

# **Mobility 2045 Workshop Including Technology Elements Related to Vehicle Occupancy Technology**

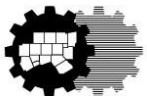
**Regional Transportation Council**

**February 8, 2018**



# Agenda Review

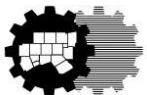
---



# Agenda

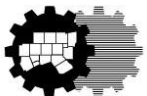
---

- 1. Agenda Review**
- 2. Recommended Roadway Plan**
- 3. Recommended Public Transportation Plan**
- 4. Mobility 2045 Financial Plan**
- 5. Recommended Policies**
- 6. Mobility 2045 Technology Foundation**
- 7. Technology Elements Related to Vehicle Occupancy Technology**
- 8. Schedule and Next Steps**



# Recommended Roadway Plan

---



# What is the Mobility Plan?

---

## Required by Law



**Represents a Blueprint for the Region's Multimodal Transportation System**



**Covers at Least a 20-Year Timeframe**



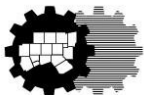
**Responds to Goals**



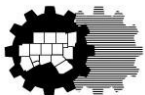
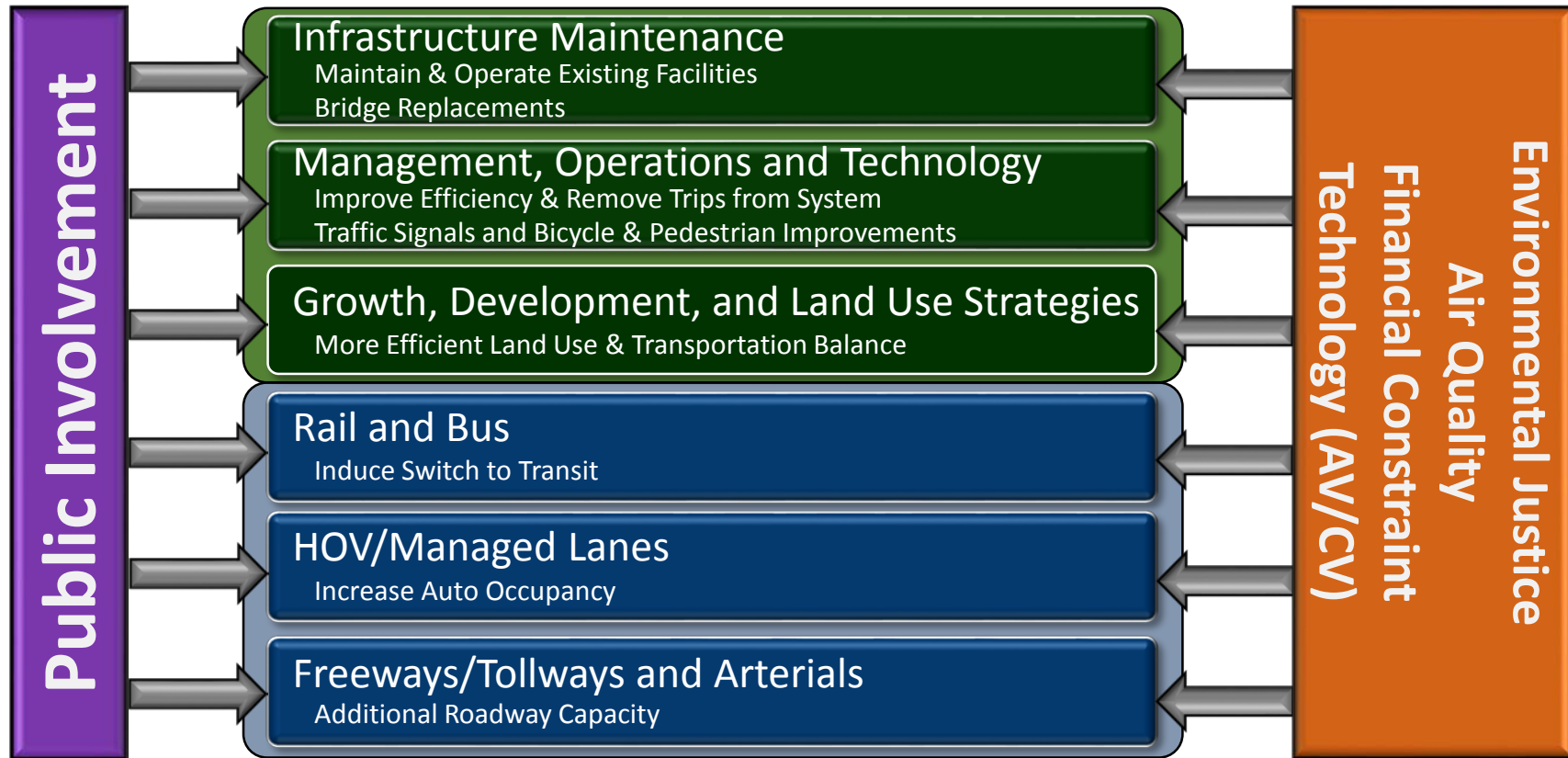
**Identifies Policies, Programs, and Projects for Continued Development**



**Guides the Expenditure of Federal and State Funds**



# Mobility Plan Process



# Mobility 2045 Goals

---

## Mobility

- Improve Transportation Options
- Support Travel Efficiency Strategies
- Ensure Community Access to System and Process

## Quality of Life

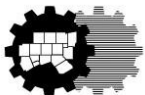
- Enhance Environment and Life Styles
- Encourage Sustainable Development

## System Sustainability

- Ensure Adequate Maintenance, Safety and Reliability
- Pursue Long Term, Sustainable Financial Resources

## Implementation

- Provide Timely Planning and Implementation
- Develop Cost Effective Projects and Programs



# Prosperity and Mobility

---

## Region Is Prospering

Adding 100,000+ Population Annually

Adding 60,000+ Jobs Annually

## Corporate Relocations

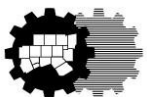
Toyota

Liberty Mutual

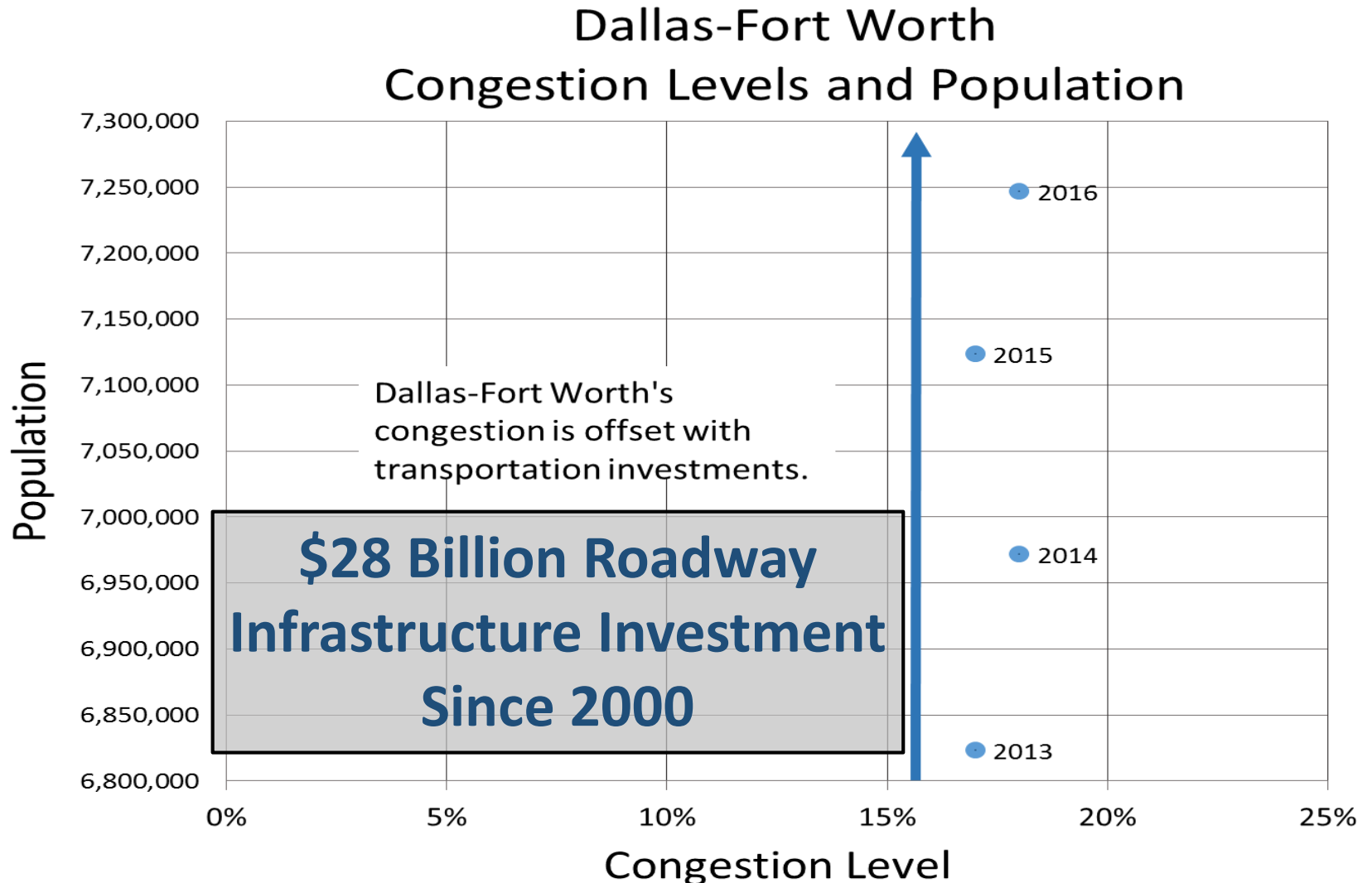
State Farm

Amazon?

## Mobility Key Factor



# DFW Congestion Levels

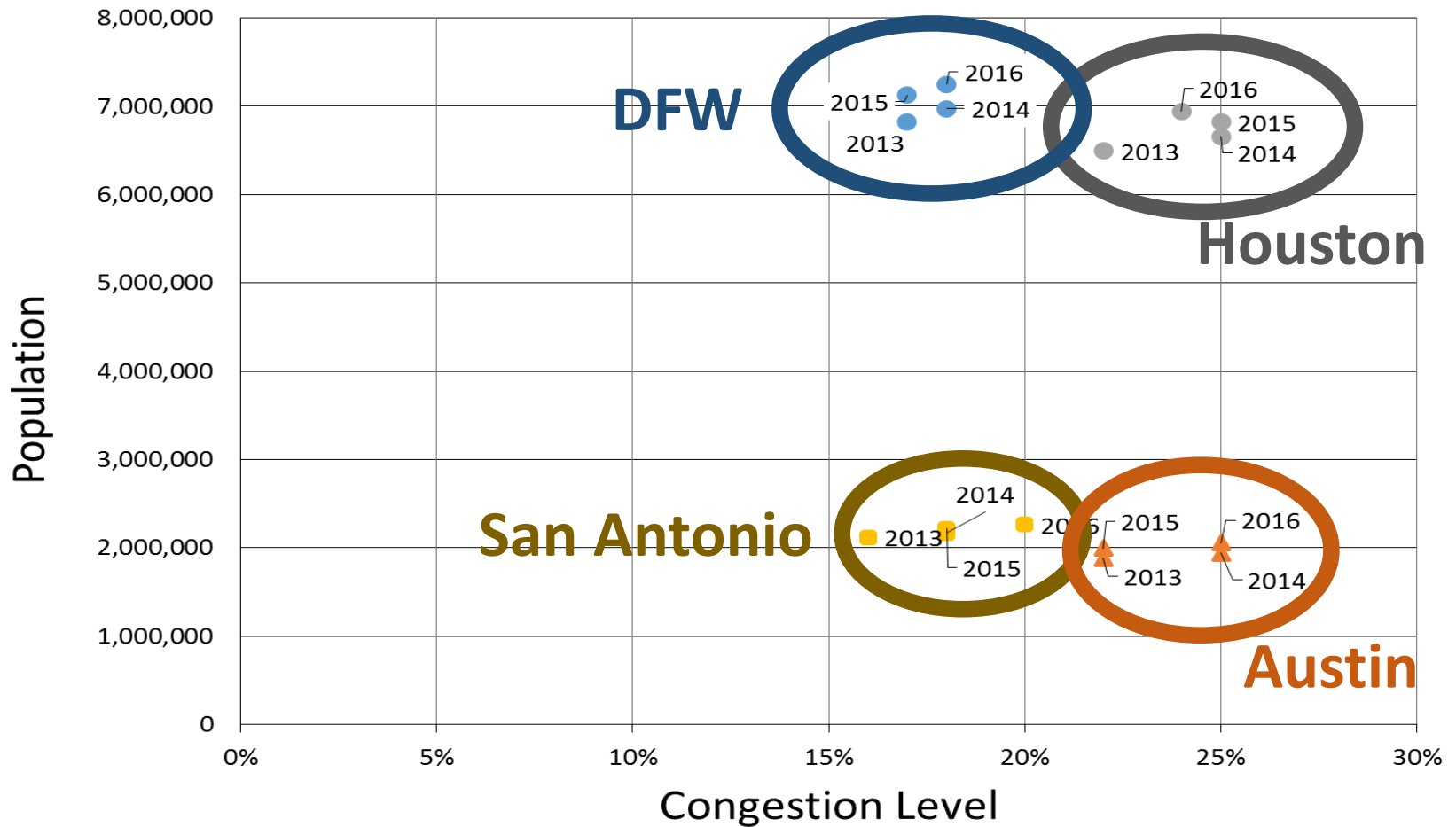


Sources: TomTom Traffic Index 2013, 2014, 2015 and 2016 Data; North Central Texas Council of Governments

● Dallas-Fort Worth

# Texas Metro Congestion Levels

Austin, Dallas-Fort Worth, Houston, and San Antonio  
Comparison of Congestion Levels and Population

