

# Case Study

## KMC Construction: National Highway 47 – KL-1 Project.

### Client

National Highway Authority of India (NHAI), Ministry of Shipping, Road Transport and Highways, Govt. of India has awarded the National Highway 47 – KL-1 project to M/s Guruvayoor Infrastructure Pvt. Ltd (GIPL), Hyderabad, a company formed by M/s KMC Constructions Ltd (KMC), Hyderabad and SREI Infrastructures Finance Ltd, on Build Operate and Transfer basis (BOT).

The entire project is being done under the BOT (Build Operate & Transfer) scheme of NHAI by M/s Guruvayoor Infrastructure Pvt. Ltd, a consortium formed by M/s KMC Constructions Ltd, Hyderabad and M/s SREI Infrastructure Ltd, Kolkata. M/s KMC Constructions Ltd. are doing the National Highway 47 – KL-1 project of 4/6 Lining and maintenance of Manuthi to Angamali Section of NH47 (Ch.270/000 to Ch.316/700) and maintenance of Angamali to Edappalli Section of NH47 (Ch.316/700 to 342/00) as an EPC (Engineering Procurement Construction) Contractor.

### Project

National Highway 47 – KL-1 Project consists of 2 phases.

Phase 1: Design, Construction, Development, Finance, Operation and maintenance of KM. 270/000 (Thrissur) to KM.316/700 (Angamali).

Phase 2: Improvement, Operation and Maintenance of KM. 316/700 (Angamali) to KM. 342/000 (Edappalli) on NH47 in the State of Kerala on Build, Operate and Transfer (BOT) basis.

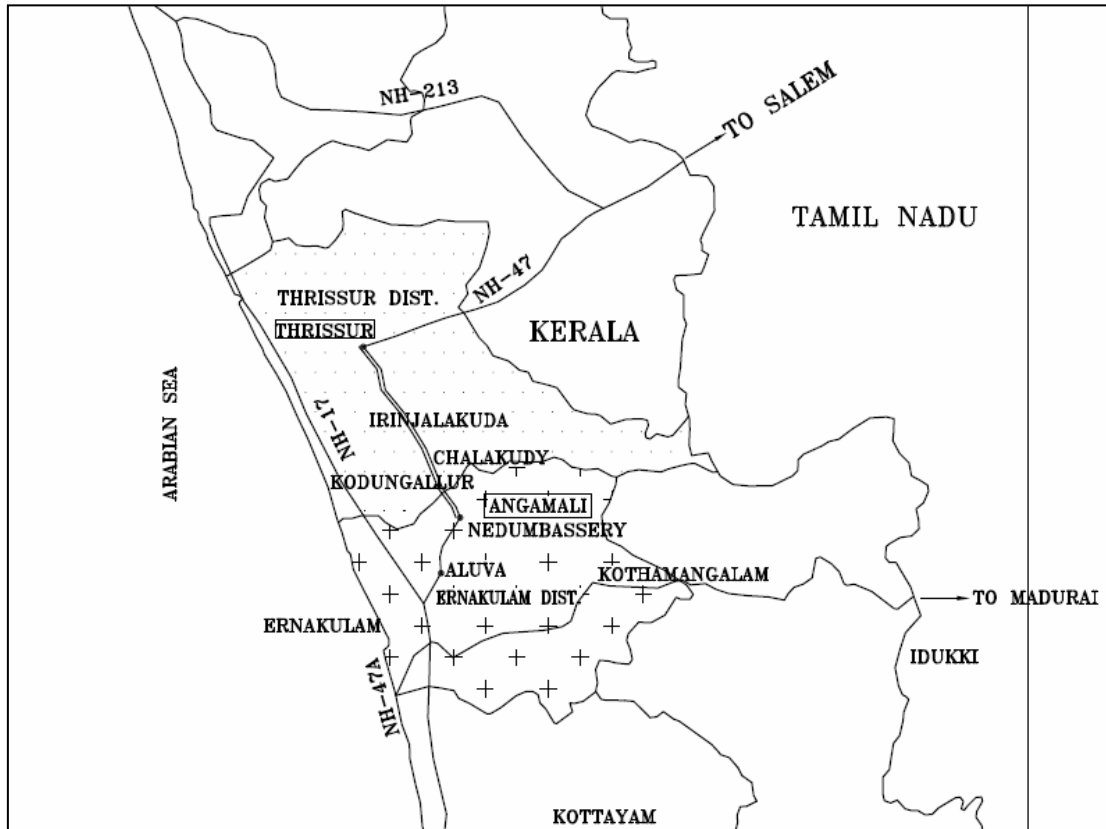
The brief description of the work involved is as follows:

