High Speed Corridors

Policy Issues for Safety

by

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Large Traffic Volumes

High Vehicle Speed
High Speed Roads

- Characteristics
  - Multiple lanes
  - Central median
  - Full / Partial Access control
  - Restricted to Motorized Traffic.
High Speed Roads

- Types
  - Autobahns, Freeways, Motorways, Expressways.
  - Arterial roads*
  - Divided Highways*
  - 2+1 Road*

(* doubtful without control on access and traffic mix)
## Requirements

- Vehicles have choice to travel safely at high (?) speeds
- Divided Carriageway
- Control on Access
- Restriction for slow moving vehicles/pedestrians/two wheelers
- Restrictions on parking
- An elaborate and clear system for Route Guidance
- User Facilities Enroute
Areas of Attention

- Planning
  - Maintaining the hierarchical system of network
- Design
  - Upfront Investment for Low Life Cycle Cost
- Safety in Construction Zone
- Operation and Maintenance
  - Safety Management
  - Traffic Management
  - Asset Management
  - Toll Operations
Challenges

• Willingness and Commitment for Safety by Planners/Designers

• Awareness for All Stake Holders on Criticality of Safety on Roads

• Maintaining smooth traffic at high speeds

• Safety of travels

• Mixing of slow and high speed traffic
Challenges

• Proactive and efficient Incident Management

• Prompt Emergency Medical Services (help)

• Land Acquisition

• Environmental Impact

• Commitment and Performance of Concessionaire on Projects under PPP
Present Approach - Lessons to be learnt

- Tendency for quick results (short term view) at lowest initial investment.
- Lowest construction cost approach.
- Stage Construction/ Development
- Use of minimum Standards instead of optimum Standards
- Disregard/ Compromise on Standards for Cost Cutting
Present Approach - Lessons to be learnt

- Hurried Investigations
- Lack of Planning and design for all categories of Road Users.
- Redesign during construction.
- Absence of life cycle costing approach to save on Cost
- Belief that Human Error is Major cause of Crashes
Crash Causing Factors – Changing Understandings

- Driver: 90%
- Vehicle: 2%
- Road: 8%

90% of crashes are caused by drivers. The remaining 10% are divided between vehicles and roads.
Safety Issues to be Addressed

- In the Approach for framing the Policy
- Formulating Policy for Infrastructure Development
- Planning, Design and Operation Stages
  - Prevention through Safety Audit
  - Reduction through Design and Provision of Safety Features
Haddon’s Matrix for System Approach

<table>
<thead>
<tr>
<th>Phase</th>
<th>Approach</th>
<th>Human</th>
<th>Vehicle</th>
<th>Environment</th>
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</thead>
<tbody>
<tr>
<td>Pre-crash</td>
<td>Crash Prevention</td>
<td>Information Attitudes</td>
<td>Road Worthiness</td>
<td>Road layout</td>
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<td>Police Enforcement</td>
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<td>Road designs</td>
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<td>Handling Speed</td>
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<td>Management</td>
<td>Pedestrian Facilities</td>
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<tr>
<td>Crash</td>
<td>Injury Prevention during Crash</td>
<td>Use of Restraints Impairment</td>
<td>Occupant Restraints</td>
<td>Crash protective roadside objects</td>
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<td></td>
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<td>Other safety devices</td>
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<td></td>
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<td></td>
<td>Crash protective designs</td>
<td></td>
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<tr>
<td>Post-crash</td>
<td>Life Sustaining</td>
<td>First aid Skill Access to Medics</td>
<td>Ease of access</td>
<td>Rescue facilities</td>
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<td>Fire risk</td>
<td>Congestion</td>
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</tbody>
</table>
Approach for Safer Highways

- Humans (Drivers) are bound to commit mistakes and make errors

- Responsibility to be shared between Road Users and Systems Providers
  - Drivers/Other Users to follow Rules
  - Designers to provide safe road
  - Enforcing Agencies to enforce observance
Approach for Safer Highways

- Planning and Designing ‘Forgiving’ Highways
- Preventing Pedestrians and other Venerable Users from accessing highways and
- Preventing motor Vehicles from entering Pedestrian Zones
- Comprehensive Planning with a Vision
Policy Issues

