

Fw: [External] Lake Wheeler Intersection with Carolina Pines Ave

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Sent: June 30, 2020 9:13:33 AM EDT

All,

The City of Raleigh is proposing some improvements at the intersection of Lake Wheeler Rd and Carolina Pines Ave. When they originally started this effort, they were proposing a partial multi-lane roundabout with two southbound throughs, with the inside through lane dropping as a left only left at Sierra Drive. We reviewed the analysis and said that we could support that option. Since then, they have learned that they are unable to widen to the south, so they got rid of the partial multi lane roundabout and changed to a turbo roundabout. After reviewing the new analysis, we determined that a signal would function at better LOS. The City of Raleigh still wants to pursue the turbo roundabout instead of a traffic signal and have provided the attached memo to try to justify utilizing their design over a signal. Also, they said that Duke won't let them put signal poles next to their transmission lines and I have asked them to provide that in writing from Duke, but they haven't provided anything yet. The signal has potential to operate at an LOS B in the PM if the timing is optimized and rights on red are permitted. The turbo roundabout would operate at LOS D in the PM (Braden, let me know if I'm getting that wrong). What are your thoughts on a signal vs a turbo roundabout at this location and do you know if they are correct about Duke not allowing signal poles at this location?

Regards,

Sean Brennan, PE

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Subject: [External] Lake Wheeler Intersection with Carolina Pines Ave

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Sean,

Here is the info sent this morning.

I will send the other info that was sent to the wrong email address.

Sorry about that.

Thank you,

Amy

Amy Billings, PE

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1. 2020 06 30 Revised Memo Intersection Lake Wheeler Rd.pdf

Type: application/pdf
Size: 494 KB (506,673 bytes)

Subject: Carolina Pines Avenue Street Improvements

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Overview

The proposed roadway improvements of Carolina Pines Ave. from Lake Wheeler Rd. to South Saunders St. includes a 2-lane undivided curb and gutter roadway with amenities for bicycles and pedestrians. Traffic calming measures consisting of horizontal deflections will be implemented to help control travel speeds in the corridor. Two full size roundabouts (RABTs) and one mini- RABT are proposed in the corridor.

Purpose

The purpose of the project is to improve mobility and safety in the corridor.

Context

Carolina Pines Ave

Carolina Pines Ave. is a –two-lane roadway with turf shoulders. This city-owned facility has a 60-foot right-of-way. Adjacent development is primarily residential with several churches along the corridor. Raleigh transit operates in the corridor. Carolina Pines Avenue crosses an earthen dam that forms Carolina Pines Lake. Norfolk southern owns and operates a rail line that crosses Carolina Pines Avenue near Suffolk Avenue.

The Average Annual Daily Traffic (AADT) of Carolina Pines Avenue in 2019 is 3,300 vehicles per day (vpd). Traffic volumes are expected to reach 4,400 vehicles per day (vpd) by the year 2045. The speed limit along Carolina Pines Avenue is 35 miles per hour (statutory).

Lake Wheeler Road

Lake Wheeler Road in the project vicinity is a two-lane roadway with turn-lanes. The posted speed limit is 35 miles per hour (mph) and traffic volumes are expected to reach 19,000-22,000 vpd by year 2045. Adjacent development is a mix of residential, multi-family, and commercial.

The City of Raleigh completed a Draft Corridor Study for Lake Wheeler Rd. in October, 2013. Following the completion of the Corridor Study, the Raleigh City Council amended the Raleigh 2030 Comprehensive Plan to re-classify the facility. There was concern regarding the Edmisten House (located on the northeast corner of the Lake Wheeler Road/Sierra Drive intersection) and its recent addition to the National Register of Historic Places in February 2005. Any widening on Lake Wheeler Road to avoid the historic property would be asymmetrical, resulting in displacement of many residents and acquiring additional R/W. NCDOT was not part of these discussions at the time but is unlikely to initiate a project to widen the road without support from the City. Subsequently, the City of Raleigh implemented infrastructure improvements consisting of the addition of turn lane and sidewalk connections on the west side of Lake Wheeler Road.