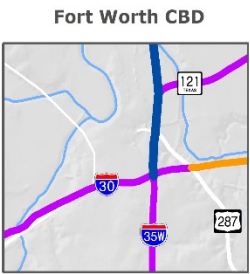
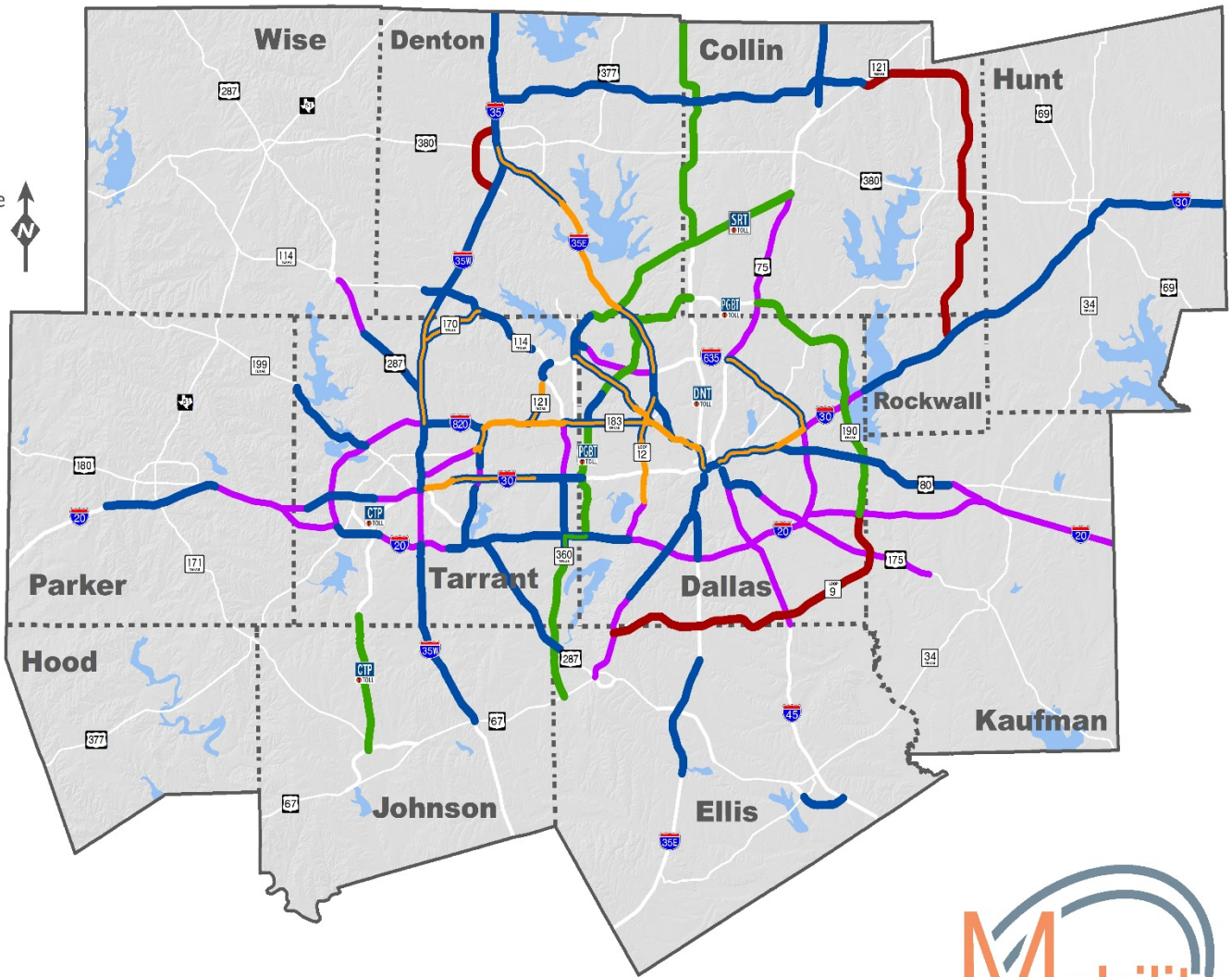


Sources: TomTom Traffic Index 2013, 2014, 2015 and 2016 Data;  
North Central Texas Council of Governments

● Dallas-Fort Worth    ▲ Austin  
● Houston    ■ San Antonio

# Major Roadway Recommendations

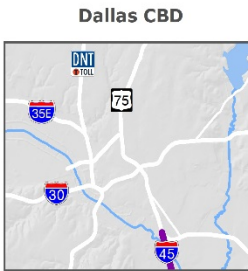
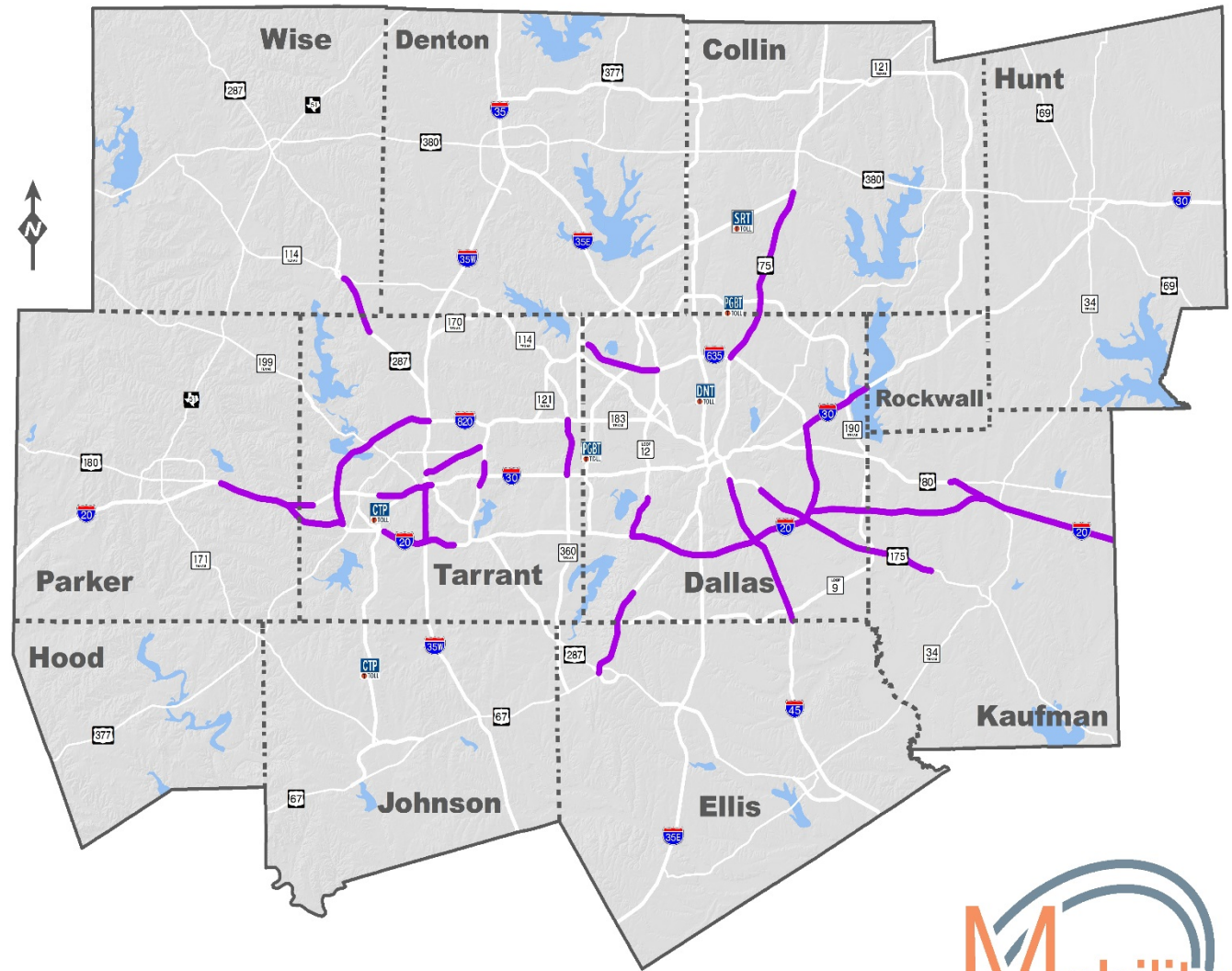
-  New or Additional Freeway Capacity
-  New or Additional Managed Lane Capacity
-  New or Additional Toll Road Capacity
-  Staged Facility (Frontage Roads)
-  Asset Optimization



**DRAFT**



# Asset Optimization Recommendations

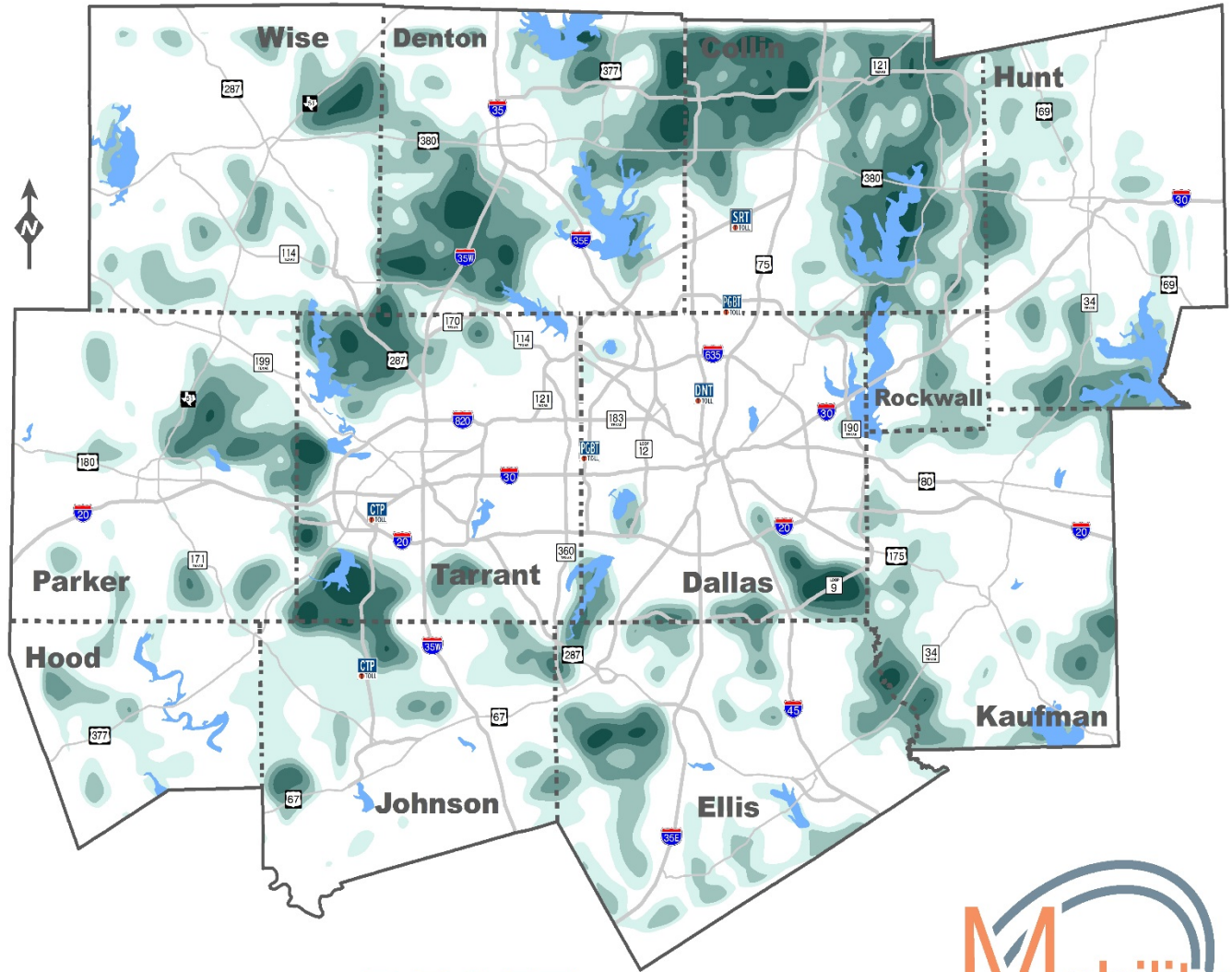
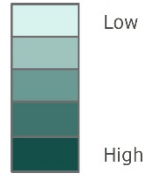


**DRAFT**



# Existing Arterial Network Deficiency Areas

## Arterial Needs Analysis



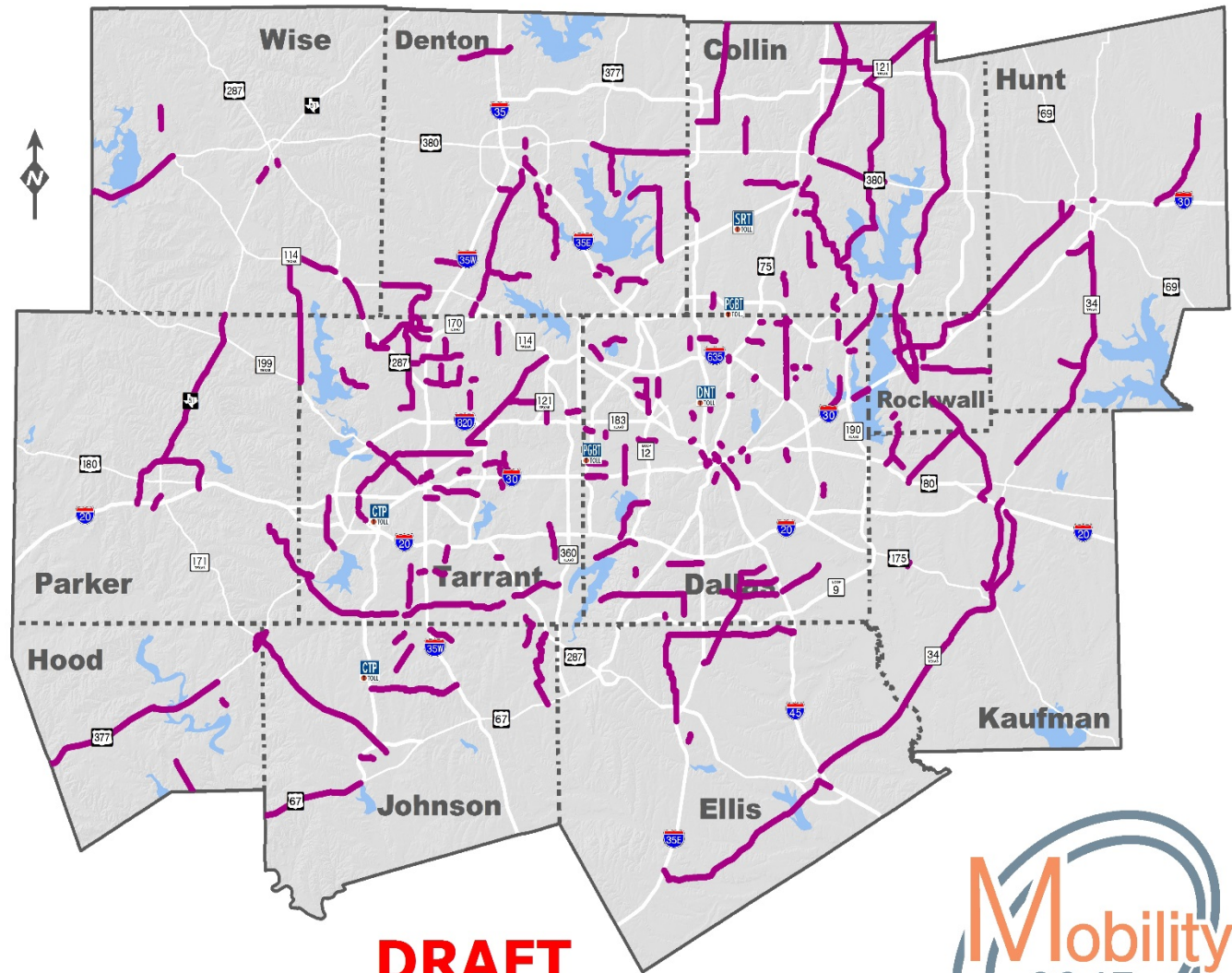
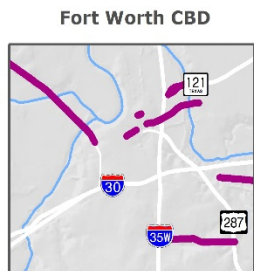
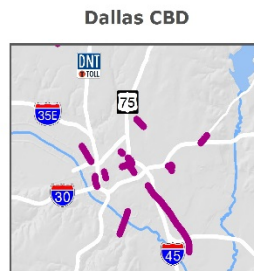
**DRAFT**



Shaded areas are not project recommendations. These areas have population/employment growth, congestion, and deficiencies in the existing arterial network that may warrant further study for arterial improvements. Higher arterial needs analysis scores depict areas of greater arterial need.

