NCDOT STIP Project U-5976
Pinehurst Traffic Circle
US 15-501 / NC 211 / NC 2 Intersection

Village of Pinehurst Council Meeting

June 28, 2022

HNTB

Presentation Agenda

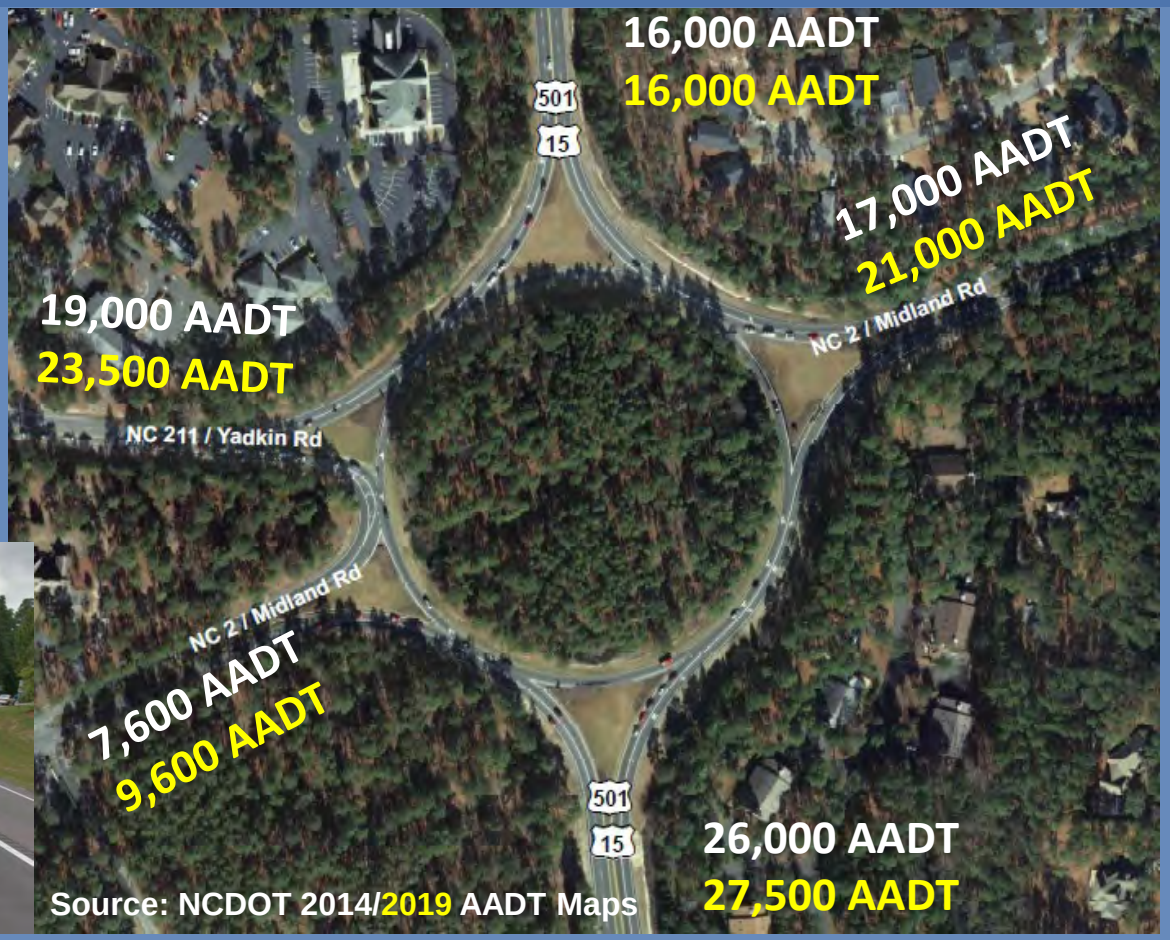
- Project History / Background
- Existing & Future Need for Project
- Previous Concepts – Screening, Design and Operational Evaluation
- 2021-2022 Most Recent Design Concepts and Evaluation
- Next Steps

U-5976 Project History / Background

- August-October 2013 – Concepts Screening Meetings
- February-November 2014 – Final Results (2013&2025) & Summary Meetings
- September-December 2016 – 2040 Traffic Analysis Update
- April-August 2017 – U-5976 Stakeholder Meetings
- August 2017-April 2018 – Development of Concept Visualizations
- May 2018 – Presentation to Pinehurst Village Council
- July 2018 – August 2019 - NCDOT requested development of Additional Concepts and Update to Traffic Forecast/Analysis
- April 2021 – Project Restart
- 2021-2022 – Update to Traffic Forecast/Evaluation of Flyover Concept and CFI

Past/Current Conditions

- Five-leg traffic circle constructed in 1956
- Gateway intersection of major routes - US 15-501 / NC 211 / NC 2
- 600 foot diameter circle
- Single lane circulator with right-turn bypass lanes



