



5<sup>th</sup> International Performance Measurement Conference

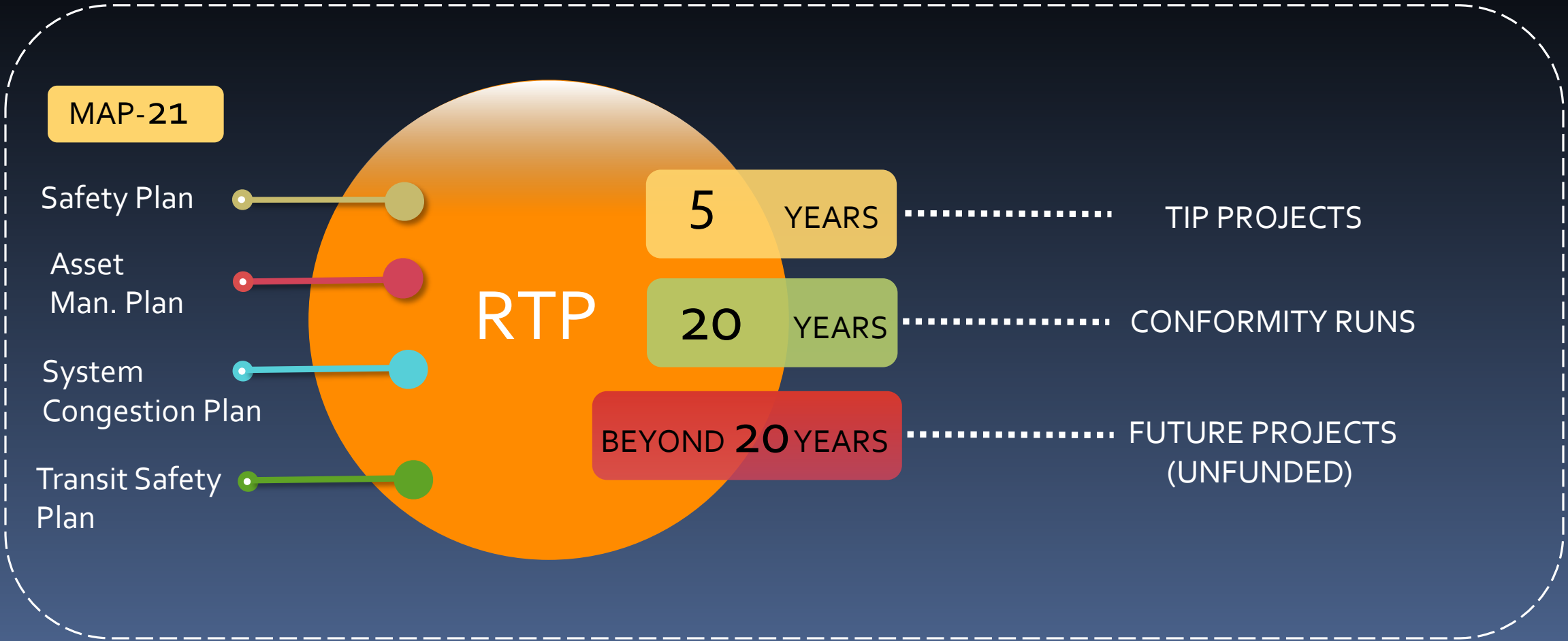
# Still making decisions based on assumptions? The benefits of Big Data analytics and visualization



6/2/15

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# MPO INVESTMENT UNIVERSE



## SOURCES

Federal Programs

State from HURF

Regional from tax

\$

## LIFE CYCLE PROGRAMS

Highway

Arterial

Transit

TIP



Advance and support  
Regional Goals and  
Targets

[Total 2014-2035 estimated \$17B  
RTP 20 yr. Plan horizon]

# TOOLS



Federal Programs

NHPP

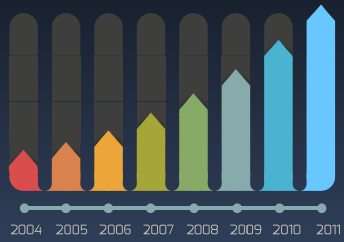
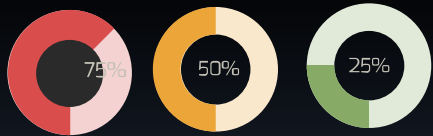
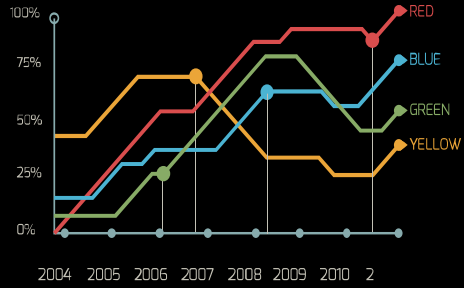
STP

TA

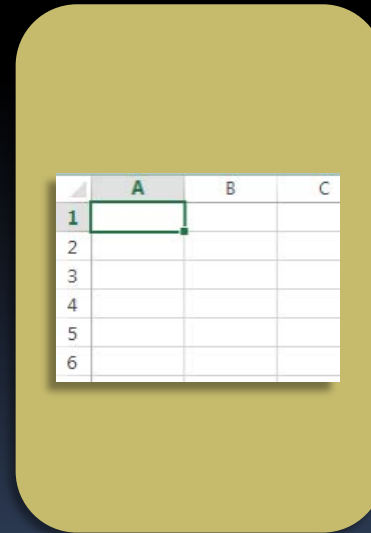
CMAQ

HSIP

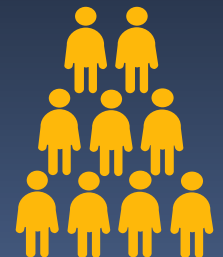




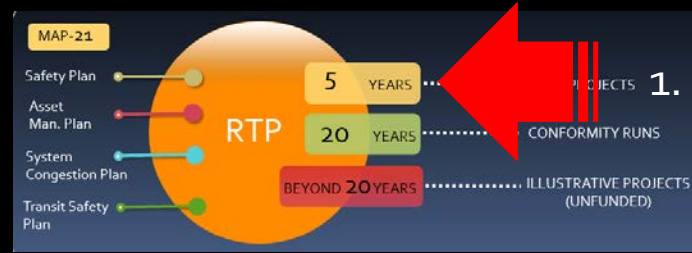
# TOOL



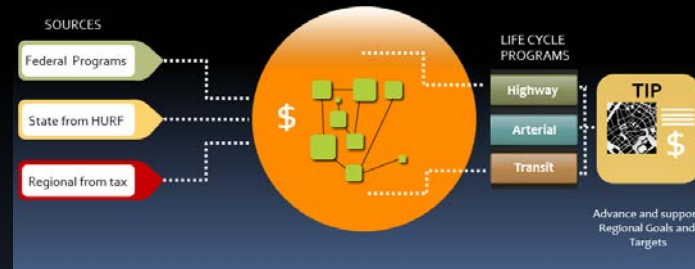
ProjID	City	Project Name	Committee Rank	Final Average	Final Rank
			20%	100%	
PHI-BikePho4	Phoenix	Regional BikeShare Along Metro Rail Corridor-Phx to Tempe	3	5.0	2.0
CHL-BikePho1	Cave Creek	Cave Creek CarFree Bike Lanes	2	8.0	3.0
MAK-BikePho1	Maricopa County	5th Bike Lane on McDowell Rd. 7th St to Library Pass	4	6.9	4.0
DES-BikePho1	Mesa	Rio Salado Shared Use Pathway - Segment 3	6	7.6	5.0
PHO-BikePho1	Phoenix	Roosevelt Row Bike Lane and Sidewalk Improvement	5	7.6	6.0
AVN-BikePho1	Avondale	Agua Fria Asphalt 1-10 Underpass	7	8.0	7.0
TEM-BikePho2	Tempe	Shared Use Path Priest Drive Underpass	1	2.7	1.0
GLN-BikePho1	Glen Dale	New River North Shared Use Pathway	8	8.4	7.0
PHI-BikePho1	Phoenix	Rio Salado 12' Shared Use Pathway 32nd Street to 40th Street	10	10.0	9.0
PHI-BikePho1	Phoenix	32nd Street Bike Lanes SR51 to Reach 11	11	11.3	10.0
PHI-BikePho1	Phoenix	12' Shared Use Pathway Rio Salado Pathway - 40th Street to SR143	9	11.7	11.0



