



NORTH CAROLINA

Department of Transportation



U-5774 NC 54 Improvements

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

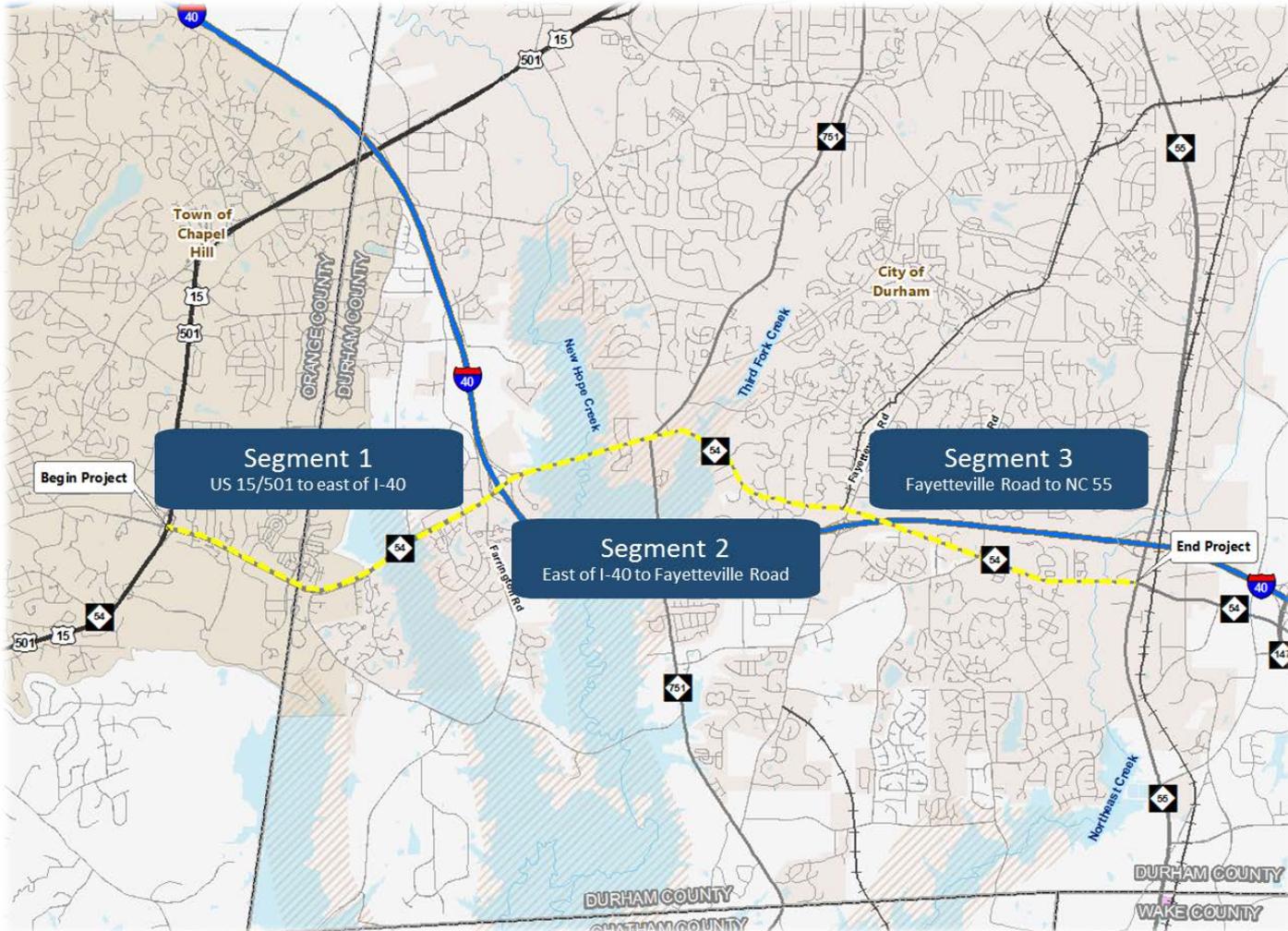
May 9, 2018

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

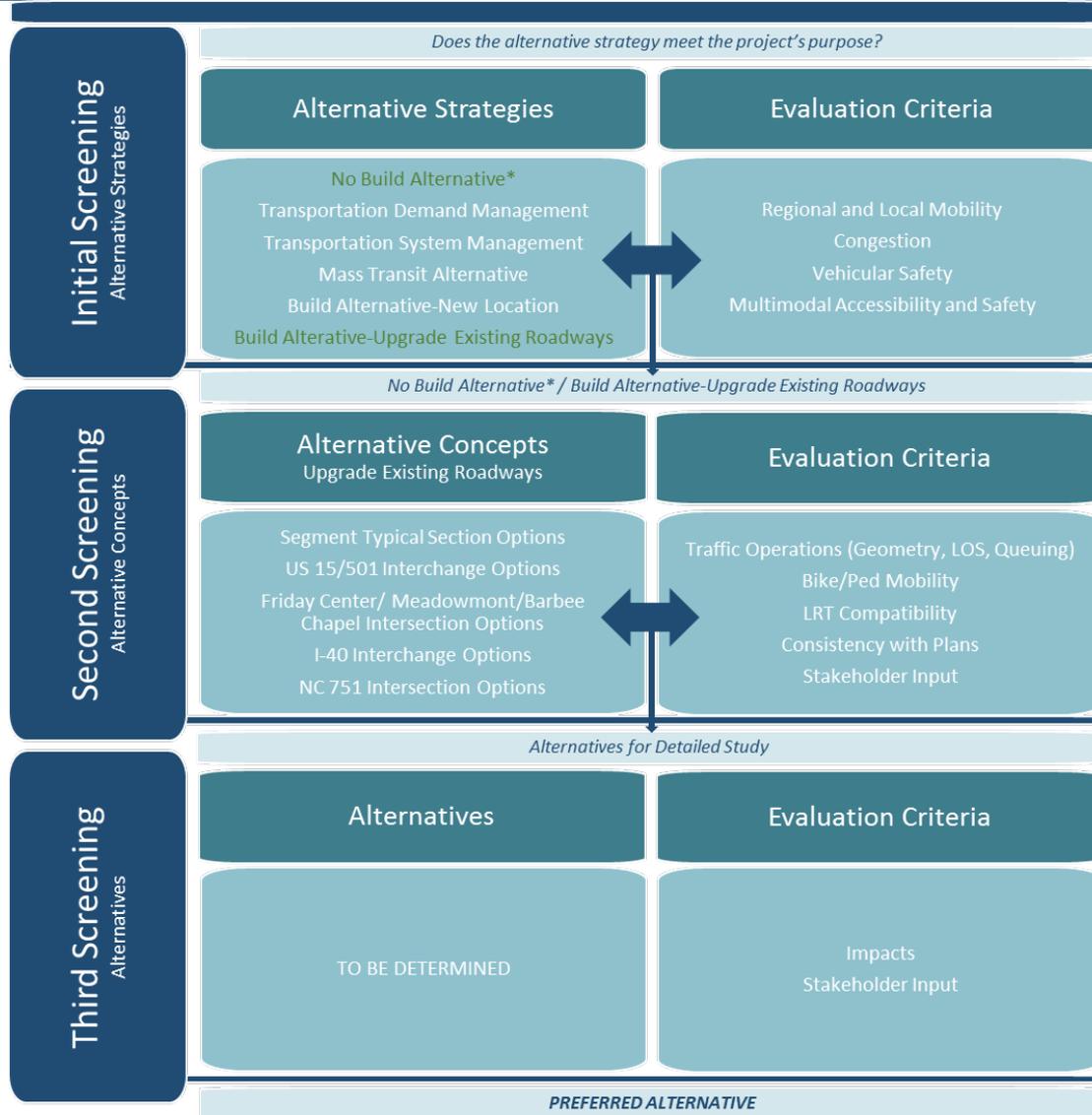
Project Purpose:

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

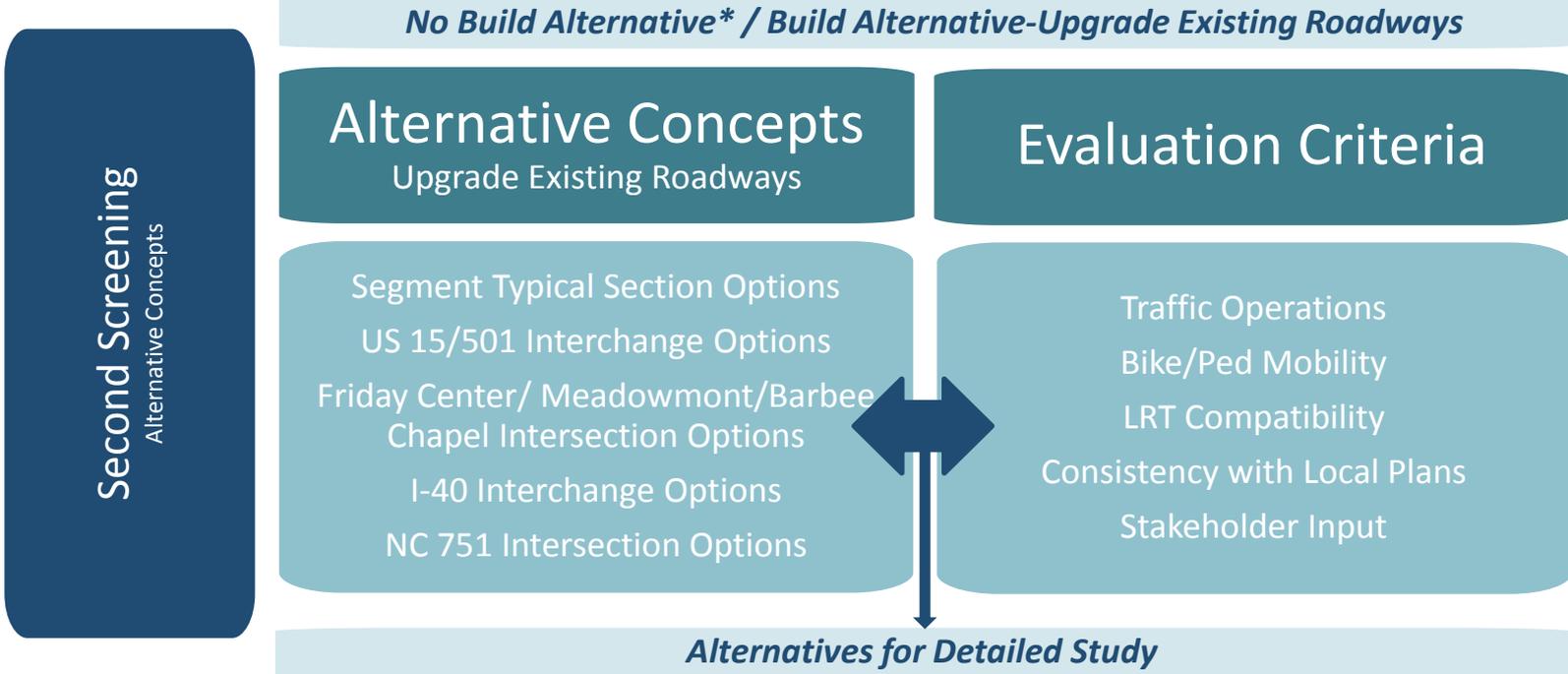


Initial Screening of Alternative Strategies

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

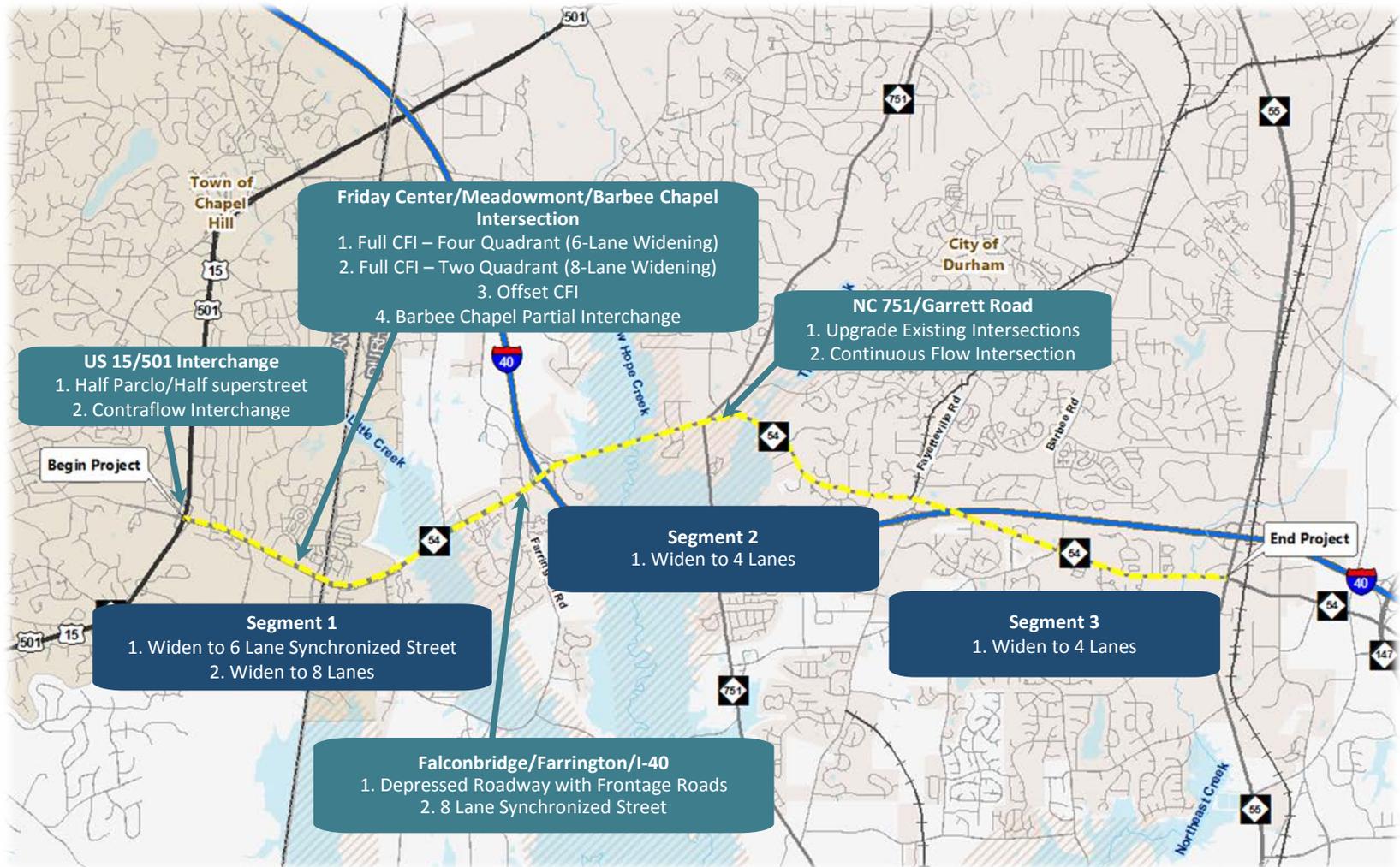


Stakeholder Input

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)

