Reducing Traffic Congestion and Accidents with Active Traffic Management in Japan

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1. Overview of NEXCO-Central

NEXCO-Central

A major P3 player in Japan with over 60-year experience at every stage of expressway construction, maintenance, inspection & repair and rest area Management

- Around **10,000** employees*
- **1,286 miles** in Operation*
- **1.87 million vehicles** per day**
- **US$ 5.28 billion** of toll revenues**
- **US$ 1.52 billion** net sales from **180 rest areas****
- Headquarters: **Nagoya, Japan**

*Data as of April, 2016
**Data as of March, 2014

NEXCO-Central

- **We have Operation and Management (O&M) solutions for keeping expressways in a good condition.**

Toll Collection

- ETC Services (almost 100% accuracy)
- Remote Toll Facility Monitoring

ETC lane

Remote Monitoring

Traffic Control

- Traffic Control Center
- Traffic Squads

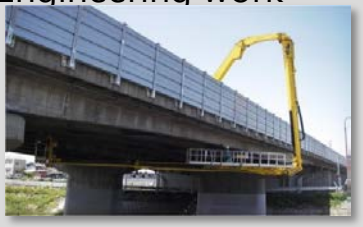
Traffic Control Center

Checking overloaded truck

Traffic Squads

Engineering

- Inspection & Diagnosis
- Engineering work



Bridge inspection

Pavement inspection

Maintenance

- Repair
- Cleaning
- Landscaping

Pavement maintenance

Lane Closure for maintenance works

2. Our ATM Activities

Definition - NEXCO-Central's ATM -

- Our Active Traffic Management (ATM) includes Conventional and Active Traffic Control with On-Site Information Capabilities

NEXCO-Central' ATM

✓ **Active Traffic Control with On-Site Information Capabilities**

Conventional ATM

- ✓ Dynamic Speed Limits
- ✓ Dynamic Lane Use Control
- ✓ Dynamic Shoulder Lanes
- ✓ Dynamic Lane Reversal or Contraflow Lane Reversal
- ✓ Adaptive Ramp Metering and Others

Dissemination - Traffic Control Signs -

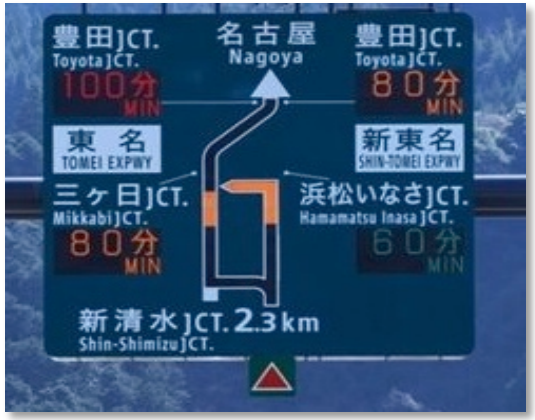
Notification to “Every” Drivers

- User-friendliness for elderly people
- Select the most appropriate route
- Alternative routing information based on quickest time to destination
- Balance traffic volume

Travel Time Sign

Graphic Travel Time Sign

Map-based Graphic Travel Time Sign



Variable Message Sign at IC Entrance

Variable Message Sign for wide-area Information

Mobile VMS

Dissemination - Traffic Control Signs -

Notification to "Every" Drivers at "Suitable" Location

Items	Locations	Objectives
✓ Variable Message Sign (VMS) ✓ Travel Time Sign	Before exit at ALL Interchanges (ICs)	To determine whether to use expressway To pay careful attention to incidents on the way
✓ VMS	Middle between ICs (AADT 50,000+)	Ditto
✓ VMS	Before entrance at ALL ICs	Ditto
✓ VMS	At ALL toll gates	Ditto
✓ VMS ✓ Map-based Graphic Travel Time Sign	Before ALL Junctions *Map-based VMS is used before the JCT with suitable alternate route	To determine which expressway to go To pay careful attention to incidents on the way
✓ VMS for Wide-area Info	Before exit at the ICs with good alternate route	To determine whether to use expressway
✓ Mobile VMS	Before congestion area	To pay careful attention to congestion (Secondary accident prevention)