# SUMMARY: Practical approach to initiate performance-based programming applications

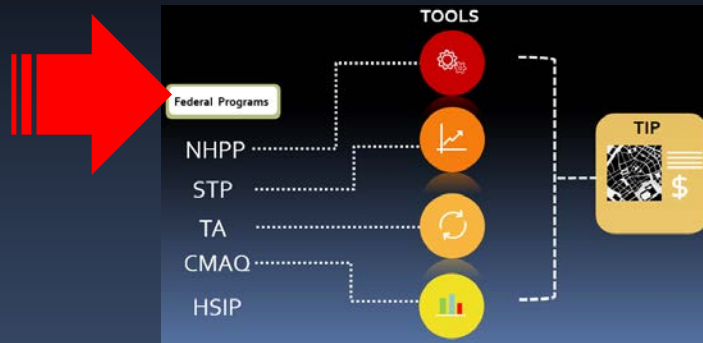


1. Start with one time frame universe



e.g. the 5 year TIP

2. Apply tools to one group of funding sources, e.g. Federal Funds



3. Use key measures appropriate to each funding program and mode



4. At appropriate stages, involve stakeholders, customers and policy makers to achieve results

5. Performance- Based investment decisions

# Background and Context

## MAG MPO

- Population (2012) 4.1M
- Land Area 10,600 sq.mi.

## MAG MPO Population Growth (2000 –2012)

- Overall: 30.60%
- Annual: 2.78%

## Total Employment (2010)

1.7M

## Existing Freeway/Highway

850 centerline miles

## Principal Arterials

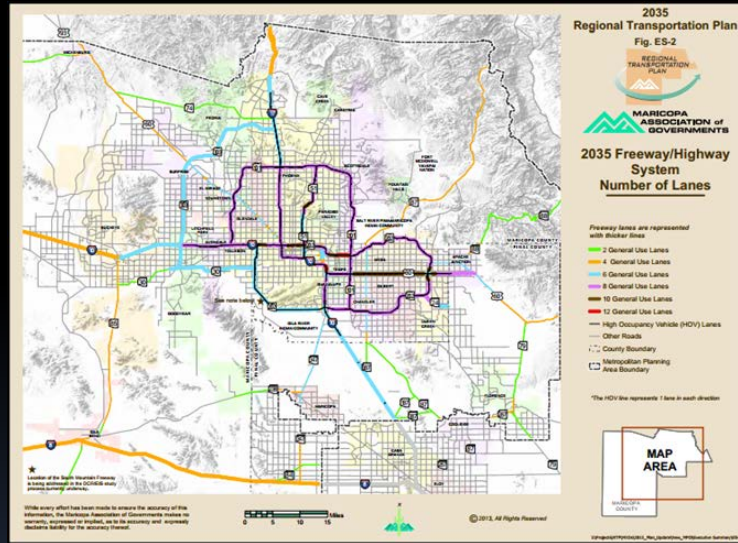
4,000 directional miles

## Transit service

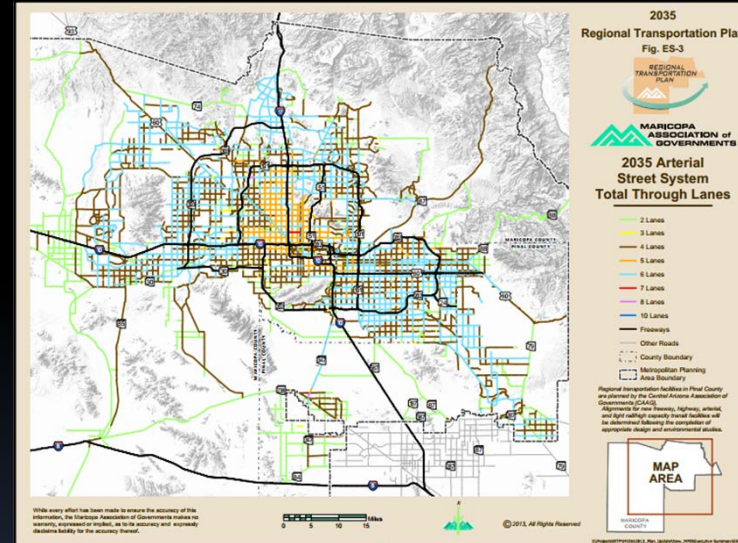
- 59 Local Bus Routes – 59 M riders /yr
- 21 Express, 5 Rapid Lines
- 20 mi. Rail Line – 14 M riders/yr



