COMPANY
TATA Consulting Engineers Limited
LOCATION
Mumbai, India
SOFTWARE
Autodesk®InfraWorks 360®
AutoCAD Civil 3D®
AutoCAD Map 3D®

Smart City - The Future of Urban Infrastructure

TATA Consulting Engineers Limited delivers India's most ambitious infrastructure project on Autodesk solutions.

"The project is developed as a green city. It would function better at every level, designed to achieve smart, sustainable economic growth while minimizing the impact on the environment, every function of the city is optimized to make life simple and efficient. Logical town planning makes the city a modern Smart City – sustainable and futuristic. The efficient BIM solution provided by Autodesk really underpins all aspects of developing green city,"

—Engineer
TCE

Image courtesy: TCE

TATA Consulting Engineers (TCE) Limited, a wholly-owned subsidiary of TATA Sons Ltd is an integrated engineering consultancy solutions provider. Founded in 1962, the company offers engineering services from concept to commissioning in key industry segments like power, nuclear & advanced technologies, chemical, infrastructure, master planning for townships, steel mining & metals and construction management.

The Mumbai-based company also has its offices in New Delhi, Pune, Jamshedpur, Kolkata, Bengaluru, Chennai, South Africa, Qatar and USA. TCE has successfully delivered more than 7,150 projects to clients across the globe and is an established name in India, Middle East, Africa and the USA.

TATA Consulting Engineers' consultancy solutions include engineering consultancy services such as feasibility studies, pre-project reports and technical studies, design, engineering, detailed engineering, environment impact assessment, sustainability and green technology solutions. Apart from this, the company also provides project management consultancy services include EPCM services, project management services, equipment management and commissioning support; construction management consultancy includes construction, support and safety management services.

The firm has an international reputation for its work in the infrastructure sector, confirmed by many notable design awards for its environment and sustainability contributions that reflect the firm's success in managing complexity and improving lives around the globe.

The Project

With an urban population set to rise by more than 400 million to 814 million by 2050, India faces the kind of mass urbanization only seen before in China, with many of its biggest cities already bursting at the seams. Government of India has recently announced an ambitious 100 smart cities program.

Delhi - Mumbai Industrial Corridor (DMIC) is India's most ambitious Infrastructure project aiming to develop new industrial smart cities and converging next generation technologies across infrastructure sectors. The corridor is spread across 2,700 km and runs through six states - Delhi, Western Uttar Pradesh, Southern Haryana, Eastern Rajasthan,

Autodesk's integration of 3D design with GIS helped TCE to build, maintain, and operate its infrastructure, as well as the capabilities of InfraWorks allowed TCE to collaborate with partners for improved delivery of projects.

Eastern Gujarat, and Western Maharashtra.

The special investment region is being developed as a mega smart city under Delhi-Mumbai industrial corridor (DMIC). The city would be built as a world-class city, with a 10 lane express way to the state capital, Ahmadabad. It would be the world's largest urban development project with a total area of 920 sq.km; twice the size of Delhi. In the first phase, 435 sq.km area with 180 km roads will be de-veloped by TCE.

The first phase of the smart city includes township encompassing industry, warehouse, recreation & residential areas, road services, administrative building, water treatment plant, roads and other utilities, etc.

"India's smart city requirements are totally different from that in western countries – a mere glossing over of civic services and infrastructures may not fulfill the requirements of the urban migrants, seeking employment is marginalized in ways that go much beyond just needing improved transport, roads or utilities. The Special Investment Region is smart, sustainable and industrial city with huge potential for business opportunities and employment," said Head, Urban Infrastructure, TCE.

The Challenges

TCE is honored to play a part in this smart city as it works to expand India's manufacturing and services base, as well as contribute towards the development of the DMIC into a global manufacturing and trade hub. TCE's project scope consists of implementing all base infrastructure, including water supply, sewerage, roads, highways, power and rail; performing extensive flood-control and drainage measures to protect the future city; and overseeing the development and execution of all public-private partnership delivered projects, such as the rail connecting to smart city project, industrial wastewater treatment and potable water treatment plant.

Operating as one interface for the complete mega city project with multiple disciplines requires a suite of software capable of providing up-to-date, live information to all the team members, project authority and contractors involved in the project, handling big data size and enabling better collaboration.

The project terrain profile is flat and low lying in the delta region and also has few big rivers in this region. The flood hazard potential of the area is high and requires a planned flood management system. The flat topography of the area also adds to the difficulties in designing a positive water supply, sewerage and sanitation, storm water drains and solid waste management without using lift stations. Site grading with least disturbance to the original surface is required to suit the architectural or engineering requirements.

