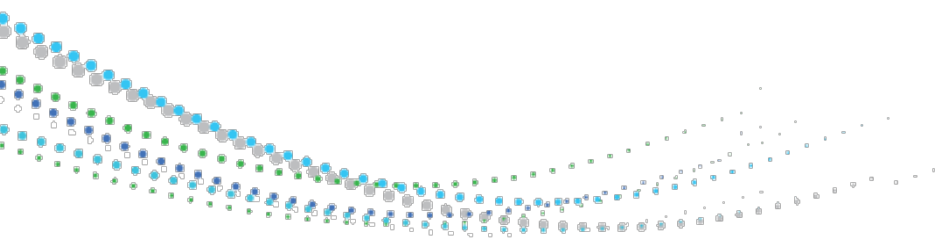




Iteris Performance Measurement System (iPeMS) Training and User Guide

February 20, 2018



Introductions

INSTRUCTOR

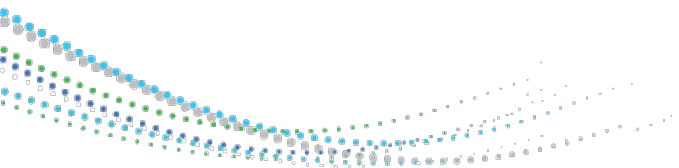
Tiffany Barkley

Director of Product, Performance Analytics

Iteris, Inc.

tbarkley@iteris.com

510-540-4816



Agenda

- iPeMS Background
- Metro iPeMS Data and Performance Measures
- Accounts and Homepage
- Map
- Link Reports
- Creating and Finding Routes
- Detailed Route Reports
- Area-Wide Route Reports
- Exercises

Objectives

Teach you the basics of using iPeMS

- How to navigate in the site
- Review the available data, report types, and performance measures

Give you some hands-on experience

- Clicking around in the site yourself is more memorable than only reviewing slides

Provide a tool for future reference

- This presentation, along with exercises, will guide you in future iPeMS use

iPeMS®

iteris®

iPeMS Solution

iPeMS collects, analyzes, and visualizes Smart Transportation data in the cloud for planning and operations performance measurement



Where is iPeMS?

Freeway Module



Third Party Module



Tollways



ICM & Transit



Arterial iPeMS Module



iPeMS Modules

Freeway Module



Arterial Module



Third Party Data Module



Event Module



Managed Lanes Module



Bluetooth Module



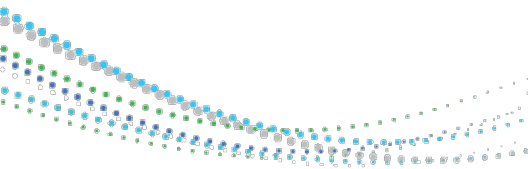
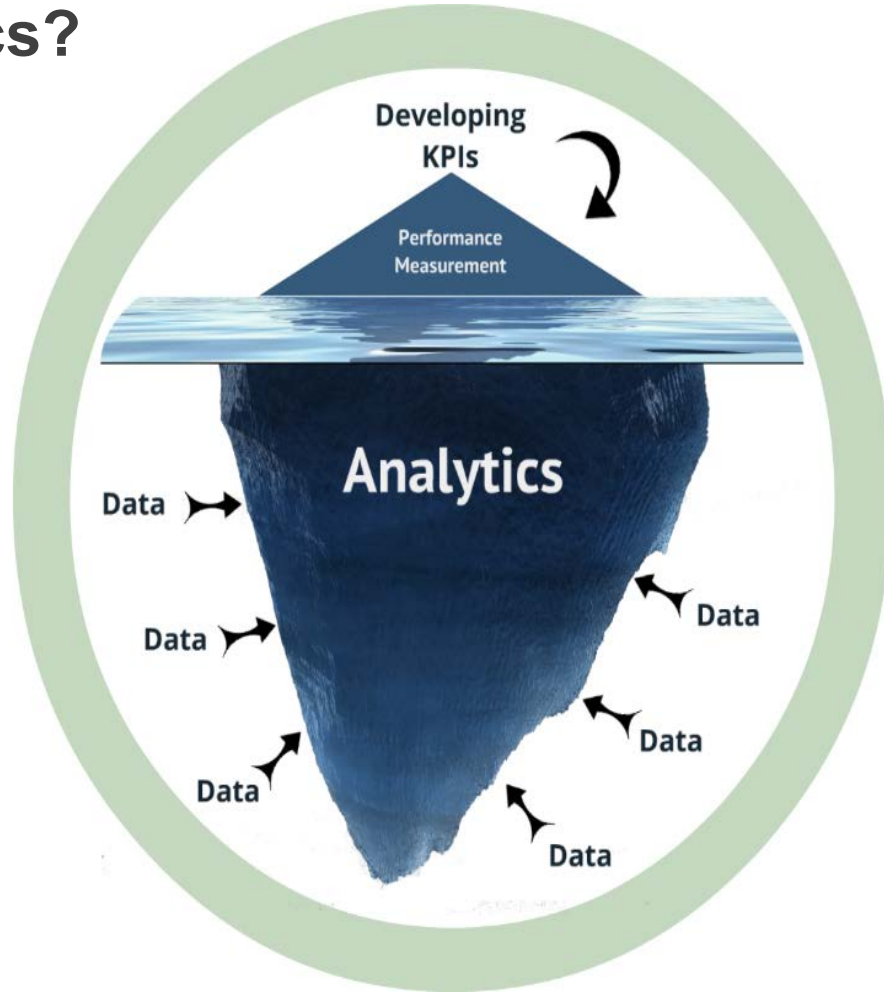
Transit Module



NPMRDS Module



What is Analytics?



Uses for the data

Why have access to speed data and what can you do with it?

Input into planning studies

Legislatively required monitoring
e.g. Congestion Monitoring
Program

Monitor the impact of a
construction project

Monitor a ramp metering
system

Before and after studies

Network-wide trend analysis

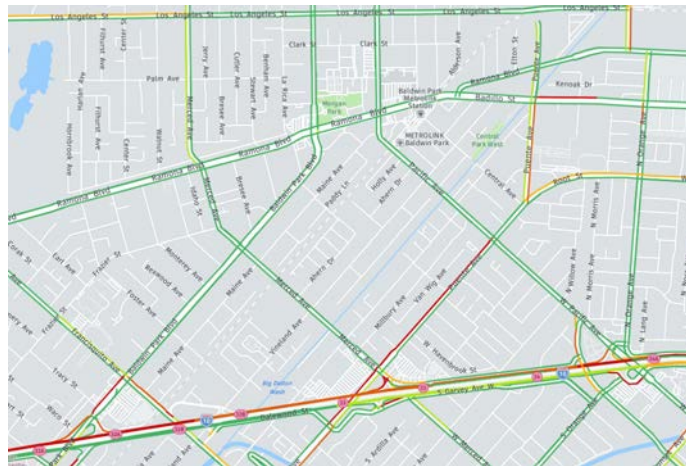
Monitor real time traffic
conditions



Metro iPeMS Data and Performance Measures

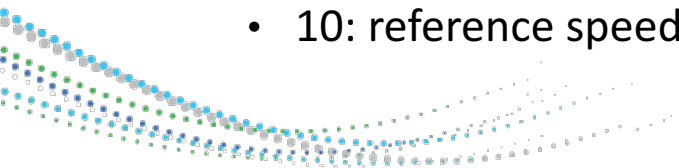
INRIX 3rd Party Speed Data

- Characteristics
 - Data is collected from GPS in vehicles and mobile devices
 - Processed into 1-minute average link speeds
- In Metro iPeMS
 - San Gabriel Valley region
 - July 1, 2014– December 31, 2016
 - Major arterials and freeways
 - Link segmentation is INRIX XD segments (which are smaller than TMCs)
 - On arterials, typically one or more links from intersection-to-intersection



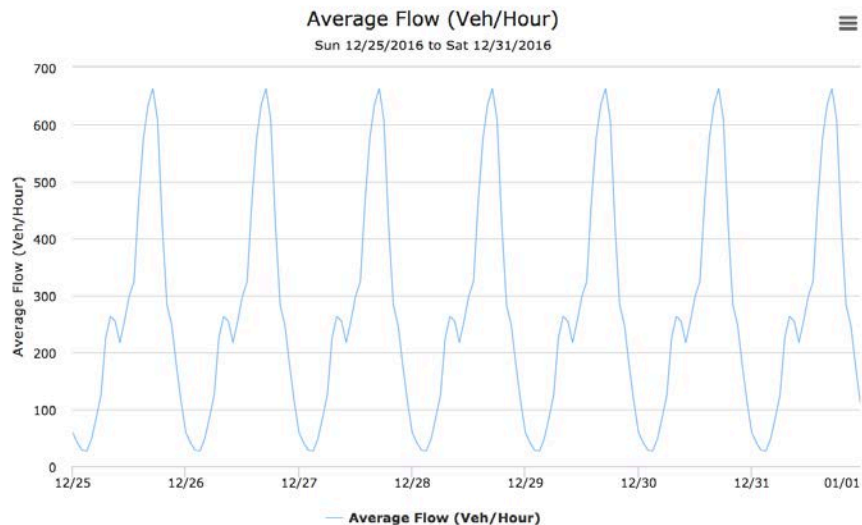
INRIX Speed Data- Terminology

- Speed: Speed measured from probe vehicles during that time period
- Reference speed: INRIX's estimate of the free-flow/uncongested speed on a link
 - In iPeMS, this is called the 'free-flow speed' and is used as a threshold speed for measuring delay
- Confidence Score: ranges from 10-30
 - 30: 'real-time' data
 - 20: historical average for that day/time period
 - 10: reference speed



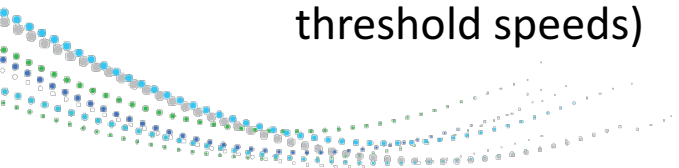
Traffic volume profiles

- Traffic count data that has been applied across roadway links
- Applied to the speed data as hourly averages that represent a 'typical' day



Metro iPeMS Performance Measures

- On all links and routes
 - Speed
 - Travel time (average and reliability)
 - Travel time index
 - Travel time delay
 - Level of Service (link-based HCM methods)
- On links and routes with volume profile data
 - Vehicle- and person-miles travelled
 - Vehicle- and person-hours travelled
 - Vehicle-hours of delay (relative to different threshold speeds)

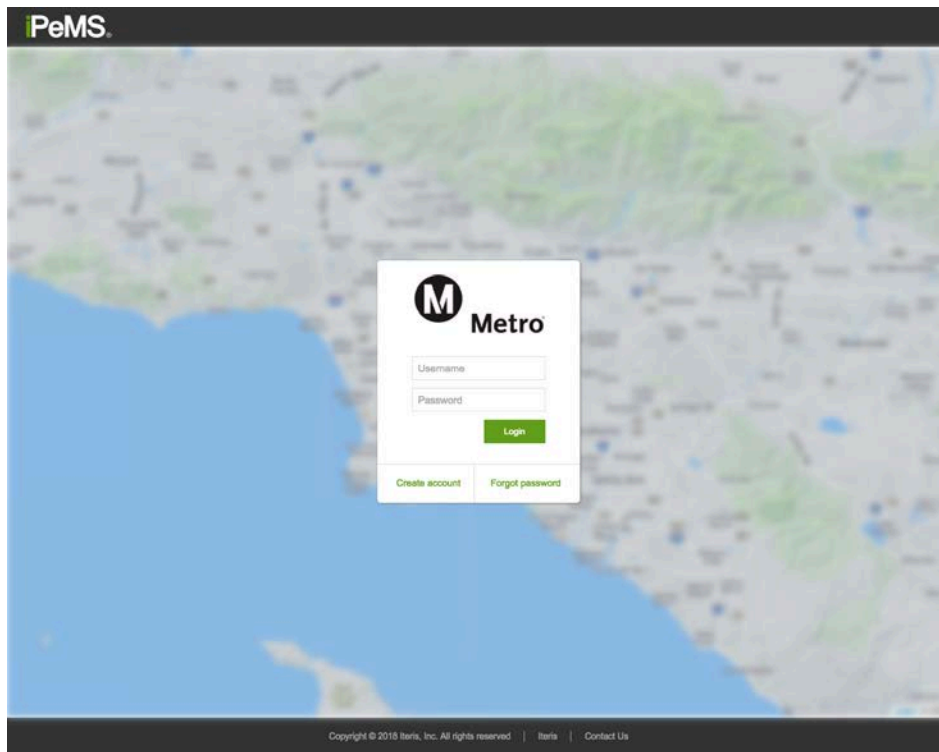




iPeMS Account and Homepage

Creating an account

- lametro.iteris-pems.com
- Create an account using your agency email address for immediate approval



Homepage

Click
map to
view
Real
Time
Map

The screenshot shows the iPeMS homepage. At the top is a navigation bar with links: Home, System Administration, Help, Logout, and Welcome admin. The main content area is divided into three sections. The left section features a map of Los Angeles with a blue overlay indicating a selected area. A blue bracket on the left side of the map points to it with the text 'Click map to view Real Time Map'. The middle section, titled 'Select Geography:', shows a breadcrumb trail: CA > Region > LA County Pilot. Below this is the 'Area-wide Performance Overview' section, which includes a green button labeled 'ROUTE REPORTS' with a plus icon. The right section, titled 'Detailed Performance of a Link or Route', contains a 'STEP 1' section with the text 'Select Link or Route' and a question mark icon. Below this are three green buttons: 'CHOOSE LINK FROM A MAP', 'CHOOSE ROUTE' with a plus icon, and 'CREATE A NEW ROUTE'. To the right of these buttons is a 'STEP 2' section with the text 'After Step 1, choose a report, graph and download content'. Below this are three options: 'STEP 2 Choose a report' with a cursor icon, 'STEP 3 Graph' with a line graph icon, and 'Download' with a download icon. A blue bracket on the right side of the 'STEP 3' section points to it with the text 'Detailed data'. At the bottom of the page is a footer with the Metro logo, links for Terms of Use, Feedback, and Release Notes, and the iteris logo.

iPeMS

Home System Administration Help Logout Welcome admin

Click to View Map.

