



SC Railway Digital System Map - Version 1.0

MMIS Technologies and Concepts.

SC Railway Digital System map a new innovation introduced by SCR Zone - implemented for Hyderabad Division.

Technologies Map Management Information Systems (MMIS) MAPS “SCR System Map components from TMS onto HYB Division Base Map for virtual views of Rail topology in Environment with respect to Bridges, Index Plans, Stations, Curves etc. in dynamic and interactive mode in a very user friendly manner.



SC Railway Digital System Map Ver. 1.0

- Thousands of entities pertaining to Linear assets, Land control Boundaries and KM hecto meter stones are geocoded from TMS excel records without carrying out Conventional surveys
- An unique and cost effective approach.

*MMIS Tech.
Spatial ERP systems
First of its kind in IT*

Product inaugurated by Shri. Vinod Kumar Yadav, Chairman Railway Board. In presence of Shri. AK Jha, CTE/SCR. On 20th December. 2018

5th April 2019
SUSWA INFOWAY PRIVATE LIMITED
Ravi Ganesh Mantha
CEO & Mentor MMIS Technologies and Concepts

Executive Summary

On close scrutiny of Indian Railways **Management Information Systems**, the **MIS** of all forms i.e. TMS (Excel sheet based inputs/outputs), Line Diagrams, AutoCAD drawings, Jurisdiction maps, Yard Diagrams, Engineering drawings etc. communicate the location of the linear and non-linear assets status and features, as on given date. Also further, we note and observe, Engineering and commercial functions revolve around these the very linear and non-linear assets time and again every time, those originate geographically which are fixed and static in nature always.

Technological advancement in visualisations of MIS, would be very handy for Indian Railway engineer strategists, in managing functional roles towards maintenance and development of the linear assets along running Rail track effectively in scientific mode intelligently. Today **Environment Intelligence (EI)***, surfaced through Open Street Maps (OSM), Google/Bhuvan (ISROs) etc. are of an immense value *(Map feature fusion to MIS emits **EI**) naturally when customized. Through SC Railway Digital System Map version 1.0 developed under MMIS Technologies and Concepts would emit Maptelligence for Strategists to intelligently manage their functional roles smoothly, at ease through proper planning on fly visually by oneself.

We all agree, that over 98% of Indian Railway MIS systems originate and conclude geographically always. Today, The MIS shared and exchanged across functional department strategists are bulky, mighty, and highly complex. The manual processing of these MIS reporting systems are resource and content intent, useful in decision making. It is more so and true, for PCEs Directorate in monitoring strategies progress in transforming the systems the way we do today in more optimal mode, for smoother rail runs safely always as motto.

SC Railway Digital System Map ver. 1.0 introduce/fuse Map feature to TMS database and represent each single record (duly geocoded) of Linear Assets viz., Index Plans, Bridges, Station and Station Yards, Curves, LWR, WPS, RAT bridges, Railway Boundaries, KM stones etc. on ground (over 10,500 entities) are geocoded, and can be accessed on a click of a mouse that communicate the ground factual position of these assets as on dates of updates, with photographs, drawings details, Dash Boards etc. MMIS Tech also induces area and distance measurement tools for usage of engineers with background of OSM pitching **EI**, introduced above. Geo coded details of TMS assets and other operational areas are displayed to strengthen strategists' strategies scientifically on fly.

Pilot Project for Hyderabad Division has given us to understand insights and strengths of Railway MIS systems, which we could gain while mapping whole 652 Running KM, using TMS data as a base source. A valuable guidance and support from Head Quarters SCR and HYB division teams are well acknowledged and appreciated paving way, for successful launch of product by GM sir. SC Railway Digital Systems Map ver. 1.0 extracts the GIST of

TMS and other allied MIS data sets to produce, visual and virtual views of linear assets and its neighborhood details from secondary data sources as OSM clubbed with geographic tools viz., search, measure area and distance, Lat./Longs etc.

SC Railway Digital System Map publish topographic views (PDFs) of HYB Division from their own MIS data sets when ported on standard map templates with Parliamentary and Assembly Constituencies' jurisdictions. Thereby, further data visualisations and analytics can be completely minimized/undone through MMIS Tech. "Doing the Undone".

MMIS Tech are completely built in an open source platforms, which are independent by itself. MMIS Tech are specially designed for strategist's teams to handle and manage the requisite knowledge, extraction from routine operations MIS reports through our easy and simple self-operable tools which would have qualitative Decision Support Systems.

Methods and models developed and used in SC Railway Digital System Map Ver. 1.0 shall ensure visual representation of HYB territorial and operational areas on standard map templates duly updated. Enabling users to navigate and understand jurisdiction roles performed, *to be performed (plans)* by various engineering personnel of HYB Division from time to time through Edit modules provided. Edit module enable photos, updated drawings can be uploaded by SSE personnel. Then application gets updated once validated by DEN groups. Thus, SC Railway Digital System map is dynamic and interactive.

Value of MMIS Technologies can be more leveraged in doing away conventional surveys, which is time and resource consuming. We have successfully done in our SC Railway Digital System Map ver. 1.0 for linear assets with Chainage data details obtained from TMS where accuracies are well within the tolerances defined. We have SC Railway Digital System Map ver. 2.0 (Mobile based) ready for deployment which captures non-linear Assets Geo-coding facility through researched MMIS Tech models - enhancing accuracies.