Widening of existing 2-Lane from KM 270.000 to KM 316.700 to 4 to 6-Lane divided carriageway including Construction of 5 Nos of 6-Lane Flyovers, 3 Nos of 3-Lane Major Bridges, 5 Nos of 3-Lane Minor Bridges, Widening of 98 Nos of Cross Drainage Culverts to cater to future expansion to 6-Lane, provision of 57 KM of 5.5M to 7 M wide Service Roads in Urban area, development of 3 Major Intersections to At-grade Intersections, development of 111 Nos of Minor Intersections, Improvement measures to 3 Major Bridges, 3 Nos of Minor Bridges and 2 Nos of Box Culverts with Highway Lighting and Road furnishings.

Junction Improvement at the road leading to the Airport, Curve improvement before Marthandaverma Bridge, 6-Lane Flyover on

Aluva Junction, Construction of approaches to Railway Over Bridge (ROB) at KM 320.090.

Construction of a Toll Plaza at Amballore, Construction of 29 Nos of Bus Shelters and Bus Bays, Provision of Highway Management Systems, Construction of Administration, Operation and Maintenance of Base Camp, Highway lighting, Landscaping which are detailed briefly in the 'Project Facilities' section in subsequent pages.



Location Map

## Project Team

Intercontinental Consultants and Technocrats Pvt. Ltd in association with Feedback Turnkey Engineers are the Independent Consultants. KMC Construction Limited is the EPC Contractor and STUP Consultants P. LTD is the EPC Consultants.

Along with the project team, GIPL is responsible for bringing the project to completion on behalf of NHAI.

## **Challenges in managing the project**

It's essential to select the right people do the right job to keep the project on the right track. This challenge is made greater with weather causing serious problems in execution of work and constraints blocking project progress.

Collection of data from the different departments was slow and delayed which was resulting in bottlenecks and difficulties in meeting their turnaround targets.

Lot of time is consumed in calculating and generating the respective reports once the data was ready.

With various documents, drawings and approval items being exchanged between the client, consultant and contractor, it was resulting in project progress delay with factors like file size restriction in email and the communication through hard copies contributing to progress delays. KMC identified that these issues would only escalate as the project ramped up.

## **Solution**

KMC implemented the Backend Project Management System to control project progress and link the project team online. Backend Project Management System is a web-based platform that enables all internal project participants to plan, monitor, assure quality and manage contract administration works like variation orders, claims, constraints, compliances and billing. It also enables any project participants with rights to view the project progress at any time during execution of the project through dashboard in terms of time, money, quality, constraint, compliance, project visuals and generate the respective reports.

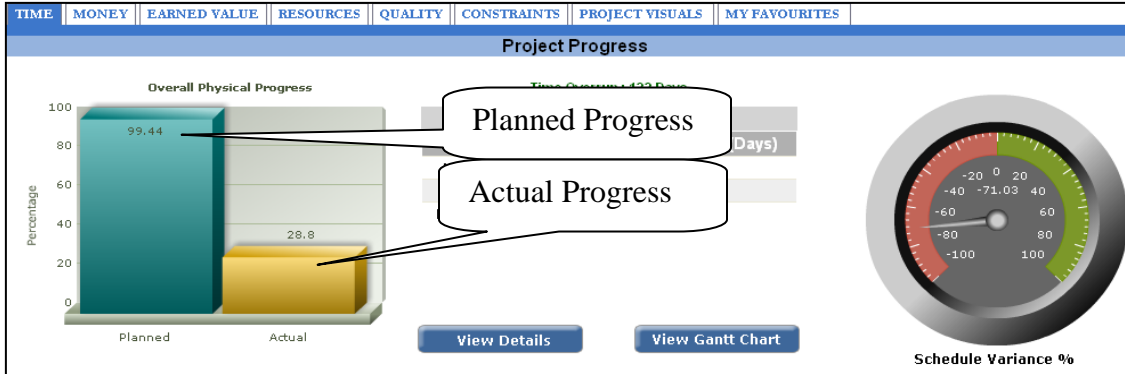
Since Backend Project Management System is web based, all authorized project participants based on the rights their organization has assigned to them can log in to the system and have full access to the information. It helps in enhancing and meeting the required security, reliability and performance standards.

Further records maintained in MS Project and MS Excel were directly imported using the Backend Project Management System resulting in minimal IT resources required for implementing an ongoing project.

## Result

Implementing Backend Project Management System is resulting in benefits to the stake holders of the project. KMC was able to derive promised deliverables in various fields by implementing Backend Project Management System. It had the necessary business intelligence built-in and some of its key reports as on March 2009 are listed below.

