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Subject: Scioto Street Safety Study

The goal of this study was to assess the pavement markings and signage and perform crash analysis along Scioto Street (US 36) from Locust Street to the SR 29/US 36 split in Urbana, Ohio. ODOT is resurfacing this segment of Scioto Street as part of the ODOT Urban Resurfacing Program. The striping changes and additional signage recommendations from this study will be included in the paving plans with the goal of mitigating crashes along Scioto Street.

Roadway Conditions

Scioto Street is a minor arterial with a speed limit of 35 mph. Scioto Street is two-way two-lane roadway between Locust Street and E Lawn Avenue with on street parking on both sides of the street. Scioto Street between E Lawn Avenue and SR 29 is a two-way four-lane roadway with a two-way left-turn lane (TWLTL) in the center. There is no on-street parking on this section of Scioto Street. Mercy Health Urbana Hospital is located on the eastern side of the study area with two driveways located on Scioto Street. Sidewalks are present along both sides of the entire study area. The existing conditions diagram showing the existing signage along Scioto Street is provided in **Attachment 1**.

Crash Analysis

Crash data from January 1, 2017 through December 31, 2019 was obtained for the study area using ODOT's GIS Crash Analysis Tool (GCAT) and analyzed using the Crash Analysis Module (CAM) Tool. The crash reports were opened and reviewed to verify to location of the crash and the crash type. A collision diagram that shows crash patterns by illustrating the approximate location of each reported crash is provided in **Attachment 2**. The output for the CAM tool is provided in **Attachment 3**. There were a total of 142 crashes with 28 (20 percent) resulting in injury. There were no fatalities in the study area and two serious injuries. **Figure 1** shows the crash frequency by year and severity. Both property damage only and injury collisions decreased significantly from 2018 to 2019.

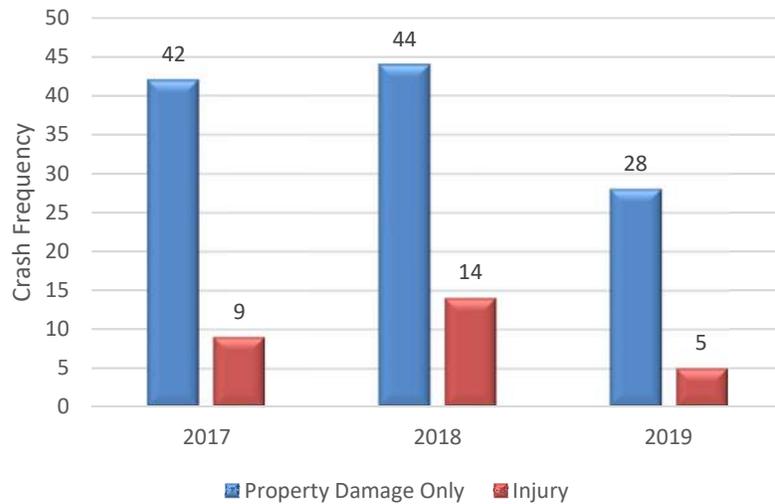


Figure 1: Crash Frequency by Year and Severity

Figure 2 shows the crash breakdown by hour of the day. The highest crash frequency peak occurred between 4:00 PM and 6:00 PM (44 crashes).