Select Geography:

CA > Region > LA County Pilot

Area-wide Performance Overview

ROUTE REPORTS +

Detailed Performance of a Link or Route

STEP 1

Select Link or Route ?

CHOOSE LINK FROM A MAP

CHOOSE ROUTE +

CREATE A NEW ROUTE

After Step 1, choose a report, graph and download content

STEP 2

Choose a report

STEP 3

Graph

or

Download

Leaflet | © HERE

Metro

Terms of Use Feedback Release Notes

iteris

Filter to a jurisdiction

Area-wide Reports

Detailed data

Homepage

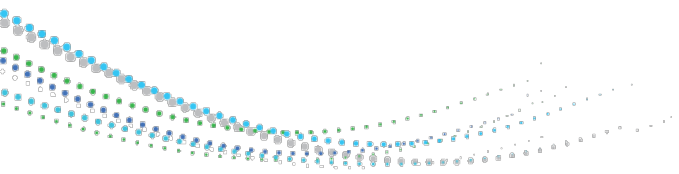
The screenshot shows the iPeMS homepage. The top navigation bar includes links for Home, System Administration, Help, **Logout**, and **Welcome admin**. The **Logout** and **Welcome admin** links are circled in red. A red arrow points from the 'Logout' link to a blue callout box on the right. Another red arrow points from the 'Welcome admin' link to a blue callout box on the right. The main content area features a map of Los Angeles on the left and a sidebar on the right. The sidebar includes a 'Select Geography' section with a dropdown menu showing 'CA > Region > LA County Pilot'. Below this is an 'Area-wide Performance Overview' section with a 'ROUTE REPORTS' button. The 'Detailed Performance of a Link or Route' section contains a 'STEP 1' box with buttons for 'CHOOSE LINK FROM A MAP', 'CHOOSE ROUTE', and 'CREATE A NEW ROUTE'. To the right of this is a 'STEP 2' box with a 'Choose a report' button, and a 'STEP 3' box with 'Graph' and 'Download' options. The bottom of the page features the Metro logo, a footer with 'Terms of Use', 'Feedback', and 'Release Notes', and the iteris logo.

Access your account settings, change your password

Logout when you are finished using the site

Terminology

- **Link** - Small length of roadway.
- **Route**
 - A user defined directional path between two points
- **Report** – Feature in iPeMS used to graph, map or tabulate performance data





Map

Accessing the Map

Click the map to access

The screenshot displays the iPeMS (Integrated Performance and Monitoring System) web application. The interface is divided into several sections:

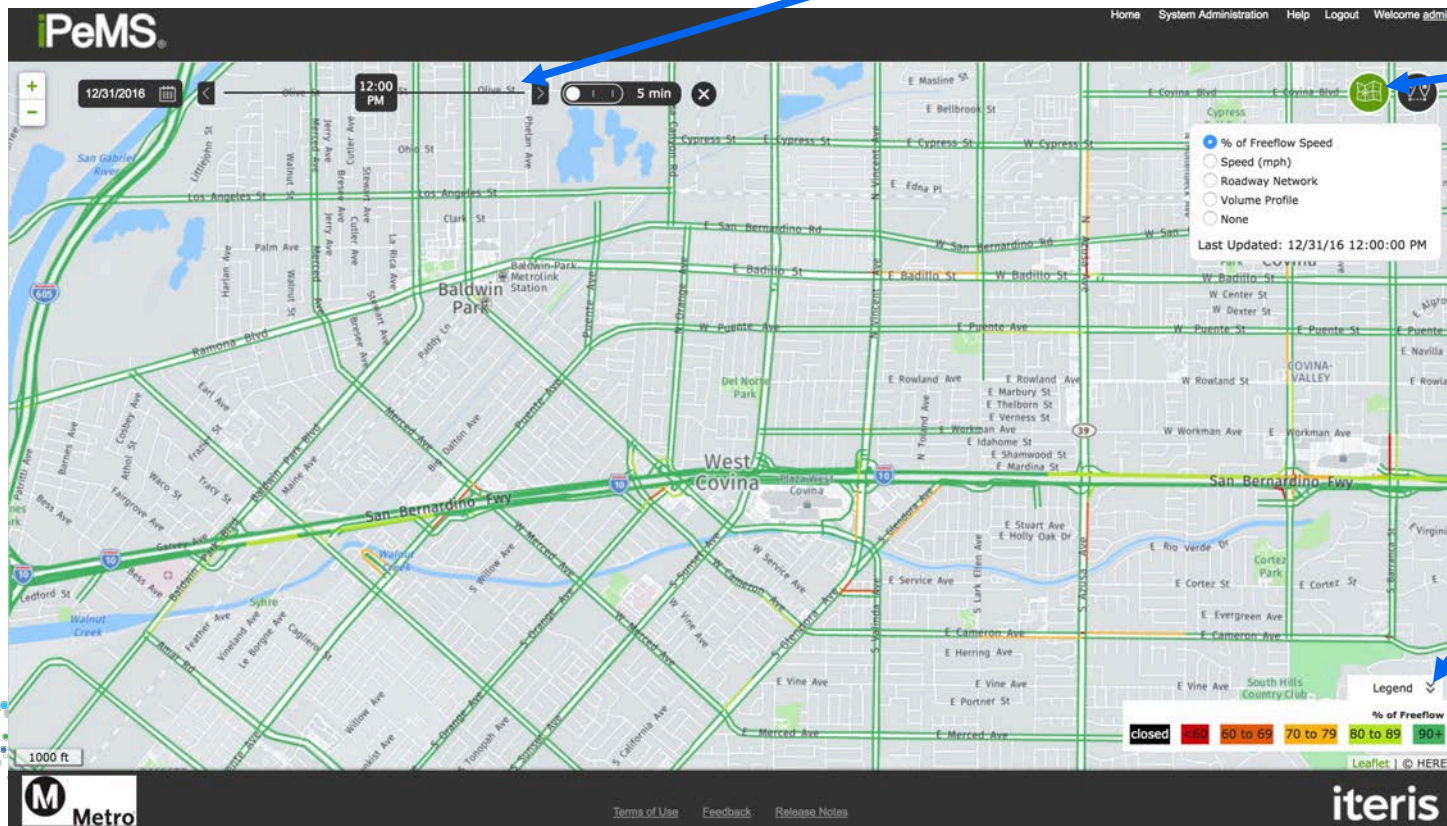
- Header:** Includes the iPeMS logo and navigation links: Home, System Administration, Help, Logout, and Welcome admin.
- Map:** A large map of Los Angeles and surrounding areas, including cities like Burbank, Pasadena, Glendale, and Long Beach. A blue shaded region highlights a specific area of interest. A blue bracket on the left side of the map points to it with the text "Click the map to access".
- Select Geography:** A dropdown menu showing the current selection: CA > Region > LA County Pilot.
- Area-wide Performance Overview:** A section with a green button labeled "ROUTE REPORTS" with a plus icon.
- Detailed Performance of a Link or Route:** A section with a "STEP 1" heading and a "Select Link or Route" dropdown. Below this are three green buttons: "CHOOSE LINK FROM A MAP", "CHOOSE ROUTE" (with a plus icon), and "CREATE A NEW ROUTE".
- Instructions:** To the right of the buttons, text reads: "After Step 1, choose a report, graph and download content".
- STEP 2:** "Choose a report" with a cursor icon.
- STEP 3:** "Graph" with a graph icon, "or", and "Download" with a download icon.
- Footer:** Includes the Metro logo, "Terms of Use", "Feedback", "Release Notes", and the iteris logo.

Map: Elements

Time Slider

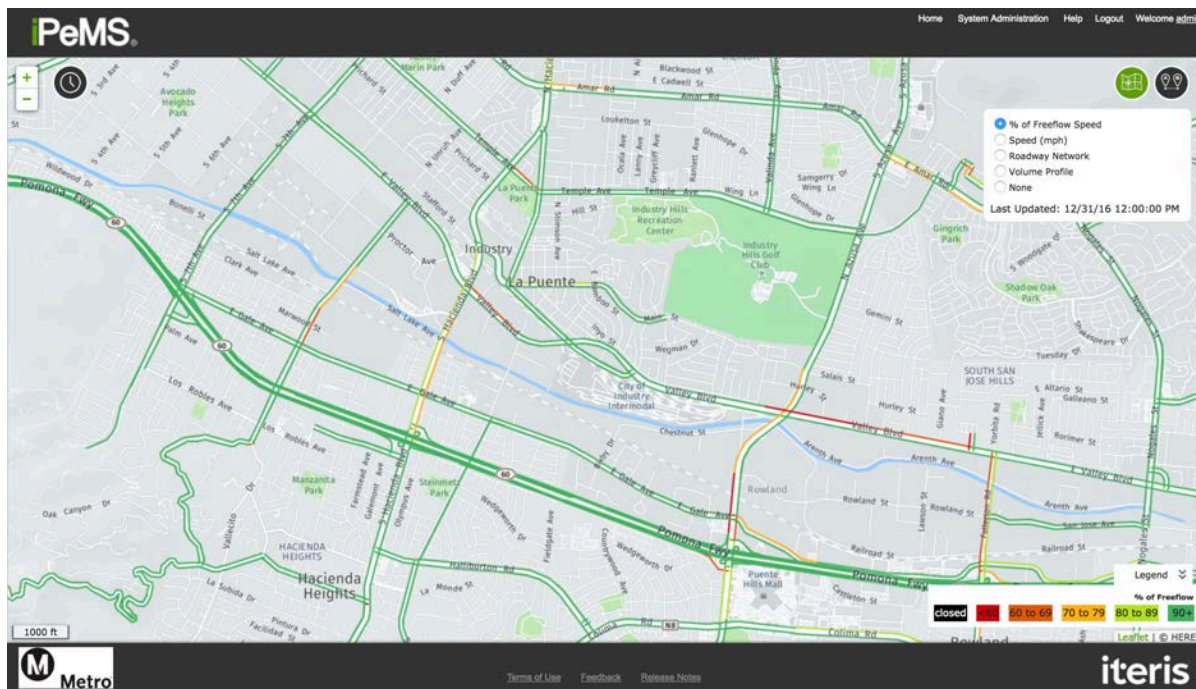
Layers

Legend



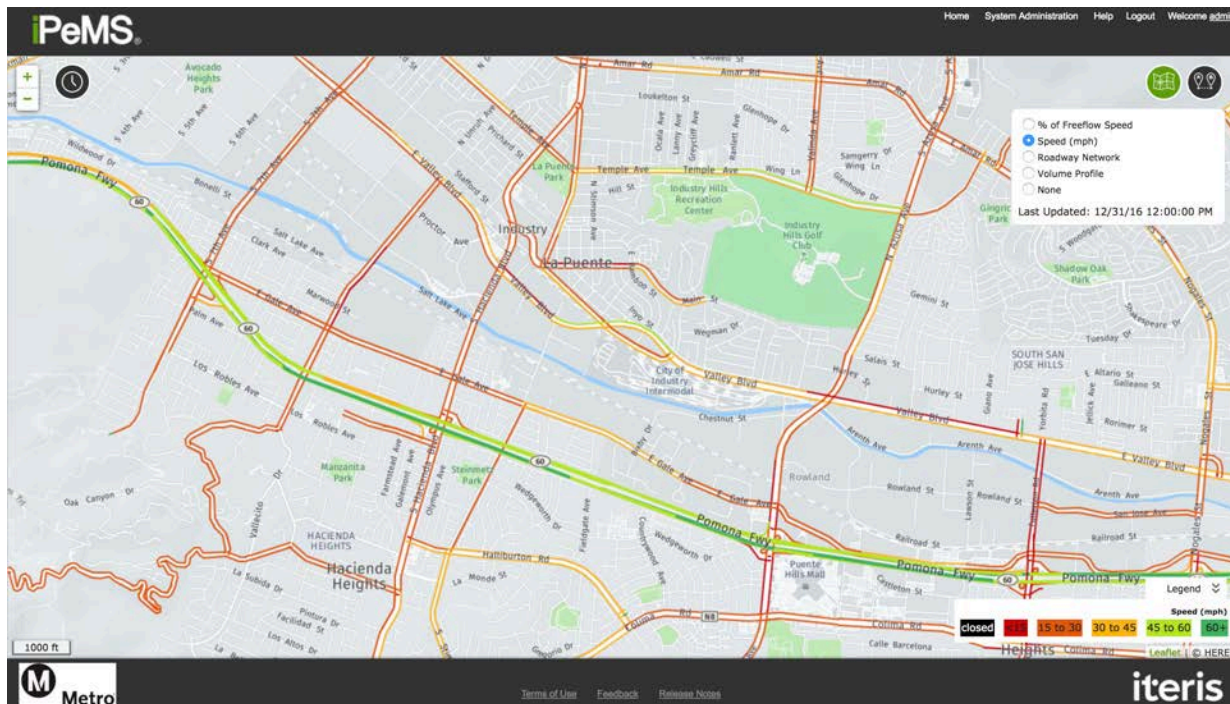
Map: % Free-flow Speed

- Indicates the level of congestion
- Dark Green: speeds are 90% of free-flow or higher
- Dark Red: Speeds are less than 60% of free-flow