# Arterial Capacity Improvements

Disclaimer: Lines indicate arterials with funds for improvement.

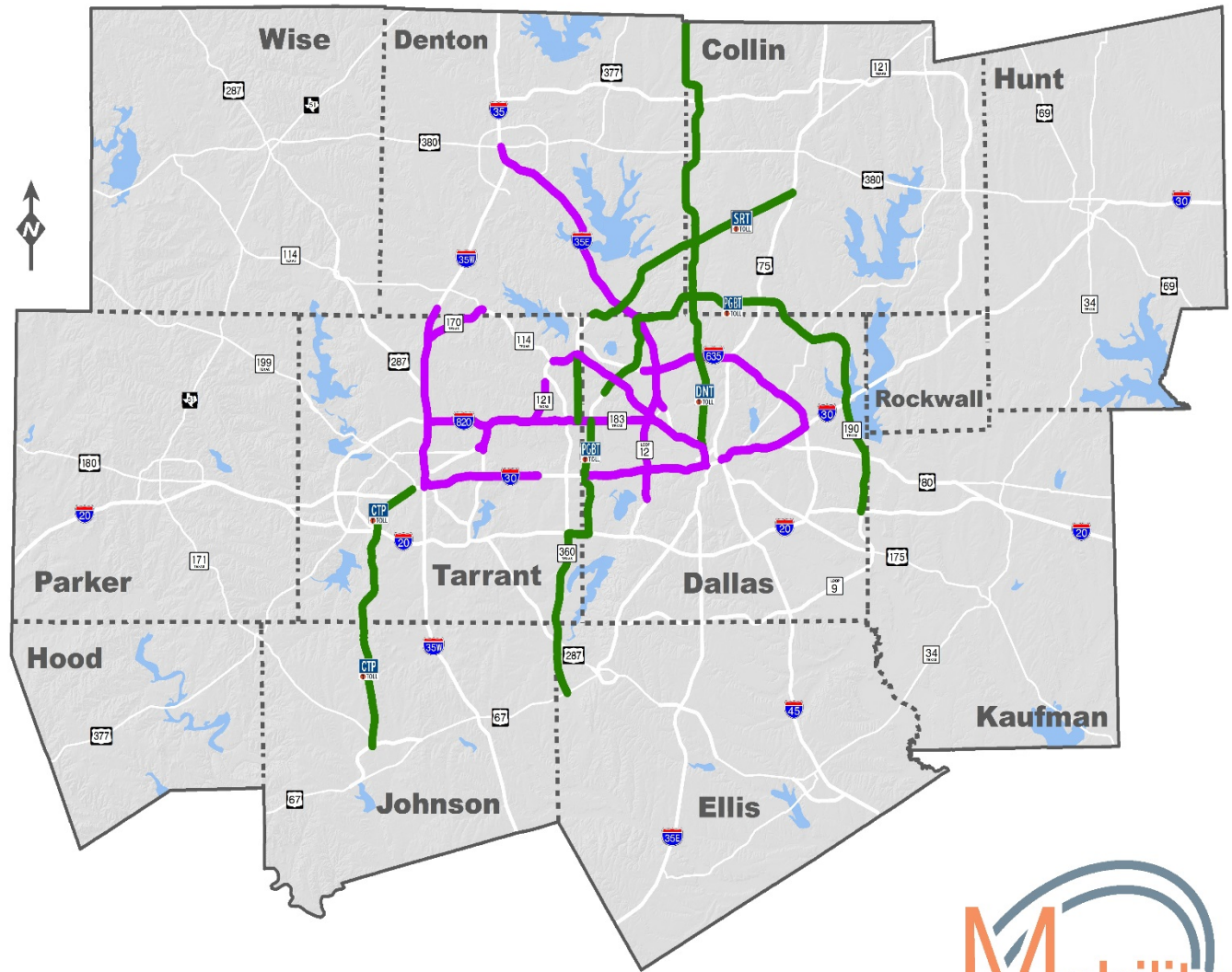


**DRAFT**



# Priced Facility Recommendations

- Managed Lanes
- Toll Roads



**DRAFT**

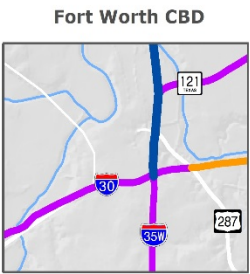
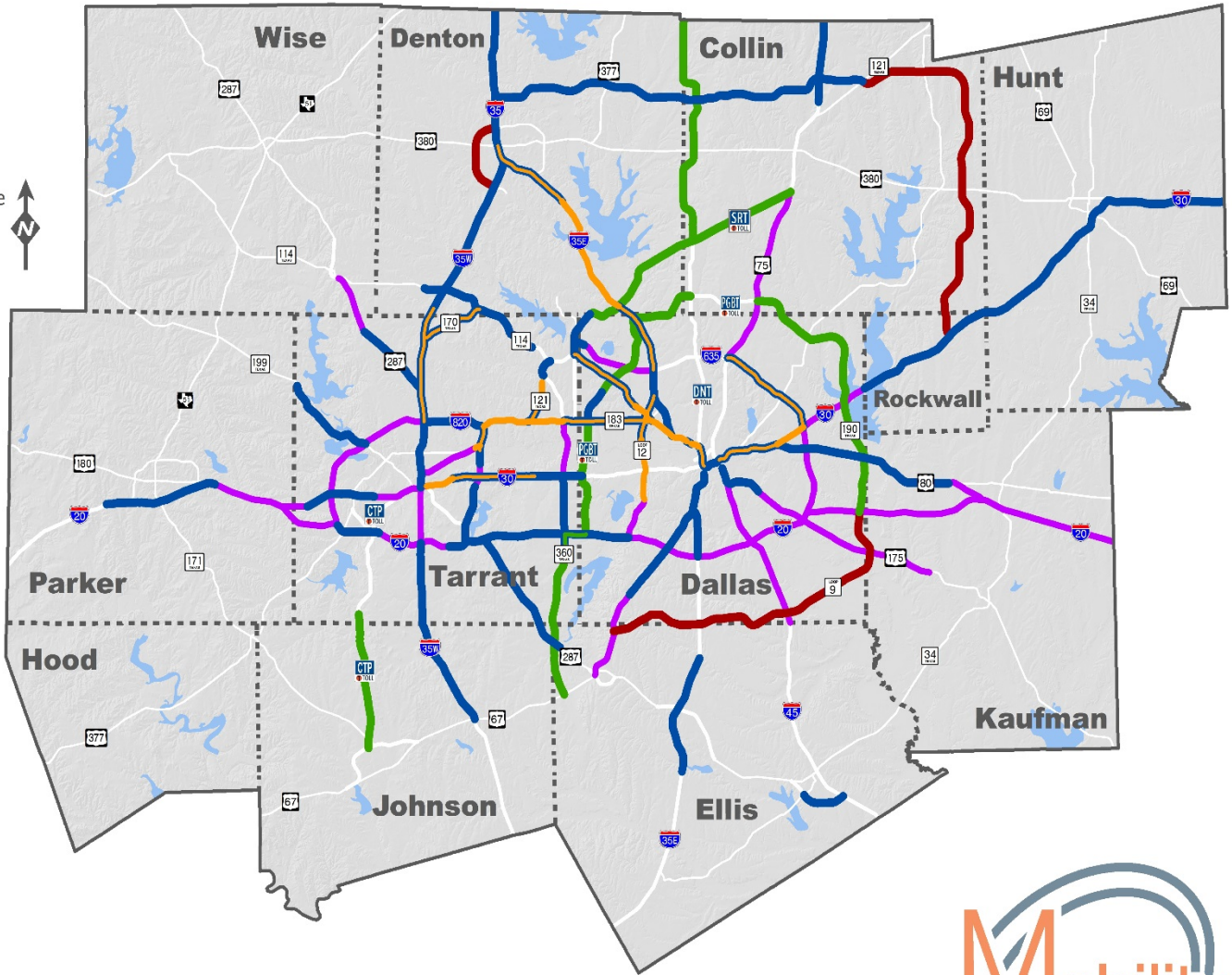


Facility recommendations indicate transportation need. Corridor-specific alignment, design, and operational characteristics will be determined through ongoing project development.



# Major Roadway Recommendations

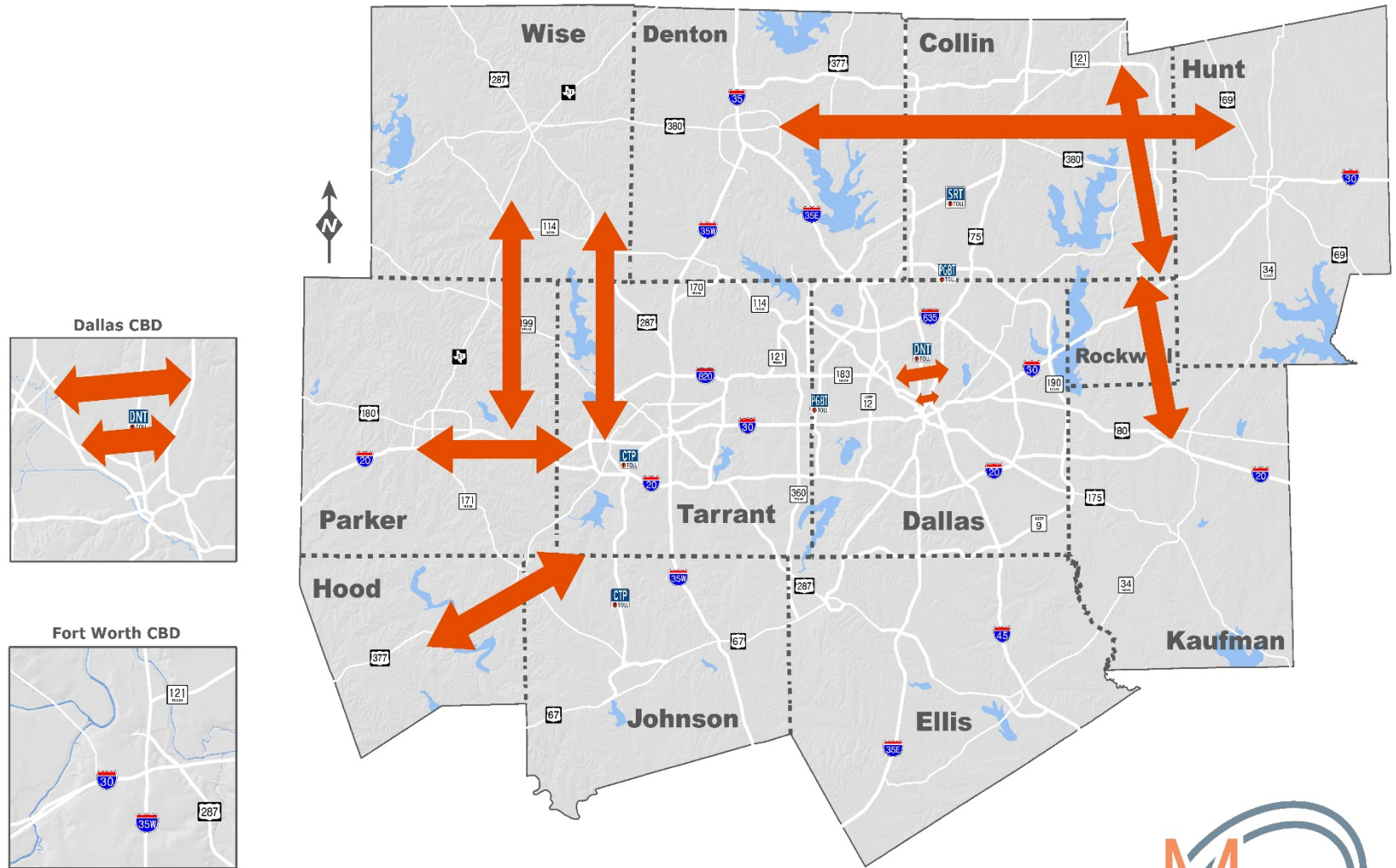
-  New or Additional Freeway Capacity
-  New or Additional Managed Lane Capacity
-  New or Additional Toll Road Capacity
-  Staged Facility (Frontage Roads)
-  Asset Optimization



