World Bank and star rating of roads in new projects in India

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WHAT

✓ IS THE MAGNITUDE OF PROBLEM
☐ HAS BEEN DONE SO FAR
☐ IS BEING PROPOSED NOW
☐ ARE SOME CHALLENGES
India accounts for about 10% of the global road fatalities.

In 2015:
- 501,423 crashes
- 146,133 killed
- 500,279 injured

Source: Road Accidents in India 2015, MORTH, GOI
Rapid Motorization
Doubled in less than 10 years ...

Rising RT Deaths
1980-2009 (in Thousands)

Rapid Loss of Young & Productive
INDIA: Road Fatalities in 2015

Source: Road Accidents in India, 2014, MORTH, GOI
In 2015, of all fatalities, about:
35% were on National Highways
& 28% were on State Highways

SH & NH comprise just 5% of road network

In 2014, 50 cities (with POP > 1 million) had:
22% of all crashes
11% of all fatalities
16% of all injuries

In 2015, rural areas accounted for:
54% of all road crashes
61% of all fatalities
59% of all injuries

Source: Road Accidents in India, 2014, MORTH, GOI
WHAT

- IS THE MAGNITUDE OF PROBLEM
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Adopted the Brasilia Declaration on Road Safety
Confirmed the goal of **halving road fatalities by 2020** as part of UN Sustainable Development Goals adopted in September 2015

Amendments made to the Motor Vehicle Act
• Stronger penalties for speeding, dangerous driving, overloading
• Automated driver and vehicle testing
• Speedy assistance to road accident victims
• Highway Traffic Patrol on National Highways

Under Supreme Court Directives
• Action plans being developed by all states
• Helmet wearing made mandatory for rider and pillion
• Overloading made illegal
• Good samaritan guidelines issued
Support at the National Level
Extended knowledge and technical support to the Ministry of Road Transport & Highways on improving road safety legislation

Support at the State Level
- Road Safety Component integral to all road projects
- iRAP surveys of project roads
- Knowledge support in safety management and audit

Support at the City Level
One of eight implementing agencies of the Bloomberg Initiative for Global Road Safety in
- Mumbai, India
NATIONAL/STATE INITIATIVES

- **Assam** – 446km
  - Design star ratings for SH3 & SH31
  - 10,500km surveyed between 2010-14
  - Potential to prevent 878,000 deaths and serious injuries over the next 20 years
  - Upgrades are completed/ongoing

- **Andhra Pradesh & Telangana** – 589km
  - APRSP 431km
  - NHIIP 158km

- **Gujarat** – 2,260km
  - GSHP-II
  - Baruch to Valia demo corridor
  - 581km of design star ratings

- **Karnataka** – 2,200km
  - KSHIP
  - SCDP SH20 & SH17 min. 3-star
  - NHIIP 1,134km

- **Kerala** – 623km
  - KSTP-II
  - Results published July ’12
  - Construction underway

- **Rajasthan** – 340km
  - NHIIP
  - Safer Greener Pilot – 120km
  - NH-1 Delhi to Panipat

- **Uttar Pradesh** – 2,018km
  - UP Core Road Network Development Program

- **Kerala** – 623km
  - KSTP-II
  - Results published July ’12
  - Construction underway

- **Tamil Nadu** – 2,007km
  - TNRSP-II
## BASELINE STAR RATINGS

<table>
<thead>
<tr>
<th>Star Ratings</th>
<th>Vehicle Occupant</th>
<th>Motorcyclist</th>
<th>Pedestrian</th>
<th>Bicyclist</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Stars</td>
<td>Length</td>
<td>Percent</td>
<td>Length</td>
<td>Percent</td>
</tr>
<tr>
<td>4 Stars</td>
<td>343</td>
<td>3%</td>
<td>174</td>
<td>2%</td>
</tr>
<tr>
<td>3 Stars</td>
<td>2214</td>
<td>21%</td>
<td>1654</td>
<td>16%</td>
</tr>
<tr>
<td>2 Stars</td>
<td>4000</td>
<td>38%</td>
<td>2976</td>
<td>28%</td>
</tr>
<tr>
<td>1 Star</td>
<td>3818</td>
<td>37%</td>
<td>5584</td>
<td>53%</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>52</td>
<td>0%</td>
<td>52</td>
<td>0%</td>
</tr>
<tr>
<td>Totals</td>
<td>10444</td>
<td>100%</td>
<td>10444</td>
<td>100%</td>
</tr>
</tbody>
</table>
## Typical Indicators on WB Funded Projects in India

| PDO Results Level Indicator(s)                                      | a) Road safety rating  
b) Reduction in number/percent of annual fatalities |
|----------------------------------------------------------------------|---------------------------------------------------------------------|
| **Unit(s) of measure**                                             | a) Km or % of roads with desired road safety rating  
b) Number or Percent |
| **Baseline**                                                       | a) iRAP ratings before project start  
b) Official casualty records before project start |
| **Target**                                                         | a) 100% of project roads  
b) Based on state policies |
| **Frequency**                                                      | Pre- and post-construction |
| **Data source / methodology**                                      | a) iRAP  
b) Accident surveys/records |
| **Description (indicator definition, etc.)**                       | a) % of km with at least 3-star rating for all road users.\(^1,2\)  
b) Number of annual fatalities on project roads |

\(^1\) Wherever infrastructure countermeasures are economically unviable to achieve 3-stars with such countermeasures, operating speeds may be lowered.