We hope, this Indian Innovative MMIS Tech. will be of use to our Indian Railway engineer strategists. We at our end would be glad to hear from you on our product and seek your valuable advices in improving the same through constructive critics as well.

Our firm, M/s. Suswa Infoway (P) Ltd. Incorporated In 2003, and is an intense R&D organisation and has developed MMIS Technologies (Map Management Information Systems) which uniquely ports whole MIS systems on to the Map frame works, for an auto visualisations and analytics. A "Spatial ERP" systems designed under MMIS Technologies are implemented for MHRD/UNICEF, ISB, ITC etc. MMIS Technologies are unique and first of its kind in IT domain, and are of an Indian origin which are validated by IGNOU, ICAI, ISRO and Xlr8AP/FICCI/IC² University Texas at Austin, USA.

Ravi Ganesh Mantha
CEO & Mentor – MMIS Technologies
Product from the son of Railway Station Master
Late Shri. MSVS Sastry.

ACKNOWLEDGEMENTS

We are indeed pleased to acknowledge our sincere thanks to SCR Zone - Indian Railways, for having given us an opportunity to develop first of its kind application SC Railway Digital System Map Desktop based. Version 1.0. Further we felt very privileged when the product got inaugurated by **Shri. Vinod Kumar Yadav, Chairman, Railway Board.**

Principal Chief Engineer of SCR, Shri. **K. V. Siva Prasad**, IRSE visionary views have been inspirational in Innovation development and implementation in HYB Division. Further CE/works Shri P. Srinivas, IRSE, guidance in frame work designs for strategist's team was exciting.

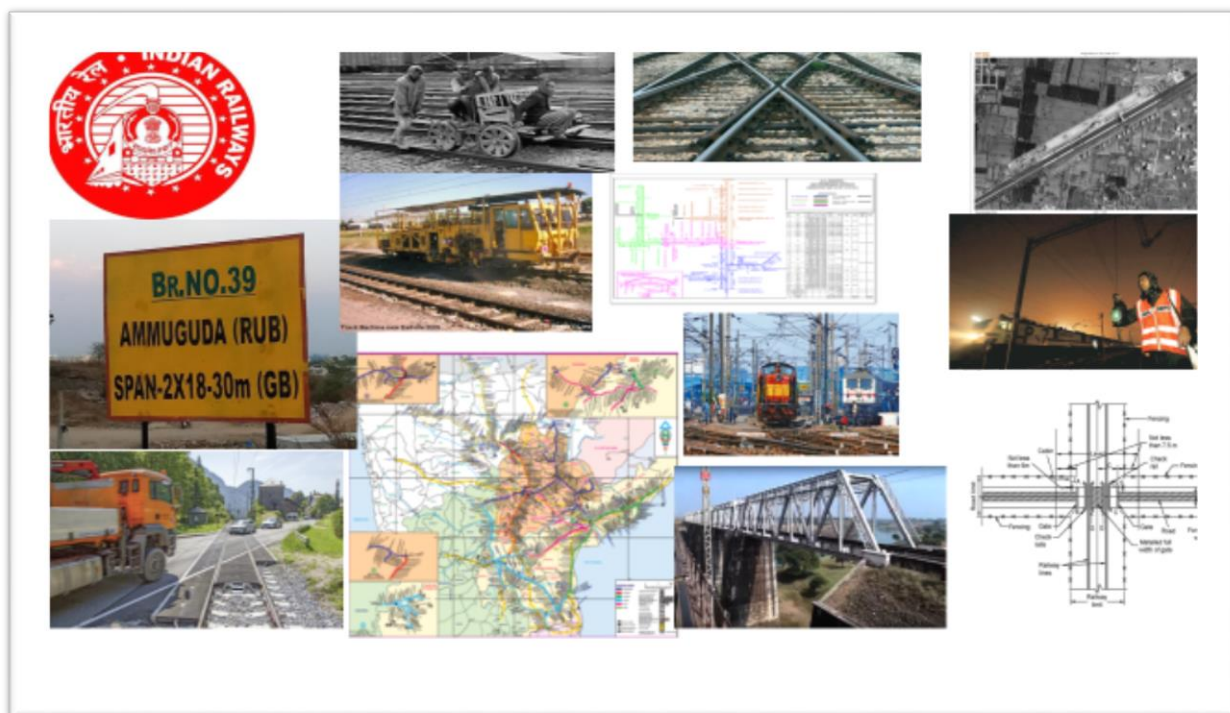
Shri. HK Bhagoria, IRSE, Dy. CE Works amazing patience, and his inputs made our work and application development initiatives very joyous, month on month as calendar changed, along with his team in learning and understanding SCR System Map components structures and its usefulness when application developed.

We could stand to the expectations and beyond proposal scope of SC Railway Digital System Map Ver. 1.0 with due support of HYB Division Sr. DEN/CO/HYB Coordination Team Shri. Mothilal Bhookya and DEN/Lines Shri. N.B. Surya Prakash in field and providing quality data/advices required for application development, checking and validating the product. Also thankful to Shri. A Krishna Reddy SSE/P.Way/SOR/HQ. for providing various inputs and feedback based on his vast field experience and Shri. I. Srinivas (SSE/P.Way/Sr DEN/O/HYB for his quality data inputs and feedback helped development of the application smoothly. Finally but not the least all those supporting office personnel in sharing and exchanging views and thoughts in the process of developing first of its kind application in IT system

We further acknowledge presentation of SC Railway Digital System s to the delegates of IPWE (I) International Technical seminar held at HICC – Hyderabad which was visited by Shri. Visvesh Choubey, Member Engineering, Railway Board.