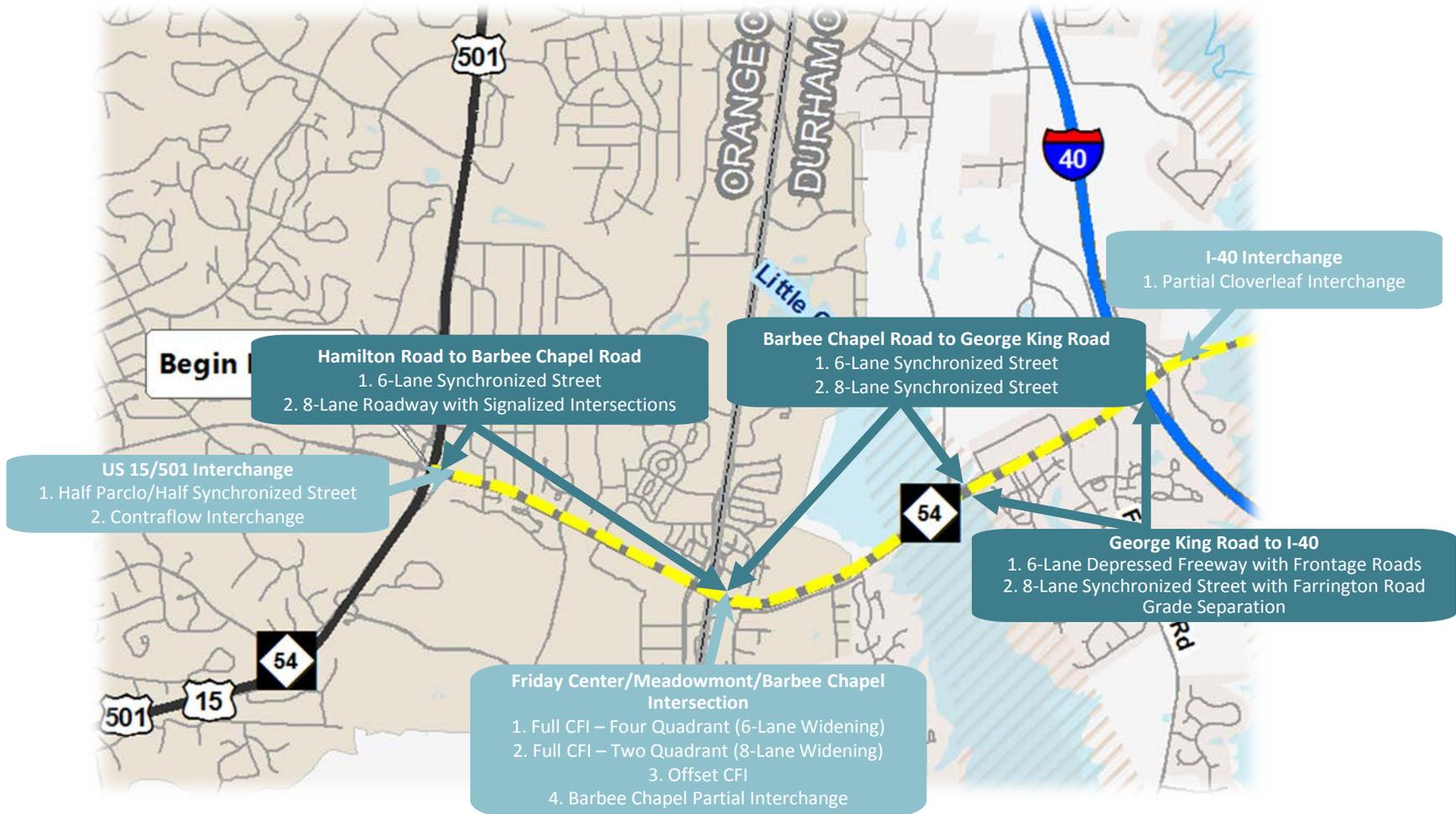
- Town of Chapel Hill
- City of Durham, DCHC MPO