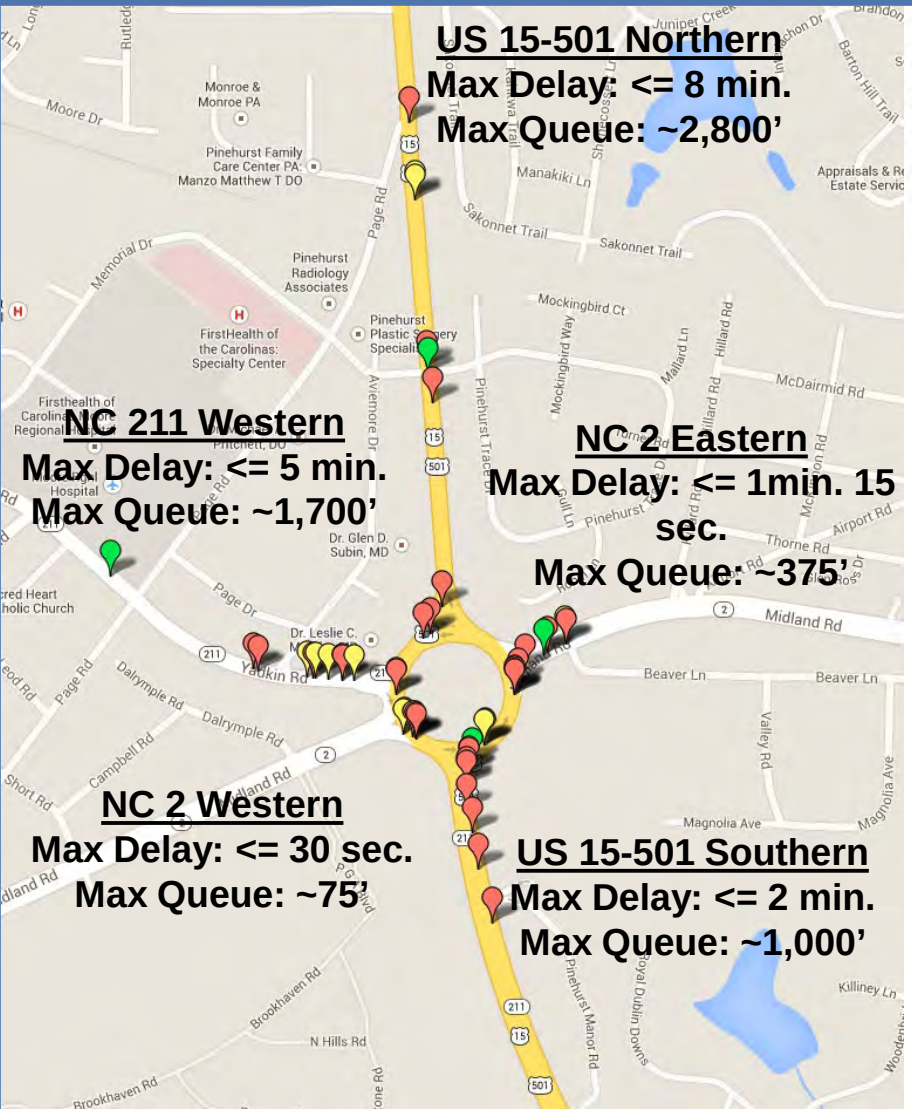
Past/Current Conditions

NC 211 Western Leg at Traffic Circle

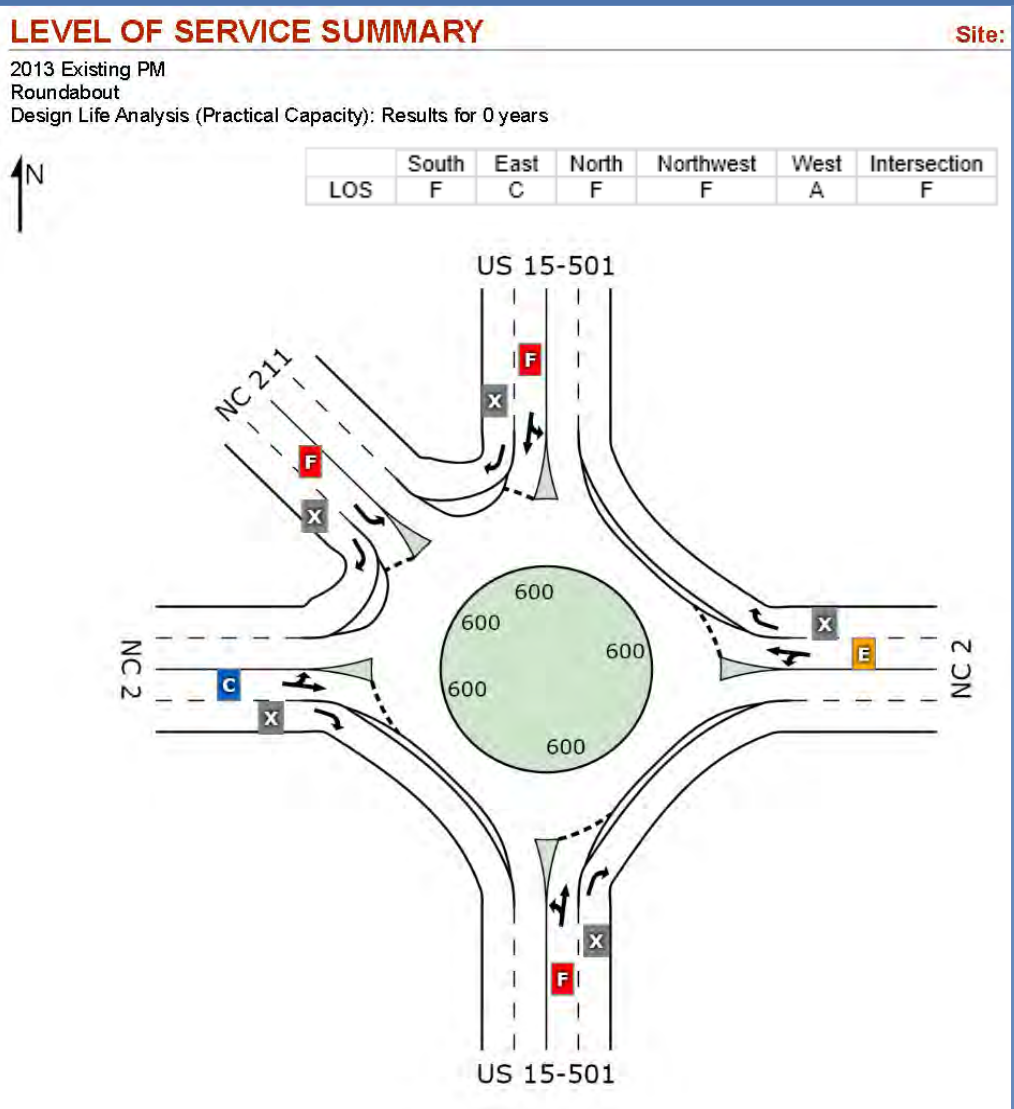
US 15-501 Northern Leg at Traffic Circle

Past/Current Conditions – Operations

Field Observations (5/29-30/2013)



2013 Existing Conditions Level of Service



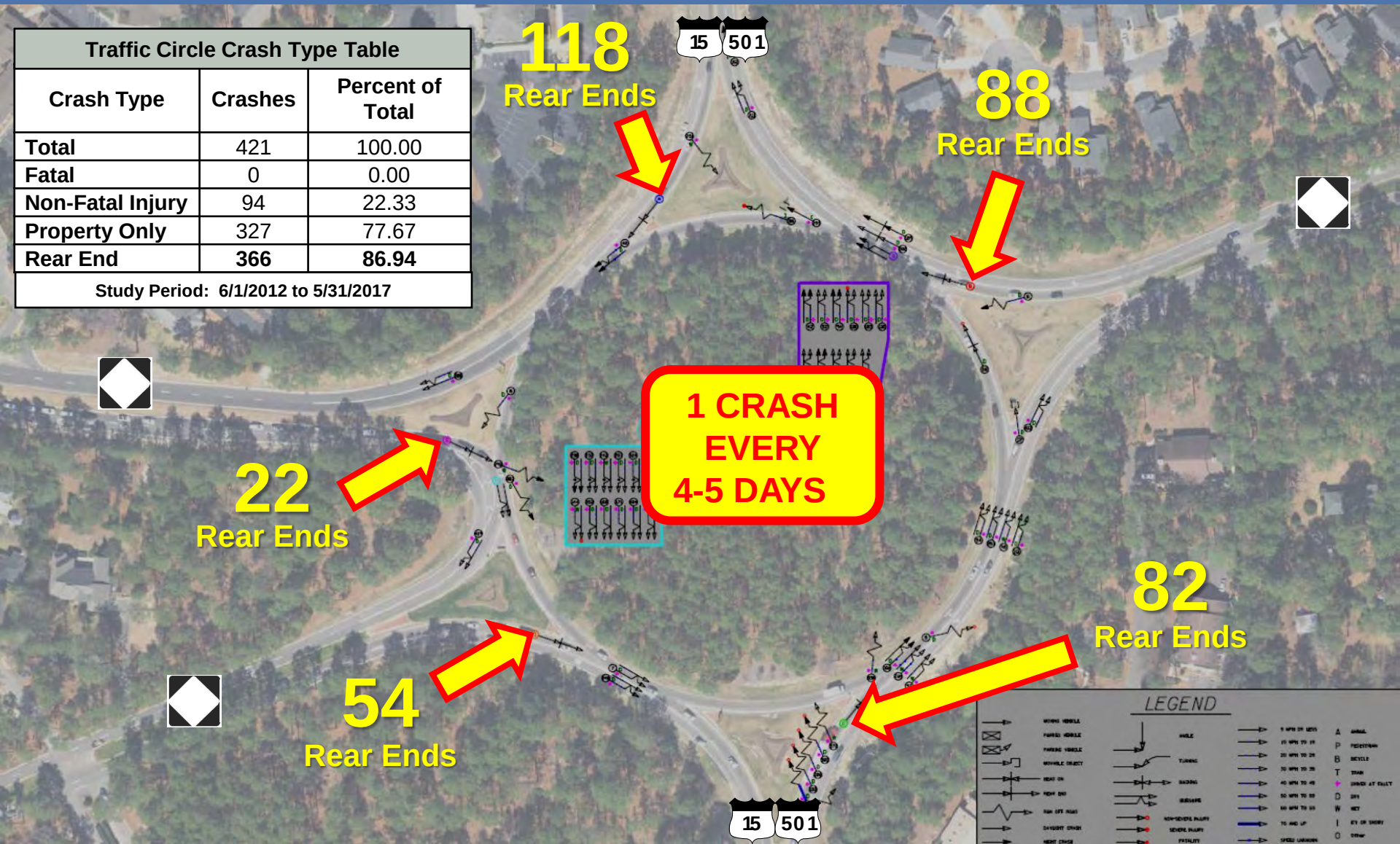
Level of Service Description

LOS	Control Delay at Roundabout Approach	General Observation
A	Less Than 10 Seconds	Little to No Traffic
B	10 – 15 Seconds	
C	15 – 25 Seconds	
D	25 – 35 Seconds	Threshold of Acceptable Peak Hour Operations
E	35 – 50 Seconds	At Capacity - Very Congested
F	Greater than 50 Seconds	Over Capacity - Extremely Congested – Long Queues

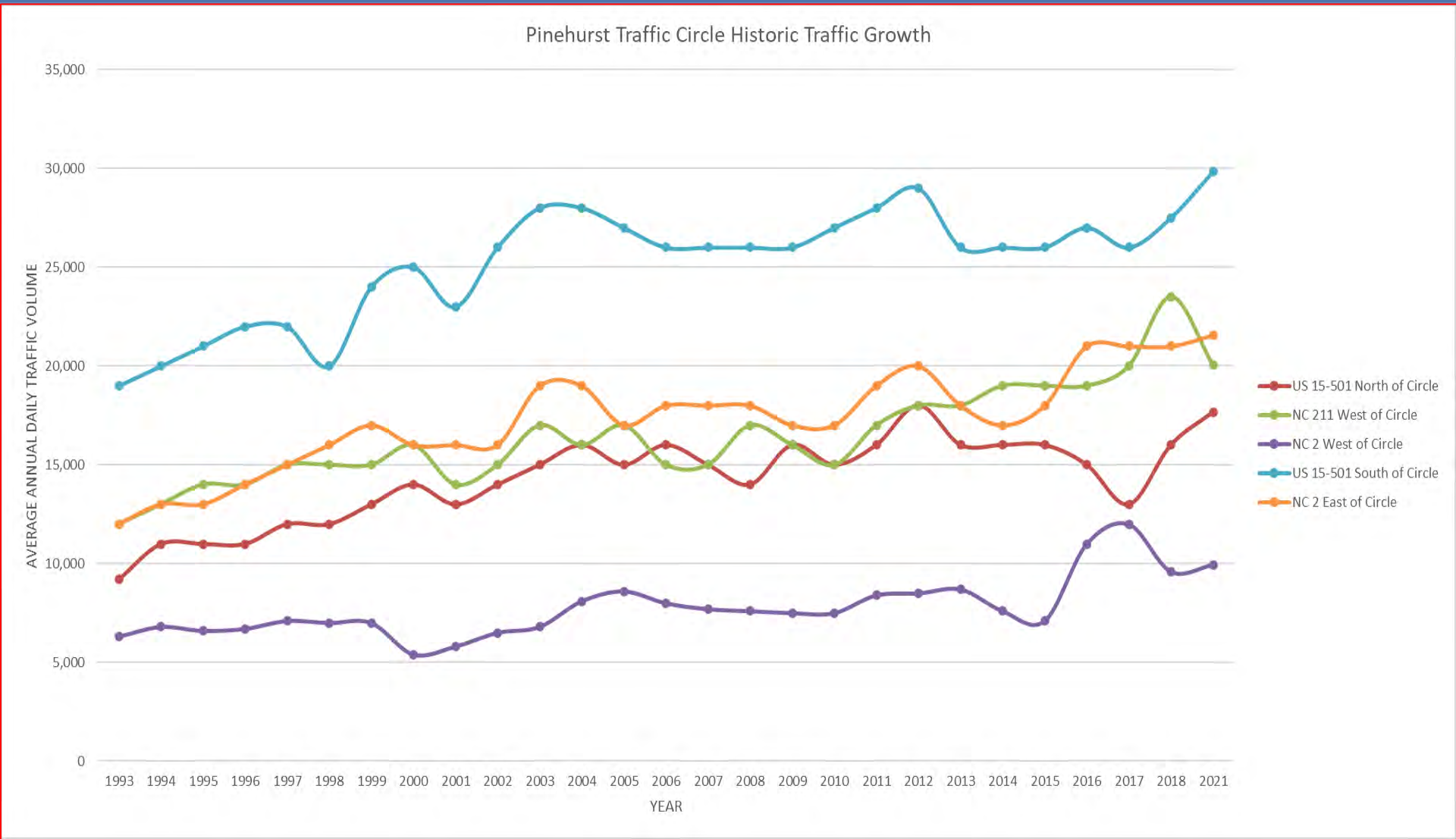
…but the Circle, and any Concepts to Improve it, Also Need to be judged as a "system" and not individual approaches/ movements