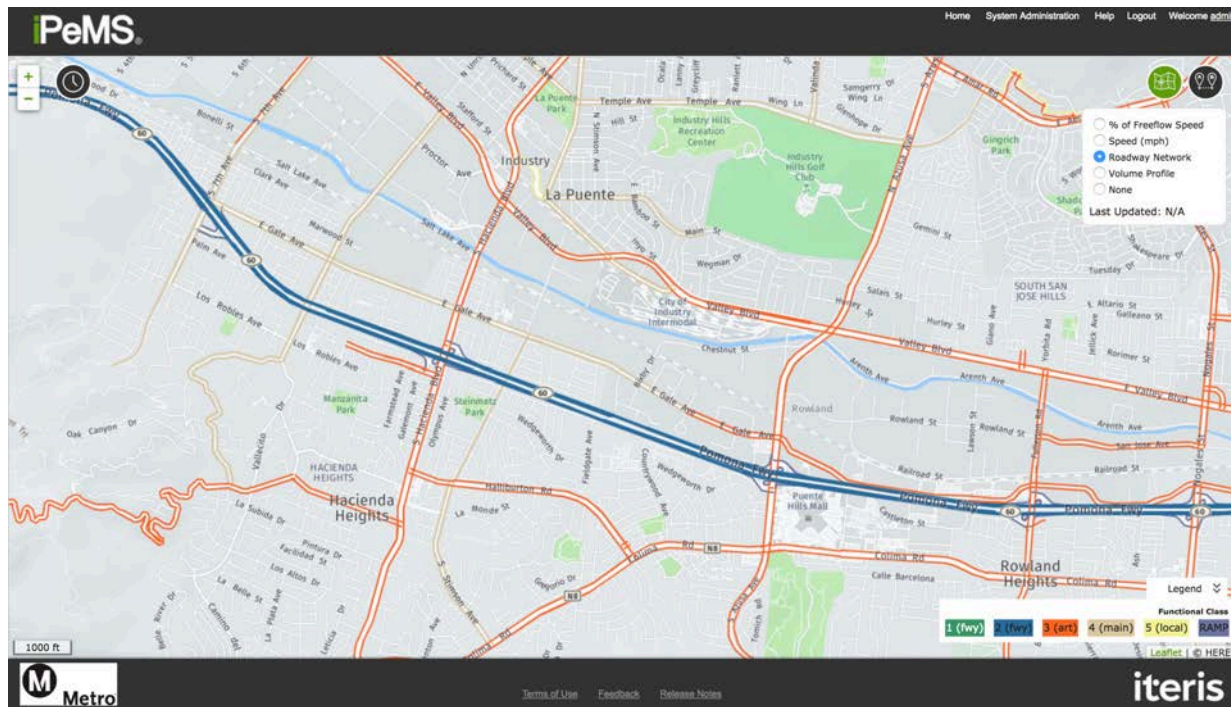
Map: Speed

- Colors based on the actual speed value



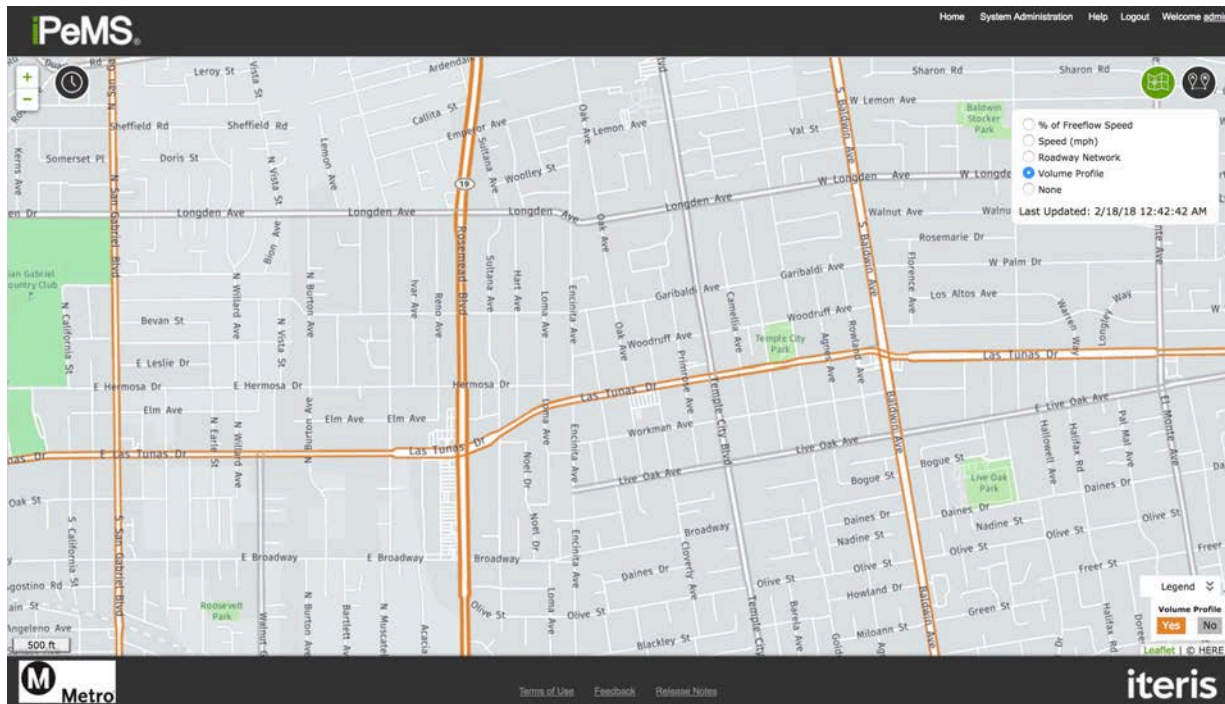
Map: Roadway Network

- Functional Class system as specified by INRIX



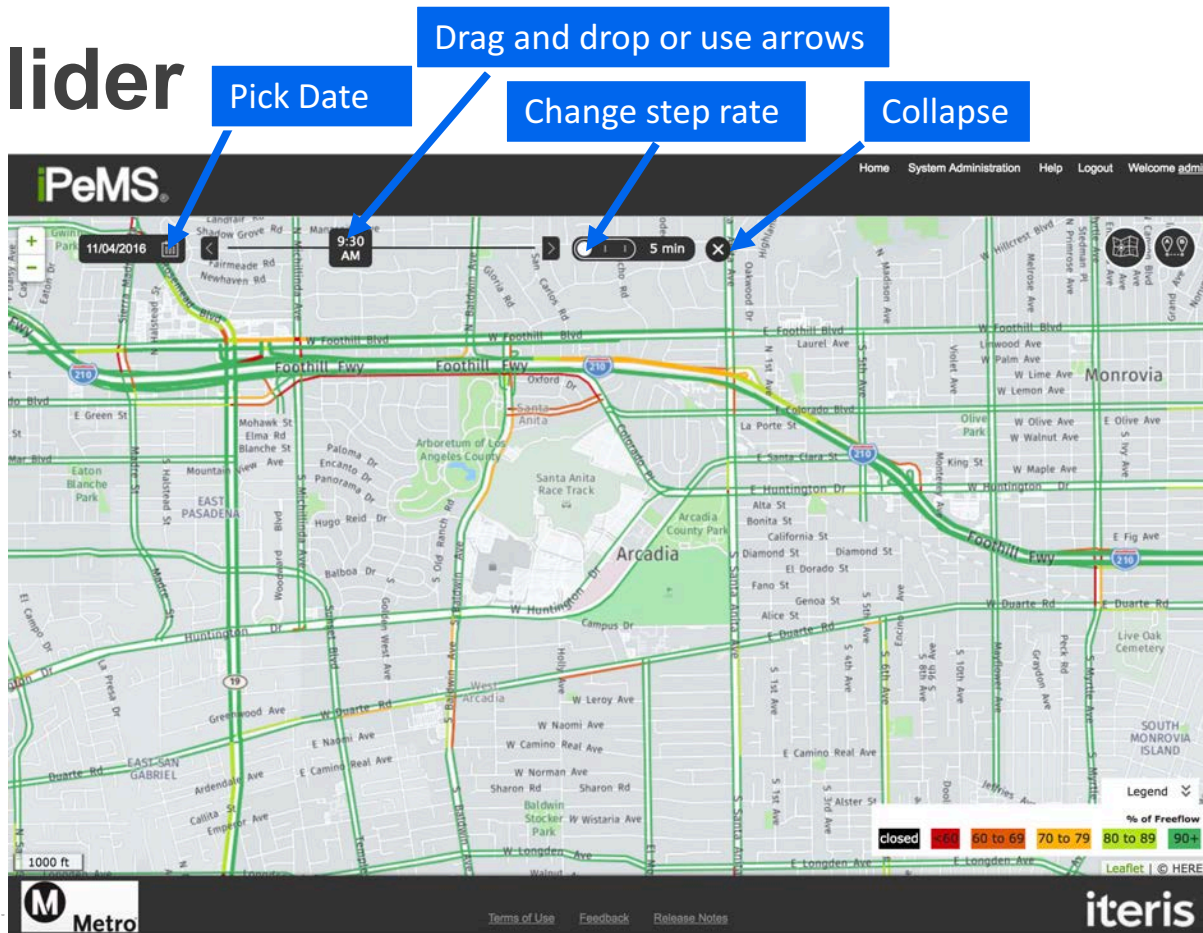
Map: Volume Profile Layer

- Shows which roadways have volume profile data
- These are the roadways that you can obtain volume-based performance measures on



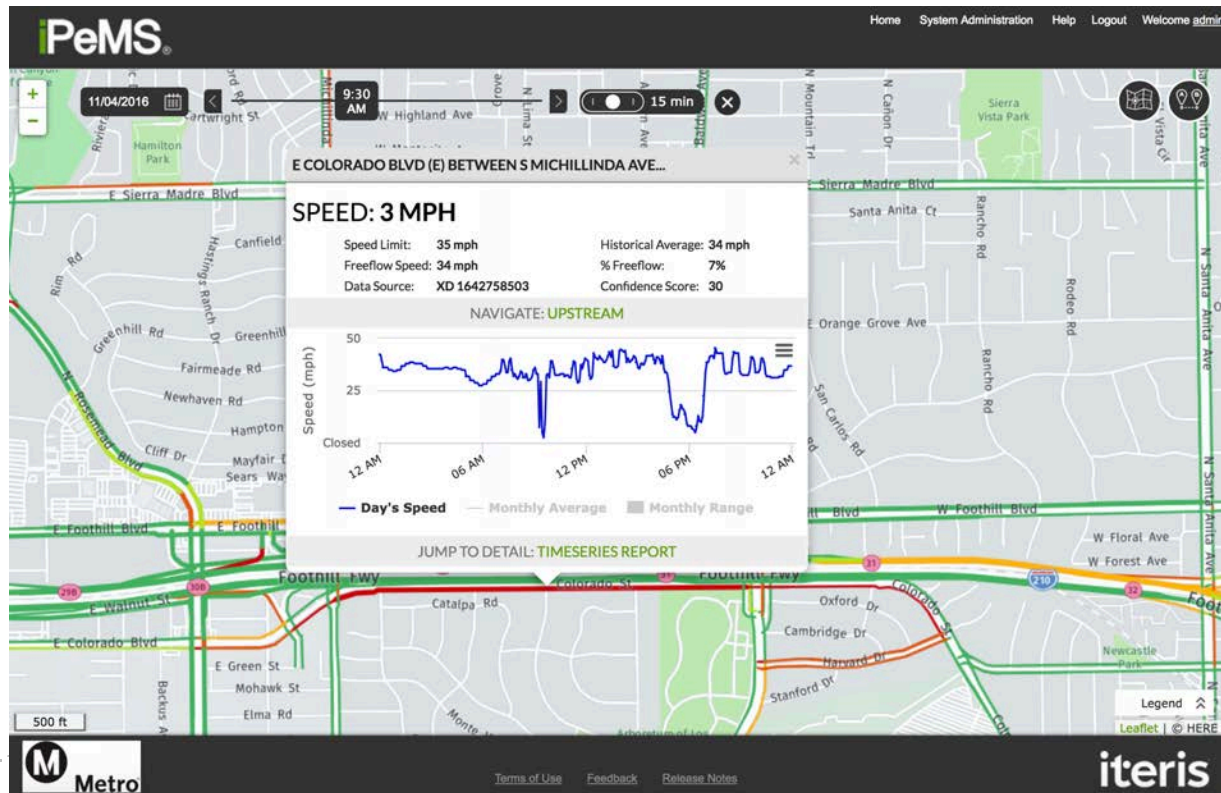
Map: Time Slider

- “Play back” speed conditions on any day in the past
- Example: % of free-flow speed near Santa Anita Race Track on 11/4/16 at 9:30 AM (2016 Breeder’s Cup World Championships began at 11:25am)



Map: Link Pop-up

- Hover over a roadway to display the link
- Click on a link to get detailed pop-up comparing that day's speed with the 'typical' speed
- Click on Timeseries Report at bottom of pop-up to go to detailed reporting