Dissemination - Traffic Control Media -

Notification to “Every” Drivers at “Suitable” Location

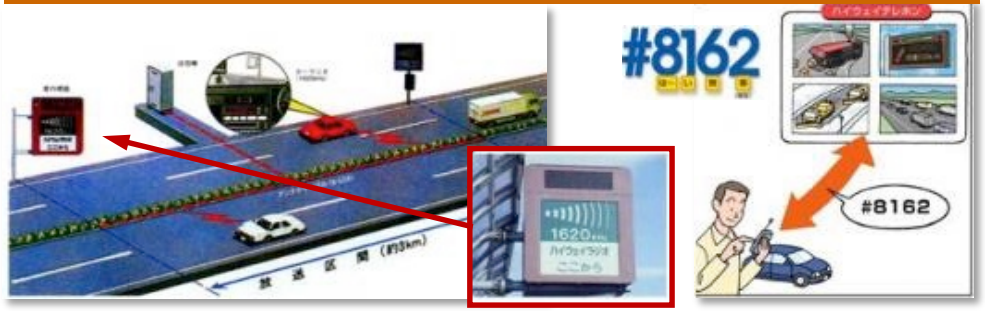
VICS (Vehicle Information and Communication System)

Radio Wave Beacon

Graphic Information

Map w/ road info.

Advisory Radio / Expressway Telephone



Traffic Information Mobile Website

“i Highway” – Mobile Site

Information Kiosk

Full Information Display

Simple Display

Japan Road Traffic Information Center

Administrators of Major Highways

- Traffic Incidents: congestion, accident, traffic restriction, road closures
- Real-time Data Transmission

Japan Road Traffic Information Center

- Every 5 minutes

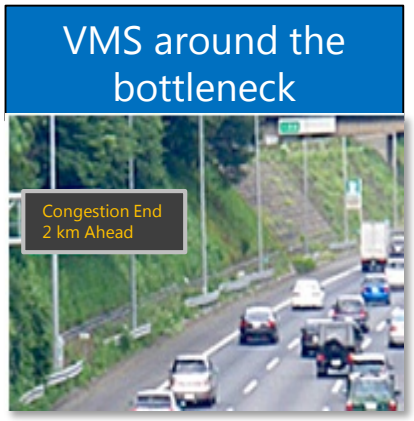
Information Provision

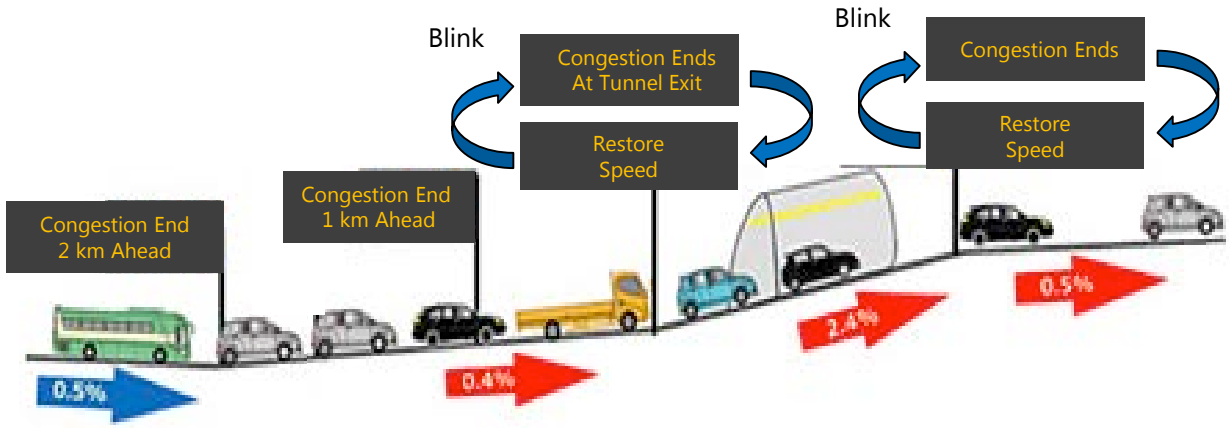
Radio | Telephone | Internet

(e.g.) Dissemination - On-site Traffic Control -

○Bottleneck Notification (VMS)

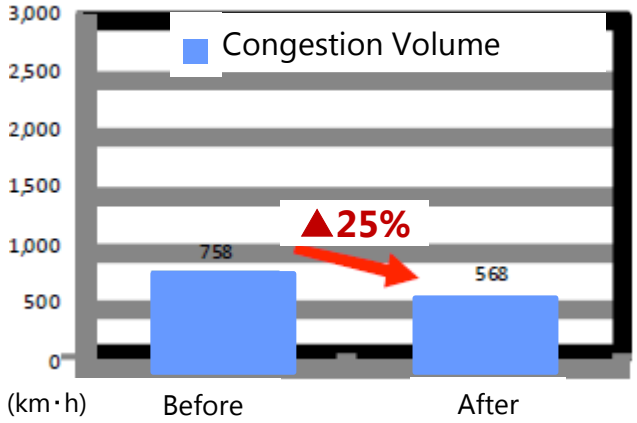
- Alerting speed reduction caused by distracted driving with VMS
- Encourage quick restoration of driving speed