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



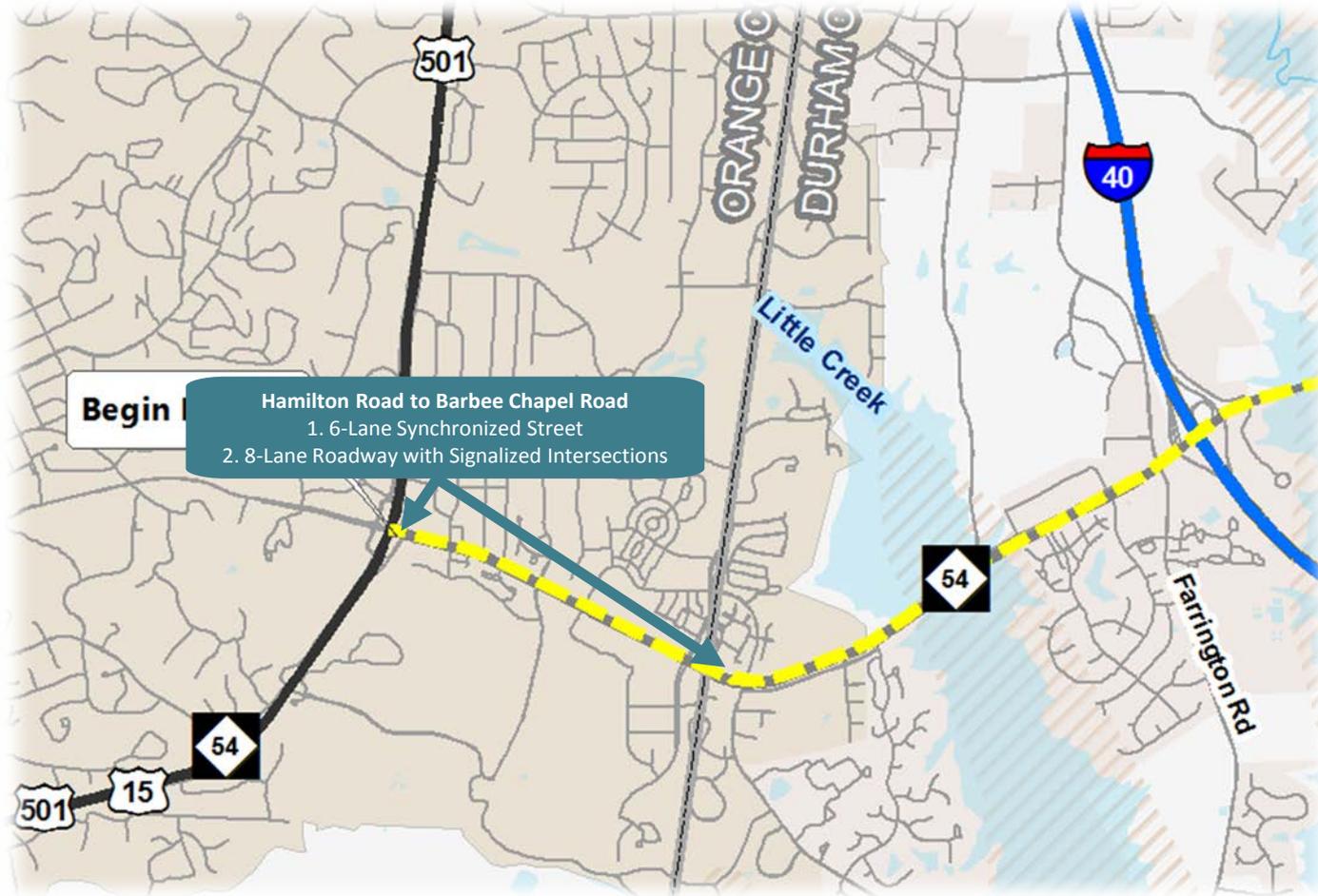
Option 1



Option 2

Alternative Concepts

Segment 1: Hamilton Road to Barbee Chapel Road



Segment 1

US 15/501 to east of I-40

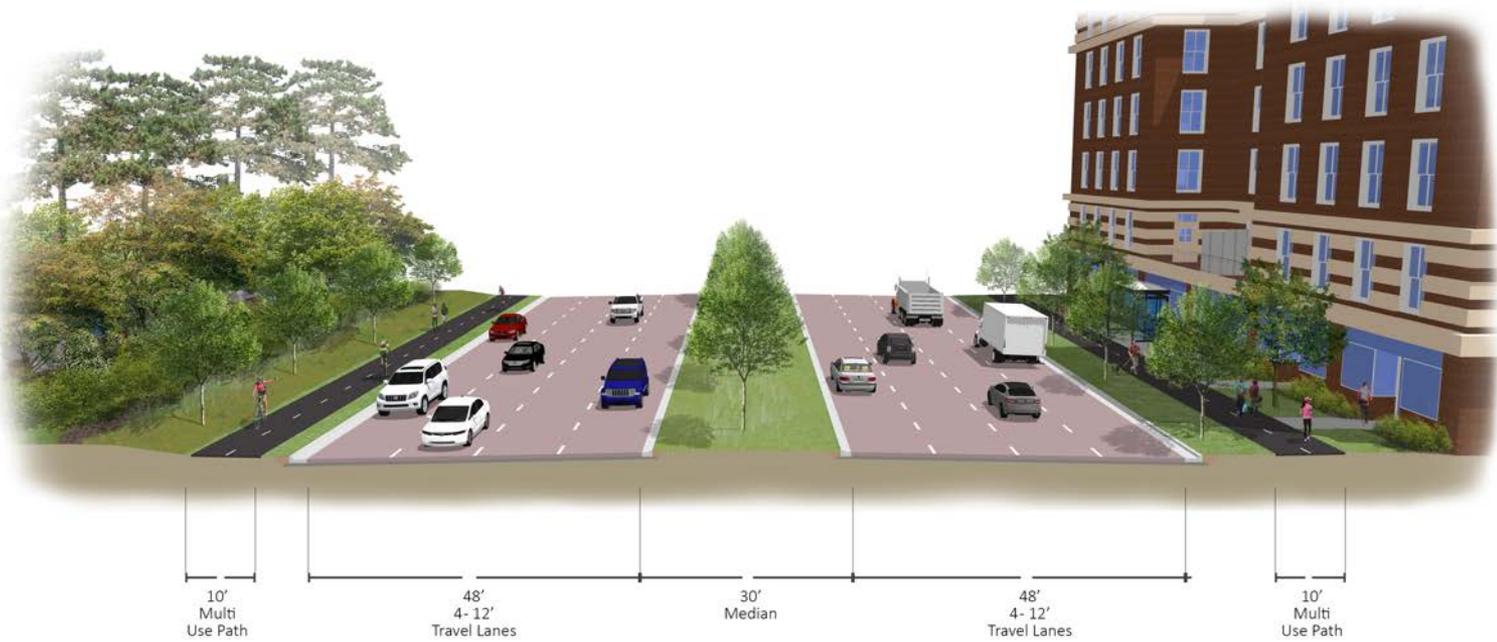
- Hamilton Road to Barbee Chapel Road
- 1. 6-Lane Synchronized Street
- 2. 8-Lane Roadway with Signalized Intersections



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.

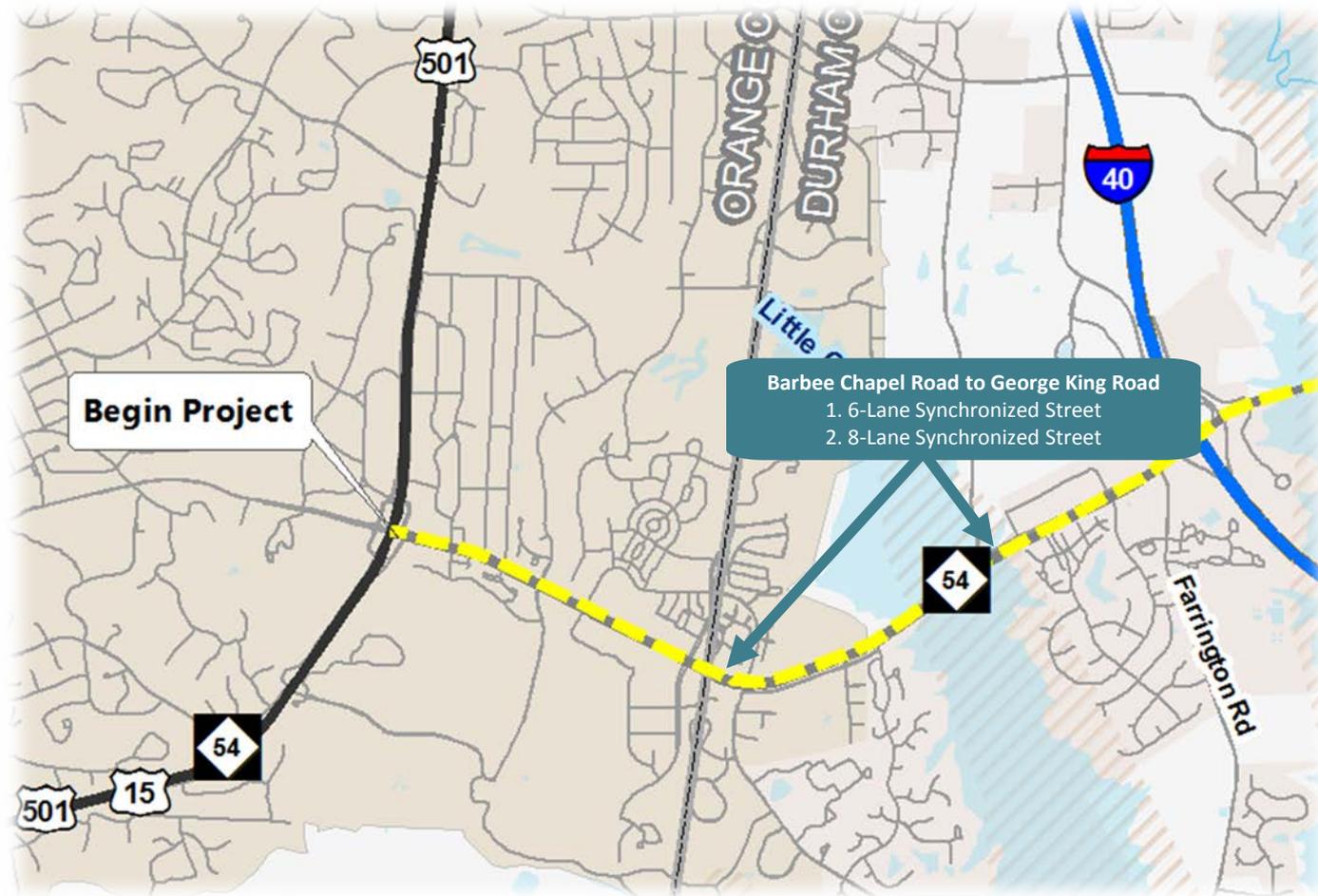
*One or more failing movements (LOS F) during AM or PM peak.

