

---

# Environment Protection and Safety During Construction

EHS Management During Construction of Roads and Highways

Snapshots from World Bank Funded Projects

**July 13, 2018**

**Neha Vyas**

Senior Environment Specialist

Environment and Natural Resources Global Practice

The World Bank

---



# EHS during Construction ...

- **Cross-disciplinary area** concerned with natural resource management, environmental protection, safety, human health and labour welfare
- Benefits people engaged in construction work, road users and residents around worksites.
- Involves interactions among **many subject areas**, including engineering, management, public health, chemistry, ergonomics, toxicology, environmental health, labour laws and psychology/behavior.

# Some Key/ Common Issues ....













# Working at Height ...

Falls are the leading cause of fatalities in construction industry.



Account for one-third of all deaths in construction



# Structural Safety Issues ...





# Dust at Construction Sites...



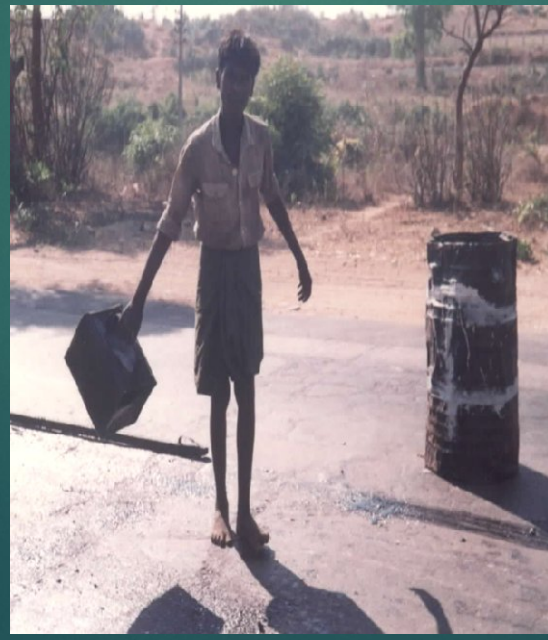


## Transportation and Mechanical Safety Issues...





# Worker's Safety and Health Issues





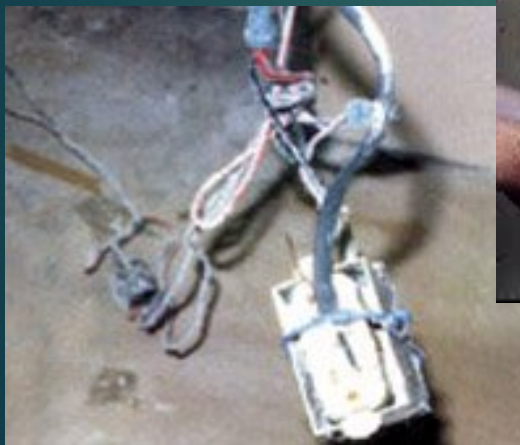
## Lack of Provision and Enforcement of PPE...





# Electrical Hazard ..

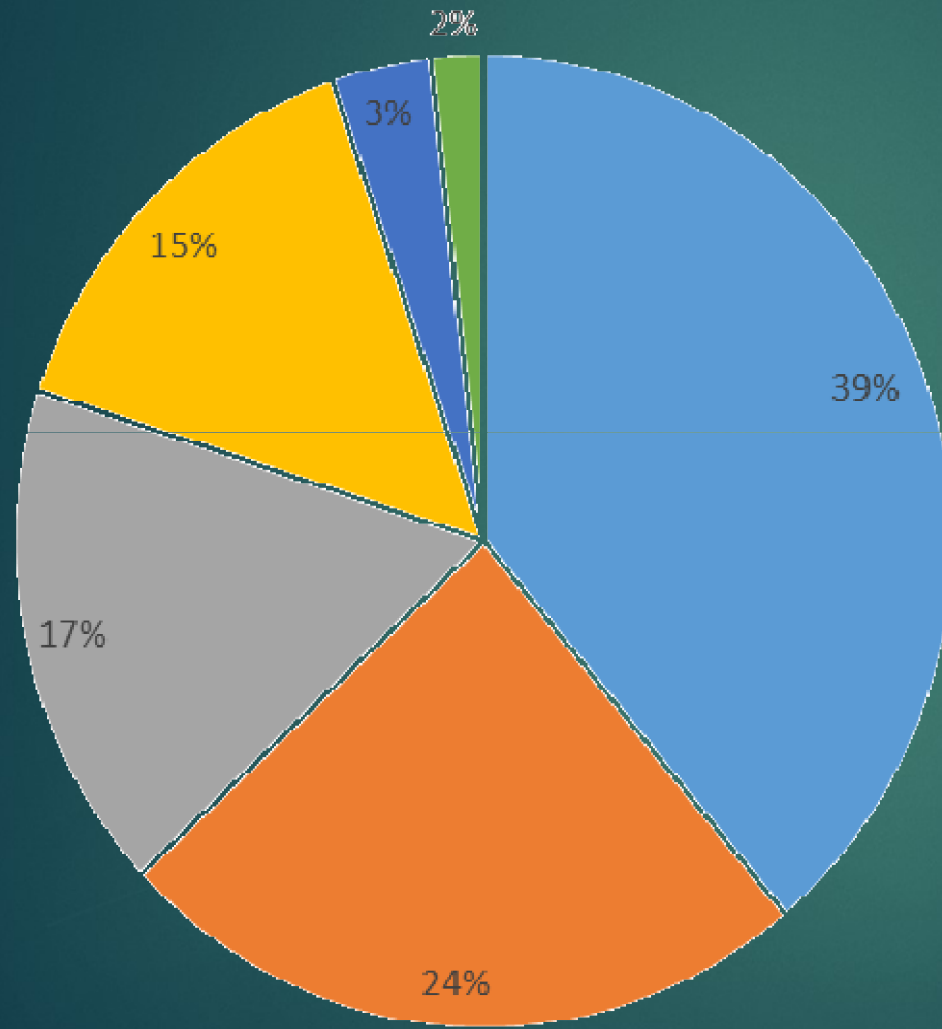
1. Contact with Overhead Power Lines
2. Lack of Ground Fault Protection
3. Equipment Not Used in Manner Prescribed