Fixed VMS

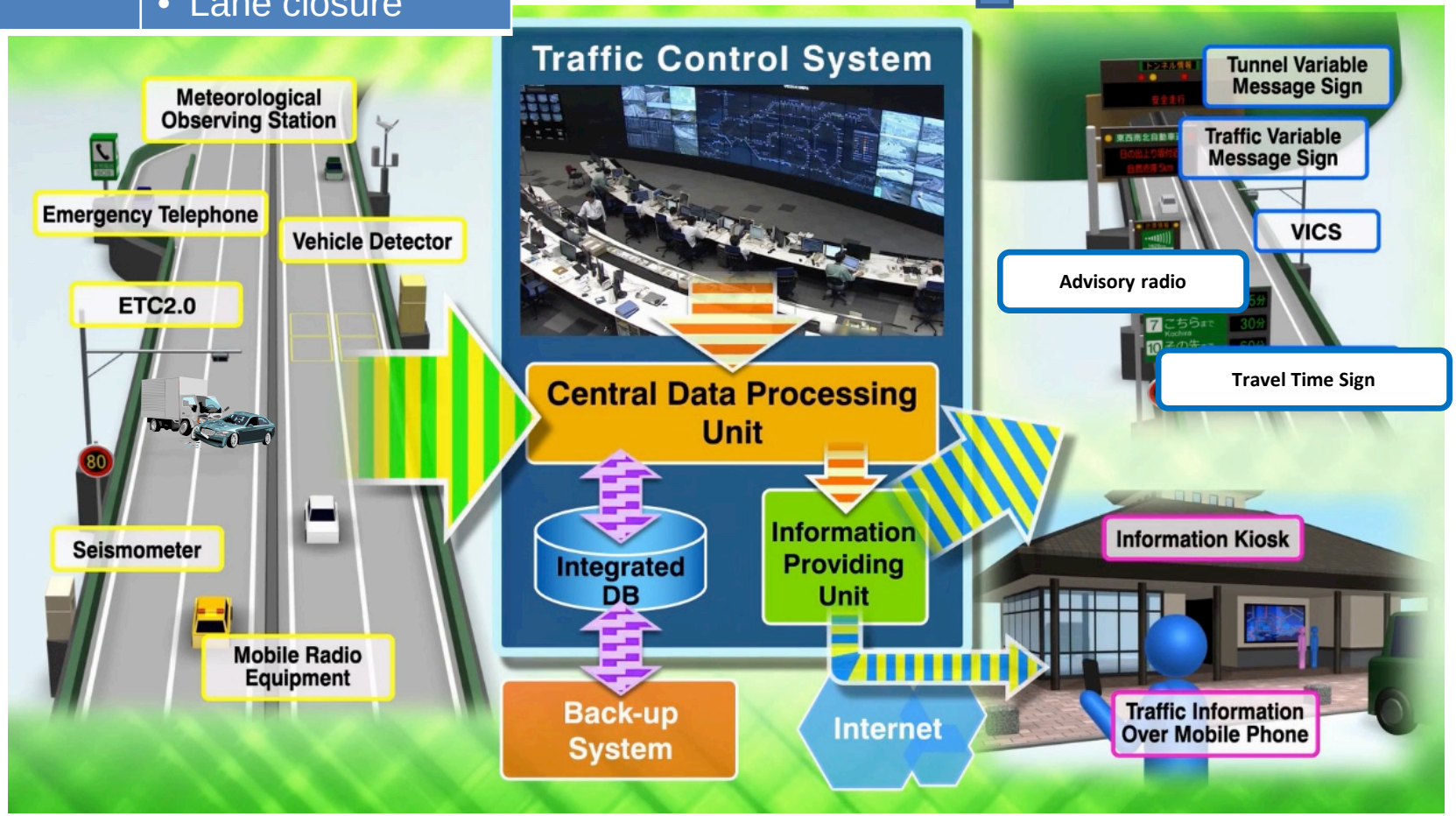
Mobile VMS



Road Information Flow Overview

Type of Information	• Accident • Congestion • Weather • Road defect • Fallen object • Lane closure

