2023 SPRING NCMUG MEETING

APRIL 26, 2023

# Scenario Planning in the 2050 CRTPO MTP

# Today's Presentation

SCENARIO
PLANNING AND
THE 2050 MTP

 USING THE MRM FOR
SCENARIO
PLANNING

• FINDINGS AND NEXT STEPS

#### Connection to the 2045 MTP Scenario Planning Initiative



Citv

Explaine

**RS&H** 

CRTP

The CRTPO's next scenario planning initiative for the 2050 MTP should embrace the biggest opportunities for shaping transportation in the future autonomous vehicles, telecommuting, transit investments, competing growth centers, etc. — as alternative growth scenarios.

ADOPTED

# Scenario Planning: CRTPO 2045 MTP

- Goal: Develop long-term framework for measuring impacts and evaluating trade-offs of different land use, urban design, highway network, and transit network choices
- Desired outcome: More informed decisions about funding, policies, and projects
- CRTPO's first direct scenario planning exercise
  - Eased into the shallow end of scenario planning
- Build on earlier efforts in the Charlotte region

### Earlier Charlotte Region Scenario Planning Efforts



# Scenario Planning: CRTPO 2050 MTP

- Build on 2045 MTP
- Goal: Similar to 2045 MTP
- Desired outcome: Resource for member jurisdictions to identify potential projects to be considered for inclusion in the MTP

### General Approach to Scenario Development







Scenario Planning Strategy for the 2050 MTP



Adapted Available Tools & Data Sets in the Region



## Key Drivers of Change for the Region



**Connected & Autonomous Vehicles** 







Growth & Development Patterns



#### Trends Toward Work-from-Home



#### Image Credit: Joan Koka, Argoone National Laboratory

**RS&H** 

- Reduced crashes and improved overall vehicle safety because of continuous monitoring, making up for driver lapses in judgement
- Reduced demands for new infrastructure because of optimized traffic flows, less construction and maintenance costs
- Improved travel time dependability via real-time, predicative routing decisions

**Center for Advanced Automotive Technology, www.autocaat.org** 











# **CAV ADOPTION TIMELINE**



This image was captured from the presentation "Capacity Impacts of Connected and Autonomous Vehicles" made at a TRB Conference held on September 29, 2020.

If they follow previous vehicle technologies autonomous vehicles it will take one to three decades to dominate vehicle sales, and one or two more decades to dominate vehicle travel, and even at saturation a significant portion of vehicle travel may continue to be human operated, indicated by the dashed lines.

Source: Litman, Todd, 2018. Autonomous Vehicle Implementation Predictions. https://www.vtpi.org/avip.pdf









### Connected-Autonomous Vehicles







#### **Aggressive Investment**

Moderate CAV Network Plus Select Thoroughfares



**Connected-Autonomous Vehicles** 

- Assume 60% CAV population in 2050
- Create CAV and non-CAV highway networks
- Freeway capacity factor based on Kittelson report and discussion
- 1.2 Capacity factor on all Class II and Major Thoroughfares and on Minor Thoroughfares in urban, fringe and CBD area types



Chapter 26 – Draft Capacity Adjustment Factors (CAFs)

» Basic Freeway Segments

Proportion of CAVs in Traffic Stream	Adjusted Segment Capacity		
	2,400 pc/h/ln	2,100 pc/h/ln	1,800 pc/h/ln
0	1.00	1.00	1.00
20	1.02	1.02	1.15
40	1.07	1.10	1.27
60	1.13	1.25	1.40
80	1.22	1.37	1.60
100	1.33	1.52	1.78

Notes: CAV = connected and automated vehicle, defined here as a vehicle with an operating cooperative adaptive proposed cruise control system.

Interpolate for other CAV proportions and adjusted segment capacities. Assumptions: Average intervehicle gap within CAV platoons = 0.71 s based on a distribution (see text), CAV interplatoon gap = 2.0 s, maximum CAV platoon size = 10 pc, human-driven vehicles operate with average gaps calibrated to the given adjusted segment capacity



Exhibit 26-15

Capacity Adjustment Factors for CAVs for Basic Freeway

and Freeway Diverge Segments

## Growth & Development Patterns

#### **Intended Growth Areas**



## Growth & Development Patterns

#### **Changing Suitability Scores**



## Growth & Development Patterns

#### **Anticipated Growth Areas**



## Shift to Work-from-Home Status



www.hugo.team/blog/the-future-of-work-is-almost-here-4-facts-from-the-future-of-jobs-report





#### Is Working From Home Here to Stay?

% of respondents who would like to change their work schedule after COVID-19 has been contained



www.statista.com/chart/21120/survey-remote-work/



### Intended Growth Drivers Telecommuting (Work-from-Home)





#### Alternative Growth Scenarios for the CRTPO 2050 MTP

The combination of different factors considered for the CRTPO 2050 MTP scenario planning initiative guided the creation of ten growth scenarios for testing in the Metrolina CommuityViz Model or the Metrolina Regional (Travel Demand) Model. Nine of the scenarios assumed different combinations of the change factors described earlier in the document. The tenth scenario — Status Quo — provided a baseline for comparing the type and magnitude of change expected for each future alternative.

The combination of factors considered for the alternative growth scenarios — assuming different conservative-moderate-aggressive movements away from existing conditions are summarized here. Future year growth projections for population, employment, and students in 2050 remained constant for all the scenarios.



Dispersed Activity Centers

**CRTP** 

**RS&H** 

City

Explained

10% Shift in Telecommuting for Office (Non-Retail/Non-Industrial) Oriented Jobs



NC MODEL USER GROUP

SC 3

Freeway General

Managed Lanes for

Widespread Sprawl

35% Shift in Telecommuting

for Office (Non-Retail/Non-

Industrial) Oriented Jobs

SC 9

Freeway General

Purpose Lanes,

Lanes for US 74

Centers

Managed Lanes for

Freeways & Managed

Compact, Centralized

35% Shift in Telecommuting

for Office (Non-Retail/Non-

Industrial) Oriented Jobs

Freeways & Managed

Purpose Lanes,

Lanes for US 74

Patterns



#### Reduction in VMT on the Highway System in 2050



**All-In CAV Investment** (Conservative Telecommuting)

**RS&H CRTP** 





**Big Swing to Telecommuting** (Conservative CAV)

#### **All Road Facilities Reported**



Volumes Increase with Change

Thin Line (less traffic volume)

#### **Reduction in VHT** on the Highway System in 2050

Thick Line (more traffic volume)



# What does 1% change represent in the scenario planning study?

# 868,800 vehicle miles traveled

in the three-county region



# What does 1% change represent in the scenario planning study?

44,500 vehicle hours traveled

in the three-county region

# Key Takeaways

- Can be implementable with available tools (TDM & LU Allocation model)
- Highlights the range of outcomes possible in the future
- Good tool and valuable exercise, but need to
  - Be aggressive in selling it
  - Provide clear path forward

# Next Steps

- Making Scenario Planning results a resource in upcoming MTPs
  - Bonus points in project ranking process?
  - Use of discretionary funds to promote VMT/VHT reducing scenarios?
- Track assumptions
- Incorporate Scenario Planning analysis in travel demand model development
  - Sensitivity Testing
  - Range of forecast volumes in corridor studies, etc?

# Questions?

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