10,218  
electrical-  
related  
fatalities  
occurred  
in 2013



# Construction Worker Fatalities by Event or Exposure



- Falls, slips, & trips
- Transportation incidents
- Contact with objects and equipment
- Exposure to harmful substances or environments
- Violence and other injuries by persons or animals
- Fires and explosions



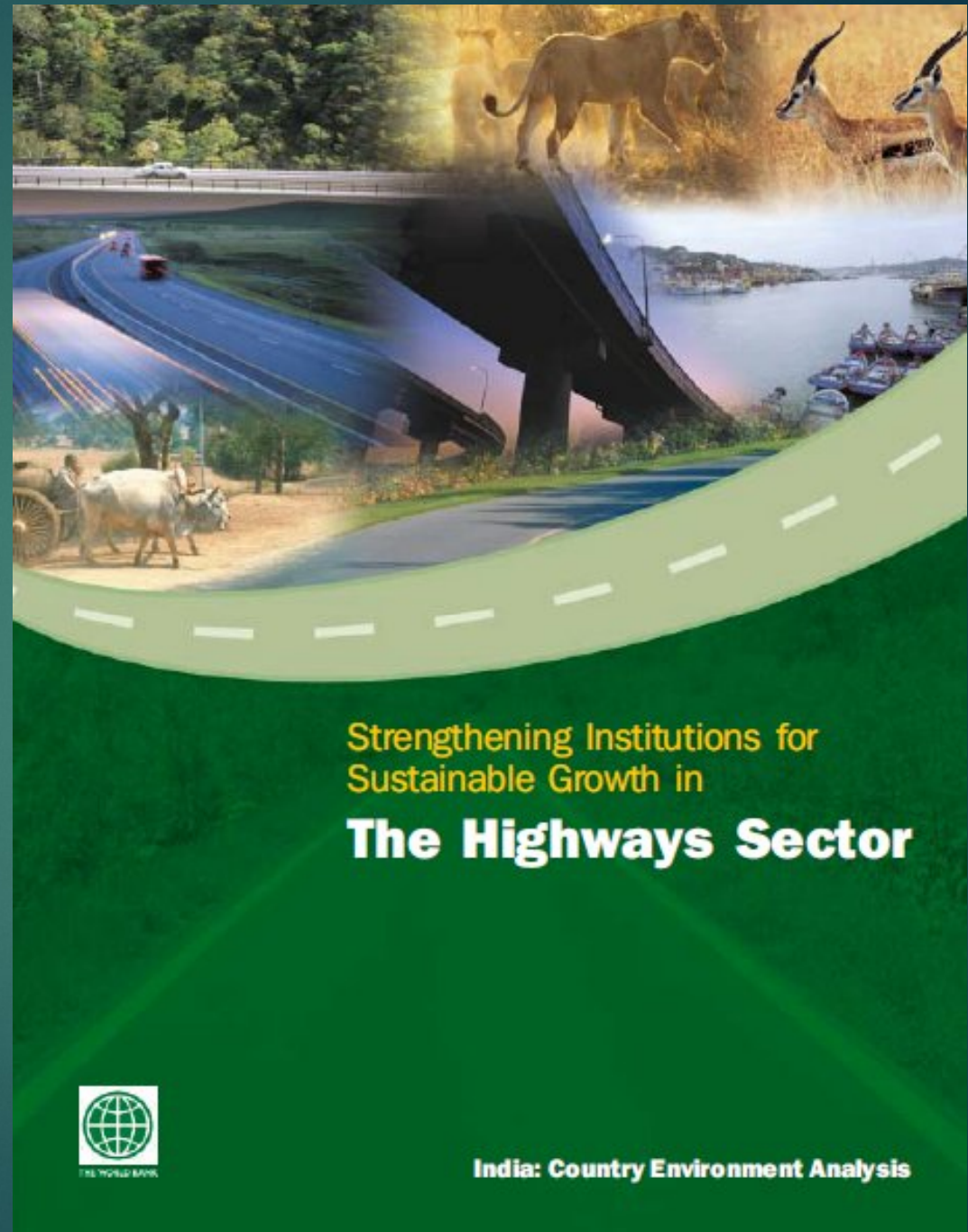
## Earlier Initiatives/Efforts ...