Segment 1

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

Alternative Concepts

Segment 1: Barbee Chapel Road to George King Road

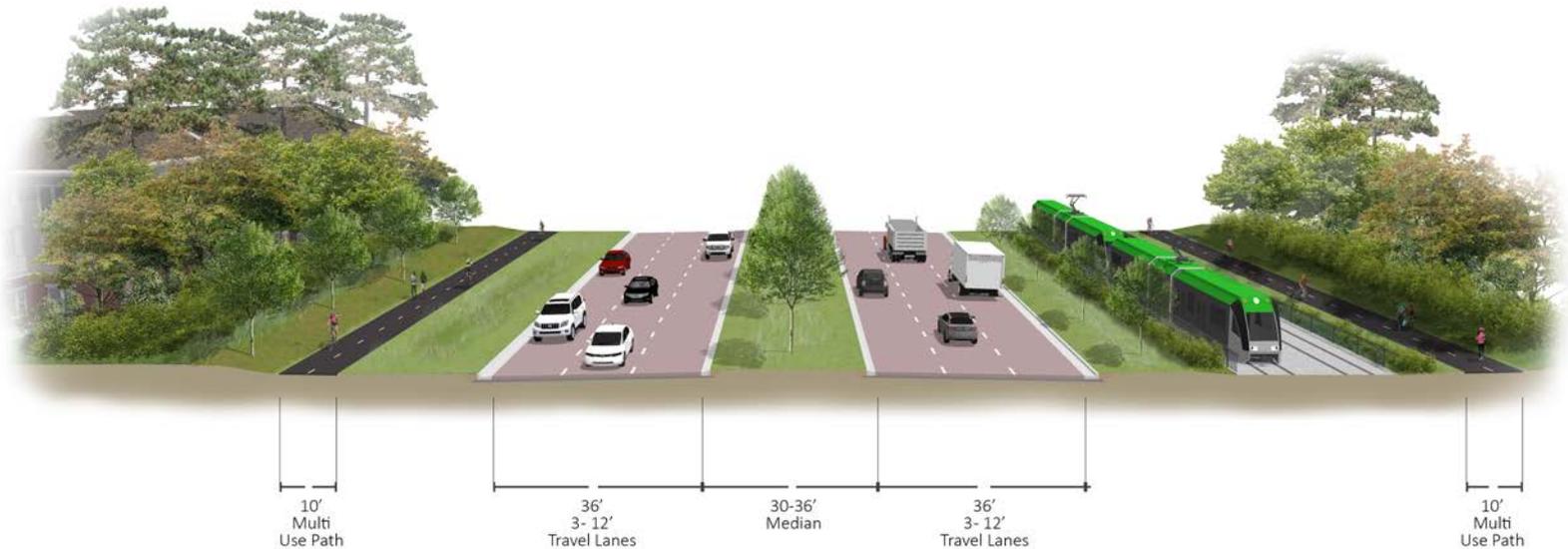


Segment 1

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	Option 1: 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.
	Option 2: 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

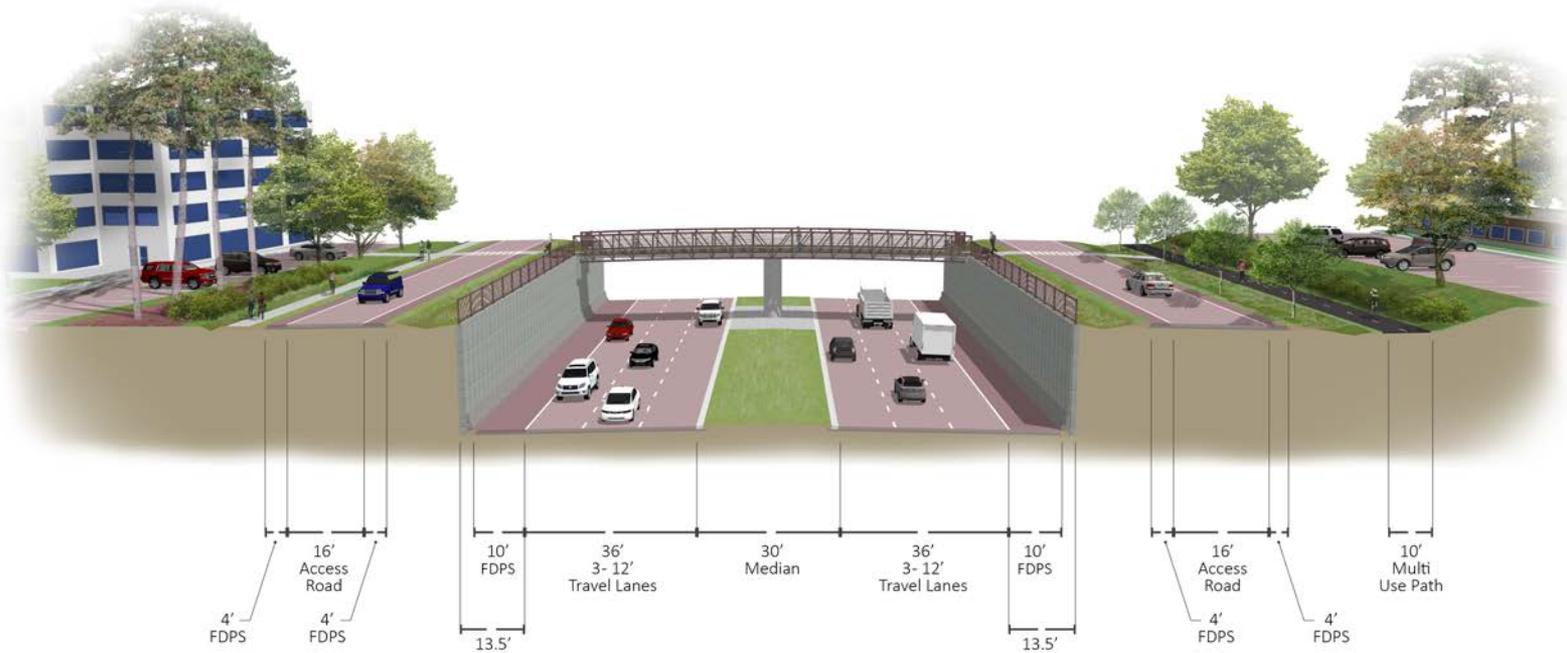
Segment 1: George King Road to I-40



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	-

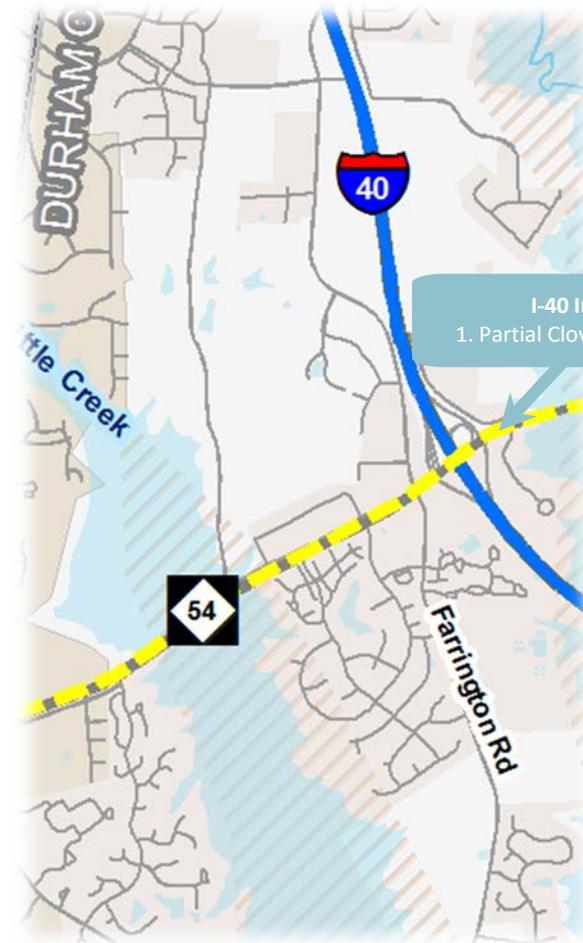
Segment 1 Screening

Segment 1 Alternative Concepts		Evaluation Criteria			
					
George King Road to I-40	Option 1: 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
	Option 2: 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