2017 Study – 5 Year Crash Analysis

Traffic Circle Crash Type Table		
Crash Type	**Crashes**	**Percent of Total**
Total	421	100.00
Fatal	0	0.00
Non-Fatal Injury	94	22.33
Property Only	327	77.67
Rear End	**366**	**86.94**
Study Period: 6/1/2012 to 5/31/2017		

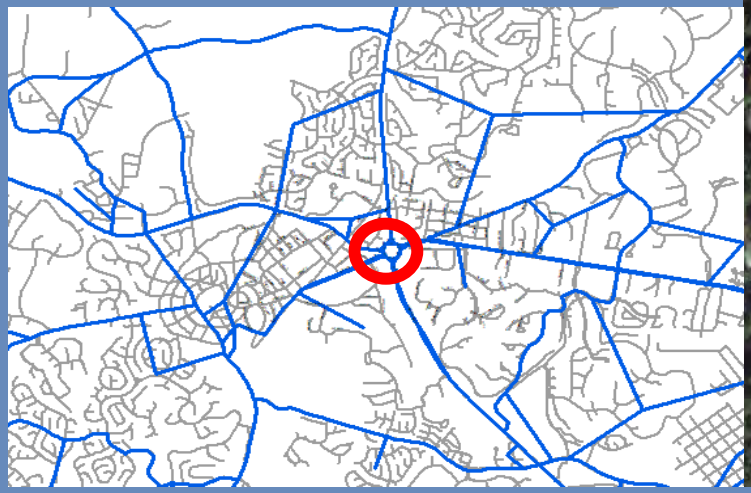


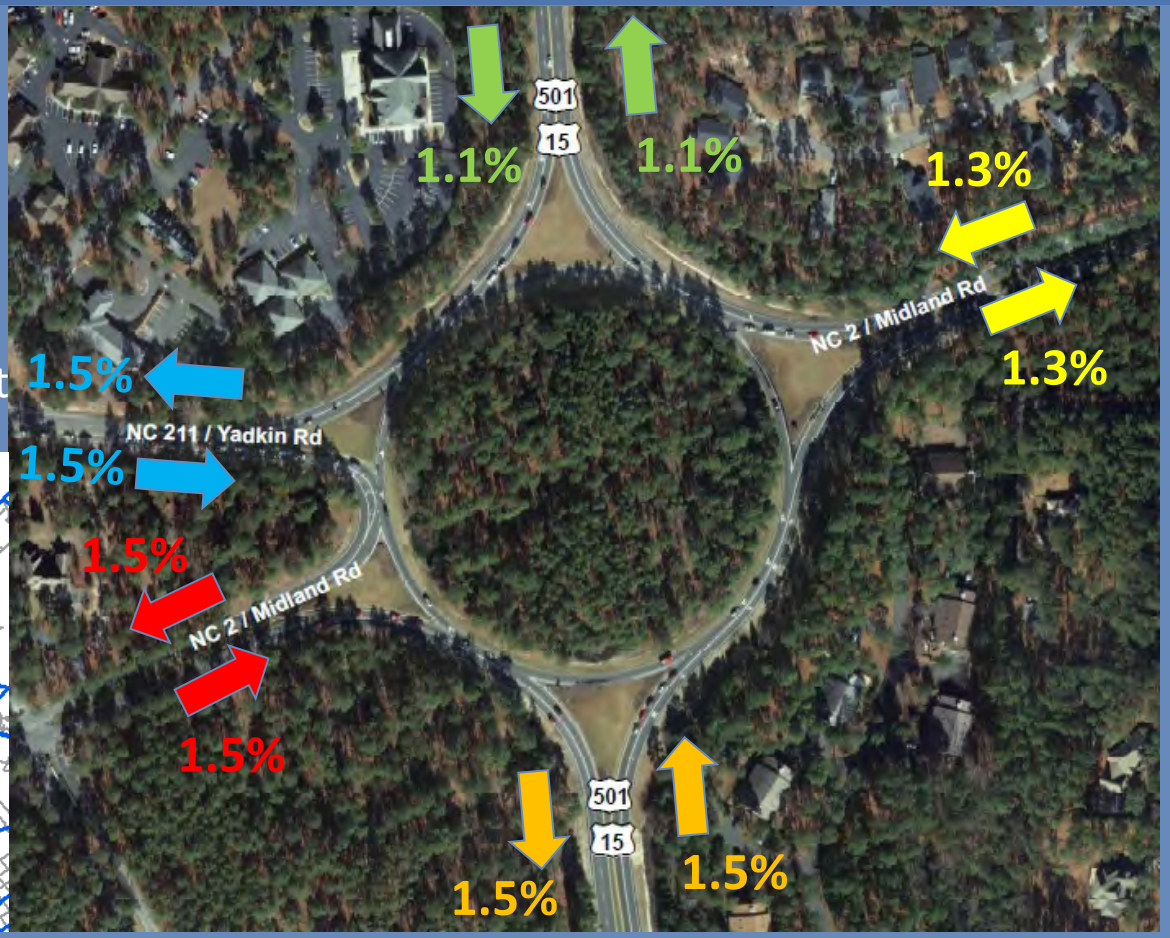
Traffic Circle
Historical Traffic Growth



Traffic Circle
Regional Travel Demand Model
(2010-2040)

- Accounts for Residential and Employment Growth
- Includes all Major Highways/Streets
- Compare Model Growth Rates to Historical Data to Make a Forecast





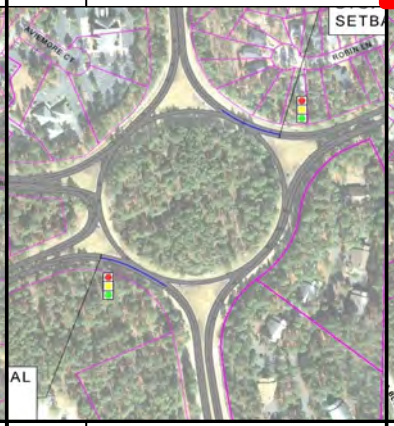
2014 Study Alternative Concepts

Developed Hybrid Concept 1/3

All Screening Concept Choices Preserved the Circle

1 Modified Geometry
Rank / Notes:

2 Metering (Signal)
Rank / Notes:



3 Multi-Lane Traffic Circle
Rank / Notes:

4 Modified (Split) Traffic Circle
Rank / Notes:

5 Modified Traffic Circle / Superstreet
Rank / Notes:

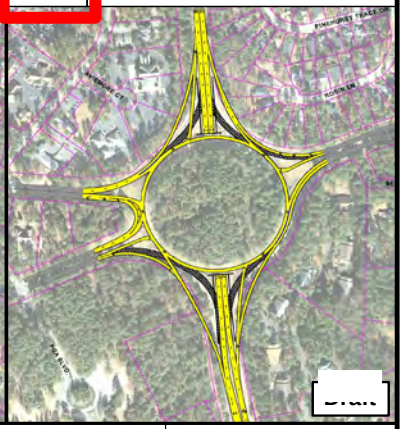
6 Multi Single-Lane Roundabouts
Rank / Notes:

7 Modern Two-Lane Roundabout
Rank / Notes:

8 At-Grade Intersections
Rank / Notes:

9 US 15-501 Grade Separation (Overpass)
Rank / Notes:

10 US 15-501 Grade Separation (Tunnel)
Rank / Notes:



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NOT TO SCALE

Pinehurst Traffic Circle Study
US 15-501 / NC 211 / NC 2 Intersection

Alternative Screening Concepts

STIP #: N/A | **COUNTY:** Moore

DATE: November 2014 | **DIVISION:** 8

PREPARED BY: HNTB North Carolina, P.C.
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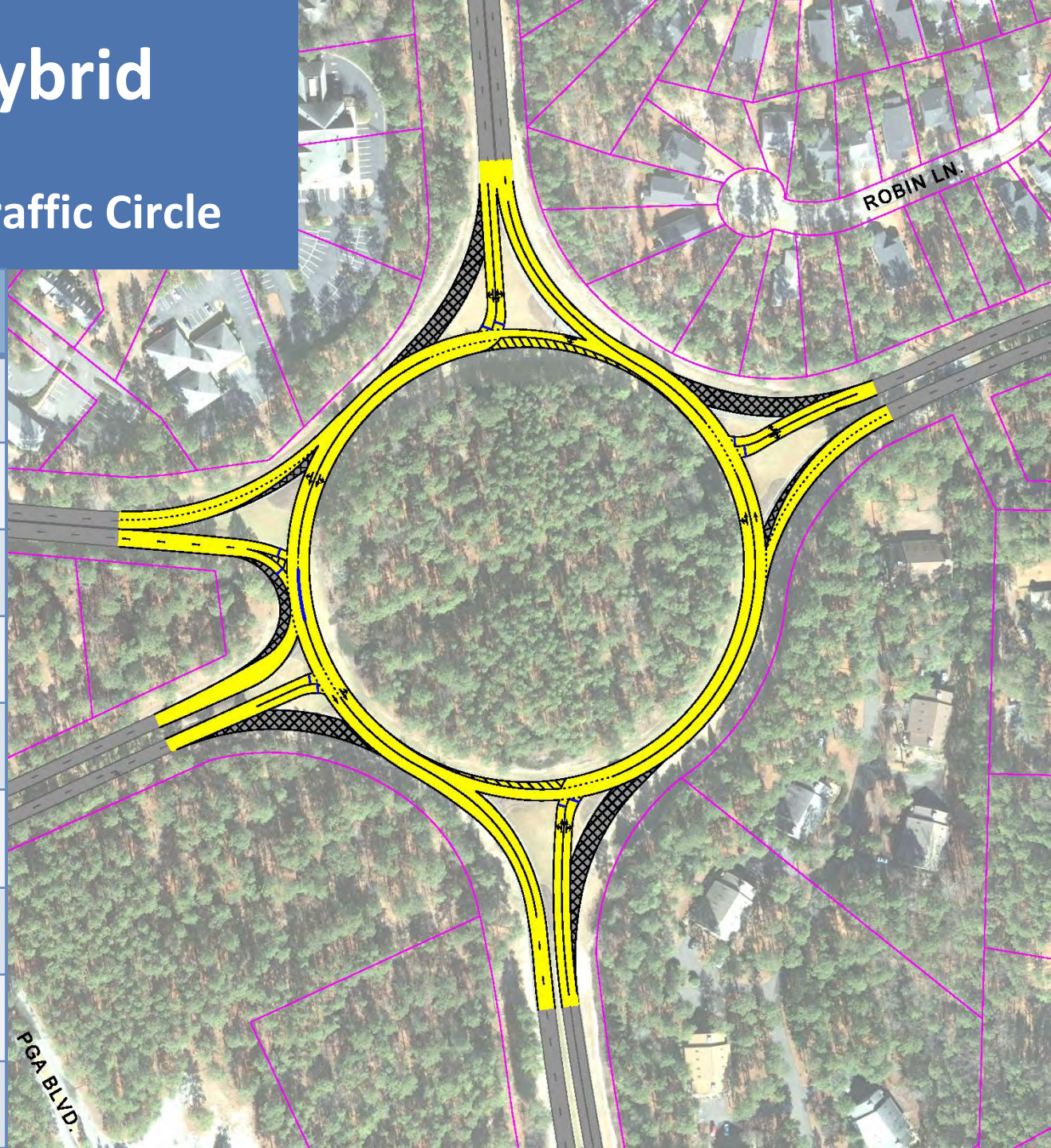
Raleigh, North Carolina 27609

Concept 1/3 Hybrid

Modified Geometry & Multi-Lane "Turbo" Traffic Circle

Screening Criteria	Prelim. Rank (vs. Concepts)
"System Operations Enhancements"	Medium
Safety	May Introduce Crashes
Cost	$2.4 - $3.8M
ROW Impacts	None
Impact to existing circle / aesthetics	Low
Driver Familiarity / Expectations	Low
"Bottleneck" Potential	Medium
Operational Design Life	Medium-term
Ped / Bike / Freight "Friendly"	Low

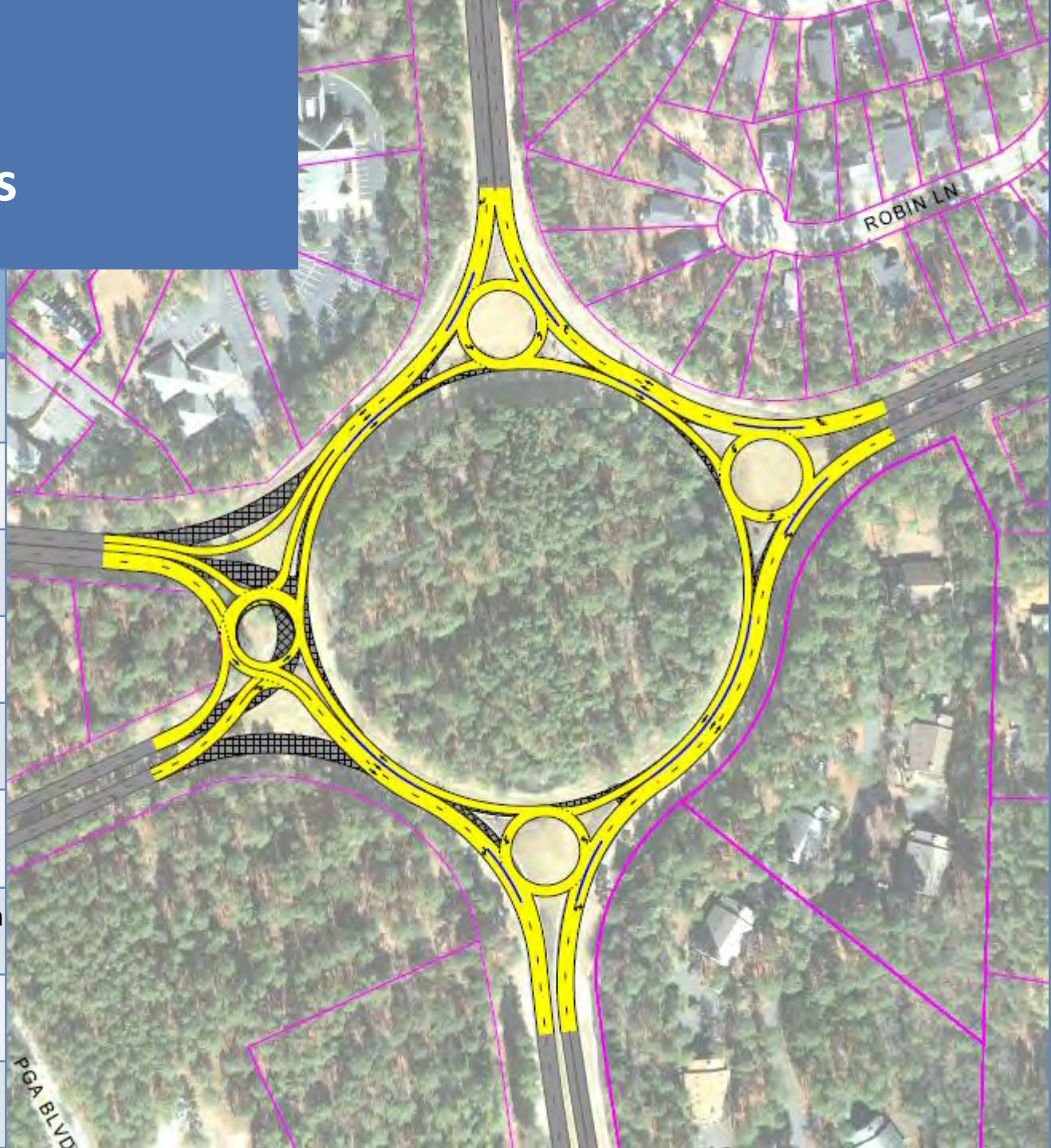


Concept 5
Modified Superstreet

Screening Criteria	Prelim. Rank (vs. Concepts)
“System Operations Enhancements”	Low, Increase VMT/VHT
Safety	May Reduce & Introduce Crashes
Cost	Medium
ROW Impacts	Medium
Impact to existing circle / aesthetics	Low
Driver Familiarity / Expectations	Low
“Bottleneck” Potential	Medium, Introduce “Bottlenecks”
Operational Design Life	Medium-term (w/ Enhancements)
Ped / Bike / Freight “Friendly”	Low

