

# ROADS & HIGHWAYS: THE GROWTH PATH

The Indian roads and highways sector is on a revival path with a large volume work in progress, after the slow performance in the past couple of years due to the pandemic and other bottlenecks in the system. **Construction Times** explores the progress of the sector and the way forward.

India's roads and highways sector has witnessed a major transformation in the recent past with expanding and modernizing the existing road networks while constructing new highways and expressways with modern facilities and amenities. The current Budget has a record fund allocation of Rs 2.7 lakh crore for 2023-24. While this can drive better prospects to the Indian roads and highways sector, more attention is needed in the design and execution stages of roads and highway projects.

## PREVAILING TRENDS

Roads and construction activities had slowed down in the past couple of years, due to the pandemic impact. However, the market has showed some revival in 2022-23. According to market reports, the

average pace of highway construction in India has fallen in 2022-23. It fell marginally from 20.89 km/day in FY21-22 to 18.97 km/day in FY22-23, but much lower than the average of 36.5 km/day during FY20-21, according to **Abhimanyu Roy, Executive Director, Avalon Consulting**. "The pace of road projects awarded in 2022-23 has also been lower



**ABHIMANYU ROY**  
Executive Director,  
Avalon Consulting





available for contractors and other stakeholders to bid on. This can lead to more business opportunities and increased revenue. With a higher budget, the quality of the projects can be improved. Contractors can use better materials and equipment, which can result in a higher-quality finished product. A higher budget can also lead to more jobs in the construction industry. This can benefit contractors, workers, and other stakeholders by providing additional employment opportunities. Higher budget allocation can encourage contractors and other stakeholders to invest in new technologies for road and highway construction. This can result in innovative solutions, better efficiencies, and improved safety.

“The capital outlay announced by the government earlier this year is a welcome move and augurs well for players involved in construction of roads and highways. In line with the sector’s growth, we expect to see an upswing in our business portfolio. With a healthy order book, we plan to target projects with healthy returns, rather than bidding for tenders aggressively,” says **Sandeep Garg**, **Managing Director, Welspun Enterprises**.



**SANDEEP GARG**  
Managing Director,  
Welspun Enterprises

The roads and highways projects are facing challenges on various fronts, apart from the pandemic-induced challenges in the past. According to Roy, road construction projects entail the acquisition of land, financial closure of contractors, and securing necessary clearances. Sluggish land acquisition procedures and substantial hikes in land prices are the primary factors that contribute to slow progress in road construction. The peak of second wave of pandemic led to disruption of large scale economic activity, while extended monsoon also slowed down the construction activity.

According to **Ramesh Babu Ravuri**, **Executive Vice President, NCC Limited**, challenges faced by the highway sector include availability of construction materials and machinery, timely completion of projects, trained human resources, and road congestion and safety concerns. “It’s important for the government

than in 2021-22, with 7,497 km of highway projects being awarded in 2022-23 (till Feb 2023), 121 km lower than 2021-22,” he added. However, there is a large volume of work in progress - road projects exceeding 65,000 km in length, costing more than Rs 11 lakh crores is under construction, of which work in respect of projects of more than 39,000 km length has been completed until December 2022 and balance length of more than 26,000 km works are in progress.

### OPPORTUNITIES & CHALLENGES

The Union Budget 2023-24 has allocated Rs 2.7 lakh crore for the roads & highways sector, which has created more opportunities for the stakeholders of the sector. According to Roy, a higher budget for roads and highways means that there will be more projects



**RAMESH BABU RAVURI**  
Executive Vice President,  
NCC Limited

and stakeholders to address these challenges to ensure efficient and timely construction of national highways for economic development,” he points out. Typically, a project undergoes a 12-18 month cycle to finalize the detailed project report (DPR), select a developer, and secure financial closure. Following this, the construction process may take an additional 2-3 years. However, due to disruptions in 2020, the project cycle has been impacted, resulting in a lower rate of construction in FY22 and FY23. Roy is of the view, “It is anticipated that the situation will improve by FY24 as many projects initiated in 2020 will reach completion by then.”

### DESIGN AND IMPLEMENTATION

The Indian roads and highways are becoming futuristic with a vision to transform the overall revival in transportation infrastructure. In this scenario, designing roads and highway projects has become of utmost importance. Various factors are to be considered while designing a road/highway project. These include: traffic volume and patterns, terrain and geology, climate and weather conditions, environmental factors, design standards and guidelines, safety measures, economic viability, maintenance and upkeep.

The volume and pattern of traffic on a road determine its width, alignment, and design speed. For instance, a road with heavy traffic requires a wider carriageway, better road surface, and suitable traffic control measures. The terrain and geology of a region significantly impact the design of a road. The road design should consider the soil stability, drainage, and slope stability. For instance, roads in hilly areas may require extra earthwork, retaining walls, and adequate drainage. The climate and weather conditions in a region determine the materials and construction techniques suitable for road construction. For example, roads in coastal regions require materials that can withstand the corrosive effects of salt spray. Environmental factors such as proximity to wildlife reserves, water bodies, and forest areas must be taken into account. Proper measures need to be taken to prevent soil erosion, maintain water quality, and prevent soil contamination. Design standards and guidelines provide guidance on road design elements such as lane width, vertical and horizontal curves, intersection design, and traffic control measures. The design team should consider relevant standards and guidelines during the road design process.

“India was ranked number 1 among 20 countries for road crashes and reported over 4 lakh road accidents in 2021. The National Highways, which has a share of only 2.1% of total road length accounted for 30.3% of the accidents (highest). Thus steps need to be taken to ensure higher safety during the design and construction phase itself,” cautions Roy.