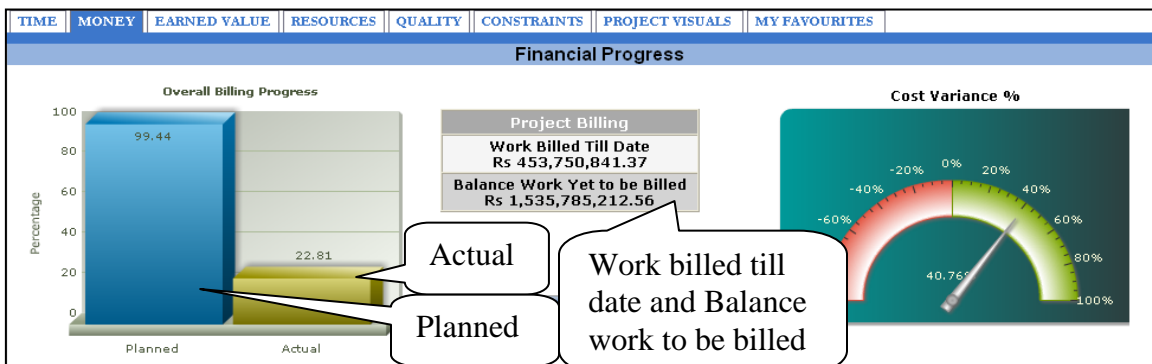
### Overall Physical Progress



KMC was able to monitor the physical progress of the project in a lot more detail. The graph above shows that as on March 2009 physical progress of the project was 29.7% against planned progress of 100%.

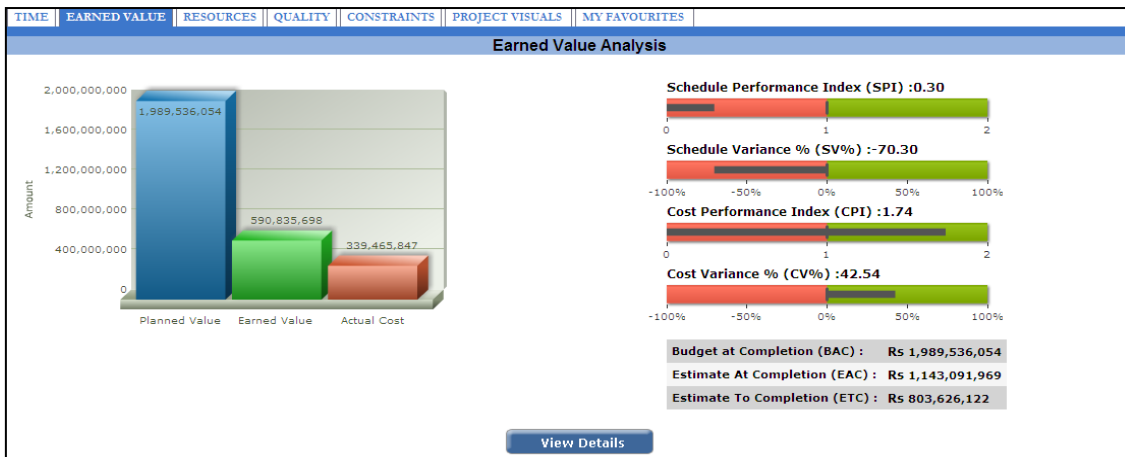
The Construction supervision team was able to monitor the progress mile stone wise, area wise, activity wise, and drill down to the list of Request For Inspection (RFI) contributing towards that progress which allowed them to do better planning and management of the project.

### Overall Billing Progress

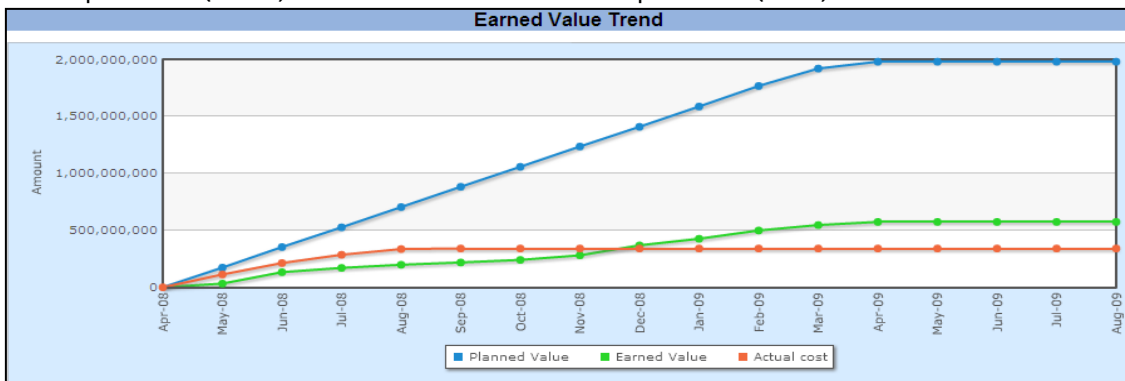


The Interim Payment Certificate (IPC) were generated automatically for the actual work done based on the approved RFI quantity. Further KMC were able to generate bills, milestone wise for the actual work done.