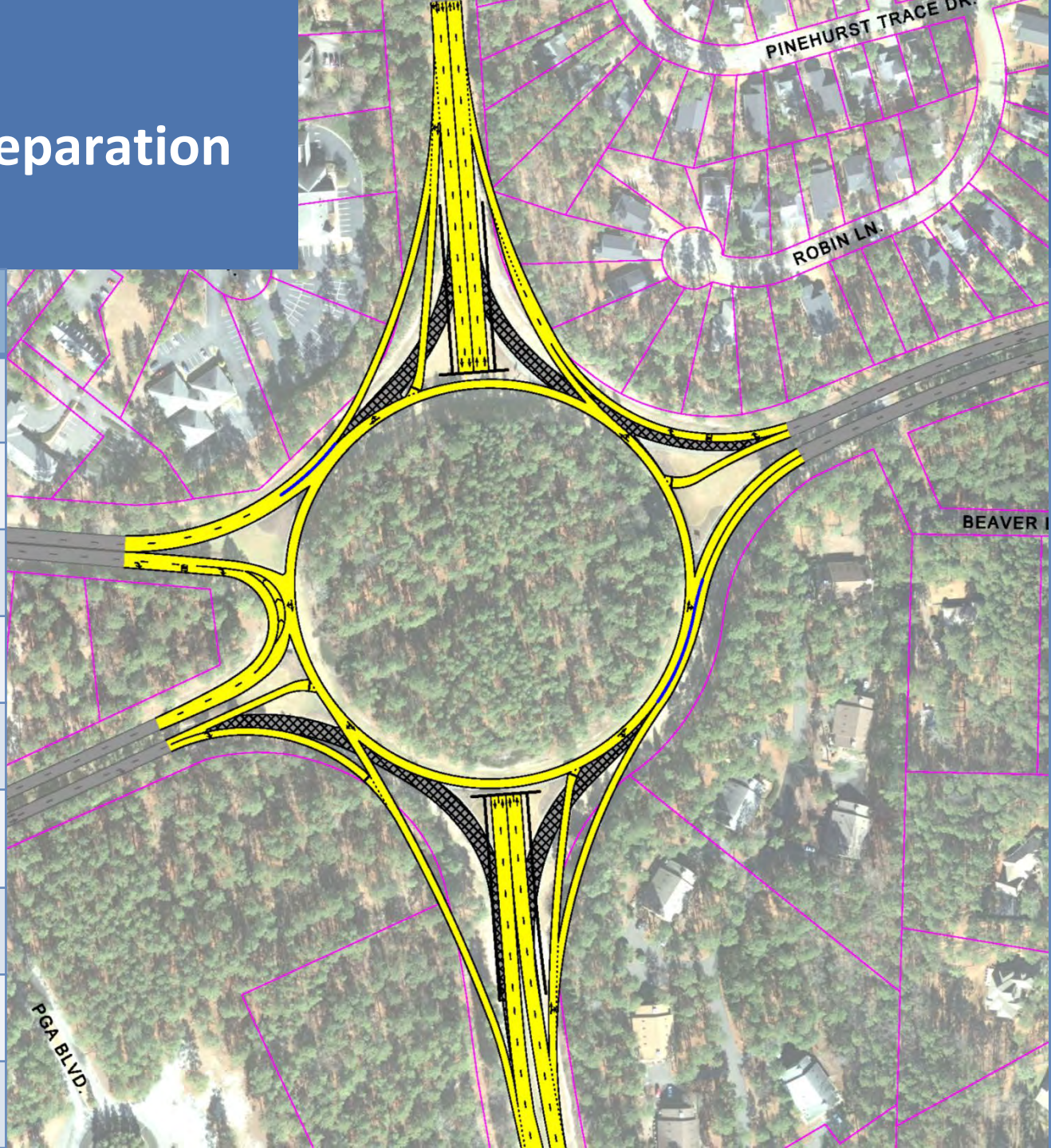
Concept 6
Multi-Roundabouts

Screening Criteria	Prelim. Rank (vs. Concepts)
“System Operations Enhancements”	High
Safety	May Increase Total Frequency
Cost	$2.8 – $4.4M
ROW Impacts	Low
Impact to existing circle / aesthetics	Low
Driver Familiarity / Expectations	Low
“Bottleneck” Potential	Medium, Intersection Spillback
Operational Design Life	Medium / Long-term
Ped / Bike / Freight “Friendly”	Low



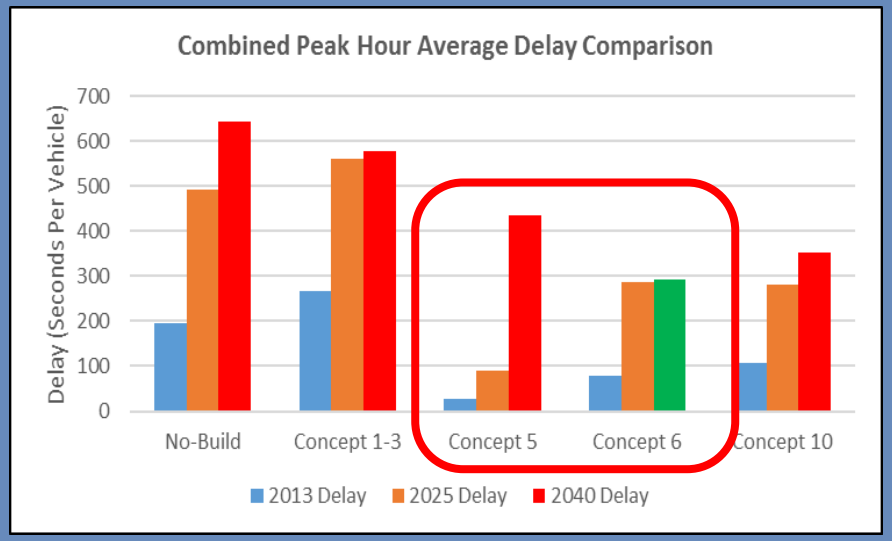
Concept 10
US 15-501 Grade Separation (Tunnel)

Screening Criteria	Prelim. Rank (vs. Concepts)
“System Operations Enhancements”	High
Safety	May Reduce Frequency
Cost	$16.9 – $26.5M
ROW Impacts	Medium / High
Impact to existing circle / aesthetics	Low to High
Driver Familiarity / Expectations	Medium
“Bottleneck” Potential	Low
Operational Design Life	Medium / Long-term
Ped / Bike / Freight “Friendly”	Low



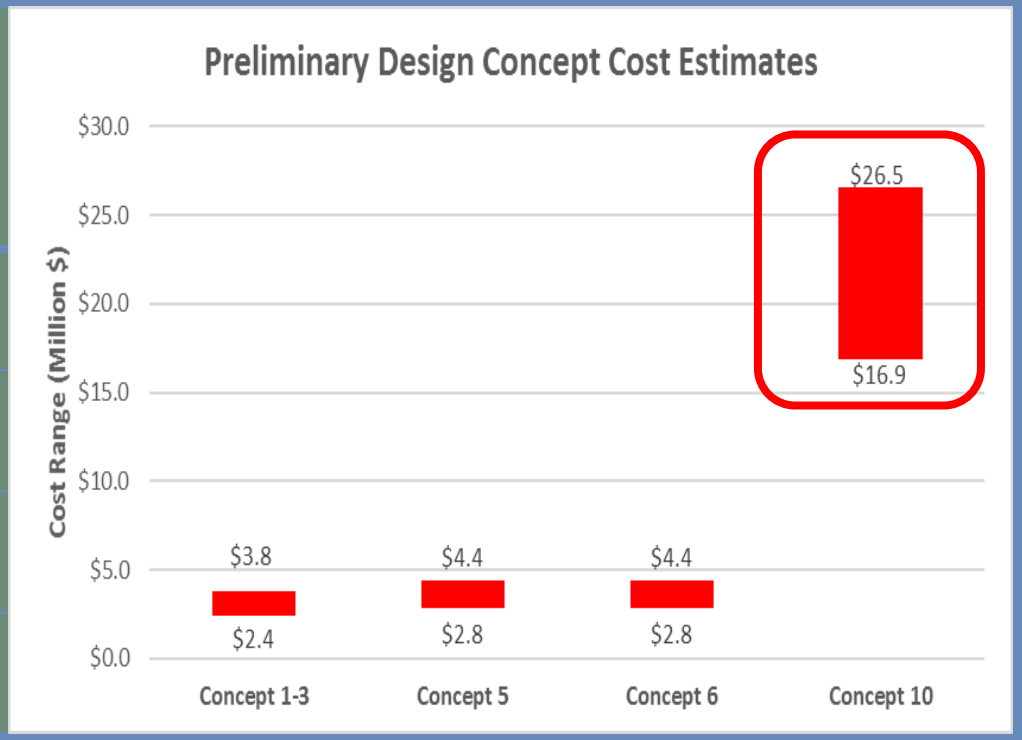
2014 – 2017
Traffic Model Evaluation
Base Year / Opening Year / 2040

- **Concept 1/3 Hybrid** – Little Mobility Benefit
- **Concept 5 – Superstreet** – Works Well Short-Term, Then Fails
- **Concept 6 – Multi-Roundabouts** – Best Long-Term Performance (At the Time)
- **Concept 10 – Tunnel** - Doesn't Perform As Well Long-Term



2017 Preliminary Sketch-Level Cost Estimate

Concept
1/3 – Hybrid Modern
5 – Modified Superstreet
6 – Multi-roundabouts
10 - Tunnel

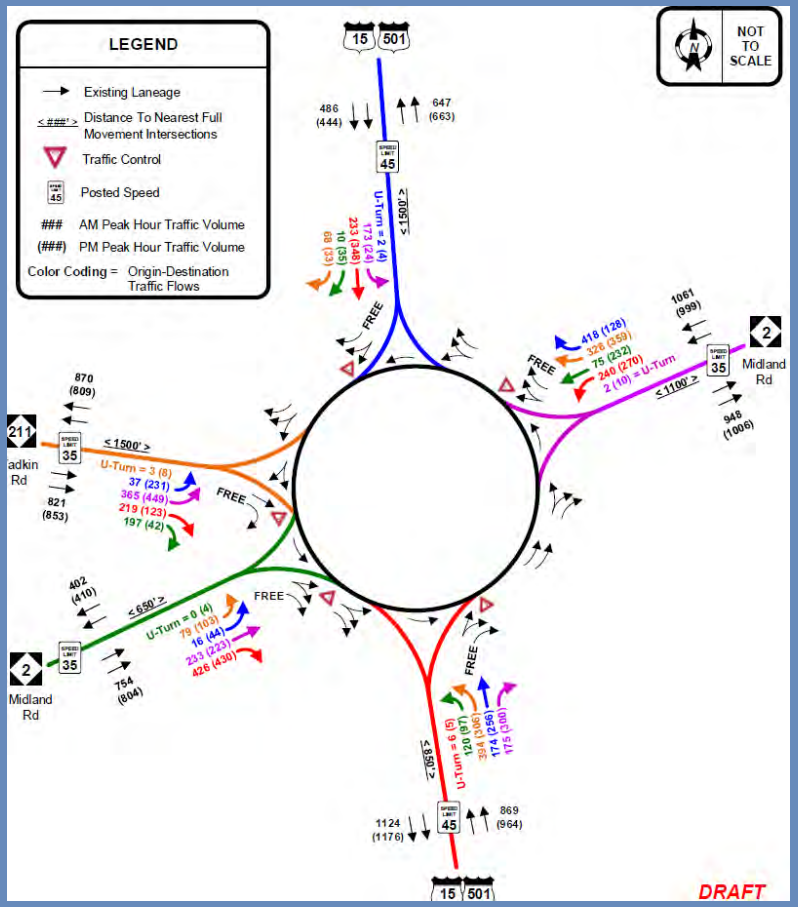


2017-2018
2-D / 3-D Visualizations

2018 Study - Updated/New Concepts

Task List

- Develop New Concepts - <u>May Impact Circle</u>
- Update Traffic Counts/Forecasts
- Look at Metering/Flyover
- Re-engage Stakeholders