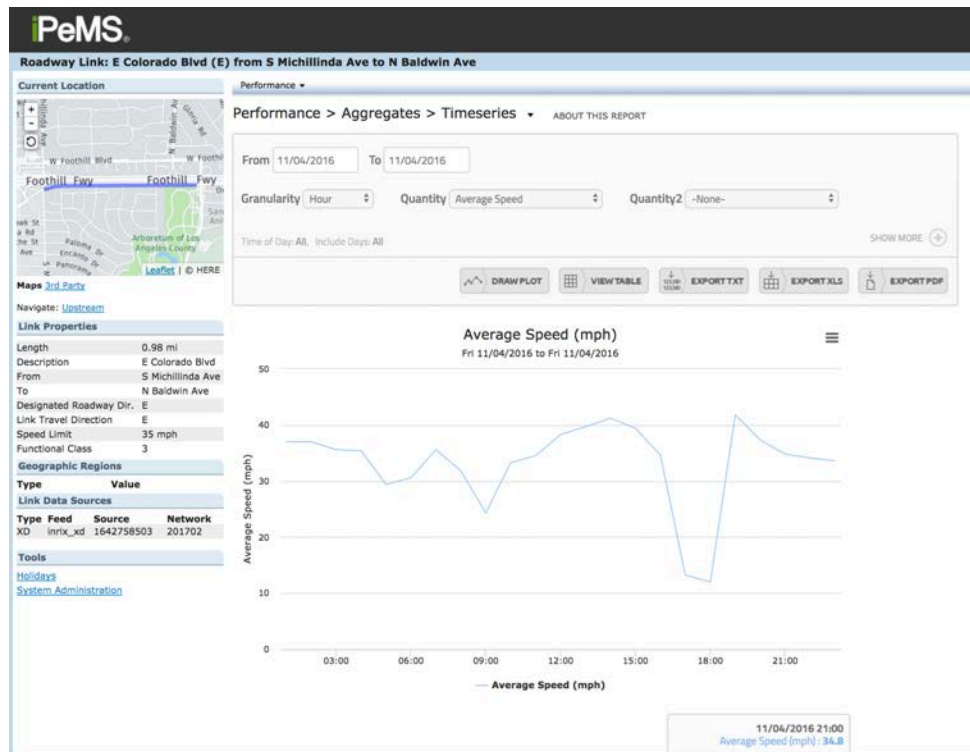




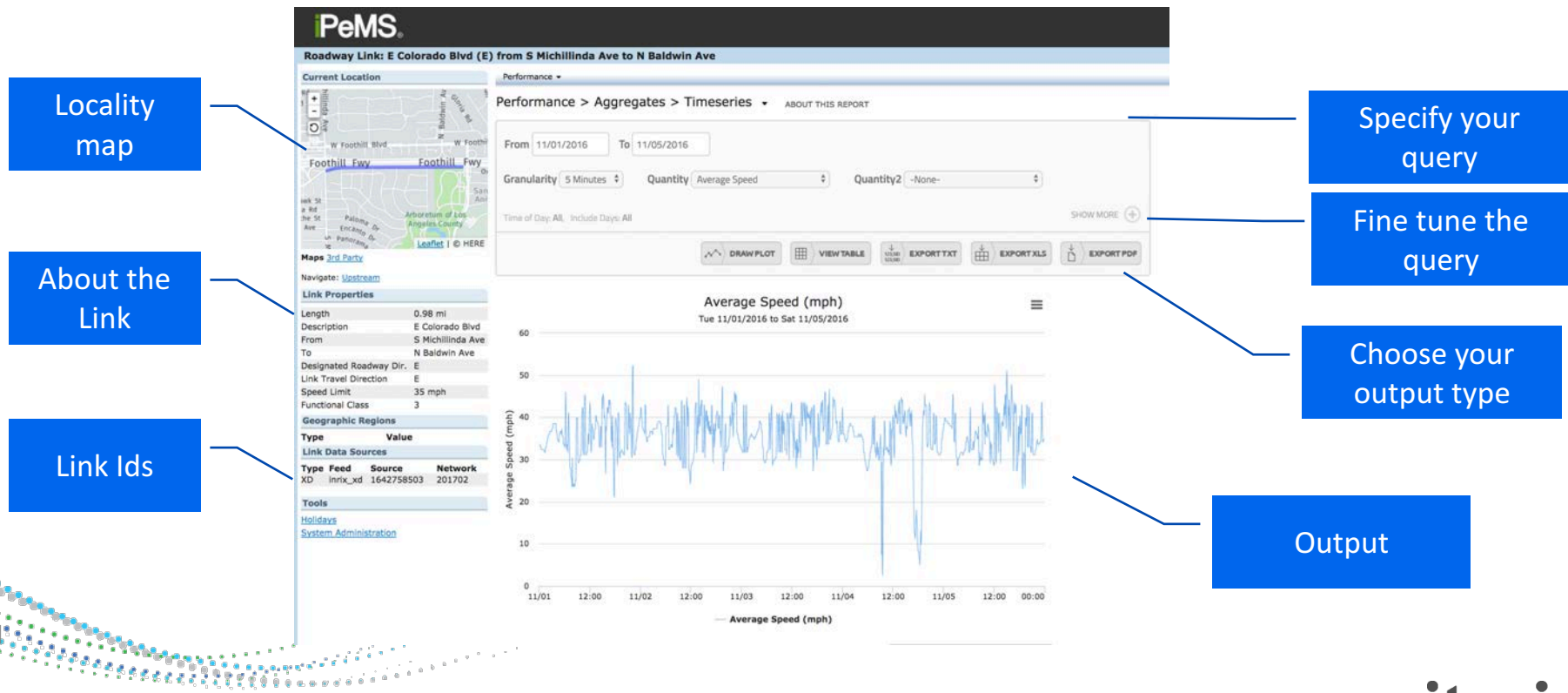
Link Data

Accessing Link Data

- By default, the link from the map goes to the Performance > Aggregates > Timeseries report for the link
- The default settings are the selected day, with granularity of one hour, showing the quantity of average speed
- Take a moment to review the granularities and quantities available
- See more detail by hovering over the chart

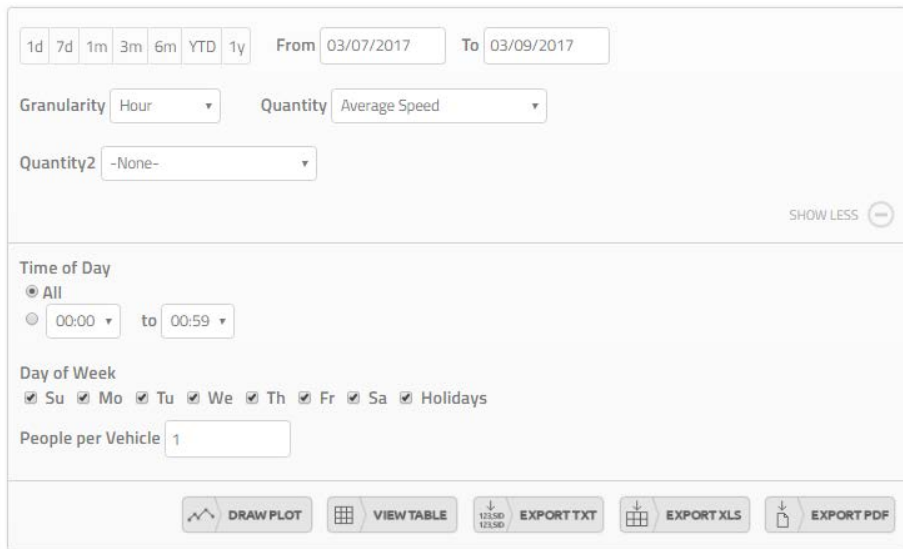


iPeMS Report Structure



Link Reports Introduction

Click the + - to fine tune your query



The screenshot shows a query builder interface for Link Reports. At the top, there are tabs for time intervals: 1d, 7d, 1m, 3m, 6m, YTD, and 1y. Below these are date pickers for 'From' (03/07/2017) and 'To' (03/09/2017). The 'Granularity' is set to 'Hour' and 'Quantity' is set to 'Average Speed'. There is a 'Quantity2' dropdown set to '-None-' and a 'SHOW LESS' button with a minus icon. The 'Time of Day' section has a radio button for 'All' and a time range selector from 00:00 to 00:59. The 'Day of Week' section has checkboxes for Su, Mo, Tu, We, Th, Fr, Sa, and Holidays, all of which are checked. The 'People per Vehicle' is set to 1. At the bottom, there are buttons for 'DRAW PLOT', 'VIEW TABLE', 'EXPORT TXT', 'EXPORT XLS', and 'EXPORT PDF'.

Specify your query

Expand the +/- to show more options

Specify the time of day or day or week to include

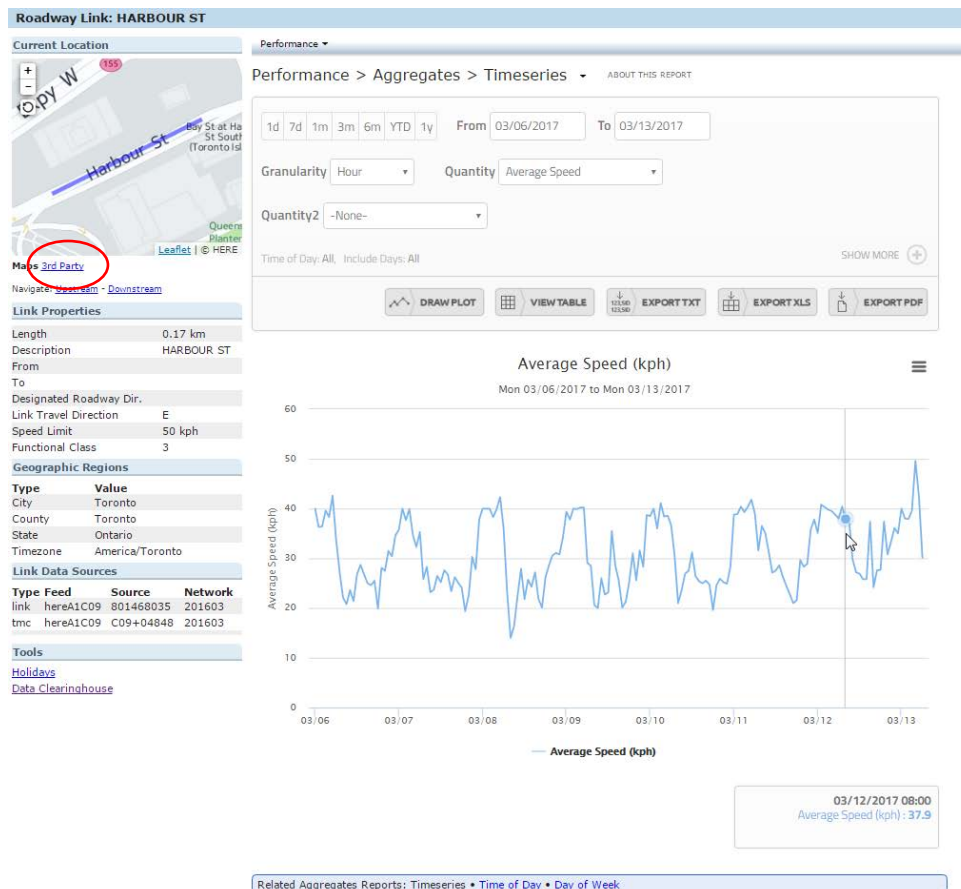
available reports for
same segment

- available reports for
same segment



Navigation Tip

- If you want to go back to the map, you can return to the Real Time Map by clicking '3rd Party' link underneath the inset map
- But don't do it yet as we are going to go through link data in more detail next



Link Reports

There are three different link reports

Timeseries

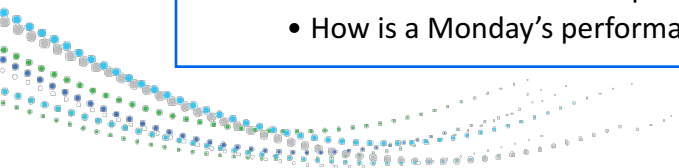
- Shows variables over time

Time of Day

- Shows the averages over the time of day
- Answers questions like, what is the typical speed at 7am?
- This plot is used to review typical traffic patterns.

