

Integrated Traffic Management System (ITMS)

System (ITMS)



1st July 2019

Table of Contents

Section	Slide Numbers
1. Goals & Objectives.....	8
2. Solution Brief on H-ITMS	14
A. Incident Management Module.....	21
B. Traffic Junction/Street Management Module.....	24
C. Traffic Routing Module.....	26
D. Violation Management Module.....	27
E. Special Events Management Module.....	28
F. Traffic Business Intelligence Module.....	30
G. Case Management Module.....	33

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

1

Goals & Objectives

Safe & Smart City Goals

Goal 1

To create safe and secure communities through planned and accountable policing

Goal 2

To provide reassurance on responsive police services to vulnerable sections of Women, Children, Weaker Sections, Minorities and other disadvantaged people

Goal 3

To effectively prevent and control Organized Crimes

Goal 4

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.

Goal 5

To Improve Road Safety, Handling Accidents, Disasters and Crisis Management

Goal 6

To create safe and secure communities through planned and accountable policing

ITMS Objectives

1. To ensure best and reliable travel times across the city roads

2. To achieve ZERO fatalities due to traffic on city roads

3. To achieve cop-less junctions in the city

4. To aid the road users with improved decision making

5. To ensure vehicular pollution levels within permissible limits

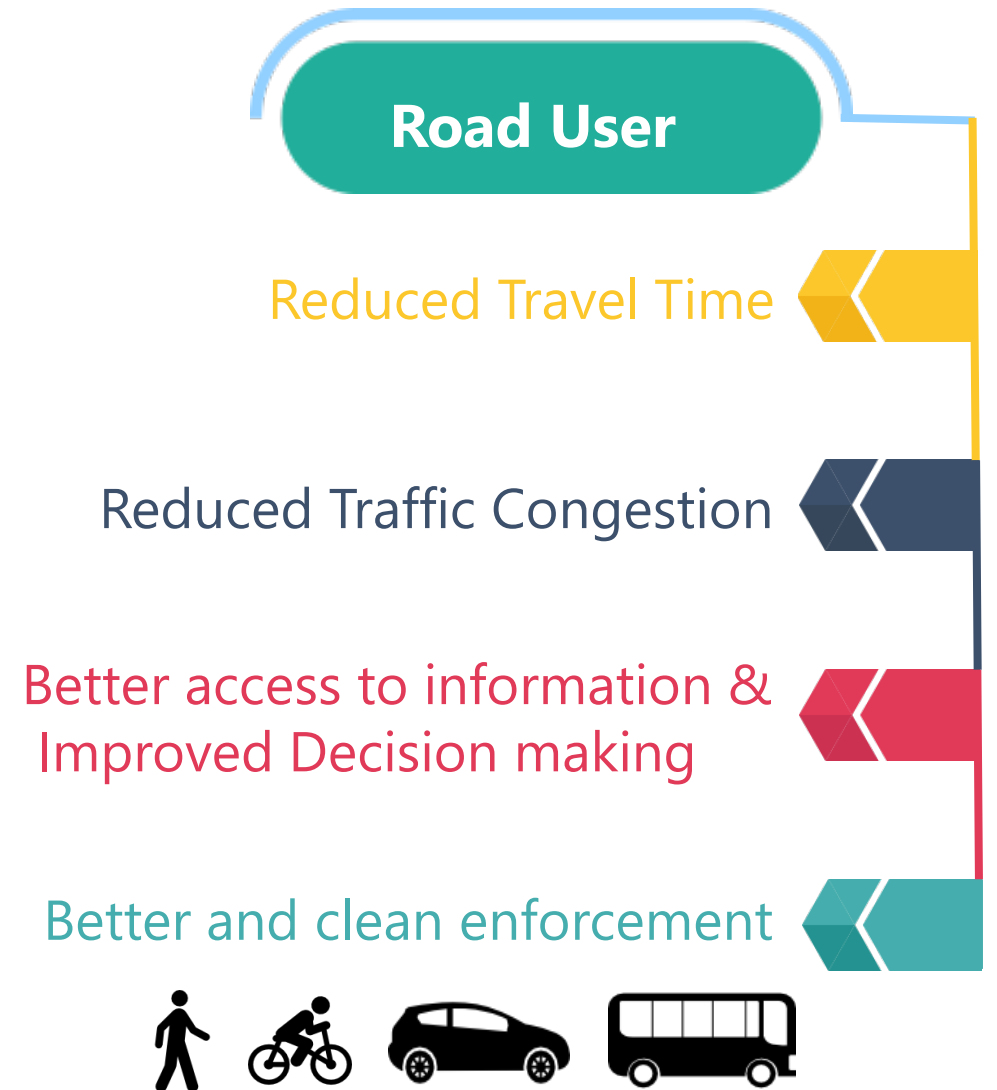
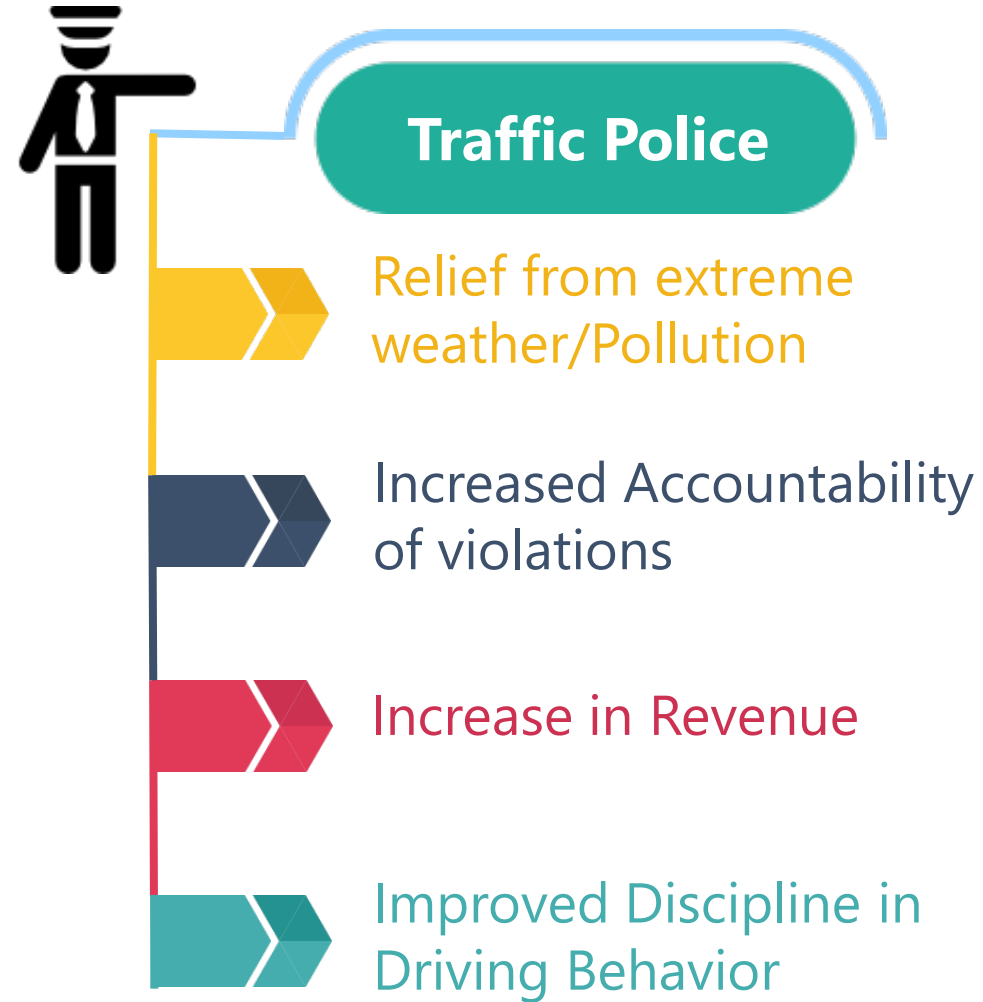
Prosecution

