



NORTHEAST OHIO AREAWIDE COORDINATING AGENCY

MEMORANDUM

TO: Mayor Kevin Hurst, Village of Walton Hills

FROM: Josh Naramore, NOACA

DATE: November 3, 2014

RE: Alexander Road and Northfield Road Intersection Recommendations

The Village of Walton Hills recently approached NOACA staff to request technical assistance to develop operational improvements at the intersection of Alexander Rd and Northfield Rd. Northfield Road is a state facility and Alexander Road is a County facility. The recent opening of the Hard Rock Rocksino in Northfield Park is just south of this intersection and across the county line into Summit County. Village staff believes this has led to an increase of traffic at this intersection as well as an increase in traffic violations and crashes at the intersection. The Village has increased the funding of police personnel at this intersection to help alleviate ongoing traffic issues, particularly as they relate to special events, but this is not a long-term solution.

Mayor Kevin Hurst requested NOACA staff assistance to identify low-cost, short term operational improvements that can be made at this intersection. The Village has a potential funding source in both the soon-to-be-closing Ford Plan on the southeast corner of the intersection and the owner of the Rocksino. NOACA staff conducted an operational field review at the intersection of Alexander Road and Northfield Road on Wednesday, October 1, coordinated with Cuyahoga County Department of Public Works (CCDPW) and ODOT District 12 staff.

The following summarizes the issues identified from observed traffic conditions and relevant transportation data at the intersection and make recommendations for low-cost improvements to improve intersection operations and safety

Reported Issues

- Recent crashes
- Pedestrians crossing Alexander Rd during busy events
- Pedestrians crossing Alexander Rd to/from bus stops
- Special event traffic during Thursday, Friday, and Saturday evenings until 10pm

- Dislike of industrial feel; beautification is desired.

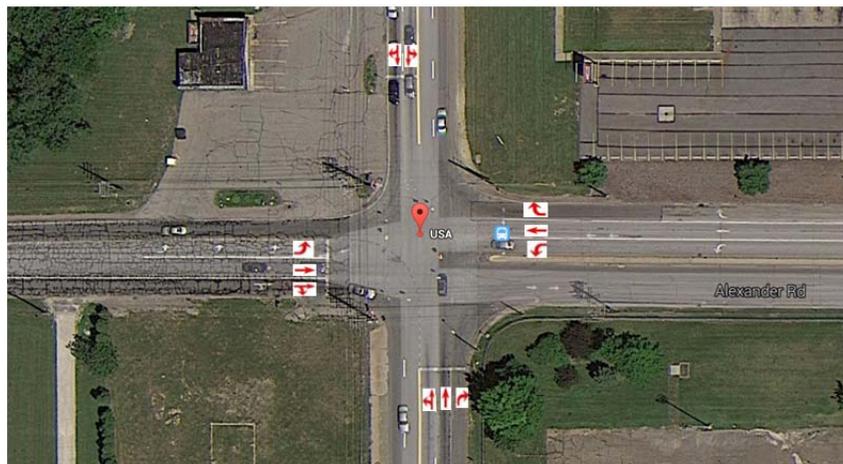
Recommendations Summary

Below is a summary of the recommendations, in order of cost. Options 5 and 6 are only recommended if the signal timing plan adjustment and vehicle detection repair/upgrade do not resolve the operational issues. The costs are planning level estimates and may change as more detailed design is undertaken.

Recommendation	Approximate Cost
1. Signal timing plan adjustment	Coordinate with GPD & CCDPW
2. Repair westbound loop detectors	\$3,000
3. Pedestrian signals & pushbuttons	\$15,000-\$20,000
4. Non-intrusive Vehicle Detection	\$10,000-\$20,000
5. Widening NE corner & reconfiguring lanes	\$70,000
6. Full intersection widening	\$250,000

Intersection Characteristics

	Alexander Rd (C-121) E/W	Northfield Rd (OH-8) N/S
<i>Road Classification</i>	-Urban Principal Arterial, west of intersection -Urban Minor Arterial, east of intersection	-Urban Minor Arterial, south of intersection -Urban Principal Arterial, north of intersection
<i>Pavement Condition (PCR)</i>	62 (west), 52 (east)	81
<i>ADT</i>	8,448 (west), 12,490 (east) [2013 data]	11,920 (north), 17,870 (south) [2010 data]
<i>% Trucks</i>	4.5% (west), 10% (east)	6% (north), 5% (south)
<i>Posted Speed</i>	35 mph	35 mph
<i>Speeding</i>	7% driving 41 mph or more	



