



## I-210 ICM Performance Metrics

August 12,  
2013

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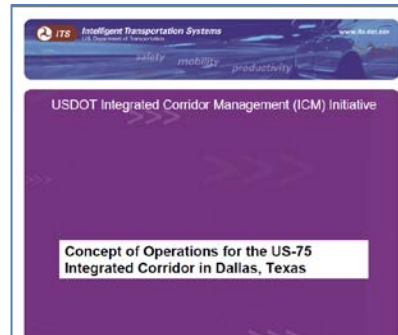
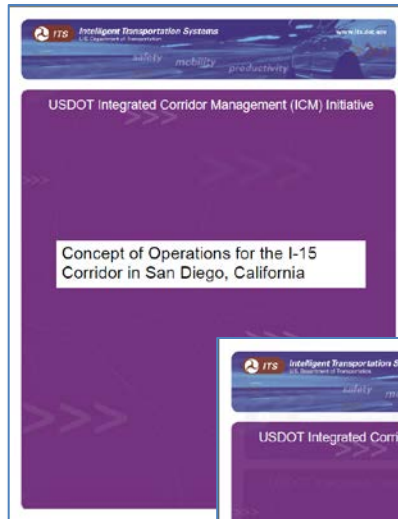
# Performance Metrics

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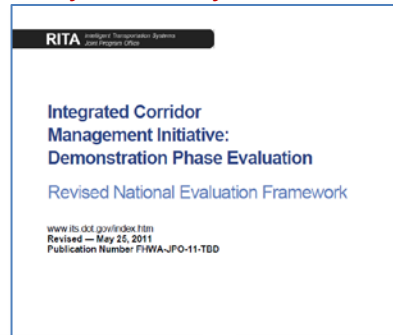
- **Corridor mobility**
  - Corridor
  - Freeways
  - Arterials
  - Transit services
  - Parking facilities
- **Travel reliability**
- **System safety**
- **System awareness**
- **Data processing**
- **Decision support system operations**
- **Intra-agency organizational impacts**
- **Inter-agency collaboration**

# Information Sources

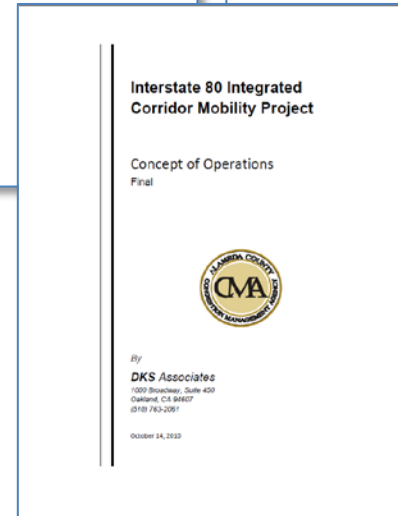
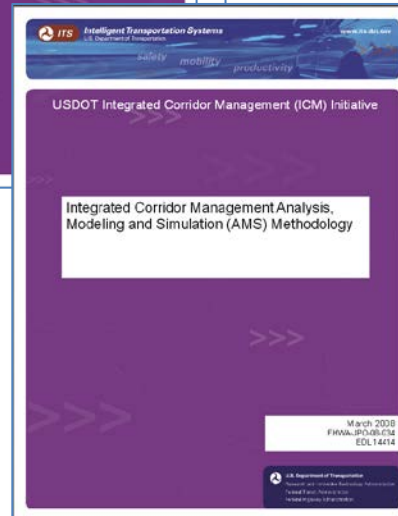
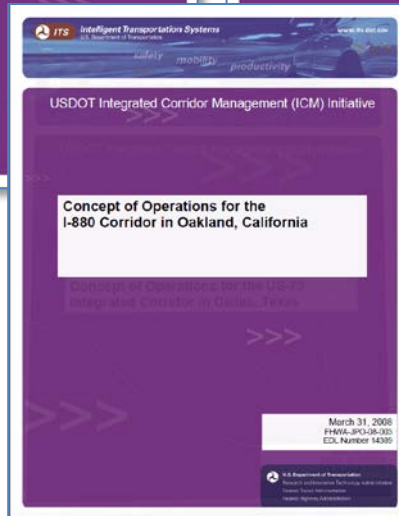
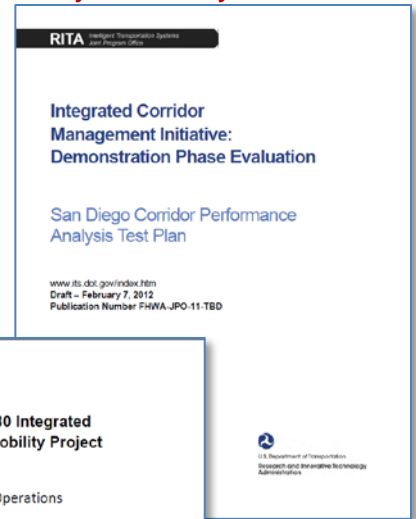
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*Not yet Officially Released*