Team MMIS
Suswa Infoway (P) Ltd.

GIS on Track (Geographically Informed System Track – GIST the visuals of Each TMS record on Map duly geocoded from Rail MIS systems



The TMS components on ground geo-positioned map

GIS Track is Geo mapping / overlaying of all the Assets like Track, Index plans, Bridges, SEJ's, Curves, Points, Level Crossing Gates, Stations, Land Boundaries, RAT's and data like Permanent Speed Restriction locations, Patrolling Locations etc OSM Open street Maps . **The created layer wise digital maps of all the assets will be overlayed on Open Street Maps to have virtual visualizations of the location and its surroundings**

Standard templates for updating field photos and other attributes for all the assets / categories will be provided for further updation.

The Attributes / Query menu for visualization of the Data will be From Station to Station or From Km to Km or Jurisdiction of DEN / ADEN / SSE Wise. The data can be updated by concerned SSE/ADEN/DEN with the separate login ID's given.

Application developed with following features

a. Measurement / analytics tools development and integrations for following functions.

1. Extracting GPS readings of Point of interest of the user
2. Distance measurement between two selected points in Kms close to + or – 1 meter accuracies.
3. Measures the Area of interest closed area the polygon
4. DEN/ADEN/SSE can correlate the assets under his jurisdiction required for visualization / analytics of the assets position as on given date.
5. Layers for each layer will enable user to visualize the Asset wise data.

b. Reports

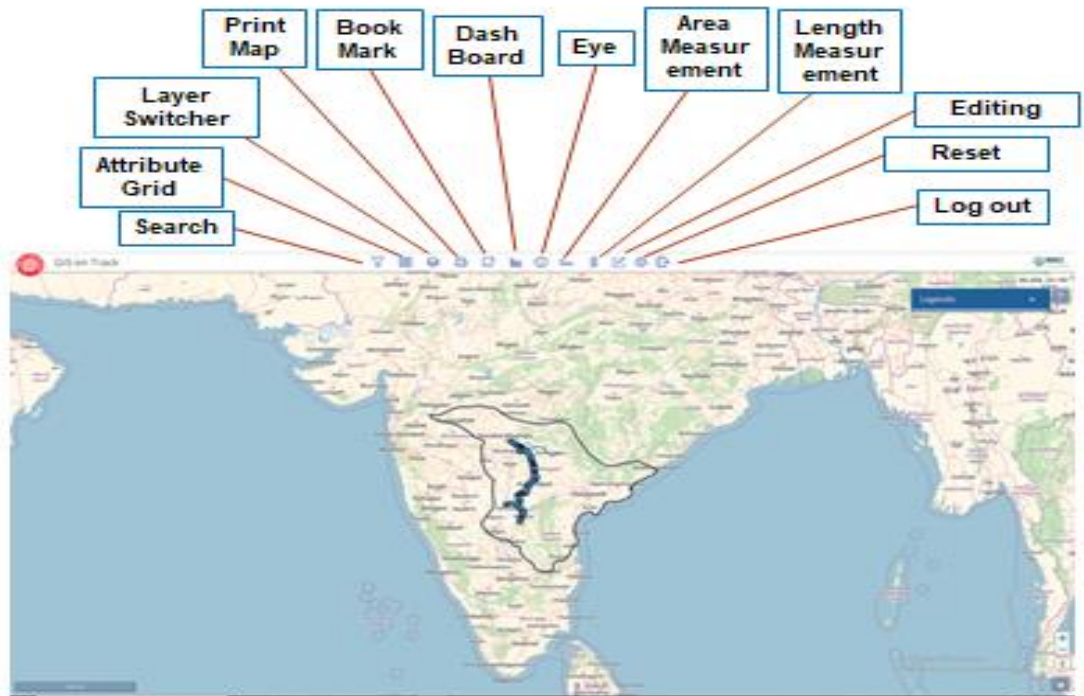
1. Excel sheet data downloads with standard templates
2. PDF views of Area of interest map prints with user observations while downloading

c. Updating to retain dynamism

1. Layer attributes of the assets data for display
2. Updating field attributes in defined structure along with photos / videos/audio.
3. Drone survey data images / shape files upload facility provision as separate layers for immediate usage of Map Data
4. On click mouse to the area of interest attributes either on track or on an asset would to be displayed.

Home Screen

Home Screen will be viewed with following buttons –
Search, Attribute Grid, Layer Switcher, Print map, Book mark, Eye, Area Measurement, Length Measurement, Editing, Reset, Logout.

