



## **NORTH CAROLINA**

Department of Transportation



# U-5774 NC 54 Improvements

US 15/501 in Chapel Hill to NC 55 in Durham

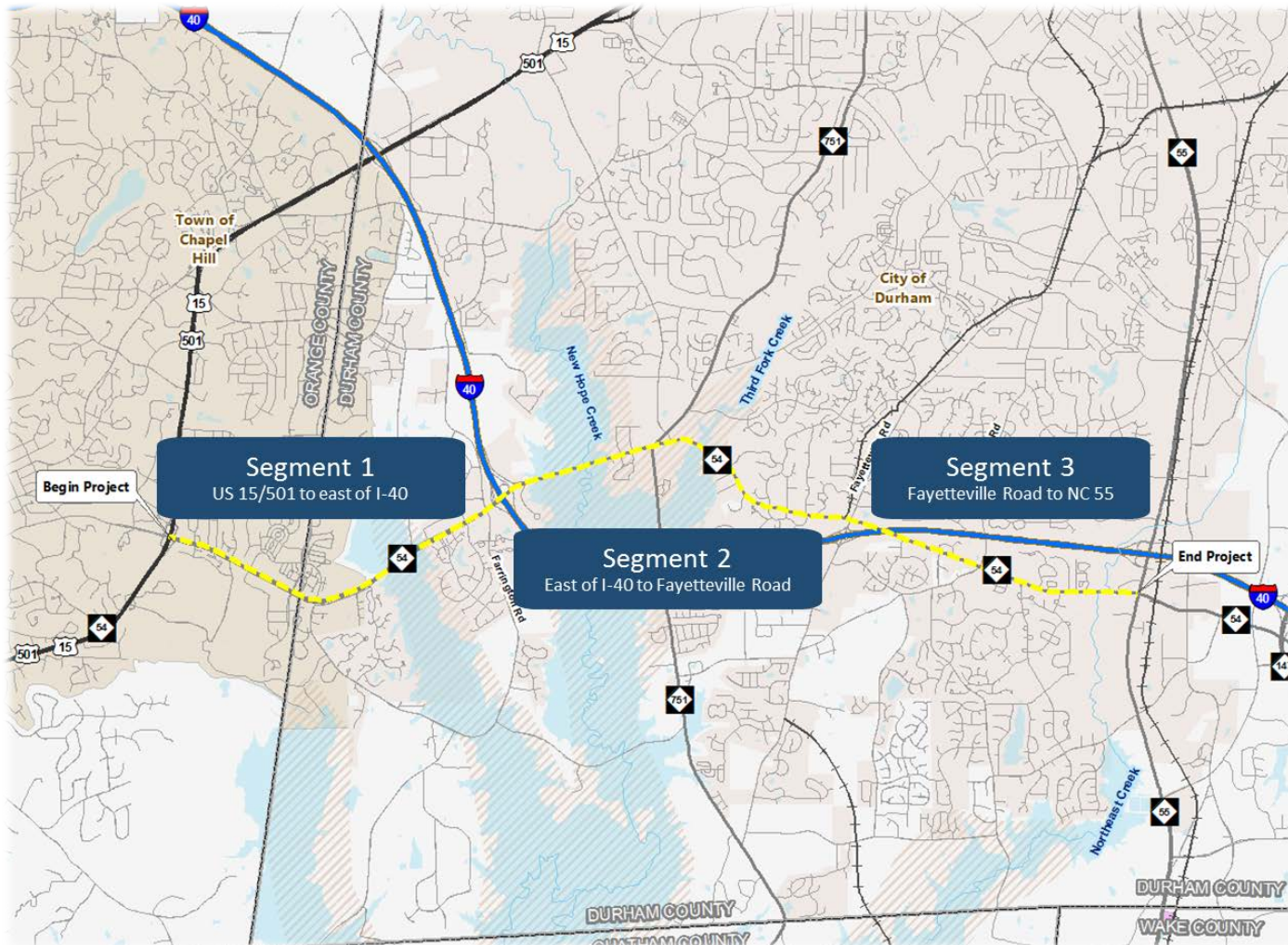
May 9, 2018

# Agenda

1. INTRODUCTIONS
2. REVIEW OF CP #1 & PROJECT PURPOSE AND NEED
3. ALTERNATIVES DEVELOPMENT AND EVALUATION
  - Alternative Strategies
  - Initial Screening Evaluation Criteria
  - Initial Screening Results
4. ALTERNATIVE CONCEPTS
  - Development of Alternative Concepts
  - Concepts by Segment
  - Alternative Concepts Evaluation Criteria
  - Stakeholder Comments
5. NEXT STEPS AND SCHEDULE

# U-5774 NC 54 Improvements

US 15/501 in Chapel Hill to NC 55 in Durham



# Purpose and Need

## Project Needs:

- Decreased mobility in the NC 54 corridor
- Increasing congestion due to roadway capacity deficiencies
- Critical crash rate exceeding state average

## Project Purpose:

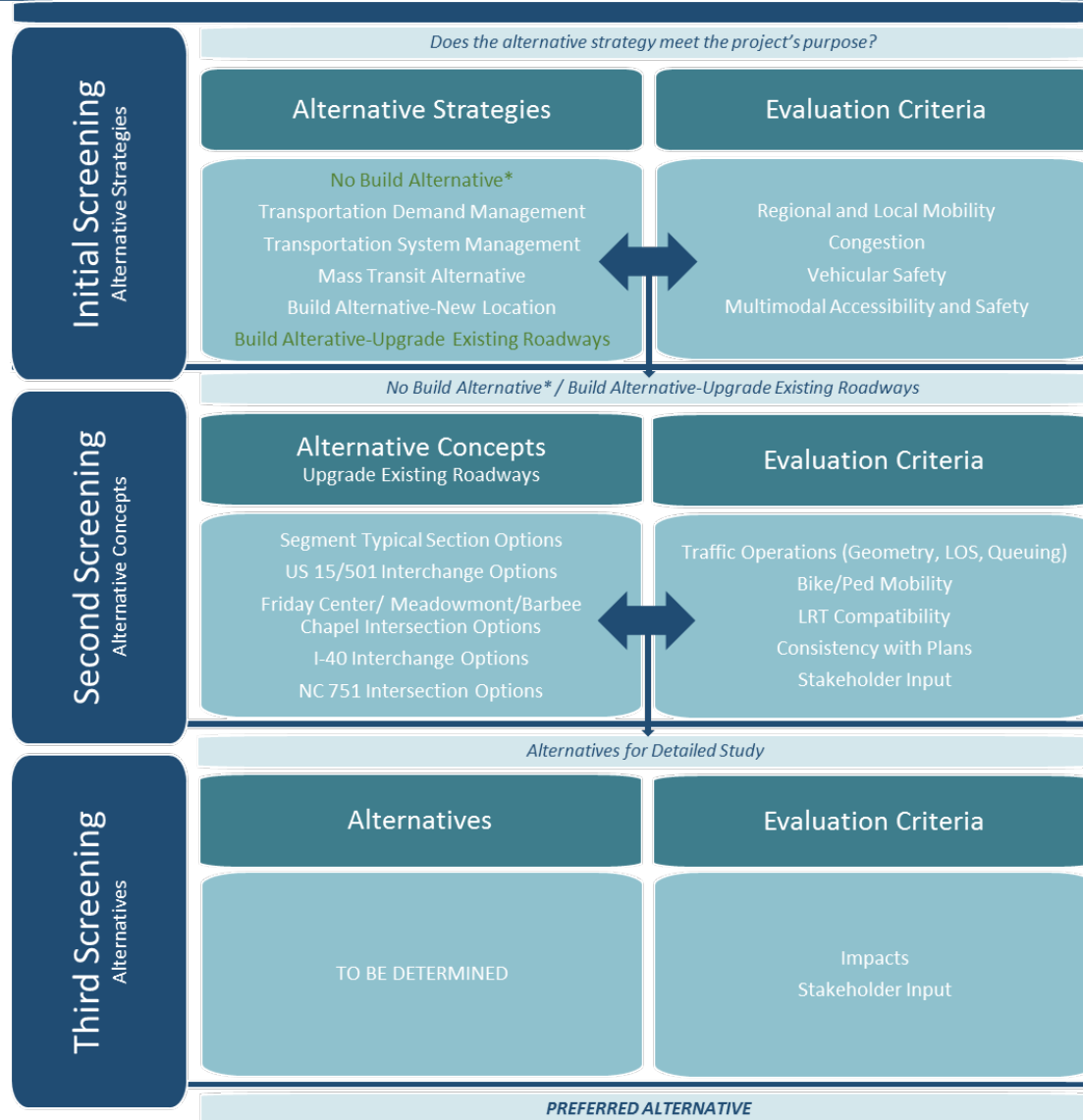
*The purpose of the proposed project is to improve traffic operations along NC 54 between US 15/501 and NC 55 by reducing congestion, while improving mobility and accessibility for all users of the NC 54 corridor.*

## Other Desirable Outcomes:

- Multimodal accessibility and safety
- Vehicular safety



# Alternatives Screening



# Initial Screening of Alternative Strategies

## Initial Screening Alternative Strategies

*Does the alternative strategy meet the project's purpose?*

### Alternative Strategies

No Build Alternative\*  
Transportation Demand  
Management  
Transportation System  
Management  
Mass Transit Alternative  
Build Alternative-New Location  
Build Alternative-Upgrade Existing  
Roadways

### Evaluation Criteria

Regional and Local Mobility  
Congestion  
Vehicular Safety  
Multimodal Accessibility and Safety

# Initial Screening of Alternative Strategies

## Alternative Strategies

- No Build Alternative
- Transportation Demand Management
- Transportation System Management
- Mass Transit
- Build Alternative – New Location
- Build Alternative – Upgrade Existing Roadways

