

## ROLE OF R&D IN ROAD DEVELOPMENT

A good road transport system is one of the indicators of the economic and industrial level of a country and its growth. The recent improvements in road development in India are indeed synonymous with the upward trends in our economy. With growing road network of the country and with ambitious road development plans, the role of R&D inputs becomes most valuable, considering large impact that even a minor technological change can play in such scenario. The main thrust of research and development (R&D) in the roads sector is to build a sustainable and environment friendly road infrastructure comparable to the best roads in the world. To build such roads, our existing technology policy needs to be reformulated in the light of the scenarios emerging from technological development taking place elsewhere in the world, increased traffic, depleting sources of construction materials, environmental damage and aesthetic consideration. We need to be more aggressive in acquiring and applying advanced technologies in a wide range of fields, including roads, bridges, tunnels, traffic-transportation and incident management.

The highway systems are largely victims of their own successes. The economic growth made possible by the efficient highway systems has fueled tremendous increase in the demands placed on them. These circumstances present highway agencies with many critical challenges, including the need to extend the service life of existing highway infrastructure, the need to build and rehabilitate infrastructure which would optimize the overall cost/benefit aspect and the need to effectively address the mobility challenges posed by natural or man-made hazards by employing rapid restoration. Effectively addressing these challenges would require a multifaceted, multidisciplinary and collaborative approach in the area of research.

Success would require active involvement of all stakeholders spanning from fundamental sciences to advanced research to create new knowledge, materials and systems through applied R&D.

As technologies are changing at a fast pace, we must be open to new ideas, learn from our experiences and develop the capacity to compete and innovate user friendly technologies. The various components of R&D strategy should be improvement in design, modernization of construction techniques, introduction of improved materials conforming to latest standards, evolving better and appropriate specifications, encouraging development and use of new technologies, use of marginal materials, etc. The basic aim of research should be to develop durable infrastructure and elements to improve in-service performance, reduce maintenance needs and costs, reduce life-cycle costs and significantly improve safety during normal service and during extreme hazard events. This strategy would require that infrastructure durability and deterioration-prevention be addressed in a more systematic manner by developing high-performance, long-life, advanced materials that increase resiliency and reduce maintenance and reconstruction needs, improved systems, preservation techniques, analysis methods, to prevent material degradation, corrosion, cracking, fatigue and other serviceability problems in existing highway infrastructure, intelligent disaster-resilient infrastructure such as smart bridge systems and countermeasures, advanced infrastructure performance prediction and design models for both service-level and extreme events etc.

Often it is seen that research schemes take a lot of time to commence after their identification and

taking the research work to a logical completion also takes considerable time. There is, therefore, a need to evolve a strategy to reduce this time period and put R&D activities on a fast track. It is essential to shorten the time taken in award of the research work and in implementing them by following a comprehensive monitoring system which should also solve the bottlenecks, when faced, while carrying out research work. The ultimate outcomes of the proposed R&D programme would be:

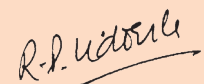
- Nationally applicable, integrated, infrastructure performance monitoring systems and asset management models and approaches
- New materials to provide more durability and reliability
- New systems which could be constructed faster, are more reliable and significantly more durable
- Advanced methods of design
- Increased safety on roads
- Tools and technologies that address effective inspection, preservation and rehabilitation
- Infrastructure planning, design, contracting, construction and maintenance practices which would address highway infrastructure as an integrated system
- To reduce detrimental environmental and social impacts

The outcomes of applied research should be able to develop accelerated construction, rehabilitation and reconstruction methodologies for roads and structures. The R&D to be pursued should include bridge substructures and superstructures, geotechnical investigations, advanced fabrication, construction

and erection techniques, equipment and technologies to enable real-time quality control and assurance in accelerated construction activities. The outcomes envisioned would benefit the public by enabling improvements in the performance, safety and cost effectiveness of a nation's highway infrastructure, while minimizing the environmental impacts of highway construction, maintenance and rehabilitation. The results would make reductions in highway congestion possible and enhance safety characteristics and improvements in the overall driving experience for the road users.

Investment in road research should be viewed as a long term investment, to put the country on higher pedestal in the field of highways. It is well established that investment in road research gives larger benefits. Internationally, the allocations of research in highway sector are at about 2% of the total investment in roads. Our investment in road research is negligible compared to the huge investments in road construction. This gap should be addressed on an emergent basis in the country. Innovations are important for quick development and the same is possible only by undertaking required research and development (R&D) activities.

There are many organizations in the country which are involved in the R&D activities. There is an urgent need to coordinate all these R&D activities to avoid duplication of research work and their dissemination for effective application of the available results in the field.



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