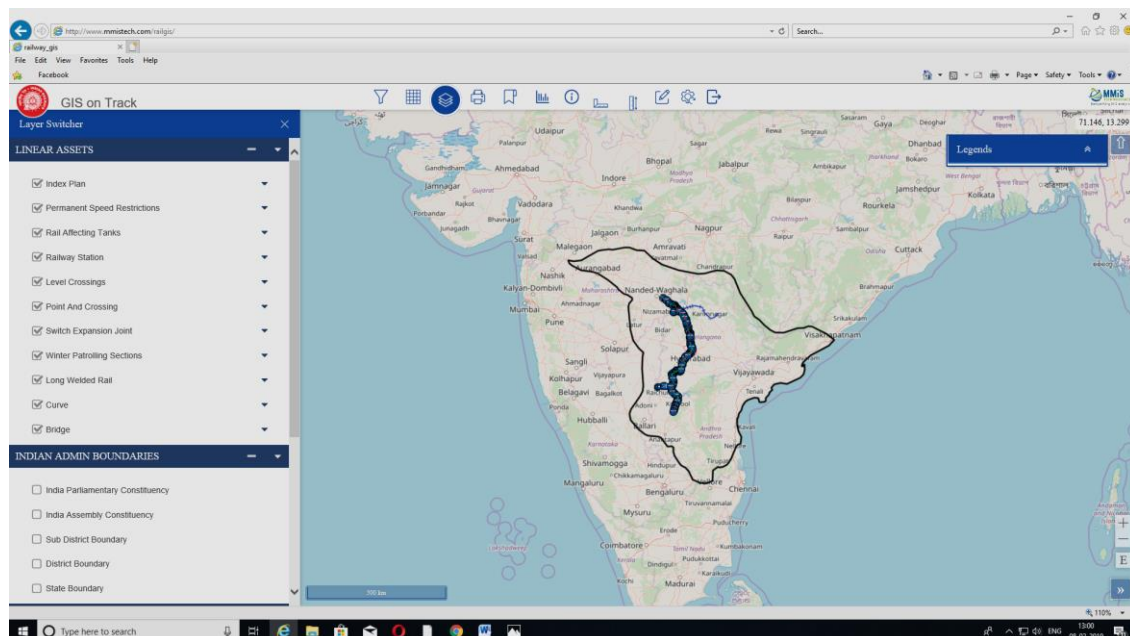


1. Search – This is used for selecting a particular DEN, ADEN & SSE/P.Way along with the asset layer which has to be viewed.
2. Attribute Grid – This is used for viewing the total details of different asset layers.
3. Layer Switcher – This is used for viewing the asset layers which are required so that only required asset layers only be marked and viewed.
4. Print Map – Used for Printing the map viewed on screen
5. Book Mark – for saving certain data which is being viewed, it will be saved in Book marks which can be viewed any time after.
6. Dash Board – All the details of Assets with categories will be viewed as summarised.
7. **(I)** Info tool – This is used for viewing the details at a particular point or a asset by pinpointing that particular location.
8. Area Measurement – Area of particular wanted location can be measured
9. Length Measurement - Length of a particular location can be measured
10. Editing – For editing purpose
11. Reset – To reset and come back to Home Screen.
12. Log out – For Logging out.

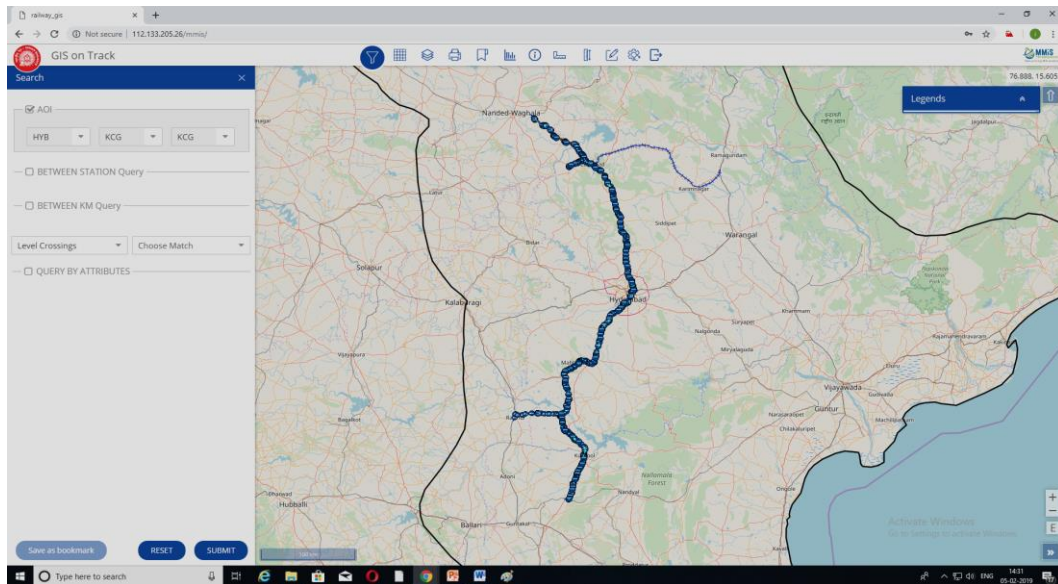
Initially Linear Assets to be viewed has to be selected through Layer Switcher and then go for search option for further selection.

