Roads and Road Transport
An Overview
and
Current Initiatives

by

D. P. Gupta

Director (Roads and Highways), AITD

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Purpose of Roads

- Enabler for quality and efficient transport services:
  - Inter-city transport
  - Rural transport (inter-village; intra village)
  - Urban transport
- Provide access to social infrastructure
  - Education centres
  - Healthcare facilities
  - Markets, fairs
- Safety, security, administration
- An infrastructure critical to socio-economic development of our country

As such the road infrastructure must have capacity to support the flow of goods and people and the vehicles (motorised and non-motorised) and pedestrians that move on the road network.

Historical Growth of Road Network

('000 km)					
Category	1951	1971	1991	2011	Current 2016 (Quick estimates)
Total	400	915	2327	4690	5000
NHs	22	24	34	71	101
SHs	50	57	127	164	166
Surfaced Roads	157	398	1113	2525	3000

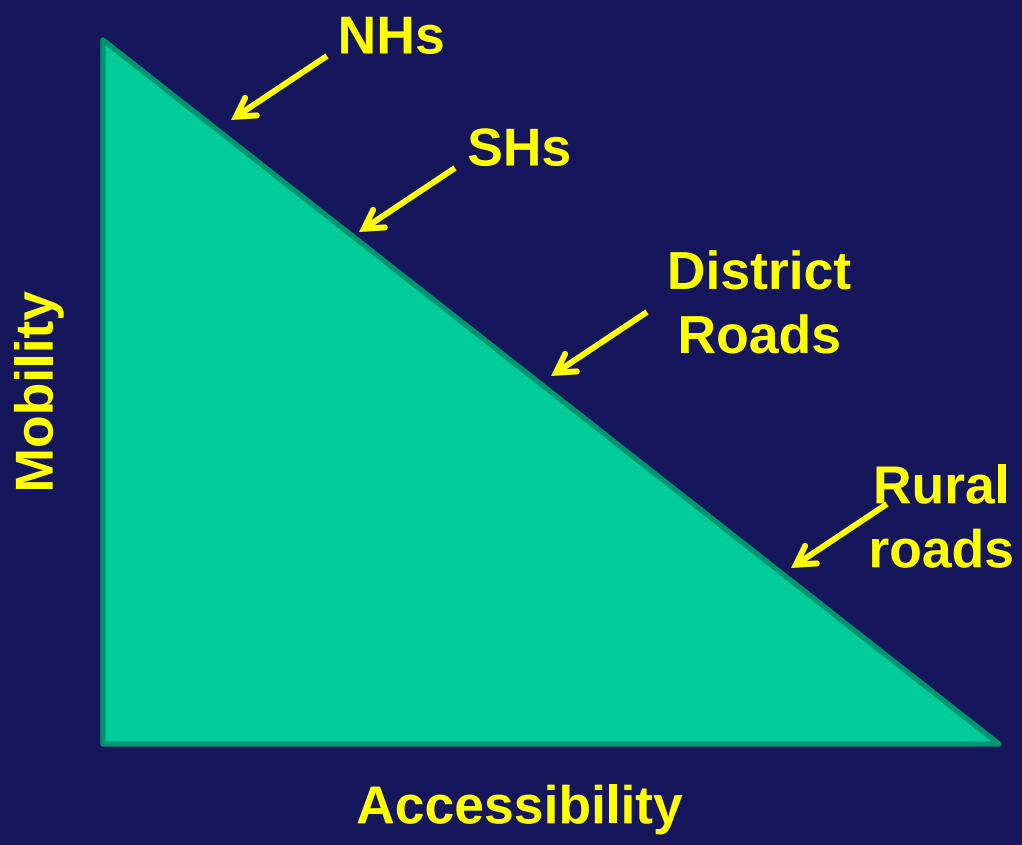
- Currently rural roads constitute about 85 percent of the total road network
- Overall road density – very good. But regional differences exist
- Still several states where habitations are crying for connectivity with all-weather roads
- Sector got a push with Vajpayee's announcement of NHDP and PMGSY

Expenditure on Roads

Period	Expenditure (Rs. crore)
1992-1997	13,200
1997-2002	39,300
2002-2007	130,000
2007-2012	430,000
2012-2017	725,000 (Estimated)

