

# Preliminary Assessment of Interchange Concepts

Seven Corners Task Force  
March 11, 2014



## Presentation overview

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- Introduction
- Concept selection and refinement
- Future volume development and assignment
- Preliminary assessment of interchange concepts
  - Level of service and queuing
  - System-wide delay
  - Travel time
- Measures of effectiveness (MOEs)
- Next steps and schedule
- Task Force discussion



# Introduction

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- Work completed since December, 2013
  - Concept revisions based on Task Force/FCDOT feedback
  - Draft conceptual design sketches
  - Travel demand modeling
  - Traffic assignment
  - Network development and analysis
  - Measure of effectiveness (MOEs)
  - Draft operational results

# Travel Demand Modeling Results

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- Existing (2007)
- Comprehensive Plan (2040)
- 7 Corners Land Use Plan (2040)
- Comprehensive Plan annual growth rates (2040)
  - 0.96% (AM)
  - 0.82% (PM)
- 7 Corners Land Use Plan annual growth rates (2040)
  - 1.14% (AM)
  - 1.14% (PM)

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# Volume Assignment and Intersection Analysis

- O-D matrix used to develop Comprehensive Plan and conceptual design alternatives (“Build”) volumes
- Create Synchro network (AM/PM peak hours)
  - Lane assignments/turn lanes
  - Signal timing/coordination/pedestrian phasing
- Error checking and network balancing
- Model outputs
  - Vehicle level of service (LOS)
  - Delay
  - Queuing



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# Design Concept Preliminary Results Overview

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- PM peak hour
- Review by “corridor”
  - Route 50 and Route 7
  - Wilson Boulevard
  - Hillwood Avenue/Route 7 area
  - New overcrossing(s)
  - Patrick Henry connection to Wilson Boulevard
- Results
  - Vehicle level of service and delay by approach
  - 95<sup>th</sup> percentile queuing

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# Evaluation Criteria

Theme	Evaluation Criteria	Alt 1: Diverging Diamond	Alt 2: Split Diamond with Couplet	Alt 3: Single Point Interchange	Alt 4: Two Half Diamonds	Alt 5: Four Corners	Alt 6: Jughandle Configuration
<b>1 Vehicle Mobility</b>							
A	Includes a new overcrossing of US-50	●	●	●	●	●	●
B	Provides local roadway connectivity	○	◐	○	●	◐	●
C	Impacts to high volume origin-destination routes	○	◐	○	◐	◐	◐
D	Improve vehicle mobility	◐	●	◐	◐	◐	◐
<b>2 Land Use</b>							
A	Facilitates implementation of Seven Corners Task Force Land Use plan	◐	●	◐	●	◐	●
B	Impacts to Eden Center (physical and/or access)	◐	◐	○	◐	◐	◐
C	Ramp locations impede parcel access	◐	◐	○	●	○	●
<b>3 Constructability</b>							
A	Ability to phase and maintain traffic during construction	○	◐	○	●	◐	●
B	Construction costs	○	○	○	○	◐	○
<b>4 Right-of-way Impacts</b>							
A	Right-of-way impacts	◐	○	○	●	●	●
B	Impacts to Oakwood Cemetery	◐	◐	○	◐	◐	◐
C	Impacts to Sleepy Hollow neighborhoods (physical and/or access)	○	◐	○	◐	●	◐
<b>5 Transit, Pedestrian, and Bicycle Mobility</b>							
A	Ability to accommodate transit services	◐	●	◐	●	◐	◐
B	Pedestrian and bicycle travel on VA 7	○	◐	○	●	◐	●

○ Low (undesirable)   ◐ Medium   ● High (desirable)

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## Comprehensive Plan Results (2040)

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- Vehicle congestion would be worse than today
  - Demand exceeds Interchange Area capacity
  - Off-ramp queuing extends onto Route 50
  - Route 50 and Route 7 congestion
- Shared roadway transit service would be less reliable
- Challenging/costly to improve for pedestrians/bikes
- Queues would block driveways and access points
- Fewer transportation or land use investment/leverage opportunities

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## Concept A: Split Diamond with Couplet Results (2040)

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- Network improvements
  - New interchange would provide mobility for Route 7/Route 50
  - Overcrossings would provide mobility/access across Route 50
  - Multiple potential transit and bicycle routes
- Route 50
  - Over capacity at Patrick Henry intersection; would provides a new connection to Wilson Boulevard
- Wilson/Sleepy Hollow would decrease system connectivity
- Route 7 may have less “Main Street” character than other concepts

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## Concept B: Two Half Diamonds Results (2040)

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- Network improvements
  - Ramps to/from Route 50 would increase mobility
  - “Ring road” and new overcrossings carry high traffic volumes
  - Route 7/Wilson intersection would be a new network hub
- Route 50
  - Over capacity at Patrick Henry intersection; would provides a new connection to Wilson Boulevard
- Route 7 potential for boulevard/Main Street treatment
- Many possibilities for multi-modal improvements

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## Concept C: Jughandles Results (2040)

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- Network improvements
  - Jughandle ramps would provide redundant capacity
  - Overcrossing and Route 7/Wilson intersection connectivity
- Route 50
  - Patrick Henry intersection better than Concepts A and B; side street/jughandle congestion
- Route 7/Hillwood and South Street congestion
- Route 7 potential for boulevard/Main Street treatment
- Pedestrian/bicycle improvements at two locations

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# System-wide Delay Results

**DRAFT**

- Calculation components:
  - Per-vehicle delay per intersection
  - Total entering vehicles per intersection
  - Average system-wide vehicle delay
- Results
  - Existing (2013): **42.5** seconds/vehicle
  - Comprehensive plan (2040): **98.3** seconds/vehicle
  - Concept A (2040): **40.2** seconds/vehicle
  - Concept B (2040): **31.9** seconds/vehicle
  - Concept C (2040): **30.7** seconds/vehicle

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# Travel Time Results

**DRAFT**

- PM peak hour
- Four highest volume origin-destination pairs
- Travel time results are the sum of:
  - Travel time between intersections
  - Intersection delay for the movement in the direction of travel

Scenario	Origin-Destination Route Travel Time (minutes)			
	From Route 50/Patrick Henry	From Route 50/South St	From Route 7/South St	From Route 50/South St
	To Route 50/South St	To Route 50/Patrick Henry	To Route 7/Patrick Henry	To Route 7/Patrick Henry
<b>Existing (2013)</b>	4.4	2.7	6.1	5.7
<b>Comprehensive Plan (2040)</b>	4.7	2.7	9.5	9.6
<b>Concept A (2040)</b>	3.2	3.2	5.9	5.6
<b>Concept B (2040)</b>	3.3	3.1	3.2	4.4
<b>Concept C (2040)</b>	3.5	3.2	3.8	3.8

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