## Earned Value Analysis



The Construction supervision team was able to view the actual cost involved in the project and the earned value amount in the project. They were able to view Schedule Performance Index (SPI), Schedule variance (SV) 70.30%, Cost Performance Index (CPI) and Cost Variance (CV) 42.54%. Further they were able to view Budget at Completion (BAC), Estimate at Completion (EAC), and Estimate to Completion (ETC).



They were able to view the planned value, earned value and actual cost involved in the project month wise.

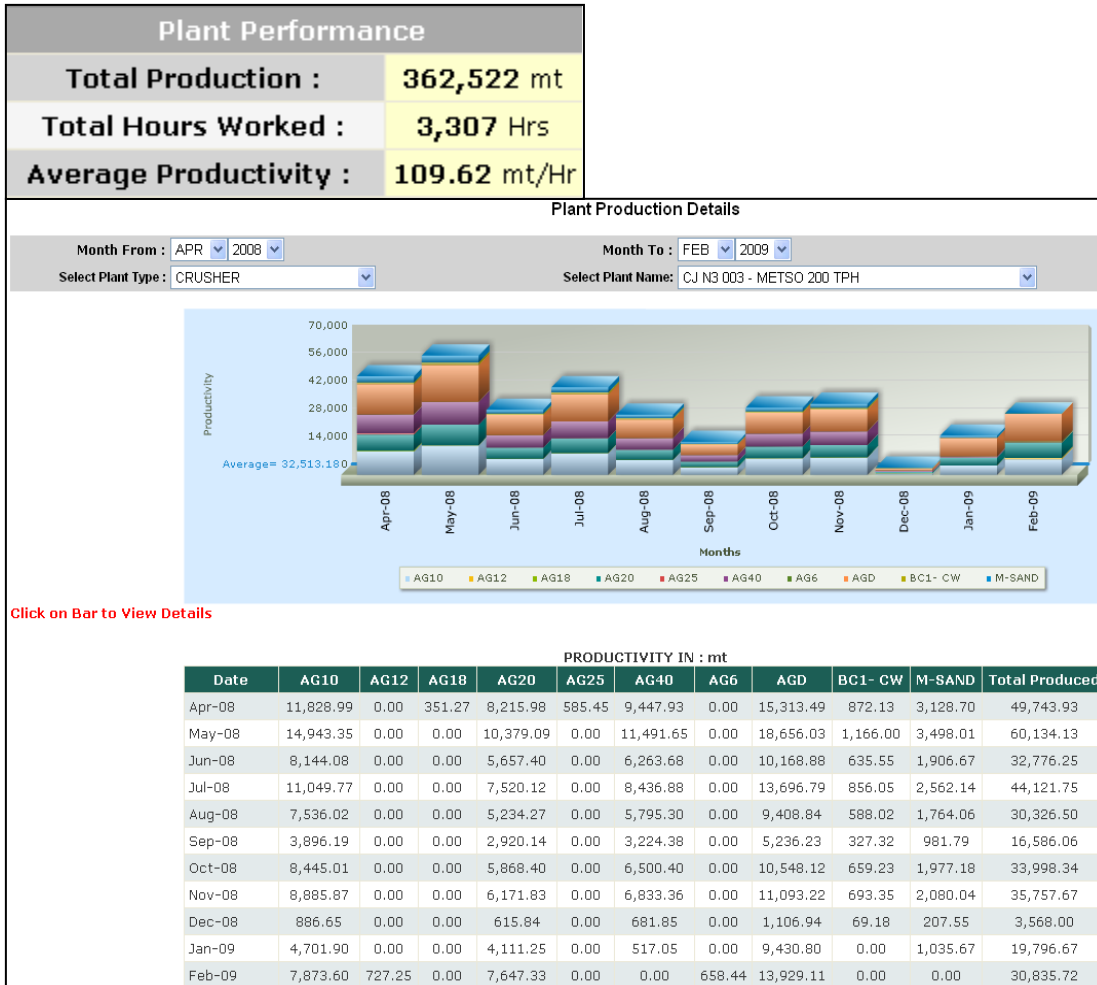
## Resource Monitoring

KMC are able to extract value using Backend Project Management System. They could do resource planning for the project using Backend Project Management System. KMC could compare daily resources productivity with theoretical productivity and view resource productivity and utilization details on a daily basis.