1. First to bring and operationalize environment and social management into highway/road projects in the country
2. Big role in awareness generation and capacity building
3. Integration of EA/EMPs into design/DPRs and Bidding Documents
4. Use of Improved Technology
5. First worksite safety audit in India
6. Biodiversity Management in Road Projects
7. Bio-engineering for slope stabilization (and management of debris from hill cutting)



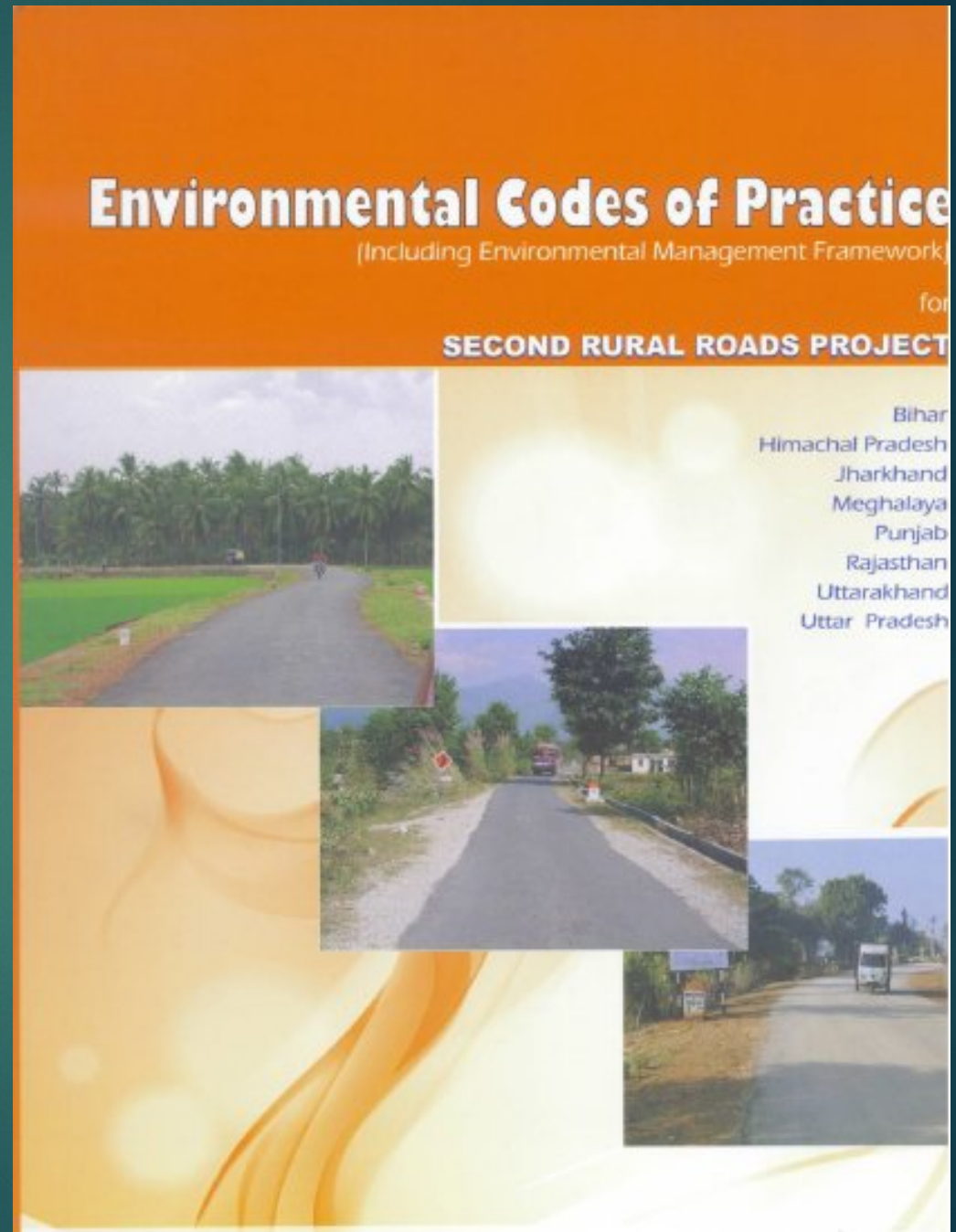
# Strengthening Institutions ...