Towing and Recovery | Road Service | Police/Fire/ Ambulance



Processing System Overview

Feature

Traffic Control Center

Traffic Prediction Server

Incident detection
- Traffic Congestion
- Traffic Accident
- Stationary vehicle
- Wrong-way Driving
- Falling Object
- …

Incident Management Server

Image Processing Server

Attention!!
Incident A

VMS

A IC

Camera A (Existing)

Camera B

Camera C

Camera D

B IC

Direction

point A domain

point B domain

point C domain

point D domain

Road Information Collection

Well-Trained Traffic Squads

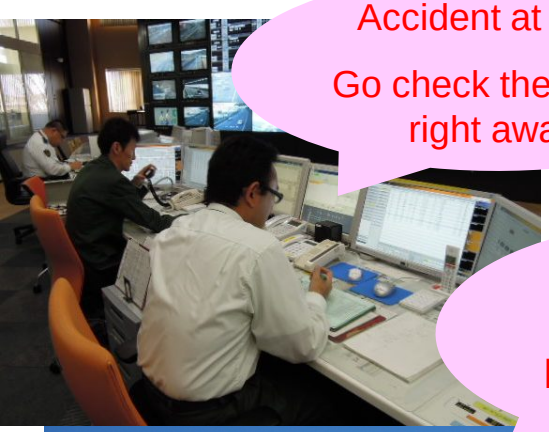
The Main Roles

- ✓ Road Info Collection
- ✓ Dealing with Traffic Accidents, Broken Cars, Fallen Obstacles
- ✓ Advising Caution
- ✓ Checking Pavement/Equipment

Toyota Land Cruiser w/LED Display

Equipped Items (examples)

Well-Trained Traffic Squads



Accident at ○○!

Go check the scene right away.

Copy!

I'll be right there.

Rushing to the scene!

Warn the following cars of the accident

Ensure the customer safety by controlling traffic

Are you all right?

Please wait outside the guardrail.

Contact and arrange for police, EMS, and tow trucks to assist customers

Well-Trained Traffic Squads

✓ Fallen Obstacles Pick-Up

Wait until the line of vehicles breaks…

One waves a flag while the other picks it up

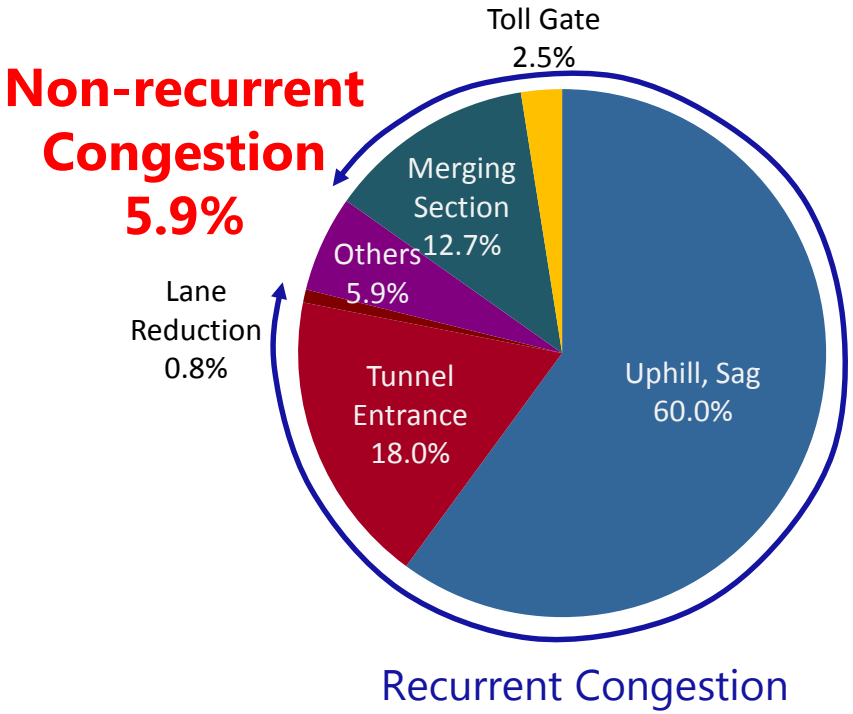
Look how big it is..!

This operation prevents serious accidents.

24,000+ Obstacles per year were cleared.

