Feasibility Study Report

February 2018

FRA-161-5.77

PID No. 101775

Prepared For:

The Ohio Department of Transportation

District 6

400 East William Street

Delaware, OH 43015

Prepared By:

4700 Lakehurst Court, Suite 110

Columbus, OH 43016

Table of Contents:

List of Exhibits:

Appendices:

Executive Summary

SR 161 is an east-west corridor that runs parallel to, and just south of, the I-270 North Outerbelt, in northern Franklin County. Other than I-270, SR 161 is the only continuous east-west arterial that crosses both the Scioto and Olentangy Rivers. This section of the corridor from Sawmill Road to Olentangy River Road is mostly a two-lane, undivided roadway that connects the City of Dublin to the City of Worthington, while also encompassing the City of Columbus and Perry Township.

This area experienced significant development growth in the late 1980s and 1990s, precipitating study and discussion of SR 161 corridor improvements. In 1988, the City of Worthington's Comprehensive Plan Update acknowledged that future widening of SR 161 would likely occur, while the 2005 update indicated Worthington should limit any widening to three lanes. In 1991, the City of Columbus Department of Development identified the widening of SR 161 as a regional priority in the Northwest Plan. Subsequent studies of the corridor have evaluated the feasibility of improvements, including widening and grade separation of the railroad crossing. However, these previous studies identified improvements that were unable to be funded and/or did not receive enough support from the public or government agencies to move beyond the analysis stage. In 2016, the Ohio Department of Transportation (ODOT) initiated a feasibility study of the SR 161 corridor between Sawmill Road and Olentangy River Road to develop a strategy for improvements that are constructible and manageable from a funding perspective.

The purpose of the project is to improve vehicular and pedestrian mobility in the SR 161 corridor. Conceptual alternatives were developed to address the primary and secondary needs identified by the Advisory Committee. The primary needs include reducing vehicular delay in the SR 161 corridor, especially at the SR 161 & Linworth Road intersection, improving access to and from driveways and side streets along the corridor, addressing identified rear-end crash problems and improving pedestrian connectivity and walkability in the corridor. Secondary needs for addressing mobility in the corridor include reducing delay at the railroad crossing west of Linworth Road and improving cycling facilities' quality and connectivity.

During the progression of the study, it was determined that the entire corridor should be broken down into four logical pieces for alternative development and evaluation. Alternatives within each section were developed to function independently, allowing for a combination of alternatives to be evaluated. The alternatives identified for evaluation included an enhanced 2-lane with minor improvements, a 3-lane and 5-lane alternative, both with and without a railroad grade separation, intersection alternatives for Linworth Road and overpass and underpass alternatives at the railroad crossing. All alternatives included different combinations of pedestrian and bicycle facilities. The corridor was broken down as follows:

- **CW** = Corridor West – Sawmill Road to Aeros Drive (CW1-CW7)
- **RR** = Railroad corridor - Aeros Drive to Hutchinson Street (RR1-RR7)
- **LI** = Linworth Intersection – Hutchinson Street to Strathaven Drive (LI1-LI5)
- **CE** = Corridor East – Strathaven Drive to Olentangy River Road (CE1-CE4)

The alternatives were evaluated based on their ability to meet the primary needs of the project, right-of-way impacts (impacts to drives, land, and buildings) and a combination of construction and right-of-way costs.

The traffic analysis conducted for the corridor determined that the severe congestion and long queues at the Linworth Road intersection occurs daily and is present even if a train has not crossed SR 161. While the presence of a train certainly can create longer queues, it is not the root cause of the congestion. Split signal phases, left turning vehicles and the hump at the railroad crossing were identified as the contributing factors for the congestion. Planning level traffic forecasts were developed for the corridor using the methodology presented in NCHRP Report 255/765. Traffic forecasts for the 3-Lane alternatives indicated approximately 4% more through volumes along the SR 161 corridor compared to the No-Build. With the additional capacity provided by the second through lanes in the 5-Lane Alternative, the SR 161 corridor becomes a more attractive route. 2040 traffic forecasts along the SR 161 corridor for the 5-Lane Alternative are approximately 25% higher than the 3-Lane Alternative. The 3-Lane and 5-Lane alternatives will both adequately address the capacity concerns along the SR 161 corridor and both will provide a significant improvement to the biggest capacity concern, which is the Linworth Road intersection. The 5-Lane Alternative has lower delays at the signalized intersections than the 3-Lane Alternative, however, the higher traffic volumes in the 5-Lane Alternative offset most of the capacity benefits, resulting in traffic operations that are only marginally better than the 3-Lane Alternative. For the Linworth Road intersection, a traditional traffic signal with left- and right-turn lanes was found to have fewer impacts to adjacent property than alternatives such as roundabouts and a Superstreet concept.

The public involvement approach for this project included sending property owner notification letters, creating and updating a study fact sheet, forming an Advisory Committee, and holding a public meeting. The study team formed an Advisory Committee with members from each of the jurisdictions and neighborhood groups along the corridor. The Advisory Committee's role was to inform the study team and advise the decision-makers. Six meetings were conducted for the Advisory Committee between August 2016 and July 2017. An open-house style public meeting was held on June 6, 2017 at Thomas Worthington High School from 5:00 to 7:00 p.m. Attendance at the public meeting totaled 185, including 162 members of the public and 23 representatives of the funding partners and project team.