**DRAFT**



# Roadway Corridors for Future Evaluation



**DRAFT**

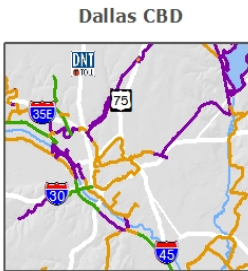
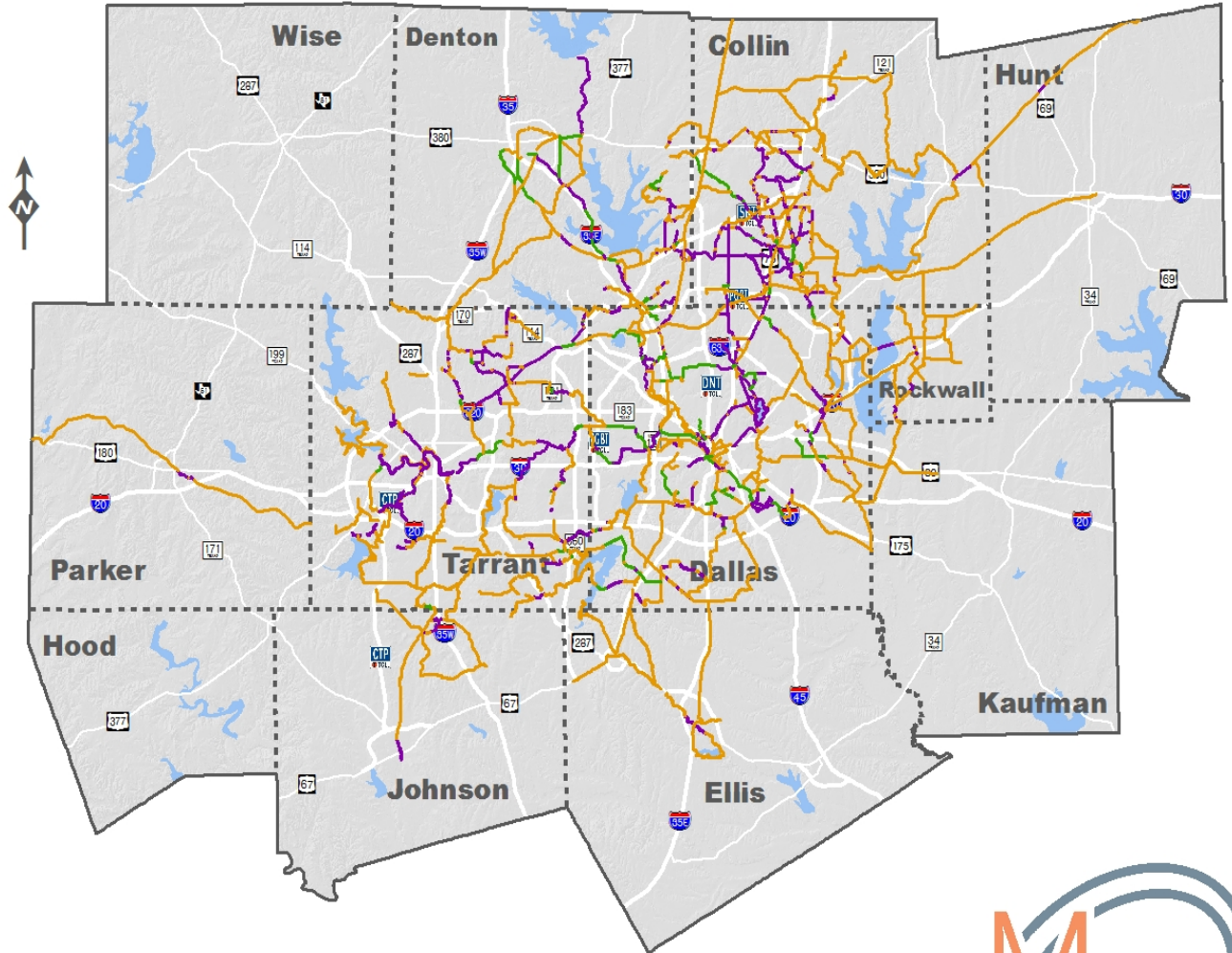


Illustrative roadway corridors indicate an identified transportation need and do not represent recommendations or specific alignments. Recommendations may be developed for future MTPs through feasibility analyses, thoroughfare plans, and environmental studies.

# Regional Veloweb

## Facility Status

- Existing
- Funded
- Planned
- Major Roadways



Facility recommendations indicate transportation need. Corridors specific alignment, design, and operational characteristics for the Regional Veloweb system will be determined through ongoing project development.



# High-Speed Rail

**Connected System**

**“One Seat Ride”**

**Three Stations**

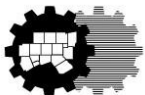
**Fort Worth**

**Arlington**

**Dallas**

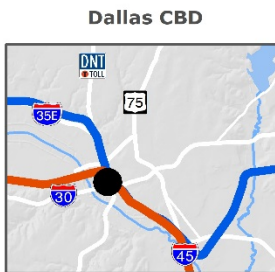
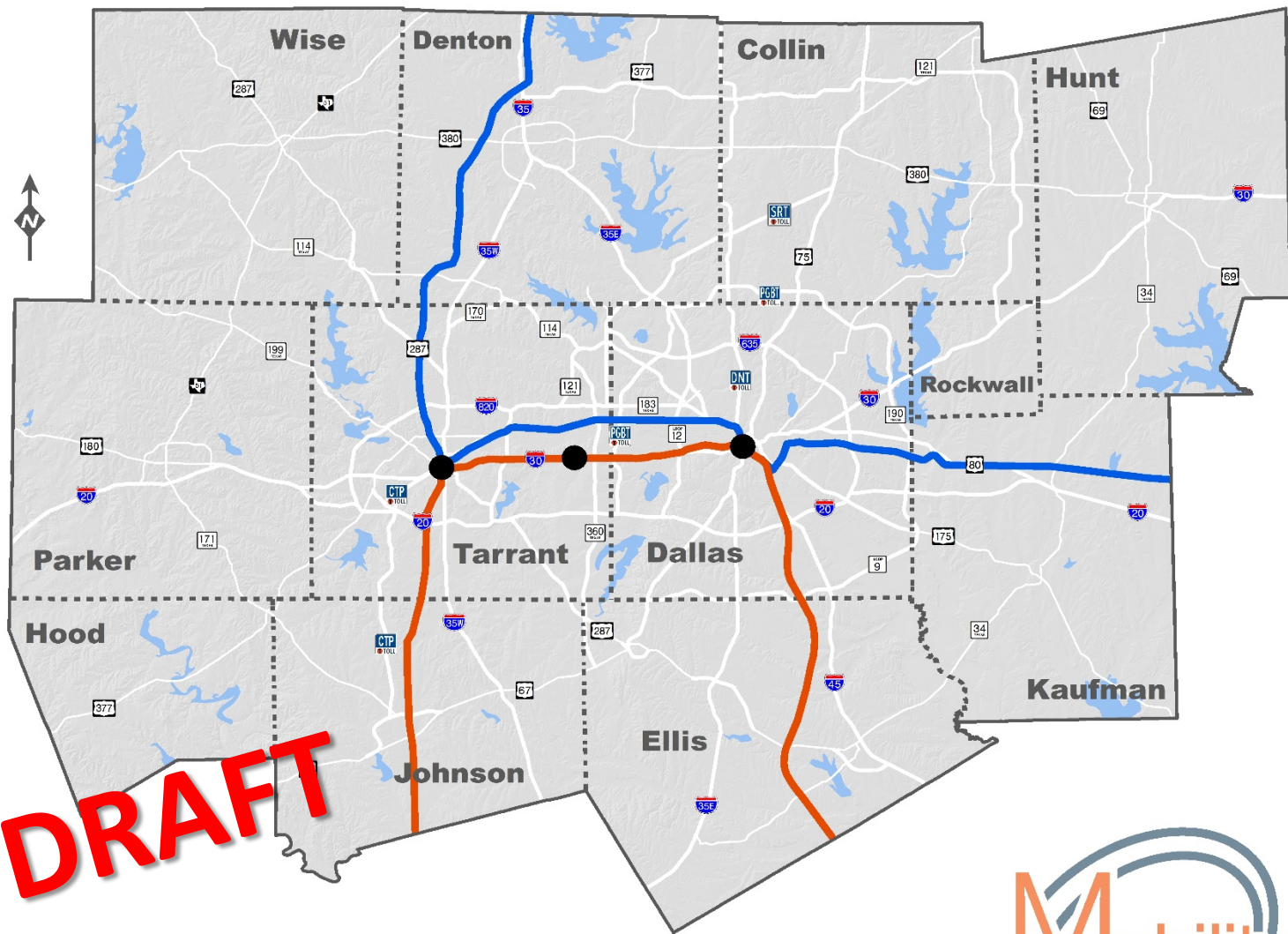


Source: Getty Images



# High-Speed Rail Recommendations

- At-Grade
- Grade Separated
- Stations



**DRAFT**

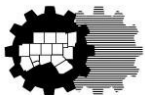


Corridor-specific alignment, design, and operational characteristics for the intercity passenger, regional passenger, and freight rail systems will be determined through capacity evaluation and ongoing project development. Refined rail forecasts are necessary to determine technology and alignment in future rail corridors.

# Additional Plan Components

---

- ✓ Sustainable Development
- ✓ Pedestrian Facilities
- ✓ People Movers
- ✓ Freight
- ✓ Aviation
- ✓ Transportation Demand Management
- ✓ Transportation System Management
- ✓ Transportation System Safety and Security



# Additional Plan Components

## ✓ Environmental Considerations

- ✓ Natural Environment – Including Extreme Weather Resiliency
- ✓ Environmental Justice

## ✓ Social Considerations

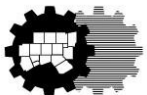
## ✓ Financial Plan

## ✓ Technology

## ✓ Policies

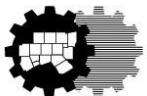
## ✓ Programs

## ✓ Public Transportation



# Recommended Public Transportation Plan

---



# Mobility 2045 Transit Programs

## State and National Transit Connections Program

- High-speed rail, intercity bus, intercity train, next generation magnetic levitation

## Regional Connections: Next Generation Transit Program

- High-intensity bus, guaranteed transit, stacked commuter rail, regional rail, light rail

## Last-Mile Transit Connections Program

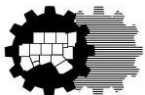
- People mover and goods movement, circulator, streetcar, local bus

## Community Access Transit Program

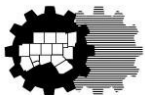
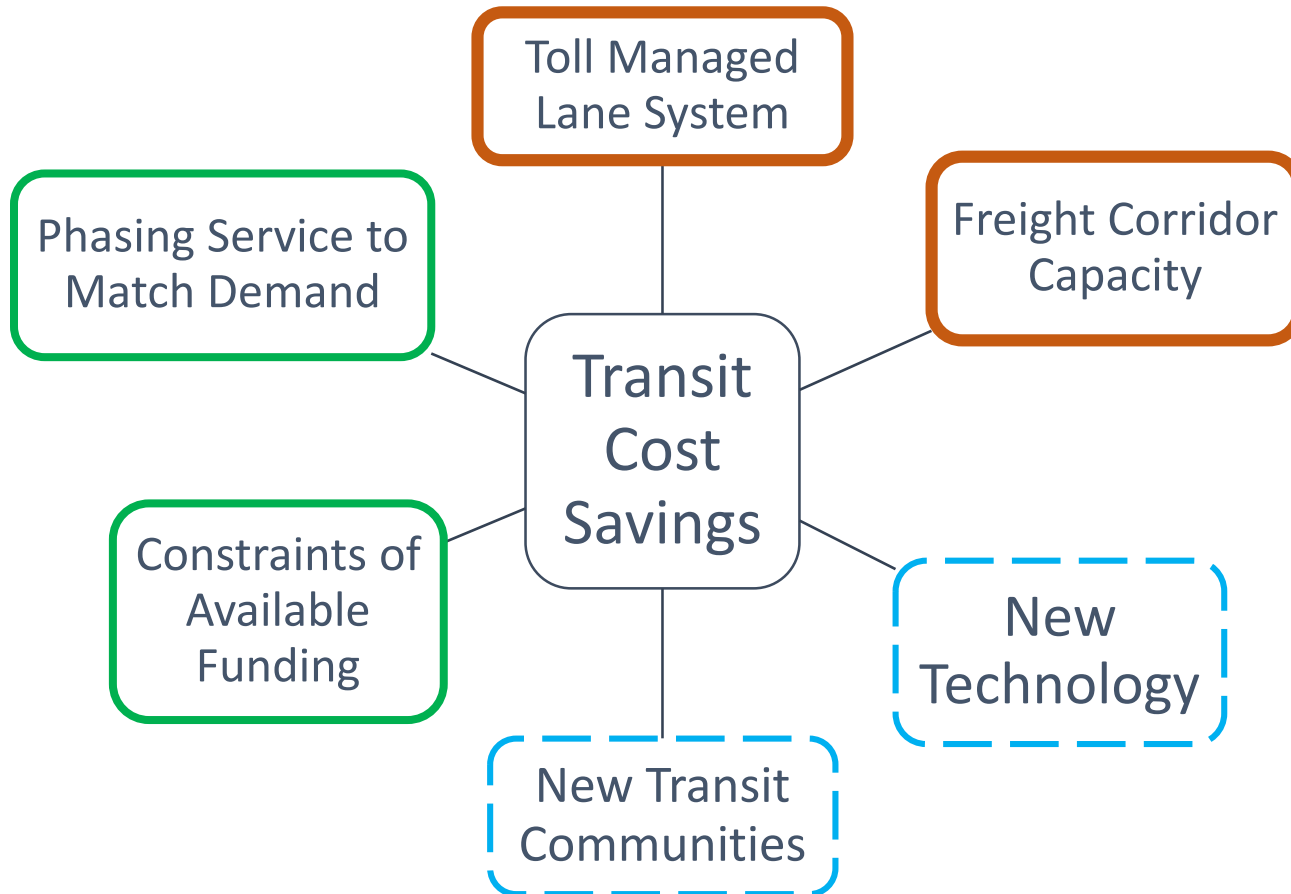
- Specialized services for community access including autonomous vehicles

## Transit Enhancements and Mobility Improvements Program

- Improvements to safety and security, capacity, operations, technology, and accessibility