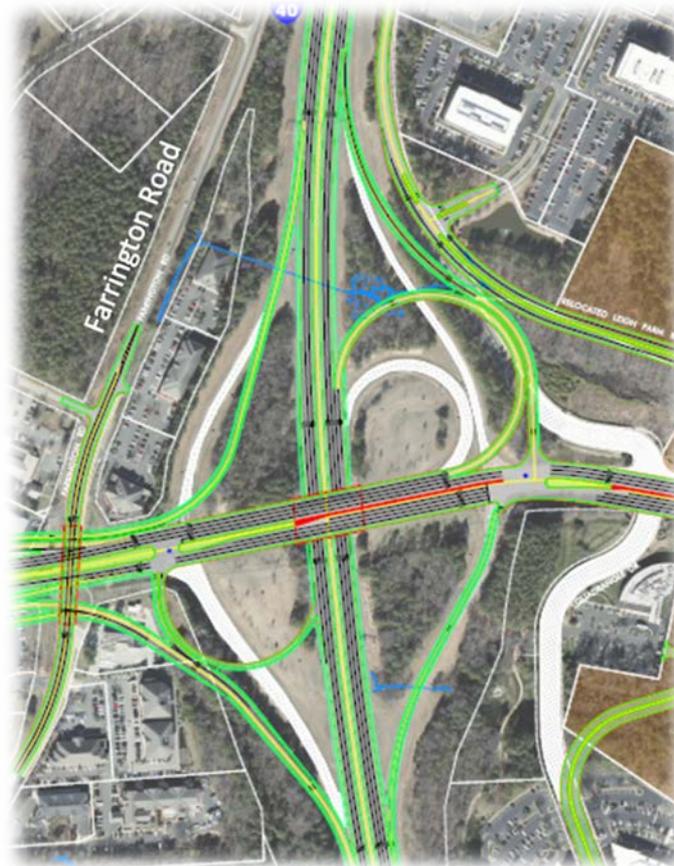


Alternative Concepts

Segment 1: US 15/501 Interchange

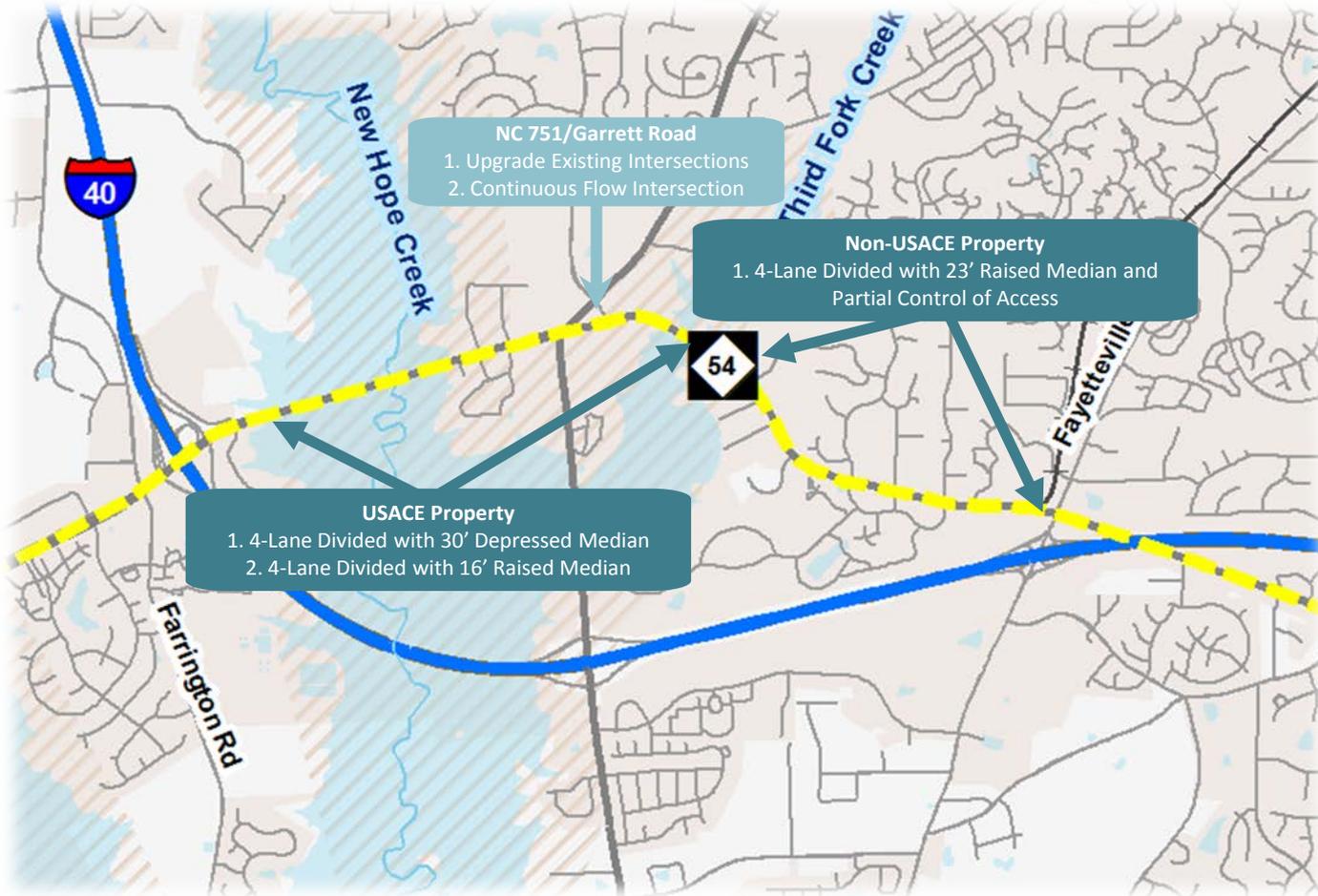
I-40 Interchange

1. Partial cloverleaf interchange



Segment 2

East of I-40 to Fayetteville Road

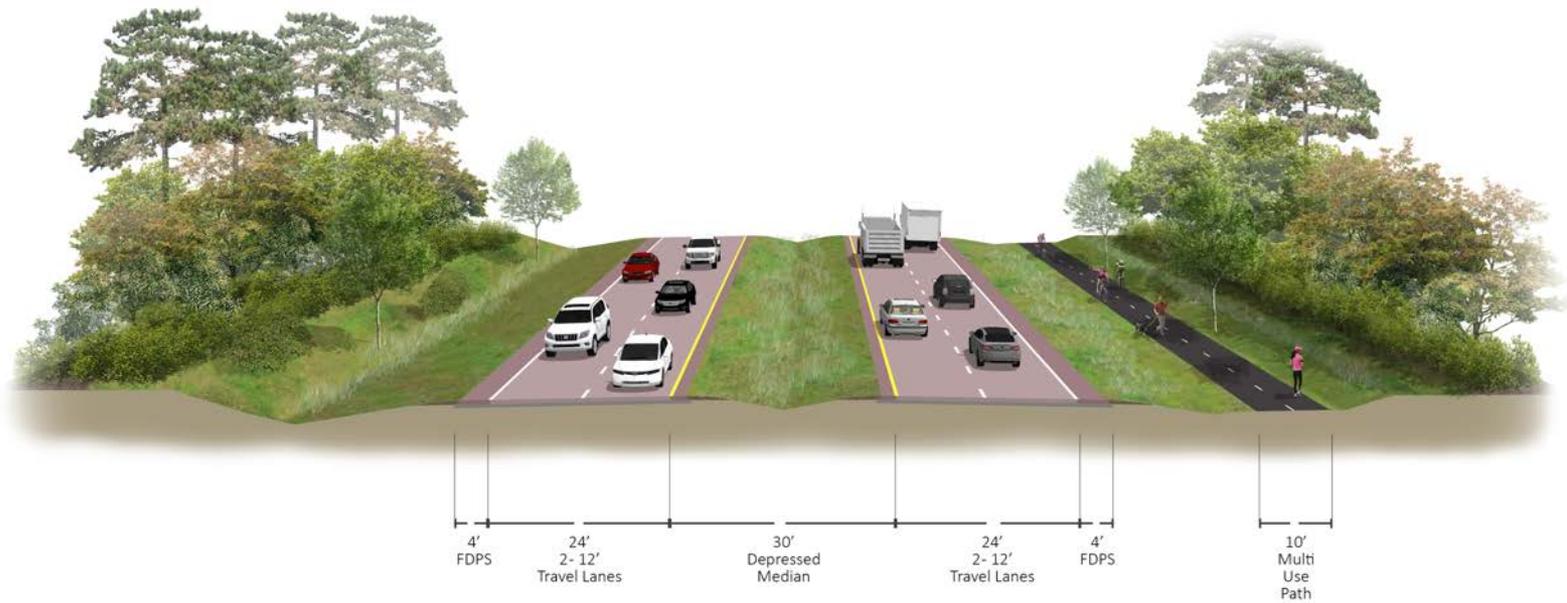


Segment 2