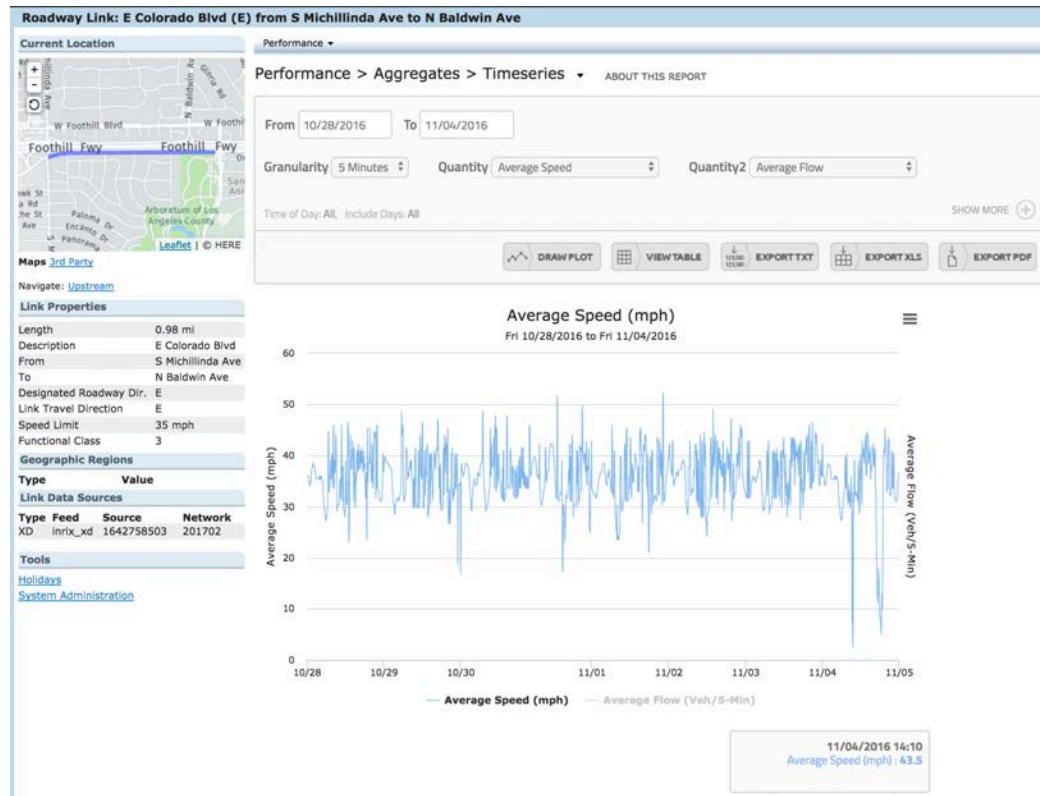
Day of Week

- Review the difference in performance between the days of the week
- How is a Monday's performance different from a Wednesday?



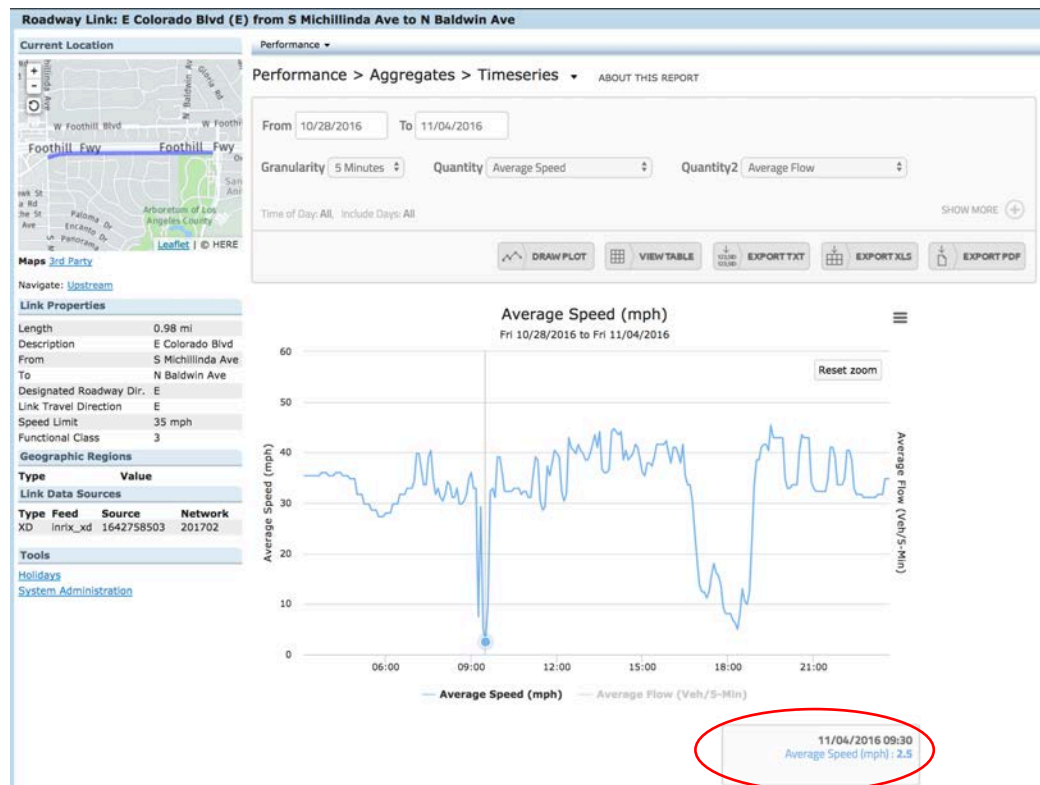
Timeseries Report

- Let's see how the Friday 11/4 congestion compares to conditions the rest of the week
- Date Range: 10/28/2016 – 11/4/2016
- Granularity = 5 Minutes
- Quantity = Average Speed
- Quantity2 = Average Flow
- Always click Draw Plot or View Table to refresh the report with your new settings



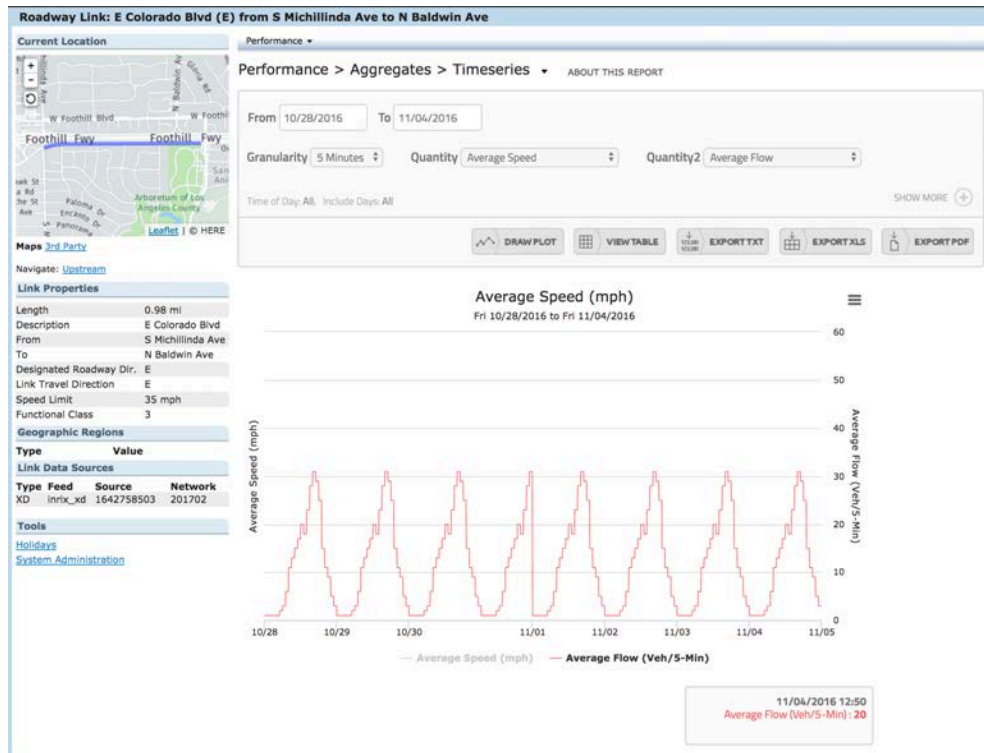
Timeseries Report

- Click and Drag on the plot to zoom into a particular area
- Hover over the plot to see the exact value in the box below the plot



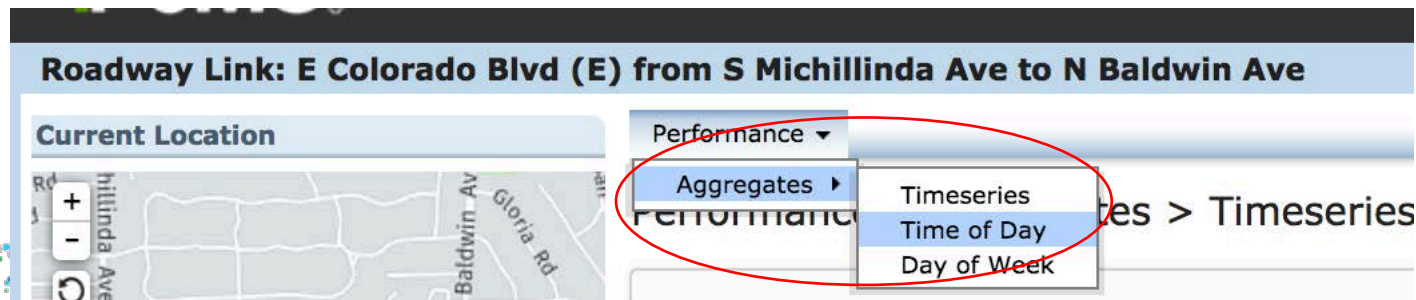
Timeseries Report

- Look at Average Flow to see the traffic volume profiles for each link
- Note that the volume profile is the same every day
- These volumes are being used in the delay computations for the link (and for routes that the link is part of)



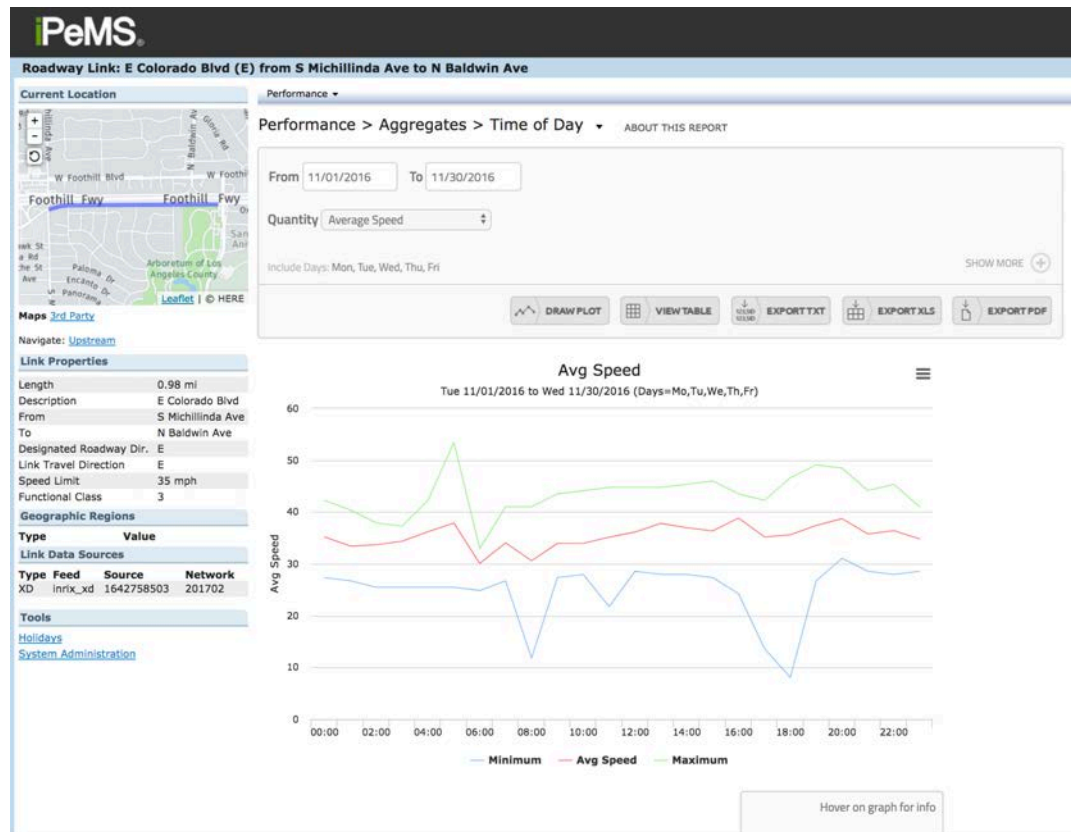
Time of Day Report

- Useful to answer questions, i.e. what are the average conditions at 9am?
- From the top tool bar, select, Performance > Aggregates > Time of Day
- Instead of presenting data in a chronological order from a beginning date to ending date, the Time of Day report aggregates the data according to the hour of day across the date range selected.
- So all 8am hours are evaluated together, and all 9am, 10am, etc., for all hours of day.
- The min, mean, and max values are the default values presented



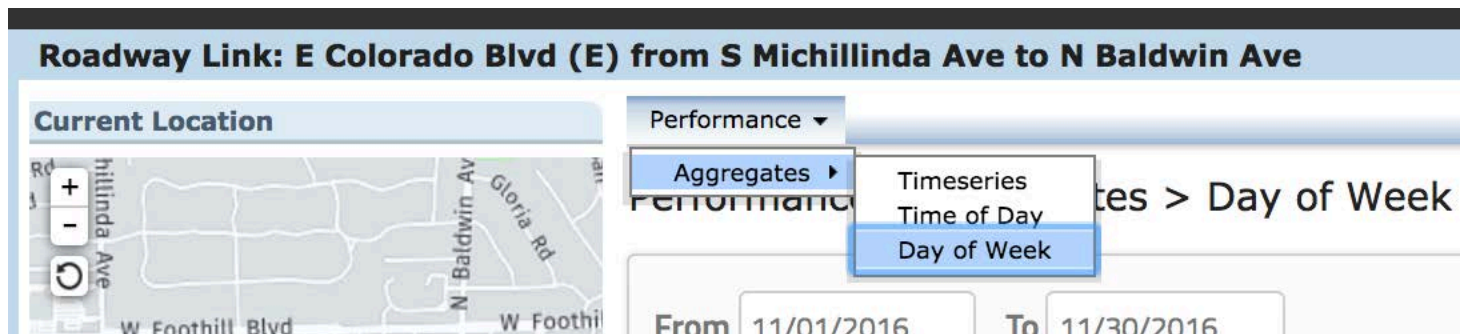
Time of Day Report

- Staying on the same link, change the report settings
- Date range = 11/1/16 – 11/30/16
- Quantity = Average Speed
- Expand the “Show More” box by clicking on the plus sign
- De-select Saturday, Sunday and Holidays
- Keep the statistics as mean, min, max
- Draw Plot