# Opportunities for Early Implementation of Transit Projects



# Transit Corridor Recommendations

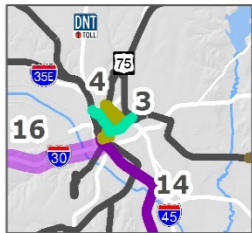
## Rail

- 1 - Cotton Be
- 2 - Cotton Belt East Extension
- 3 - Downtown Dallas 2nd Alignment (D2)
- 4 - Dallas Streetcar
- 5 - A-train Extension
- 6 - Frisco Line
- 7 - Mansfield Line
- 8 - McKinney Line
- 9 - Midlothian Line
- 10 - Green Line Extension
- 11 - Cleburne Line
- 12 - Southwest TEX Rail
- 13 - Scyene Line
- 14 - Waxahachie Line

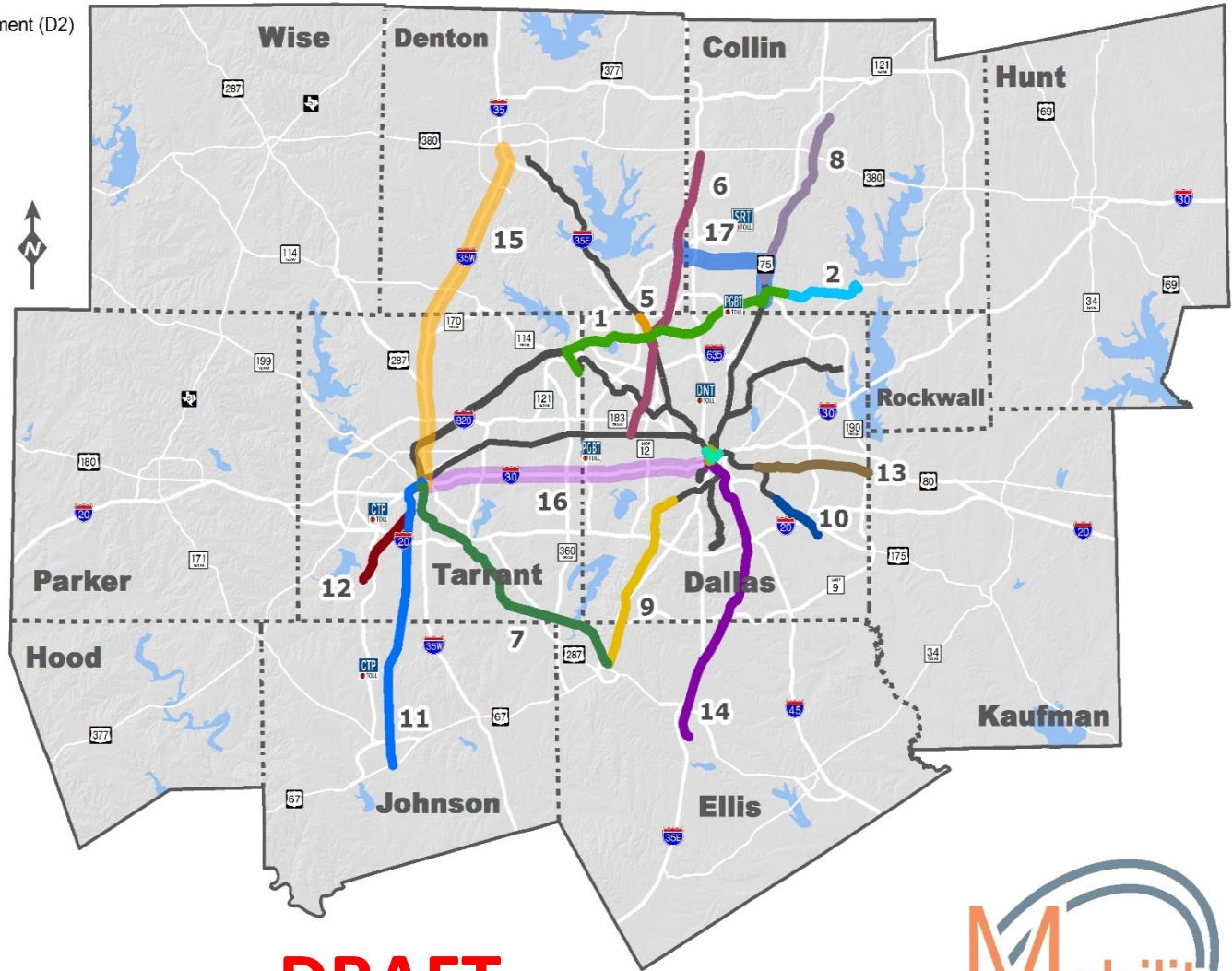
## High-Intensity Bus

- 15 - IH 35W Express
- 16 - IH 30 Express
- 17 - Spring Creek Parkway
- Existing Rail

Dallas CBD



Fort Worth CBD

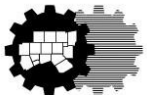


**DRAFT**



# Mobility 2045 Financial Plan

---



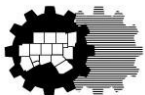
# Financial Plan Requirements

---

**Must be Financially Constrained**

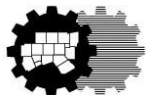
**Use all “Reasonably Expected” Sources**

**Balance Priorities with Available Resources**

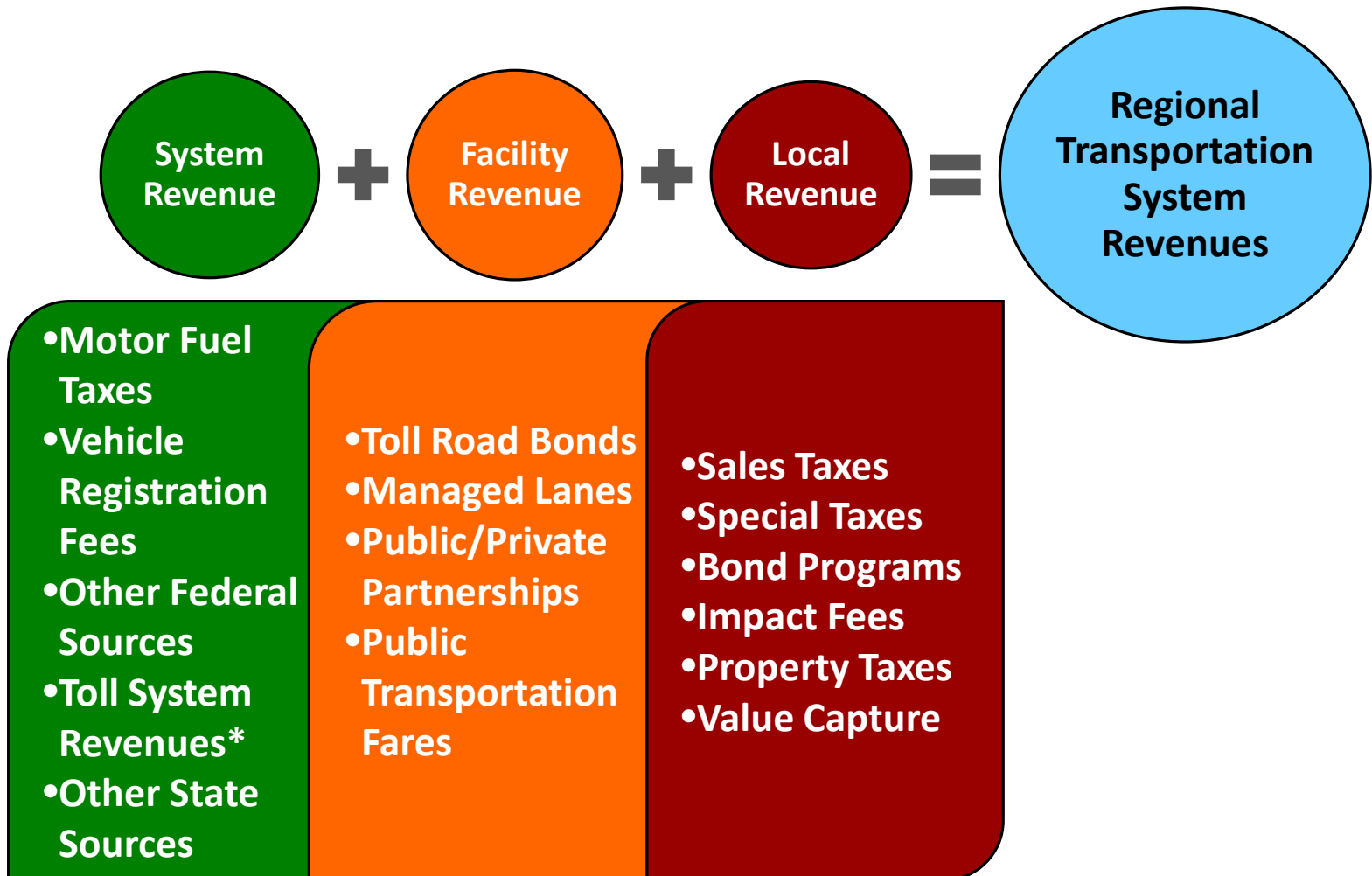


# Mobility 2040 vs Mobility 2045

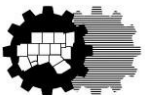
	Mobility 2040	Mobility 2045
<b>Planning Horizon</b>	2016 – 2040 (25 Years)	2018 – 2045 (28 Years)
<b>Legislative Action Revenue</b>	Propositions 1 & 7 Revenues Estimated	Propositions 1 & 7 now integrated into UTP and TIP
<b>Innovative Revenue</b>	Toll and tolled managed lane facilities scaled back	Continue to use toll managed tools in select corridors based on new regional toll policy boundary
<b>Enhancement Revenue</b>	Needs outpace ability to pay for improvements; included state, federal, and local revenue enhancements	Needs outpace ability to pay for improvements; continuing assumptions of federal, state, and local revenue enhancements



# Transportation Funding Basics



\* Revenue from existing NTTA facilities after bonds are retired.



# Financial Assumptions

---

**Traditional Funds are Insufficient**

**Multiple Scenarios and Options to Generate Additional Funds**

**Continue Toll Roads and Toll Managed Lanes as a Long Term Strategy**

**Not Approving a Specific Scenario**

**Future Available Funding Sources Unknown**

**New Federal Infrastructure Initiative**

**Approving Equivalent Magnitude Funding Amount**



# Financial Assumptions

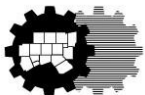
Funding Strategy	Mobility 2040 (Final)	Mobility 2045 (DRAFT)
State Fuel Tax (per gallon)	Existing State Motor Fuel Tax +\$0.05 in 2020 +\$0.07 in 2030	Existing State Motor Fuel Tax +\$0.05 in 2025 +\$0.07 in 2035
State Fuel Tax Indexing	No	No
Federal Fuel Tax (per gallon)	Existing Federal Motor Fuel Tax +\$0.05 in 2020 +\$0.05 in 2030	Existing Federal Motor Fuel Tax +\$0.05 in 2025 +\$0.05 in 2035
Average Vehicle Registration Fee	Existing Fee +\$10 in 2020 +\$10 in 2030	Existing Fee +\$10 in 2025 +\$10 in 2035
Tollroads, Managed Lanes, CDA, and PPP	Currently Funded Facilities	Currently funded projects + select, strategic facilities based on new toll area policy
Other Assumptions	Utilize New Revenues from 84 <sup>th</sup> Legislature (~\$34.5B to region over time)	New revenues from 84 <sup>th</sup> legislature now allocated in UTP/TIP, will continue through horizon year
Total Revenue (\$B)	\$118.9	\$135.5

# Funding Estimates (in \$billion)

Roadway Funds		
	Traditional Federal and State	\$ 42.9
	Tolled/Managed (Local)	\$ 9.3
	Subtotal*	\$ 52.2
Transit Funds		
	Traditional (Federal and Local)	\$ 37.7
	Innovative (State and Local)	\$ 19.8
	Subtotal*	\$ 57.5
Revenue Enhancements		
	State	\$ 3.3
	Federal	\$ 3.9
	Local	\$ 2.4
	Subtotal*	\$ 9.6
Local Funds		
	Local Spending and Local Match	\$ 16.2
<b>Grand Total*</b>		<b>\$ 135.5</b>

**DRAFT**

\* Actual dollars in billions. Values may not sum due to independent rounding.

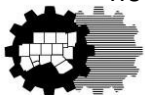


# Prioritization and Expenditures

**DRAFT**

		2040	2045
Maximize Existing System	<b>Infrastructure Maintenance</b> Maintain & Operate Existing Facilities Bridge Replacements	\$37.4	\$ 38.7
	<b>Management and Operations</b> Improve Efficiency & Remove Trips from System Traffic Signals and Bicycle & Pedestrian Improvements	\$7.2	\$ 9.6
	<b>Growth, Development, and Land Use Strategies</b> More Efficient Land Use & Transportation Balance	\$3.6	\$ 3.2
Strategic Infrastructure Investment	<b>Rail and Bus</b> Induce Switch to Transit	\$27.2	\$ 33.4
	<b>HOV/Managed Lanes</b> Increase Auto Occupancy	\$43.4	\$ 50.6
	<b>Freeways/Tollways and Arterials</b> Additional Roadway Capacity		
<b>Total Expenditures*</b>		<b>\$118.9</b>	<b>\$ 135.5</b>

\* Actual dollars, in billions. Values may not sum due to independent rounding.