Plant and Equipment breakdown and maintenance details were monitored. Analysis on worked hours break down hours and idle hours for each equipment was available giving its utilization and productivity job-wise.

## Plant Productivity

KMC could monitor productivity for all Plants on a daily basis, monthly basis with production and consumption details. KMC could view Total production, Total hours worked, Average productivity for any selected Plant.

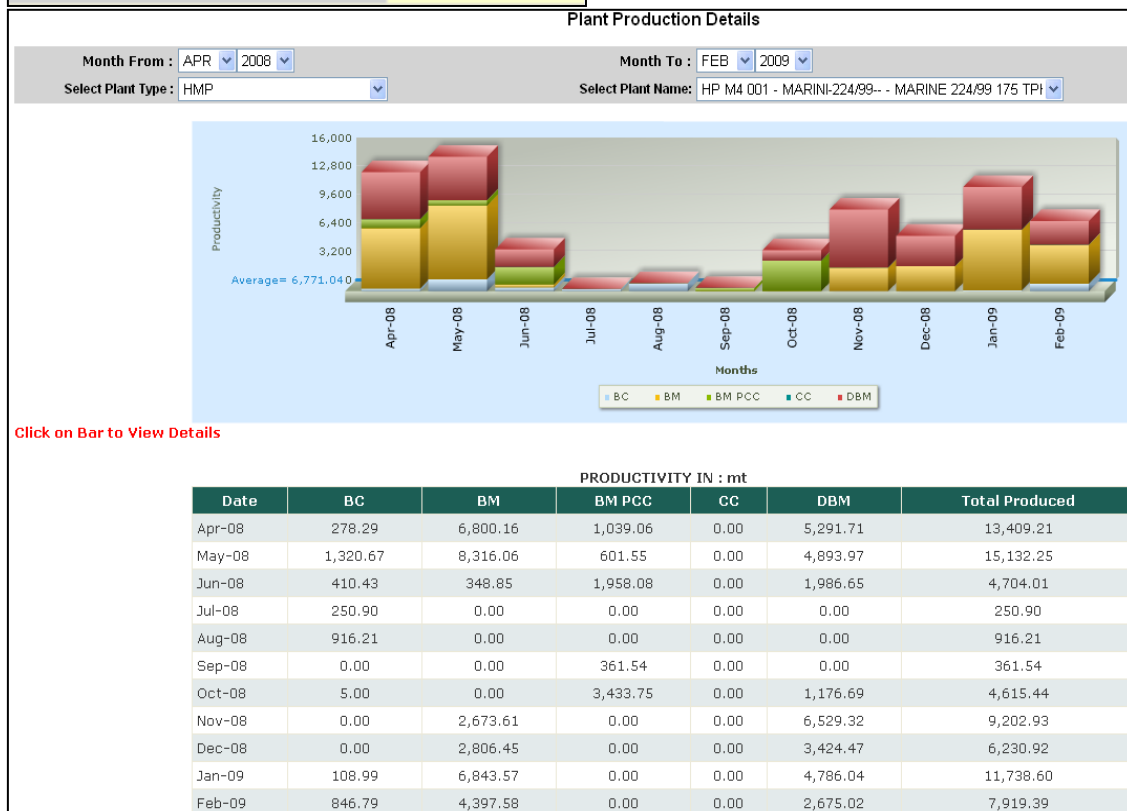


Here KMC monitoring the productivity for Crusher Plant and HMP Plant is shown.

The Crusher plants productivity from April 2008 to February 2009 on a daily basis, monthly basis with productivity and consumption details are shown. Further KMC could view Total Production of 362,522 mt, Total Hours worked: 3,307 Hours, Average productivity: 109.62 mt for the Crusher Plant