Linear Assets displayed are

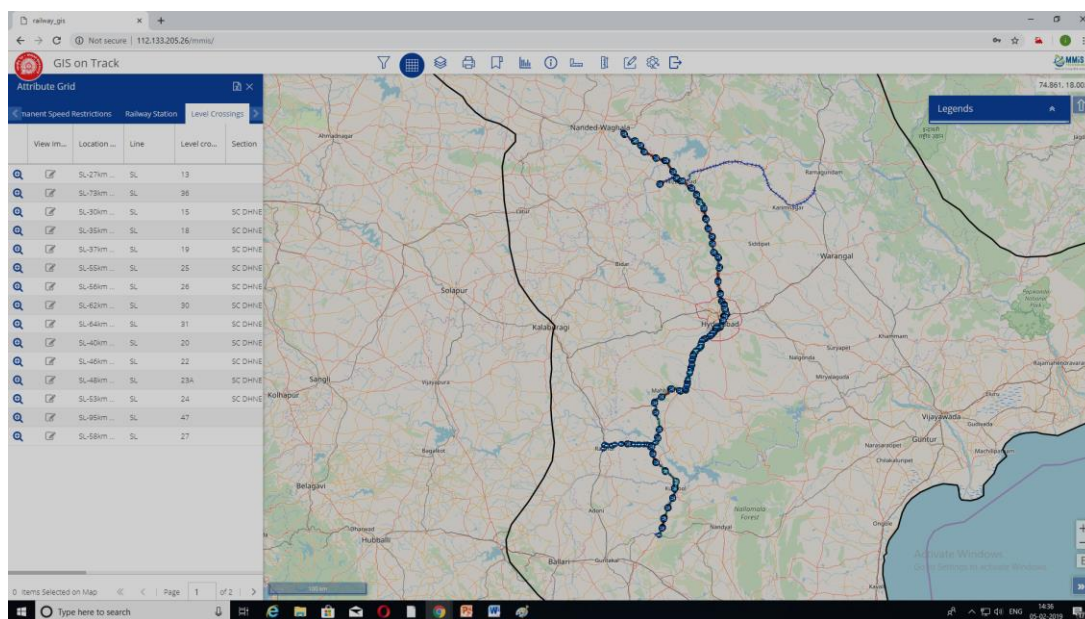
1. Index Plan
2. Permanent Speed Restrictions
3. Railway Affecting Tanks
4. Railway Station
5. Level Crossing
6. Points & Crossings
7. Switch Expansion Joint
8. Winter Patrolling Sections
9. Long Welded Rails
10. Curve
11. Bridge.



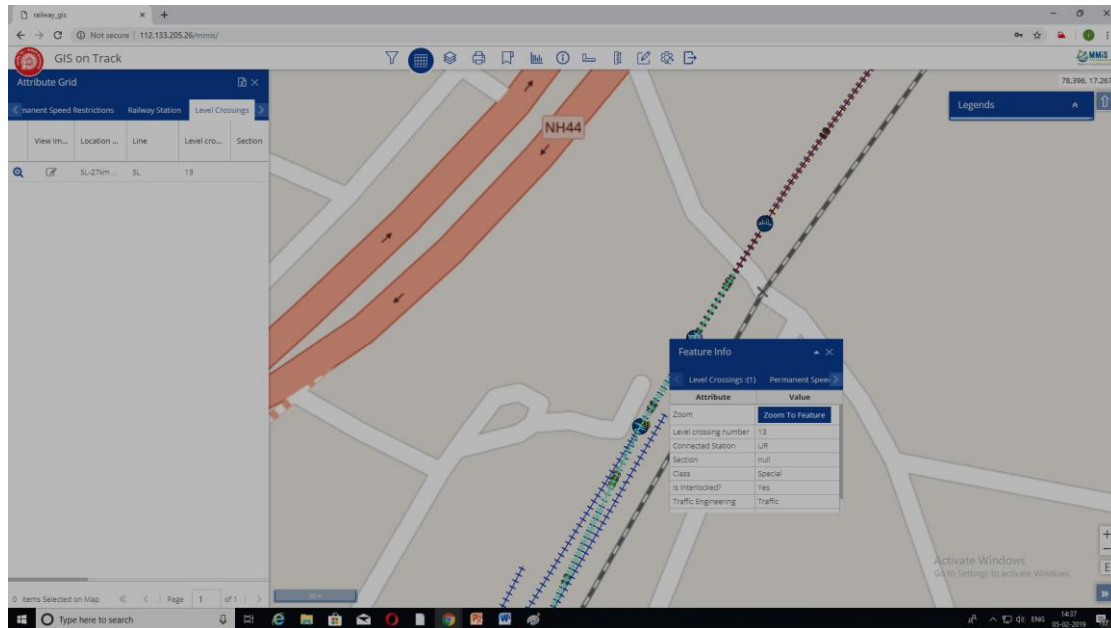
- In the Search option, DEN, ADEN and SSE has to be selected and then the Asset for which details required has to be selected. **(Below selected is Level Crossing)**
- Navigation system to view all linear assets are same and for few layer assets navigating methods have been displayed which would be same for all other Linear Assets
- The above linear assets are overlaid with Political and administrative boundaries
- Kilo meter stones for every hundred meters are mapped to the count of 63,300 covering 652 km running tracks
- Layer on/off features to understand the physical location of assets useful for planning and monitoring the work at any given point of time can be updated on map



- The details of Asset selected in that particular jurisdiction selected will be displayed as under.