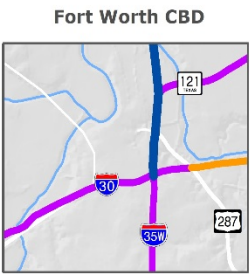
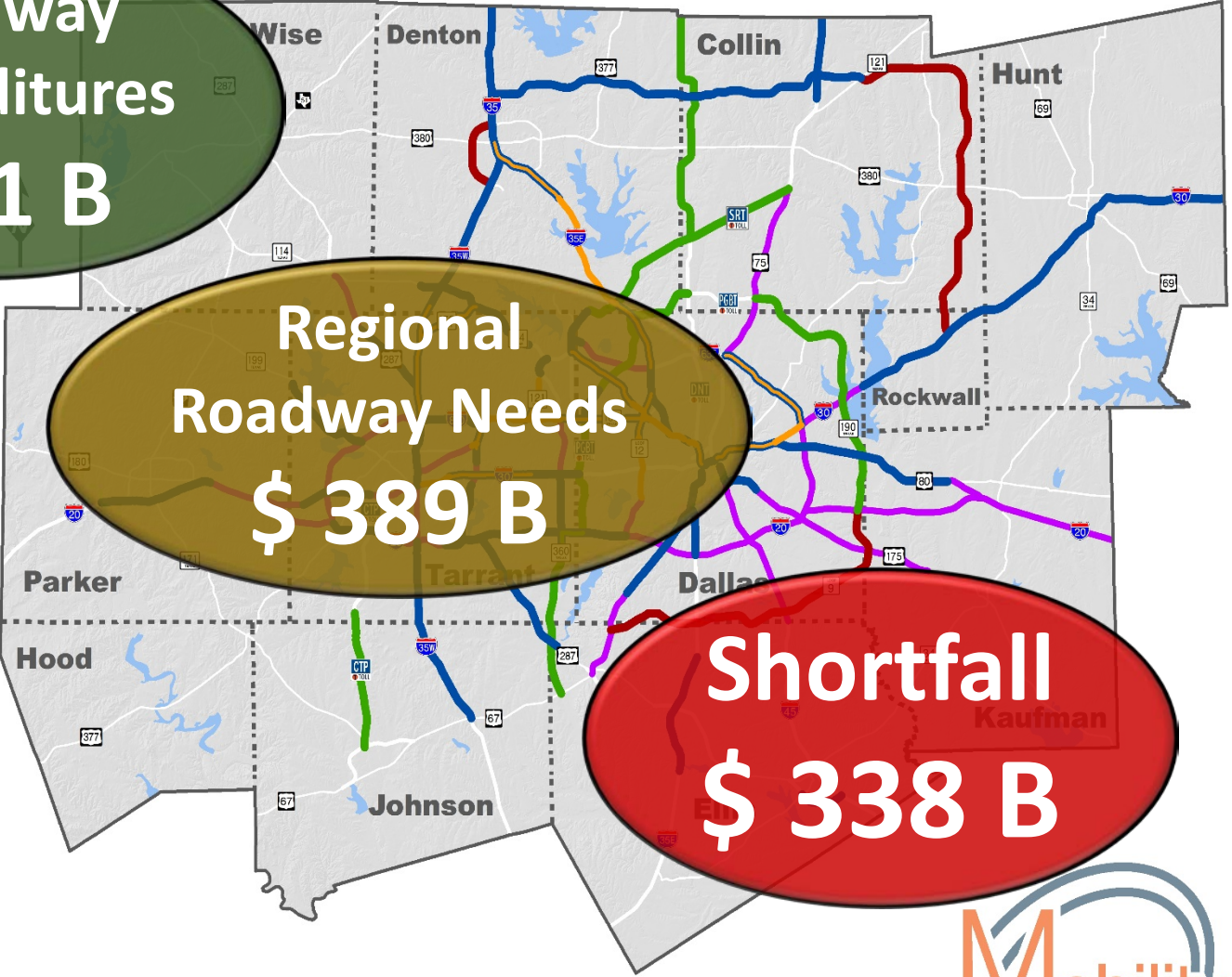
# Regional Funding

**Roadway Expenditures \$ 51 B**

- New or Additional Freeway Capacity
- New or Additional Major Road Capacity
- New or Additional Toll Road Capacity
- Staged Facilities (Fringe Roads)
- Asset Optimization

**Regional Roadway Needs \$ 389 B**

**Shortfall \$ 338 B**

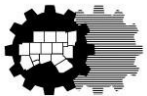


**DRAFT**



# Recommended Policies

---



# Proposed Policy Additions

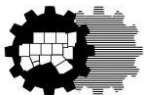
---

## Freight

Encourage Regional Railroads to Participate in Regional Planning

## Active Transportation Mode Share

Support Active Transportation Measurable Share of all Transportation Modes



# Proposed Policy Additions

## Technology

Encourage Data Sharing

Encourage Automated Vehicles

Support Infrastructure Maintenance

Encourage Ridesharing

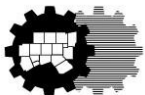
## Asset Optimization

Resiliency

**Develop Strategies to Address Vulnerabilities**

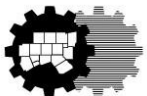
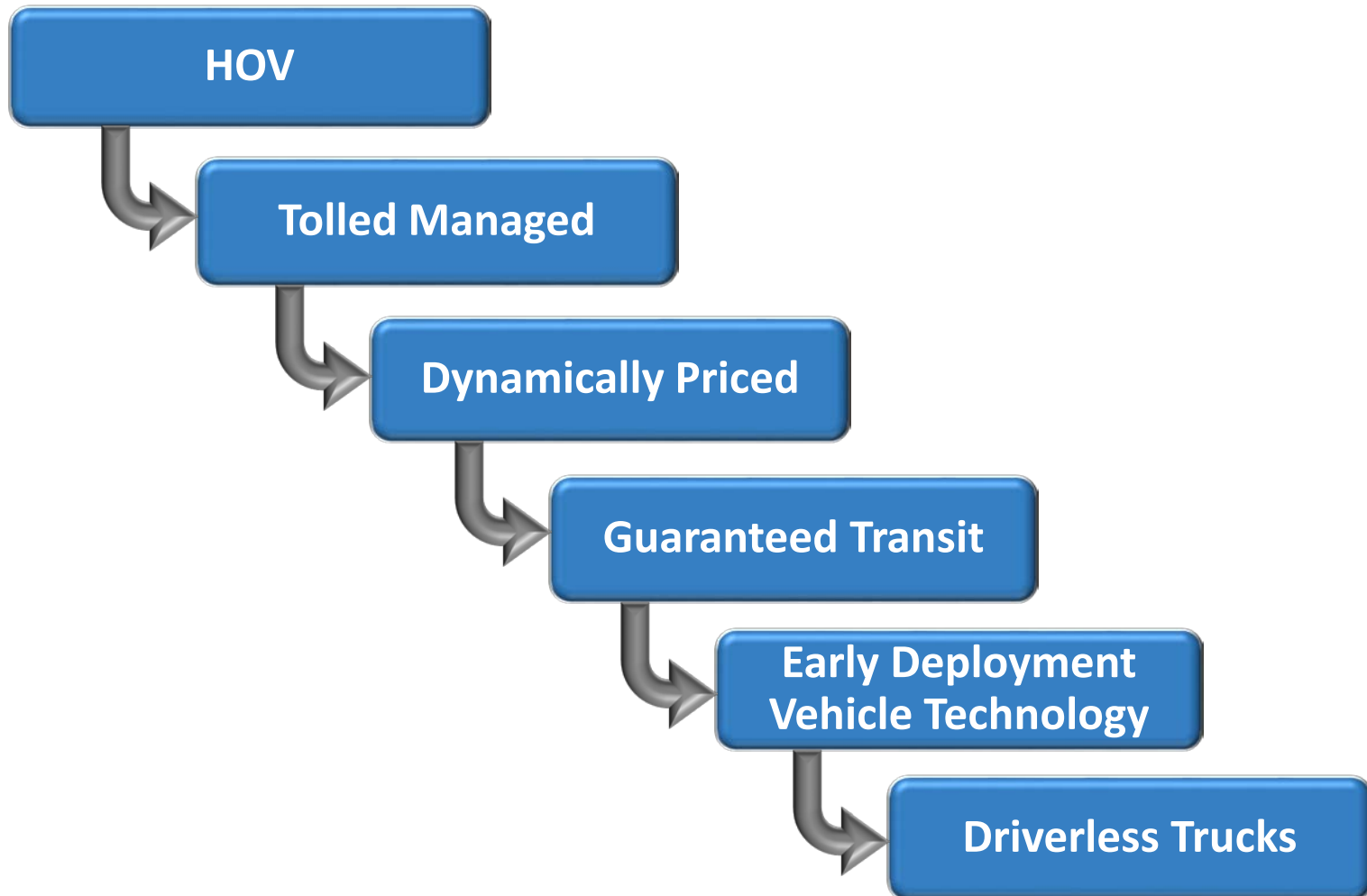
Roadway Maintenance

**Support Asset Management Policies**



# Managed Lanes Evolution

---



# Selected Proposed Policy Additions

---

## General

Support Ability to Modify Mobility Plan for  
Emergency Operational Improvements

Technology Lanes

Managed Lanes

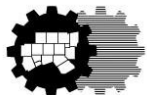
Access Ramps

Auxiliary Lanes









## Managed Toll Lane System

Support Implementation within a Tolled  
Managed Lane Policy Area



# Toll Managed Lane System Policy Boundary

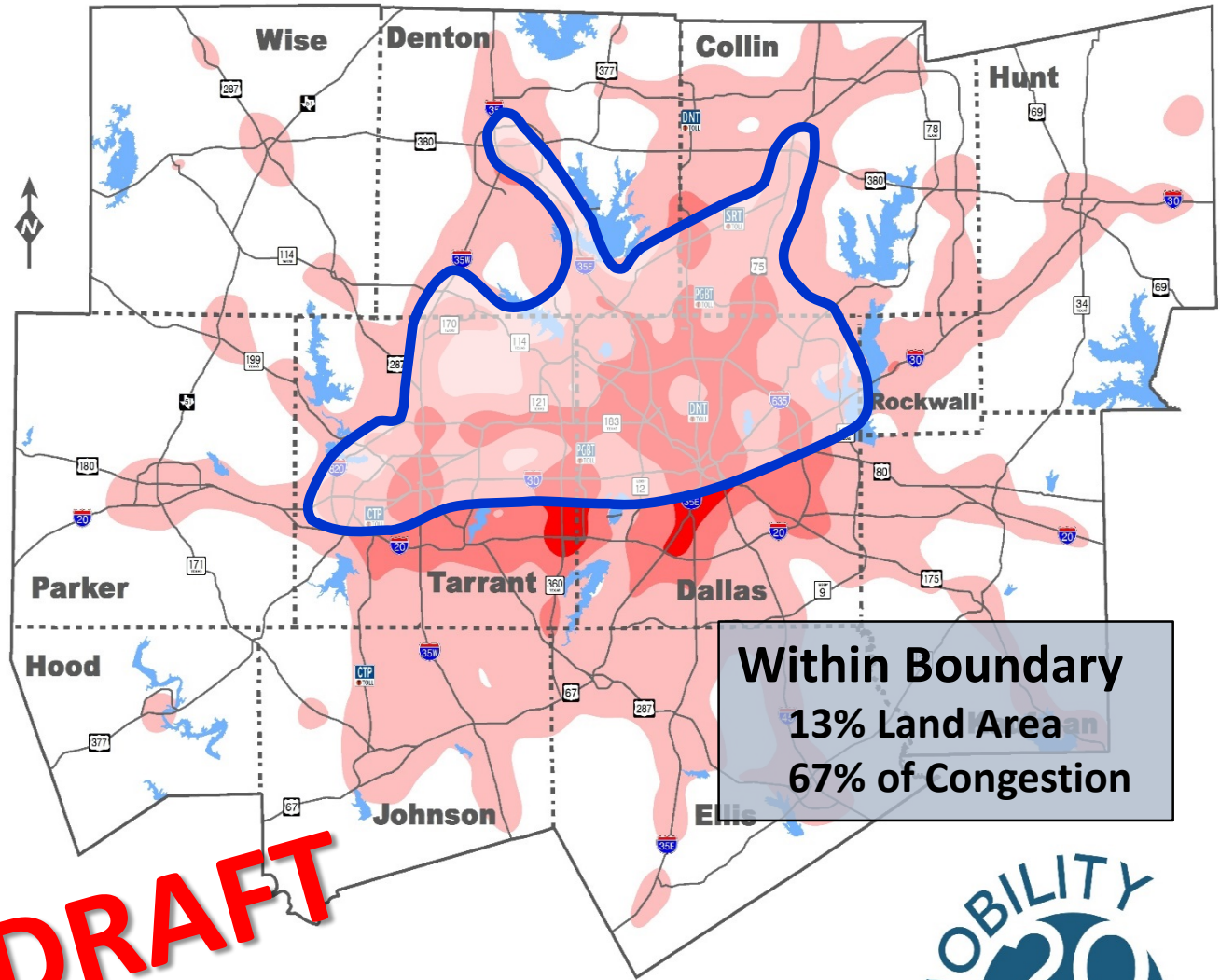
## Congestion Index\*

-  No Congestion
-  Light Congestion
-  Moderate Congestion
-  Severe Congestion
-  Major Roads
-  Toll/Managed Lane Policy Boundary

### Dallas CBD



### Fort Worth CBD



**DRAFT**



Cost of Congestion/Delay: \$25.3 billion

\*Congestion Index is based on a percent increase in travel time.

# Tolled Managed Lanes

---

**Purpose: Manage Congestion**

**Effect: Increased Mobility**

**Improved Speeds in Tolled Lanes**

**Speeds 50% Faster for Non-Tolled Lanes**

**Speeds 75% Faster for Tolled Lanes**

**Project Funding Supplement**

**Allow Private Sector Participation**

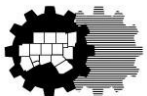
**Users Average About \$10 per Month**

**Drivers Have Choice and Predictability**



# Mobility 2045 Technology Foundation

---



# Can Technology Help?

---

## Predictions 2016 to 2040 (Cumulative)

Public Sector: \$120+ Billion Investment

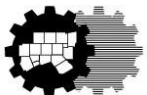
Vehicle Miles Travelled: Up 55%

Highway Capacity: Up 18%

Vehicle Hours in Delay: Up 136%

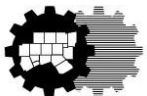
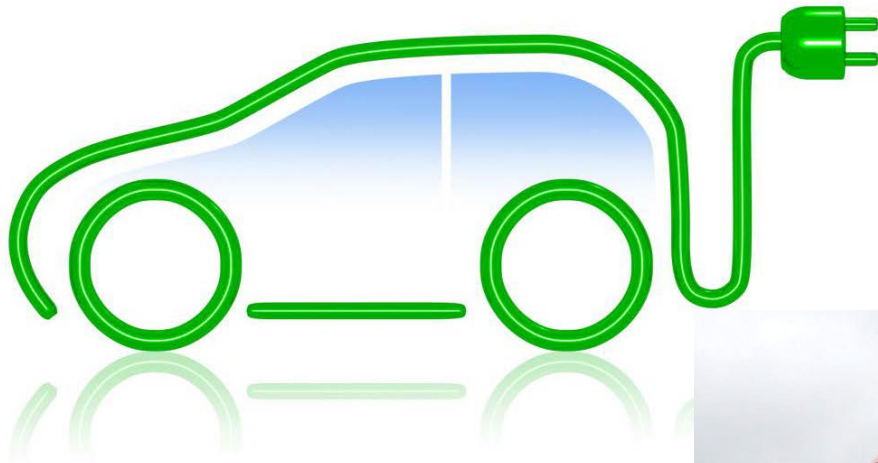
Highway Deaths: 15,000