\(^2\) Number of fatalities and serious injuries estimated using the iRAP method for vehicle occupants, motorcyclists, pedestrians and bicyclists must not increase on any section of project roads.
Implementation of a Safe Corridor Demonstration Program: This sub-component will support the development, implementation, and evaluation of a result focused multi-sector Safe Corridor Demonstration Program. The road section(s) that will constitute the safe corridor(s) are yet to be finalized. The following activities are proposed to be financed under this program:

- Improving the engineering condition of the two safety corridors based on the iRAP recommendations, to achieve a minimum of three-star safety rating.
(a) *Safe Corridor Demonstration Project:* Multi-sectoral interventions will be implemented on two high volume, high safety risk, 30 km corridors (Dehgam to Bharuch & Ankleshwar to Valia) to demonstrate road safety best practices. The interventions will include comprehensive road safety measures including infrastructure safety designs, road traffic police support activities, public awareness/social media campaign and post-crash health care management aimed at reducing deaths particularly among vulnerable road users. On the infrastructure countermeasures, specially focusing on vulnerable road users, the corridor will be improved to eliminate all high-risk sections by targeting of minimum 3 star rating (per iRAP program) applicable to all categories of road users. A robust road safety management and monitoring and evaluation system will also be developed under this initiative.

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>YR1</th>
<th>YR2</th>
<th>YR3</th>
<th>YR4</th>
<th>End Target</th>
<th>Frequency</th>
<th>Data Source/Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads constructed, non-rural</td>
<td>☒</td>
<td>Kilometers</td>
<td>0.00</td>
<td></td>
<td>100.00</td>
<td></td>
<td></td>
<td>350.00</td>
<td>At Baseline, Mid-Term and Yr 5 (End-term)</td>
<td>Ex-Post Evaluation</td>
<td>R&amp;B&amp;D</td>
</tr>
<tr>
<td>Safety Demonstration Corridor, complying with a minimum iRAP star rating of 3 developed</td>
<td>☐</td>
<td>Kilometers</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30.00</td>
<td>At Baseline, Mid-Term and Yr 5 (End-term)</td>
<td>Mid-Term Review, Ex-Post Evaluation, iRAP Surveys</td>
<td>R&amp;B&amp;D, Consultants</td>
</tr>
</tbody>
</table>
3. Component A1 (US $ 322 million): This subcomponent will include upgrading 281 km state highways through FIDIC based input contracts. It would also include the associated pre-construction activities including resettlement and utility relocation, environmental management and supervision and quality control services.

4. Improved road safety and traffic management measures have been fully integrated in to the engineering designs. These interventions are based on an automated road safety assessment (conducted through iRAP), manual safety audits, public consultations and detailed traffic surveys. The interventions range from traffic calming, raised pedestrian crossings, signalization of intersections, provision of footpath, segregation of slow and non-motorized traffic from motorized traffic, off-site parking arrangements and roadside barriers.
Road Safety: The project preparation and detailed designs of the roads and structures including road safety features have been carried out through DPR consultants who in their team consisted of a road safety specialist. Safety vulnerabilities were identified and specific road safety engineering counter measures including speed calming measures to reduce accidents especially in populated areas were adequately integrated in the engineering designs to reduce the risks. All the upgradation project roads are subjected to International Road Assessment Program (iRAP) assessments and the final designs will address the findings and improve the safety rating of the road.
11. **Implementation of a Safe Corridor Demonstration Program.** The selected road safety corridors are Maddur to Mysore (53 km) and Belgaum to Hungund (186 km). Under this Program, the following activities will be funded:

(a) Improving the engineering conditions of the two safety corridors based on the iRAP recommendations to achieve a minimum of three-star rating along the corridors.