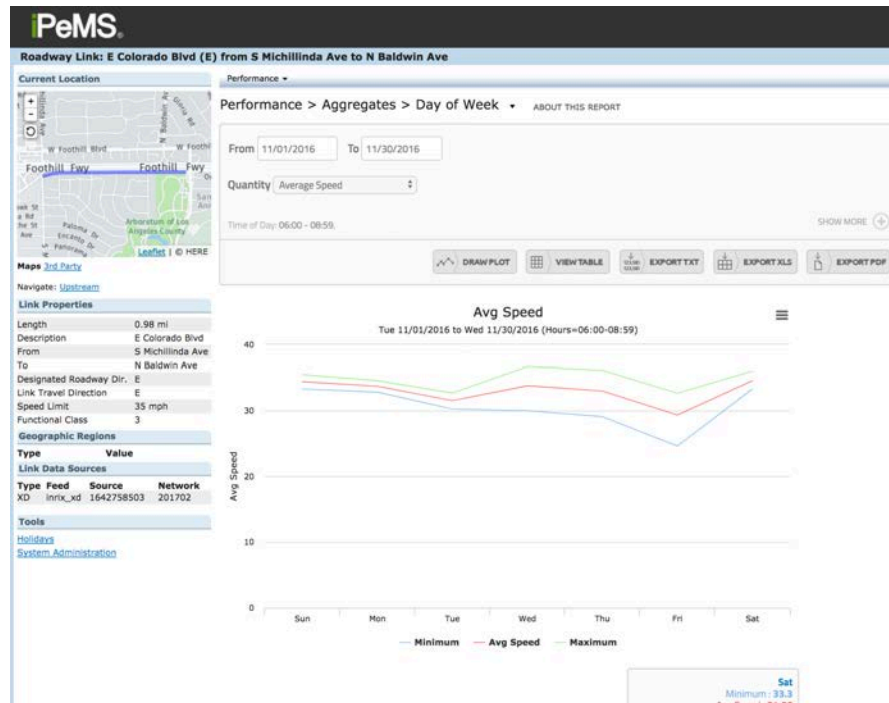
Day of Week Report

- Helps answer questions like, how is Monday different than Wednesday?
- Note that you can also change the report by clicking on the small pull down triangle after the report name. Select Day of Week.
- The Day of Week report does a different kind of aggregation. Instead of aggregating days by their hour of day, it aggregates by the day of week.
- All Mondays are analyzed together, all Tuesdays, etc. This can be a useful report to evaluate weekday vs. weekend performance



Day of Week Report

- Expand the + button and choose times between 06:00 & 8:59
- Quantity = Average Speed
- Tip: Make sure to choose a date range longer than a week to get results for each day of the week

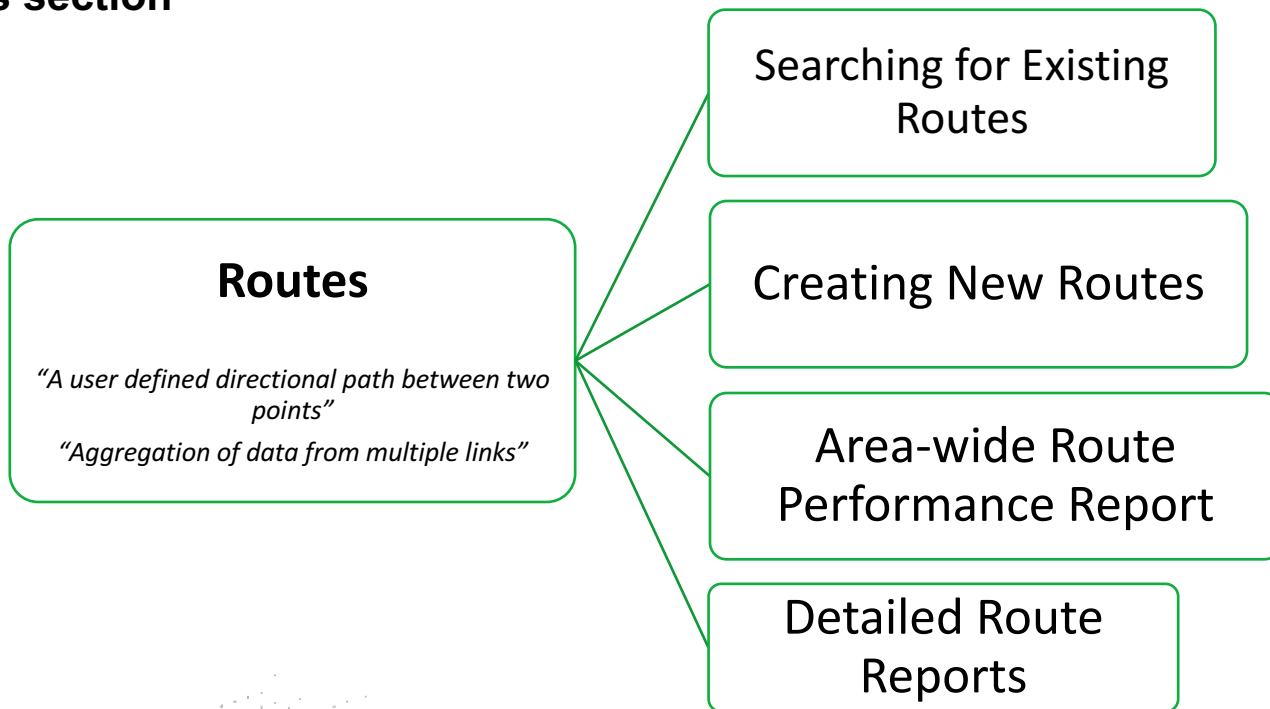




Creating and Finding Routes

Route Data

In this section

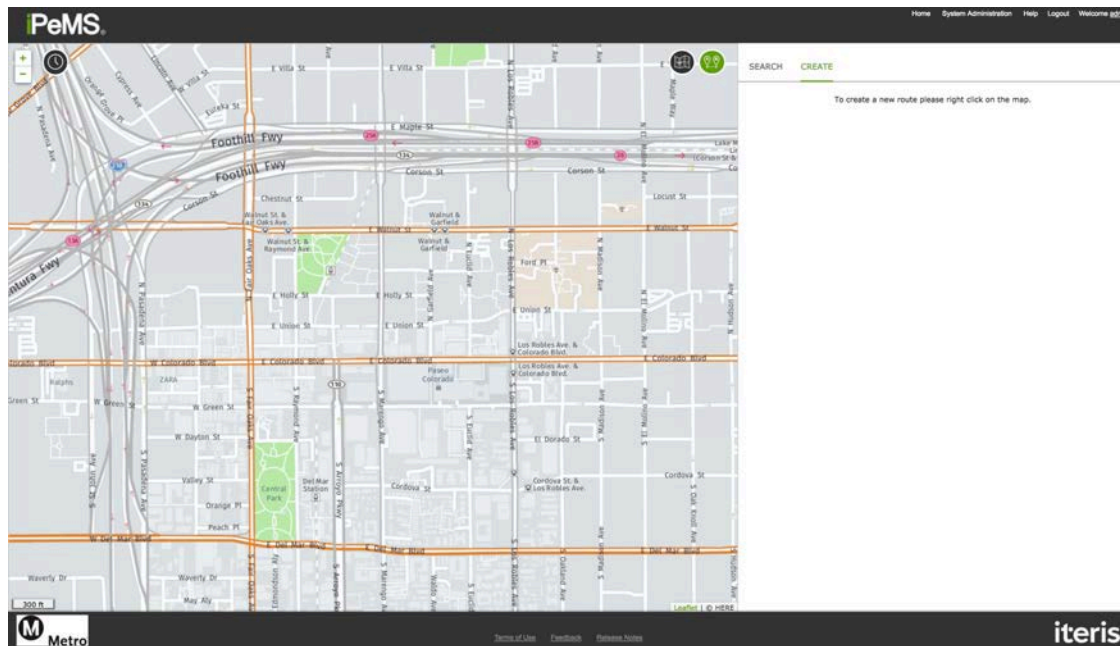


Creating a new route

- Click the Route icon in the top right

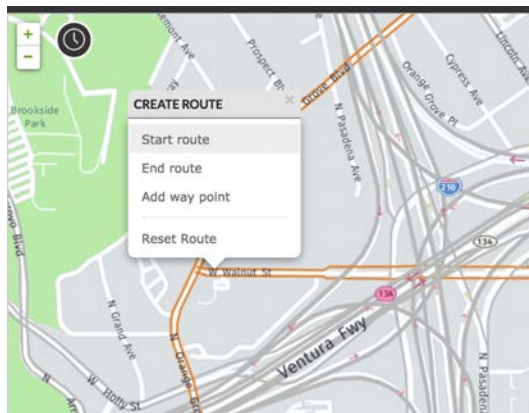


- This opens the Route creation side panel that displays information about your route as you create it.
- If you want to look at volume performance measures on a route, make sure you have the Volume Profile layer on and only choose roadway links that have volume data



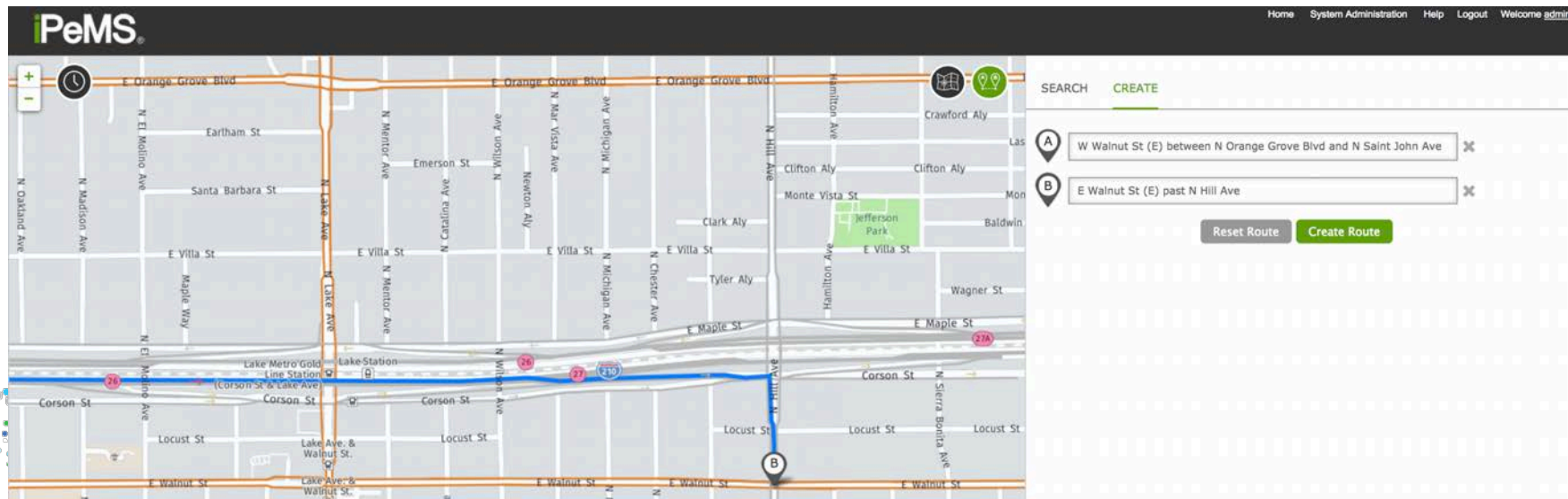
Creating a new route: Start

- Start by right clicking in the map, which brings up the Create Route pop-up. Click “Start route”



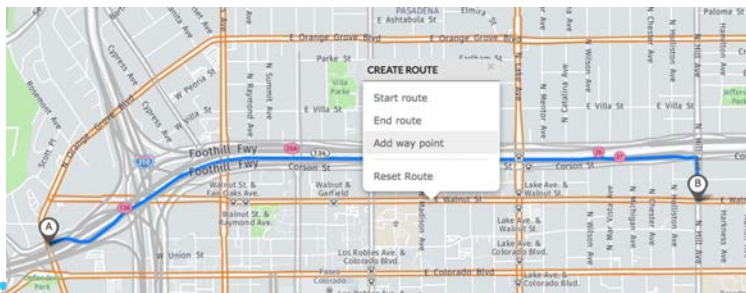
Creating a new route: End

- Then, right click again in the map where you want the route to end, and click “End route.”
- Starting and ending descriptions are provided



Creating a new route: Way point

- But I didn't want my route to take the freeway!
- We can fix this by adding a way point
- Right click on the map where you want to add a way point
- The route pathway will update to include your way point
- If you wanted to start over, select Reset Route



Creating a new route: Saving

- Click Create Route
- Route Name:
 - E.g. **Road Name Dir: Start to End**
Walnut St EB: Orange Grove Blvd to Hill Blvd
- Option to let other users see route
- Select Start date to process performance measures back to that date (earliest is 7/1/14)
- Select Roadway Type to calculate LOS using correct HCM link equations
- Tags let you organize and easily search for routes
 - Eg: pasadena, signal sync, ICM

SEARCH CREATE

A W Walnut St (E) between N Orange Grove Blvd and N Saint John Ave X

B E Walnut St (E) past N Los Robles Ave X

C E Walnut St (E) past N Hill Ave X

Reset Route Create Route

SEARCH CREATE RESULTS SAVE

Route name: Walnut St EB: Orange Grove Blvd to Hill Blvd

Share route? ☒ Yes ☐ No

Start date: 12/01/2016
Route data will be processed back to this date

Description: Test Corridor

Roadway Type: Arterial

Tag(s):
(Separate keyword phrases with a comma)
test pilot

Save Route

Searching for an Existing Route: List

- Route Listing

List of all routes in the tool

The screenshot displays the iPeMS web application interface. On the left is a map of the Los Angeles area. On the right is a sidebar with navigation options. A blue callout box on the left contains the text "List of all routes in the tool" with a blue arrow pointing to the "CHOOSE ROUTE" button in the sidebar. Another blue callout box points to the "Route List" option within the "CHOOSE ROUTE" dropdown menu.