# Initial Screening of Alternative Strategies

*Does the alternative strategy meet the project's purpose?*

## Initial Screening Evaluation Criteria:



Regional and local mobility



Congestion



Vehicular safety





































Multimodal accessibility and safety



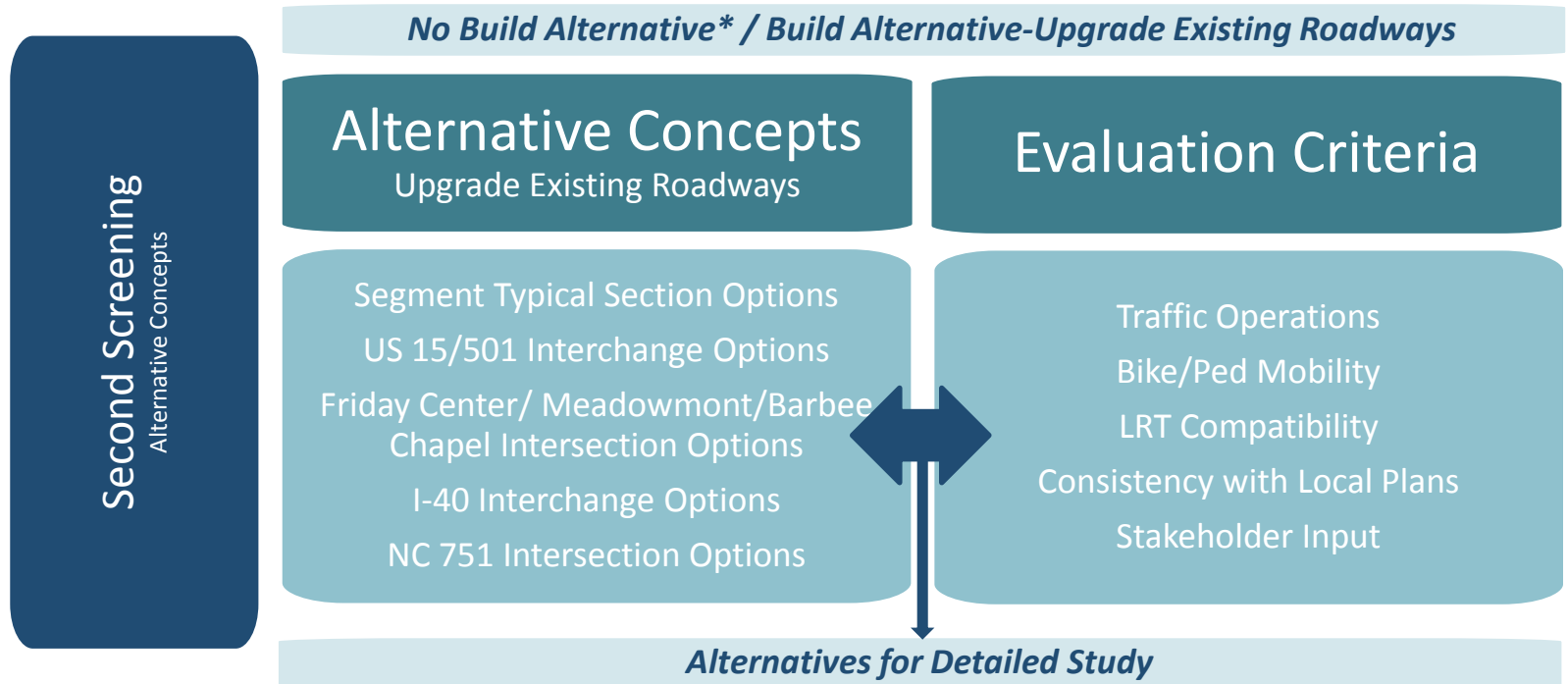


# Initial Screening of Alternative Strategies

Alternative Strategy	Evaluation Criteria				Decision
					
No-Build					
Transportation Demand Management					
Transportation System Management					
Mass Transit					
Build – New Location					
Build - Upgrade Existing Roadways					

\* Retained for further study as a baseline for comparing other alternatives

# Second Screening of Alternative Concepts



# Second Screening of Alternative Concepts

## Second Screening Evaluation Criteria:



Traffic Operations (Geometry, LOS, Queuing)



Bike/Ped Mobility



LRT Compatibility



Consistency with Local Plans



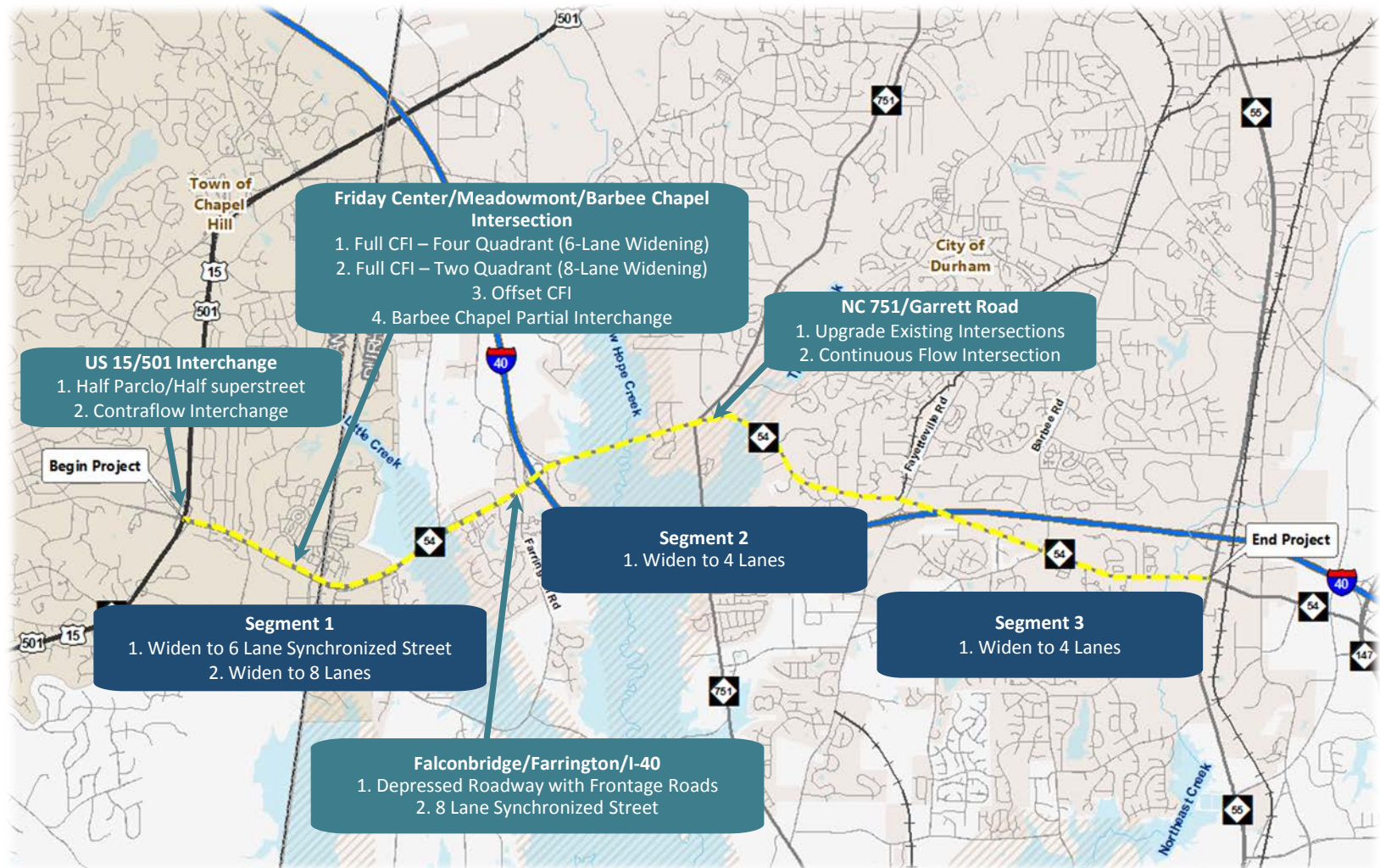
Stakeholder Input

# Build Traffic Forecast

Section	Existing ADT (2016)	Future No- Build ADT (2040)	Future Build ADT (2040)
NC 54 – US 15/501 to Friday Center Drive	46,900-49,400	57,000-60,700	76,600-80,500
NC 54 – Friday Center Drive to Farrington Road (SR 1109)	46,800-47,500	51,000-53,800	77,400-107,300
NC 54 – Farrington Road (SR 1109) to I-40	55,600	71,400	107,300
NC 54 – I-40 to NC 751 (Hope Valley Road)	16,600-18,800	18,000-21,900	32,000-37,100
NC 54 – NC 751 (Hope Valley Road) to Rollingwood Drive	17,500-18,800	19,400-21,500	19,300-23,000
NC 54 – Rollingwood Drive to Fayetteville Road (SR 1118)	19,900-24,000	22,700-27,400	23,500-28,400
NC 54 – Fayetteville Road (SR 1118) to Barbee Road (SR 1106)	14,000-16,200	18,000-20,400	29,400-32,000
NC 54 – Barbee Road (SR 1106) to NC 55	17,400-22,000	21,500-27,100	34,100-42,700



# Alternative Concepts





# Stakeholder Input

## **NCDOT**

- Congestion Management, Roadway, Division 5 (December 2017)
- Division 7 (January 2018)