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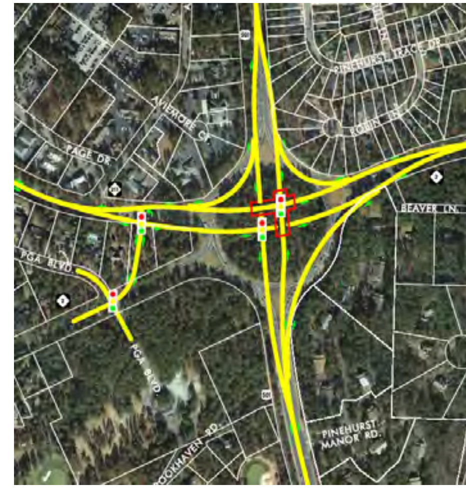
2018 Study - Updated/New Concepts

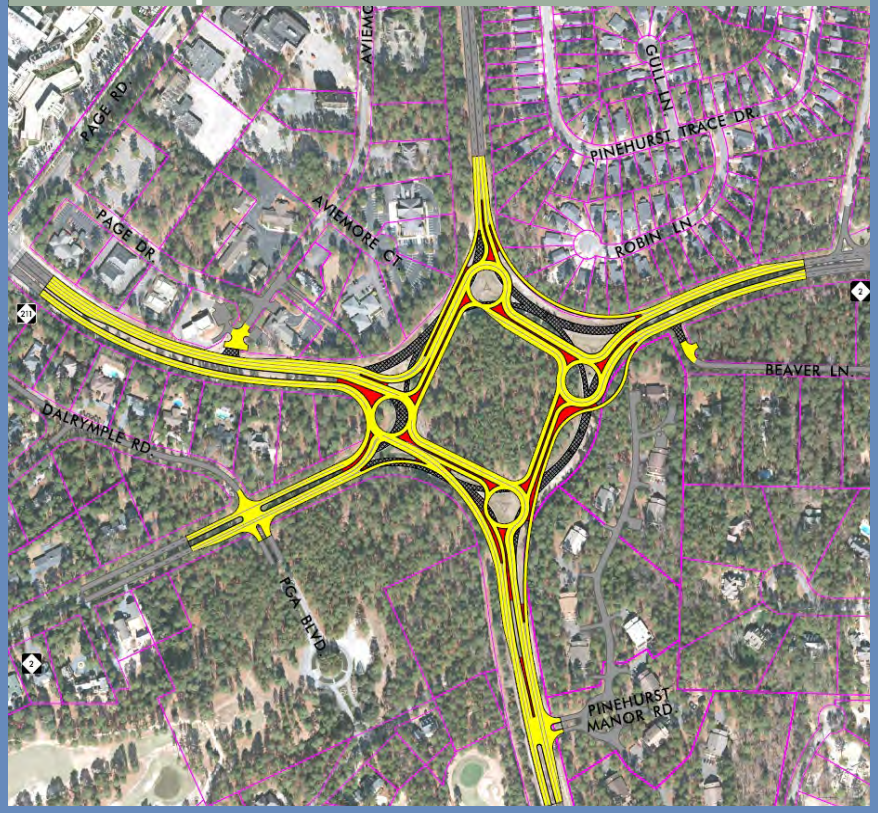
Initial Sketch-Level Vetting Process



Concept 13 –Partial Cloverleaf Type “A” Interchange

2018 Study – Preliminary Concept Designs

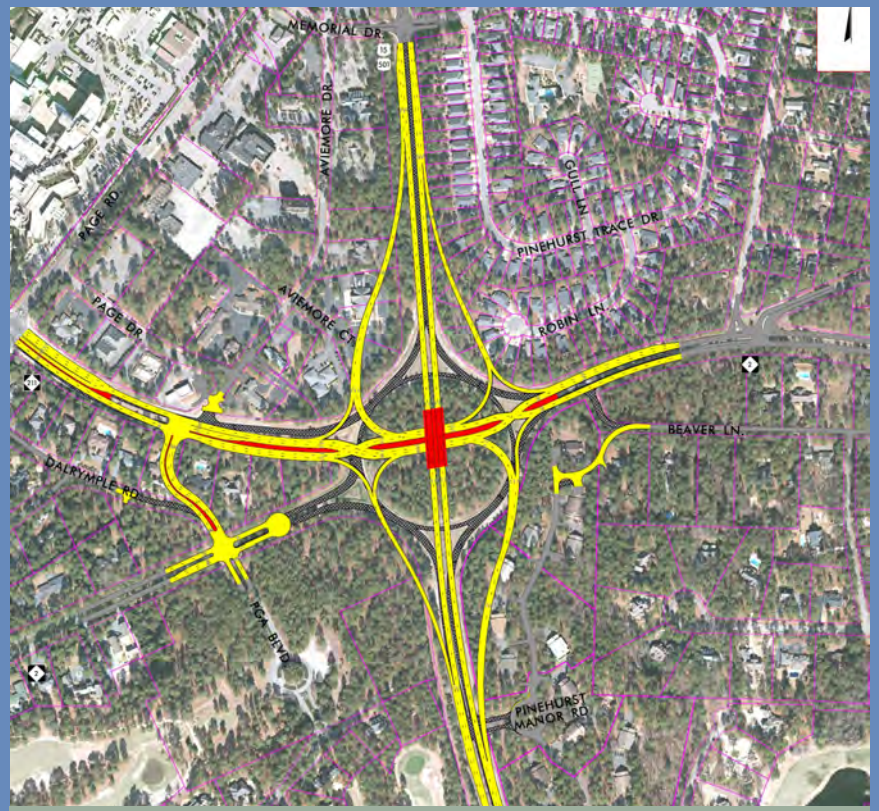
Concept 6 Modified – Squared Multi-Roundabouts



Concept 8 – At-Grade Intersections

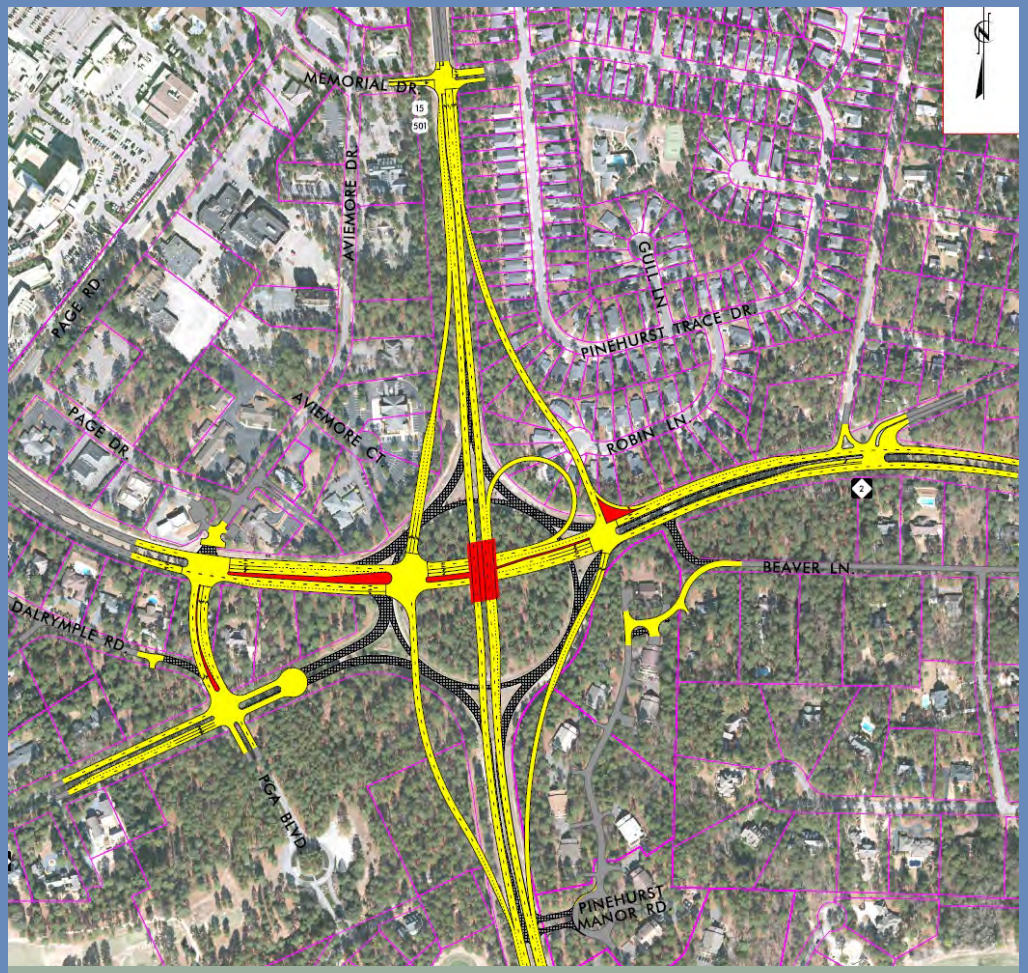
2018 Study – Preliminary Concept Designs