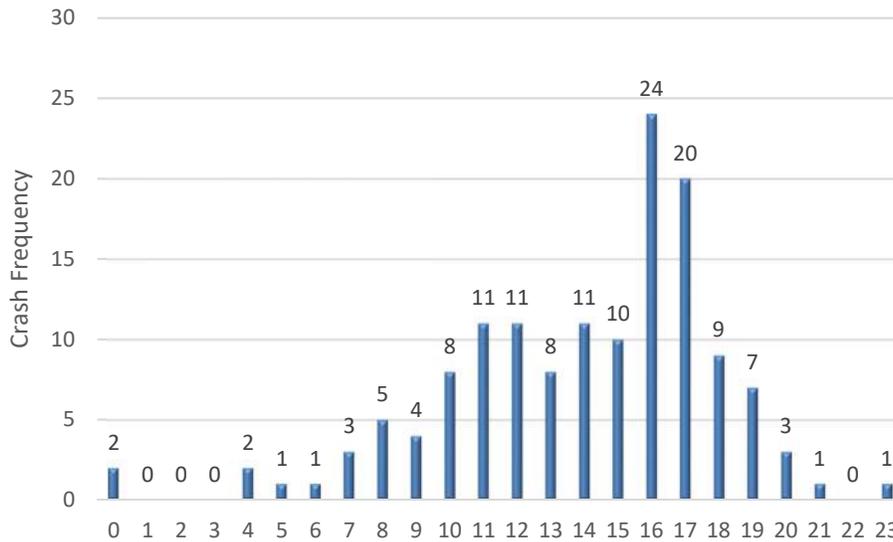


Figure 2: Crash Frequency by Hour of the Day

Figure 3 shows the crashes in the study area by crash type. Rear end collisions were the most prevalent crash type along Scioto Street (38 percent). 17 out of the 54 rear end collisions resulted in injury (31 percent). The crash patterns at each location along Scioto Street will be described in more detail in the following section.

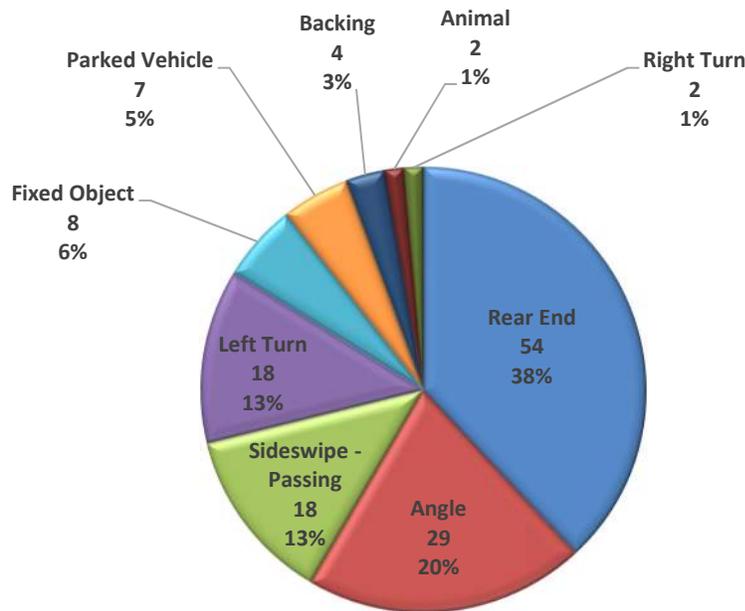


Figure 3: Crash Frequency by Crash Type

Locations for Improvement

The existing conditions and potential improvements for each location along the corridor is detailed below. Detailed layouts of the potential improvements are shown in **Attachment 4**. The corresponding page number for each location is included below.

Locust Street (Page 1)

Existing Conditions

- The channelizing line for the westbound left-turn is worn and faded (**Photo 1**) which indicates some path overlap because of the lane alignment through the intersection.
- One fixed object collision was related to the intersection. This crash occurred when a semi-truck attempted to turn left into the south leg of the intersection and struck the building on the southeast corner.

Potential Improvements

- The westbound left-turn lane at Locust Street will be aligned with the pavement markings to the west.



Photo 1: Faded Channelizing Line at Locust St

Kenton Street (Page 2)

Existing Conditions

- Due to the tight radius of the eastbound right-turn and the narrow roadway, it is difficult for turning vehicles to avoid vehicles waiting at the stop bar on the south leg (**Photo 2**) of the intersection.
- Four rear end collisions occurred on the westbound approach, likely as a result of vehicles slowing or stopping in the through lane to turn left onto Kenton Street.
- Fixed object collisions were also a common crash type at this intersection. Two crashes occurred when vehicles struck signal poles and one crash occurred when a vehicle struck the building on the southwest corner.



Photo 2: South Leg of Scioto St and Kenton St

Potential Improvements

- Add left-turn lanes on both the eastbound and westbound direction. Adding these turn lanes would take away 97 feet of parking, which equates to approximately 4 parking spots on the east leg of the intersection. Parking would be unaffected on the west leg of the intersection.
- Relocate the stop bar on the south leg to be farther from the intersection and restrict right-turns on red on the northbound approach.
- While not part of the upcoming resurfacing project, adding backplates on all signal approaches is proposed to improve signal visibility.

Happersett Street (Page 3)

Existing Conditions

- When eastbound traffic is waiting to turn left on Scioto Street, vehicles are passing on the right due to the wide lanes.
- The main crash pattern at this intersection was westbound rear end collisions. This pattern is likely related to the queue that occasionally forms behind vehicles waiting to turn left onto Happersett Street (**Photo 3**).