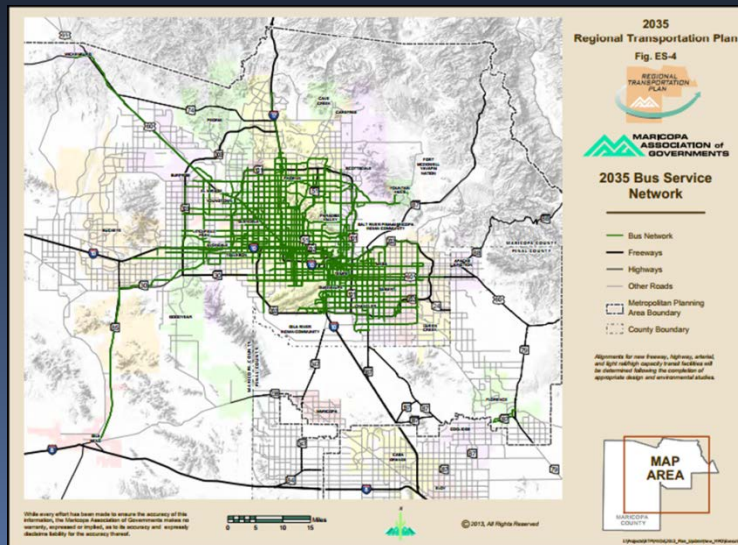
# Freeway/Highway



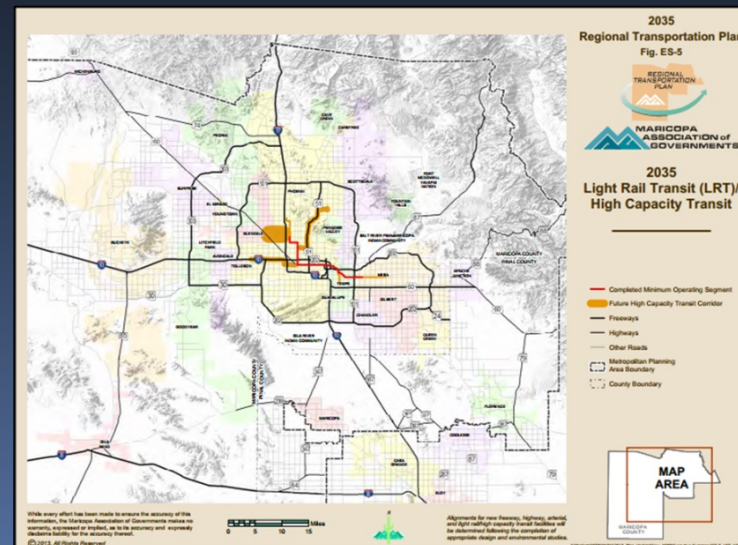
# Arterial



# Bus Service Network



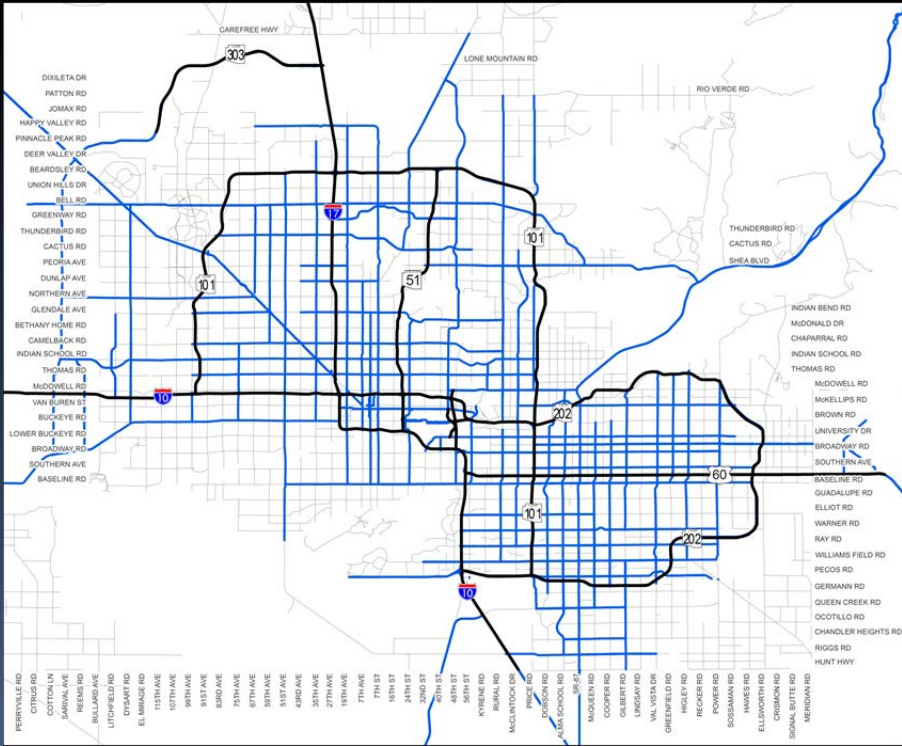
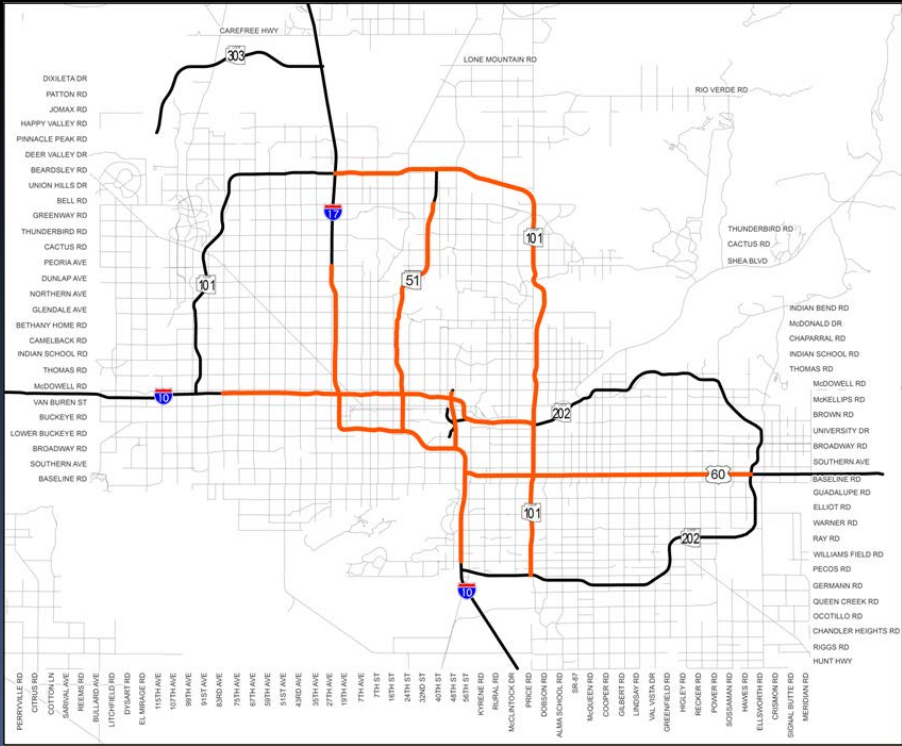
# Light Rail Transit