## **Local Staff** (February & April 2018)

- Town of Chapel Hill
- City of Durham, DCHC MPO

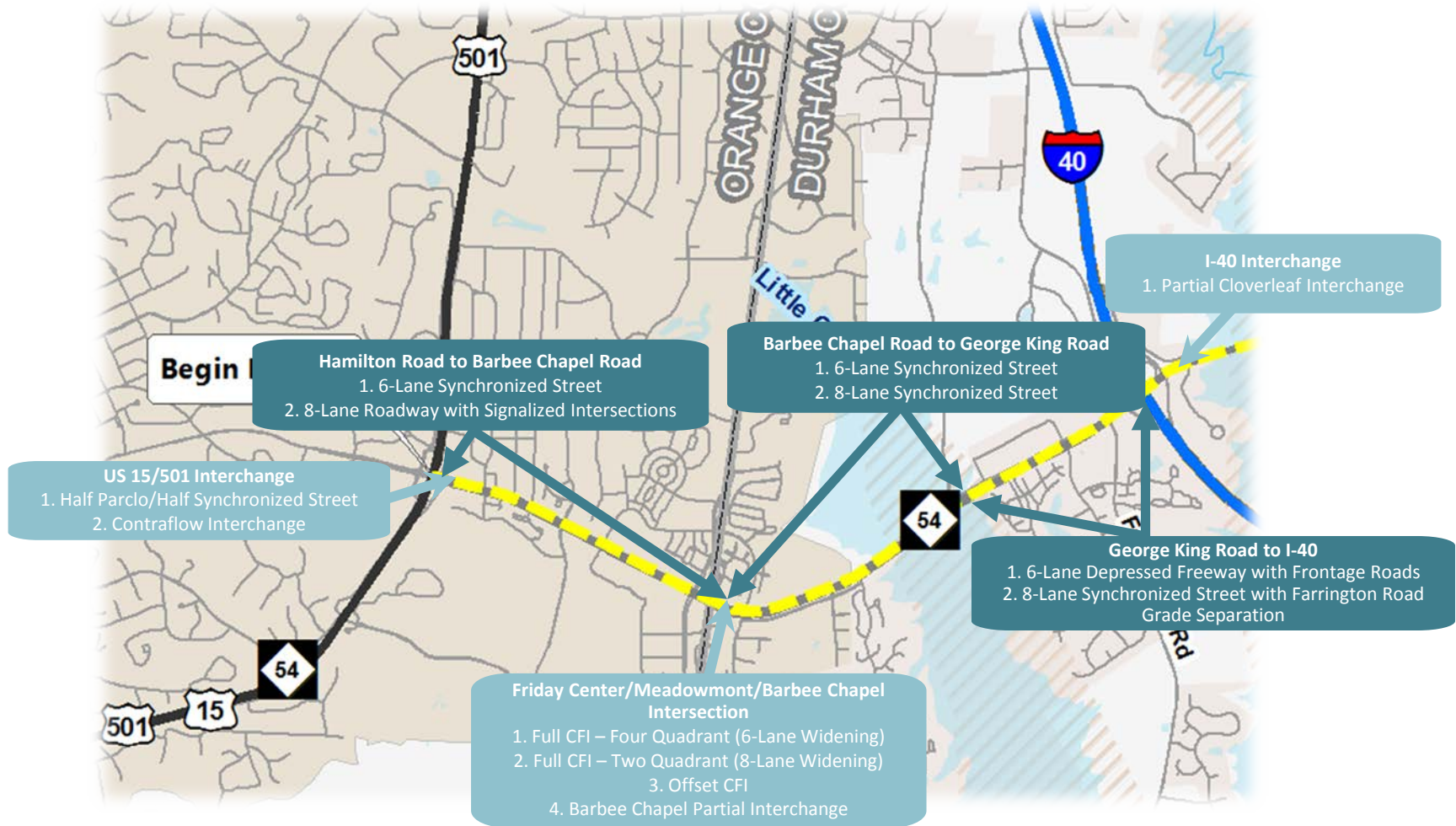
## **GoTriangle** (February 2018)

## **USACE & NC WRC** (April 2018)



# Alternative Concepts

## Segment 1



# Alternative Concepts

## Segment 1: US 15/501 Interchange



- Traffic operations
- Minimize footprint impacts (historic districts, school)
- Bike/ped considerations

