Integrated Traffic Management System (ITMS)

1st July 2019

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Abbreviations

ITMS – Integrated Traffic Management System

VMB – Variable Message Board

ATCC – Automatic Traffic Counting and Classification

ANPR – Automatic Number Plate Recognition System

HTRIMS – Hyderabad Traffic Integrated Management System

PAS – Public Address System

RLVD – Red Light Violation Detection

VAC – Vehicle Actuated Control

AQI – Air Quality Index

TSP – Traffic Signal Priority

DCP – Deputy Commissioner of Police

SHO – Station House Officer

ATCS – Adaptive Traffic Control System

PCP – Previous Corresponding Period

GIS – Geographic Information System

SOP – Standard Operating Procedure

CCTNS - Crime and Criminal Tracking Network & Systems

L&O – Law and Order

Definitions of the terms used

1. **Stakeholders:** An independent department or organization who provides input or act based on input or responsible for a particular activity. *Ex. Traffic Police, GHMC, TSRTC, HMRL, etc.*
2. **Hotlist Vehicle**: A vehicle identified as theft, repeated violator, stolen, with fake reg. number plate and suspected by the authority
3. **Traffic Simulation**: Mathematical modelling of transportation systems and traffic operations using the software to better plan, design and operate transportation systems. It is an important area of traffic engineering.
4. **Special Events**: The special events in the city include public meetings, any permitted crowd gatherings, processions, festivals, etc. which lead change in the traffic demand pattern and/or changes in transport network operations.
5. **Analytics**: Analytics is the discovery, interpretation, and communication of meaningful patterns and trends in data.
6. **Event/Incident**: Planned and unplanned events such as accident, congestion, road closure, etc. which impact traffic operations.
7. **Response Plan:** A plan to suggest all the relevant stakeholders to act upon an incident/event/problem to quickly clear the incident and reduce damage caused/going to be caused due to incident/event
8. **Congestion Index**: It is the indicator which represents the congestion at a junction calculated using the traffic volumes on each arm and the corresponding capacity of the roads based on width. More is the ‘congestion index’ more the volume. It is also called critical volume to capacity ratio as per HCM (Highway Capacity Manual).

Definitions of the terms used (contd..)

9. **Proactive Strategies:** Proactive Strategies are interventions/actions which are taken on an ongoing basis in an attempt to reduce the likelihood of occurrence of the challenging behavior/problem. These are preventive usually.
10. **Reactive Strategies:** Reactive Strategies are actions taken in reaction to a problem/incident/behavior which occurred already reduce damage.
11. **Traffic Rules Compliance:** It is the percentage of vehicle following traffic rule at a given location on a road.
12. **Average Speed on Network**: Average of speeds of vehicle flow in the network segments under study.
13. **Pareto Analysis**: Pareto Analysis is a statistical technique in decision-making used for the selection of a limited number of tasks/factors that produce significant overall effect. It uses the Pareto Principle (also known as the 80/20 rule) the idea that by doing 20% of the work you can generate 80% of the benefit of doing the entire job.
14. **Incident Response Time**: Time elapsed between creation of incident and time when responder starts reacting to an a incident.
15. **Dashboards**: Operational Dashboards to monitoring current indicators
16. **Score Cards**: Monitoring and comparing KPIs reflecting goals

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Goals & Objectives

Safe & Smart City Goals

Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6
To create safe and secure communities through planned and accountable policing	To provide reassurance on responsive police services to vulnerable sections of Women, Children, Weaker Sections, Minorities and other disadvantaged people	To effectively prevent and control Organized Crimes	To improve the quality of life and ensuring safer living conditions in the jurisdictional area by empowering and partnering with Neighbourhoods and Communities through Community Policing.	To Improve Road Safety, Handling Accidents, Disasters and Crisis Management	To create safe and secure communities through planned and accountable policing

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ITMS Objectives

ITMS Benefits

Traffic Police

- Relief from extreme weather/Pollution
- Increased Accountability of violations
- Increase in Revenue
- Improved Discipline in Driving Behavior

Road User

- Reduced Travel Time
- Reduced Traffic Congestion
- Better access to information & Improved Decision making
- Better and clean enforcement

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7 Steps for Realization of Goals

1. System Deployment
2. Infrastructure Engineering
3. Road User Education
4. Violation Enforcement
5. Institutional - Capacity Building and Collaboration
6. Right Policy Framework
7. Continuous Monitoring for Improvement

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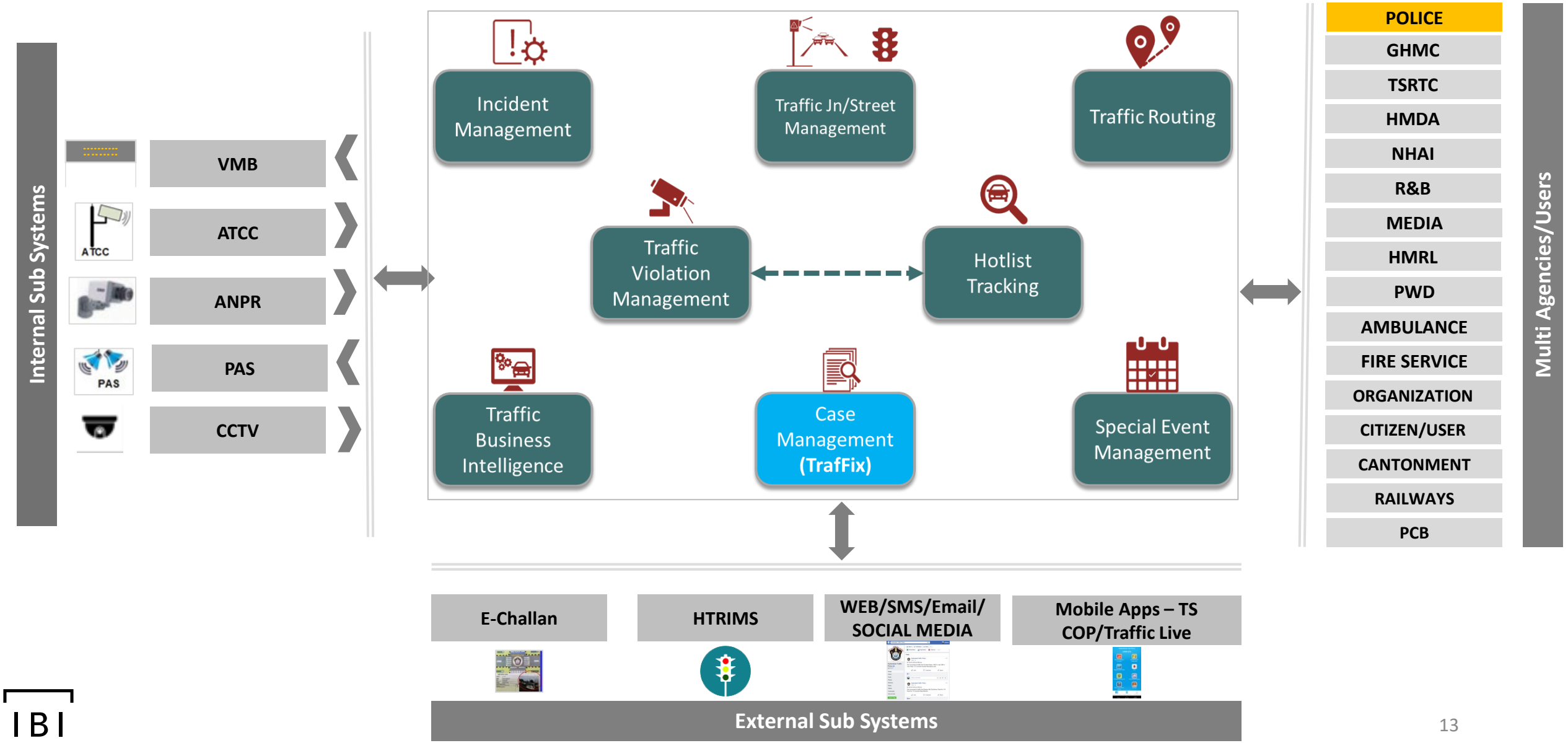
Solution Brief on H-ITMS

ITMS Architecture



ITMS Architecture

Traffic Business Intelligence

- Monitoring of traffic eco system in terms of traffic performance, accident pattern, violation pattern and road user behavior
- Root cause assessment & Impact evaluation
- Monitoring KPI