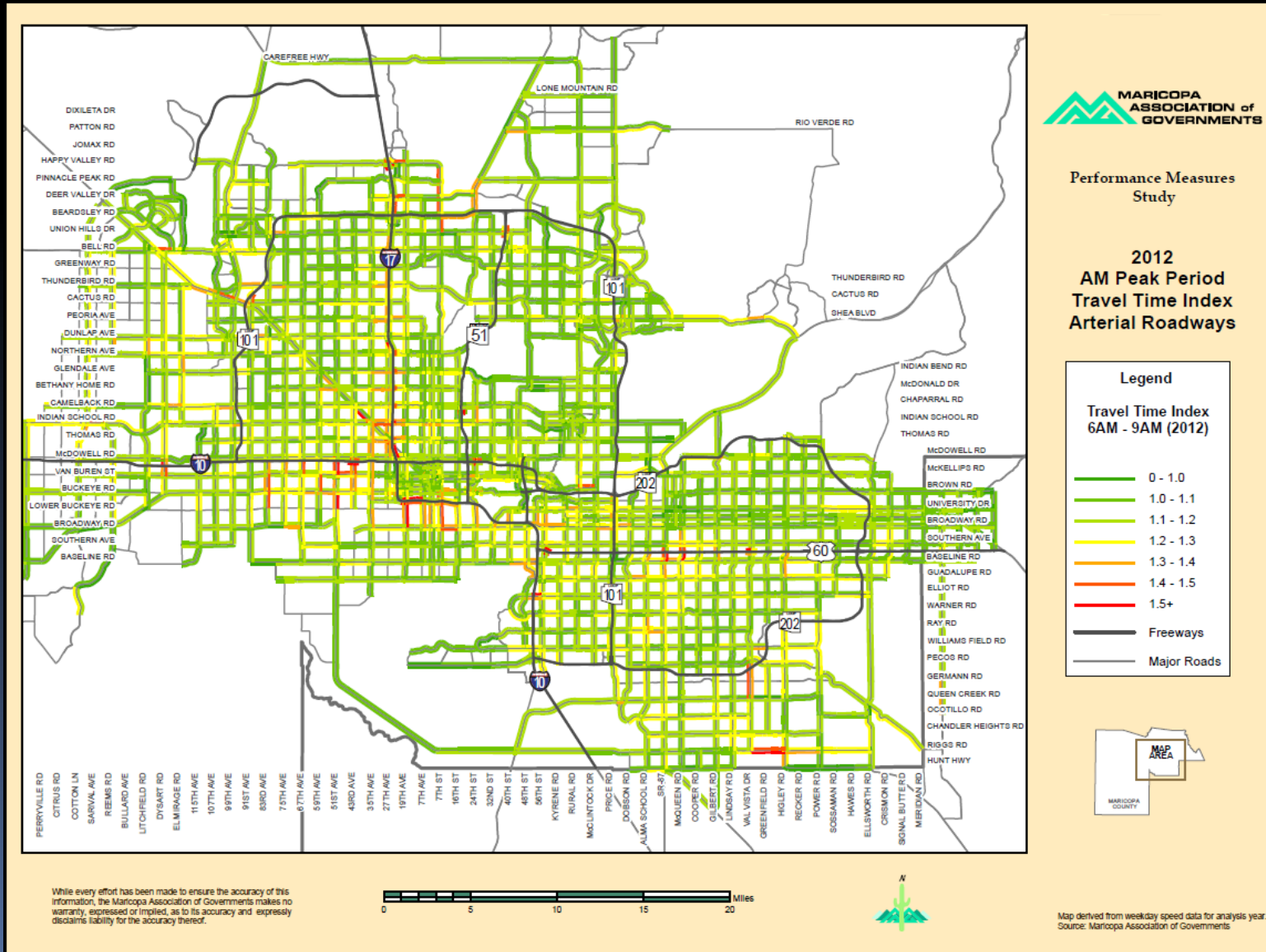
# DATA SOURCES

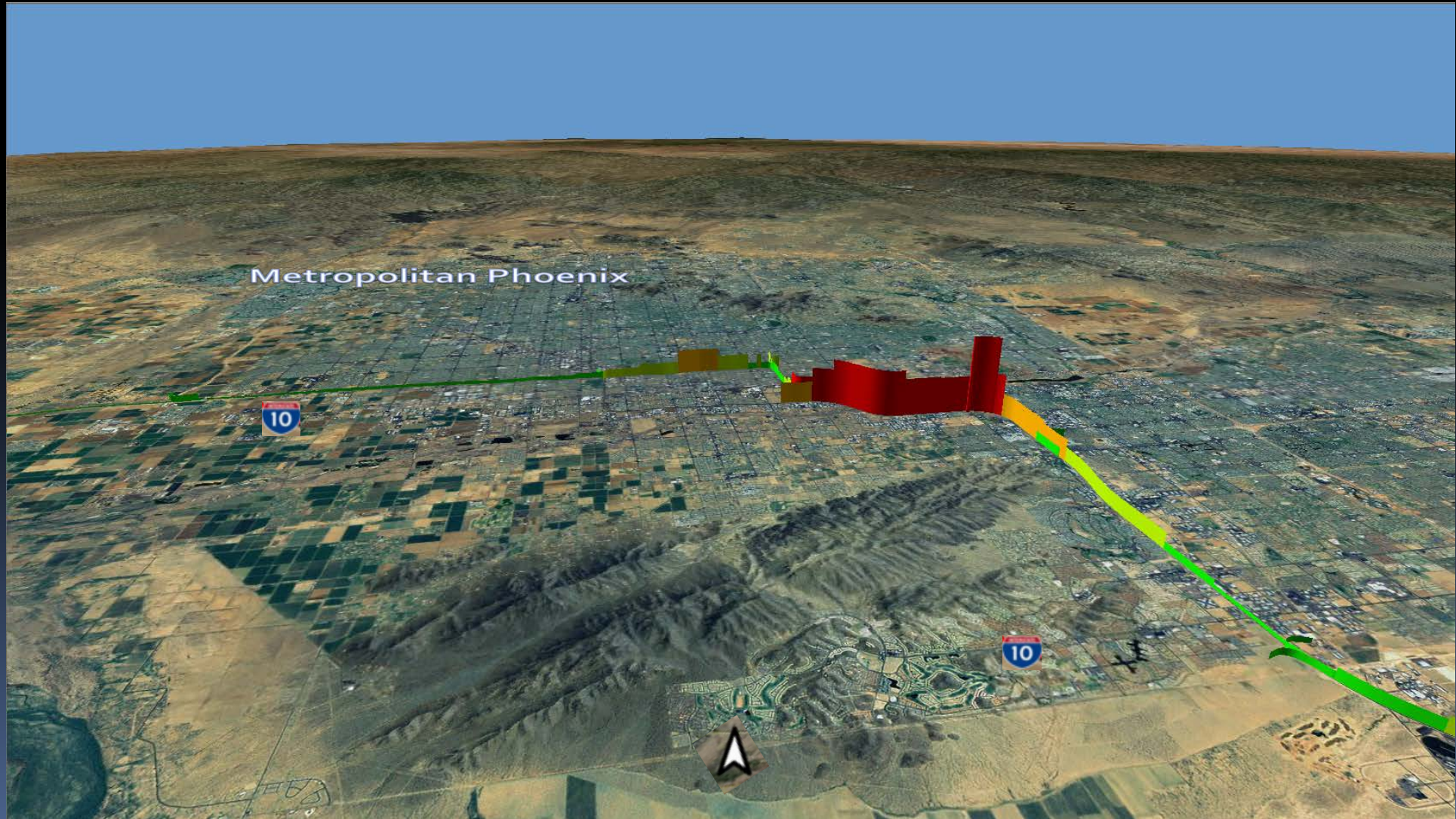
## Comparing Coverage of ADOT FMS vs NPMRDS