Concept 11 – CFI



Concept 12 – DDI Interchange

2018 Study – Preliminary Concept Designs



Concept 13 – Partial Cloverleaf "A" Interchange

2021/2022 Updates – Current Design Status and Visualizations

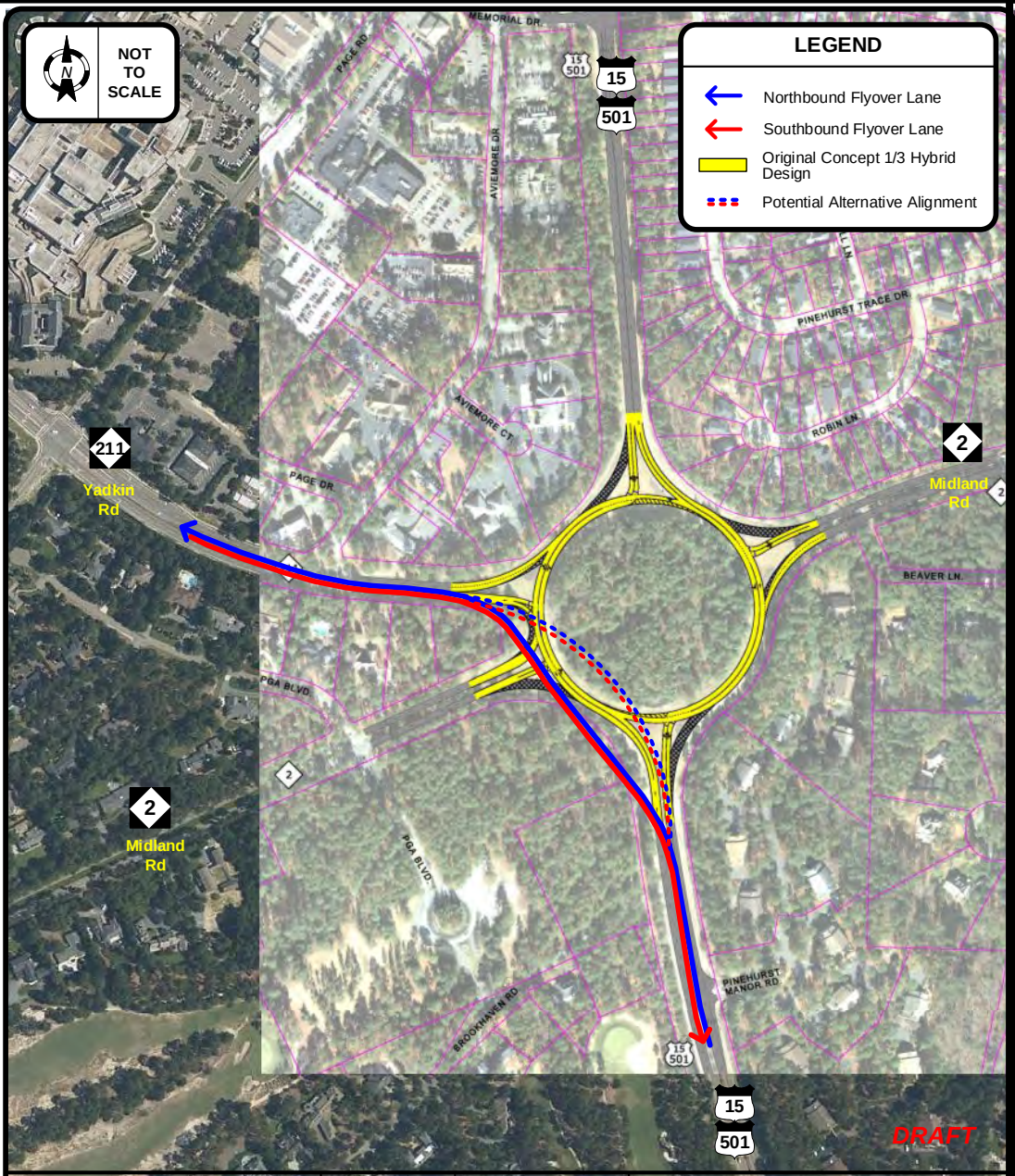
- ***No-Build Alternative*** – What if We Do Nothing?
- ***New Alternatives 14-16 – Flyover Concepts*** – Minimize Circle Impact / Remove Highest Traffic Stream
- ***Alternative 11 – Continuous Flow Intersections (CFI)*** – Preferred Overall Solution

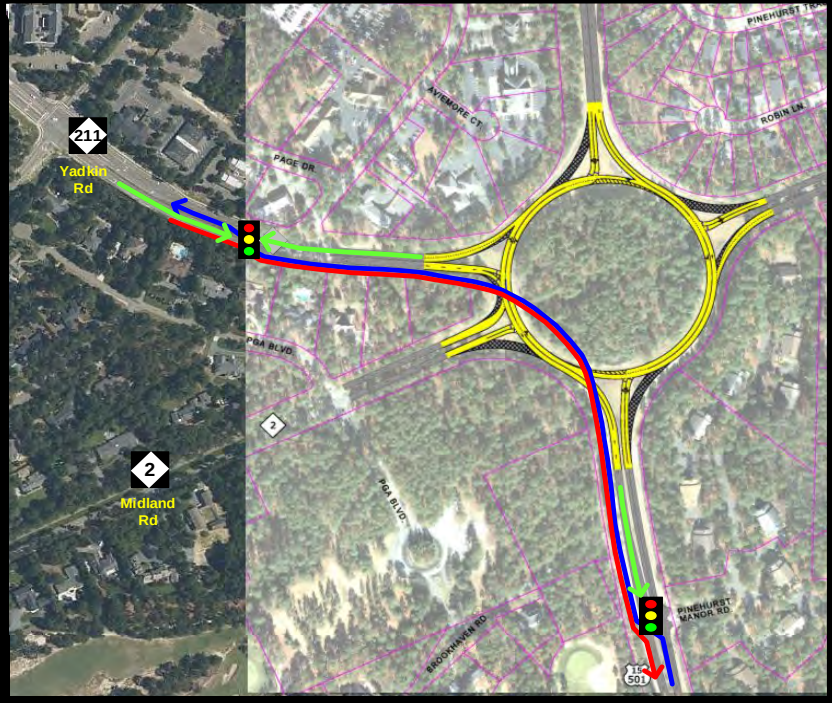
No-Build Alternative

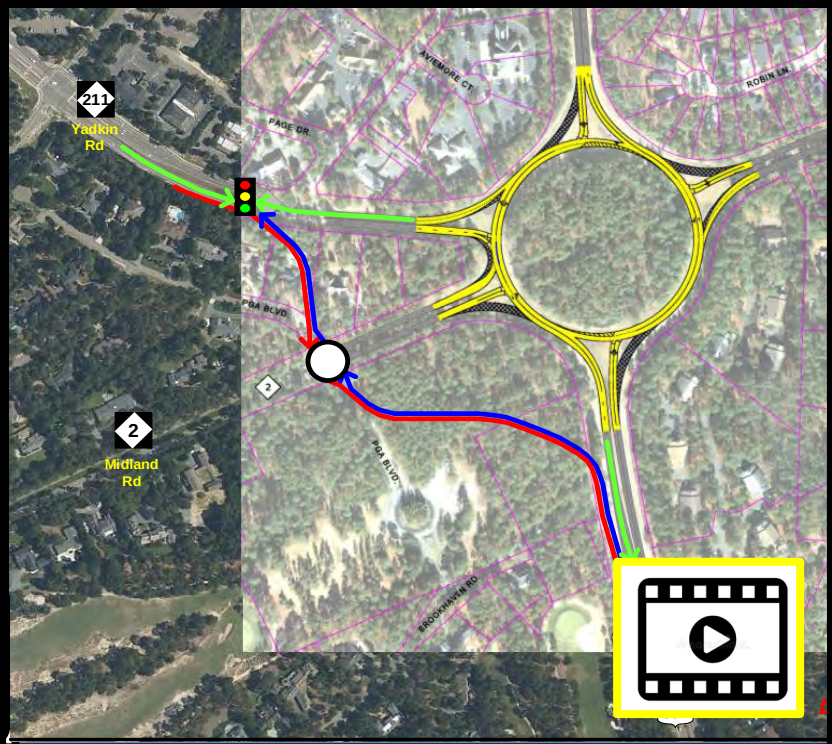
- **Only 70% of Projected Peak Hour Demand Can Enter Circle Study Area in 2045**
- Delays and Queues Longer Than Today – More Traffic Will Cut Through Other Routes For Longer Durations – 70,000 vpd in 2045
- Same Safety Issues with More Crashes
- No Construction Cost/Impact – But Still Quantifiable Costs and Impacts of Status Quo

Fly-Over Concept

- **Free Flowing Elevated Bridge for US 15-501 South Leg to NC 211 West Leg movements – highest traffic volume movement in the Circle**
- Upgrade Remainder of Circle to Concept 1/3 Hybrid
- Bridge Alignment to Avoid As Much Circle or Existing Property Impact







PREPARED FOR
North Carolina Department of Transportation

PREPARED BY
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COUNTY	Moore	STIP PROJECT NO.	U-5976
DIVISION	8	WBS NO.	45964.1.1