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### India: Second Karnataka State Highway Improvement Project

#### Annex 1: Results Framework and Monitoring

<table>
<thead>
<tr>
<th>PDO Level Results Indicators*</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values**</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate Result (Component Three): Road Safety Improvement Component</td>
<td>Effective implementation of Safe Corridor Pilot</td>
<td>✓</td>
<td>Policy and Institutional Actions</td>
<td>Lead Agency Established</td>
<td>Consultant services procured</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>YR 1</td>
<td>YR 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
KARNATAKA – STAR RATING OF ROAD DESIGNS ON KSHIPII

- GOK Commitment to set minimum safety ratings
- 77% of selected roads achieved a 3 star rating
- Used as a performance indicator

**CAR RPS STAR (SMOOTHED) STAR RATINGS**

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>KSHIP Annuity roads - existing</td>
<td>549 km</td>
</tr>
<tr>
<td>0 km</td>
<td>0.0%</td>
</tr>
<tr>
<td>231 km</td>
<td>42.1%</td>
</tr>
<tr>
<td>241 km</td>
<td>43.9%</td>
</tr>
<tr>
<td>69 km</td>
<td>10.7%</td>
</tr>
<tr>
<td>10 km</td>
<td>3.3%</td>
</tr>
<tr>
<td>0 km</td>
<td>0.0%</td>
</tr>
<tr>
<td>KSHIP Annuity Roads - proposedv3</td>
<td>549 km</td>
</tr>
<tr>
<td>0 km</td>
<td>0.0%</td>
</tr>
<tr>
<td>0 km</td>
<td>0.0%</td>
</tr>
<tr>
<td>11 km</td>
<td>2.0%</td>
</tr>
<tr>
<td>421 km</td>
<td>76.7%</td>
</tr>
<tr>
<td>91 km</td>
<td>16.6%</td>
</tr>
<tr>
<td>25 km</td>
<td>4.6%</td>
</tr>
<tr>
<td>0 km</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

- But, constraints of land precluded achievement of better ratings for pedestrians
Several Issues – unsafe vehicles, users, behavior
Some Junction Improvements

Before

After
Some Curve Improvements

Before

After
Better Pedestrian Facilities
WB’S CITY-LEVEL INITIATIVES

Bloomberg Initiative for Global Road Safety 2015-19 in Mumbai, India

- Implement design recommendations on pilot road (10 km) based on iRAP assessments and benchmark improvements using IRAP metrics

- Support for iRAP assessments for another 150 km of high-risk, high-volume roads

- Support on vetting design interventions for 150 km of high-risk, high-volume roads based in iRAP results

- Build client capacity on replicating safety interventions for all 2000 km of city roads in a phased manner
## Fatality Count on the Corridor

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of deaths (2012-2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian</td>
<td>19</td>
</tr>
<tr>
<td>Bicyclist</td>
<td>1</td>
</tr>
<tr>
<td>Motorcyclist</td>
<td>10</td>
</tr>
<tr>
<td>Vehicle Occupants</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>47</strong></td>
</tr>
</tbody>
</table>

13 deaths per year on 9.5km stretch
EXPECTED RATINGS

% Length of road with 3-star or better ratings for 45 kmph

iRAP recommended replacement of zebra markings with raised pedestrian crossings and set of bar markings with studs for better delineation.
CONSTRAINTS

Shifting of Utilities

Shifting of Bus stops

Encroachments
WHAT

- Is the magnitude of problem
- Has been done so far
- Is being proposed now
- Are some challenges

India – Road Safety Star Ratings
FOCUS ON THE STRATEGIC NETWORK

• Golden Quadrilateral and its diagonals that account for 25% of all fatalities

• Star rating to be conducted for Delhi-Mumbai-Chennai sections (3800 km)

• Focus on removal of 786 black spots on NHs

• Ensure that at least none of the highways are 1*
WHAT

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✓ ARE SOME CHALLENGES

INDIA – Road Safety Star Ratings
SOME CHALLENGES ...

- Countermeasures must be sensitive to local traffic and user acceptability
  - 80% two-wheelers - dedicated motorcycle lanes or shoulder widening/sealing
  - Big impact of median closures, shoulders, barriers on non-motorized road users especially in rural areas
  - Benefit-Cost Ratios must represent local traffic conditions
  - Local design standards

- Land constraints are perennial
  - In Kerala, despite investments, 3 star was not achieved;
  - In Karnataka and Gujarat, the designs had to be changed due to land issues

- Proper maintenance of the safety features
  - Needs enforcement and speed management
**... AND SOME THOUGHTS**

- iRAP is an excellent tool to help translate the SDGs into reality
  - Elevates the strategic dialogue on road safety
  - Results should spur investments in related road safety pillars – road safety management, safer vehicles, safer users and post-trauma care
- Incremental approach may be better to maximize gains within available budgets
  - Better road safety gains through some 4 and some 2 stars rather than all 3 star?
- Institutional arrangements critical for mainstreaming iRAP
  - Explore combining with road asset management systems?
  - Explore combining with road safety audits?
  - Synchronize with road asset data collection for agencies?
Thank you!