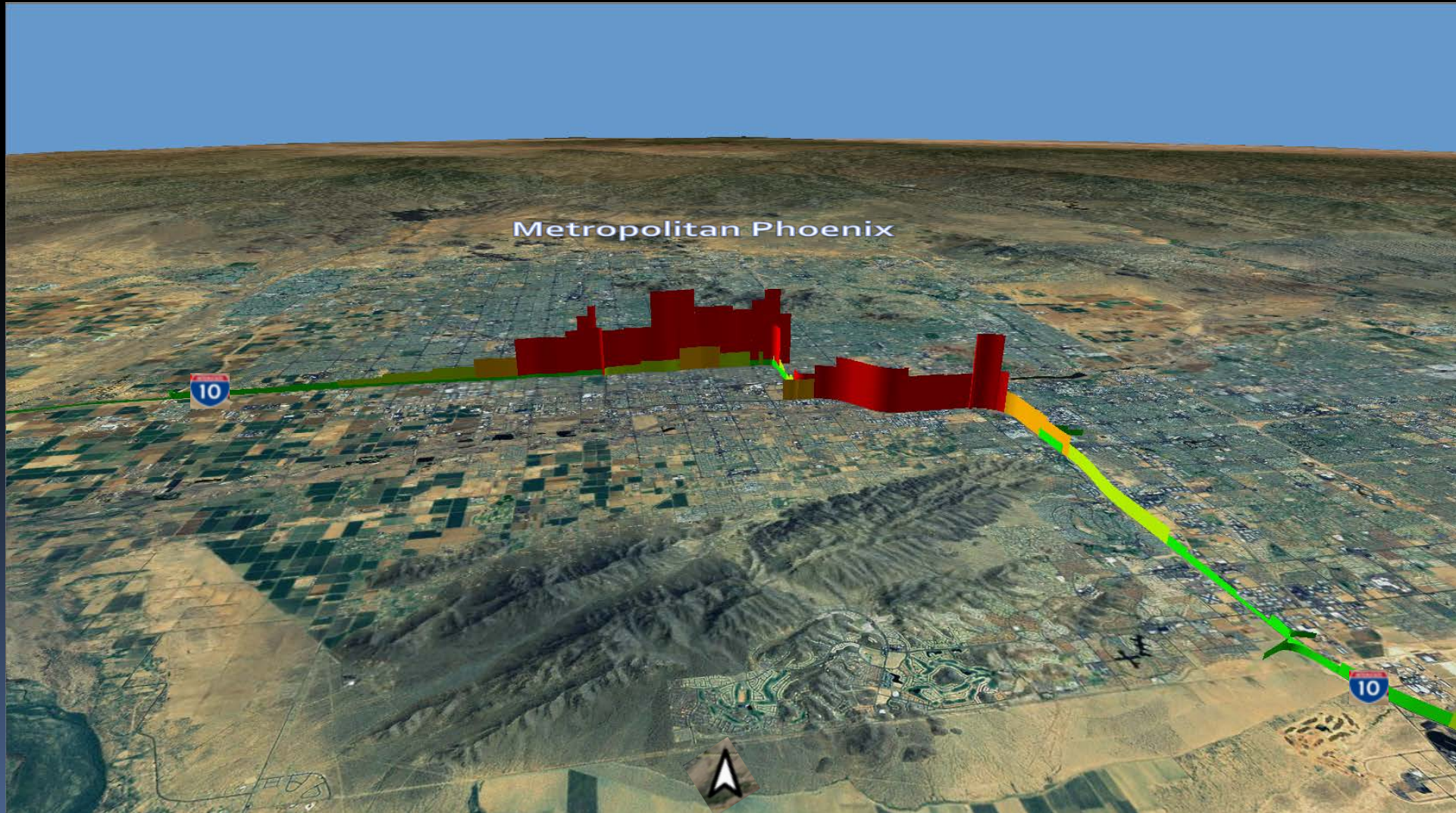


# Travel Time Index Output



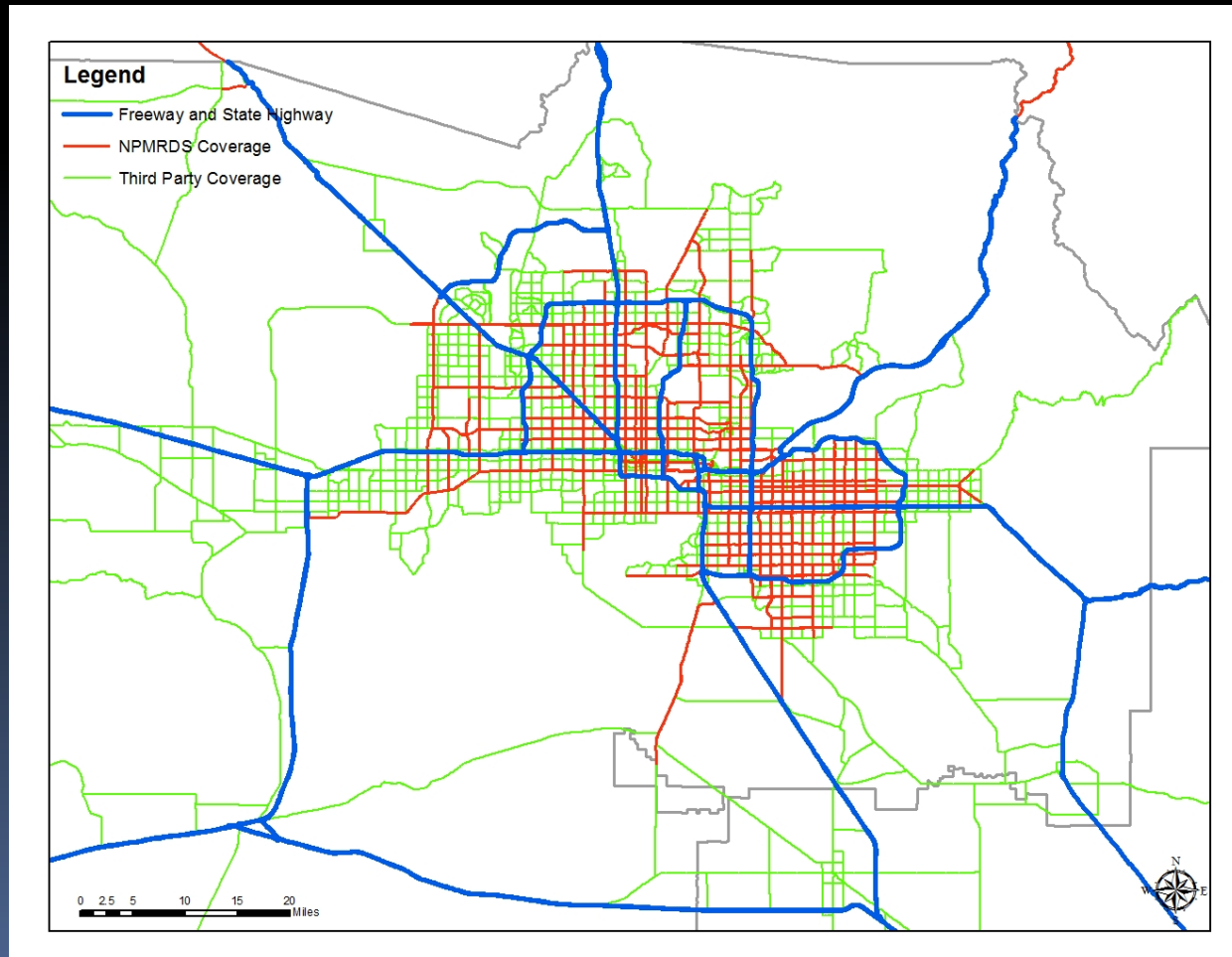


Interstate 10 – Free Flow Delay Weekday Speed 2014



Interstate 10 – Peak Period Weekday Delay 2014

# Coverage: NPMRDS vs. Analytic Traffic Patterns

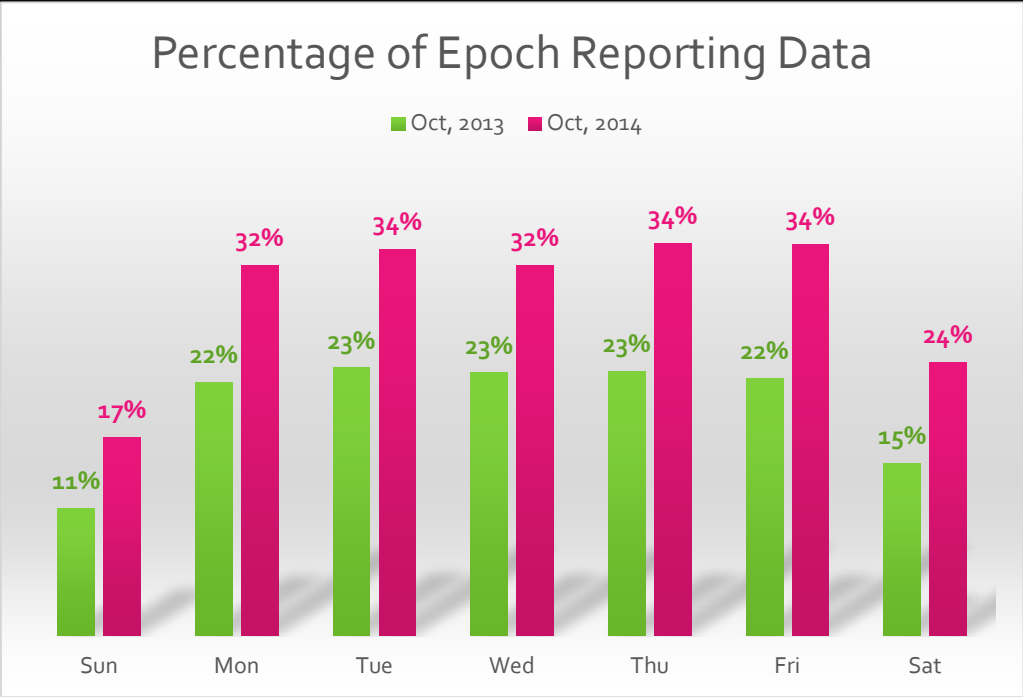


Data Set	# of TMC	Tot Length (miles)
NPMRDS	3,136	3,599
Analytic Traffic Pattern	5,740	6,801
Percentage (NPMRDS/Analytic)	55%	53%

- NPMRDS covers all freeways and state highways, and arterials in NHS (National Highway System).
- About 50% of arterials are not covered by NPMRDS