The eastbound approach has a pavement width of approximately 50' consisting of one EB and WB through lane, one EB left-turn lane, one EB right turn lane, and a stop bar recessed 40' from

the southbound curb lane. The westbound approach has a pavement width of approximately 66' consisting of one WB through lane, one WB right-turn lane, one WB left-turn lane, two EB through lanes, and a stop bar recessed 30' from the SB curb lane. The southbound approach is approximately 50 wide and consists of two SB through lanes, one shared left-turn and through lane, one through lane, one right-turn lane, and a stop bar recessed 40' from the EB curb lane. The northbound approach is 40' wide and consists of two southbound through lanes, two northbound through lanes, and a stop bar recessed 80' from the WB curb lane.

The stop bar for the southbound approach is unusually far away from the intersection to accommodate large trucks turning right from westbound Alexander Rd. This lengthens the amount of time for stopped southbound vehicles to clear the intersection, causing this phase to be relatively inefficient. The northbound and southbound left-turn lanes have a negative offset, which is undesirable for visibility of drivers completing left-turn movements.

Crash Data

Five years (2009 through 2013) of crash data was compiled using ODOT's GIS Crash Analysis Tool (GCAT). There were 51 total crashes for all five years. None of the crashes were fatal, and 11 were injury crashes. This intersection is not on ODOT's 2013 Safety Priority List for Urban Intersections. However, this crash data likely does not capture any issues that have arisen since the Rocksino's opening in late December of 2013.

Existing Volumes & Signal Phasing

Manual turning movement counts were conducted on September 30, 2014 during AM and PM peak periods. According to this count and observation, routine commuter traffic is not an operational issue. The existing intersection geometry and signal phasing provide adequate capacity. Vehicles are able to proceed through the intersection with one signal cycle, and there is no queueing.

Screenline 24-hour vehicle classification counts from 2010 and 2013 show high percent of heavy vehicle traffic, ranging from 5% to 10% on each approach.

Start Time	Alexander Rd Eastbound				Alexander Rd Westbound			
	Left	Thru	Right	Peds	Left	Thru	Right	Peds
730a-830a	206	335	50	0	130	265	37	1
445p-545p	92	277	121	0	237	342	40	4

Start Time	Northfield Rd Northbound				Northfield Rd Southbound			
	Left	Thru	Right	Peds	Left	Thru	Right	Peds
730a-830a	45	594	261	0	17	170	60	0
445p-545p	124	256	221	1	45	523	157	8

All four approaches have one 5-section signal head and one 3-section signal head, allowing protected left-turn phasing. The signal controller is eight phases and dual ring, and can accommodate four pedestrian phases. The controller diagram indicates that the original signal

phasing scheme utilized all 8 phases to allow leading protected left phases for all approaches. A supplemental controller timing sheet was placed in the controller cabinet in August of 2012 showing a six phase cycle where EB and WB have leading protected left phase (if vehicles are detected in the left-turn lanes), and NB and SB operate independently as split phases. Intersection observation and controller cabinet inspection showed that the WB loop detectors are not functioning, and have been disconnected from the controller. To compensate for this, the WB phases are on automatic recall.

	Phases							
	1	2	3	4	5	6	7	8
	NB	SB	WB LT	EB			EB LT	WB
Min Green	10	10	5	10			5	10
Yellow	4	4	3.6	4			3.6	4
Red	3	3	2	3			2	3
Max Green	50	50	45	35			25	45

Overall, the identified issues for this intersection include

- Malfunctioning loop detectors causing signal inefficiency and limiting phasing options
- Transformer utility poles very close to curb returns, making implementation of intersection improvements that would adequately accommodate large truck turns more difficult
- NB stop bars recessed unusually far back, decreasing the efficiency of green time
- NB and SB left turners are negatively offset, inhibiting sight distance
- No pedestrian accommodation

Signal Operation Solutions

Weekday AM and PM Operation

Split phasing is not the most efficient phasing type for this intersection. A benefit of split phasing applicable to this intersection is providing additional roadway space for heavy vehicle turn movements. In addition, the automatic recall for WB movements contributes additional inefficiency.