Challenges in Road Development

- Capacity augmentation of NHs, SHs, MDRs
- Expansion of road network – universal connectivity
- Rehabilitation of deteriorated roads
- Preservation of existing roads
- Balanced development
  - All categories of roads
  - All regions of country
- Resource efficiency
- Sensitive to social, environment concerns
- Efficient delivery of programmes
- Governance, transparency



Road Transport

- Share of road transport in total transport very high
- Motorised : Cars, buses and trucks: tremendous growth and continuing
  : Car ownership levels are still low
  : Buses and trucks – annual growth 7-10%
- Short haul by road plus long haul by rail continues to be a challenge
- Truck industry has seen considerable modernisation by way of increase in proportion of multi-axle vehicles
- Provides door to door service, flexibility of operation
  - But Negative externality : Overloading
    : Impacting railway operations
    : Accident hazards
    : Energy guzzlers

Road Transport

- Roads have a critical role in containing vehicle operation cost of cars, buses and trucks.
- Current broad assessment is Annual VOC = Rs.800,000 crore.
- Bad roads could cause annual loss of say Rs.30,000 crore.
- Bus transport services have considerably expanded. However, it may still be inadequate in remote areas.
- Buses and trucks are the rolling stock of road transport infrastructure.
- GPS enabled trucks, buses, cars
- ITS coming up for traffic management and violation detection

Integrated Rural Development

- Social justice
- National integration
- Economic uplift
- Higher productivity in rural areas
- Role of rural roads:
  - Undeniable
  - An instrument of poverty alleviation

  That explains the rationale of GOI intervention in PMGSY and entrusting this to MORD
- MORD Model: Standards national, implementation local
- Also several states – including Bihar started creation of separate rural engineering organisations even though same cadre of engineers

Central Road Fund

- Existed since 1929
- Revamped in December 2000: Re.1.00 per litre on petrol & diesel at that time
- Currently Rs.6.00 per litre on petrol and diesel
- Annual proceeds – currently of the order of Rs.70,000 crore
- Distribution among all categories of roads as per CRF Act (with amendments from time to time).

Current Allocation of CRF
(Effective 01.06.2016)

Current Cess on Petrol and Diesel : Rs. 6.00 per ltr

S. No.	Category of roads	Percent
1.	Development and maintenance of national highways	41.5
2.	Development of rural roads	33.5
3.	Railway over/under bridges and safety works at unmanned railway level crossings	14.0
4.	Development and maintenance of state roads of inter-state and economic importance	10.0
5.	Development and maintenance of roads in border areas	1.0

Current Initiatives

National Highways

Seven Phases of NHDP

- **I : 4-laning GQ**
- **II : 4-laning E-W and N-S**
- **III : 4-laning links to state capitals**
- **IV : Two-laning**
- **V : 6-laning**
- **VI: Expressways**
- **VII: Ring Roads, Bypasses, Flyovers**

PPP initiatives saw good progress

Some review being undertaken now

- **Recent initiatives include focus on:**
  - **Bridges and Bridge Management System**
  - **EPC, Hybrid Annuity Mode of Delivery**

State Highways and Major District Roads

- Several states are taking up capacity augmentation and upgradation of their SHs and MDRs including bridges
- Strategies include tapping private sector financing and avail of Viability Gap Funding of Central Government
- Dedicated programmes for safety engineering measures
- Proceeding with Performance Based Maintenance Contracts
- Earlier neglect also to be made up

Rural Roads

- PMGSY launched in 2000
- An excellent example of managerial and technical support at national level
- And, sound implementation by states and their field PIUs
- Several states undertaking own programmes – MMGSY, GTSNY (Bihar)
- MGNREGS

Projected Investments in Roads

(Rs. crore)