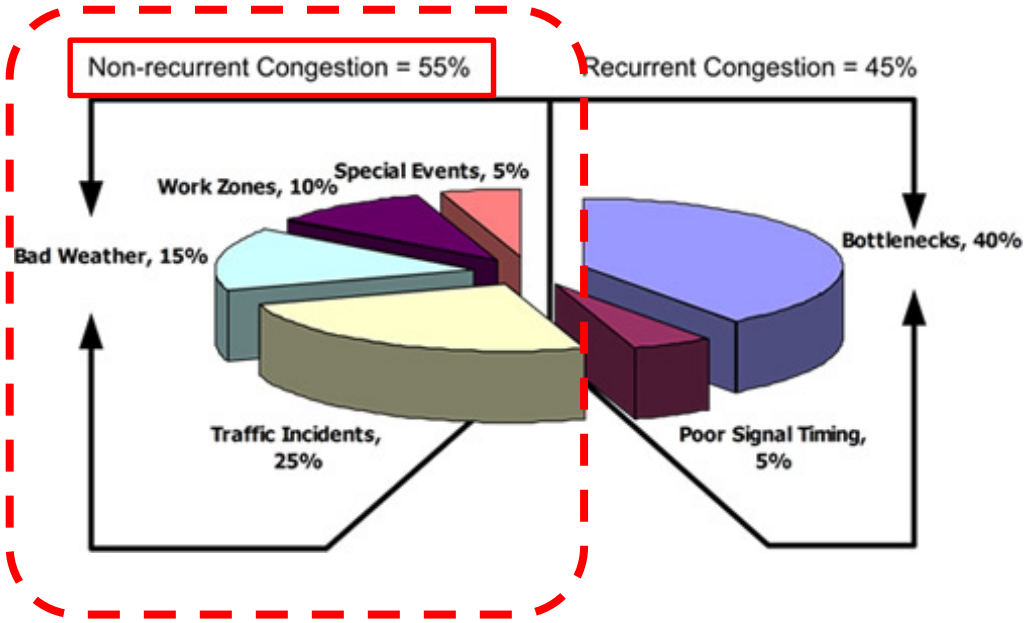
Successful Outcome

Congestion Causes in NEXCO-Central



Source: NEXCO-Central

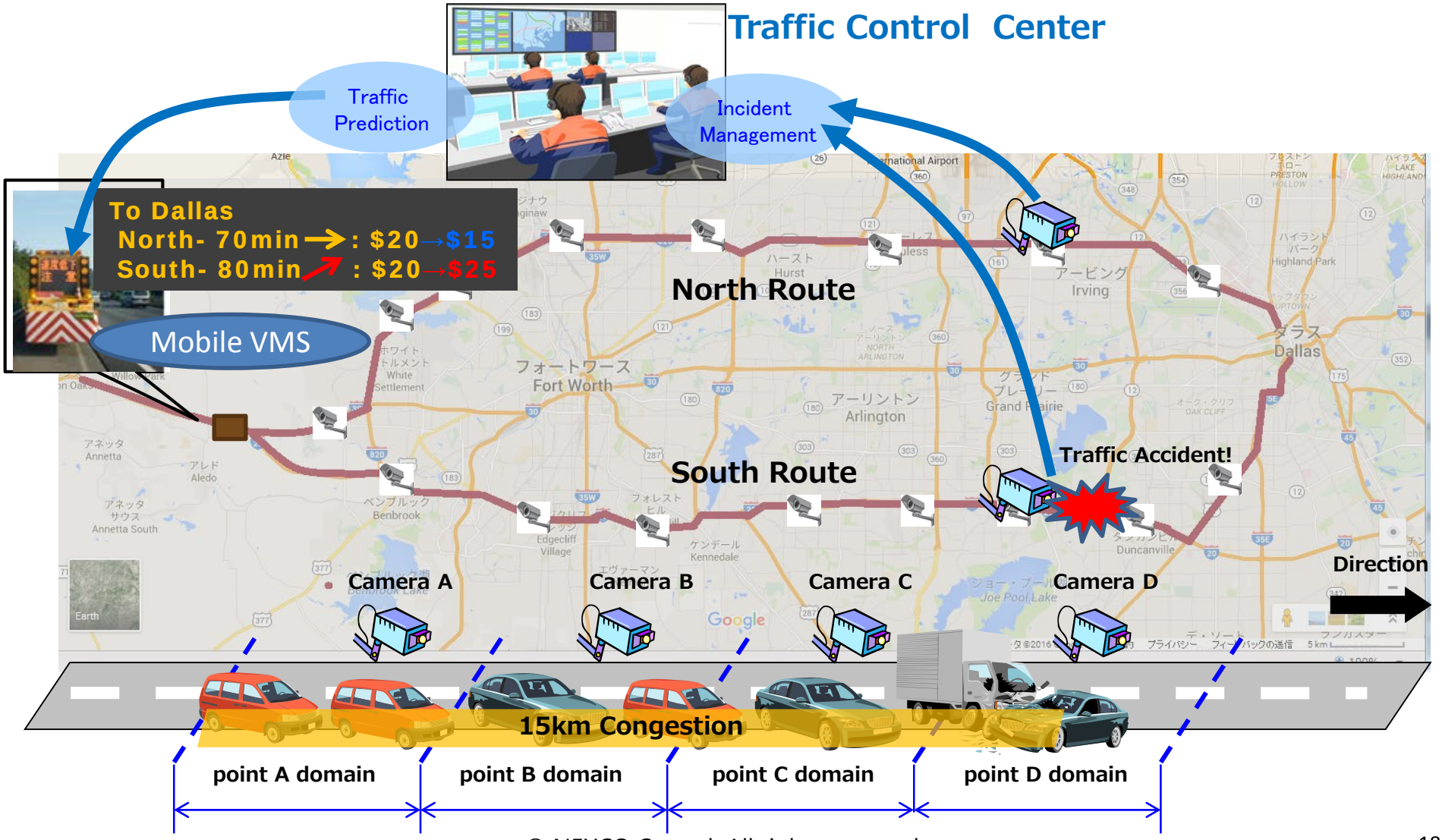
(Cf.) Congestion Causes in the U.S.