Highway Injuries: 1,000,000

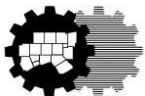


# Technology Driver: Electrification

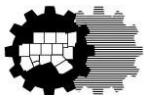
---



# Technology Driver: Automation

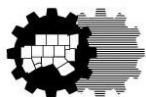
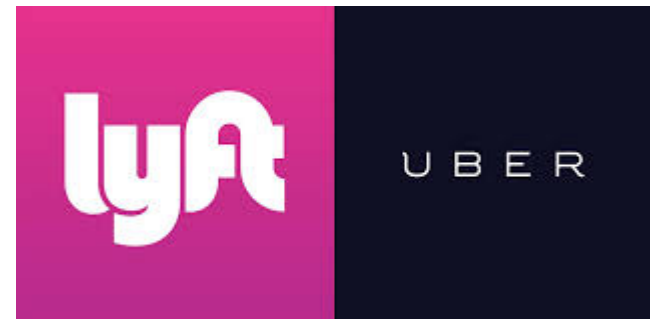


# Technology Driver: Connectivity



# Technology Driver: Service Delivery

---



# Technology Drivers: Unknowns



Artificial Intelligence



Virtual Reality



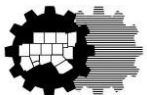
Wireless Communications



Transformative Devices

# AVs and Cities

- Robo-taxis
- AV Shuttles
- Buses
- Delivery
- Personal
- Mover
- Freight

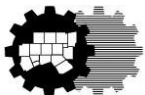


# Proposed Policies: Data Sharing

---

**TT3-001: Transportation agencies will use open data best practices with their transportation data.**

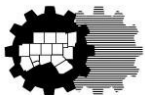
**TT3-002: Priority will be given to two-way data sharing arrangements.**



# Proposed Policies: Data Use

---

**TT3-003: Perform cost/benefit analysis of data sharing as alternative to hardware solutions.**

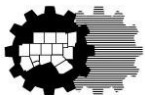


# Proposed Policies: Asset Utilization

---

**TT3-004: Support reliable and robust wireless communications for transportation uses.**

**TT3-005: Use technology to preserve and effectively use transportation corridors.**

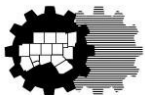


# Proposed Policies: AV Deployment

---

**TT3-006: Support deployment of automated vehicles.**

**TT3-007: Priority given to maintaining roadways to support safe operation of automated (and human driven) vehicles.**

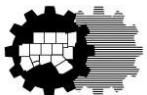


# Proposed Policies: AV Impacts

---

**TT3-008: Ameliorate impact of automated vehicles by increasing average vehicle occupancy.**

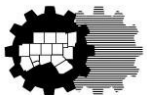
**TT3-009: Perform cost/benefit analysis of using automated vehicle technology and demand management tools to build roadway capacity.**



# Proposed Policies: AVs Serve Regional Priorities

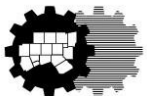
---

**TT3-010: Automated vehicles must be deployed in a manner consistent with Mobility 2045 goals.**



# Technology Elements Related to Vehicle Occupancy Technology

---



# Current HOV Enforcement

Register



Declare Every Trip



Occupancy Declaration Sent to Field



Officers Watch for Red Light



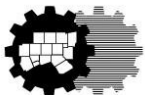
Violation: Legal Process



And Toll Collected



NTTA Back Office System for Billing



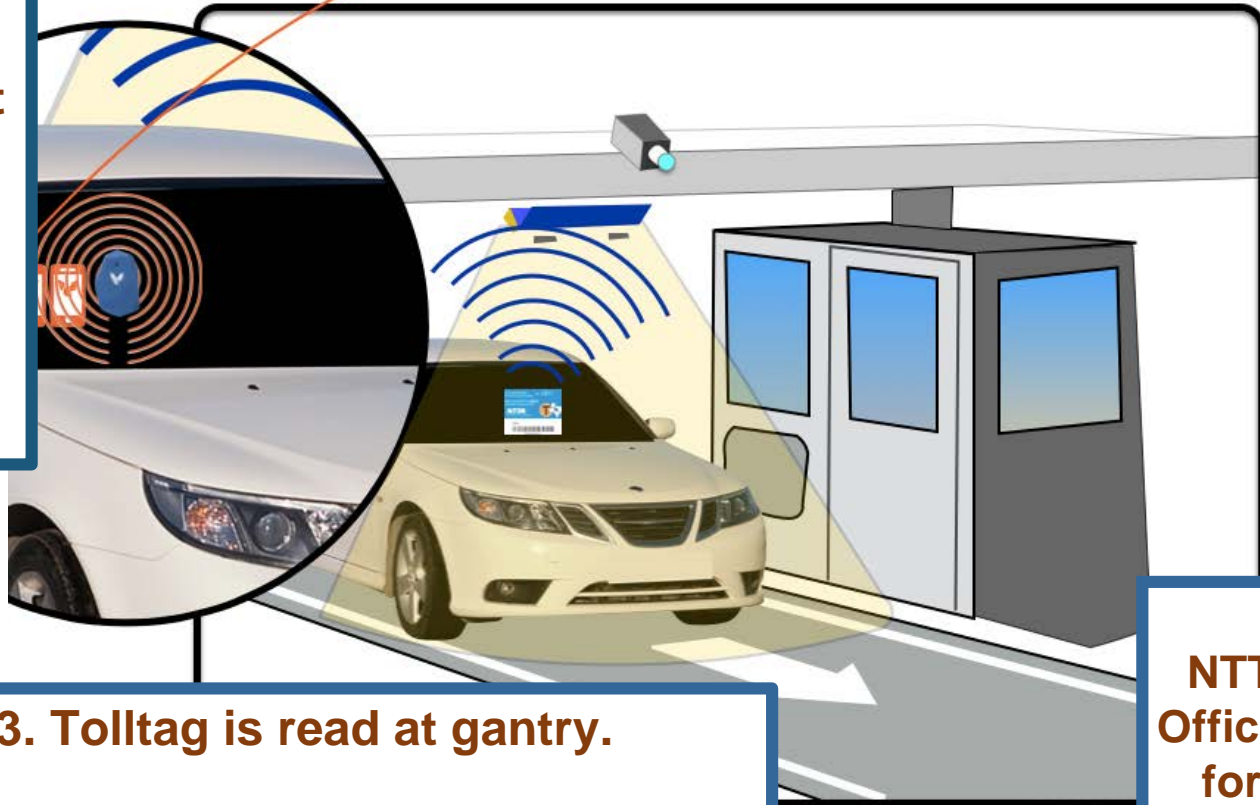
# Technology Overview

## How Carma's Solution Works

TollTag ID: T1982465  
2 Occupants

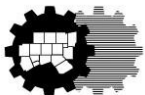


1. Car beacon "reads" cell phone/occupant beacon.
2. Number of occupants recorded within app.



3. Tolltag is read at gantry.
4. Occupancy info time-stamped within app.



NTTA Back Office System for Billing

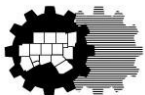
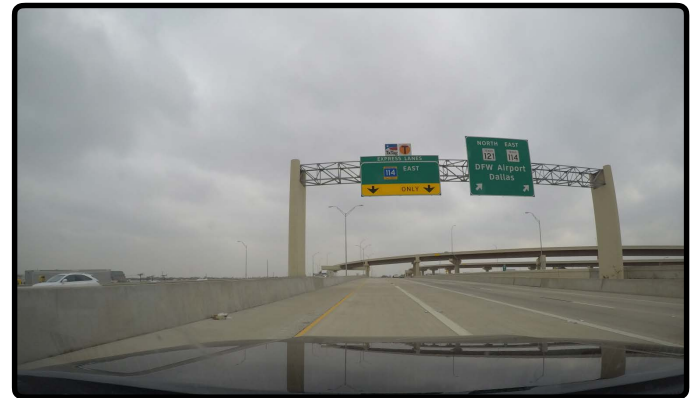


# HOV Discounts

## *Discounted Tolls for Verified High-Occupancy Vehicles*



TO Westmoreland Rd	
HOV 2+	0.22
 	0.44
PAY BY MAIL	0.66

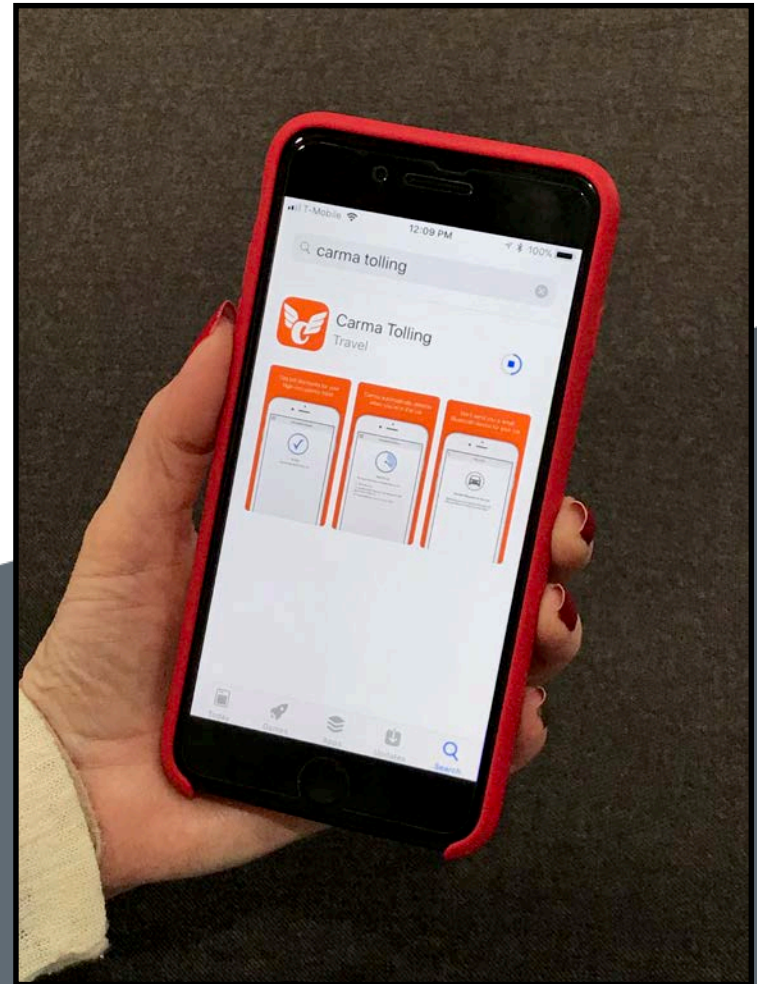


# App Download

iOS and Android

## *Carma Tolling*

Automatic HOV Toll Discounts



[www.gocarma.com/download](http://www.gocarma.com/download)

# User Sign Up



## Create a Carma Account

### Fast Sign Up

Email address

Name

Password

Phone Number

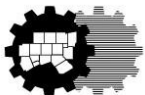
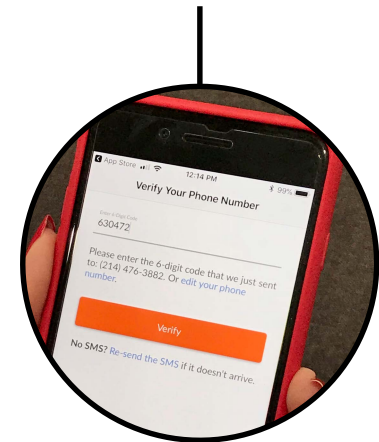
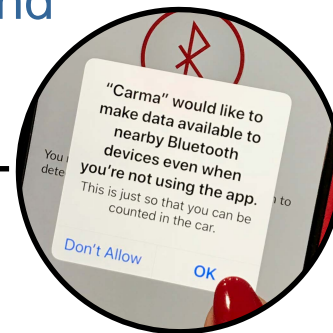
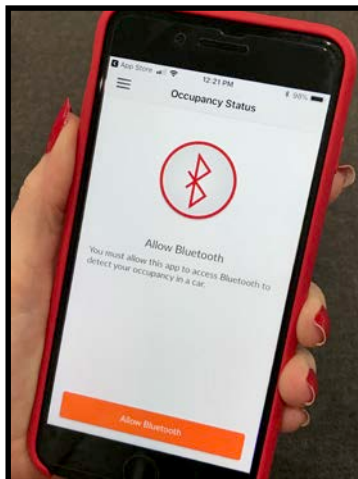
Verify Phone Number

### Setup App Permission

Allow Access

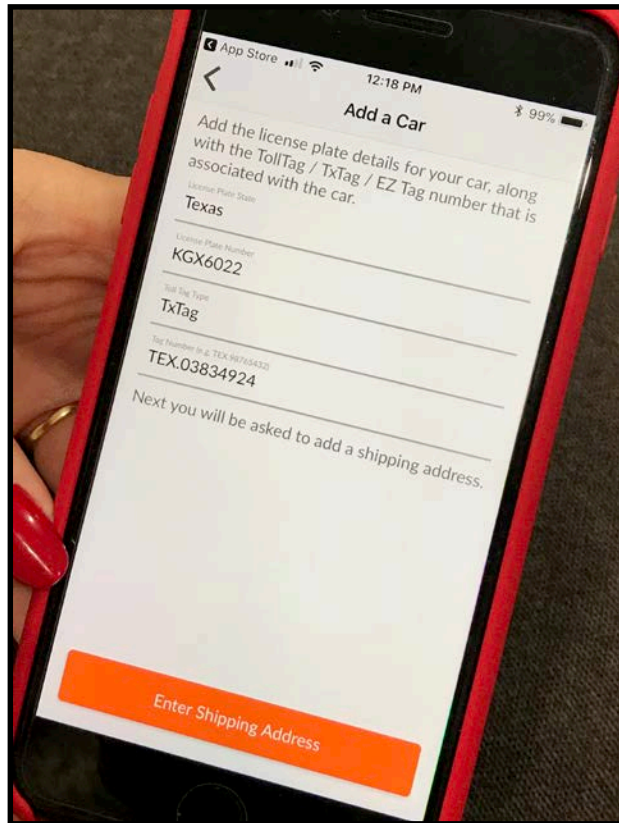
Once-only

Enables app to run in background



# Vehicle Setup

## Request a Car Beacon



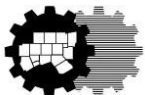
## Add Car and Toll Tag Details (Drivers only)