No.	Scheme	2012-17	2017-22	2022-27	2027-32	2012-32
1.	Expressways	20,000	60,000	120,000	180,000	380,000
2.	National Highways	215,000	315,000	420,000	570,000	1,520,000
3.	Special Schemes SARDP-NE + Arunachal Package (central sector)	25,000	40,000	50,000	60,000	175,000
4.	Other special schemes (central sector)	10,000	15,000	20,000	20,000	65,000
5.	State Highways	210,000	270,000	320,000	360,000	1,160,000
6.	Major District Roads	100,000	130,000	160,000	210,000	600,000
7.	Rural Roads including PMGSY	145,000	185,000	130,000	110,000	570,000
	Total	725,000	1,015,000	1,220,000	1,510,000	4,470,000
Source: NTDPC						

Toll Financing

- Sector got commercialised
- Public private partnership can flourish
- System and methodology of collection of toll needs advance technologies
- Advances in mode of project delivery

  BOT (Toll), BOT (Annuity/Hybrid Annuity), EPC
- Toll financing even for government funded projects

Replacement Value of Road Assets

(Broad Assessment* as of January 2013)

		Rs. Billion
A.	**National Highways**	
	19,000 km (4 lane or more) @ Rs.70 million/km	1,330
	40,000 km (2 lane) @ Rs.20 million/km	800
	19,000 km (Single lane) @ Rs.8 million/km	152
		2,282
B.	**State Highways**	
	4,000 km (4 lane) @ Rs.65 million/km	260
	61,000 km (2 lane) @ Rs.18 million/km	1,098
	101,000 km (single lane) @ Rs.7 million/km	707
		2,065
C.	**Major District Roads**	
	266,000 km (single lane) @ Rs.5 million/km	**1,330**
D.	**Rural Roads**	
	PMGSY: 400,000 km @ Rs.4 million/km	1,600
	Non-PMGSY: 25,00,000 km @ Rs.1.2 million/km	3,000
		4,600
	Total Road Network Asset Base (excludes roads in urban areas)	10,277
		Say 10,300

** Source: NTDPC estimates prepared by DP Gupta, former DG (Roads) MORTH*

Combined Wealth of Top 10 Industry Captains (India)

		US$ (Billion)
1.	Mukesh Ambani	23.1
2.	Dilip Sanghvi	15.8
3.	Azim Premji	15.4
4.	L. N. Mittal	13.3
5.	Shiv Nadar	12.1
6.	Cyrus Poonawalla	8.8
7.	Kumar Mangalam Birla	8.8
8.	Uday Kotak	7.9
9.	Sunil Mittal	6.5
10.	Deshbandhu Gupta	4.9
	Total	**116.6**

**** Source: Hindustan Times, 22 October 2016***

(Forbes, IMF)

Impact of Poor Maintenance

- Loss of Assets
  - Current replacement Value : Rs. 10,300 billion
  - Annual Loss due to poor condition (5% of 7,000) : Rs. 350 billion
  - Erosion of network (Annual) : 40,000 km rural roads
    10,000 km secondary roads
- Increased Vehicle Operating Cost (Say Rs.300 billion per year)
- Reduced Life of Vehicles
- Increase in carbon footprint
  - Higher fuel consumption
  - Higher pollution
  - Avoidable burden of quarrying and transporting road aggregates due to reconstruction
- Economic and Social Benefits of Creating Assets are Lost
- Loss of Image: Highway Agency, State, Nation
- Saviour: Growing awareness among political leadership and administrators in states