Incident Management

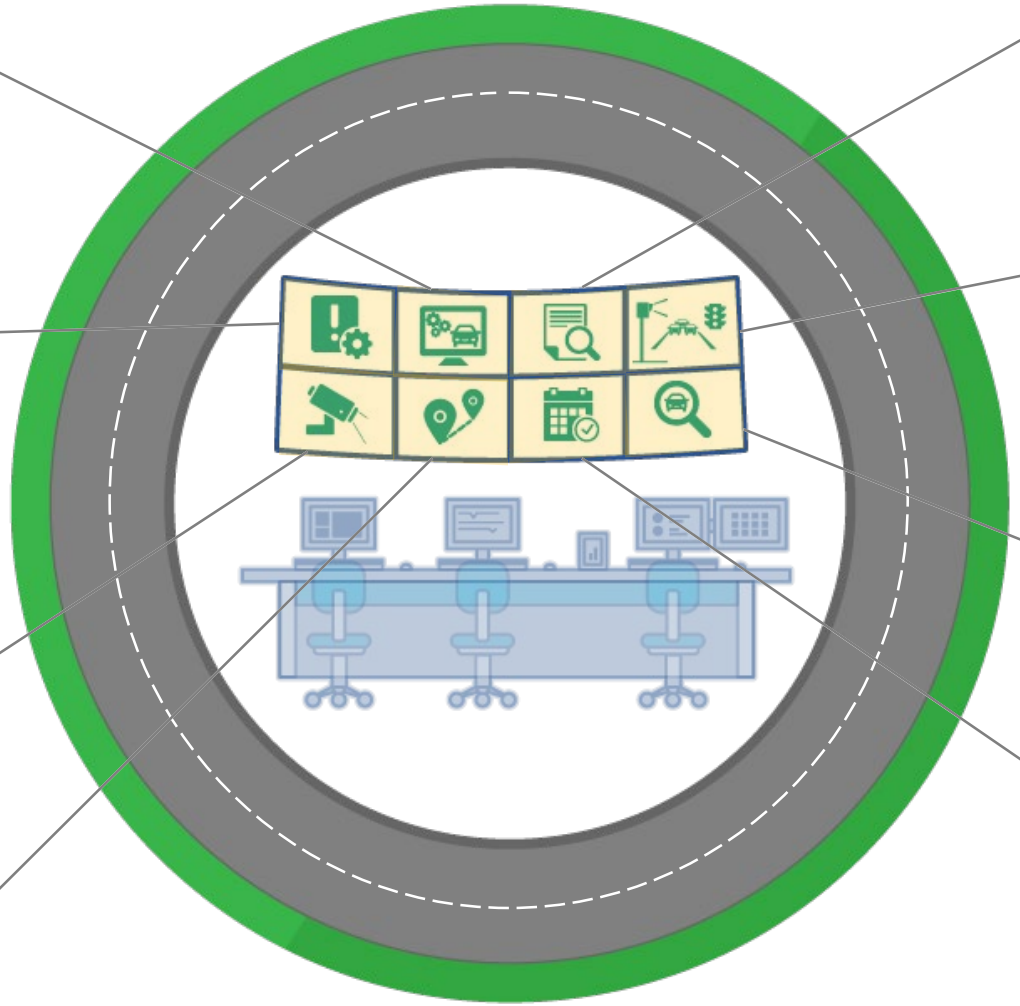
- Quick Traffic Incident Clearance
- Shorter Incident Response Times
- Automatic Multi Agency Coordination
- Road User Info on Alternative Routes

Violation Management

- Improved compliance to traffic rules and reduction in accidents
- Automatic detection of violation and enforcement

Traffic Routing

- VIP/Emergency Routes Planning, Tracking and Priority
- Travel time guidance to road users on alternatives



Case Management (TrafFIX)

- Managing complete cycle of case management from problem identification to investigation to action plan to monitoring performance

Traffic Management

- Optimized Traffic Signal Timing using Real time traffic data from ATCC
- Automatic traffic control/alerts at junction without manual control

Hotlist Management

- Tracking of Hotlist Vehicles automatically using ANPR without intervention of cops on field

Special Event Management

- Scientific pre-evaluation of alternative traffic management scenarios and choosing the best to minimize impact for a special event using traffic simulation

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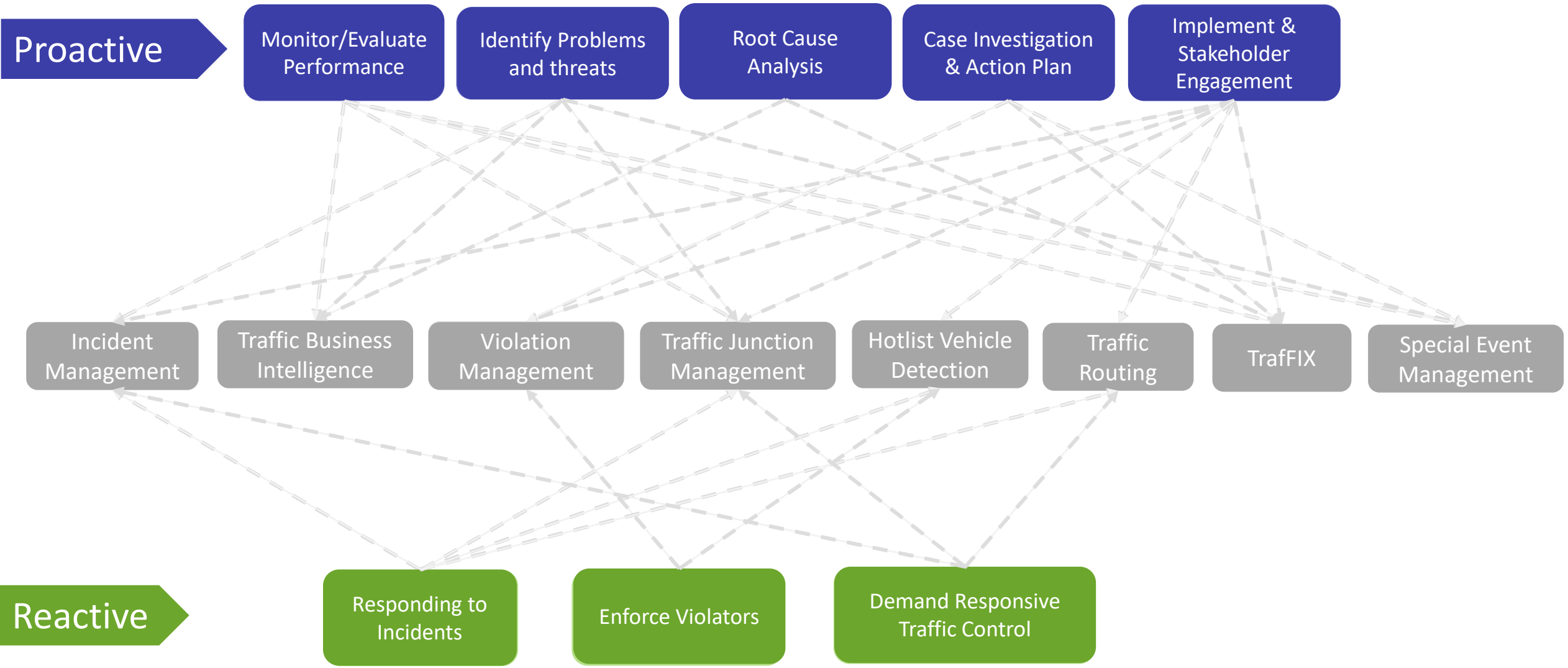
Modules vs Objectives

	Objective 1 Reliable & Best Travel Time	Objective 2 Achieve Reduce Fatalities	Objective 3 Cop-less Junction	Objective 4 Road User Engagement	Objective 5 Environment Friendly
Incident Management	✓	✓	✓	✓	
Traffic Jn/Street Management	✓		✓		✓
Traffic Routing	✓		✓	✓	
Violation Management /Hotlist Tracking		✓	✓		
Traffic Business Intelligence	✓	✓	✓		✓
Case Management (TrafFix)	✓	✓	✓		
Special Event Management	✓		✓	✓	