Lake Wheeler Road/Carolina Pines Avenue Intersection Alternatives

The following information provides the data to aid the decision-making process for the Lake Wheeler Road / Carolina Pines Avenue intersection. The project begins at the Lake Wheeler

Road / Carolina Pines Avenue intersection which is located between I-40 and Tryon Road in south Raleigh. More specifically, it lies between the signalized intersections of I-40 eastbound ramps (approximately 1,300 feet to the north) and Sierra Drive (approximately 800 feet to the south).

General Intersection Roadway Information

	Owner	Classification	Approach leg(s)	Lanes	ADT (2045)	Intersection Control	Posted Speed Limit
Carolina Pines Ave	City of Raleigh	Avenue 2-Lane, Undivided Major Collector (NCDOT Classification)	Westbound	L-T-R	4,400	Stop sign	None (Statutory 35 mph)
Lake Wheeler Road	NCDOT	Minor Arterial Avenue 2-Lane, Undivided (City of Raleigh Classification)	Northbound	T-R	22,000	None	35 mph
			Southbound	T & L	19,000		

Intersection Design Development

The results of the traffic analysis for the minor approach (Carolina Pines Avenue) in 2019 is LOS F for both the AM and PM peak hours. Several intersection design alternatives were developed to remedy the failing traffic operations at this location. The alternatives developed include:

- 1) Traffic Signal Installation – A Traffic Signal Warrant Analysis was performed at this location. Based on current (2019) traffic volumes, 3 out of 4 applicable traffic signal warrants were satisfied.
- 2) Traditional Roundabout – A circular RABT with a southbound (SB) bypass lane for through traffic.
- 3) Turbo Roundabout – An innovative circulatory treatment with a physical barrier to separate SB left-turning vehicles from the SB through vehicles. (See Visualization) [..\2020 05 28 RABT Visualization\CPA Animation - 200528.mp4](#)

A Comparison Matrix for the design alternatives follows:

Comparison Matrix

Evaluation Factor	Signalized Intersection (Alt 1)	Traditional Roundabout (Alt 2)	Turbo Roundabout (Alt 3)
2045 LOS (AM /PM) Assigned value for PM*	B / C 3	B / B 2	B /D 4
Comparative R/W Impacts (Low 1 → 3 High)	1	3	2
Initial Cost (Low 1 → 3 High)	1	3	2
Comparative Safety Risk (Low 1 → 3 High)	2	3	1
ADA Compliant x-walks (Compliant = 0; Non-compliant = 5)	5	0	0
Duke Policy: No signal poles in transmission easement (Compliant = 0; Non-compliant = 5)	5	0	0
NCDOT Standard: Min. distance between signals = 1,200 FT. (Compliant = 0; Non-compliant = 5)	5	0	0
Access to Lawrence Dr (Limited = 2; Full = 1)	1	2	1
Access to Grocery Boy Jr. (Limited = 2; Full = 1)	1	2	1
Citizen Support (High 1 → 3 Low)	3	2	1
Historic Property Impacts (Rufus and Linda Edmisten) (Low 1 → 3 High)	1	2	1
Vehicular Queuing S/B Lake Wheler Rd. (Low 1 → 3 High)	3	1	2
TOTALS	31	20	11

*LOS A = 1, LOS B = 2, LOS C = 3, LOS D = 4, LOS E = 5, LOS F = 6

Conclusions and Recommendations

Based on all the evaluation factors included in the above matrix, the Turbo Roundabout, Alternative 3, is recommended for implementation. *Although this alternative shows a LOS of D in the PM peak hour in year 2045, LOS D is considered “acceptable” and is just one hour out of 24 hours per day. This alternative has the added benefit of minimal impacts to the surrounding property owners, surrounding business, adjacent cross street (Lawrence Ave.), avoids impacts to the historic property, is compliant with NCDOT spacing requirements for signalized intersections, and is preferred by Duke Transmission over adding traffic signal poles in their easement. There has also been strong support for the RABT during previous citizen engagement periods.*