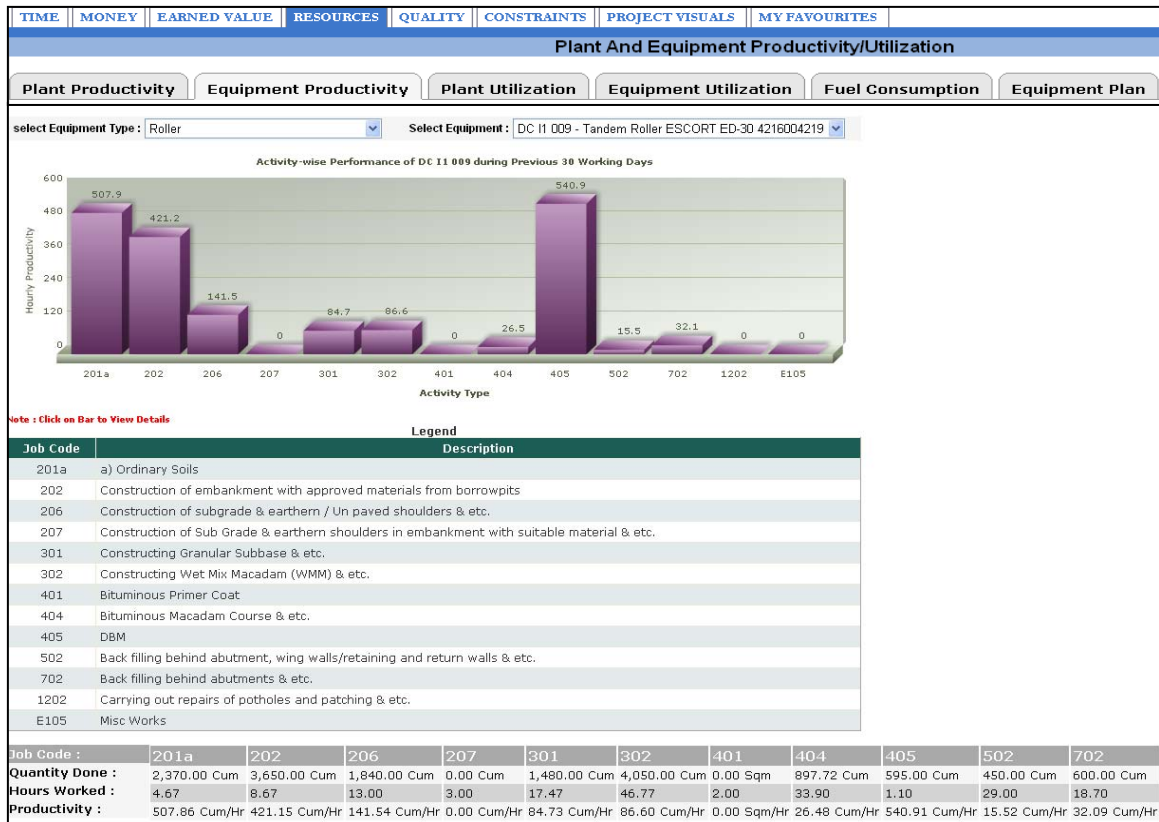
The HMP plants productivity from April 2008 to February 2009 on a daily basis, monthly basis with productivity and consumption details are shown. Further KMC could view Total Production of 79,447 mt, Total Hours worked: 662 Hours, Average productivity: 120.02 mt for the HMP Plant.

Plant Performance	
<b>Total Production :</b>	<b>79,447 mt</b>
<b>Total Hours Worked :</b>	<b>662 Hrs</b>
<b>Average Productivity :</b>	<b>120.02 mt/Hr</b>



## Equipment Productivity

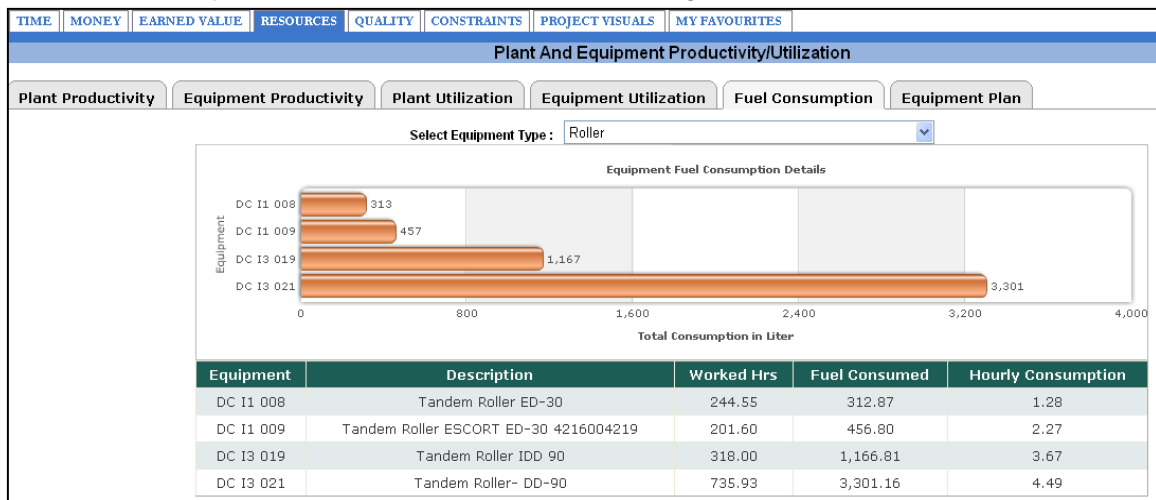
The Productivity of equipment against different activities during project execution was monitored by KMC on a regular basis