Supporting both Proactive & Reactive Processes



Module 1: Incident Management

Objective 1: Reliable & Best Travel Time

- Quick Traffic Incident Clearance & enhancing smooth flow of traffic

Objective 2: Achieve Reduce Fatalities

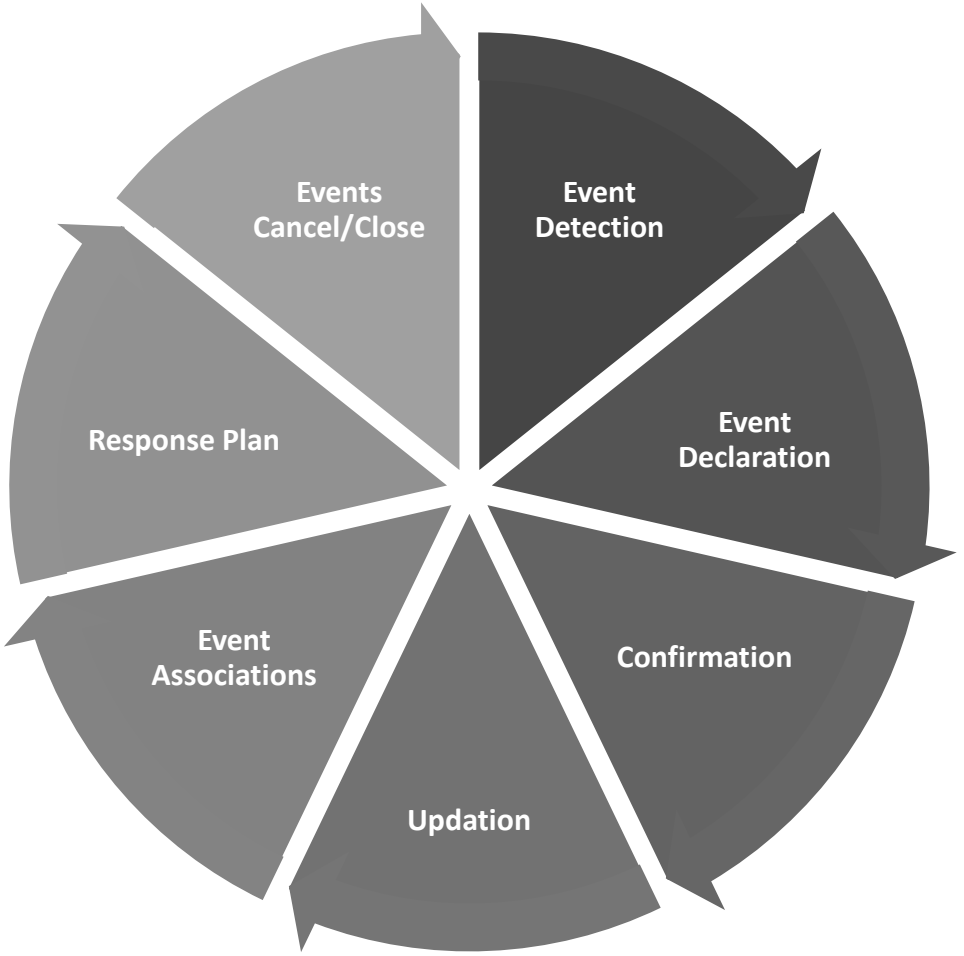
- Shorter Incident Response Times

Objective 3: Cop-less Junction

- Automatic Multi Agency Coordination

Objective 4: Road User Engagement

- Road User Info on Alternative Routes



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Module 1: Incident Management

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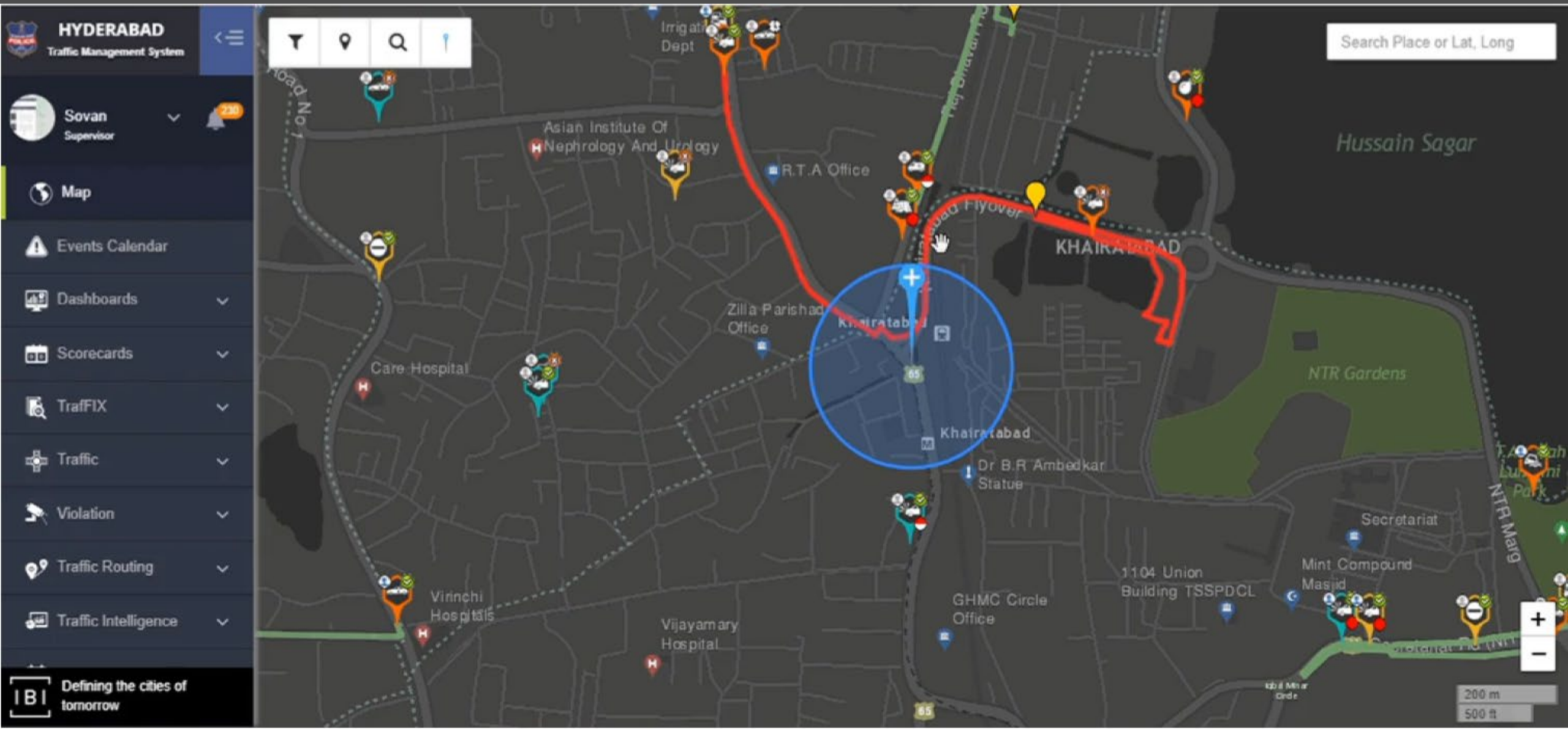
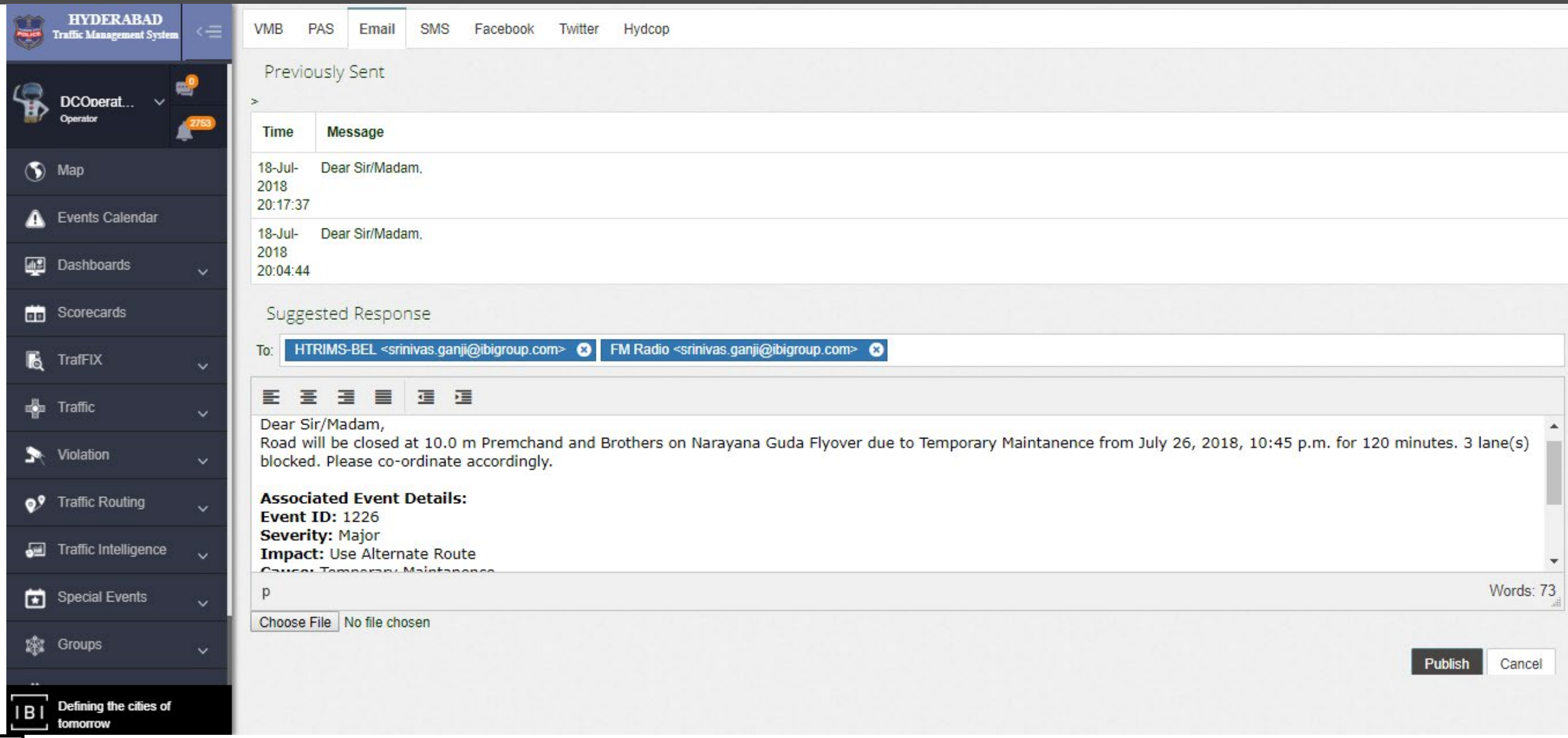