# Alternative Concepts

## Segment 1: US 15/501 Interchange

### US 15/501 Interchange

1. Half Parclo/Half Synchronized Street
2. Contraflow Interchange



Option 1

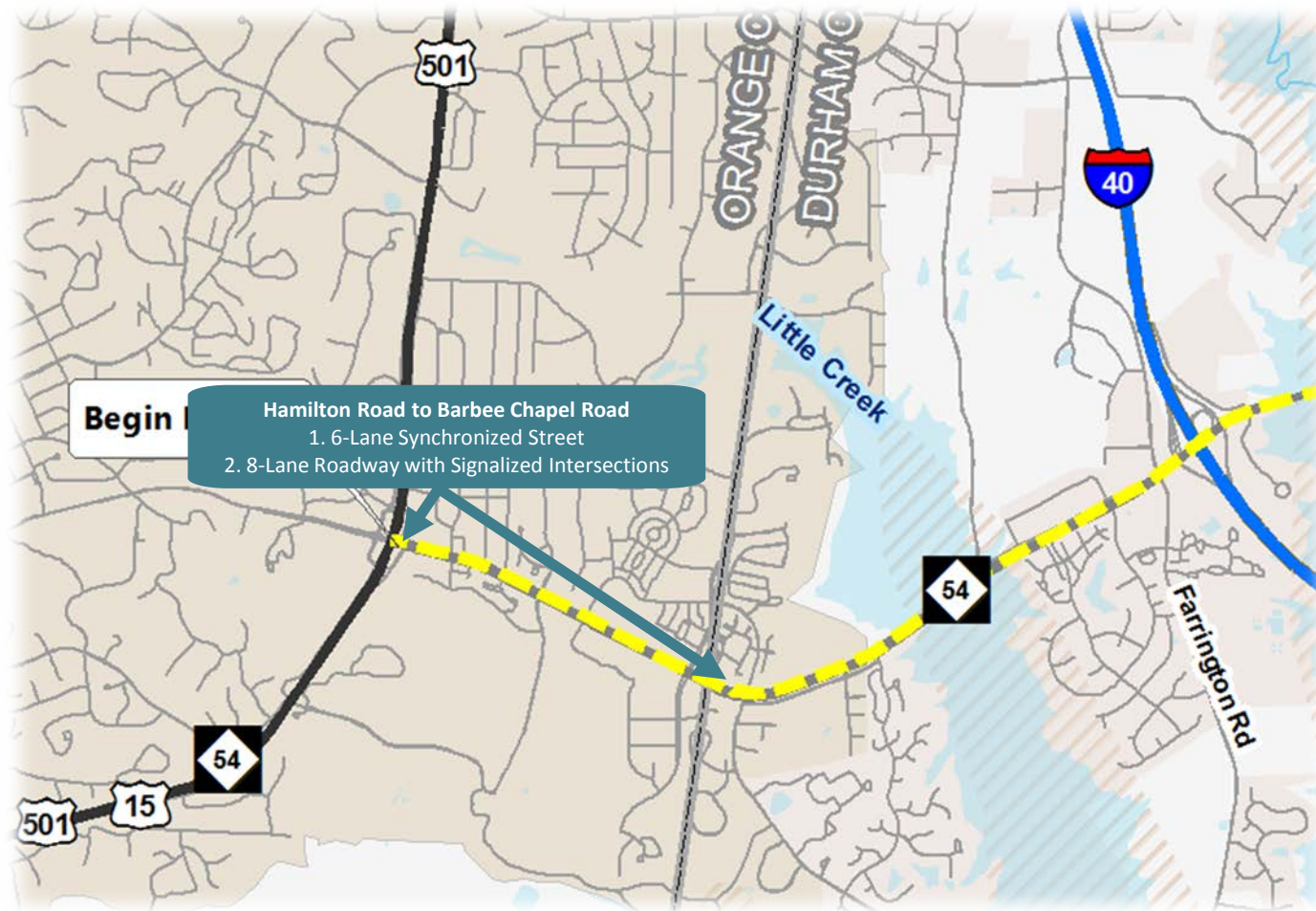


Option 2



# Alternative Concepts

## Segment 1: Hamilton Road to Barbee Chapel Road



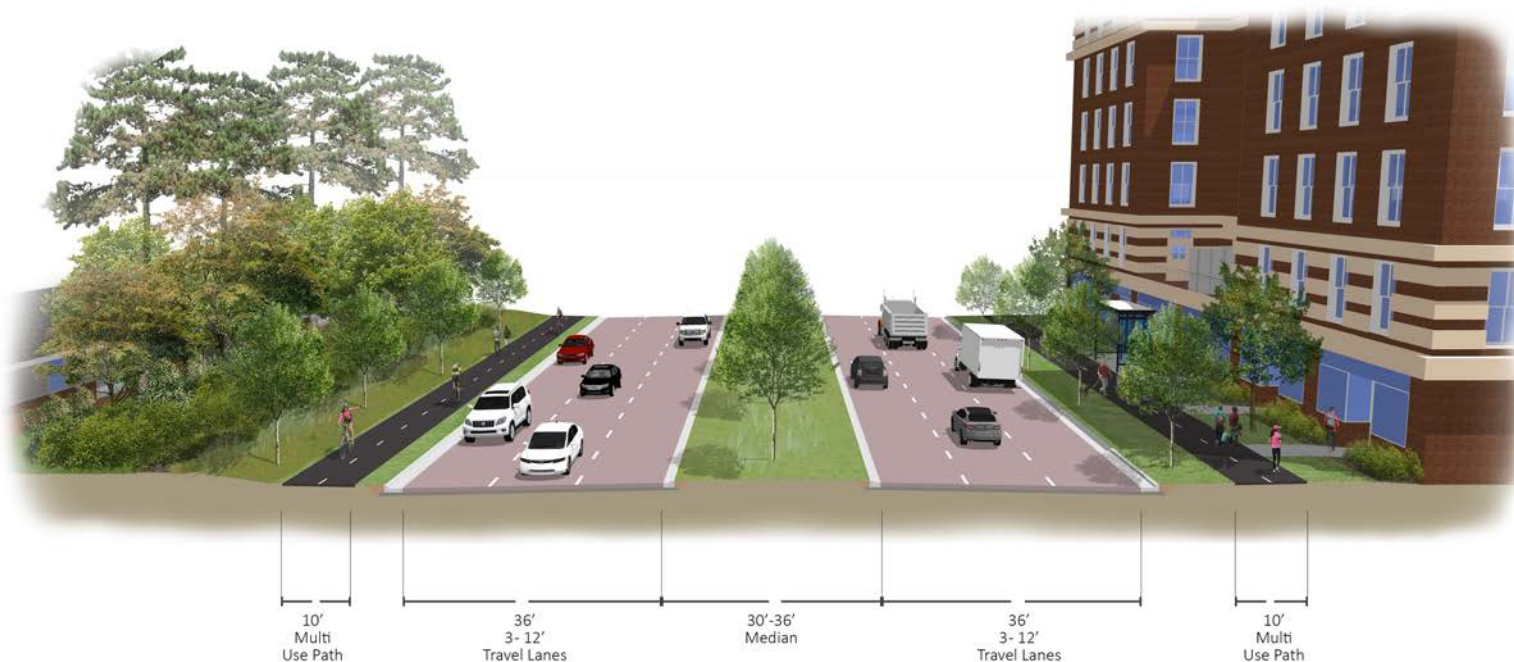
# Segment 1

US 15/501 to east of I-40

## Hamilton Road to Barbee Chapel Road

1. 6-Lane Synchronized Street

2. 8-Lane Roadway with Signalized Intersections

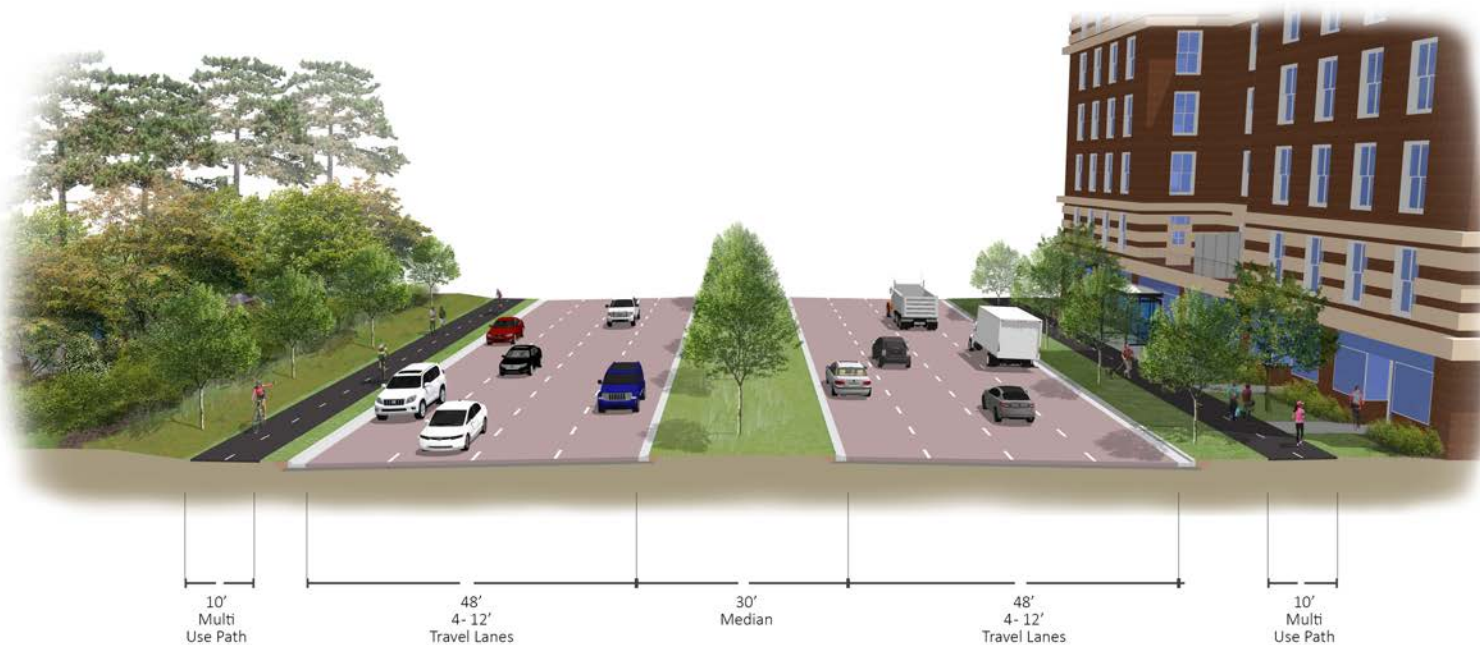


# Segment 1

US 15/501 to east of I-40

## Hamilton Road to Barbee Chapel Road

1. 6-Lane Synchronized Street
2. 8-Lane Roadway with Signalized Intersections






# Segment 1 Screening

## Hamilton Road to Barbee Chapel Road

1. 6-Lane Synchronized Street

2. 8-Lane Roadway with Signalized Intersections





	No-Build		Option 1: 6-Lane Synchronized Street		Option 2: 8-Lane Roadway with Signalized Intersections	
	2016 LOS	2040 NB LOS	Proposed Build Treatment	2040 LOS	Proposed Build Treatment	2040 LOS
Hamilton Road	B	C*	Synchronized Street	C	Full signalized intersection	C
Environ Way	A	A	Synchronized Street	-	Partial intersection (no left out)	A
Finley Golf Course Road/Burning Tree Drive	B	B*	Synchronized Street	B	Full signalized intersection	B
Exchange/W. Barbee Chapel Road	B	B*	Closed	-	Partial intersection (right out from W. Barbee Chapel; Exchange closed)	A

Source: Traffic Capacity Report 2018.

For signalized intersections, LOS is lowest overall LOS for AM or PM peak; for unsignalized intersections, LOS is worst individual movement in AM or PM peak.

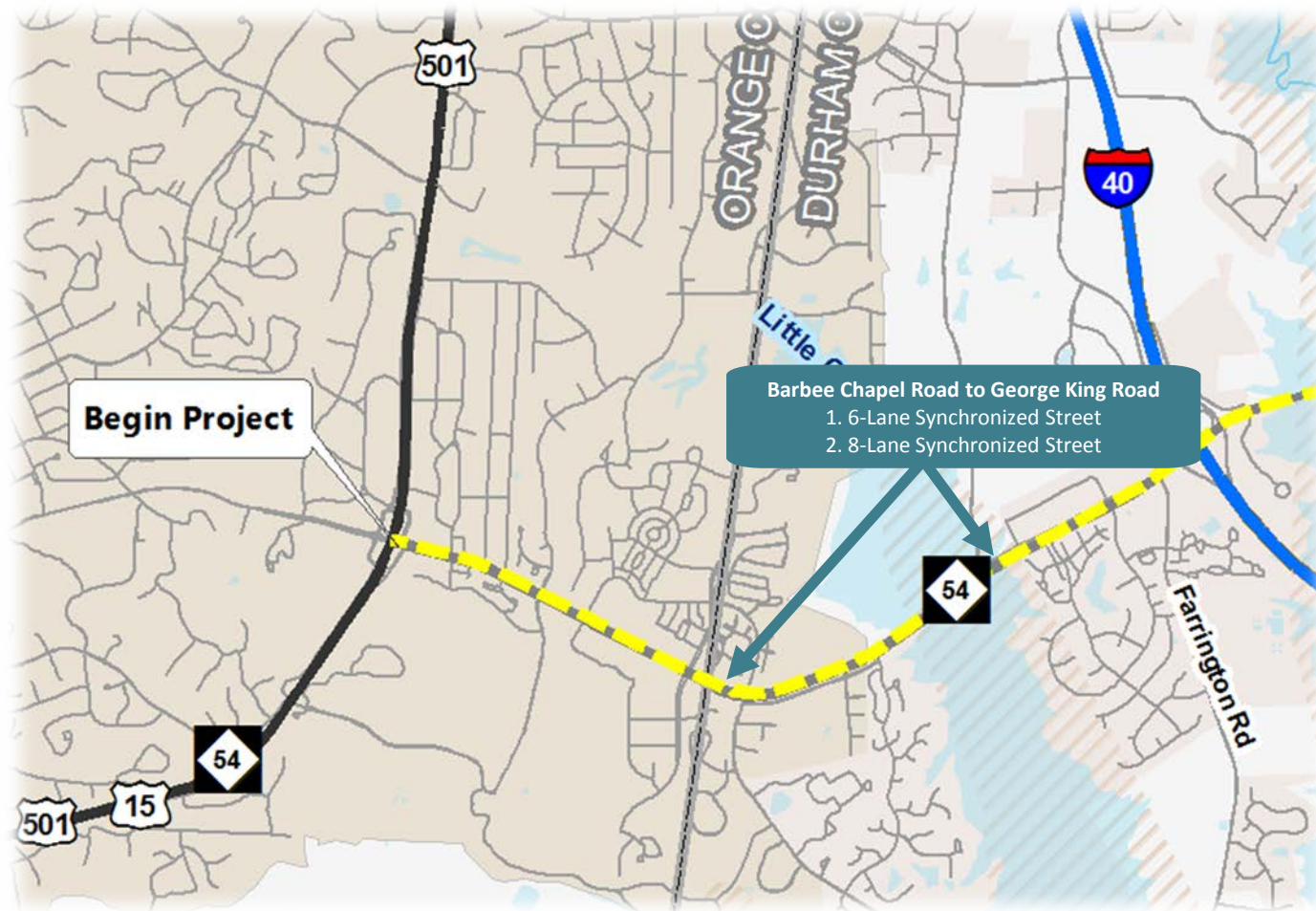
\*One or more failing movements (LOS F) during AM or PM peak.