License Plate State

License Plate Number

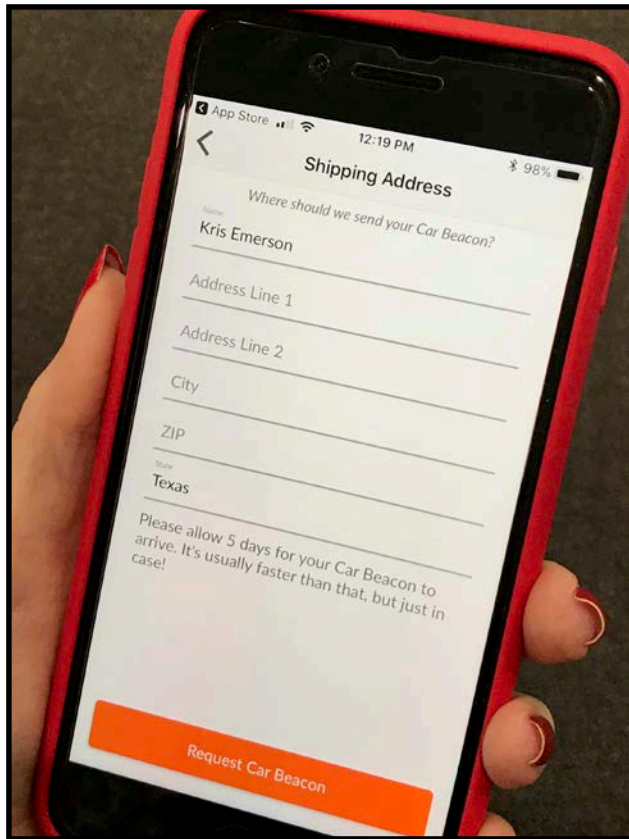
Toll Tag Type

Toll Tag Number (TxTag or TollTag)



# Car Beacon Setup

*Free, Fast Delivery to Each Driver*



**Enter Shipping Address**

Name

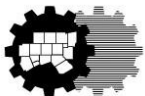
Address

**Upon receipt, put in car glove box**

One-to-one relationship with toll tag

Enables app to detect when in car

Long-lasting battery life



# Drive in TEXpress Lane

## Earn a HOV Toll Discount



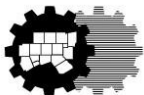
### Automatically Get a HOV Toll Discount

For verified HOV status

Weekday peak period transactions only

See discount in your toll statement

Transaction Type/Description	Discount	Amount
Toll	HOV2+-50%	-\$2.75
Express Toll	HOV2+-50%	-\$2.48
Express Toll	HOV2+-50%	-\$2.48
Toll	HOV2+-50%	-\$2.48
Toll	HOV2+-50%	-\$2.48
Toll	HOV2+-50%	-\$2.48
Toll	HOV2+-50%	-\$2.48
Toll	HOV2+-50%	-\$2.48
Toll	HOV2+-50%	-\$2.48
Toll	HOV2+-50%	-\$2.48

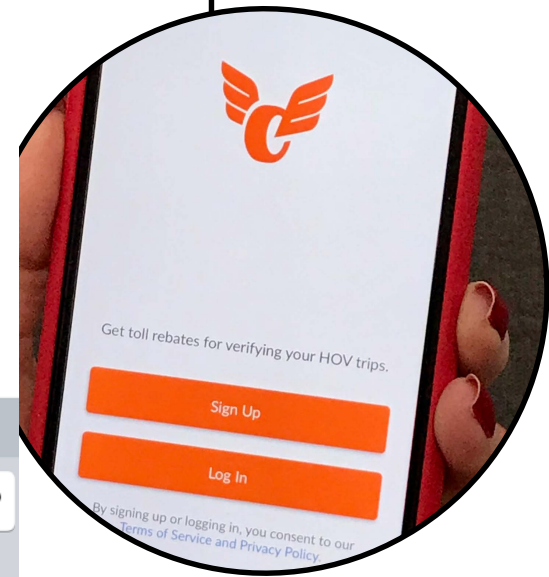
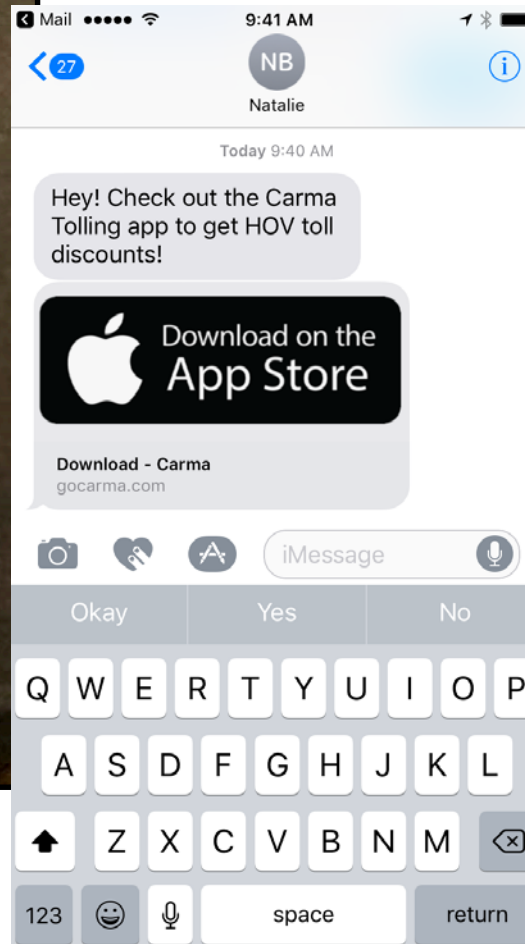
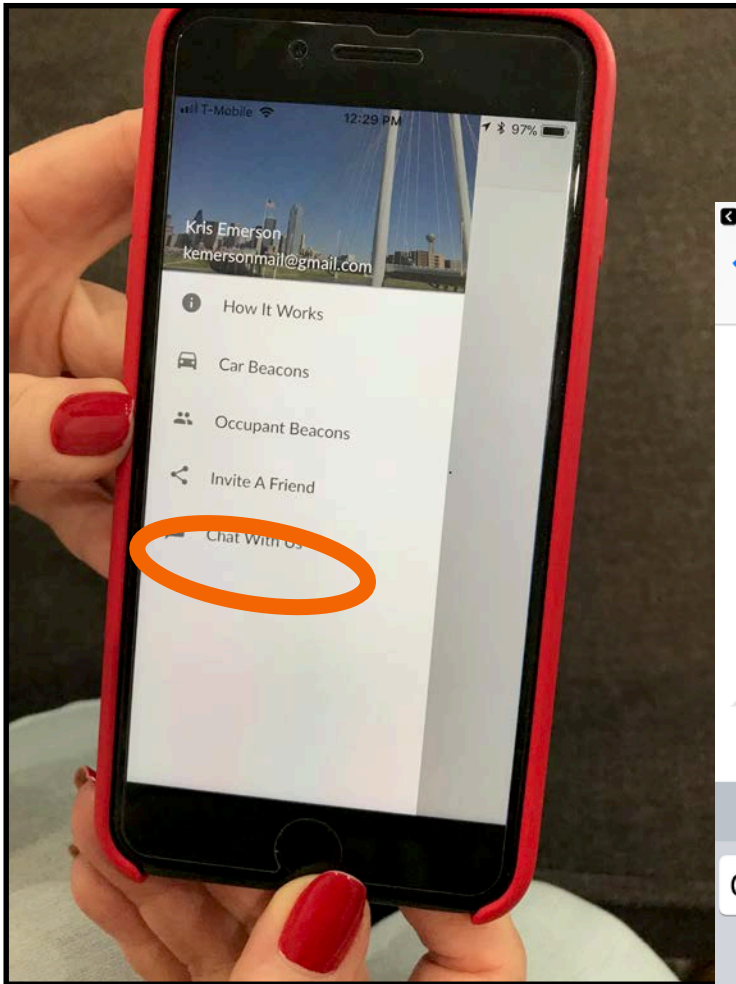


# Invite a Friend

Refer → Download → Sign Up

Send download link to each passenger

- 2-minute passenger sign-up
- No user interaction required after sign up
- Effective immediately



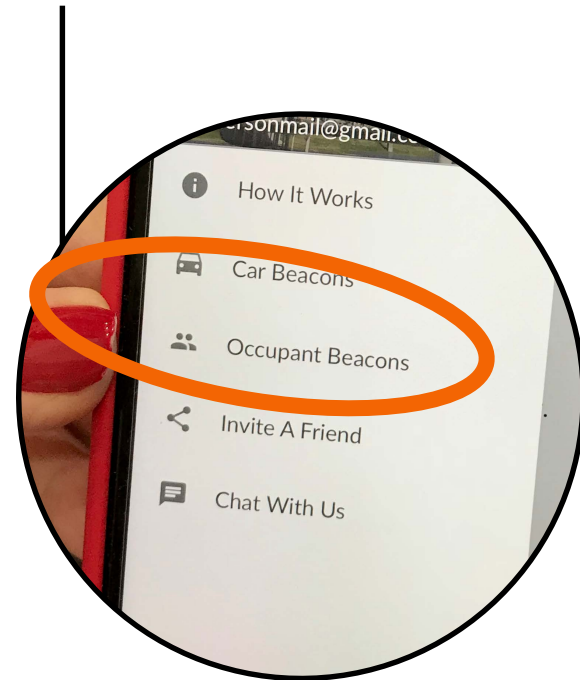
# Occupant Beacons

For passengers without smartphones



## Carry-On Occupant Beacon

- For kids/those without smartphones
- To keep in backpack or diaper bag
- Requested in-app



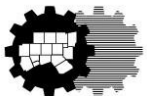
# Contact Information

**Natalie Bettger**  
**Senior Program Manager**  
[nbettger@nctcog.org](mailto:nbettger@nctcog.org)  
**817-695-9280**

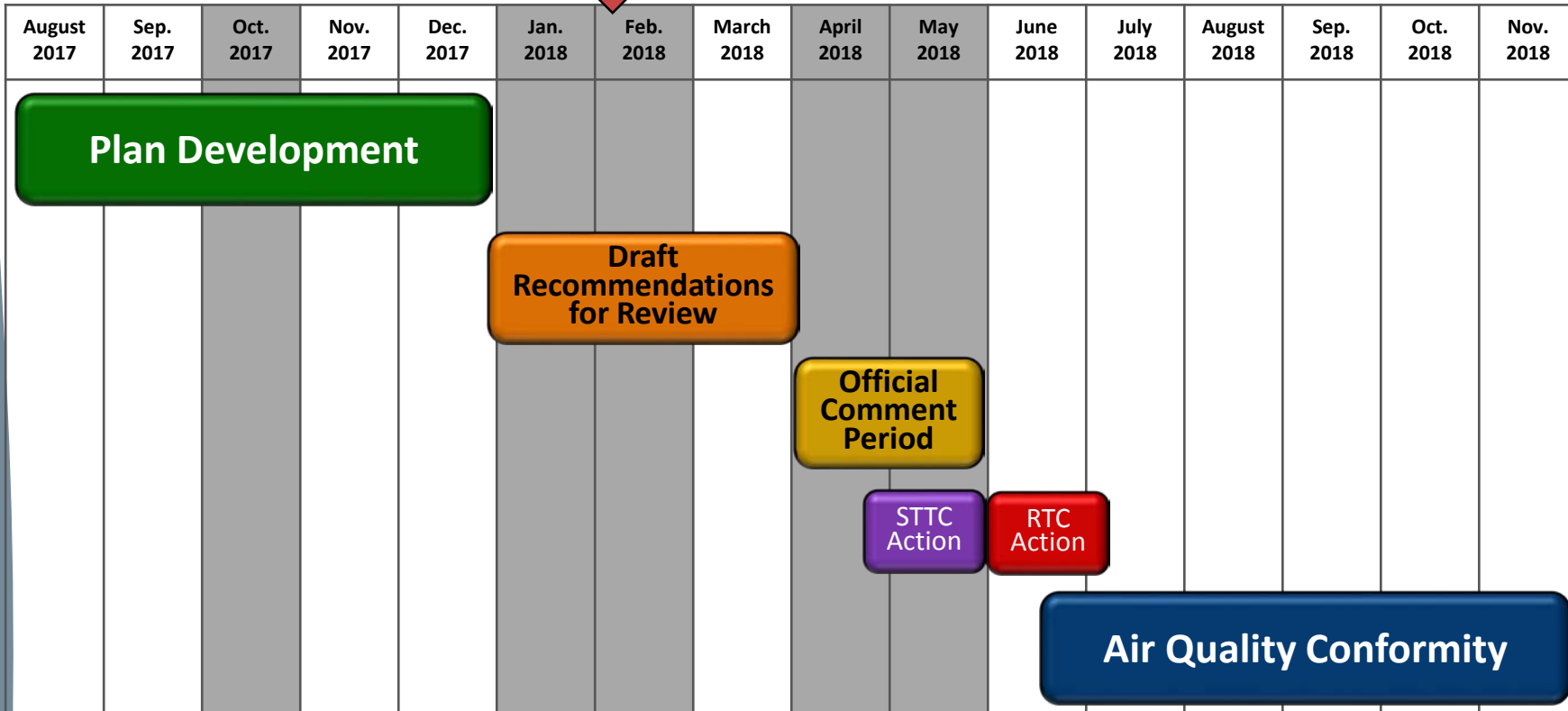
**Dan Lamers**  
**Senior Program Manager**  
[dlamers@nctcog.org](mailto:dlamers@nctcog.org)  
**817-695-9263**

# Next Steps

---

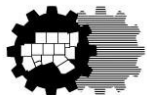


# Mobility 2045 Schedule



**Notes:**

- Public meetings held during highlighted months.
- Regional Transportation Council action on Mobility 2045 Plan scheduled for June 14, 2018.



# Next Steps

---

## Vehicle Occupancy Technology

Request RTC Approval in March

## Mobility 2045

Revise Recommendations

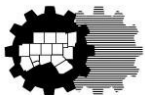
RTC Update in March

Public Comment Period April through May

Review and Action

**STTC – May 25**

**RTC – June 14**



# Questions?

---

## **Dan Lamers**

Senior Program Manager  
dlamers@nctcog.org  
(817) 695-9263

## **Tom Bamonte**

Senior Program Manager  
tbamonte@nctcog.org  
(817) 704-5604

## **Kevin Feldt**

Program Manager  
kfeldt@nctcog.org  
(817) 704-2529

## **Sarah Chadderdon**

Program Manager  
schadderdon@nctcog.org  
(817) 695-9180

[www.nctcog.org/mobility2045](http://www.nctcog.org/mobility2045)