Potential Improvements

- One potential alternative involved converting Happersett Street and Kenton Street to one-way streets. This alternative was dismissed so to not disrupt driver familiarity with the current roadway network and because Locust Street (directly to the west) is already one-way southbound.
- Another presented alternative involved adding signing on Scioto Street preventing left-turns onto Happersett Street. These vehicles would then be able to turn left at the Kenton Street signal. This



Photo 3: Queued Vehicles on Westbound Scioto St

alternative is not recommended due to the high volume of vehicles turning left and the low predicted driver compliance to the restriction without continuous enforcement.

- The preferred option at this intersection is to add a westbound left-turn lane at Happersett Street. Adding the left-turn lane would eliminate 330 feet of parking or approximately 14 parking spots on the north side of Scioto Street.

Sycamore Street (Page 4)

Existing Conditions

- Similar to Happersett Street, when eastbound traffic is waiting to turn left on Scioto Street, vehicles are passing on the right due to the wide lanes.
- One sideswipe collision occurred at this intersection when a westbound vehicle moved to the right side of Scioto Street in preparation to turn onto Sycamore Street but decided not to turn and moved back into the center of Scioto Street.

Potential Improvements

- Add an eastbound left-turn lane. This would eliminate 250 feet of parking or approximately 11 parking spots on the south side of Scioto Street.

E Lawn Avenue (Page 6)

Existing Conditions

- It has been observed that some vehicles unfamiliar with the area (especially trucks) are not aware that the westbound right through lane becomes a right-turn only lane (**Photo 4**), so they abruptly change lanes before the intersection.
- Overall the pavement markings are misaligned through the intersection on Scioto Street, creating path overlap.
- The main crash pattern at this intersection is rear end collisions on the eastbound approach (four crashes).



Photo 4: Westbound Approach at E Lawn Ave

Potential Improvements

- Re-align pavement markings on both sides of the intersection.
- Extend the channelizing line for the westbound right-turn lane to the intersection of Patrick Avenue.
- Add a “Right Lane Must Turn Right” sign on the westbound approach.
- The following improvements are proposed to improve safety but not as part of the resurfacing project:
 - Add pedestrian signal heads and push buttons on the east leg.
 - Add backplates on all signal approaches to improve signal visibility.

Patrick Avenue (Page 6)

Existing Conditions

- “Right-Turn Only” signage used to be at Patrick Avenue, but drivers still turned left out of Patrick Avenue.
- Some vehicles were observed to experience delays while waiting for a gap in traffic along Scioto Street to turn left out of Patrick Avenue. This delay caused many drivers to accept smaller, less desirable gaps when turning left.
- Two angle collisions occurred at Patrick Avenue. These collisions both occurred between vehicles turning right from Patrick Avenue and vehicles turning left out of the driveways across the street.

Potential Improvements

- A channelizing island is recommended at this location to prevent vehicles from turning left out of Patrick Avenue. Left-turning vehicles would be rerouted to the south to Water Street. While the current left-turn volume is relatively low, a senior center is being constructed on Patrick Avenue which will increase vehicle traffic on Patrick Avenue, thus increasing conflicts along Scioto Street and making this option desirable to improve safety.

Jefferson Avenue (Page 7)

Existing Conditions

- This intersection had the highest crash frequency in the study area (29 crashes). There were various angle crashes, rear ends and sideswipe collisions occurring at the intersection but no clear crash patterns.

Potential Improvements

- While not part of the upcoming resurfacing project, adding backplates on all signal approaches is proposed to improve signal visibility.

Scioto Street between Jefferson Avenue and Ames Avenue (Page 8 and 9)

Existing Conditions

- Many drivers ignore the porkchop in the McDonald's driveway and turn left in and out of the driveway on Scioto Street (**Photo 5**).
- The striping of the TWLTL at the Pizza Hut driveway can be confusing to drivers as they attempt to turn left due to its close proximity to the westbound left-turn lane at Jefferson Avenue.
- The majority of crashes in this section of Scioto Street are related to various driveways along this section of Scioto Street. It can be difficult to accurately judge gaps in traffic due to the many vehicles entering and exiting the road from differing locations.



Photo 5: Vehicle Turning Left Out of McDonald's

- Four left-turn collisions occurred at the center driveway into Wendy's.

Potential Improvements

- The following improvements are proposed to improve safety but not as part of the resurfacing project:
 - In order to solve the access management issues along Scioto Street, in the long-term an access management study is recommended to determine what driveways can be closed or if there is a possibility of constructing a backage road.
 - When new developments build in the area, they should comply with access management rules set by the City of Urbana.
 - Add backplates on all signal approaches of the Scioto Street and Finch Street signal.