# Segment 1

Segment 1 Alternative Concepts		Evaluation Criteria			
					
Hamilton Road to West Barbee Chapel Road	<b>Option 1:</b> 6-lane synchronized street	"Z" crossing at Hamilton Road, Environ Way, and Finley Golf Course Road/Burning Tree Drive.	No LRT crossings (existing crossing at Exchange eliminated by the closing of Exchange at NC 54).	Consistent with MTP.	Preferred by stakeholders.
	<b>Option 2:</b> 8-lane roadway with signalized intersections	Crossing at the signalized intersections at Hamilton Road or Finley Golf Course/Burning Tree Drive. Crossing at Environ Way would not be permitted, as NC 54 westbound traffic would not be signalized at this location.	No LRT crossings (existing crossing at Exchange eliminated by the closing of Exchange at NC 54).	Not consistent with MTP or local plans.	Not preferred by stakeholders due to inconsistency with local plans.

# Alternative Concepts

## Segment 1: Barbee Chapel Road to George King Road

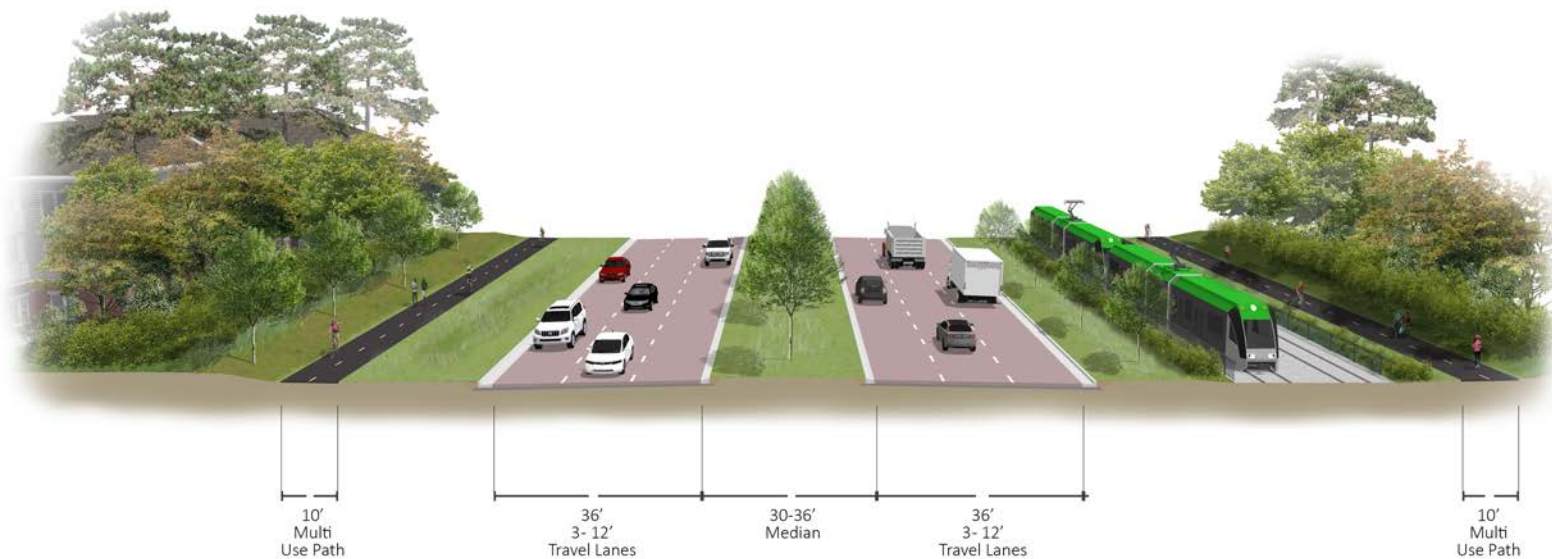


# Segment 1

US 15/501 to east of I-40

## Barbee Chapel Road to George King Road


1. 6-Lane Synchronized Street
2. 8-Lane Synchronized Street



# Segment 1 Screening





## Barbee Chapel Road to George King Road

1. 6-Lane Synchronized Street
2. 8-Lane Synchronized Street

	No-Build		Option 1: 6-Lane Synchronized Street		Option 2: 8-Lane Synchronized Street	
	2016 LOS	2040 NB LOS	Proposed Build Treatment	2040 LOS	Proposed Build Treatment	2040 LOS
Little John Road	F	F	Synchronized Street	D	Synchronized Street	A
Downing Creek Parkway	D	F	Synchronized street access via Stancell Drive at Little John Road	-	Synchronized street access via Stancell Drive at Little John Road	-
George King Road	-	C*	Realigned to Celeste Circle	B	Realigned to Celeste Circle	B



# Segment 1 Screening

Segment 1 Alternative Concepts		Evaluation Criteria			
					
Barbee Chapel Road to George King Road	<b>Option 1:</b> 6-lane synchronized street	Multiuse path on south side of NC 54 only; no crossings in this area.	One crossing of LRT remains at Little John Road; crossing at Downing Creek Parkway eliminated; no conflicts with LRT aerial crossing of NC 54 from south to north.	Consistent with MTP and local plans.	Preferred by stakeholders.
	<b>Option 2:</b> 8-lane synchronized street	Multiuse path on south side of NC 54 only; no crossings in this area.	One crossing of LRT remains at Little John Road; crossing at Downing Creek Parkway eliminated; substantial re-design of the LRT alignment and proposed bridge over NC 54 required.	Not consistent with MTP or local plans.	Not preferred by stakeholders.



# Alternative Concepts

## Segment 1: George King Road to I-40

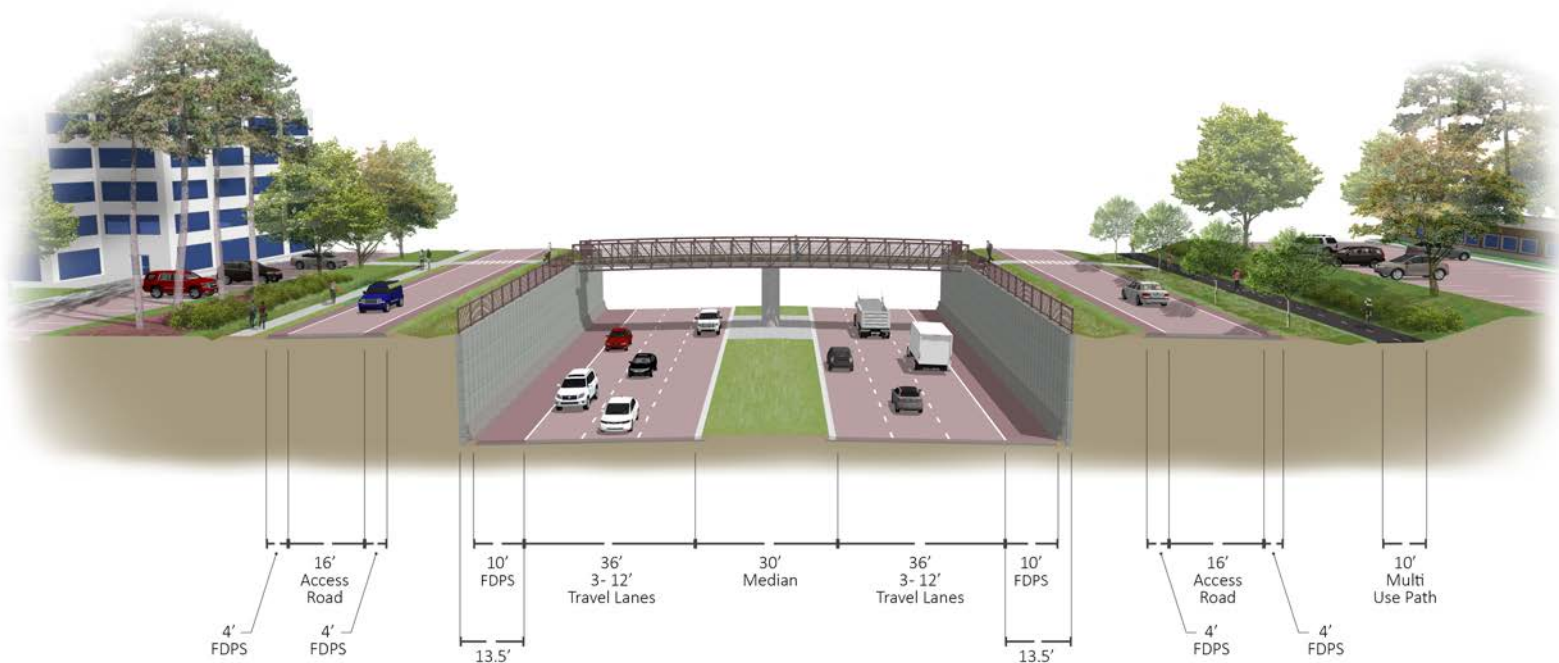


# Segment 1

US 15/501 to east of I-40

## George King Road to I-40


1. 6-Lane Depressed Roadway with Frontage Roads
2. 8-Lane Synchronized Street with Farrington Road  
Grade Separation







# Segment 1 Screening

## George King Road to I-40

1. 6-Lane Depressed Freeway with Frontage Roads
2. 8-Lane Synchronized Street with Farrington Road Grade Separation

