **Rocks** transport 88% of passengers and 91% of freights.

• **Expressways** carry roughly half of total road freights.
# Asian Highways in Koreas

<table>
<thead>
<tr>
<th>Asian Highway Routes in Korean Peninsula</th>
<th>Country</th>
<th>Primary (km)</th>
<th>Class I (km)</th>
<th>Class II (km)</th>
<th>Class III &amp; Below (km)</th>
<th>Total (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Republic of Korea</td>
<td>457</td>
<td>309</td>
<td>72</td>
<td>-</td>
<td>838</td>
</tr>
<tr>
<td>(South Korea)</td>
<td>DPR Korea</td>
<td>-</td>
<td>492</td>
<td>-</td>
<td>910</td>
<td>1,402</td>
</tr>
<tr>
<td>(North Korea)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AH Specification</th>
<th>Primary</th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Access-controlled</td>
<td>4 or more lanes</td>
<td>2 lanes</td>
<td>2 lanes</td>
</tr>
<tr>
<td>Pavement Type</td>
<td>Asphalt or Cement Concrete</td>
<td>DBST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Speed (km/hr)</td>
<td>120~60</td>
<td>100~50</td>
<td>80~40</td>
<td>60~30</td>
</tr>
<tr>
<td>Lane Width(m)</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.0~3.25</td>
</tr>
</tbody>
</table>

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Statistics of the Road Traffic Accidents in Korea

Death Toll of Traffic Accident: 2006-2015

Death Toll: Expressways

Death Toll: National Highways

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Number of Road Traffic Accidents

Number of Fatalities from Road Traffic Accidents

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Regulatory Standard for RSFs of Korea

- **Road Traffic Act** (Article 4: Traffic Safety Facilities)

- **Rules on the Standard of Road Structures and Facilities** by Ministry of Land, Infrastructure & Transport (MOLIT Ordinance No.223)
  도로의 구조·시설 기준에 관한 규칙 (국토교통부령 223호)

- **Guidelines on the Installation and Maintenance of Road Safety Facilities** by MOLIT (MOLIT Rule No.69)
  도로안전시설 설치 및 관리 지침 (국토교통부 예규 제69호)

- **Rules on the Installation and Maintenance of Traffic Safety Facilities** by National Police Agency (NPA Rule No.701)
  교통안전시설 등 설치·관리에 관한 규칙 (경찰청 훈령 제701호)

- **Manual on the Vehicle Crash Test for Barriers** by MOLIT
  차량방호 안전시설 실물충돌시험 업무편람 (국토교통부)

*written in Korean  translated in English*
Contents of the MOLIT’s Rule

Volume 1: Delineation system
  Delineators, Chevron alignment signs, Road studs, Obstacle signs, Structure Paintings, Delineator Posts

Volume 2: Lighting System

Volume 3: Barrier system
  Barrier fences, Crash cushions, End treatments and Transitions, Anti-Dazzling Panel

Volume 4: Others
<table>
<thead>
<tr>
<th>Volume</th>
<th>Contents of the MOLIT’s Rule</th>
<th>Establishment</th>
<th>Final Revision</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>Barrier System</td>
<td>1997. 02.</td>
<td>2014. 02.</td>
</tr>
<tr>
<td>4</td>
<td>Others</td>
<td>1997. 08.</td>
<td>2014. 02.</td>
</tr>
<tr>
<td></td>
<td>4-02 Speed Bumps</td>
<td>1997. 08.</td>
<td>2011. 07.</td>
</tr>
<tr>
<td></td>
<td>4-03 Convex Mirrors</td>
<td>2000. 11.</td>
<td>2011. 07.</td>
</tr>
<tr>
<td></td>
<td>4-06 Electronic Road Signs</td>
<td>1999. 11.</td>
<td>2009. 02.</td>
</tr>
<tr>
<td></td>
<td>4-07 Facilities for Bad Weather/Tunnels/Long Bridges</td>
<td>2005. 01.</td>
<td>2014. 02.</td>
</tr>
<tr>
<td></td>
<td>4-09 Rumble Strips</td>
<td>2005. 05.</td>
<td>2011. 07.</td>
</tr>
<tr>
<td></td>
<td>4-10 Facilities for Jaywalking Ban</td>
<td>2012. 11.</td>
<td>-</td>
</tr>
</tbody>
</table>
Example of Road Safety facilities on the Expressway