The phasing could be adjusted to improve efficiency of the signal. Specifically, the AM and PM peak southbound left-turn volume is not high enough to justify a protected southbound left-turn phase, and NB peak volumes could benefit from a protected/permissive left turn phase. In the absence of a SB protected left turn phase, vehicles wishing to turn SB left slowly move past the stop bar while waiting for an acceptable gap in NB traffic. Vehicles that are not able to make the SB left turn will be stopped far ahead of the stop bar, potentially impeding the ability of WB trucks to turn right. However, this is an existing condition, and will not be made worse by adding an exclusive NB left-turn phase. Impacts to large truck EB and WB right turn movements should be monitored after implementing simultaneous NB and SB phasing. Staggering the stop bars on all approaches will further improve efficiency by moving stopped vehicles in the curb lanes closer to the intersection, while still allowing additional space in the inner lanes for right-turning trucks.

An option to consider to increase the likelihood of clear space on the SB approach for WB right-turning trucks during weekdays is to operate the SB turn arrow. This could be done from 7a until 3p, when the NB left-turn demand begins to increase before the PM peak period.

In addition to these signal phasing recommendations, pedestrian traffic should be accommodated by installing pedestrian signals and pushbuttons, for an approximate cost of \$15,000-\$20,000. The existing signal cabinet is pole mounted; in some cases it is necessary to upgrade to a ground mounted signal cabinet (in addition to the cost above) in order to accommodate the additional pedestrian signal equipment.

Special Event and Off-Peak Operation

Addressing the traffic issues typically experienced before/after special events will require additional turning movement data collection during these times. With this data, an actuated timing plan could be developed to provide operational improvement for special event traffic that is active only during days/times of special events (e.g., Thursday, Friday and Saturday evenings). During off-peak times, simultaneous phasing, without protected left-turns, for NB and SB is recommended.

All approaches of the intersection currently have inductive loop detection, which tends to lack durability on roadways with heavy volumes and poor pavement condition. All detectors are functioning, except the WB detectors. This detection malfunction prevents the signal from being fully actuated. A short-term, low-cost solution to restore the signal to being fully actuated is to repair the WB loop detectors for a cost of approximately \$3,000.

In the long term, installing non-intrusive vehicle detection will be more reliable. Cuyahoga County and ODOT D12 recommend the purchase and installation of non-intrusive detection for all approaches. Durable, low-maintenance options include radar and infrared detection with a cost range of \$10,000-\$20,000 per intersection; ODOT and Cuyahoga County have experience using both types. Loop detection is not recommended for this intersection because it lacks durability on roadways with high heavy vehicle volumes and poor pavement condition. Video detection can be problematic in poor weather.

Pavement Marking and Widening Solutions

Widening at the intersection on Northfield Rd for NB and SB left-turn lanes would allow use of protected-permitted left-turn phasing. Existing, major electric transmission poles are very close to the intersection (approximately 5', 7', 10', and 13' per Google Maps), and would need to be relocated for widening. This will increase the cost of widening. Further analysis is needed to provide an estimate on the cost to relocate utility poles.

A 3-lane section (one thru lane in each direction, with a center turn lane) was considered for Northfield Rd, but the northbound and southbound thru volumes were counted and observed to be too high for this to be desirable in peak hours. In addition, a 3-lane section would make it difficult for passenger vehicles to pass large, slow-moving trucks, and potentially cause difficulty for trucks turning right from Alexander Rd to Northfield Rd.

Overall, the long-term recommendation is to observe the impact of the short-term signal phasing and detection improvements. If these are not effective or introduce other operational problems, intersection widening for NB and SB left turn lanes is recommended. Intersection improvements should also include closure of redundant driveway on the NW property, and installation of sidewalks and curb ramps for bus stop and special event access by pedestrians. If the northbound right-only lane is converted to a shared through/right lane, widening is only needed on the northeast corner to provide two through lanes and one exclusive left-turn lane for both NB and SB traffic. The approximate cost of intersection widening is \$70,000.