	No-Build		Option 1: 6-Lane Depressed Roadway with Frontage Roads		Option 2: 8-Lane Synchronized Street	
	2016 LOS	2040 NB LOS	Proposed Build Treatment	2040 LOS	Proposed Build Treatment	2040 LOS
Celeste Circle			Access to one-way frontage roads with grade separation of depressed freeway	B	Synchronized street	A
Huntingridge Road	B	B*	Access to one-way frontage roads with grade separation of depressed freeway	B	Closed; new connection to Falconbridge road	A
Falconbridge Road	E	F	Access to one-way frontage roads with grade separation of depressed freeway	C	Synchronized street	C
Farrington Road	E*	F	Grade separated	-	Grade separated	-

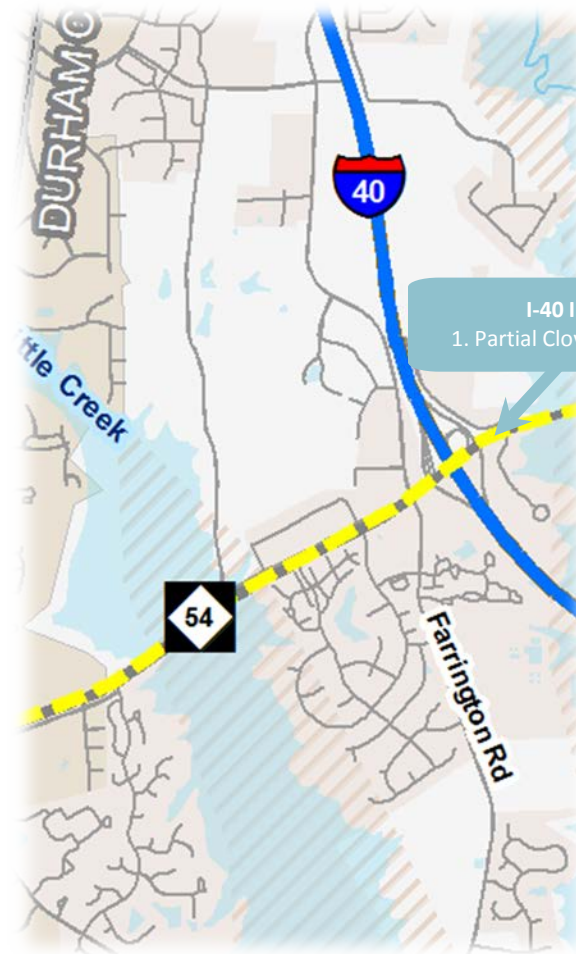
# Segment 1 Screening

Segment 1 Alternative Concepts		Evaluation Criteria			
					
George King Road to I-40	<b>Option 1:</b> 6-lane depressed roadway with frontage roads	Bike/ped connectivity across NC 54 via at-grade bridges over depressed section; crossing on Farrington Road grade separation	N/A	Generally consistent with MTP and STIP.	TBD
	<b>Option 2:</b> 8-lane synchronized street	"Z" crossing at Falconbridge Road; crossing on Farrington Road grade separation	N/A	Not consistent with MTP and STIP.	TBD

# Alternative Concepts

## Segment 1: I-40 Interchange

- Very high traffic volumes
- Deficient existing geometry (loop too small, ramp merge too short)
- Nearby intersections