- VMS & cameras
- Lights
- Crush Cushion
- Guardrail
- Median Barrier
  - Higher fence to avoid dazzling
- Delineation Line
- Delineation Post
- Anti-skid Pavement

National Expressway No.1 (AH1) : Around Giheung S/A

Before HVL  After HVL

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Service Area of the Expressway

Giheung Service Area on the National Expressway No.1

Safety Enhanced Layout of the Service Area

Parking-Info Board  Separation of Buses and cars  Raised Crosswalk  Pedestrian Path

Safe-zone for Pedestrian  Parking lot Identification  Parking for Elderly and Disabled

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RSFs in Korea: 1. Delineation System

• Locations: speed ≥ 50 km/h / curved section / change of lane number, or width
• It should be installed continuously on expressways and main arterial roads.
Chevron Signs

Delineator Post

Anti-Dazzling Panel

Delineator

Color Lane

Delineator Line

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RSFs in Korea: 2. Lighting System

- Requirements: Surface brightness, Dazzling control, Landscape
- Locations
  - Expressways: Interchange, service area section, and etc.
  - Urban roads: - AADT ≥ 25,000
  - Tunnels

LED Lights

Lights at Interchange
Lighting at Crosswalk

Lighting to prevent drowsy driving

Lower Position Lights

Lighting using Solar Energy & Wind Energy

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RSFs in Korea: 3. Barrier System

- Types by usages: Roadside, Median, Sidewalk, Bridge
- Types by stiffness: Rigid type, Flexible type, Semi-rigid type
Grade of Barriers in Korea

- Types of **SB** (Safety Barrier) by **Impact Energy**: 7 levels (1-7)
  - SB1, SB2, SB4: for Low speed sections (National Highway, or Provincial Road)
  - SB3, SB5: for High-speed sections (National Expressway)
  - SB6, SB7: for Special Sections

- Types of **CC** (Crash Cushion) by **Impact Speed**: 3 levels (1-3)
  - CC1, CC2: for Low speed sections
  - CC3: for High-speed sections
Locations of SB & CC

- SB: Guardrail
- SB: Median
- SB for Bridge

Roadside SB3

Median SB5

Bridge

CC3

SB5

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• Updated **Guidelines** for barriers in 2014
  Median barriers, Roadside barriers, Bridge railings
  Crash cushions, Transitions, End-terminals

• **Full-scaled vehicle crash tests** to evaluate the crashworthiness of the features are mandatory

  [Accredited Agencies for the test]
  - **Korea Expressway Corporation** Research Institute
  - **Korea Transportation Safety Authority**
RSFs in Korea: 4. Others

- Pavement system
  - Anti-skid Pavements (bonding or cutting/grooving)
  - Speed Bumps
  - Rumble Strips

- Electronic Road Signs
  - Variable Message Sign
  - LED Warning Sign
  - Lane Control Sign
  - Variable Speed-limit Sign
Grooving (longitudinal)

Grooving (Transversal)

Tinning Treatment (Transversal)

18mm
3mm
3mm

Pavement

40-60 mm
4-5 mm
6-9 mm

Pavement

Longitudinal Grooving

Transversal Grooving

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- Facilities for Bad weather, Tunnels, and Long bridges
  - **Foggy Area**: Safety Sign, Visibility meter, Electronic Sign, Rumble Strip, Delineators
  - **Rain & Snow Area**: Delineator, Chevron Sign, Anti-skid Pavement, Rumble Strip, Safety Sign, Electronic Sign
  - **Tunnels**: Lights, Structure Painting, Delineator, Road Stud, Electronic Sign
  - **Bridges**: Lights, Delineator, Road Stud, Electronic Sign, Chevron Sign for Bridges, Rumble Strip

- Auxiliaries
  - Convex Mirror
  - Facilities for Disabled
  - Rock-fall Preventing System: Fence, Net, Retaining Wall, Tunnel for Falling-stone, Vegetation
  - Emergency Escape Ramp: Sand Mound, or Gravel Dump
  - Jaywalking Ban

*Dr. CHO, Sung-min Michael*
Traffic Enforcement by Police
Enforcement by Cameras
Automated Traffic Enforcement System based on the Travel Time Speed
Thank You

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Crashworthiness Test at KEC Research Institute