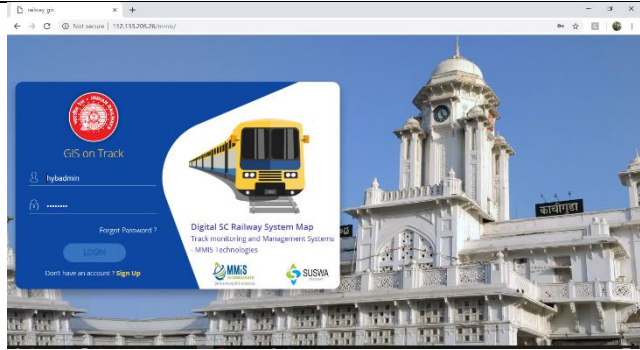
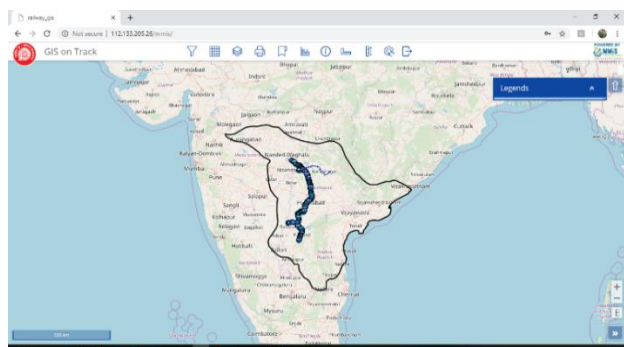
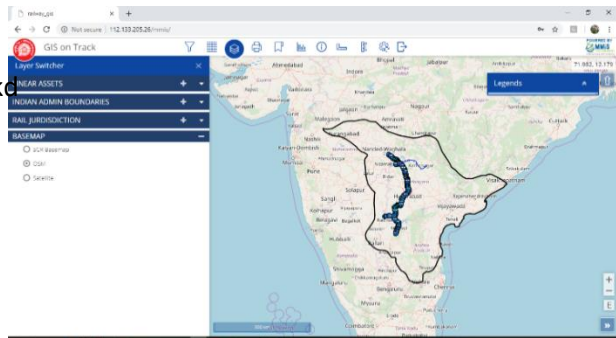


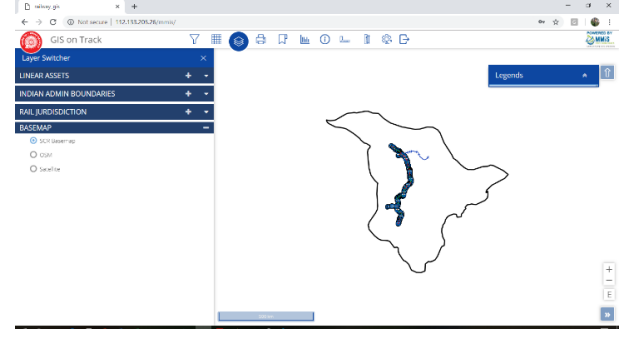
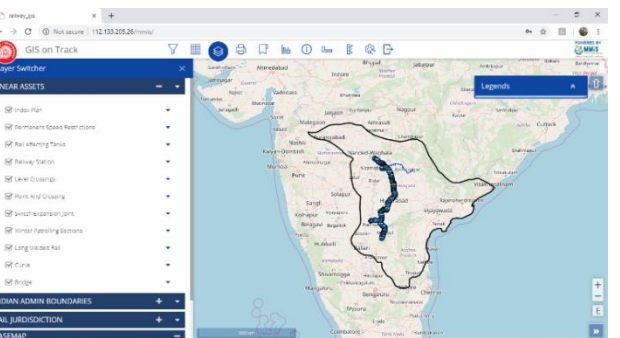
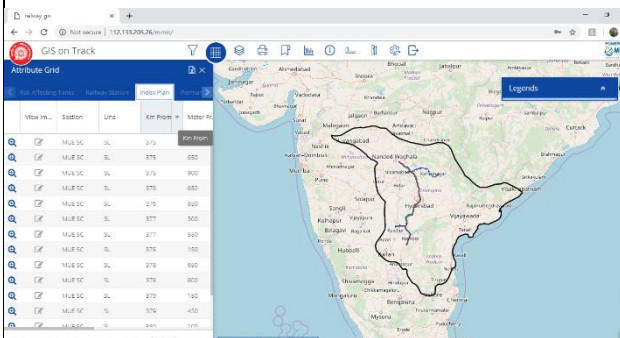
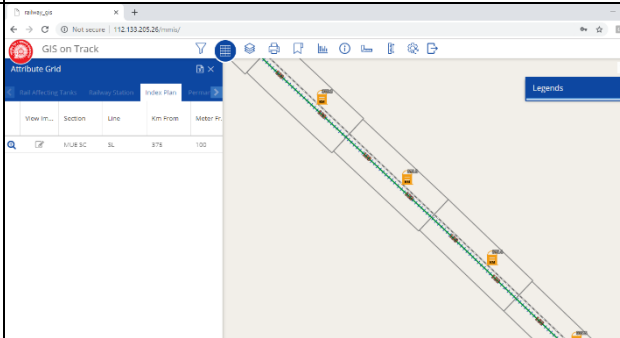
- Further, through eye option on the left of the Screen, that particular Asset can be zoomed into and viewed. And then the details of that particular can be viewed on the linear map through Eye button option.