Review of  
Highways Sector  
as part of Country  
Environment Analysis



# Environmental Codes of Practice ... Rural Roads

- Upstream identification of environment and social issues - **Sub-project level EA avoided.**
- Scoping of common construction related issues and developing Environment Codes of Practice **to standardize requirements for environment management across states**
- Includes Auditing Requirements – checklists















Excavated area  
Properly  
Barricaded



























# Other Measures ...

- Project Information Boards
- Grievance Redressal Mechanism
- Permissions for camp/plant location and layout
- Traffic management/diversion plan
- Debris Management Plan
- Emergency response plan
- First aid arrangements
- Borrow area management and restoration
- Stakeholder/Community involvement
- Relocation of Religious Properties
- Tree preservation (minimizing impacts)
- Regularization of forestland diverted in the past



# Recent and on-going initiatives ...

1. Strengthening EHS management through modifications in Bidding Documents
  - Linking IPCs with EHS performance/Safety Audits
2. Greener-Safer Demonstration Project in Gujarat
3. Knowledge Products (Managing Road Wildlife Conflicts)
4. Specific Trainings and Exposure
5. Codes/standards/guidelines
6. Switch over to alternative technologies and materials
  - Warm and cold mix options
  - Use of fly ash paver blocks
  - Use of Recycled Materials
7. Maximizing impact – dovetailing with GoI's Efforts
  - Food Waste Disposal to near by Cow/Cattle Shelters
  - Excess Food Given Away near by NGO/s
  - No or minimal use of plastics (disposable plates/bottles on the site)



## Modifications in the Bidding Documents ..

- Bidder's ESHS Performance Declaration (for Works)
- **Performance Security**
- Code of Conduct and implementation method
- **Proposed Personnel**, with declaration of availability and duration of employment
- Comprehensive and concise Method Statements and Implementation Plans that describe in detail the actions, materials, equipment, management processes etc. that will be implemented by the contractor and its sub-contractors (for Works)
- Technical Approach, Methodology and Organization to respond to ESHS requirements in the ToR (for Supervision)