### ROLE OF TECHNOLOGY

Today, technology plays a major role in the roads

and highways construction like never before as projects are becoming bigger and complex. Latest digital construction technologies and construction equipment with advanced features are being used in the construction of the projects. The use of drones has been mandated by the NHAI for national highway projects at all stages in June 2021. The LiDAR (light detection and ranging) survey is also being deployed for the preparation of detailed project reports and equipment-based testing. The two technologies have helped in optimising the planning process and enhancing the monitoring ability of contractors. The adoption of building information modelling (BIM) system has streamlined the construction process and encouraged greater collaboration among all stakeholders. Geospatial technology is also increasingly becoming helpful in monitoring the condition of bridges remotely, especially in difficult terrain. Advanced construction equipment are being used in the bigger highways and expressway projects. **Anand Sundaresan, Managing Director, Ammann India**, says, “At Ammann India, we are primarily engaged in the manufacturing of



**ANAND SUNDARESAN**  
Managing Director,  
Ammann India

road construction equipment, including asphalt plants, compactors, asphalt pavers, and concrete plants. We contribute to the road infrastructure development of the country by providing state-of-the-art equipment that supports efficient, durable, and sustainable road construction projects.”

Trimble provides a range of advanced solutions to municipalities, departments and other authorities for building, maintaining or upgrading roads. For example, for the Mumbai Coastal Road Project, the Municipal Corporation of Greater Mumbai (MCGM) is using Trimble's solutions to maximize precision and accuracy. “Trimble's state-of-the-art S7 Total Station equipment has been used to measure the topography of the land where the road will be built, including the contours of the coast and the surrounding terrain,” says **Roshan Purohit, Regional Sales Manager, India & SAARC Region, Trimble Civil Infrastructure Solution**.



**ROSHAN PUROHIT**  
Regional Sales Manager,  
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## SUSTAINABILITY PRACTICES

Sustainability plays a key role in construction projects and various sustainability practices and methods are being followed in many road projects today. Waste and other indigenous materials are being used as alternatives since the use of naturally occurring construction material through quarrying degrades the environment irrevocably while depleting the natural reserves. Mixing of bitumen with shredded waste plastic, rubber, iron slag, fly ash, and construction and demolition waste has been helpful in mitigating this impact and reducing the cost of road construction. Also, solar powered electric highways for charging of heavy duty trucks and buses are in progress. The toll booths on these highways will also use solar or wind energy.



**DR ABHISHEK MITTAL**  
Principal Scientist and  
HoD, Flexible Pavements  
Division, CSIR-CRRI

Dr Abhishek Mittal, Principal Scientist and HoD, Flexible Pavements Division CSIR-Central Road Research Institute (CSIR-CRRI), Highway construction and maintenance consume a lot of fossil energy in mining, transportation and paving works, and causes air and noise pollution, by the very nature of the activities involved. For sustainability in roads and highways sector, one needs to look for materials, design, construction and maintenance aspects for the road pavements.”



**DR AJAY RANKA**  
CMD,  
Zydex Industries

Dr Ajay Ranka, CMD, Zydex Industries, elaborates, “Sustainability is the core of our way of life at Zydex. We constantly innovate to take the world towards the goal of sustainability. A few solutions related to the road sector which we have innovated, are reducing the consumption of aggregates and make the soil bases as strong as the stone layer. We can now make stabilized soil bases which are stronger, more flexible and at the same time water resistant. This will allow us to get higher resilient modulus numbers maintainable in rainy season and enabling us to reduce the thickness of the bitumen layer or the cement concrete layer depending on the quality of the road being flexible or rigid.”

## OUTLOOK

According to Roy, there is a noticeable trend in the road industry towards focusing on operation and maintenance (O&M) as well as capacity augmentation work rather than construction. He adds, “Monetizing existing roads can bring several benefits, such as efficient O&M and additional funds for the authorities. State governments should adopt the TOT (toll-operate-transfer) mode to monetize operational high traffic state highways and major district roads, which can generate more funding for the development of new roads. Moreover, capacity augmentation work is expected to increase in the coming years, as many high traffic road stretches are approaching capacity. This presents contractors with additional business opportunities.”

Looking at the upcoming trends in road construction, ICRA expects a substantial ramp-up in road execution activity in FY2024 by 16-21% to 12,000-12,500 km, in the backdrop of a healthy pipeline of projects, increased capital outlay by the Government of India and focus on project completions, ahead of the general elections.



**VINAY KUMAR G**  
Sector Head,  
Corporate Ratings, ICRA

Giving more insights, Vinay Kumar G, Sector Head, Corporate Ratings, ICRA, says, “The project pipeline remains strong at 55,000 km under various stages of execution. This, along with focus on project completions ahead of general elections, is expected to boost execution to 12,000-12,500 km in FY2024. With the model code of conduct in place during Q4FY2024 (Q4 typically accounts for 50-60% of awards in a year), ahead of the general elections, the awarding activity is likely to be impacted in FY2024 and the overall awards are expected to decline to 9,000-9,500 km from 12,375 km in FY2023. The EPC will continue to remain the mainstay of awarding accounting for 70-75% of awards in FY2024. The BOT-Toll awards accounted for less than 5% of the orders in the last five years, and its share is expected to remain at similar levels in FY2024.”

“The government is clearly focussed on infrastructure development to bring growth of the country. With the seamless adoption of the latest technological advancements, the Indian road sector is rapidly evolving and several trends are emerging that are likely to shape its future,” Dr Mittal concludes. ■