KMC were able to monitor the productivity of Roller against different activities. The Roller productivity is highest 540.9 in Job Code 405. Further for each Job Code, KMC were able to monitor productivity of individual equipment in terms of Quantity done in cubic meters, Hours worked and productivity in cubic meters per Hour.

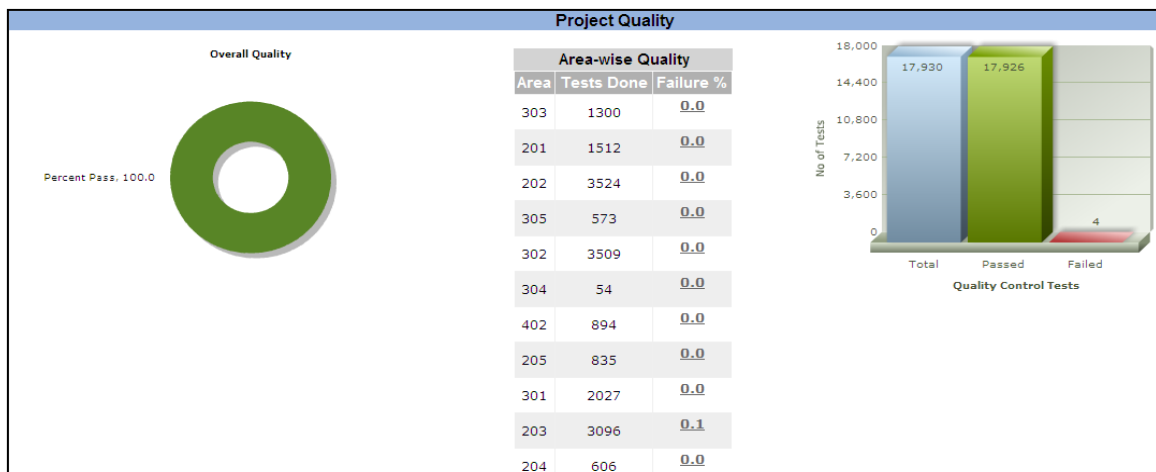
## Fuel Consumption

The Overall fuel consumption for each plant and equipment details per hour consumption details were monitored by KMC.



Here KMC could monitor the Fuel Consumption details of all Rollers in terms of Worked Hours, Fuel Consumption, and Hourly Fuel Consumption. It was noted that the Roller DC I3 021 consumed the highest quantity of fuel 3,301.16 liters. This brought the Mechanical departments attention towards the reason of high fuel consumption.

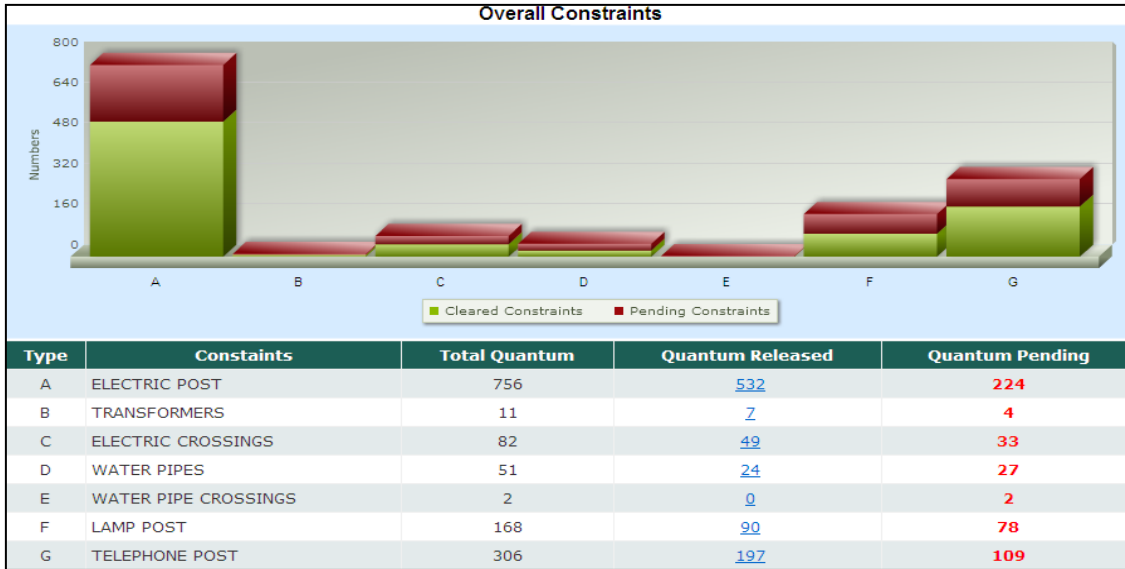
## Quality



KMC has conducted about 18000 Quality Control tests during the course of the project.