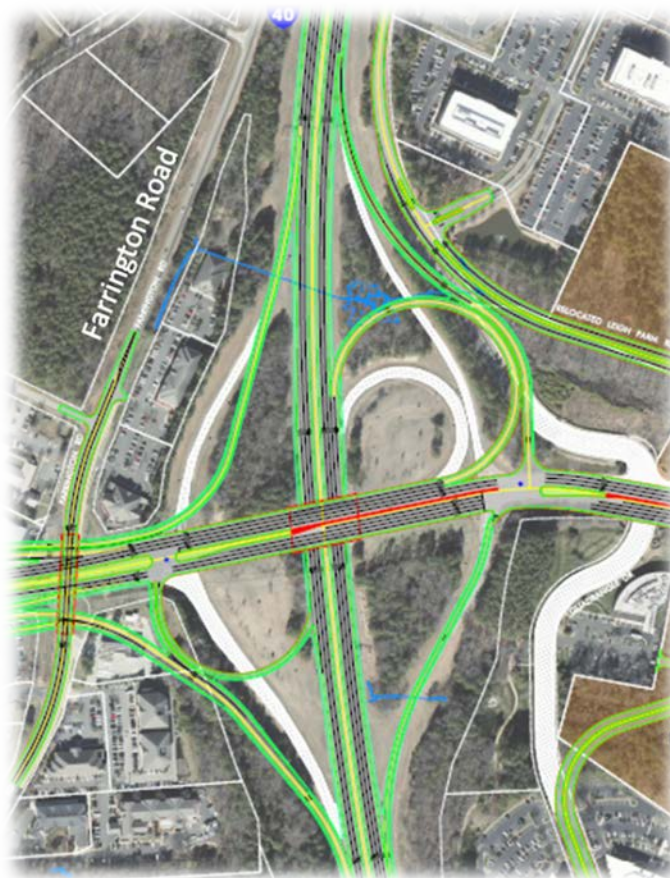


# Alternative Concepts

## Segment 1: US 15/501 Interchange

### I-40 Interchange

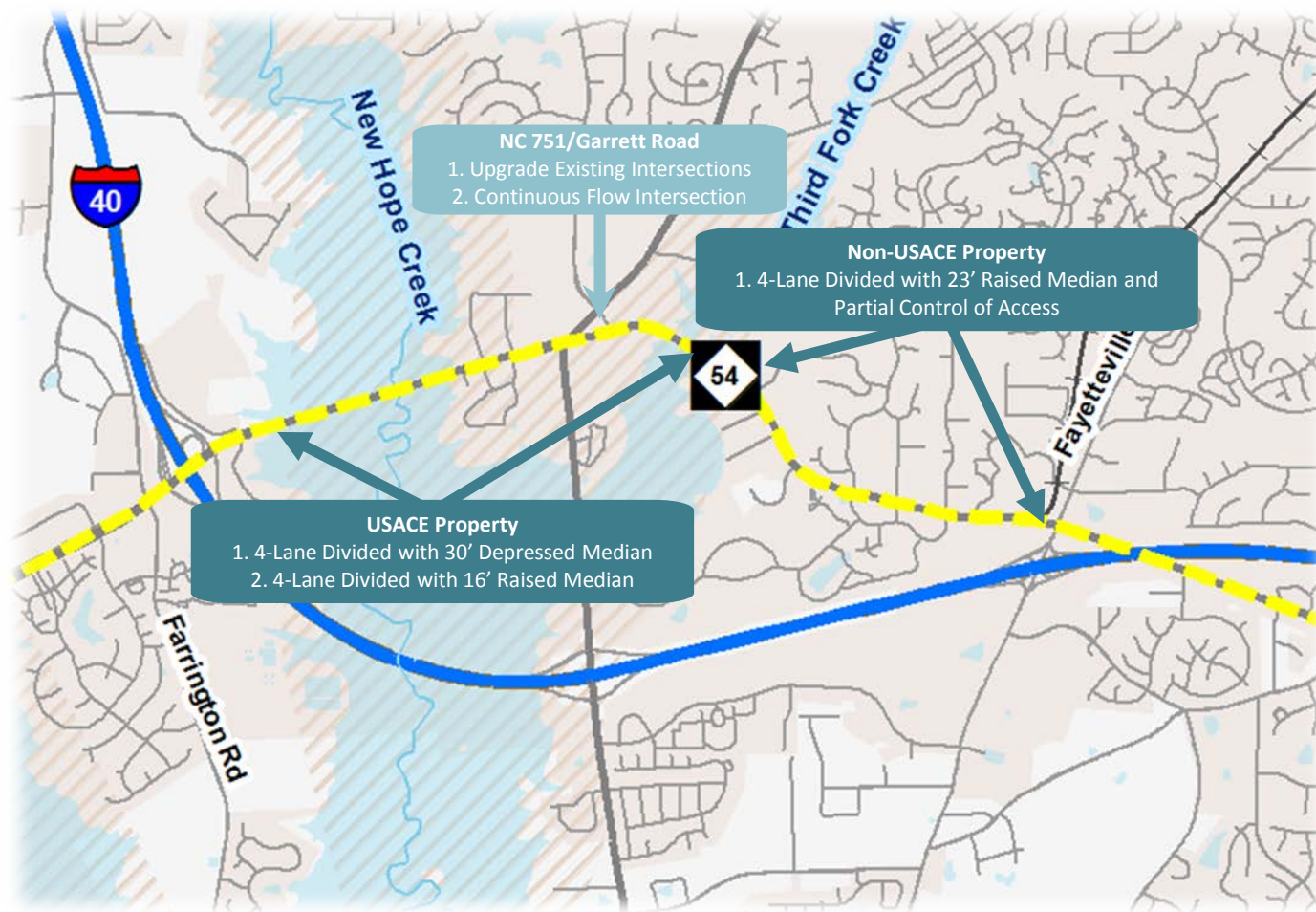
#### 1. Partial cloverleaf interchange





# Segment 2

## East of I-40 to Fayetteville Road

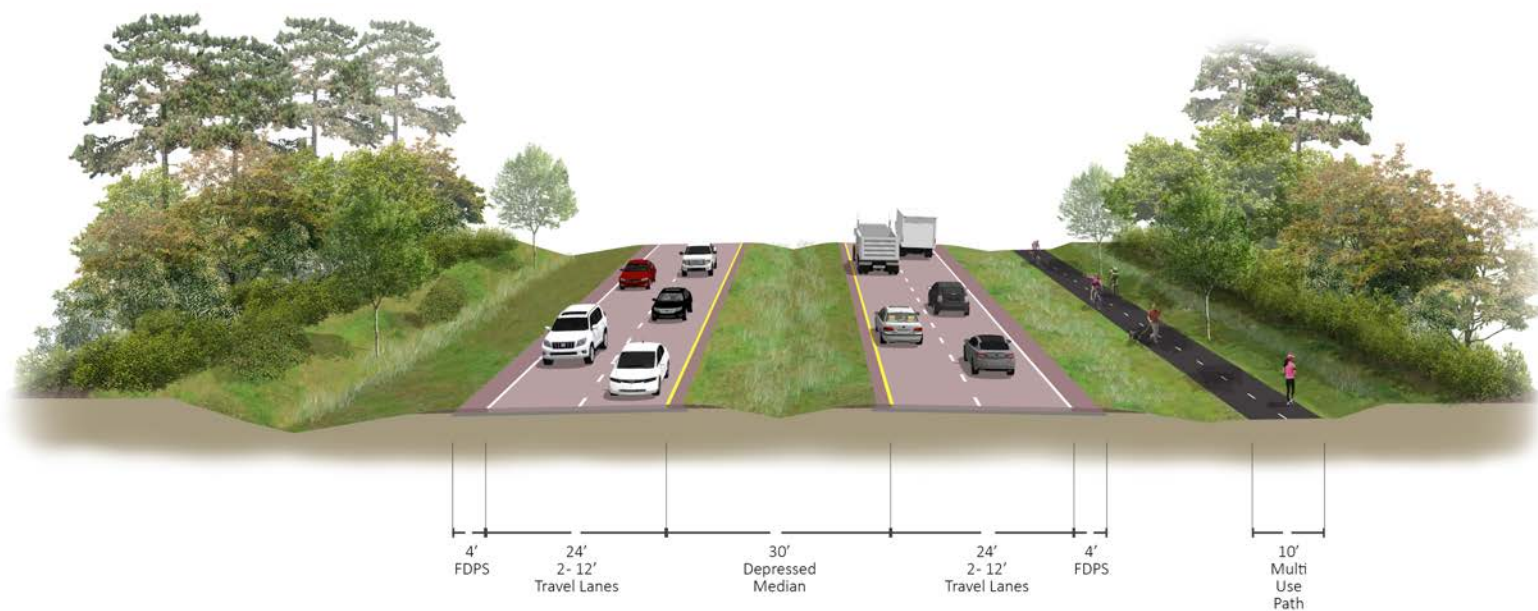


# Segment 2

East of I-40 to Fayetteville Road

## USACE Property

1. 4-Lane Divided with 30' Depressed Median
2. 4-Lane Divided with 16' Raised Median

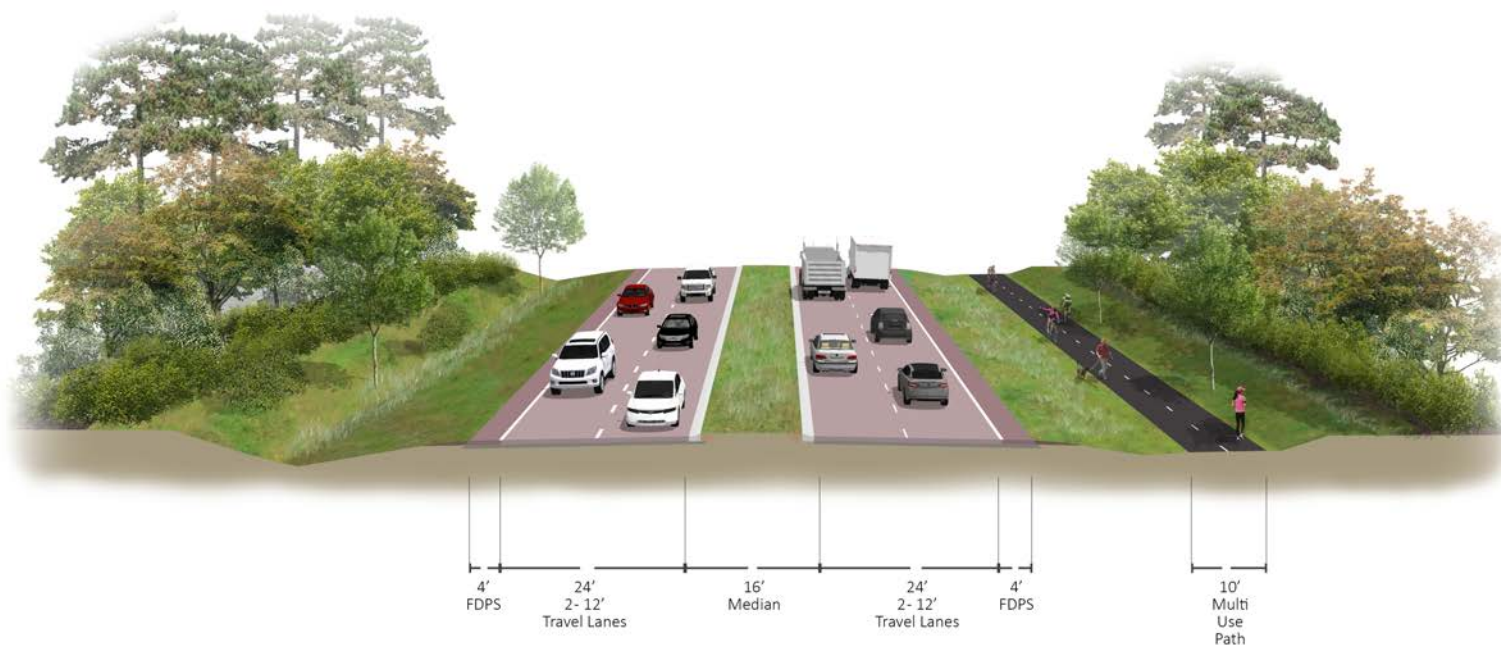


# Segment 2

East of I-40 to Fayetteville Road

## USACE Property

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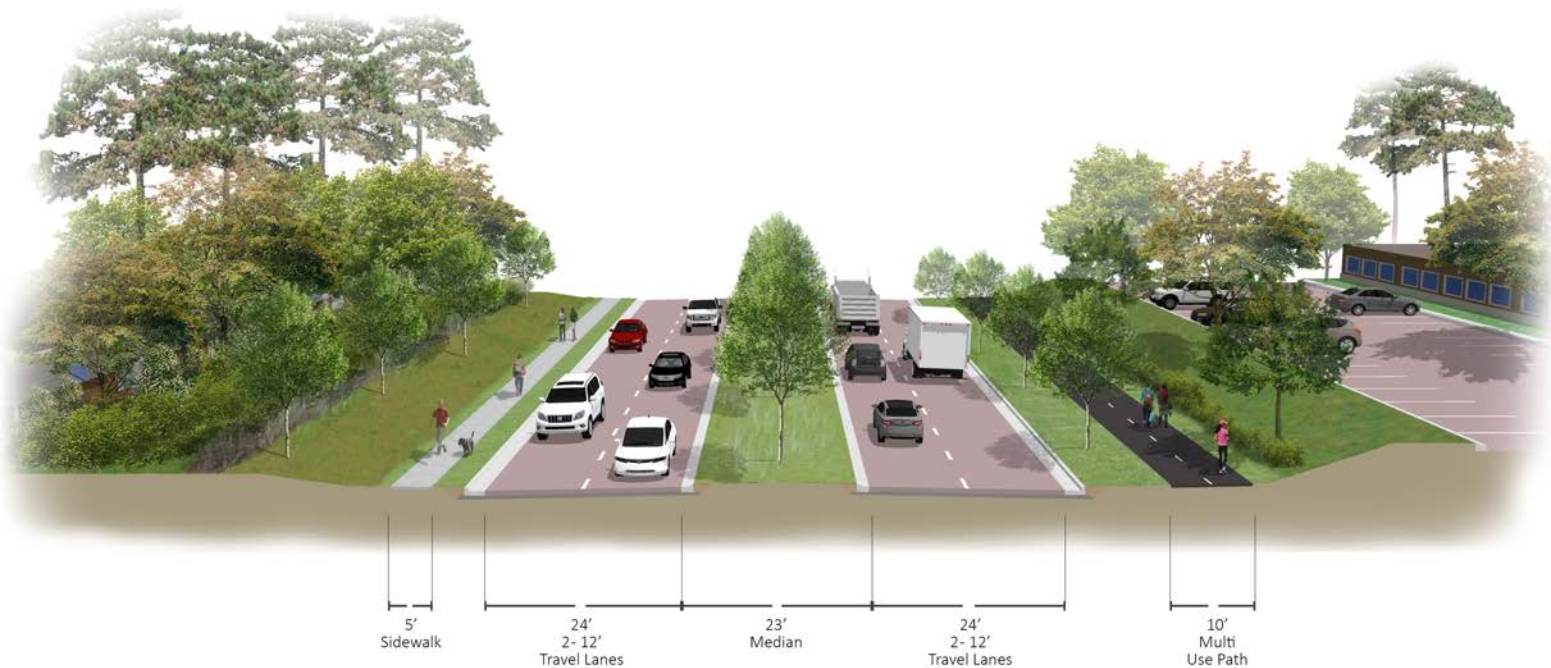


# Segment 2


East of I-40 to Fayetteville Road

## Non-USACE Property





1. 4-Lane Divided with 23' Raised Median and Partial Control of Access



## Segment 2 Screening




	2016 LOS	2040 NB LOS	Proposed Build Treatment	2040 Build LOS
Quadrangle Drive/Leigh Farm Road	D	F	Full signalized intersection	A
Copper Ridge Drive/Biscayne Road	F	F	Full signalized intersection	C
Copper Ridge Drive/Dresden Road	F	F	Right in right out access	C
Hope Valley Commons Driveway/Woodcroft Shopping Center Driveway	C	E*	Full signalized intersection	A
Park Ridge Road	B	C*	Full signalized intersection	A
Highgate Drive	F	F	Full signalized intersection	B
Southpark Drive	F	F	Right in right out access	B
Highgate Drive/Rollingwood Drive	F	F	Full signalized intersection	B
Homestead Market/Southpoint Crossing Drive	F	F	Full signalized intersection	D
Homestead Market/Kroger Driveway	F	F	Right in right out access	C
Fayetteville Road	F	F	Full signalized intersection	D