- Road network be classified according to road function.
  - Flow function
    - Highs speed for through traffic between O – D pair, involving large traffic volumes
  - Distribution function
    - For entering or leaving an area
  - Access function
    - Access to residences, shops, business
- Speed limits be fixed as per road function.
- Appropriate Design to meet functional requirements by
  - Appropriate use of road.
  - Traffic Mix Management by Separation
  - Making roads predictable to avoid confusion.
Design Issues / Parameters

• Design life.
  ➢ 20 yrs a more.
  ➢ Examining for longer period.

• Design speed.
  ~ 120 Kph for Expressway.
  ~ 100 Kph for 4/6 lane Highway.
  ~ Varying for terrain type.

• Geometric standards for higher design speed.
Design Issues / Parameters

- Forgiving Highways.
- Lane Width
  3.5 m or more.
- Side Slopes – Flatter or with crash barriers.
- Shoulder width.
  - Wide on both sides of Carriageways
- Wide Median
  - Min 11m in rural (US practice)
  - Min 3m in mountainous/ urban.
  - With crash barriers
Design Issues / Parameters

- Drainage
- Clear / Safe Recovery Zone
  - 3 m to 9 m
- Pedestrian Facilities
  - Pathways
  - Foot over Bridges/ Subways
    - Provision of Escalator/ Lift
- Cattle Crossing Facilities
- Alignment passing through Wild Life Sanctuaries
  - Crossing Facilities based on Animals
Design Issues / Parameters

- Elaborate system of signs and markings for guidance to users
  - Detailed Design
  - Flengible Support Posts
- Bus facilities
  - Bus Bays
  - Safe Access for Commuters
Design / Issues / Parameters

- Rest Areas Facilities
  - Parking
  - Rest Rooms
  - Restaurants
  - Separate Access for workers
Design Issues / Parameters

- Interchanges and their spacing's
- Alignment Passing through Habitations
- Services Roads and Entry/Exit ramps
Design Issues for 4/6 Lane Highways

- Design speed.
- Geometrics to suit higher speeds.
  - Larger Horizontal and Vertical Curves
  - Wide Medians and Median Barriers
- Access Management
  - Side Roads
  - Abutting Properties
- Alignment passing through Habitation
- Alignment passing through Wild Life Sanctuaries
- Services roads
  - Continuity
  - Entry/Exit ramps.
- Segregation of vulnerable road users and Xing Facilities
Entry Ramp for Service Road

Note:
1. Detailed system of Road Markings as per IRC 35
2. Detailed system of Road Signs as per IRC 67

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SUGGESTIVE LAYOUT FOR EXIT RAMP FROM HIGHWAY

FIGENO: 2.1C
SCALE: Not to Scale
Exit Ramp from Service Road

Note:
1. Detailed system of Road Markings as per IRC:35
2. Detailed system of Road Signs as per IRC:07

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DRAWN BY:
Suggestive Layout for Entry Ramp to Highway

Figure: 2.1D
SCALE: Not to Scale
Service Road meeting at Cross Road
Service Road Crossing at Intersection

Note:
1. Detailed system of Road Markings as per IRC:35

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SUGGESTIVE LAYOUT OF SERVICE ROAD CONTINUING AT INTERSECTION

Figure: 23
SCALE: Not to Scale
Operational Issues

• Asset Management
  ➢ Road Maintenance
  ➢ Property Management
  ➢ Facility management

• Traffic Management
  ➢ Incident Management
  ➢ Regulation Enforcement
  ➢ Information Collection and Dissemination
  ➢ Surveillance.
Operational Issues

• Safety Management
  Ù Accident Prevention
  Ù Post-accident Care in the Golden hour
  Ù Enforcement and Education
  Ù Data Collection and Analysis

• Toll Operations
  Ù Electronic Toll Collection

• Use of ITS
  Ù Advanced Traffic Management Systems (ATMS)
  Ù Advanced Traveler Information Systems (ATIS)

• Public Relations
Thank You!