The Construction supervision team was able to comply with the ISO Standards on all the Quality tests and have also done the failure analysis.

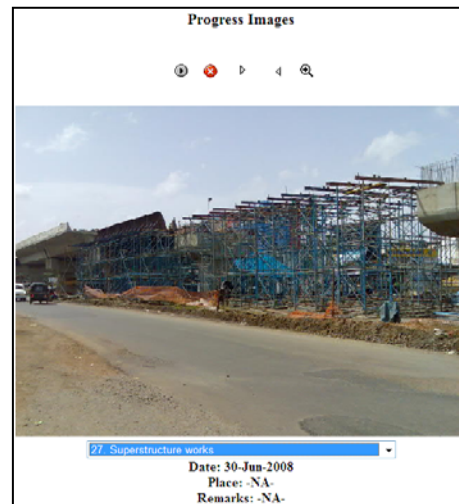
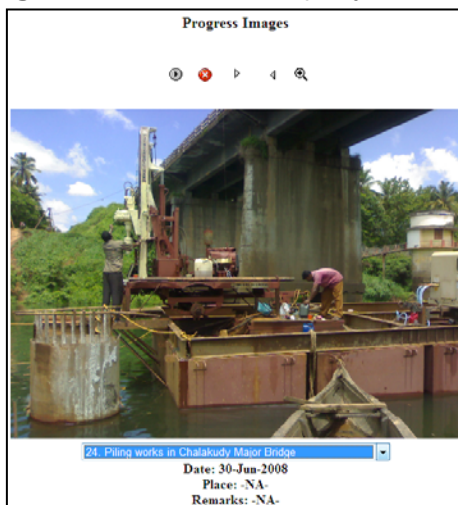
## Constraints



Various Project constraints details could be highlighted and each constraint type could be monitored and the constraint clearance history could be traced for each location.

## Visuals

The Progress photos of Four-Laning of Thrissur-Angamalai section of NH-47 Project were uploaded on Backend Project Management System regularly. KMC and other stake holders were able to view the current progress visuals of the project.



The Contractors raised a Variation Order [VO] for evacuation in hard soil and a Claim for extension of time [EOT] to complete the work. The Consultant, after investigation approved the variation order and the claim.

The Contractors raised a Claim for extension of time for 2 years 730 days due to land acquisition problem. The Consultant, after investigation approved the claim for 1 year after all land acquisitions are done.

Variation Order View						
VO No.	VO 09					
VO Desc	VO raised for additional BOQ quantity in Evacuation of Hard Soil					
Date Prepared	10-Mar-08					
Date Issued	10-Mar-08					
Ref Type	LETTER					
Ref No	CI 09					
Ref Date	7/18/2009					
Subject	VO raised for additional BOQ quantity in Evacuation of Hard Soil					
Status	APPROVED					
Additional Value	7,150,878.00					
% of Contract Value	0.36					
Expended Till Date	0					
Prepared By	Observer2					
Approved By	Observer2					
Date Approved	7/18/2009 12:38:59 PM					
VO Status	Not Started					
BoqItemName	BoqItemDesc	BoqItemUnit	Quantity	Rate	Amount	Remarks
E2	Excavation in Hard Rock	Cum	20909	342	7150878	-NA-

## Reports

KMC was able to generate the required reports at any point of time during project execution of National Highway 47 – KL-1 Project with more than 100 ready reports to choose from in the software. The reports included Daily progress report [DPR], Monthly progress report [MPR], Weekly progress report [WPR], Financial progress report, Quality control reports, Encumbrance or Constraint reports, and other project related reports.

## Implementation Training and Support

Backend Bangalore Pvt Ltd has implemented and trained the KMC staff with using Backend Project Management System. Backend Bangalore Pvt Ltd and KMC worked together to ensure that existing data was uploaded onto the Project Management System. From then onwards Project Management System was the default tool for managing the KMC project. To ensure that project members are adept at using the system, Backend Bangalore Pvt Ltd ran customized training modules for all participants and supplemented these with unlimited helpdesk and online support.