Source: U.S. Department of Transportation

In the Future

○Dynamic Route Guidance/Incentive Pricing



Arigato & Thank you!

Questions and Comments

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NEXCO-Central Booth

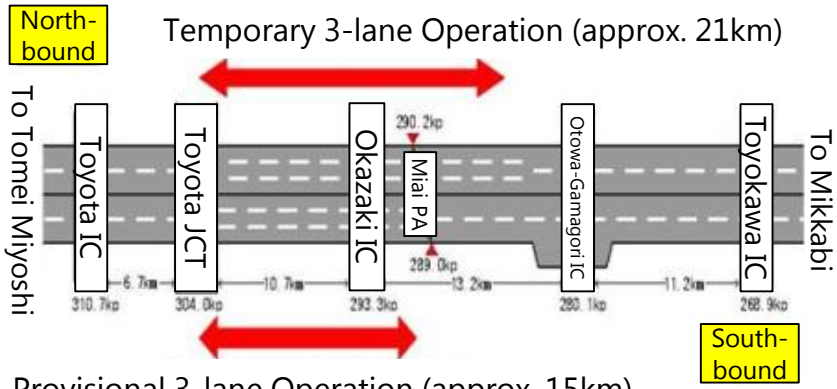
(e.g.) Recurrent Congestion Countermeasures