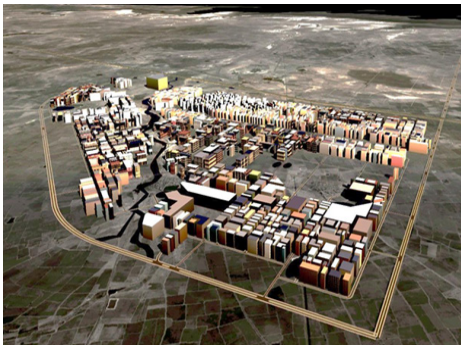

Image courtesy: TCE

As the smart city is an urban means to enhance the use of municipal utilities and public services, there is a need for efficient allocation of resources and a more equitable distribution to city consumers. Designing combined utilities like water supply, roads, electrical and gas supply presented an engineering challenge.

The Collaboration

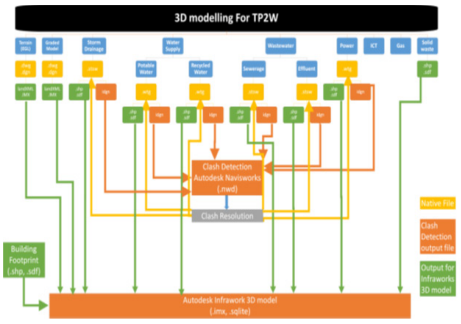

Image courtesy: TCE

The area is developed taking into account the DMIC objectives and goals- it focuses towards creating better environment for industries, enhance investment, improve quality of life, upgrade human skills, create world class infrastructure and attract global investment.

The vision is to develop a new designed urban environment creating a smarter city. The long-term objective is clear: TCE wants to better its vast amount of infrastructure information so that it can collaborate more effectively with the team members to deliver on their vision for the future. The TCE management valued Autodesk's integration of 3D design with GIS to help them build, maintain, and operate its infrastructure, as well as the capabilities of InfraWorks allowed TCE to collaborate with partners for improved delivery of projects.

AutoCAD Map 3D was used to create contour maps to analyze 3D terrain, to manage, visualize and analyze all the information that makes up an entire smart city project. Using AutoCAD Civil 3D watershed, analysis is performed on the surface to analyze the surface watersheds and floodplain mapping. The TCE team also suggested few feasible options to the client to overcome challenges faced due to the flat surface. It is not feasible to use lift stations over such a huge area of 43 sq. km so filling the area with soil from near-by area and creating a required slope is the only option. The goal of creating a slope for Phase I would be achieved to set a new benchmark in the industry; the Autodesk tools significantly supported achieving the best outcome for the client within the budget.

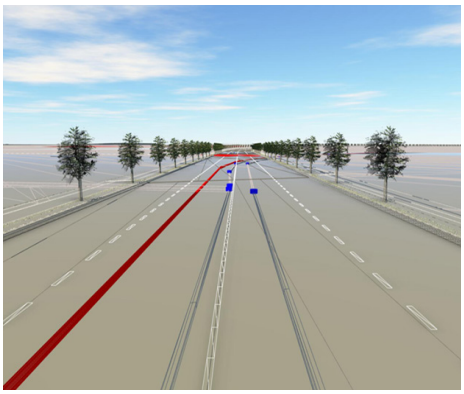

Image courtesy: TCE

Using AutoCAD Civil 3D the engineers were able to build 3D models of roadway corridor of around 180 kms. The engineers used this model as the foundation for multiple roadway design scenarios. The dynamic nature of Civil 3D enabled them to adjust design elements within each scenario and more quickly see the impact of those changes on the surrounding right-of-way boundaries, trees, and utilities. Moreover, using AutoCAD Civil 3D, one can compare the design of road elements against recognized industry standards or user defined standards. Autodesk Naviswork's clash detection capabilities reveled hundreds of problems that would have gone undiscovered with traditional 2D tools.

The Solution

Autodesk Solutions allows TCE to collaborate, coordinate and execute the project more effectively and efficiently by providing a single source of project information to use throughout the project lifecycle. The design is almost completed and construction is under way. The time saved as a result of good planning and coordination is spent on quality control in the

AUTODESK.

The efficient BIM solution provided by Autodesk really underpins all aspects of developing green city.

the field and in the office. This aids the company in its mission to provide a top quality product, with service to match.

"The project is developed as a green city. It would function better at every level, designed to achieve smart, sustainable economic growth while minimizing the impact on the environment, every function of the city is optimized to make life simple and efficient. Logical town planning makes the city a modern Smart City – sustainable and futuristic. The efficient BIM solution provided by Autodesk really underpins all aspects of developing green city," said a TCE engineer.

> "India's smart city requirements are totally different from that in western countries – a mere glossing over of civic services and infrastructures may not fulfill the requirements of the urban migrants, seeking employment is marginalized in ways that go much beyond just needing improved transport, roads or utilities. The Special Investment Region is smart, sustainable and industrial city with huge potential for business opportunities and employment,"
>
> — **Head, Urban Infrastructure**
> TCE

AUTODESK.