Asset Management

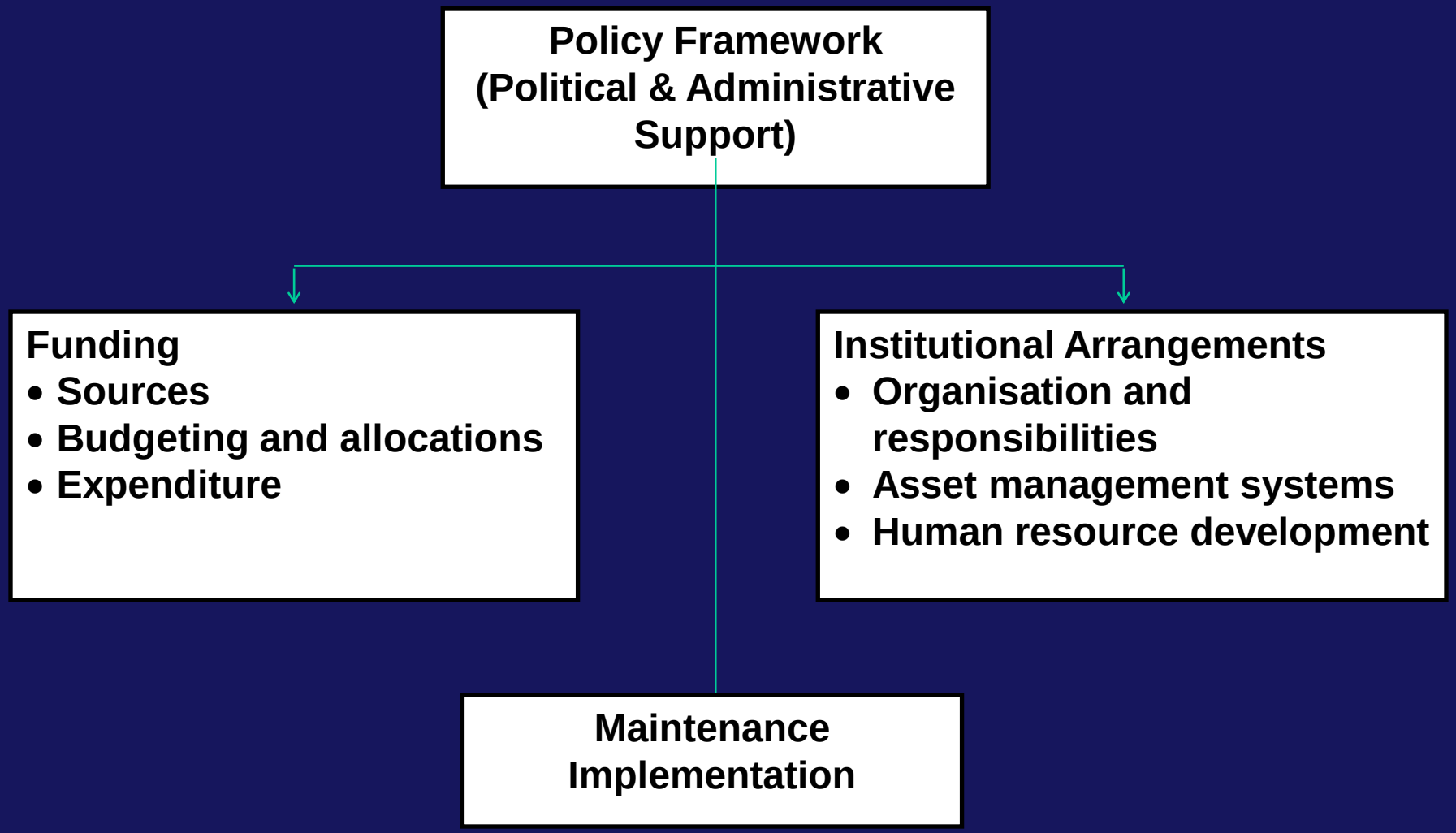
- A strategic and systematic process of:
  - Operating
  - Maintaining
  - Upgrading
  - Expanding

  Physical assets throughout their life cycle.

Asset Life Cycle

- Identifying the needs: creation, maintenance
- Asset planning
- Asset design and construction
- Asset operation and maintenance
- Asset renewal
- Asset upgradation and expansion

Asset Preservation Strategy Elements in Maintenance



Key Elements – Road Maintenance Implementation on Ground

Management & Planning

- Maintenance units
- Inventory and surveys
- Inspections
- Planning and prioritisation
- Works and supervision