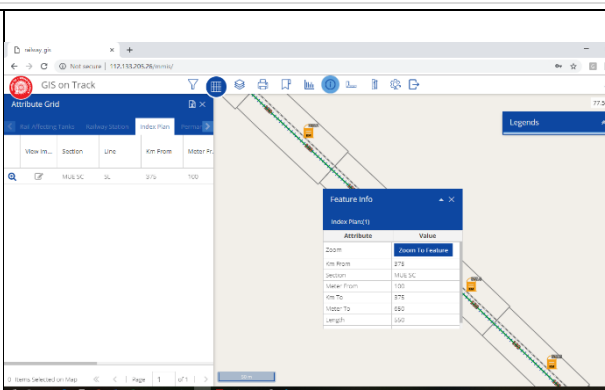
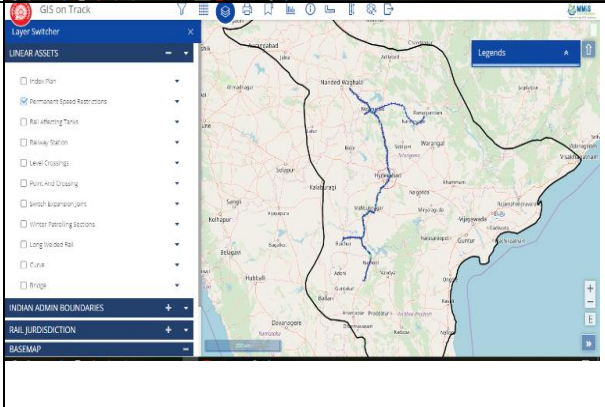


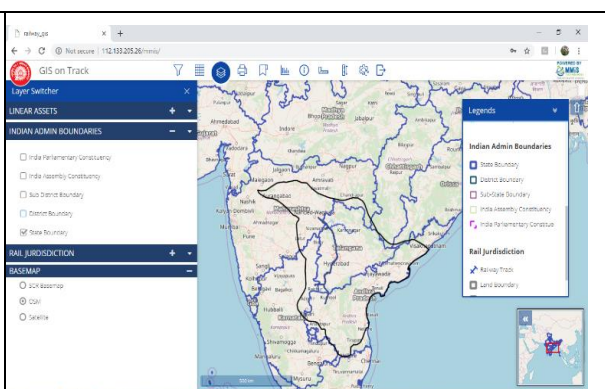
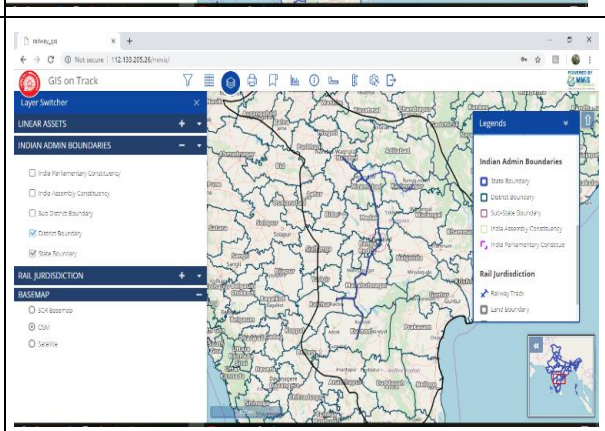
- The same procedure has been adopted for all other linear Assets.
- The availability of measuring Tools like Area Measuring and Distance Measuring Tools, the Area of Railway Land at a wanted location like Stations Yard, Circulating area, LC gates etc can be calculated and fast decision making for some particular issues.
- All the details required can be downloaded in PDF or Excel

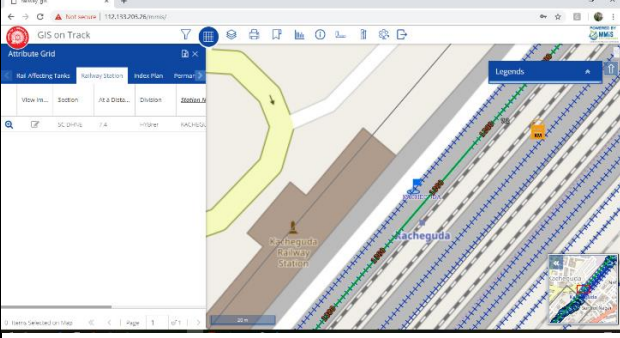
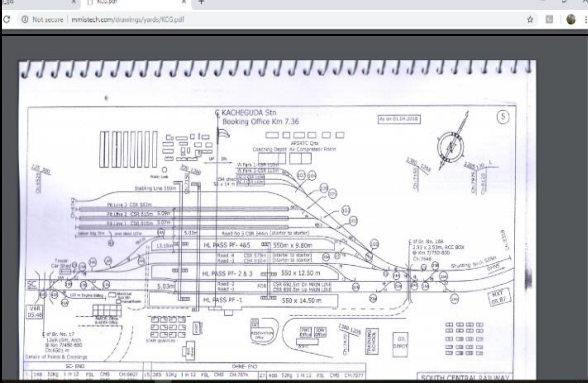
A crisp Visual Operating Manual "SC Railway Digital System Map (ver. 1.0)". HYB Base Map overlaid on Open Street Maps (OSM) GIST - MMIS Tech

Sno	Screen Shots of Application	Brief Description of visuals
1		Login Screen
2		1. Home page with – SCR Zone Boundary and Hyderabad Division base map of Linear Assets 2. With 12 features and functionalities for viewing each record of Linear Assets 3. In built area and distance measure tools 4. Lat./Longs of Each asset displayed TMS data as
3		5. Layers (L) switcher for viewing linear assets broadly a. Linear Assets – 11 L b. Indian Admin bound - 5 L c. Rail Jurisdiction – 5 L d. Base Map – 2 L 6. With legends of all layers to display when opened up 7. Thumb nail view to extreme right bottom to display position and the environs on OSM