- Increase in Traffic Capacity -

○Temporarily Road Shoulder Operation

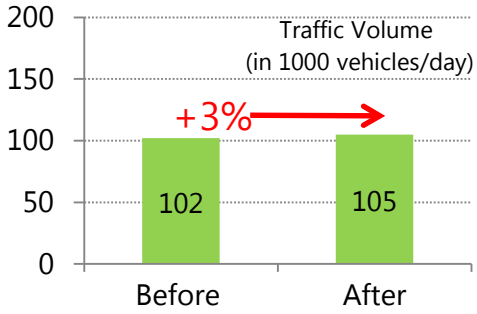
【Before】

【After】



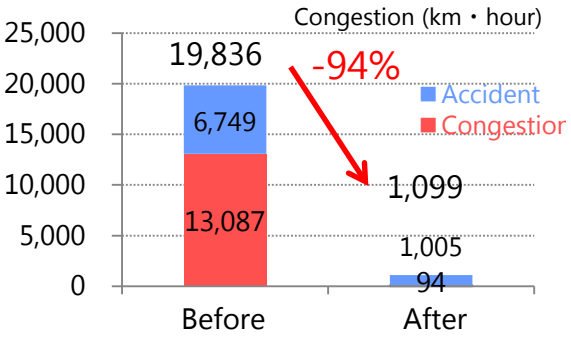
1． Traffic Volume

Increased by 3%



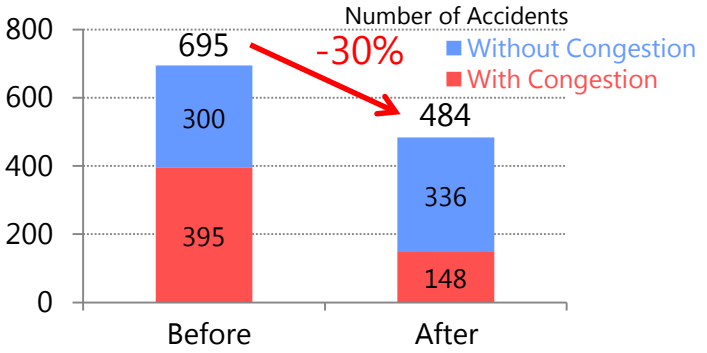
2． Traffic Congestion

Reduced by 94%



3． Traffic Accidents

Reduced by 30%



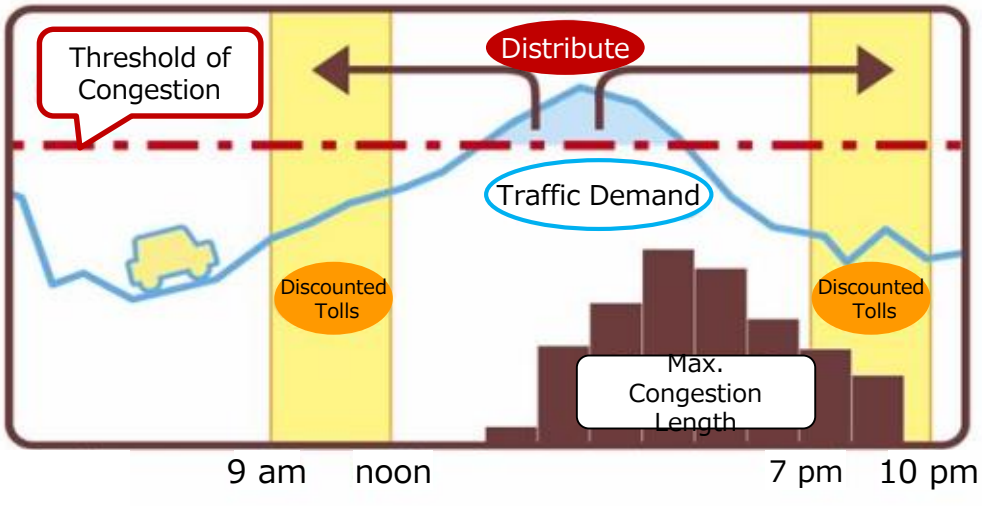
※〔Before〕：Oct 23, 2010 (Sat)-Oct 23, 2011(Sun), 〔After〕：Oct 22, 2011 (Sat)–Oct 21, 2011(Sun): 366 days

(e.g.) Recurrent Congestion Countermeasures
- Distribution of Traffic Demand -

- TDM (Traffic Demand Management)
  - Encouraging drivers to change their choices of travel time and route in order to distribute the traffic demands from peak hours to non-peak hours.
    - Variable Toll system
    - Giveaway Campaign System
    - Predicted Traffic Congestion System

Congestion Reduction Campaign w/ Giveaway

Guidebook w/ Predicted Traffic Congestion



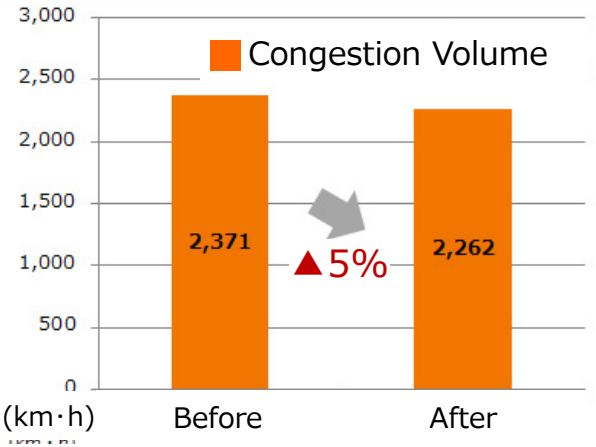
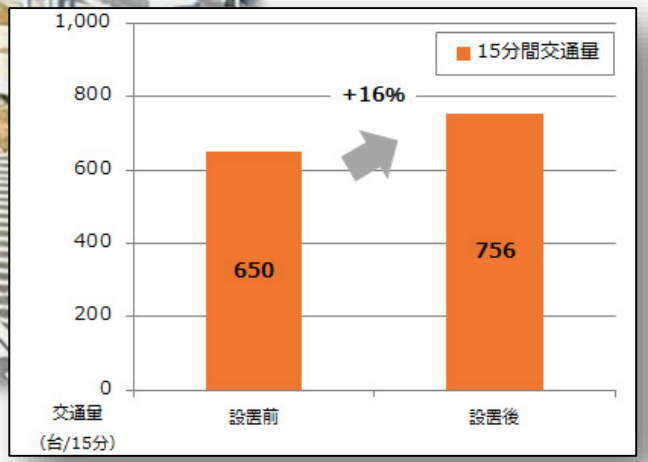