Module 1: Incident Management



Module 2: Traffic Junction/Street Management

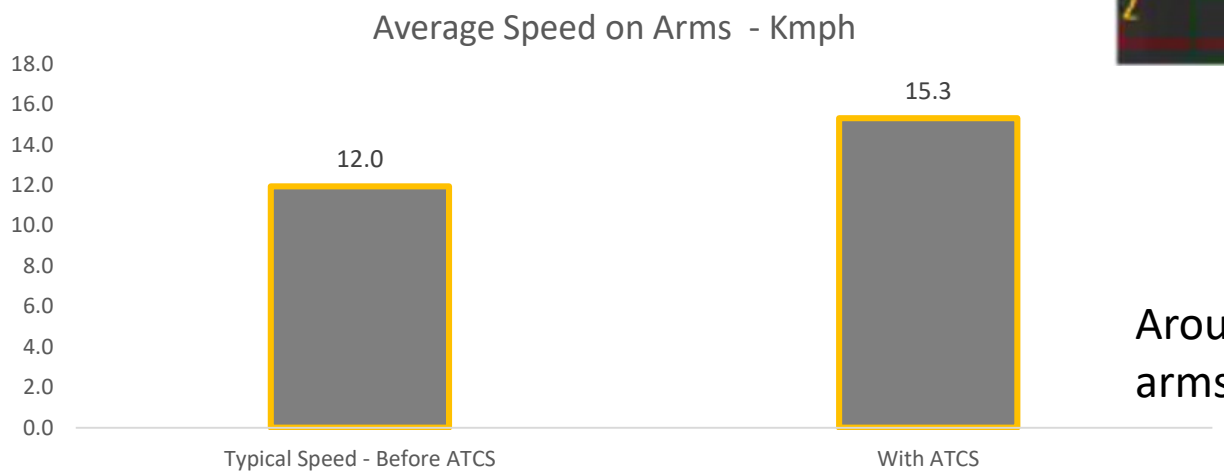
Objective 1: Reliable & Best Travel Time

Objective 3: Cop-less Junction

Objective 5: Environment Friendly

- Thermal cameras for Indian traffic and varied climatic conditions
- Optimized Traffic Signal Timing using Real time traffic data from ATCC
- Automatic traffic control at junction without manual control
- Reduction in fuel consumption & emissions due reduced delays at junctions

Performance Assessment



Around **30%** increase in speeds at Junction arms through signal timing optimization

Source: *Google Traffic*

Module 3: Traffic Routing

Objective 1: Reliable & Best Travel Time

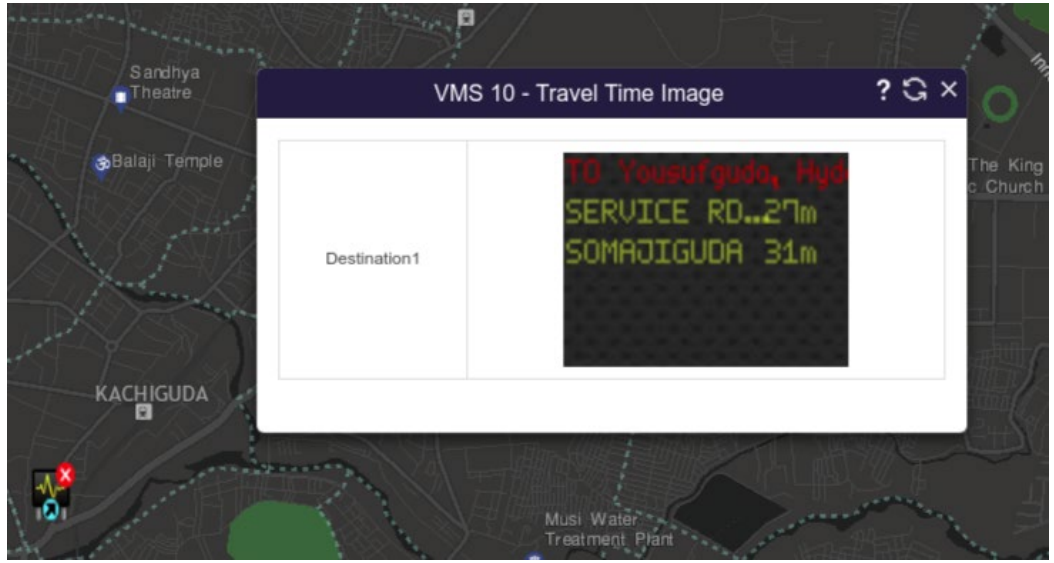
- Travel time guidance to road users on alternative Travel Time
- VIP/Emergency Vehicle Priority

Objective 3: Cop-less Junction

- Automatic routing of road users through VMB/PAS without involvement of cops

Objective 4: Road User Engagement

- Improved reliability and road user decision making



Suggested Messages

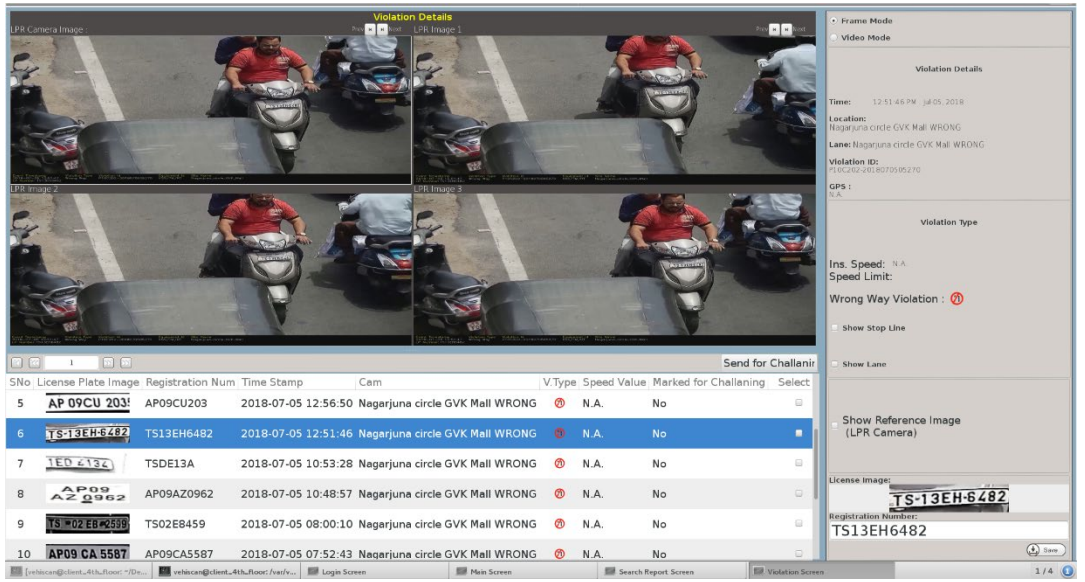
Sign	Current	Response Message
VMB-17	No message.	Accident on 0 lane(s) bl Expect Minor

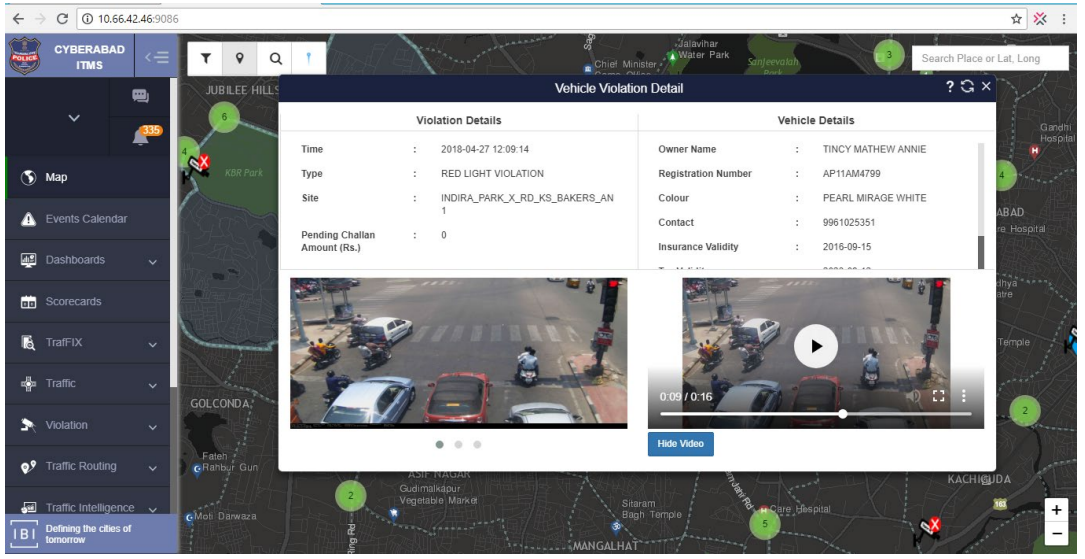
Module 4: Violation Management & Hotlist Tracking