*Not yet Officially Released*



# Corridor Mobility

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## □ Corridor-wide performance

- Vehicle throughput
  - Vehicle miles traveled (VMT)
  - Vehicle-hours of delays (VHD)
  - Average travel speed
- Person miles traveled (PMT)
  - Person-hours of delay (PHD)
  - Person throughput
  - Average travel speed

*Compilation for all relevant  
modes of transportation*

- Cars
- Buses
- Trucks
- All vehicles

# Corridor Mobility

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## □ Freeway operations

- Vehicle throughput
- Vehicles Miles traveled (VMT)
- Vehicle hours of delays (VHD)
- Average delay per vehicle
- Level of service (LOS)

- Person throughput
- Person miles traveled (PMT)
- Person-hours of delay (PHD)
- Average delay per person

### *Compilation for:*

- *General purpose lanes*
- *HOV lanes*
- *Ramps*
- *Predefined routes*

### *Compilation for:*

- *I-210 (SR-134 to Foothill)*
- *I-605 (north of I-10)*
- *SR-57 (north of I-10)*
- *I-10 (I-710 to SR-57)*

# Operational Performance

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## □ Arterial operations

- Vehicle throughput
- Vehicles Miles traveled (VMT)
- Vehicle hours of delays (VHD)
- Average delay per vehicle
- Level of service (LOS)
- Person throughput
- Person miles traveled (PMT)
- Person-hours of delay (PHD)
- Average delay per person

*Compilation for:*

- *Individual intersections*
- *Selected arterial segments*

*Compilation for:*

- *Individual arterials selected as viable alternate routes*

# Operational Performance

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## □ Transit operations

- Average route travel times
- Average vehicle delay
  - Per intersection
  - Per route segment
- Percent on-time arrivals
- Observed ridership, per route/segment

## □ Parking operations

- Occupancy rate

*Compilation for each relevant transit route:*

- Gold Line
- Silver Line
- Commuter express buses
- Others?

*Compilation for each relevant parking facility:*

- Park-and-ride
- Participating garages

# Travel Reliability

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- **Average travel time**
- **90<sup>th</sup>, 95<sup>th</sup> percentile travel time**
- **Travel time deviation**
- **Buffer index**
  - ▣ Percent travel time that must be added to a trip to account for variability
- **Planning time index**
  - ▣ Ratio of total time needed to ensure 95% on-time arrival relative to free-flow conditions
- **Number of congested hours**

Compilation for each major *system element*:

- Freeway general purpose lanes
- HOV lanes
- Freeway ramps
- Arterials
- Predefined routes

Compilation for each relevant *transportation mode*

- Cars
- Trucks
- Buses



# System Safety

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- **Number of incidents**
  - ▣ Per day/week/month/year
- **Rate of incidents**
  - ▣ Per million VMT and/or million PMT

Compilation by *severity type*:

- Non-injury
- Injury
- Fatality
- Etc.