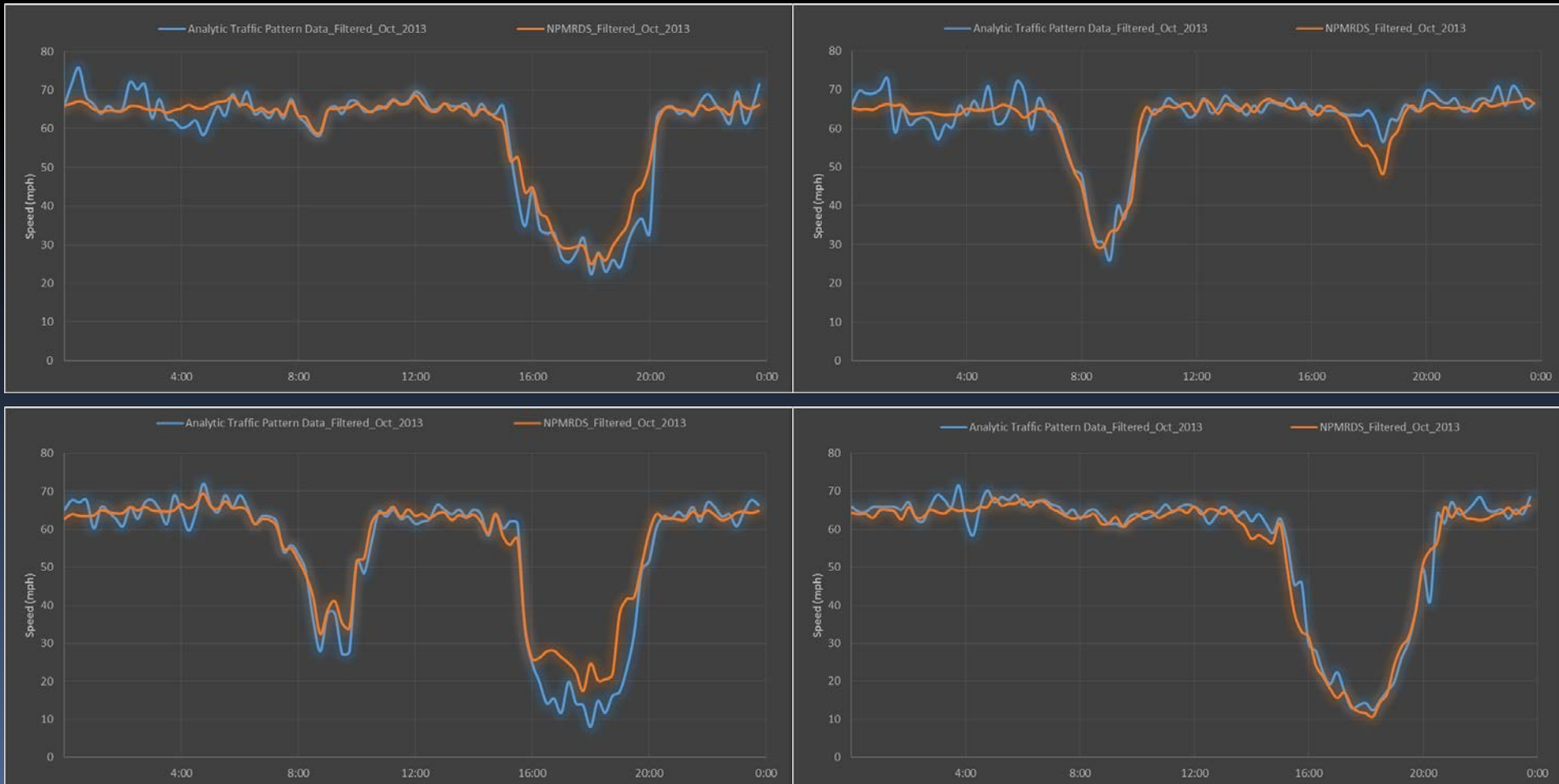
# NPMRDS Temporal Coverage

- More data reported in weekdays than on weekends.



Oct, 2013	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Week 1			23%	23%	24%	23%	15%
Week 2	11%	22%	24%	22%	24%	23%	15%
Week 3	11%	22%	23%	24%	24%	23%	14%
Week 4	11%	22%	24%	22%	24%	21%	16%
Week 5	12%	23%	24%	24%	21%		
Oct, 2014	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Week 1				34%	34%	34%	23%
Week 2	17%	32%	34%	33%	33%	34%	24%
Week 3	17%	32%	34%	34%	34%	34%	23%
Week 4	17%	31%	33%	31%	35%	34%	24%
Week 5	18%	33%	34%	29%	34%	33%	

# Speed: NPMRDS vs. Analytic Traffic Patterns





# Dashboard – System Level

<http://performance.azmag.gov>

MAGnitude

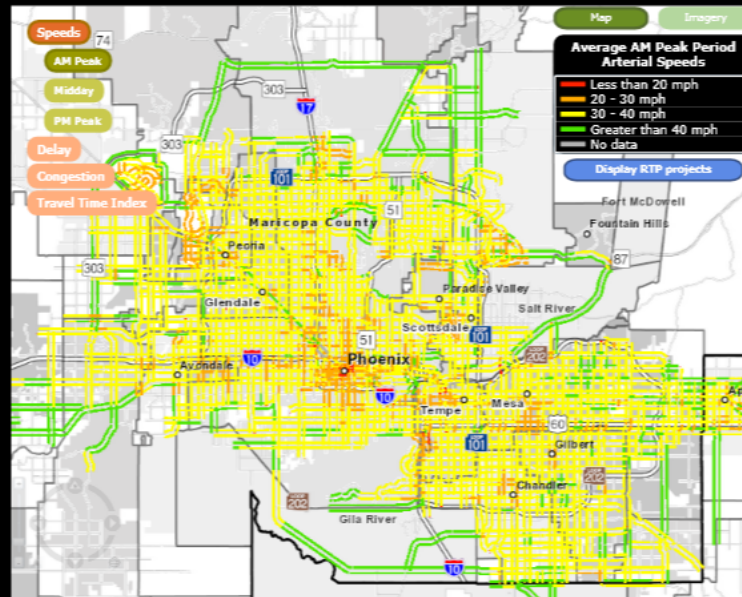
TRANSPORTATION PERFORMANCE



- Freeways
  - Arterials
  - Transit
  - Non-Motorized
- System
  - Corridor

[Go to RTP Project Cards](#)

- 2009
- 2010
- 2011
- 2012



Average Trip Length per Mode of Travel (2011-2012)

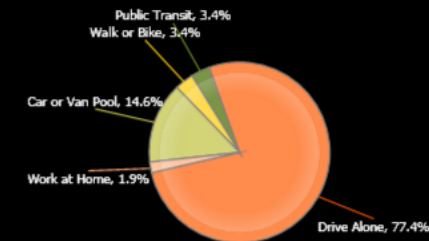
	Average Trip Length (Miles)		Average Trip Length (Minutes)		Percent of Travel	
	2011	2012	2011	2012	2011	2012
Drive Alone	15.16	15.22	23.93	23.97	75.0%	77.4%
Bicycle	7.38	6.86	19.83	19.33	1.4%	1.2%
Bus	13.68	16.54	35.09	36.85	3.2%	2.9%
Carpool	14.22	14.92	22.74	23.07	14.7%	14.0%
Light Rail	14.33	19.67	33.62	33.36	1.0%	0.5%
Telecommute	NA	NA	NA	NA	1.8%	1.9%
Vanpool	30.89	33.62	40.18	44.01	0.6%	0.6%
Walk/Run	4.41	5.76	16.44	16.24	2.4%	2.2%

Source: Maricopa County Air Quality Department's Annual Trip Reduction Report

The data used to generate this table is based on the Maricopa County Air Quality Department's Annual Trip Reduction Survey. The most recent survey was administered to over 500,000 people. Student surveys were included in this analysis.

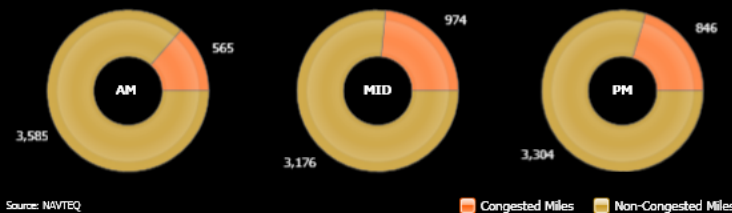
Due to rounding errors associated with the calculation of the percent of travel, the sum of the individual categories does not equal 100%.

Regional Commute Mode Shares (2012)



Source: Maricopa County Air Quality Department's Annual Trip Reduction Report  
Due to rounding errors associated with the calculation of the percent of travel, the sum of the individual categories does not equal 100%.