100% conviction of violators based on evidence

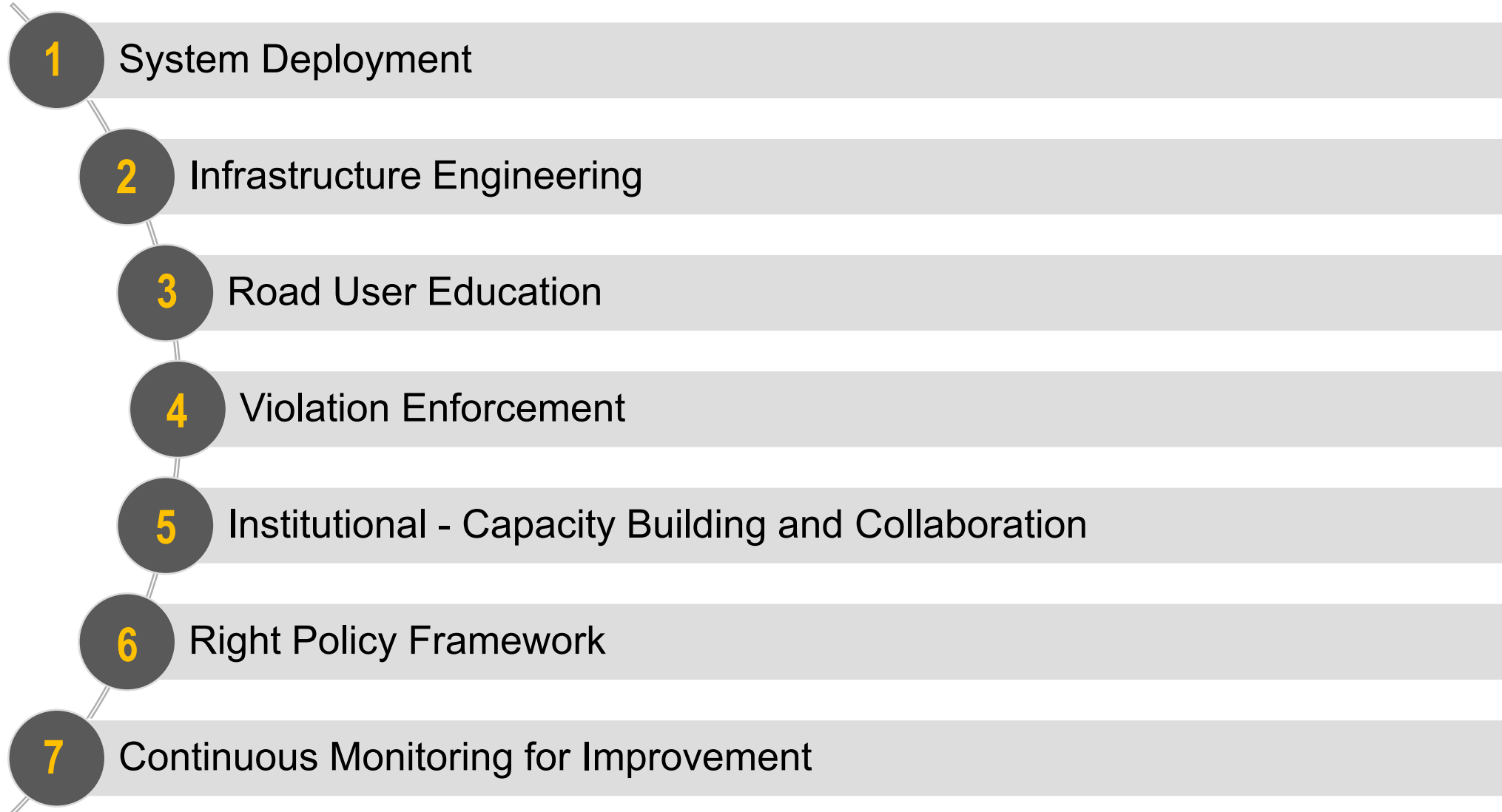
Prevention

Highest compliance to laws by road users

ITMS Benefits



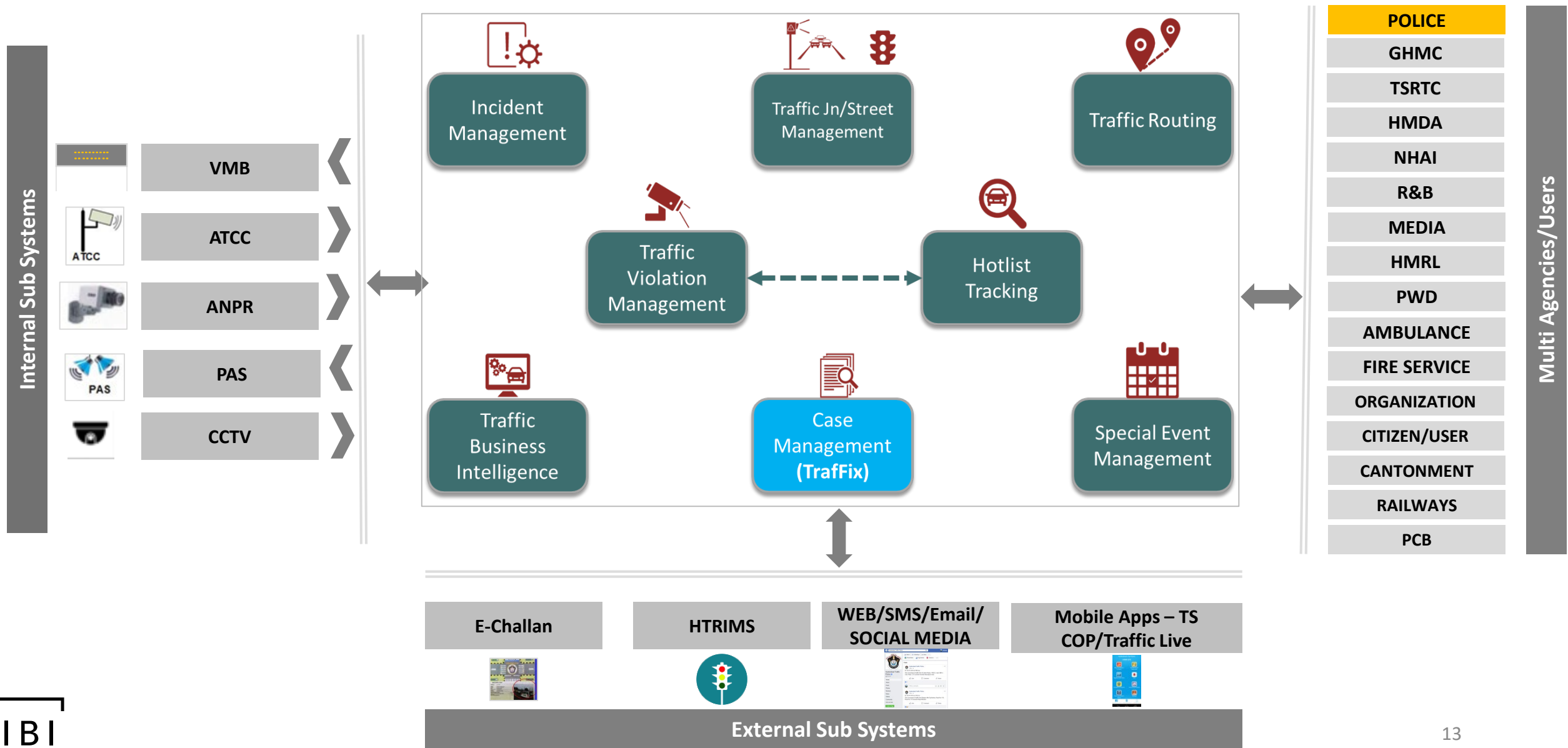
7 Steps for Realization of Goals



2

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

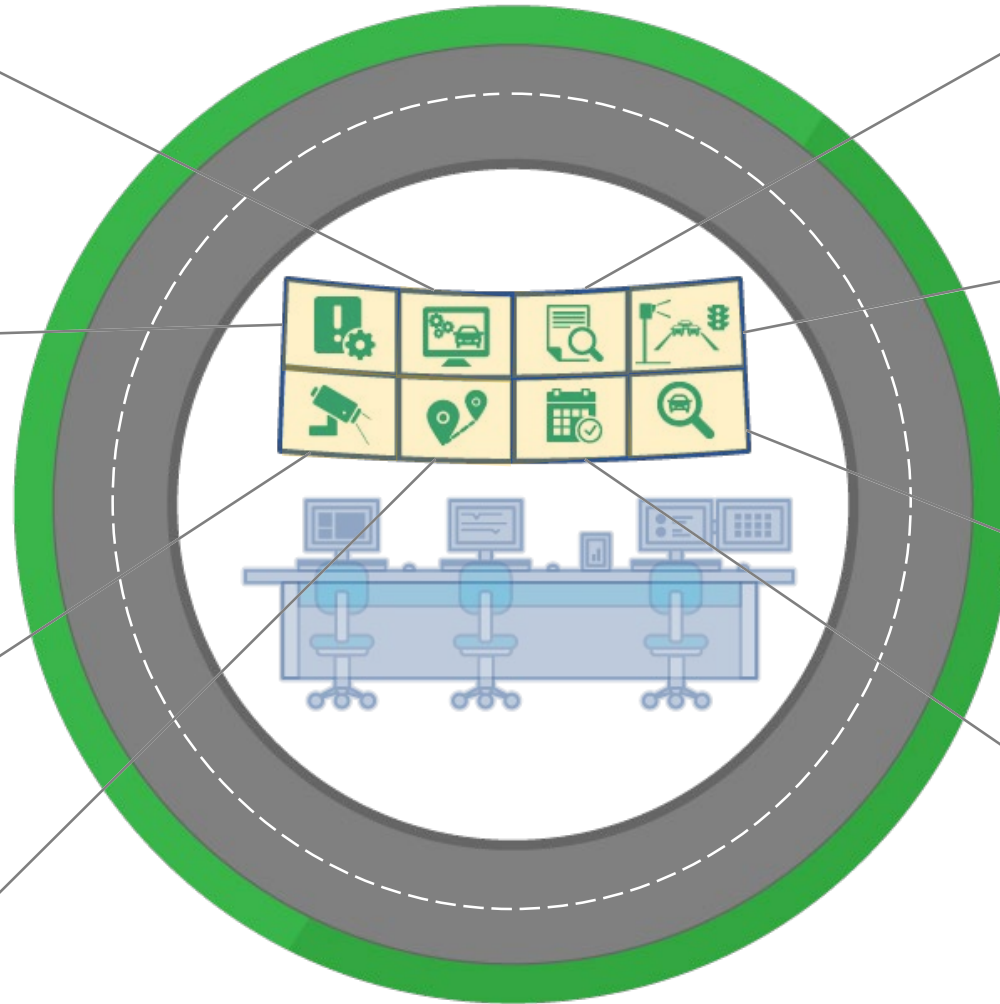
- Optimized Traffic Signal Timing using Real time traffic data from ATCC
- Automatic traffic control/alerts at junction without manual control

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



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 In/Street Management	✓		✓		✓
Traffic Routing	✓		✓	✓	
Violation Management /Hotlist Tracking		✓	✓		
Traffic Business Intelligence	✓	✓	✓		✓
Case Management (Traffix)	✓	✓	✓		
Special Event Management	✓		✓	✓	