Delivery on Ground

- Contract procedures
- Contract documentation
- Contracting arrangements

Technology

- Resource efficiency
- Knowledge development
- Appropriate equipment

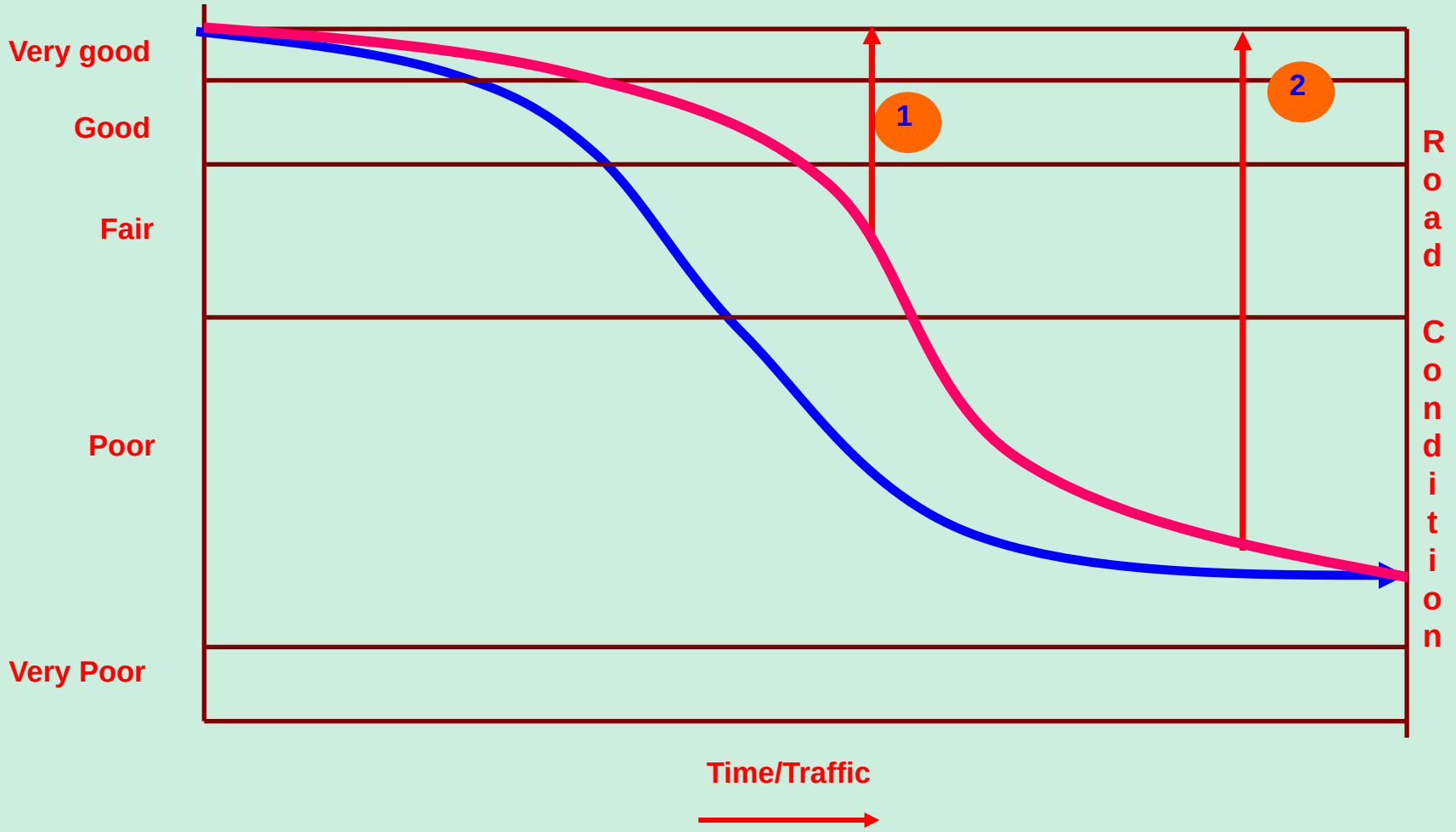
Control

- Monitoring
- Review and evaluation
- Technical and Financial Auditing

Maintenance Management – Broad Principles

- Conducting inventory and condition surveys
- Planning and economics of maintenance
- Timing of maintenance interventions
- Estimating and budgeting
- Works preparation and works programme
- Reporting