Compilation by *location*:

- Freeway mainline
- HOV lane
- Freeway ramps
- Intersections
- Arterial segments

# System Awareness

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## □ Traffic flow detection enhancements

### □ Freeways

- Percentage of freeway sensors operating correctly (*increase*)
- Percentage of observed data from freeway sensors (*increase*)

### □ Arterials

- Number of signal controllers providing real-time signal status information (*increase*)
- Number of intersections with real-time traffic information (*increase*)
- Number of arterials with real-time traffic information (*increase*)
- Number of sensors providing real-time traffic information (*increase*)
- Center-miles of arterial with real-time travel information (*increase*)

## □ Incident detection improvements

- Number of incident notifications received within X minutes (*increase*)
- Number of incident clearance notification receive within X minutes after clearance (*increase*)

# System Awareness

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- **Parking occupancy monitoring enhancements**
  - Number of parking lots providing real-time parking occupancy (*increase*)
  - Number of roadside signs providing real-time parking occupancy (*increase*)
  
- **Transit monitoring**
  - TBD
  
- **Information sharing among stakeholders**
  - Number of agencies sharing information (*increase*)
  - Number of data feeds available to each agency (*increase*)
  - Number of Information Service Providers accessing ICM-generated data (*increase*)
  
- **Traveler information system enhancements**
  - Number of planning tools providing real-time traffic/transit information (*increase*)
  - Number of planning tools providing comparative drive/transit travel times (*increase*)

# Data Processing

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- **Data processing**
  - ▣ Ability to merge probe data with traditional data sources
  - ▣ Ability to develop desired performance measures
  
- **Data quality assessment**
  - ▣ Ability to detect invalid/erroneous data
  - ▣ Ability to detect duplicate data across several sources
  - ▣ Ability to adjust to data gaps

# Decision Support System

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## □ ICM system relevancy

- Number of times in a day/week/month a response plan is developed by the ICM system (*reasonable frequency to demonstrate system usefulness*)
- Number of times ICM system recommends altering specific control elements (ramp meters, traffic signals, CMS, etc) (*reasonable frequency to demonstrate system usefulness*)
- Number of maintenance/construction events shifted as a result of DSS recommendations (*reasonable frequency to demonstrate system usefulness*)

## □ Validity of recommended response plans

- Percentage of recommendation in line with TMC operator experience and expectation (*high value*)
- Percentage of time TMC operators fully implement recommended plans (*high value*)
- Percentage of time operators alter system recommendations (*low value*)
- Magnitude of changes made by operators (*minor changes*)
- Impact of implemented response plan vs. no action (*positive impact*)

# Decision Support System

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## □ System performance

- Time required to develop an actionable response plan (*short time*)
- Time required to evaluate a proposed response plan (*short time*)
- Time required to implement a response plan (*shorter than current practice*)
- Level of operator intervention required to develop an actionable response plan (*low level to none*)
- Average number of response scenarios evaluated (*high number*)

## □ System reliability

- Percentage of time assets were available to enable a response plan generation (*high value*)
- Difference between DSS-predicted and observed traffic conditions (*low value*)

# Decision Support System

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## □ System acceptance

- ▣ perceived value of traffic predictions (*high value*)
- ▣ Perceived value of system recommendations (*high value*)
- ▣ Level of comfort in using ICM during complex situation *high value*)
- ▣ Level of comfort of agencies in partially/fully relinquishing decisions to the ICM system (*high level*)

# Intra-Agency Organizational Impacts

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- **Number of agencies altering their organization following ICM system implementation (*high value*)**
- **Number of agencies altering operational procedures following ICM system implementation (*high value*)**
- **Number of agencies adopting corridor-based operational and evaluation practices (*high value*)**



# Inter-Agency Collaboration

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- **Number of collaborative agreements signed (*high value*)**
- **Number of agencies actively participating in ICM development (*high value*)**
- **Number of agencies actively participating in ICM operations (*high value*)**
- **Frequency of communications between agencies in support to regular corridor operations (*increase*)**
- **Frequency of communications between agencies in support to incident/event responses (*increase*)**
- **Number of agencies using common incident reporting system (*increase*)**