Supporting both Proactive & Reactive Processes

Proactive



Reactive



Module 1: Incident Management

Objective 1:
Reliable & Best
Travel Time

- Quick Traffic Incident Clearance & enhancing smooth flow of traffic

Objective 2:
Achieve
Reduce Fatalities

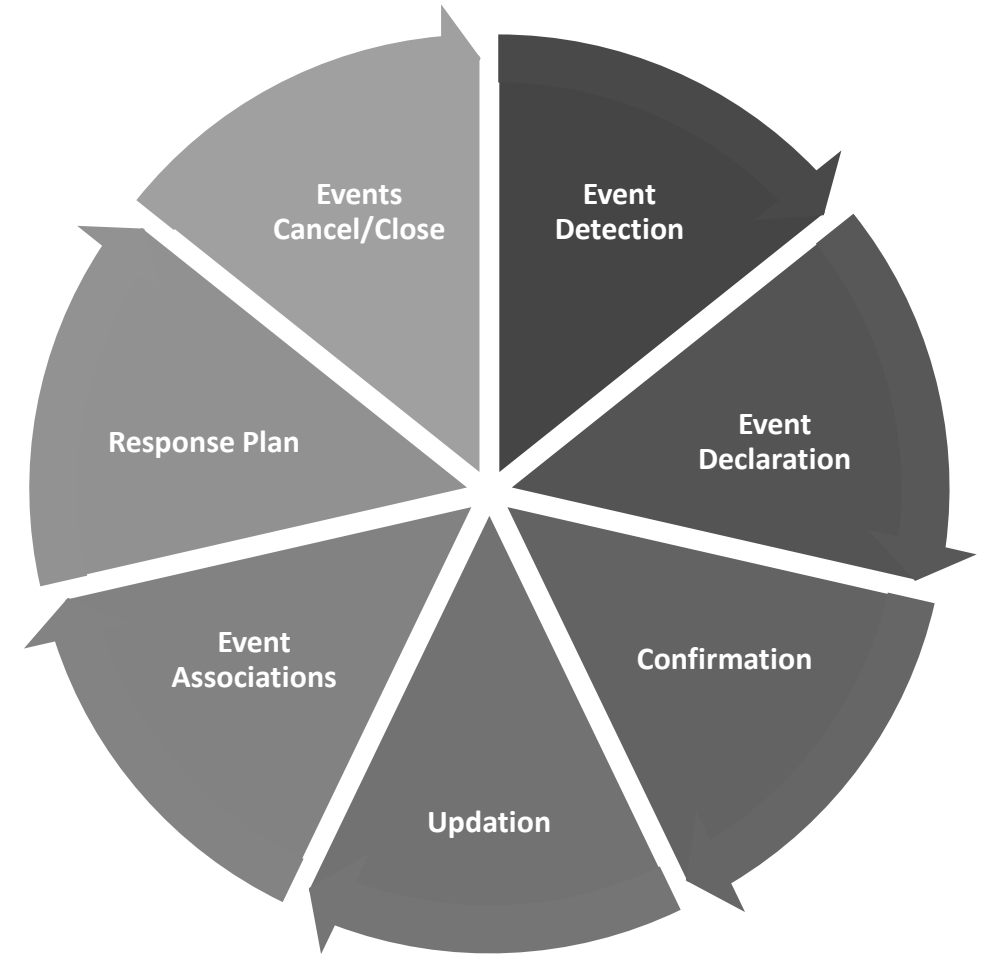
- Shorter Incident Response Times

Objective 3:
Cop-less
Junction

- Automatic Multi Agency Coordination

Objective 4:
Road User
Engagement

- Road User Info on Alternative Routes



Module 1: Incident Management



ITMS Control Centre

Operator

Operator

Supervisor

Module 1: Incident Management

The screenshot displays the Hyderabad Traffic Management System interface. On the left is a dark sidebar menu with the following items: 'HYDERABAD Traffic Management System', 'Sovan Supervisor' (with a notification badge for 230), 'Map', 'Events Calendar', 'Dashboards', 'Scorecards', 'TrafFIX', 'Traffic', 'Violation', 'Traffic Routing', and 'Traffic Intelligence'. At the bottom of the sidebar is the IBI logo and the slogan 'Defining the cities of tomorrow'. The main area is a map of Khairatabad, Hyderabad, featuring a search bar at the top right with the text 'Search Place or Lat, Long'. The map shows a network of roads with several incident markers, each represented by a colorful icon with a car and a person. A prominent blue circle highlights a specific incident on a road. Other labeled locations on the map include 'Asian Institute Of Nephrology And Urology', 'R.T.A Office', 'Zilla Parishad Office', 'Care Hospital', 'Virinchi Hospitals', 'Vijayam ary Hospital', 'GHMC Circle Office', '1104 Union Building TSSPDCL', 'Mint Compound Masjid', 'Secretariat', and 'NTR Gardens'. A scale bar at the bottom right indicates 200 meters and 500 feet.

Module 1: Incident Management

HYDERABAD
Traffic Management System

DCOperat...
Operator

Map

Events Calendar

Dashboards

Scorecards

TrafFIX

Traffic

Violation

Traffic Routing

Traffic Intelligence

Special Events

Groups

IBI Defining the cities of tomorrow

VMB PAS **Email** SMS Facebook Twitter Hydcop

Previously Sent

Time	Message
18-Jul-2018 20:17:37	Dear Sir/Madam,
18-Jul-2018 20:04:44	Dear Sir/Madam,

Suggested Response

To: HTRIMS-BEL <srinivas.ganji@ibigroup.com> FM Radio <srinivas.ganji@ibigroup.com>

☰ ☰ ☰ ☰ ☰ ☰

Dear Sir/Madam,
Road will be closed at 10.0 m Premchand and Brothers on Narayana Guda Flyover due to Temporary Maintenance from July 26, 2018, 10:45 p.m. for 120 minutes. 3 lane(s) blocked. Please co-ordinate accordingly.

Associated Event Details:

Event ID: 1226

Severity: Major

Impact: Use Alternate Route

Cause: Temporary Maintenance

p

Words: 73

Choose File No file chosen

Publish Cancel



Module 2: Traffic Junction/Street Management

Objective 1:
Reliable & Best
Travel Time

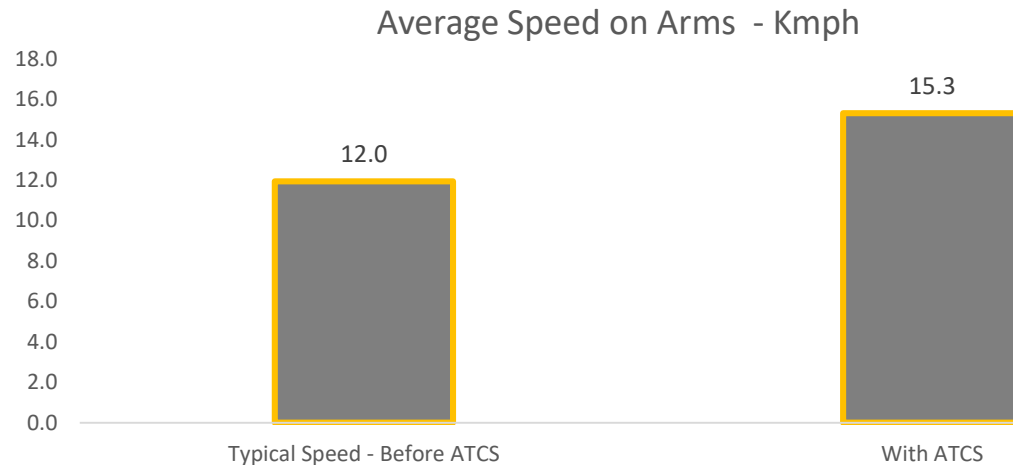
Objective 3:
Cop-less
Junction

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

Module 3: Traffic Routing

Objective 1:
Reliable & Best
Travel Time

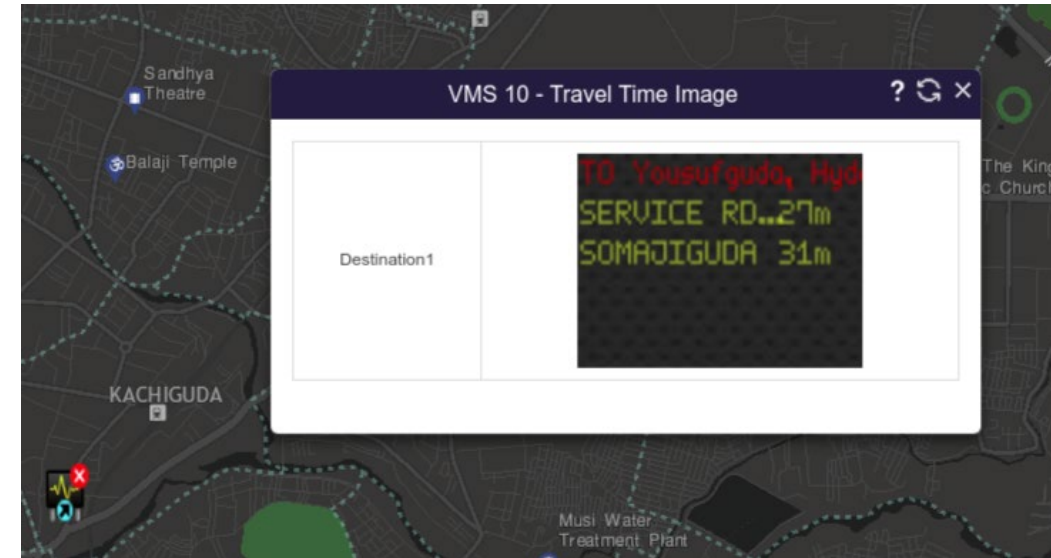
- Travel time guidance to road users on alternative Travel Time
- VIP/Emergency Vehicle Priority

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

The screenshot displays a web interface for viewing violation details. It features a 2x2 grid of LPR camera images showing a vehicle at a junction. To the right, a sidebar contains the following information:

- Violation Details:**
 - Time: 12:51:46 PM, Jul 05, 2018
 - Location: Nagarjuna circle GVK Mall, WRONG
 - Lane: Nagarjuna circle GVK Mall, WRONG
 - Violation ID: VI00102018070505270
 - GPS: N.A.
- Violation Type:**
 - Ins. Speed: N.A.
 - Speed Limit: N.A.
 - Wrong Way Violation: 01
- Options: Show Stop Line, Show Lane, Show Reference Image (LPR Camera)
- License Image:** TS-13EH-6482
- Registration Number:** TS13EH6482

Below the images is a table of violation records:

SNo	License Plate Image	Registration Num	Time Stamp	Cam	V.Type	Speed Value	Marked for Challenging	Select
5	AP 09CU 2031	AP09CU203	2018-07-05 12:56:50	Nagarjuna circle GVK Mall	WRONG	N.A.	No	
6	TS-13EH-6482	TS13EH6482	2018-07-05 12:51:46	Nagarjuna circle GVK Mall	WRONG	N.A.	No	
7	TS-13EH-6482	TS13EH6482	2018-07-05 10:53:28	Nagarjuna circle GVK Mall	WRONG	N.A.	No	
8	AP09AZ0962	AP09AZ0962	2018-07-05 10:48:57	Nagarjuna circle GVK Mall	WRONG	N.A.	No	
9	TS-02EB-02599	TS02EB459	2018-07-05 08:00:10	Nagarjuna circle GVK Mall	WRONG	N.A.	No	
10	AP09CA5587	AP09CA5587	2018-07-05 07:52:43	Nagarjuna circle GVK Mall	WRONG	N.A.	No	

The screenshot shows a mobile application interface for tracking violations. It features a map of Jubilee Hills in Hyderabad with a red marker indicating a violation location. A 'Vehicle Violation Detail' popup is displayed over the map, containing the following information:

Violation Details		Vehicle Details	
Time	: 2018-04-27 12:09:14	Owner Name	: TINCY MATHEW ANNIE
Type	: RED LIGHT VIOLATION	Registration Number	: AP11AM4799
Site	: INDIRA_PARK_X_RD_KS_BAKERS_AN 1	Colour	: PEARL MIRAGE WHITE
Pending Challan Amount (Rs.)	: 0	Contact	: 9961025351
		Insurance Validity	: 2016-09-15

Below the details is a video player showing a 0:09 / 0:16 clip of the violation. The application also includes a sidebar menu with options like Map, Events Calendar, Dashboards, Scorecards, TraFiX, Traffic, Violation, Traffic Routing, and Traffic Intelligence.



Module 4: Violation Management & Hotlist Tracking

HYDERABAD
Traffic Management System

Rajesh
System Admin

- Traffic
- Violation
- Accident
- Sentimental Analysis
- Reports
- Special Events
- Groups
- Devices
- Configuration
- Administration

IBI Defining the cities of tomorrow

SUMMARY
CELL HEATMAP
CALENDAR
PARETO ANALYSIS
REVENUE
VIOLATORS
PCP COMPARISON
SPECIAL EVENT IMPACT

YTD (11/1/2017)

177,066
No. of Violations

70 Cr
Amount of Challan issued till date

4.27M
Revenue collected till date

28.88M
Pending Fine Amount

84.32
Violations per day per Lakh pop

Split by Violation Type

177,066

Monthly Variation

Every Day

2,530
Violations

77.80%

22.20%

Wrong Side Driving

Without Helmet

W/O Driving Licence

Triple Riding

From
7/1/2017

To
12/31/2017

Source of Detection
(All)

Tr Ps Name
(All)

(All)

Vehicle Class
(All)

Module 4: Violation Management & Hotlist Tracking

The screenshot displays the Hyderabad Traffic Management System interface. On the left is a dark sidebar with the user profile 'Rajesh System Admin' and a list of navigation options: Map, Events Calendar, Dashboards, Scorecards, TraffIX, Traffic, Violation, Traffic Routing, Traffic Intelligence, and Special Events. The main area is a map of Ramgopalpet, Hyderabad, with a search bar at the top right. A modal window titled 'Event 2559 Tracking' is open, displaying the message: 'Hotlist Vehicle with registration number AP84WH1837 of category Hotlist has been detected at Anpr-974.' Below the message are two buttons: 'Send Location to Local PCR' and 'Show Location On Map'. An 'OK' button is being clicked by a mouse cursor. The map shows various landmarks like Masjid Jamiya Iqbal Lud Doula, Begumpet police Station, and Sunshine Hospitals.