Objective 2:
Achieve Reduce Fatalities

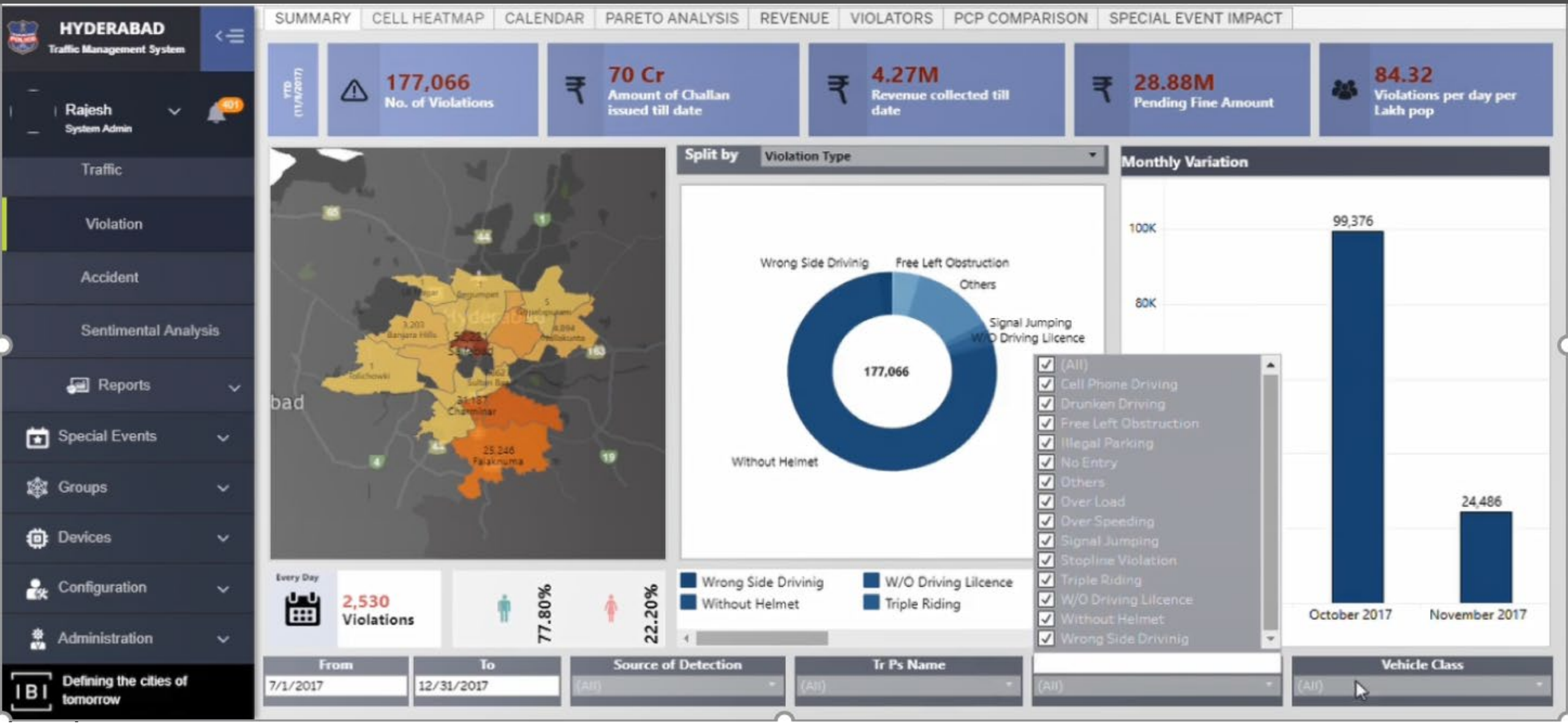
Objective 3:
Cop-less Junction

- Improved compliance to traffic rules and reduction in accidents
- Automatic detection of violation and enforcement
- Tracking of Hotlist Vehicles automatically using ANPR without intervention of cops on field
- Notifying cops to catch hotlist vehicles accurately