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

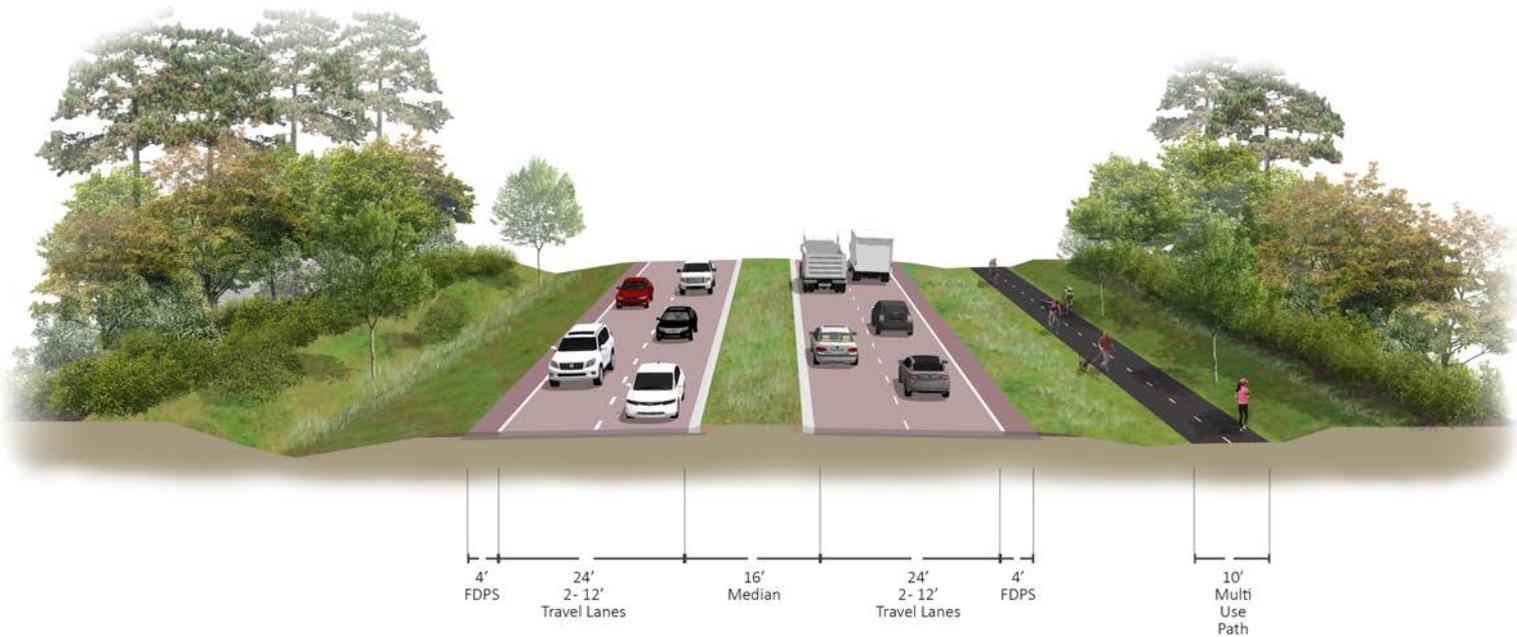


Segment 2

East of I-40 to Fayetteville Road

USACE Property

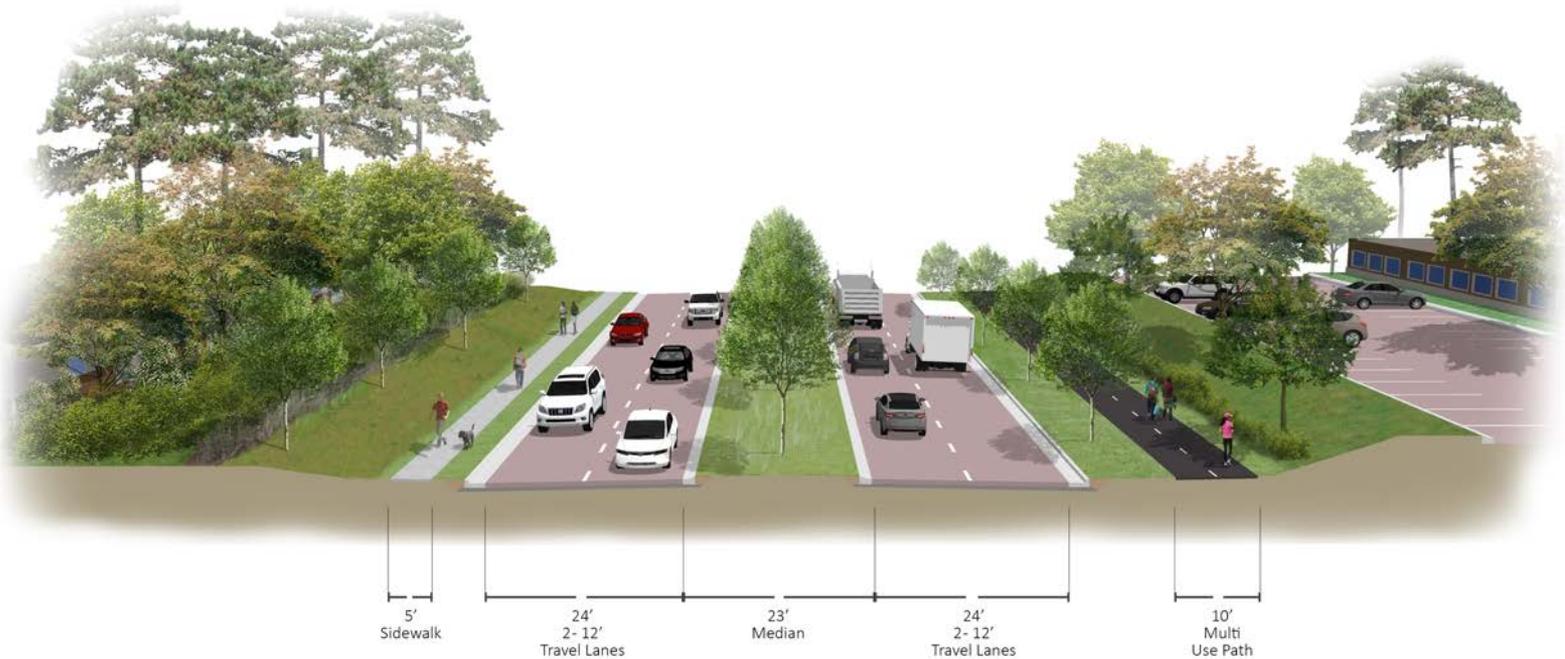
- 1. 4-Lane Divided with 30' Depressed Median
- 2. 4-Lane Divided with 16' Raised Median