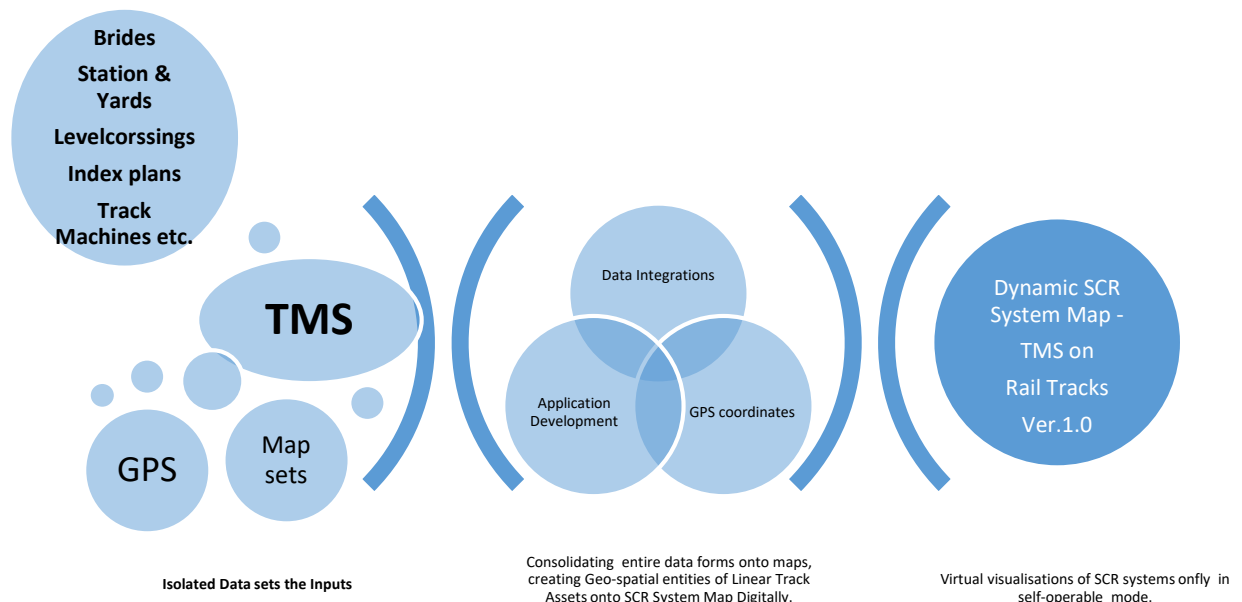
S.no	Screen Shots of Application	Brief Description
4		Geo referenced and digitized 652 KM length with 16 layers of Railway linear assets and jurisdiction boundaries. 1. Introduced layer – on/off features of each layer for use of each user context 2. Non -default view without OSM 3. Displays environment overview from Top down
5		11 layers of liner assets viz., I. Index plans II. Permanent Speed Restriction III. Rail Affecting Tanks (RAT) IV. Railway stations V. Level Crossings VI. Point & Crossings VII. Switch Expansion Joints VIII. Winter Patrolling Section IX. Long weld Rails X. Curves and XI. Bridges
6		TMS Data records of all above linear assets are mapped . I. Each record of for E.g. Index plan segments of Raise, Level and Fall classes with Red, Blue and Green are viewed II. Select Attribute structure are displayed and downloadable in excel
7		Index plans views on OSM the virtual location from TMS record I. Validation of the Index line segment can be had II. Through Land boundaries and KM stones III. Tools to measure the distance and area provided for planning and strategies IV. For T/O GMT, deep screening dates etc. can be inserted in popups

8		Information of each asset are displayed when 'I' (info toll) is clicked - It would display Index segment details - Other assets around such as Jurisdiction control stones and boundaries - KM stones are developed for every
9		Permanent speed restriction layer view across HYB division as layer is displayed - Viewing of TMS data is same for viewing all individual layers discussed above - Can be viewed as per user choice to understand planning and situations of the asset to the context of location

10		Indian and Political admin boundaries integrated to give virtual intelligence of environments - State/District/Sub-district layers - Parliamentary and Assembly constituencies layers integrated
14		District boundaries topology and railway assets - Standard Legends of TMS are used to view TMS record location - Thumb Nail view feature can be viewed as displayed right corner. - Lat longs are area of interest with mouse roll can be viewed

12		Yard Plans prepared from TMS
14		data with Open Street Maps (OSM). I. Point and Crossing, Bridges and other features validation with OSM II. Topology of Kacheguda Railway station and yard can be seen
13		PDF drawings for Kacheguda station can be viewed and downloaded. Print view of the map with notes and observations on A3 & A4 size
15		Tool to access and download all drawings of Station yards and Bridges II. Methodology defined for upload of dwg. and other document formats III. Going green initiatives naturally IV. The completion drawings can be uploaded as and when modified by SSEs.

Digital SCR System Map – TMS on Rail Tracks – Map Management Information Systems – Spatial ERP structures



Components of Digital Track Systems – TMS on Rail Tracks Ver. 1.0 Development processes an overview