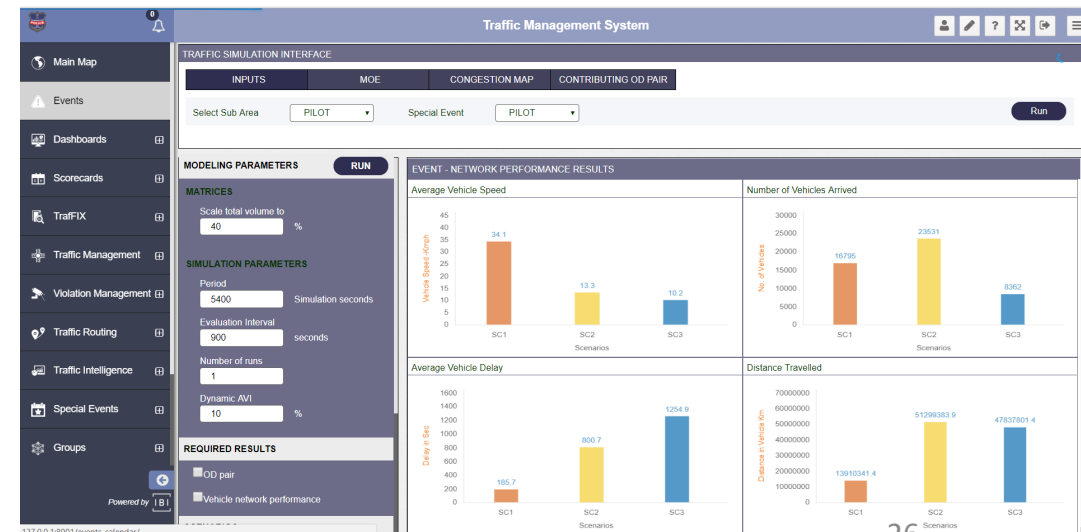
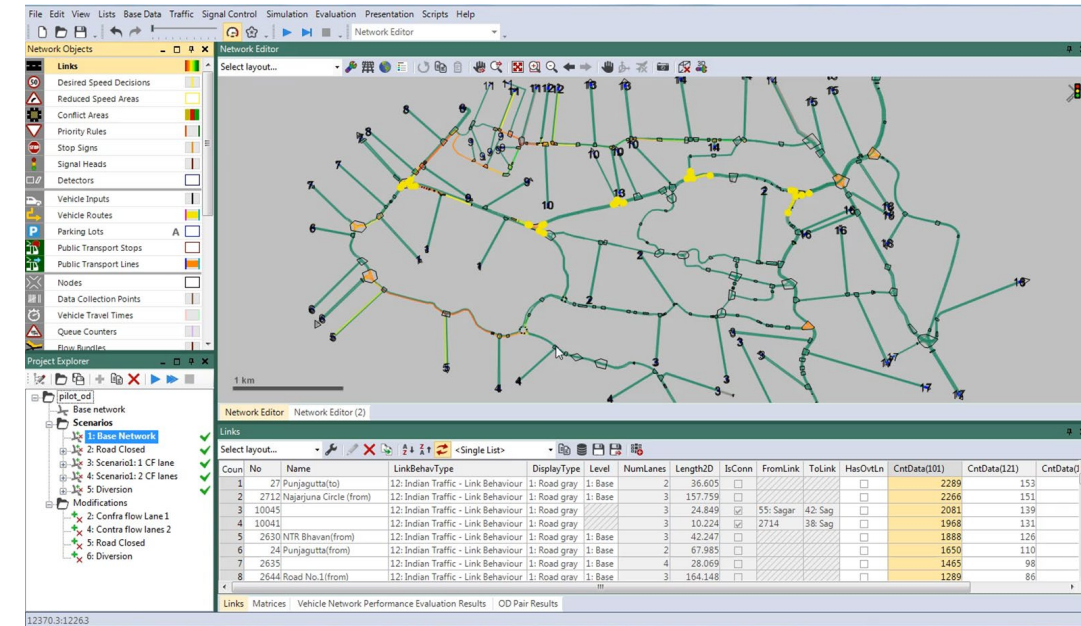
Module 5: Special Events Management

Objective 1:
Reliable & Best
Travel Time

Objective 3:
Cop-less
Junction

Objective 4:
Road User
Engagement

- Evaluation of alternative traffic management scenarios and choosing the best to minimize impact
- Advanced guidance to impacting road users on alternative routes
- Automatic routing of road users through VMB/PAS without involvement of cops
- Improved reliability and road user decision making



Module 5: Special Events Management

File Edit View Lists Base Data Traffic Signal Control Simulation Evaluation Presentation Scripts Help

Network Objects

- Links
 - Desired Speed Decisions
 - Reduced Speed Areas
 - Conflict Areas
 - Priority Rules
 - Stop Signs
 - Signal Heads
 - Detectors
- Vehicle Inputs
- Vehicle Routes
- Parking Lots
- Public Transport Stops
- Public Transport Lines
- Nodes
- Data Collection Points
- Vehicle Travel Times
- Queue Counters
- Flow Bundles

Project Explorer

- pilot_od
 - Base network
 - Scenarios
 - 1: Base Network
 - 2: Road Closed
 - 3: Scenario1: 1 CF lane
 - 4: Scenario1: 2 CF lanes
 - 5: Diversion
 - Modifications
 - 2: Contra flow Lane 1
 - 4: Contra flow lanes 2
 - 5: Road Closed
 - 6: Diversion

Network Editor

Select layout...

Network Editor Network Editor (2)

Links

Select layout... <Single List>

Coun	No	Name	LinkBehavType	DisplayType	Level	NumLanes	Length2D	IsConn	FromLink	ToLink	HasOvtLn	CntData(101)	CntData(121)	CntData(131)
1	27	Punjabgutta(to)	12: Indian Traffic - Link Behaviour	1: Road gray	1: Base	2	36.605	<input type="checkbox"/>			<input type="checkbox"/>	2289	153	
2	2712	Najarjuna Circle (from)	12: Indian Traffic - Link Behaviour	1: Road gray	1: Base	3	157.759	<input type="checkbox"/>			<input type="checkbox"/>	2266	151	
3	10045		12: Indian Traffic - Link Behaviour	1: Road gray		3	24.849	<input checked="" type="checkbox"/>	55: Sagar	42: Sag	<input type="checkbox"/>	2081	139	
4	10041		12: Indian Traffic - Link Behaviour	1: Road gray		3	10.224	<input checked="" type="checkbox"/>	2714	38: Sag	<input type="checkbox"/>	1968	131	
5	2630	NTR Bhavan(from)	12: Indian Traffic - Link Behaviour	1: Road gray	1: Base	3	42.247	<input type="checkbox"/>			<input type="checkbox"/>	1888	126	
6	24	Punjabgutta(from)	12: Indian Traffic - Link Behaviour	1: Road gray	1: Base	2	67.985	<input type="checkbox"/>			<input type="checkbox"/>	1650	110	
7	2635		12: Indian Traffic - Link Behaviour	1: Road gray	1: Base	4	28.069	<input type="checkbox"/>			<input type="checkbox"/>	1465	98	
8	2644	Road No.1(from)	12: Indian Traffic - Link Behaviour	1: Road gray	1: Base	3	164.148	<input type="checkbox"/>			<input type="checkbox"/>	1289	86	

Links Matrices Vehicle Network Performance Evaluation Results OD Pair Results



Module 6: Traffic Business Intelligence

Objective 1:
Reliable & Best
Travel Time

- Monitoring of traffic eco system in terms of traffic performance, accident pattern, violation pattern and road user behavior

Objective 2:
Achieve
Reduce Fatalities

- Identification of problematic areas of road networks

Objective 3:
Cop-less
Junction

- Key Insights from the data analytics
- Root cause assessment & Impact evaluation
- Tracking Target KPIs and acting upon them