Segment 2

East of I-40 to Fayetteville Road

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

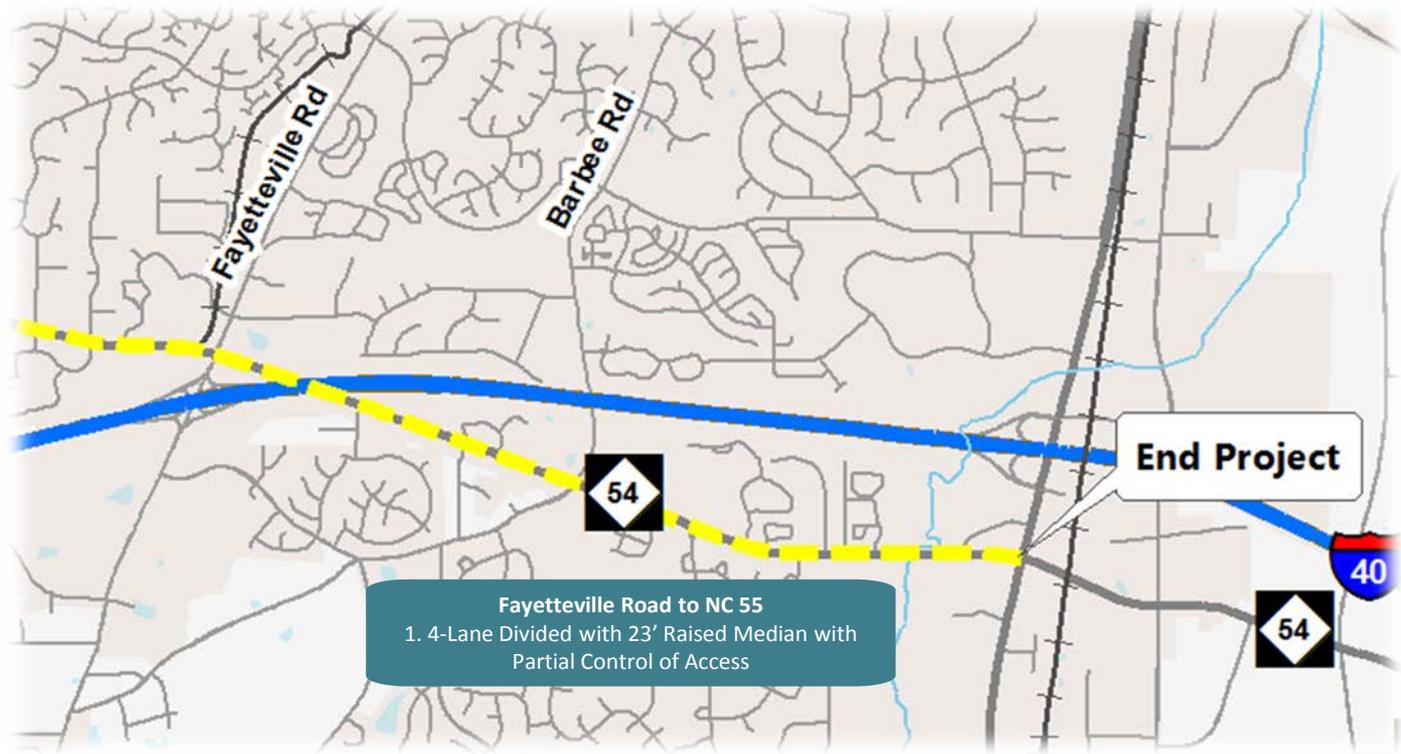
Segment 2 Alternative Concepts		Evaluation Criteria			
					
USACE Property	Option 1: 6-lane depressed roadway with frontage roads	All signalized and unsignalized intersections operate at LOS D or better; all movements have v/c ratio of 0.85 or less in all peaks.	Multiuse path on south side of NC 54.	Consistent with MTP and STIP.	TBD
	Option 2: 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	Option 1: 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.	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	<p>Option 1: Upgrade existing intersections</p>	<p>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.</p>	<p>Consistent with MTP.</p>	<p>Not preferred by stakeholders due to impacts and safety concerns.</p>
	<p>Option 2: CFI</p>	<p>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.</p>	<p>Not inconsistent with MTP.</p>	<p>Not preferred by stakeholders due to perceived complexity.</p>

Segment 3

Fayetteville Road to NC 55

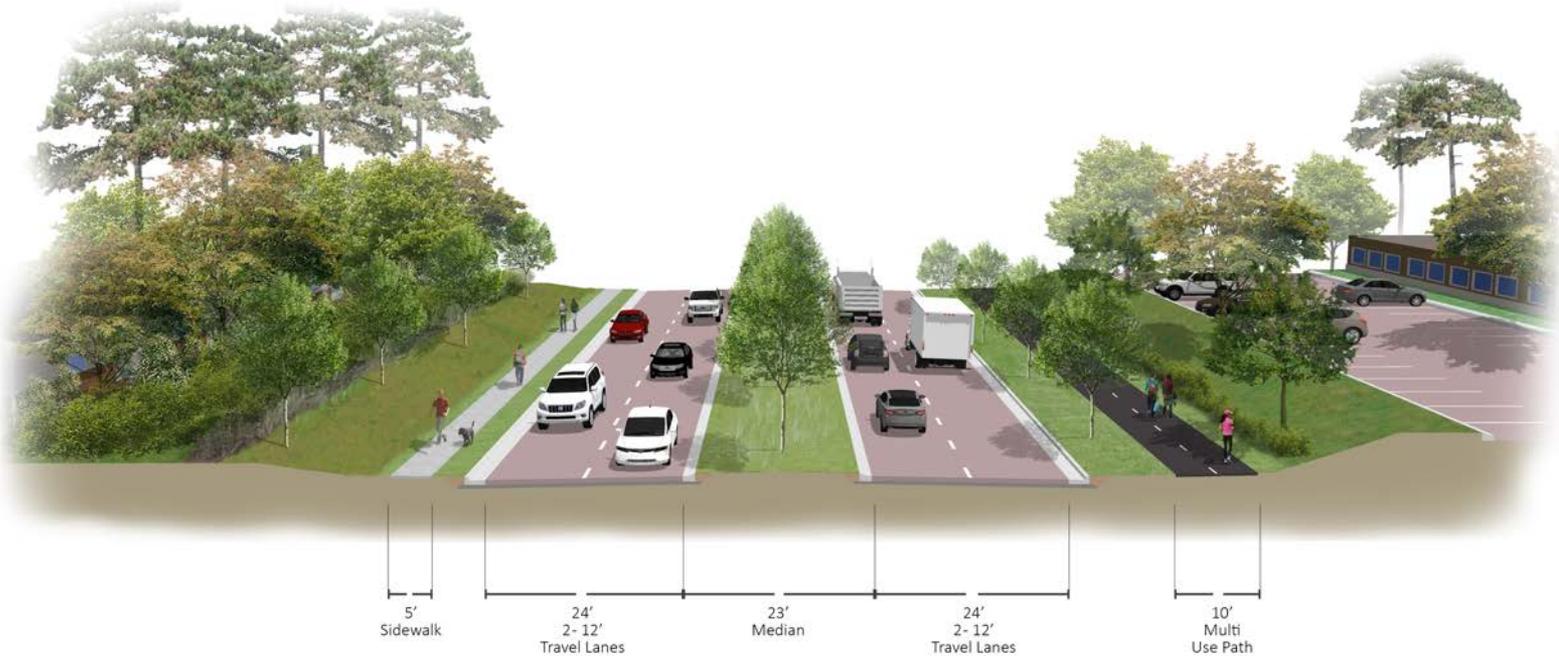


Segment 3

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	<p>Option 1: 4-lane divided with 23-foot raised median</p>	<p>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.</p>	<p>Multiuse 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.</p>	<p>Consistent with MTP.</p>	<p>TBD</p>

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	2022/2024
U-5774C	SR 1110 (BARBEE CHAPEL ROAD) TO I-40. UPGRADE ROADWAY CORRIDOR.	\$26.7M	2022/2024
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	2023/2025
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