Select Geography:
CA > Region > LA County Pilot

Area-wide Performance Overview
ROUTE REPORTS

Detailed Performance of a Link or Route

STEP 1
Select Link or Route
CHOOSE LINK FROM A MAP
CHOOSE ROUTE
Route List
Route Search

Click on to expand menu

STEP 2
Choose a report

STEP 3
Graph
or
Download

Searching for an Existing Route: List

- Routes Listing page shows a list of all routes
- Can search by keyword or tag

LA County Pilot

Current Location

Overview

Overview > Third Party Data > Routes Listing


Keyword: Owner: All Tags: Select a tag... Apply Clear

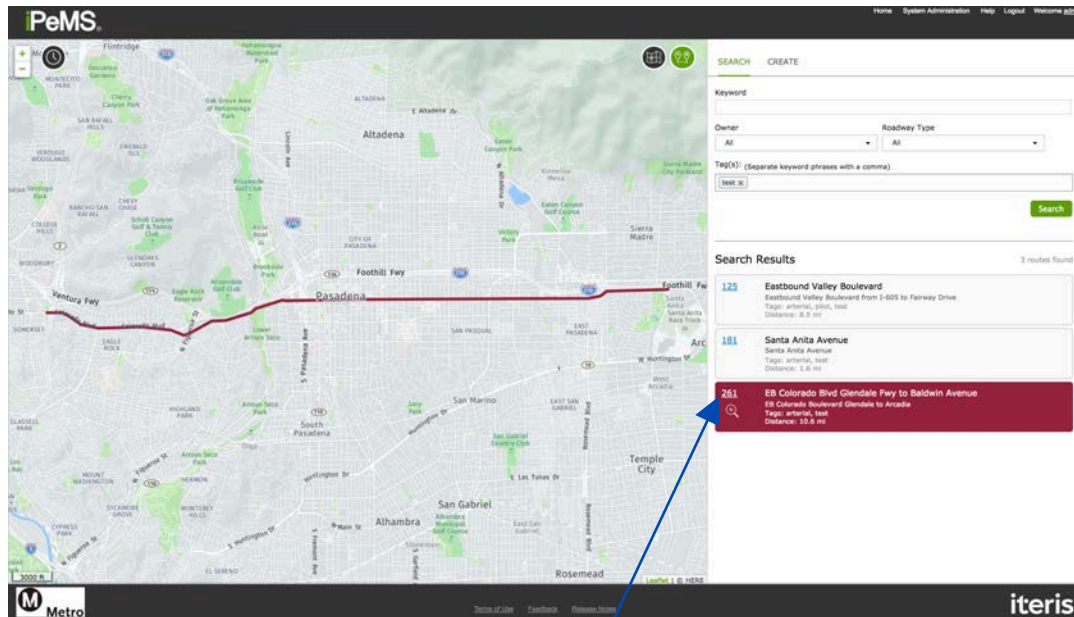
Route ID	Route Name	Description	Road Type	Tags	Owner	Length (mi)
125	Eastbound Valley Boulevard	Eastbound Valley Boulevard from I-605 to Fairway Drive	Arterial	pilot, test	System Routes	8.5
141	NB Rosemead I-10 to I-210	NB Rosemead from I-10 to I-210	Arterial	pilot	System Routes	5.2
142	EB Las Tunas Drive	Las Tunas Drive from Atlantic to Live Oaks	Arterial	pilot	System Routes	6.1
181	Santa Anita Avenue	Santa Anita Avenue	Arterial	test	System Routes	1.6
182	Sierra Madre Blvd	Sierra Madre Boulevard between Orange Grove Boulevard and Michillinda Avenue	Arterial	pilot	System Routes	3.3
201	Eastbound Valley Boulevard 2	test route	Arterial		System Routes	8.4
261	Colorado Blvd Glendale Fwy to Baldwin Avenue	EB Colorado Boulevard Glendale to Arcadia	Arterial	test	System Routes	10.6

Related Third Party Data Reports: Routes Listing • Route Performance • Route Report Card • Time Comparison • Real-Time Map

Click on the Route # to get detailed data

Searching for an Existing Route: Map

- From the Map, Click  & then Search
- All routes matching the search appear on the right
- Click any relevant routes and they'll be highlighted and plotted on the map



PeMS

SEARCH CREATE

Keyword

Owner: All Roadway Type: All

Tag(s): (Separate keyword phrases with a comma)

Search

Search Results 3 routes found

- 125 Eastbound Valley Boulevard
Eastbound Valley Boulevard from I-405 to Fairway Drive
Tag: arterial, peak, toll
Distance: 8.5 mi
- 181 Santa Anita Avenue
Santa Anita Avenue
Tag: arterial, toll
Distance: 1.4 mi
- 261 EB Colorado Blvd Glendale Fwy to Baldwin Avenue
EB Colorado Boulevard Glendale to Arcadia
Tag: arterial, toll
Distance: 19.9 mi

Metro iteris

Click on the Route #
to get detailed data



Detailed Route Reports

Detailed Route Reports

Aggregates Reports

Timeseries

- Shows variables over time

Time of Day

- Shows the averages over the time of day
- What is the typical speed at 7am?
- This plot is used to review typical weekday traffic patterns.

Day of Week

- Review the difference in performance between the days of the week
- How is a Monday's performance different from a Wednesday?

Analysis Reports

Spatial Congestion

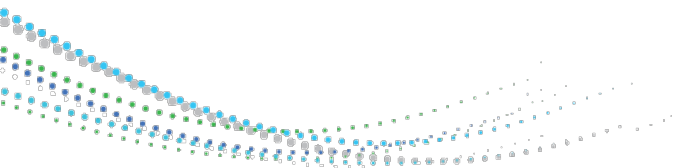
- Time in congestion along the length of the route

Contours

- Visual heat map of congestion in time and space
- Understand where and when congestion is occurring

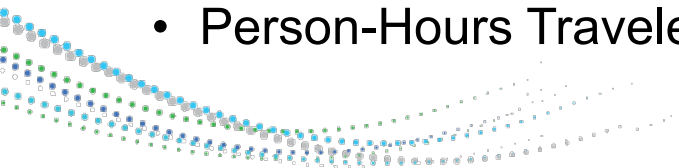
Route Performance Measures: Speed-based

- Average Speed
- Average Travel Time
- Travel Time Index (Free-Flow): Travel Time divided by Free-flow Travel Time
- Delay in Minutes (Free-Flow): Travel time minus the free-flow travel time
- Average Confidence: Ranges from 10-30



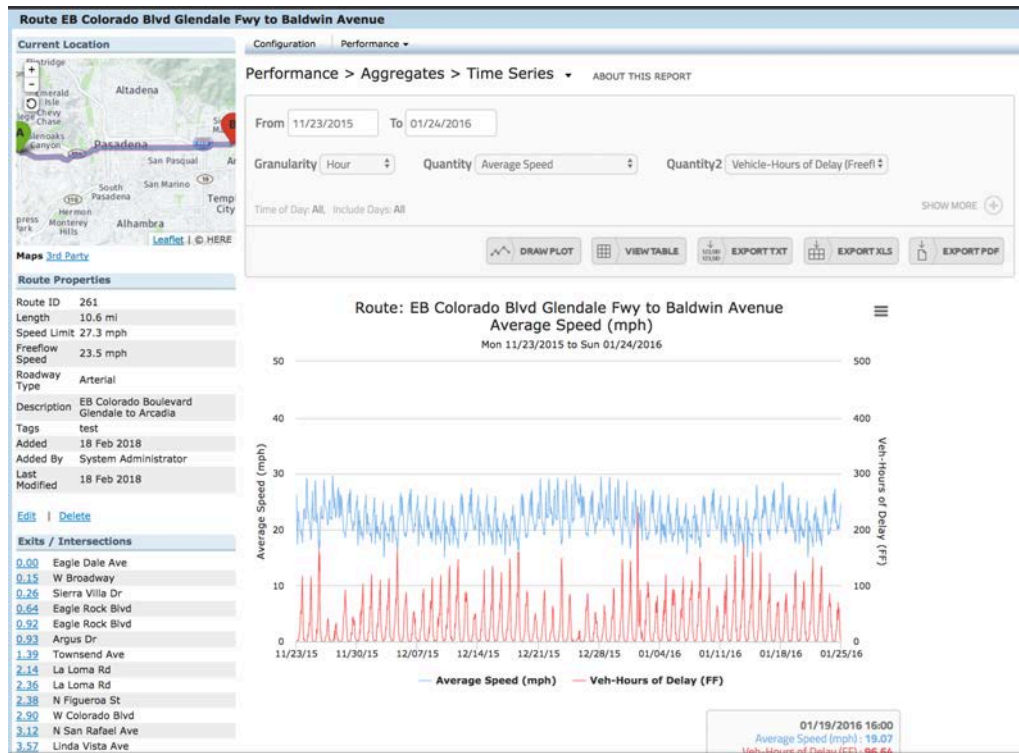
Route Performance Measures: Speed- and Volume-based

- Average Flow: Average flow across all links on the route
- Vehicle Hours of Delay (Free-flow): total vehicle-hours of delay due to travel below the free-flow speed
- Vehicle Hours of Delay (90% Free-flow): total vehicle-hours of delay due to travel below 90% of the free-flow speed
- Person-Hours of delay (Free-flow): vehicle hours of delay (free-flow) multiplied by the People per Vehicle value on the report
- Vehicle-Miles Traveled
- Person-Miles Traveled: $VMT * \text{People per Vehicle}$
- Vehicle-Hours Traveled
- Person-Hours Traveled: $VHT * \text{People per Vehicle}$



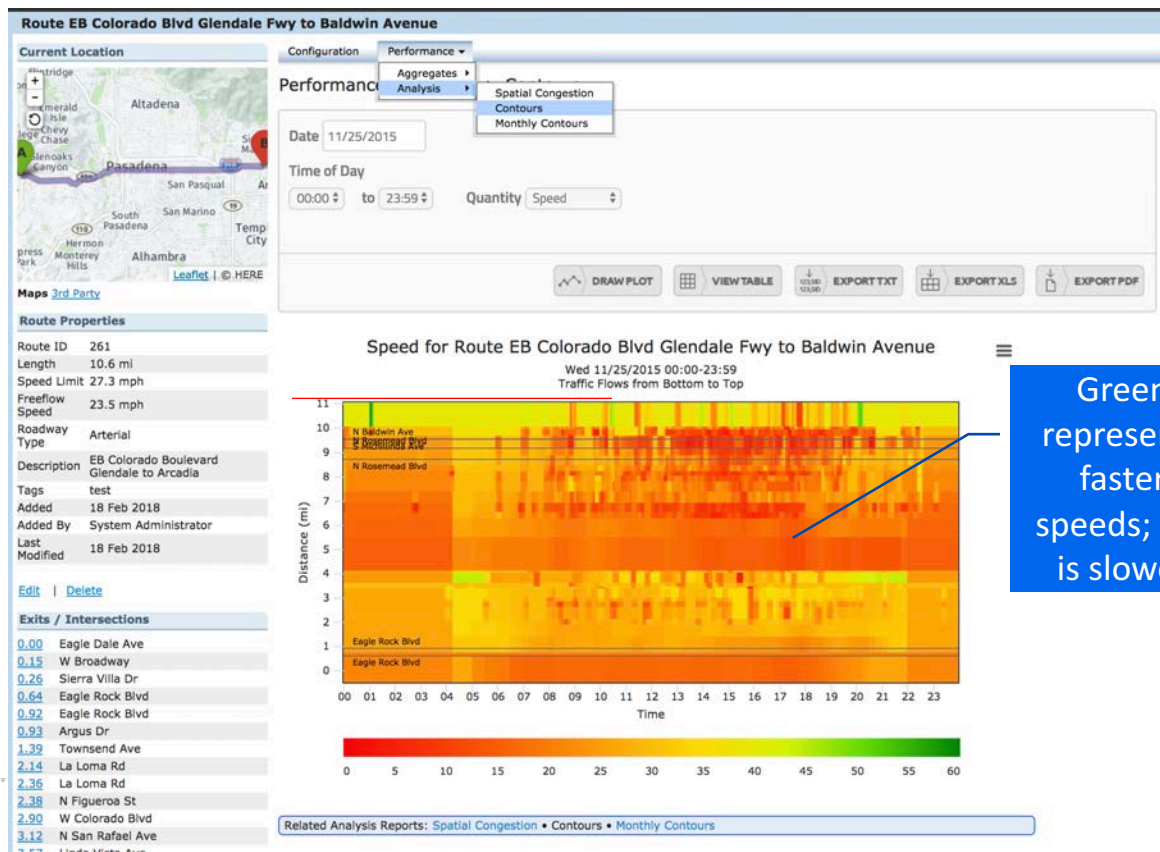
Route Timeseries Report

- Like the Link Timeseries report, but data is aggregated across all the links on the route
- Let's look at average speed and Vehicle Hours of Delay (free-flow) over the 2015 holiday season