Road Deterioration Curve
Managing Life Cycle



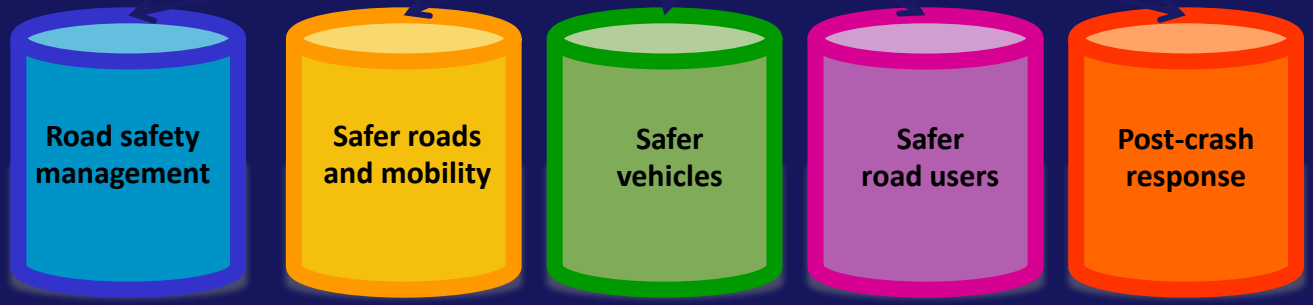
Planning and Economics of Maintenance

- First priority: Routine maintenance of roads in good condition
- Second priority: Off-carriageway maintenance of roads in fair and good condition
- Third priority: Periodic surface renewal of roads in fair condition
- Special repairs and emergency works: Reserve 15 - 20 percent of budget
- Rehabilitation, reconstruction: Not from maintenance budget

Global Plan

UN Decade of Action for Road Safety 2011-2020

Five Pillars



Road Safety and Traffic Management

- Safety with mobility
- Engineering measures: Critical element
- Society awareness
- Hazards identification and counter measures
- Inadequate road signs, pavement markings
- Poor intersection layout
- Poor arrangements at construction sites
- Unmanned railway level crossings
- Road Safety Audits: Need for sunset sometime
- Shortage of good safety auditors

State Road Agencies

- Strong institutions, need to be preserved
- Reorientation
  - Project delivery through PPP
  - Functions based management structure
  - Improved management training
  - Human resource development
  - Strong database, MIS
  - State road corporations/authorities
- HRD (knowledge and skill upgradation)
  - Fill up speciality gaps: core and business processes
  - Strengthen/enhance existing skills
  - Talent creation, talent retention
  - Career planning/cadre management
- Hygiene factors
  - Work stations
  - IT, computerization
  - Inspection vehicles

Contracting Industry

- Fillip by World Bank, ADB since mid-1980s
- ICB / FIDIC culture
- Focus on:
  - Equipment management
  - Resource scheduling
  - Innovative technology
  - Safety at construction sites
  - Training of workers
- Equipment banks
- Growth on healthy lines
- Partnership approaches
- Dispute resolution
- Healthy decision support system by Employer

Advances in Equipment, Instrumentation

- Advances in Survey Instruments
- Advances in Laboratory Testing Equipment
- Advances in Construction Machinery and Equipment
- Zero customs duty on import of road construction equipment in mid-1990s revolutionised the sector delivery (quality, speed and environment savy)
  - Vibrant equipment industry (pressure on domestic industry to modernise)
  - Several new equipments are seen now
- Information and Communication Technology provided the boost
  - Mobile Apps
  - Geotagged, Geostamped photos
- Ownership by contractors: enhanced
- Equipment banks coming up

Advances in Technology

- Innovative Materials: IRC Accreditation
- Industrial wastes – Utilisation increasing
  - Fly ash
  - Steel / Copper / Zinc slag
  - Marble slurry
- Use of construction / demolition waste
- Use of plastic waste in bitumen
- Use of crumb rubber in bitumen
- Use of geo-fabric, coir
- Use of bio-engineering measures in slope protection
- Recycling of pavements
- Use of locally available marginal materials (lime/cement stabilisation)

Advances in Technology

- Thanks to research effort by Academia (state, national and international levels)
- Thanks to research effort by Industry (all stakeholders connected with roads and road transport)
- Thanks to policy initiatives by government
- Innovations and advancements will occur
  - through partnership between Academia and Industry, and
  - through facilitation by the Government
- Government Need to Invest in Research

Paving the Way to Tomorrow's Energy
(Initiative on Wattway by Colas)

Thank you

asianinstitute.del@gmail.com