Objective 5:
Environment
Friendly

- Commissioner
- DCP
- SHO
- Manager
- Operator

**Operational
Dashboards**



- Commissioner
- DCP
- SHO
- Manager

**Performance
Score Cards**



- Operational
- Functional

**Reports
(System &
Functional)**



- **Accidents**
- Violations
- Traffic

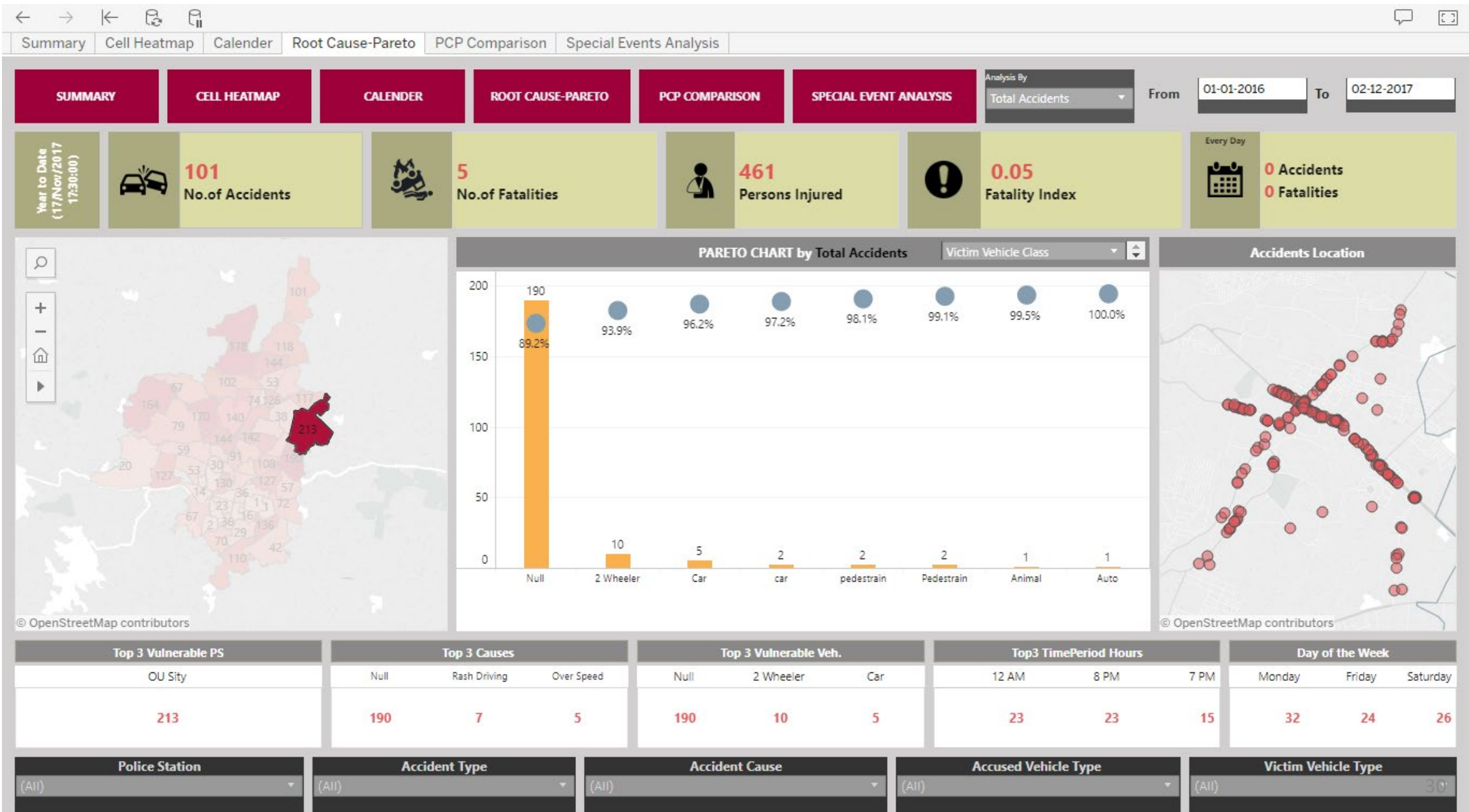
Analytics



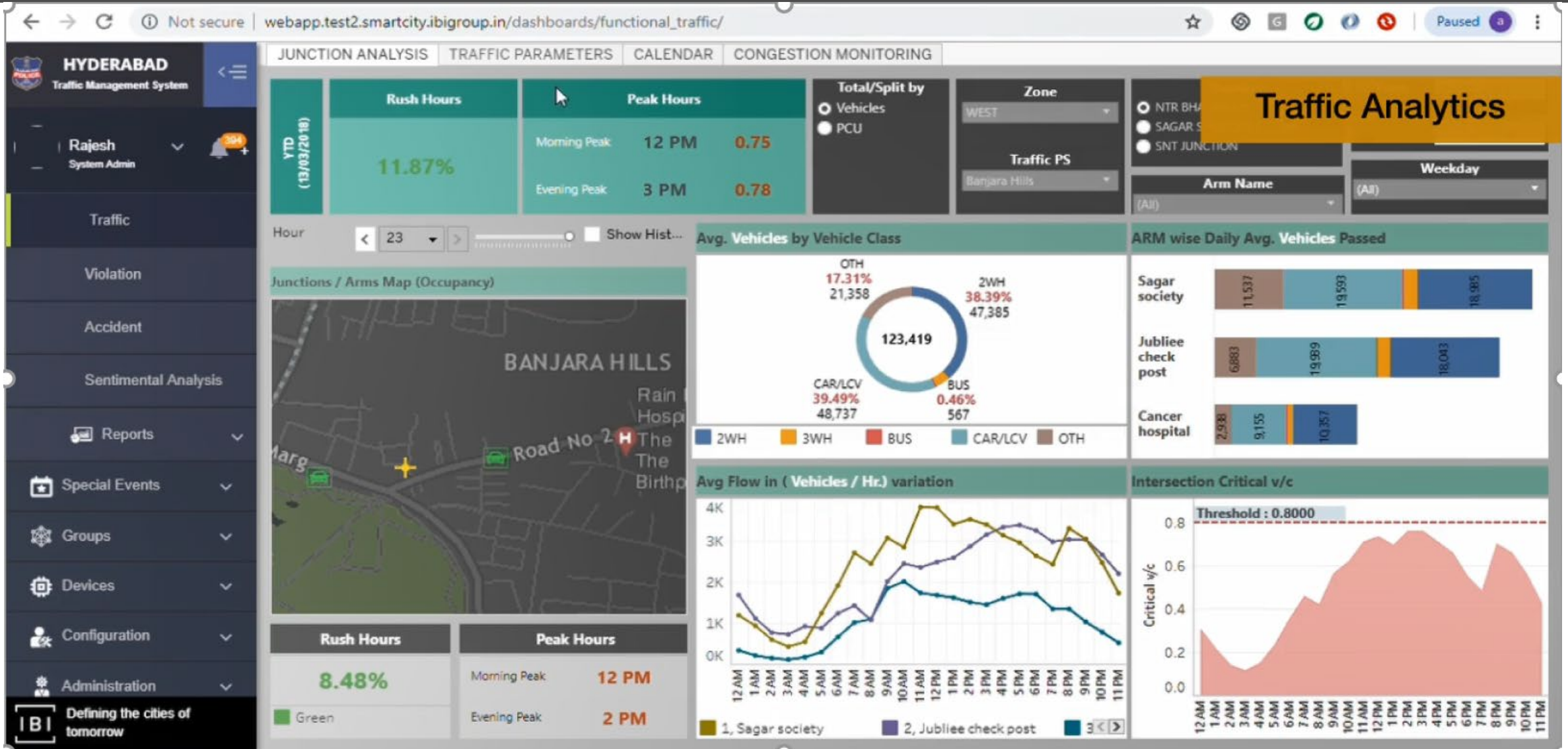
Module 6: Traffic Business Intelligence

31 °C Humidity (%) 55.0 Pressure (mb) 1.00K Wind (Km/Hr) 7.2		25 Active Events		0 Active Spl. Events		7 VIP Movements		16 Active Pending Investigation		3.5 Lakh Hawkeye Users		● Today ● This Month ○ This Year
Reliable & Best Travel Time		Safer Roads		Cop-less Junctions		Road User Engagement		Environmental Sustainability				
CONGESTION INDEX		FATALITY INDEX		TRAFFIC RULES COMPLIANCE		ROAD USER SATISFACTION LEVEL		AIR POLLUTION - µg/m ³				
0.53		0.26 Fatalities per Accident						Co No2 Pm10				
AVERAGE NETWORK SPEED		ACCIDENTS & FATALITIES		VIOLATIONS AND REVENUE				340.0 26.8 39.0				
26.7 KMPH		1530 Accidents		411 Fatalities		8.3L Violations		291.2L Collected		AIR QUALITY INDEX		
VEHICLES & LICENCES		ACCIDENTS PER 1L POPULATION		VIOLATIONS PER 1L POPULATION				6/10		163 Unhealthy		
2.87M Reg. Vehicles		2.32M Driving Licences		51 YTD		27.7K YTD						
63 Active Traffic Signals		201 Active Violation Detection Devices		43 Active VMB Devices		11 Active ATCC Devices		14 Active Flood Devices				
of 194 18 ATCS 20 Fixed 16 Manual 9 NA		of 203		of 44		of 15		of 15				

Module 6: Traffic Business Intelligence



Module 6: Traffic Business Intelligence



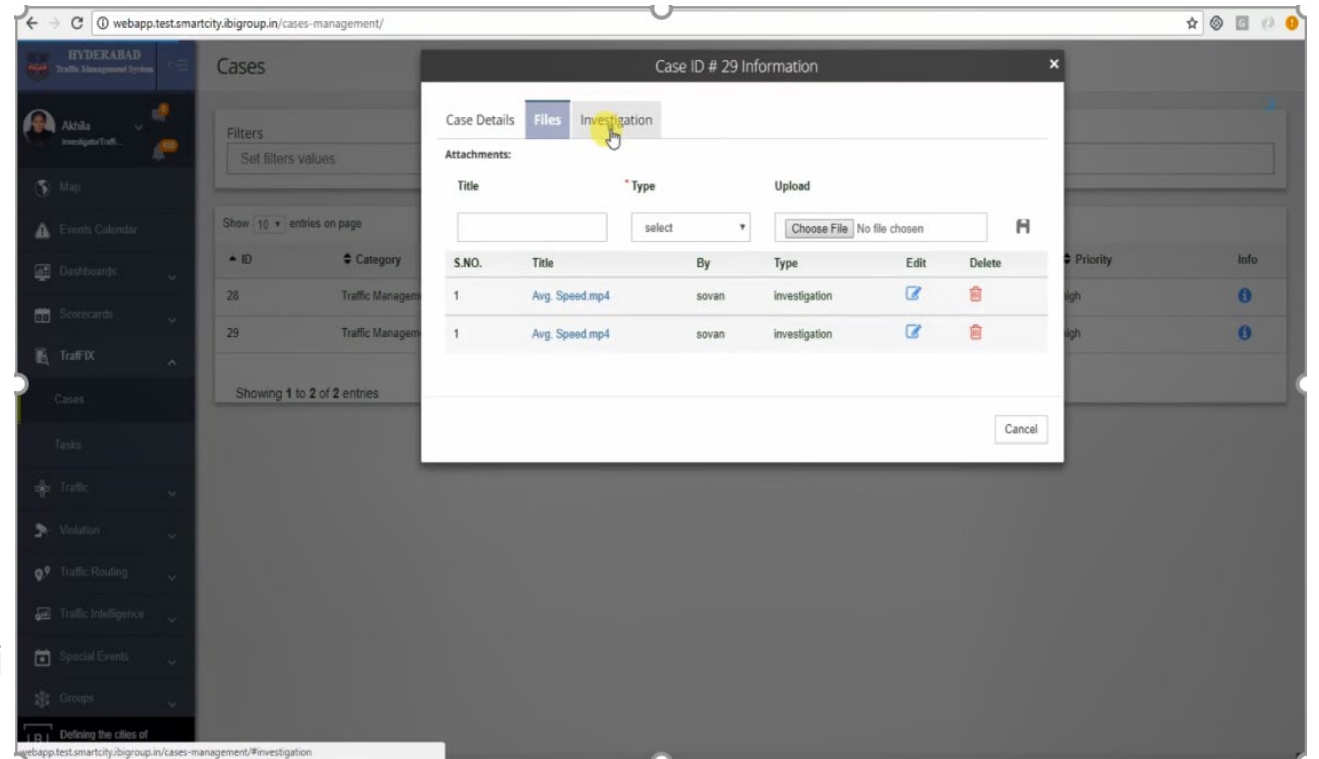
Module 7: Case Management (TrafFIX)