Arterial System Congested Miles (2012)



Source: NAVTEQ

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# Dashboard – System Level

<http://performance.azmag.gov>

MAGni↑tude

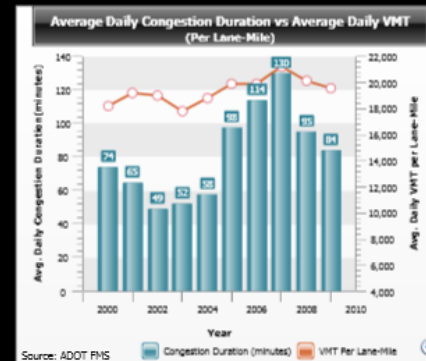
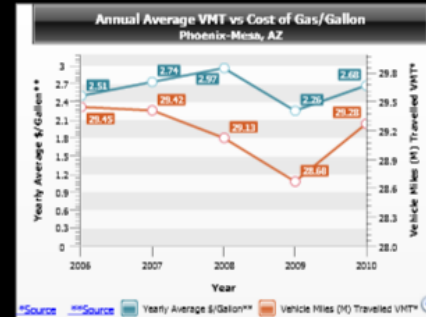
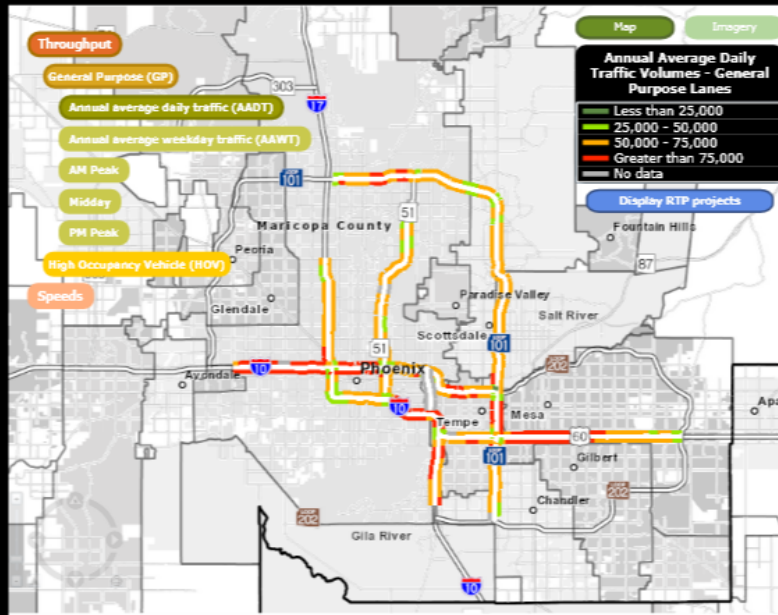
TRANSPORTATION PERFORMANCE



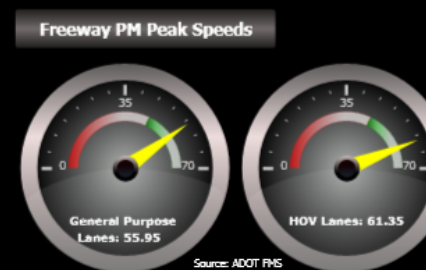
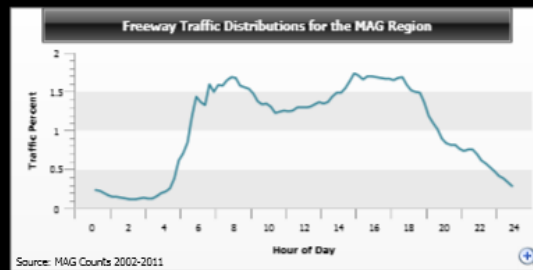
- Freeways
  - Arterials
  - Transit
  - Non-Motorized
- System
  - Corridor

- ▶ Go to RTP Project Cards
- Go to Analytical Tools

- ADOT FMS
  - Private Sector Data
- 2009
  - 2010
  - 2011
  - 2012
  - 2013

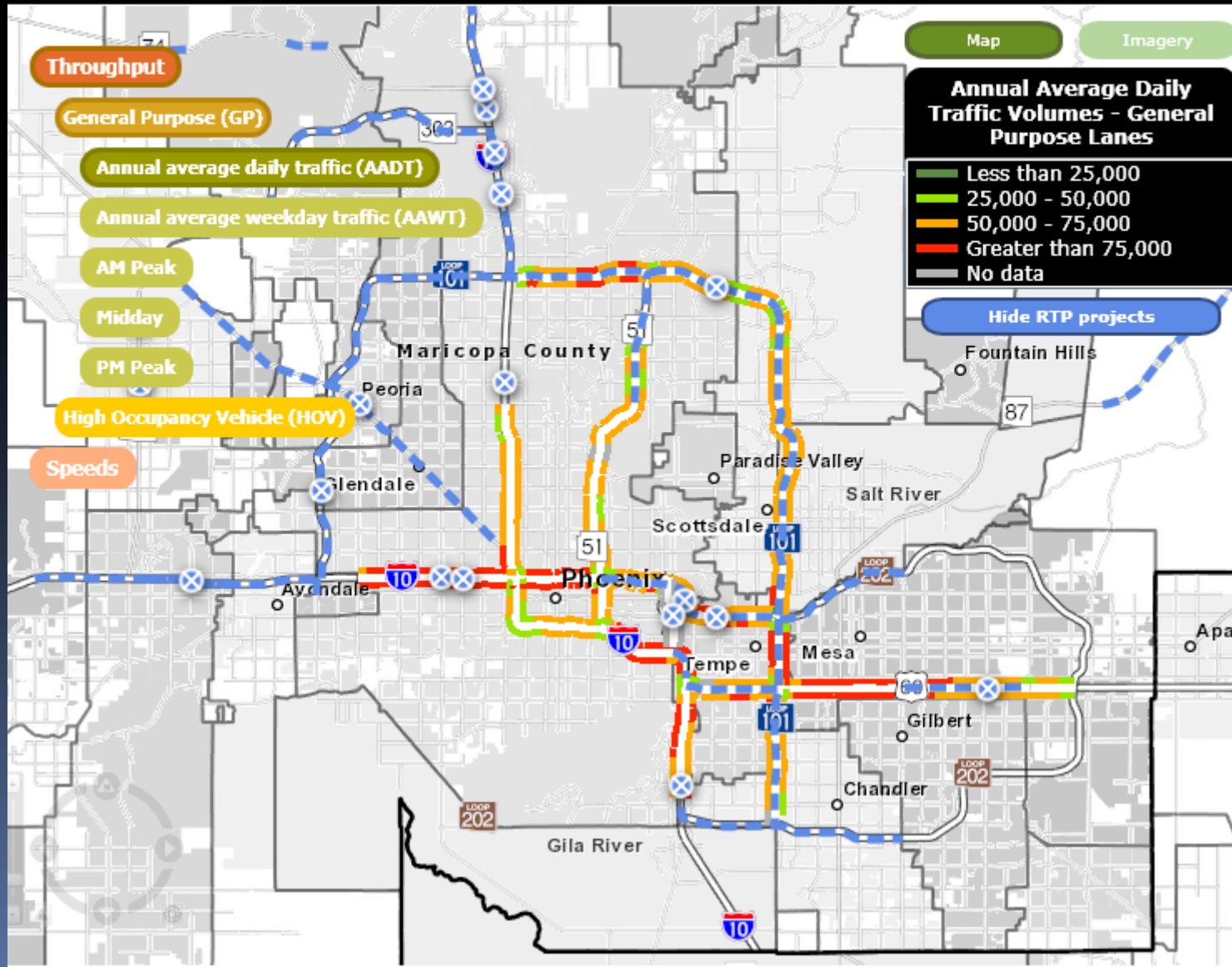


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# Dashboard – Corridor Level