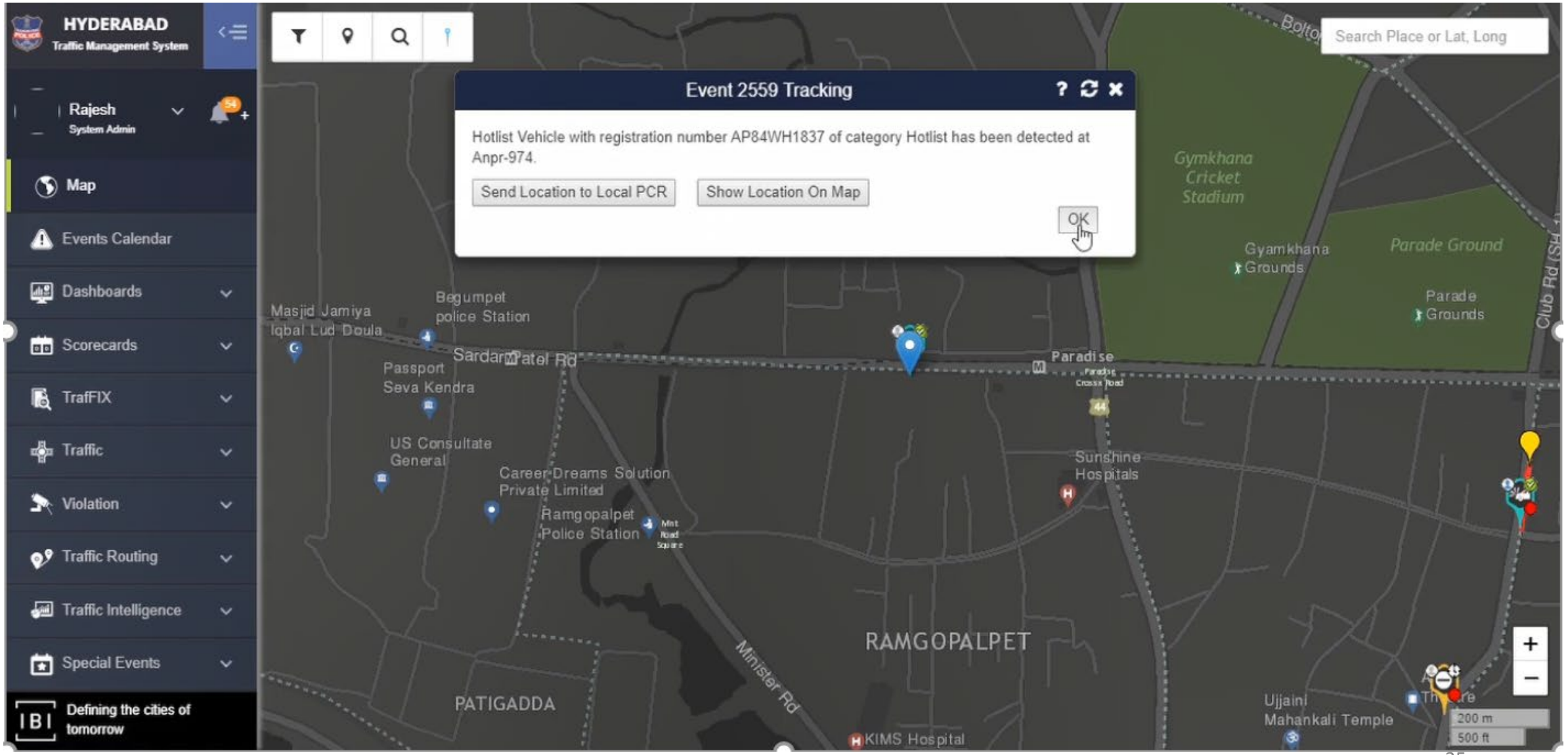




Module 4: Violation Management & Hotlist Tracking



Module 4: Violation Management & Hotlist Tracking



Module 5: Special Events Management

Objective 1:
Reliable & Best Travel Time

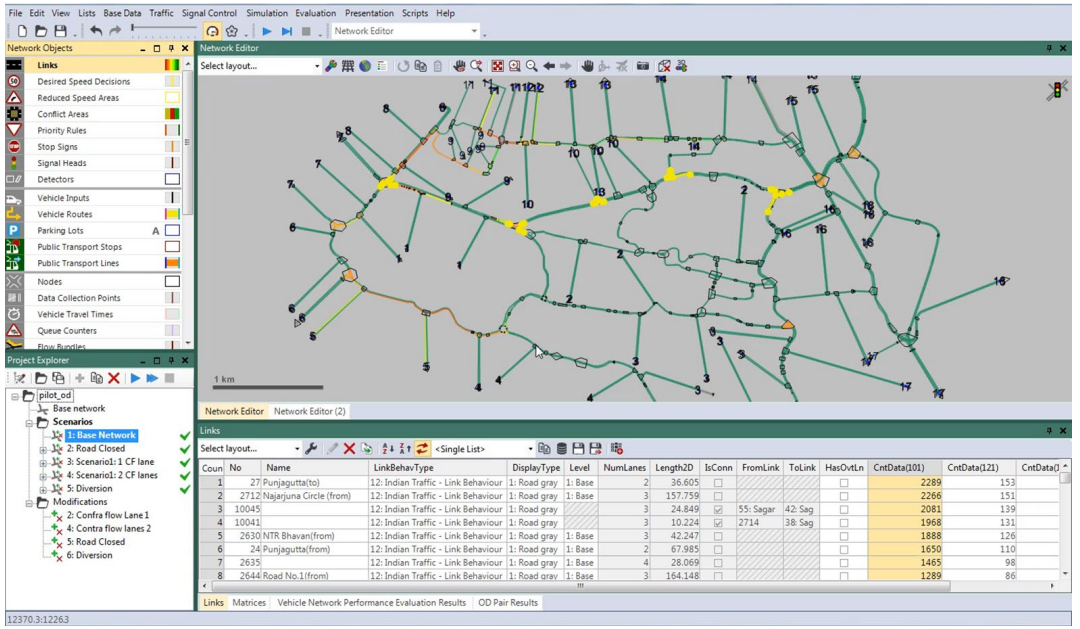
- Evaluation of alternative traffic management scenarios and choosing the best to minimize impact

Objective 3:
Cop-less Junction

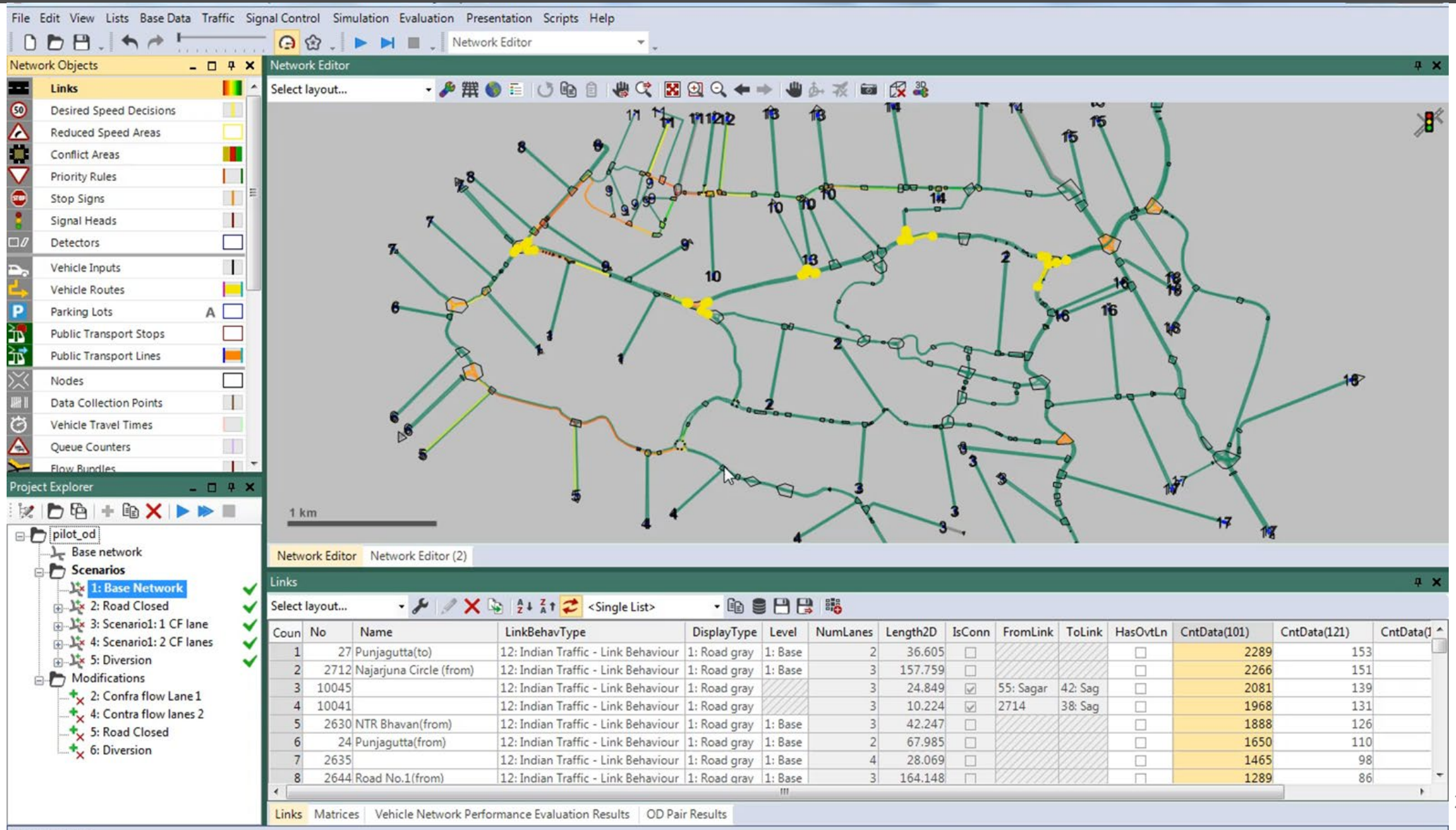
- Advanced guidance to impacting road users on alternative routes
- Automatic routing of road users through VMB/PAS without involvement of cops

Objective 4:
Road User Engagement

- Improved reliability and road user decision making



Module 5: Special Events Management



Module 6: Traffic Business Intelligence

Objective 1: Reliable & Best Travel Time

Objective 2: Achieve Reduce Fatalities

Objective 3: Cop-less Junction

Objective 5: Environment Friendly

- Monitoring of traffic eco system in terms of traffic performance, accident pattern, violation pattern and road user behavior
- Identification of problematic areas of road networks
- Key Insights from the data analytics
- Root cause assessment & Impact evaluation
- Tracking Target KPIs and acting upon them

Operational Dashboards

- Commissioner
- DCP
- SHO
- Manager
- Operator

Performance Score Cards

- Commissioner
- DCP
- SHO
- Manager

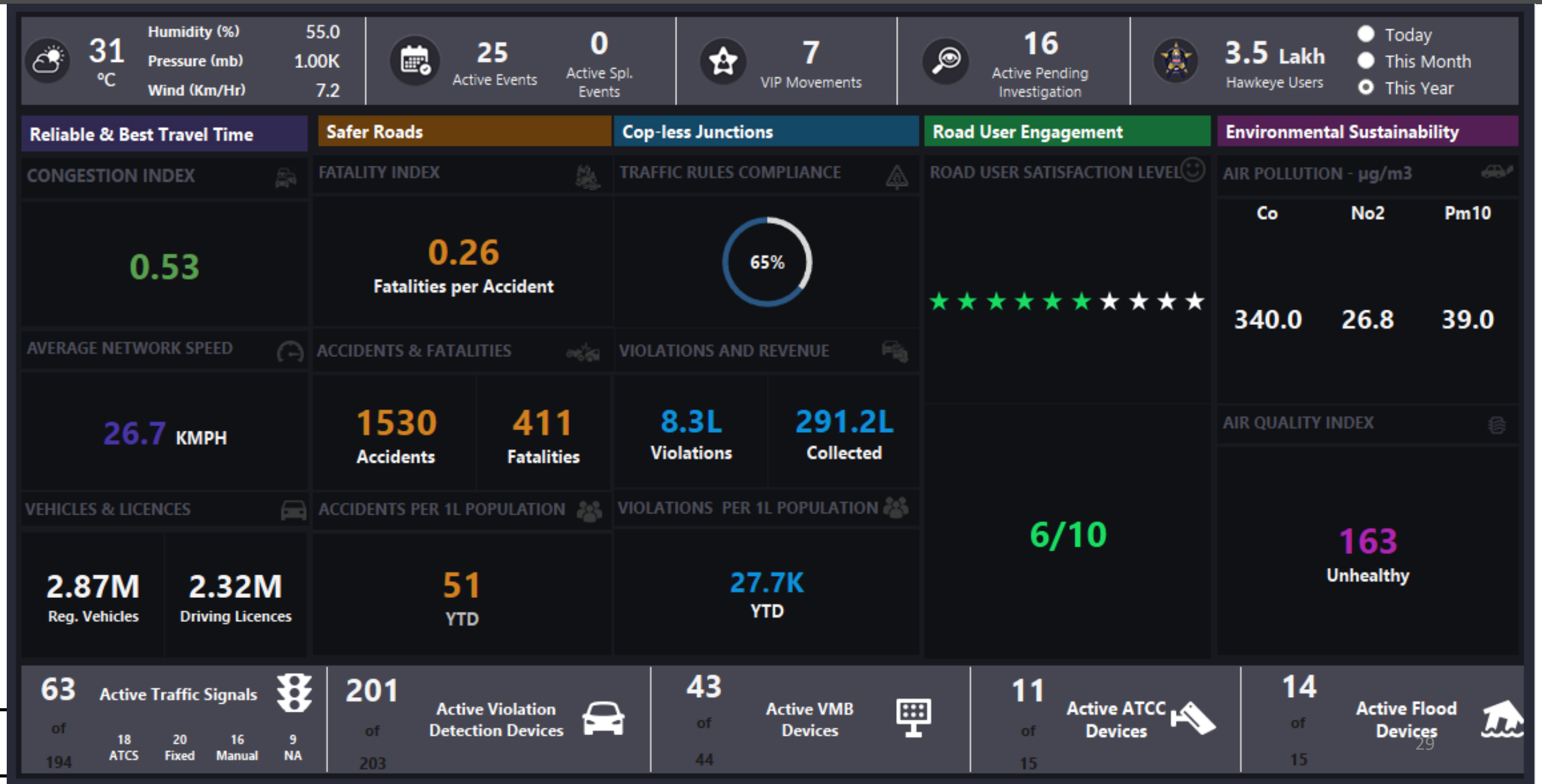
Reports (System & Functional)