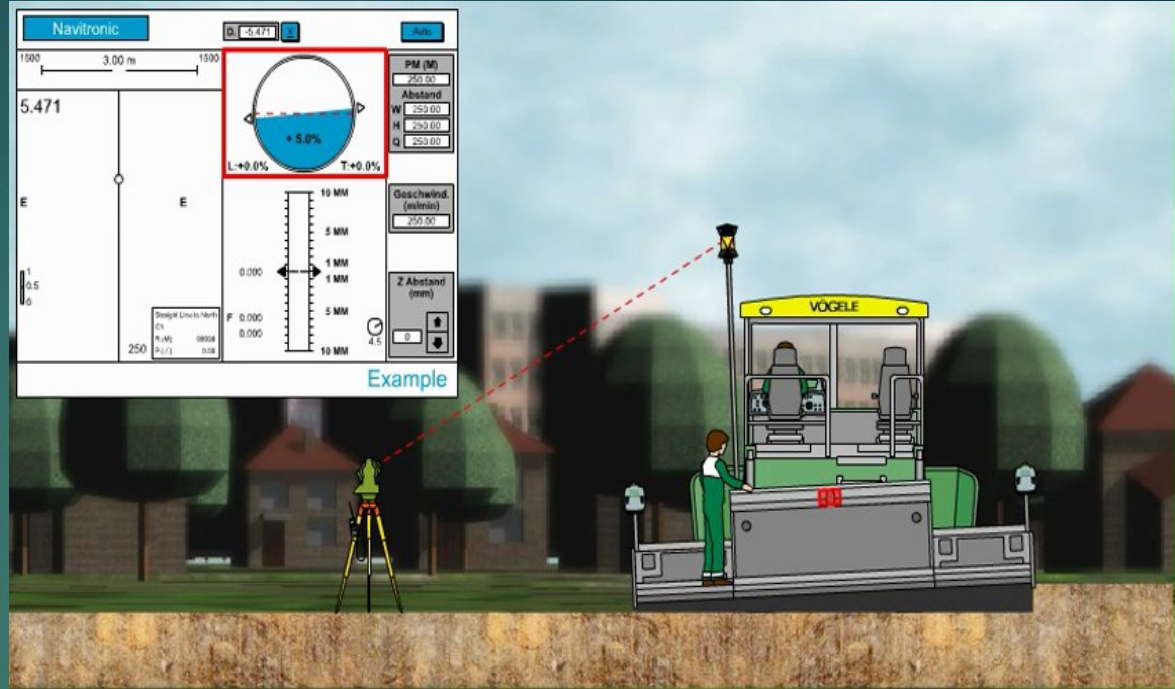
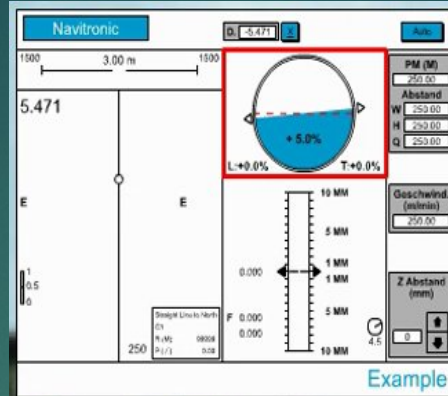


- Monitoring Environmental Footprint & GHG Measurement
- Recycling of Pavement
- Warm Mix Asphalt (WMA)
- Noise Barriers
- Silt Traps
- Enhancement Measures
- Tree transplantation
- Cattle Crossing
- Solid Waste Management

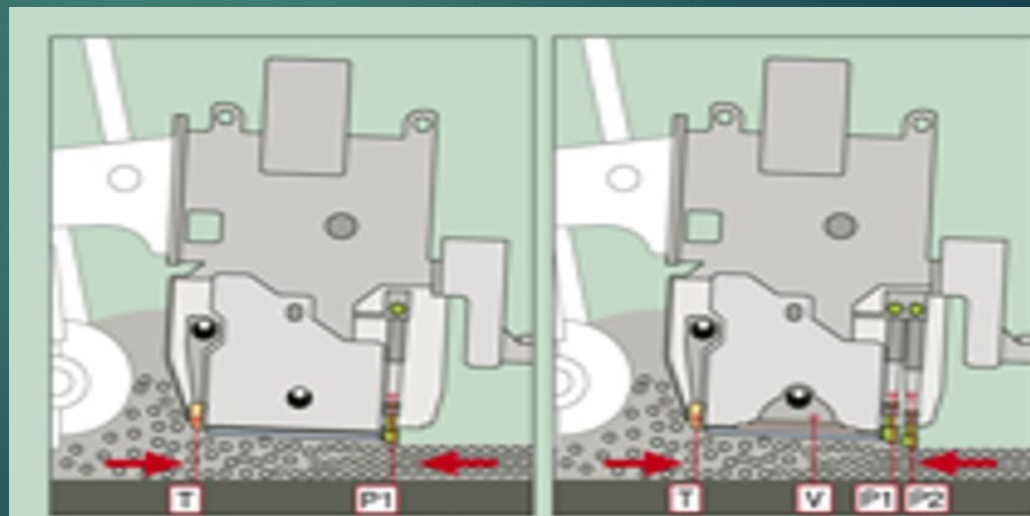




# 3-D paving in Base and BT Layers



Vogele TVP2  
High Compaction  
Screed



T = Tamper    V = Vibrators  
P1 = Pressure Bar 1    P2 Pessure Bar 2



# Continual Sensitization, Training and Capacity Building ...



Hands-on  
facilitation/  
demonstrations  
on live projects





## EHS helps in:

- ✓ Decreasing risk of accidents and fatalities
- ✓ Enhances work productivity
- ✓ Reduces legal and/or reputational risks
- ✓ Saves money for Contractor and IA
- ✓ Avoiding significant negative impacts on Environment and People, including additional stress on environmentally sensitive areas and human health
- ✓ Reduces Contractual Complications



# EHS Management during construction requires ....

- a) Proper planning and design during design/DPR preparation**
- b) Proper integration of provisions in Bidding Documents**
- c) Proper administration or management of contract**