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



Identify Problem

Investigate &
Plan of Action

Monitor

Create Case

Implement
Action Plan

Close Case

Module 7: Case Management (TrafFIX)

The screenshot displays the 'Cases' management interface in a web browser. A 'Create Case' modal is open, allowing for the creation of a new case. The background shows a sidebar with navigation options like 'Map', 'Events Calendar', 'Dashboards', 'Scorescards', 'TrafFIX', 'Tasks', 'Traffic', 'Violation', 'Traffic Routing', 'Traffic Intelligence', 'Special Events', and 'Groups'. The main content area shows a list of cases with columns for ID and Category.

Create Case Modal Fields:

- Associate ITMS Events:** select
- Location:** WEST, BEGUMPET, Begumpet
- Case Category:** Enforcement
- Requested By:** Domain Expert
- Source of OBS:** ITMS Analytics
- Assign To:** Akhilareddy
- Due Date:** 2018-07-26 16:58:12
- Priority:** High
- Case Description:** Speeds lower than planned target speed(20kmph) at [CTQ Jn](#)
- Attachments:**

Title	Type	Upload
	select	Choose File No file chosen
S.NO	File	Type
1	Avg. Speed.mp4	investigation

No Data Found

Buttons: Create, Cancel



Disclaimer: This presentation is intended for to the client & do not replace the independent professional judgment. Statements of facts and opinions expressed are those of the participants individually and, unless expressly stated to the contrary, are not the opinion or position of the IBI Group, its partners. IBI Group does not endorse or approve, and assumes no responsibility for, the content, accuracy or completeness of the information presented.