- Operational
- Functional

Analytics

- **Accidents**
- Violations
- Traffic

Module 6: Traffic Business Intelligence



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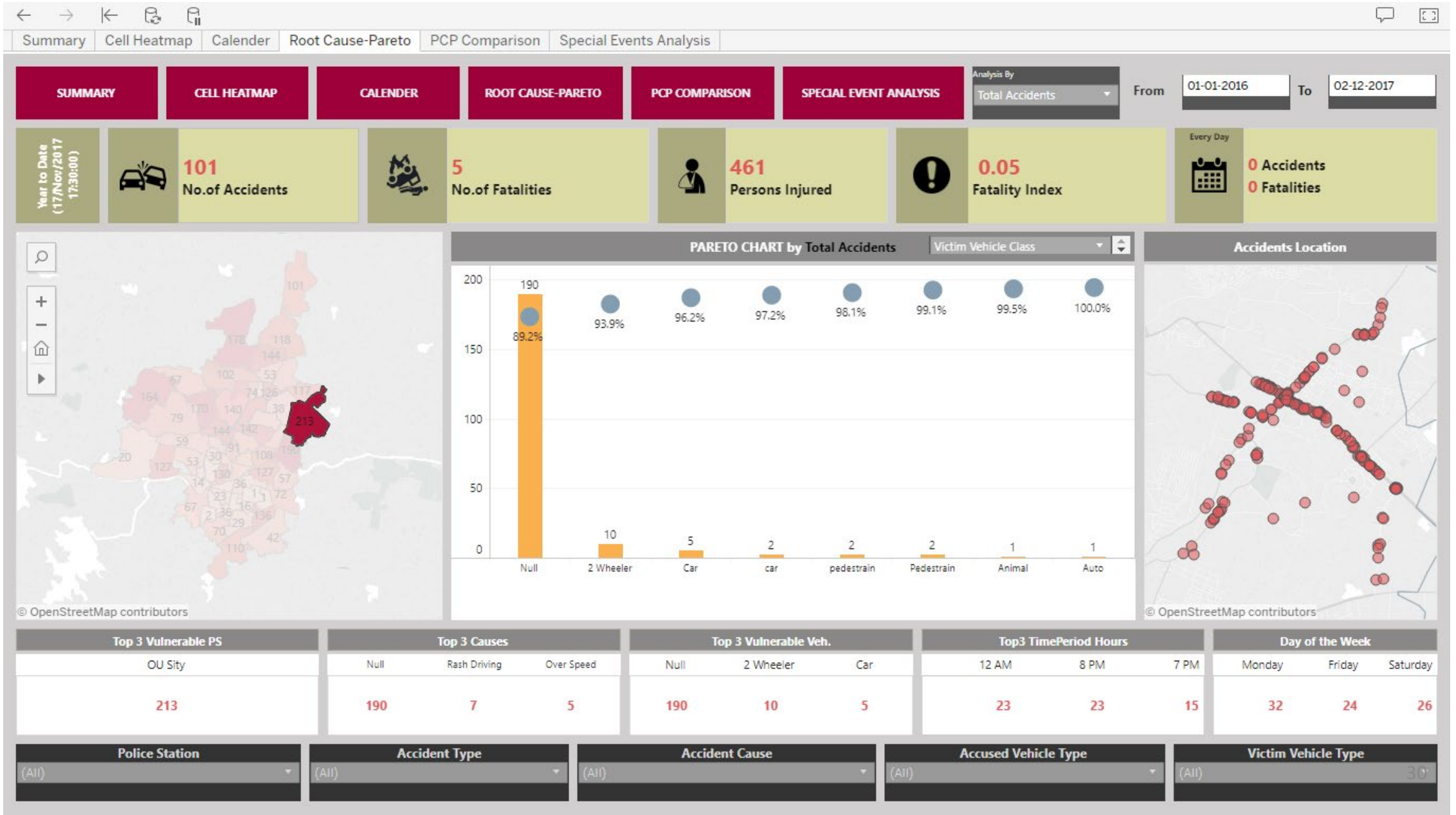

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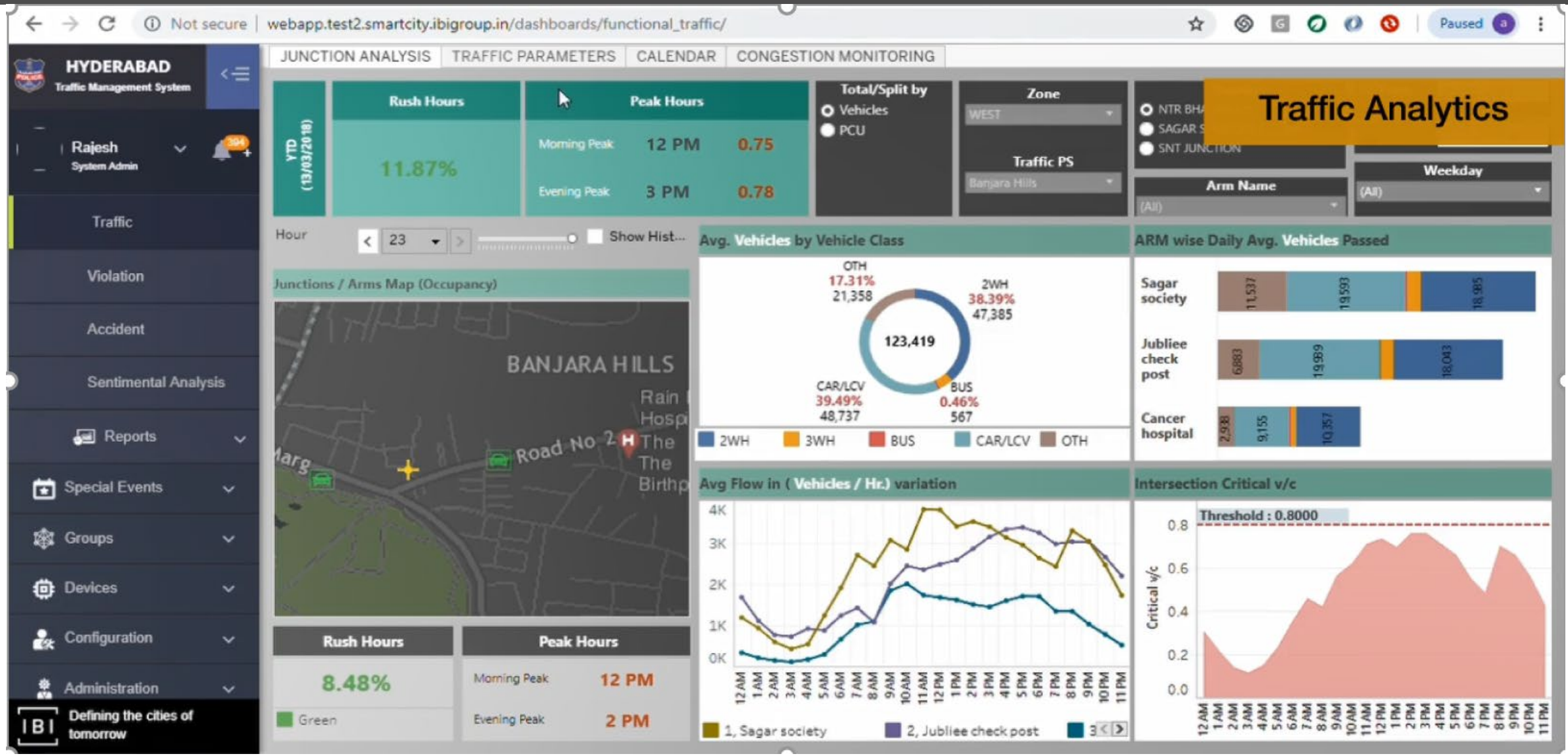