<http://performance.azmag.gov>

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TRANSPORTATION PERFORMANCE



Freeways

Arterials

Transit

Non-Motorized

Go to RTP Project Cards

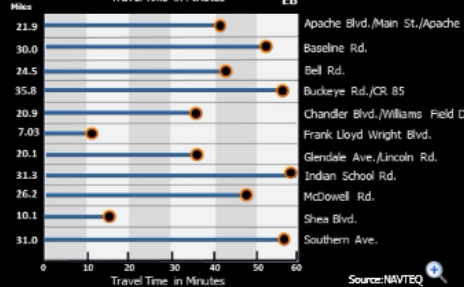
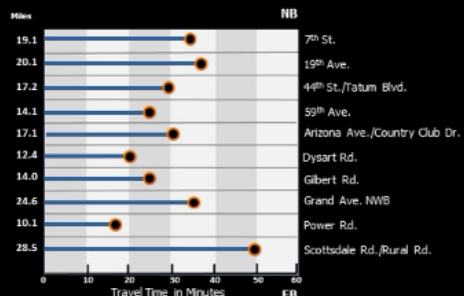
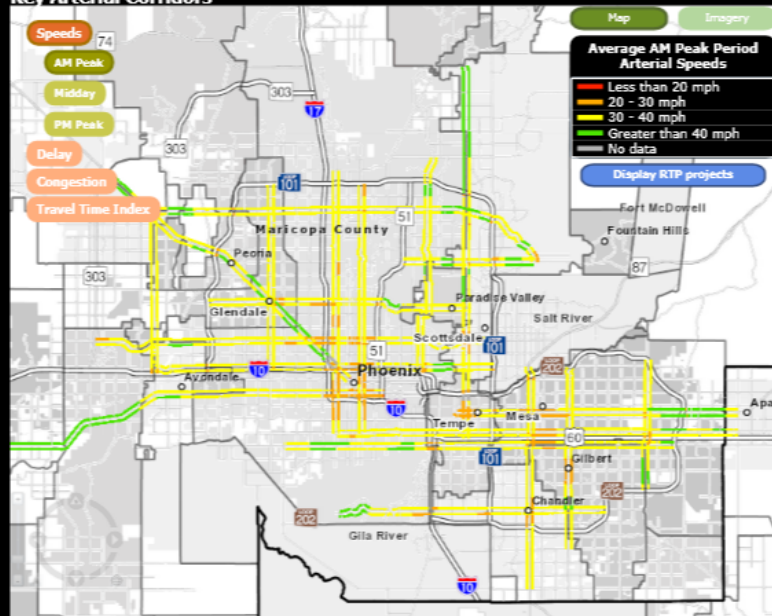
System

Corridor

2009 2010 2011 2012

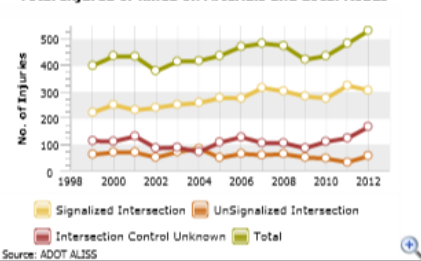
PM Peak Travel Time on key corridors 2012 **NB/EB** SB/WB

## Key Arterial Corridors



Safety (2010) **Pedestrian** Bicycle All

## Total Injured or killed on Arterials and Local Roads



## Per Capita Arterial VMT for the Phoenix/Mesa Urbanized Area

	2008	2009	2010	2011	2012
Total Arterial VMT*	21,862,000	21,700,447	21,815,245	21,194,451	21,651,648
Population of Phoenix-Mesa Urbanized Area**	3,278,843	3,308,396	3,348,298	3,370,250	3,392,348
Per Capita Arterial VMT	6.7	6.6	6.5	6.3	6.4

Source: \*Vehicle Miles Traveled - ADOT HPMS - 2012 Draft  
 \*\* ACS and Census 2010 - 1 Year Estimates

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# Dashboard – Segment Level

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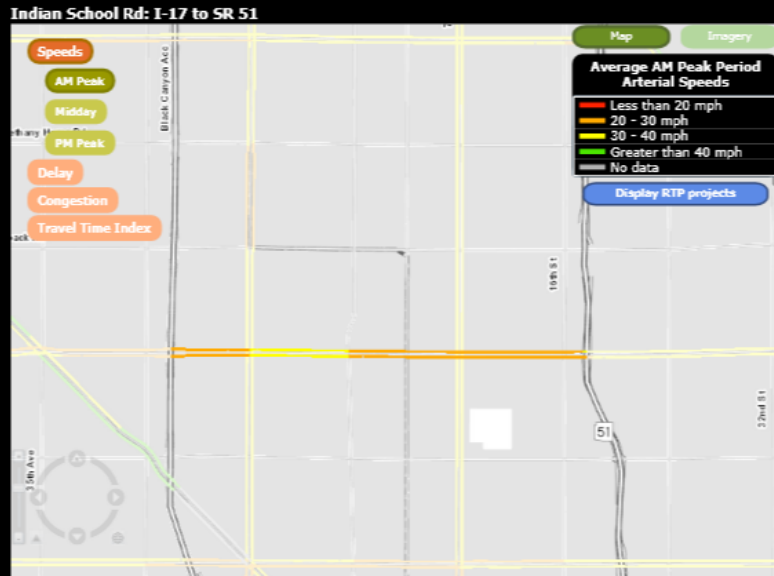
TRANSPORTATION PERFORMANCE



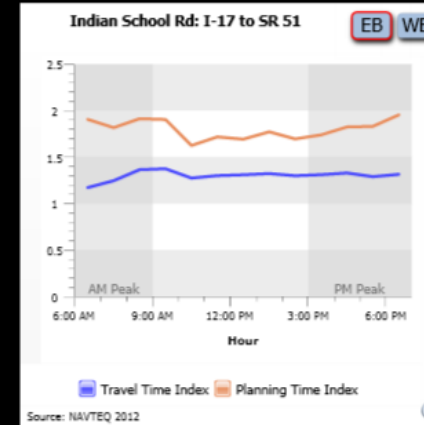
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Go to RTP Project Cards

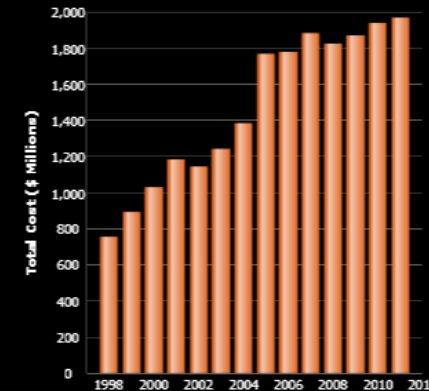
- 2009
- 2010
- 2011
- 2012



## Reliability (2012)

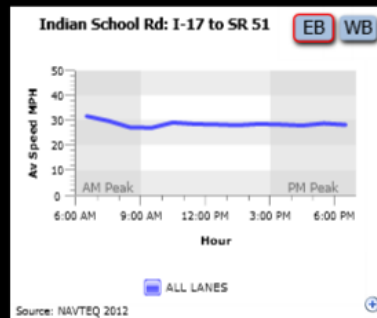


## Congestion Costs \* Phoenix/Mesa Urban Area

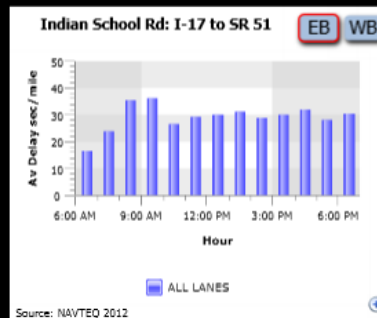


Arterial and Freeway congestion  
Source: TTI Urban Mobility Report 2011

## Speeds (2012)

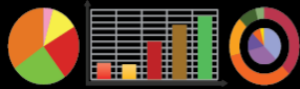


## Delay (2012)



**MAG**ni↑ude

Transportation Performance Dashboard



interactive visualization tool for regional multimodal transportation information and analysis

[performance.azmag.gov](http://performance.azmag.gov)

In collaboration with the Arizona Department of Transportation and Valley Metro



Regional Transportation Plan (RTP)  
Project Cards



informational viewer tool for all completed and underway RTP Freeway projects and Light Rail transit projects

[projectcards.azmag.gov](http://projectcards.azmag.gov)

In collaboration with the Arizona Department of Transportation and Valley Metro

**Thank you**

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