# Segment 2 Screening

Segment 2 Alternative Concepts		Evaluation Criteria			
					
USACE Property	<b>Option 1:</b> 6-lane depressed roadway with frontage roads	All signalized and unsignalized intersections operate at LOS D or better; all movements have v/c ratio of 0.85 or less in all peaks.	Multiuse path on south side of NC 54.	Consistent with MTP and STIP.	TBD
	<b>Option 2:</b> 8-lane synchronized street	All signalized and unsignalized intersections operate at LOS D or better; all movements have v/c ratio of 0.85 or less in all peaks.	Multiuse path on south side of NC 54.	Consistent with MTP and STIP.	TBD
Non-USACE Property	<b>Option 1:</b> 4-lane divided with 23- feet raised median	All signalized and unsignalized intersections operate at LOS D or better; all movements have v/c ratio of 0.85 or less in all peaks.	Multiuse path on south side of NC 54 and sidewalk on north side of NC 54; crossings at signalized intersections at Quadrangle Drive/Leigh Farm Road, Highgate Drive, Highgate Drive/Rollingwood Drive, Southpoint Crossing Drive, and Fayetteville Road.	Consistent with MTP and STIP.	TBD



# Segment 2 Screening

Segment 2 Alternative Concepts		Evaluation Criteria		
				
NC 751/Garrett Road Intersection	<b>Option 1:</b> Upgrade existing intersections	Multiuse path on south side of NC 54 and sidewalk on north side of NC 54; crossings at signalized intersections at NC 751, Garrett Road, and Hope Valley Commons/ Woodcroft shopping center driveway.	Consistent with MTP.	Not preferred by stakeholders due to impacts and safety concerns.
	<b>Option 2:</b> CFI	Multiuse path on south side of NC 54 and sidewalk on north side of NC 54; multi-stage crossing at the CFI intersection at NC 751; crossings at signalized intersections at Garrett Road and Hope Valley Commons/ Woodcroft shopping center driveway.	Not inconsistent with MTP.	Not preferred by stakeholders due to perceived complexity.

# Segment 3

## Fayetteville Road to NC 55

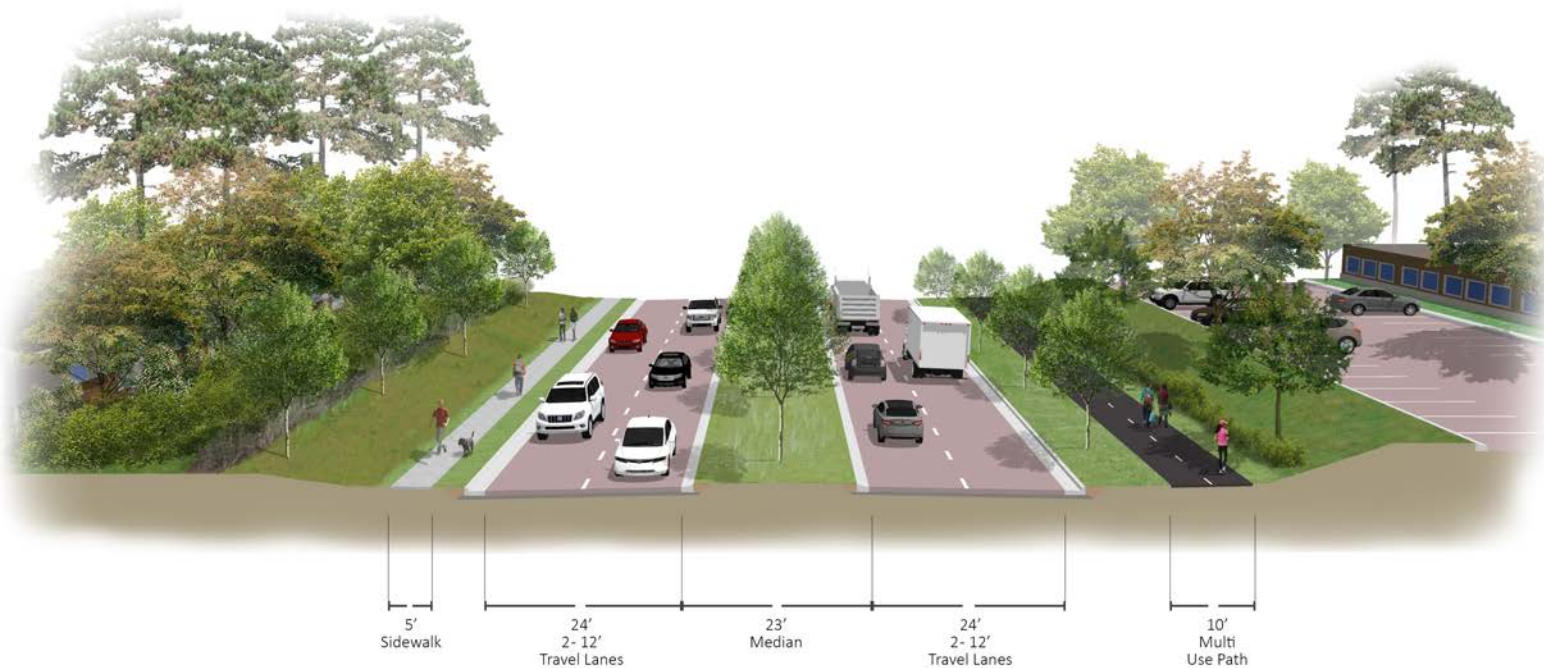


# Segment 3


## Fayetteville Road to NC 55

### Fayetteville Road to NC 55




1. 4-Lane Divided with 23' Raised Median and Partial Control of Access



## Segment 3 Screening

	2016 LOS	2040 NB LOS	Proposed Build Treatment	2040 Build LOS
Boulder Road	D	F	Full signalized intersection	A
Amhurst Road/Pine Glen Trail	F	F	Full signalized intersection	A
Pine Glen Trail	F	F	Right in, right out access	C
Barbee Road	C	E*	Full signalized intersection	D
Revere Road	B	C*	Full signalized intersection	B
Waterford Valley Drive	F	F	Full signalized intersection	A
Blanchard Road	F	F	Right in, right out access	D
Emerald Forest Drive	F	F	Right in, right out access	C
Kristen Marie Lane	F	F	Full signalized intersection	B
Seaforth Drive	F	F	Right in, right out access	C
Residence Inn Boulevard	F	F	Full signalized intersection	B

# Segment 3 Screening

Segment 3 Alternative Concepts		Evaluation Criteria			
					
Fayetteville Road to NC 55	<b>Option 1:</b> 4-lane divided with 23-foot raised median	All signalized and unsignalized intersections operate at LOS D or better; all movements have v/c ratio of 0.85 or less in all peaks.	Multituse path on south side of NC 54 and sidewalk on north side of NC 54; crossings at signalized intersections at Boulder Road, Amhurst Road/Pine Glen Trail, Barbee Road, Revere Road, Waterford Valley Drive, Kristen Marie Lane, Residence Inn Boulevard, and NC 55.	Consistent with MTP.	TBD

## Next Steps

- Get public input on range of alternative concepts
- Obtain agreement to eliminate 8-lane concept from Hamilton Road to George King Road
- Refine traffic forecast and evaluate additional concepts at:
  - Hamilton Road
  - Friday Center/Meadowmont
  - USACE property
  - NC 751 and Garrett Road
- Select alternative concepts for each Segment for more detailed study
- Begin preliminary design and technical studies of selected concepts



# Schedule

## Milestones:

- Public meetings – June 2018
- Identify Alternatives & Preliminary design – Summer/fall 2018
- Technical studies – Fall/winter 2018
- Public meetings – Spring 2019
- Agency coordination and design refinement – 2019
- Environmental document – Late 2019

# Schedule

Section	Description	Cost	ROW/ Const.
U-5774A	US 15 / US 501. UPGRADE INTERCHANGE.	\$14.8M	Unfunded
U-5774B	US 15 / US 501 IN ORANGE COUNTY TO SR 1110 (BARBEE CHAPEL ROAD) IN DURHAM COUNTY, UPGRADE ROADWAY CORRIDOR AND CONVERT AT-GRADE INTERSECTION WITH SR 1110 TO INTERCHANGE.	\$41.9M	<b>2022/2024</b>
U-5774C	SR 1110 (BARBEE CHAPEL ROAD) TO I-40. UPGRADE ROADWAY CORRIDOR.	\$26.7M	<b>2022/2024</b>
U-5774D	FALCONBRIDGE ROAD. CONVERT AT-GRADE INTERSECTION TO INTERCHANGE.	INCLUDED IN U-5774F	Unfunded
U-5774E	SR 1110 (FARRINGTON ROAD). CONVERT AT-GRADE INTERSECTION TO GRADE SEPARATION.	INCLUDED IN U-5774F	Unfunded
U-5774F	I-40 / NC 54 INTERCHANGE IMPROVEMENTS - COORDINATE WITH I-5702A.	\$94.1M	Unfunded
U-5774G	I-40 TO NC 751. UPGRADE ROADWAY CORRIDOR.	\$32.0M	Unfunded
U-5774H	NC 751 TO SR 1118 (FAYETTEVILLE ROAD). UPGRADE ROADWAY CORRIDOR.	\$21.6M	<b>2023/2025</b>
U-5774I	SR 1118 (FAYETTEVILLE ROAD) TO SR 1106 (BARBEE ROAD). UPGRADE ROADWAY CORRIDOR.	\$33.6M	Unfunded
U-5774J	SR 1106 (BARBEE ROAD) TO NC 55. UPGRADE ROADWAY CORRIDOR.	\$30.6M	Unfunded