Illustration of Variable Toll System

(e.g.) On-site Traffic Control

○Bottleneck Notification (Vection Technology)

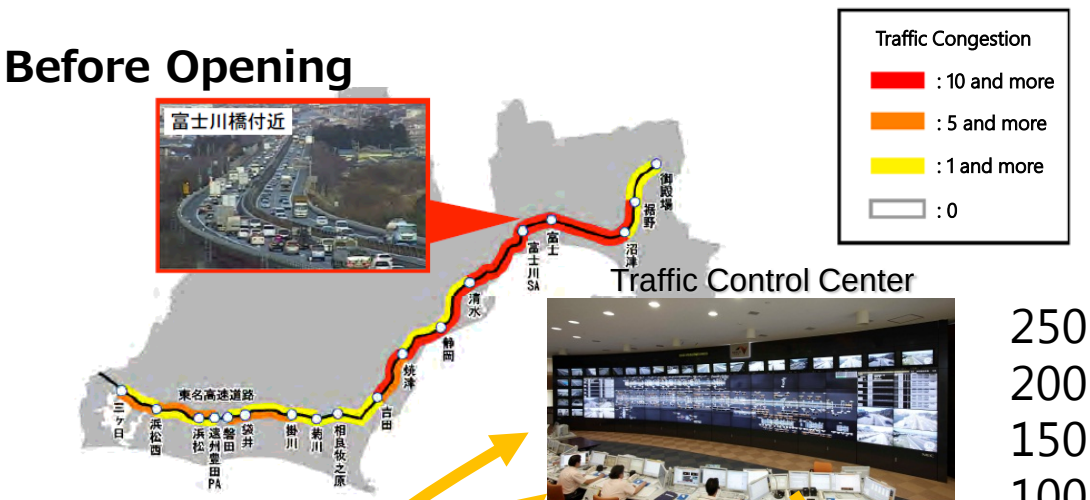
- 視覚的な効果により、運転手のスピード感に影響を与え、加速させたり、減速させたりする
- 路肩に、連続的に発光するデリネーターを設置し、発光間隔を調整することにより行う



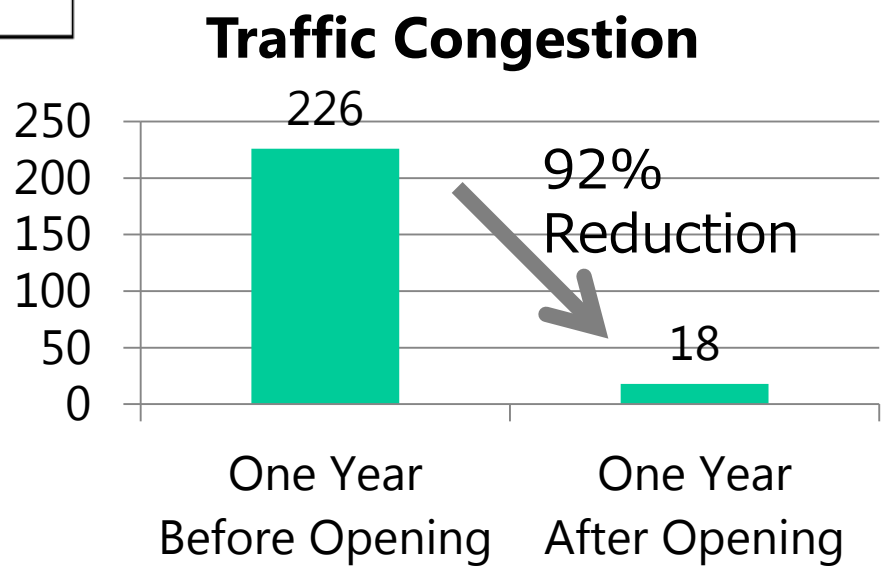
Successful Outcome

○Double Network

Before Opening



After Opening



Source: NEXCO-Central