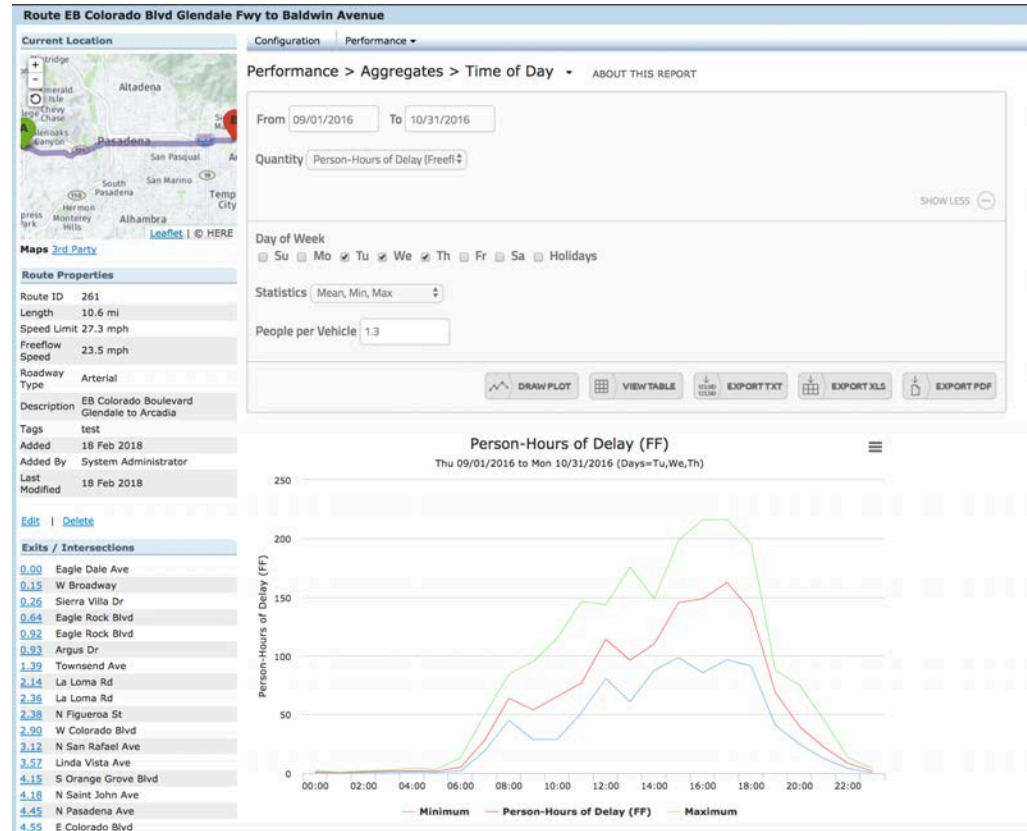
Route Contours

- Let's investigate where Thanksgiving travel slow-downs were happening on 11/25/15
- Choose Performance > Analysis > Contours in the menu
- Time / Distance heat map for a single day
- TIP – Hover over to see values and nearest exits/intersections



Route Time of Day Report

- Let's look at the min, mean, and max Person-Hours of Delay (freeflow) on Tues-Thurs of Fall 2016
- Set people per vehicle to 1.3
- Shows the range of conditions experienced over the two months





Area-Wide Route Reports

Area-wide Route Reports

Route Performance

- Performance across all routes for a given time and date

Route Report Card

- Travel times and speeds for AM (06:00 to 09:00), Midday(09:00 to 16:00) and PM (16:00 to 19:00) Peaks across all routes

Time Comparison

- Choose two time periods and compare the travel times across all routes
- Useful for before and after studies

Overview > Third Party Data > Route Report Card

1d 7d 1m 3m 6m YTD 1y From: 02/01/2017 To: 03/17/2017

Keyword: Owner: All Road Type: All

Time of Day: All, Include Days: All, Routes: All

SHOW MORE

VIEW TABLE EXPORT TXT EXPORT XLS EXPORT PDF

Area-wide Route Performance Report

Area-wide Route Performance Report:
See the performance of all routes for a specified time / date

PeMS

Click to View Map.

Select Geography:
CA > Region > LA County Pilot

Area-wide Performance Overview

ROUTE REPORTS

- Route Performance
- Report Card
- Time Comparison

STEP 1

Select Link or Route

- CHOOSE LINK FROM A MAP
- CHOOSE ROUTE
- CREATE A NEW ROUTE

STEP 2

Choose a report

STEP 3

Graph

or

Download

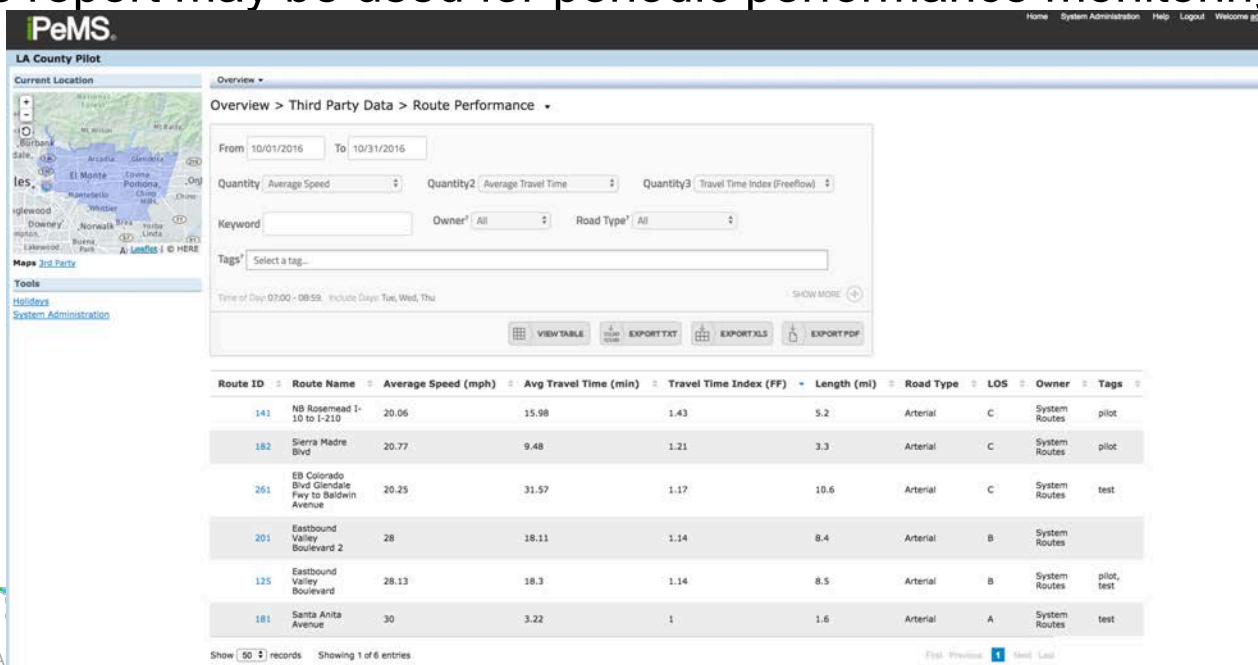
After Step 1, choose a report, graph and download content

Metro

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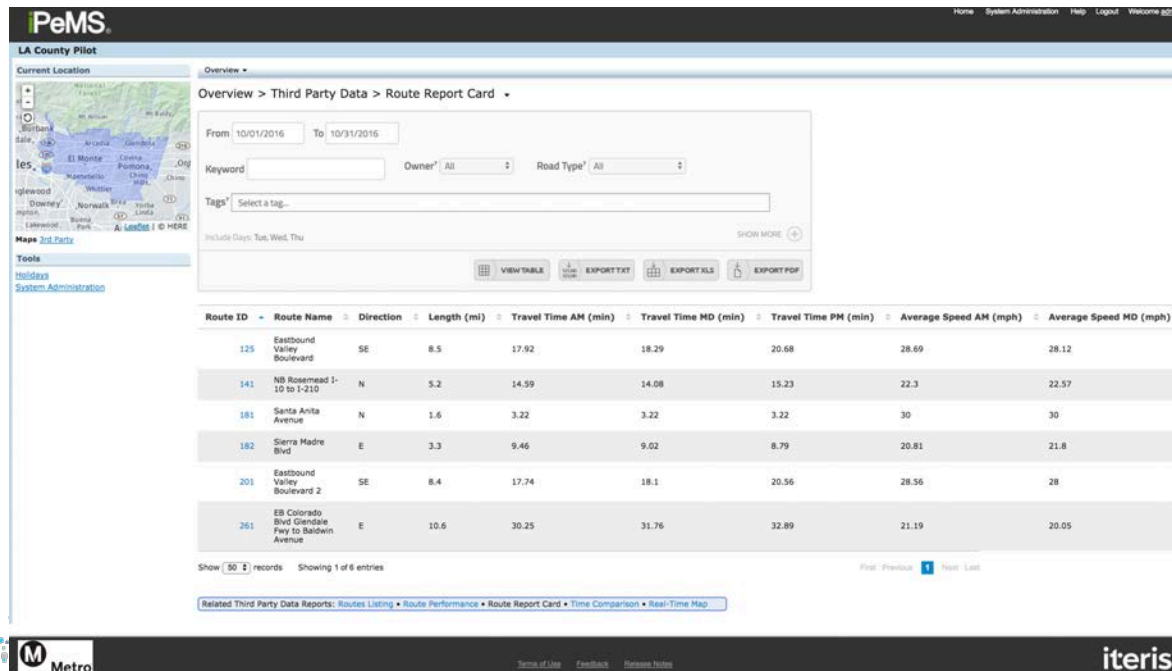
Area-wide Route Performance Report

- Understand the performance of all routes for a given time and date with key performance indicators.
- This report may be used for periodic performance monitoring.



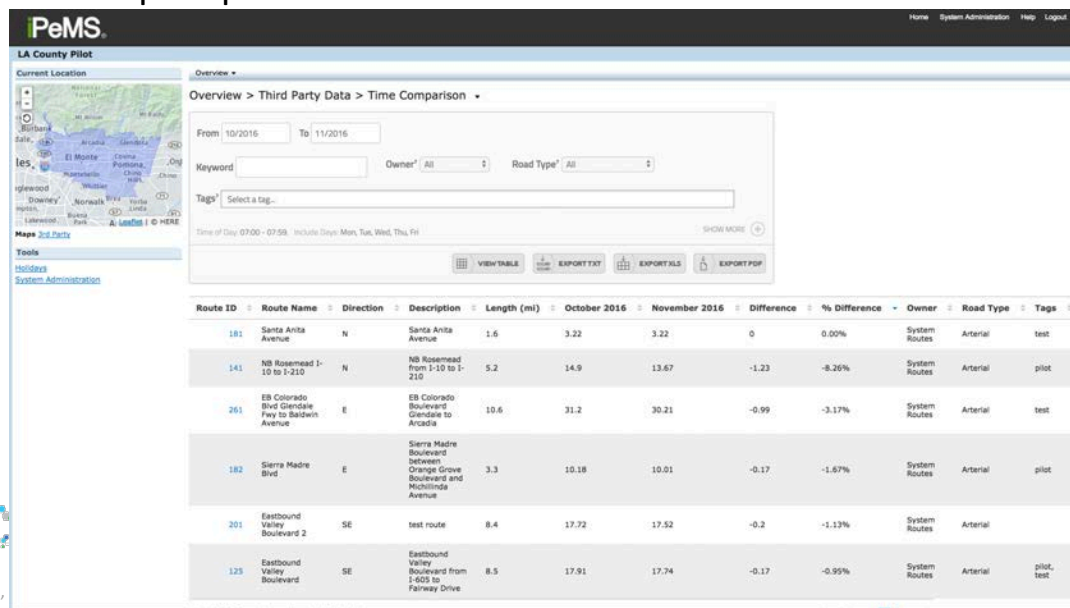
Area-wide Route Report Card

- Travel times and speeds for AM, Midday and PM Peaks across all routes



Area-wide Route Time Comparison

- Choose two time periods and compare the travel times across all routes
- Useful for:
 - Before and after studies
 - Compare performance month on month



No routes got slower during the AM peak in November vs October



Exercises

Exercise

Navigate to Route ID 281 (Rosemead Blvd NB: Beverly Blvd to Orange Grove Blvd) and answer the following questions

- Plot the timeseries of hourly average speeds and vehicle-hours of delay (free-flow) between 9/1/15 and 10/31/15
 - When was the lowest speed measured? What was it?
 - What was the corresponding vehicle-hours of delay during that hour?
- Navigate to the Performance > Analysis > Contours and visualize the speeds for that same day with the lowest speed. What patterns do you observe?
- Navigate to the Performance > Aggregates > Time of Day report and plot the mean, min, and max Delay in Minutes (Freeflow) for Tues-Thurs in Sep-Oct 2015.
 - What is the average minutes of delay at 6pm?
 - What was the highest minutes of delay at 6pm?

Thank You!

Questions?