Ames Avenue (Page 10)

Existing Conditions

- Two left-turn crashes occurred at Ames Avenue when a westbound left-turning vehicle failed to yield to a vehicle traveling eastbound in the right lane. These are likely due to vehicles waiting to turn left being waved on by a vehicle traveling the opposite direction. The vehicle then turns and collides with a vehicle in the free-flowing adjacent lane.

Potential Improvements

- A “painted nose” is recommended on the TWLTL on the west leg so vehicles turning left into the Mercy Health Urbana Hospital won’t drive through the westbound left-turn lane into Ames Avenue.

SR 29 (Page 11)

Existing Conditions

- At the eastern hospital entrance on Scioto Street, vehicles are delayed when turning left into the hospital since queued vehicles block the entrance (**Photo 6**).
- As some vehicles were turning left from SR 29, they were observed crossing into the TWLTL on the west leg (**Photo 7**).
- The main crash pattern at this intersection is north-westbound rear-end collisions on SR 29 as vehicles are approaching the signal. This is likely related to queuing on this leg of the intersection and inattentive drivers.



Photo 6: Queued Vehicles Blocking Driveway



Photo 7: Northwest Left-Turning Vehicle Path

Potential Improvements

- Add a “Right Lane Must Turn Right” sign on the eastbound approach.
- Add a channelizing line on the west leg between the through and right-turn lane.
- Re-stripe the eastbound TWLTL as an exclusive left-turn lane
 - Stagger the left-turn lane stop bar to prevent path overlap for left-turning vehicles.
- Add dotted pavement markings for northwest left-turning vehicles from SR 29 to indicate the appropriate path to drivers.
- Move the stop bar on the east leg upstream of the eastern hospital drive.
 - The initial stop bar will stay where it is with the addition of the new stop bar. Pavement markings and a sign will indicate that vehicles cannot block the intersection.
 - A sign on the east leg will indicate that vehicles traveling westbound have to stop at the “new” eastern-most stop bar.

- While not part of the upcoming resurfacing project, adding backplates on all signal approaches is proposed to improve signal visibility.
- In the long-term, the recommendation is to signalize the east hospital drive and add an eastbound left-turn signal phase.

Alternative Analysis

Capacity analysis was performed on the following alternatives at the intersection of Scioto Street and SR 29. Synchro output is provided in **Attachment 5**.

- **Alternative 1** – The westbound stop bar was moved upstream of the hospital driveway. This added two additional seconds of red time.
- **Alternative 2** – The westbound stop bar was moved upstream of the hospital driveway and the hospital drive was signalized. The northwest bound (SR 29) and southbound (hospital drive) movements were run as split phased.

All approaches for the existing condition and Alternative 1 are operating at LOS D or better. In Alternative 2, all approaches are operating at LOS D or better except for the northwest left-turn movement which is operating over capacity ($v/c=1.04$), likely because of the split phased operation.

There was concern that by moving the east stop bar upstream of the hospital drive would result in the westbound queue backing up through the intersection of Scioto Street and Berwick Drive. The intersection of Scioto Street and Berwick Drive is approximately 165 feet east of the hospital drive. **Table 1** shows the 95th percentile queue lengths for the westbound movement at Scioto Street and SR 29. Based on this analysis, the westbound queue during the PM peak of Alternative 2 may back up to Berwick Drive. Even so, this backup would only occur during a few cycles of the PM peak hour, not during every cycle.

Table 1: Westbound Queues on Scioto Street at SR 29

		95th Percentile Queue
Existing	AM	110'
	PM	130'
Alternative 1	AM	105'
	PM	145'
Alternative 2	AM	115'
	PM	160'

Cost Estimates

The following items were included in the cost estimates:

Resurfacing

- Additional signage
- Median at Patrick Avenue

Additional Improvements

- Backplates (Existing signals are assumed to support the addition of backplates)
- Pedestrian signal heads and push buttons for the east leg of E Lawn Avenue
- New signal at SR 29 and US 36

Table 2 shows the cost estimate for both the resurfacing project costs and the additional safety improvements. Costs that will be covered in the ODOT Resurfacing Project (such as striping) are not included. The design costs and construction contingency for the new signal at SR 29 and US 36 is included in the cost estimate. These costs are detailed in **Attachment 6**.

Table 2: Cost Estimates

Improvement	2020 Construction Costs
Resurfacing Costs	\$ 8,300
Additional Improvements	\$ 228,000