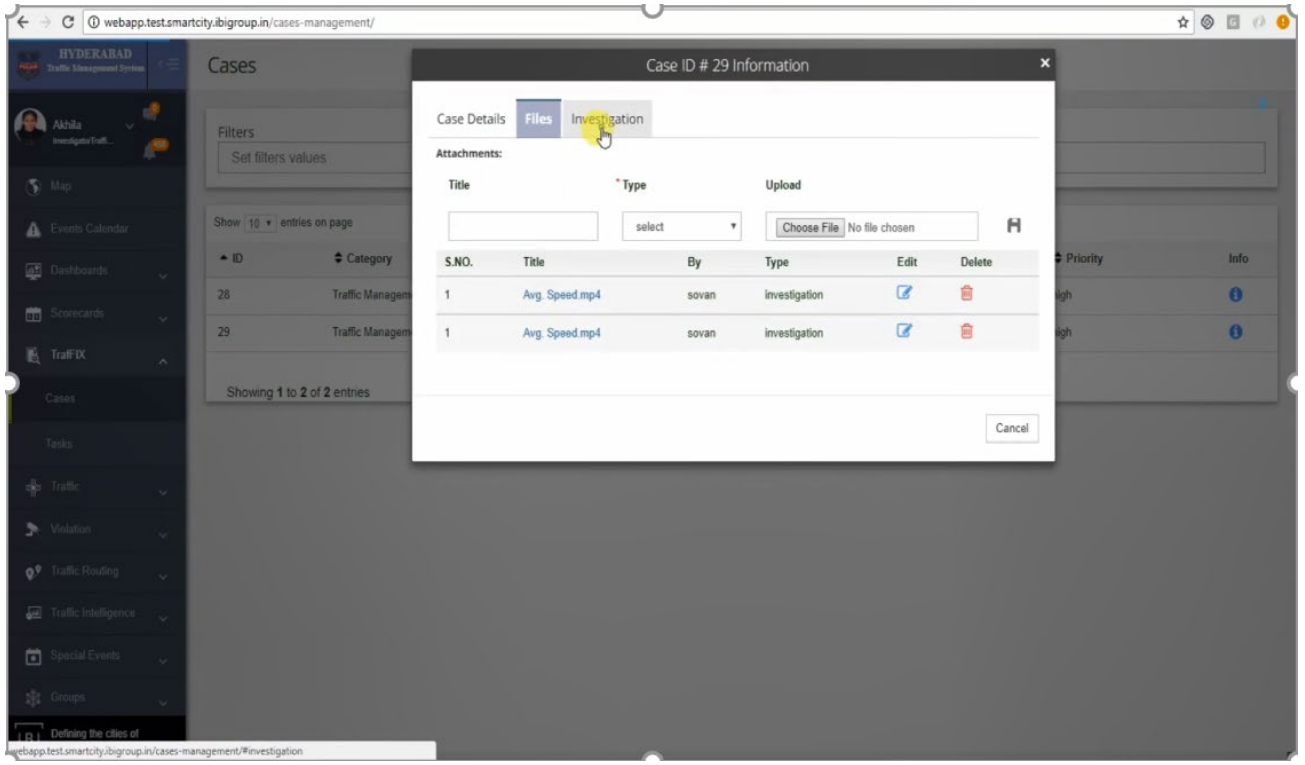
Module 7: Case Management (TrafFIX)

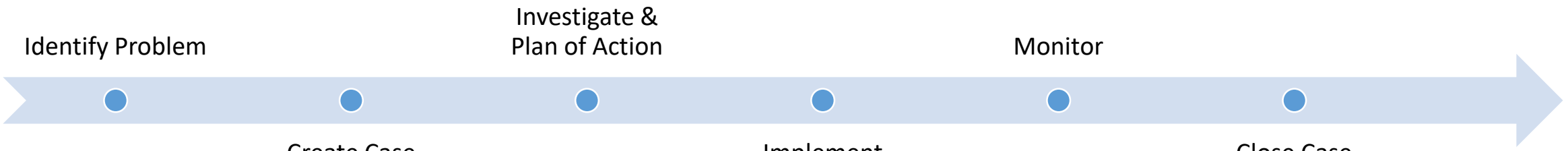
Objective 1:
Reliable & Best Travel Time

Objective 2:
Achieve Reduce Fatalities

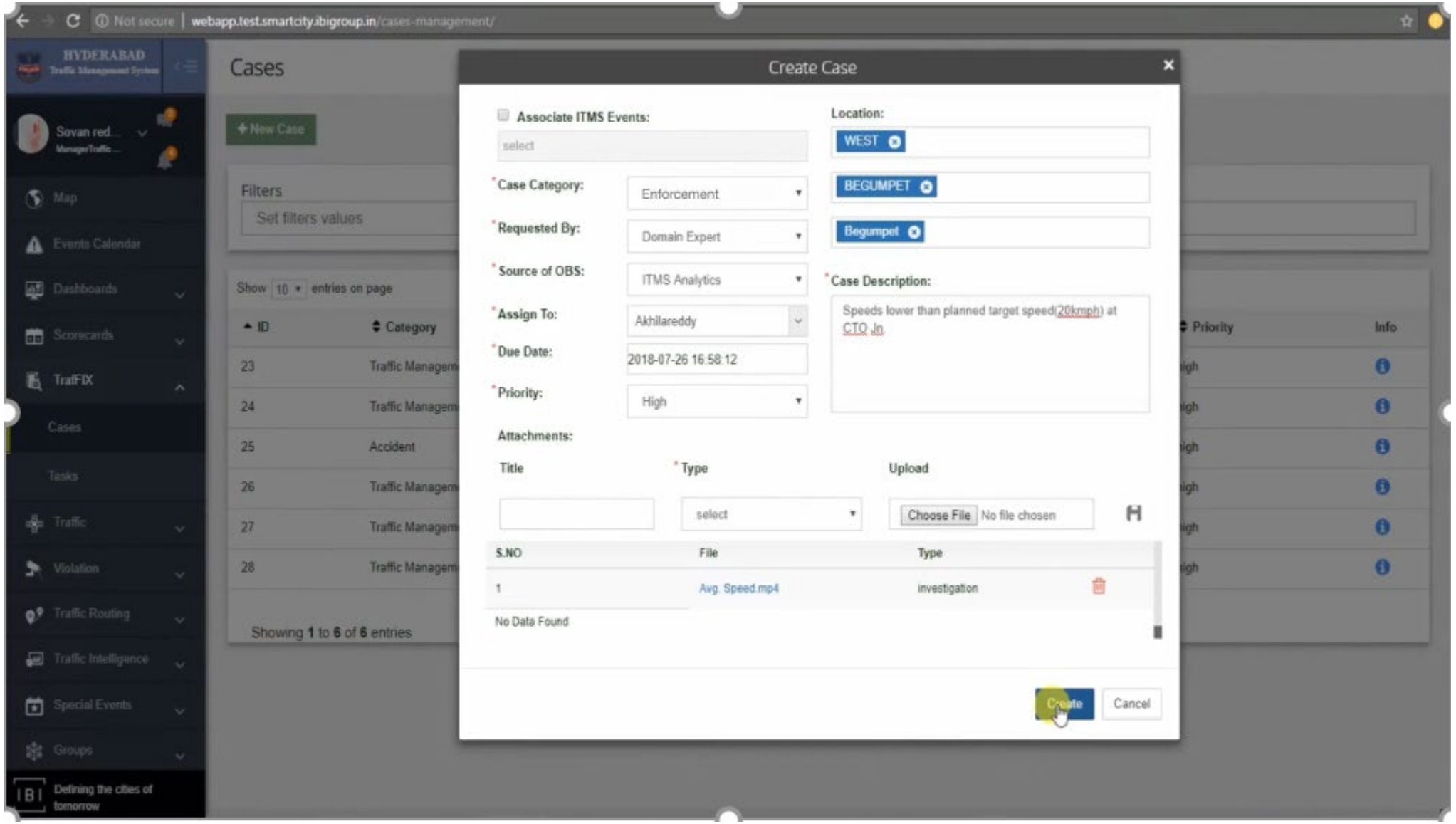
Objective 3:
Cop-less Junction

- Organized investigation and finding root cause for problems/Issues in the traffic eco system
- Derive actions based on root causes
- Monitoring the results of actions
- Fixing the problem with multi agency coordination





Module 7: Case Management (TrafFIX)



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