PROJECT DESCRIPTION
Pinehurst Traffic Circle Improvements

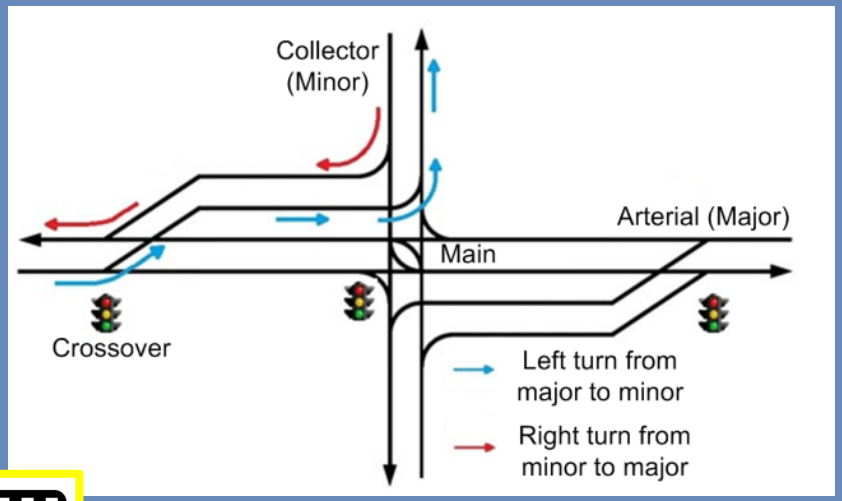
Concept 14
HYBRID MODERN ROUNDABOUT WITH FREE-FLOW FLYOVER

DATE
December 2021

FIGURE 1A

Continuous-Flow Intersections

- **Left Turns Cross Over Prior to Main Intersection**
- More Traffic Signals – But All Simple 2-Phase Design
- All Signals Synchronized in Both Directions



Continuous-Flow Intersections

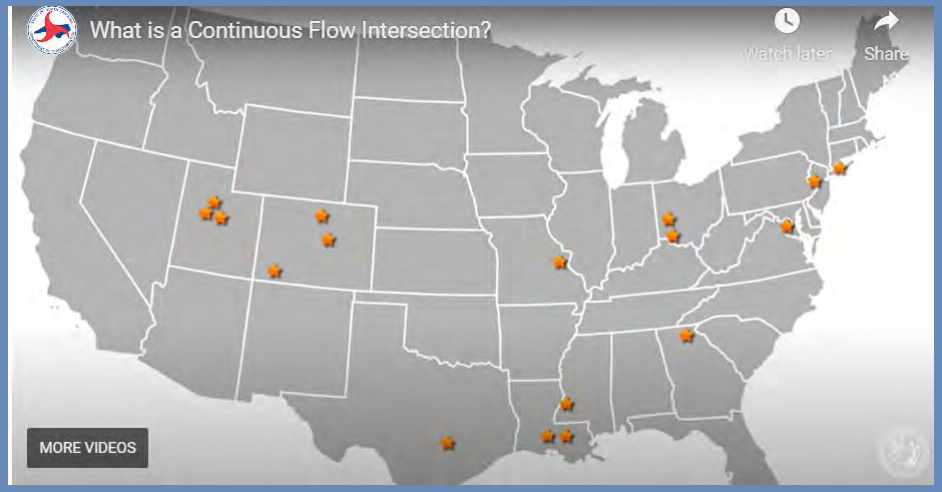
Advantages

- Constructable
- Flexible for Traffic Demand Changes
- Potential Crash Reduction Benefit Over Conventional Intersection and Existing Circle
- Cost Comparison- **$26** million for CFI, **$30** million for Par-Clo A Interchange (+ ROW), **$26** million for Flyover

Continuous-Flow Intersections

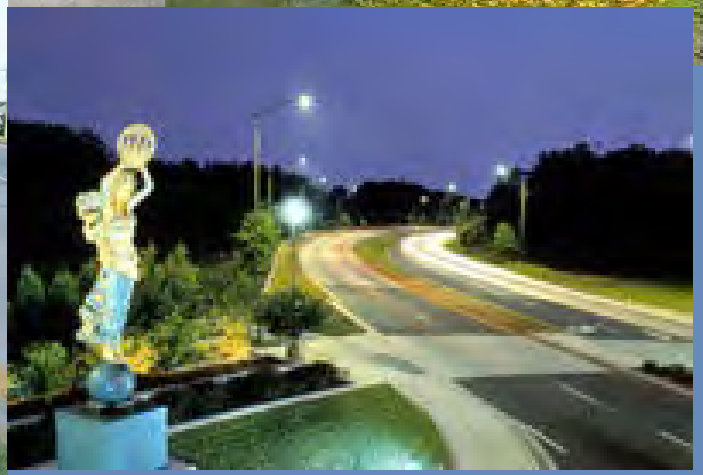
Implementation

- **NC 16 & Mt. Holly-Huntersville Road - Charlotte**
- 25 constructed in United States
- https://www.ncdot.gov/initiatives-policies/Transportation/safety-mobility/continuous-flow-intersection/Pages/default.aspx



Continuous-Flow Intersections

Aesthetics



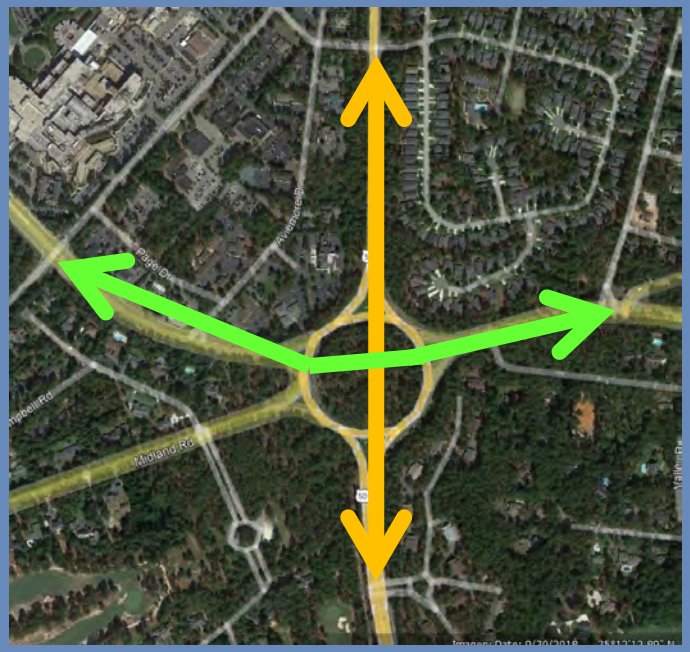
Continuous-Flow Intersections

Aesthetics

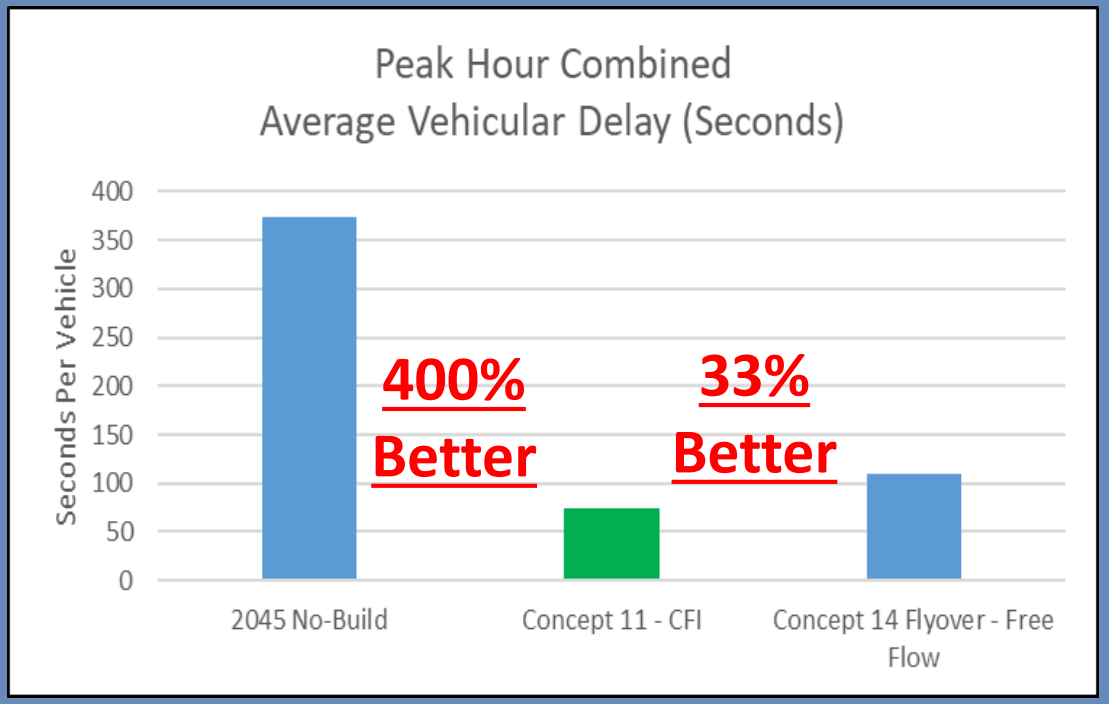
Continuous-Flow Intersections

Traffic Model Evaluation

2045 Design Year



- **2045 AM Peak Averaged Travel Times**
- **No-Build** 4:15 5:15
- **Flyover** 3:00 3:00
- **CFI** 1:30 1:10



Next Steps

- Additional Public Meetings & Workshops
- Detailed Environmental & Cultural Resource Studies
- Selection of Preferred Alternative
- Final Project Design/Engineering
- NCDOT STIP Schedule – ROW Acquisition 2024, Construction 2026

Questions?

Comments?

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