Recommendations

The overall corridor consists of areas with different characteristics, however certain aspects are recommended throughout. These are included as part of the *CW2, RR1, LI1-3L-2* and *CE2* options and include:

1. Roadway
1. Include a center two-way-left-turn (TWLT) lane throughout.
2. Add needed left- and right-turn lanes at the intersection with Linworth Road.
3. Align opposing lanes at Linworth Road intersection and eliminate the existing split signal phase.
4. Add targeted left- and right-turn lanes at spot locations as identified by traffic analysis.
5. Extend the existing, second eastbound through lane from Sawmill Road to Federated Blvd.
6. Extend the existing, second westbound through lane from Olentangy River Road, with length of extension to be evaluated.

2. Shared Use Path (SUP):
1. At western end, the SUP begins on the north side to meet up with the path at Sawmill Road.
2. Cross the path to the south side at some point between Federated Blvd. and Brookdown Road. Evaluate the appropriate location for the crossing during implementation along with a traffic or pedestrian signal.
3. SUP on the south side from its crossing location to Olentangy River Road.

3. Sidewalk:
1. Sidewalk proposed on the north side beginning where the SUP crosses to the south.
2. During implementation, an evaluation should be performed section-by-section to determine where to include the sidewalk and where to omit it based upon jurisdictional requirements, regulations and more detailed impact information.

4. Railroad Crossing:
1. Improve the roadway profile at the railroad crossing to allow for vehicles to safely cross at the legally posted speed, thus improving the traffic flow.

I. Introduction/Background

SR 161 is an east-west corridor that runs parallel to, and just south of, the I-270 North Outerbelt, in northern Franklin County. Other than I-270, SR 161 is the only continuous east-west arterial that crosses both the Scioto and Olentangy Rivers. This section of the corridor from Sawmill Road to Olentangy River Road is mostly a two-lane, undivided roadway that connects the City of Dublin to the City of Worthington while also encompassing the City of Columbus and Perry Township.

The corridor has been studied many times over the last two decades. Relevant studies include the ODOT Stage 1 Report SR 161 Highway Improvements (April 1996), the City of Columbus Multi-Use Path Study (2014), the Mid-Ohio Regional Planning Commission (MORPC) SR 161 planning-level Traffic Study (2014), and the 2015 ODOT in-house Preliminary Engineering study for various roadway configuration typical sections and schematic-level plan views.

The 1996 corridor improvement study was undertaken at a time when SR 161 functioned as an alternate parallel route to I-270, more so than providing local access to communities on the north side of the Columbus metropolitan area. At that time, I-270 was a 4-lane freeway that was later widened to 8 lanes in 1998 to accommodate increased traffic volumes. Since capacity improvements to I-270 were implemented, SR 161 no longer serves as much through traffic in the corridor and earlier recommendations may not serve the current and projected traffic patterns.

The most recent analysis, the 2014 MORPC SR 161 Traffic Study, collected land use, employment, population and traffic data for a Land Use Review Area bounded by I-270, US 23, Bethel Road and the Scioto River. Using this data, as well as development assumptions provided by OSU for their undeveloped properties adjacent to Don Scott Field, MORPC created traffic projections used in Synchro and Sim Traffic analyses for current year (2013) and future year (2035) operations. 2013 analyses indicated that the SR 161 & Linworth Road signalized intersection located in the middle of the study corridor was already operating at or near capacity. When the influence of the nearby at-grade rail crossing was incorporated into the capacity analyses, the Linworth signal failed during peak hour analyses. Future year analyses for the SR 161 & Linworth Road signal is expected to be over capacity, even without incorporating the influence of the nearby at-grade rail crossing. The 2014 SR 161 Traffic Study analyzed the effects of a number of modifications to the study corridor. The findings included the following:

1. Current (2013) traffic volumes are approaching maximum capacity.
2. The SR 161 & Linworth Road intersection is the most congested intersection and should be considered a bottleneck of the corridor.

Exhibit 1 – Corridor Study Area: SR 161 from Sawmill Road to Olentangy River Road

In 2016, ODOT initiated a study of State Route 161 (SR 161 - also known as Dublin-Granville Road) between Sawmill Road and Olentangy River Road. ODOT has several partners in the study effort, including Columbus, Worthington, Perry Township, Franklin County, and MORPC. The purpose of the study is to develop a strategy for improvements that are constructible and manageable from a funding perspective. The study corridor consists of three sections with differing characteristics as described below.

Section 1 (Sawmill Road to just West of the CSX RR) – This section is more commercial in nature at the west end with left-turn lanes between Sawmill Road and Federated Boulevard, where it transitions into two lanes with narrow shoulders. Residential development, including Brookside Estates and Country Club is present on the north side. Don Scott Airport dominates the land on the south side of SR 161 in this section, along with the Ohio Emergency Management Agency and the Ohio Army National Guard Recruiting facility. There is a 35-acre preserved area located between Don Scott Airport and SR 161.

Section 2 (From just West of the CSX RR to just East of Linworth Road) – An active CSX rail line crosses the corridor at-grade, just west of the Linworth intersection. Commercial development is present in this section including United Dairy Farmers, BP and Wendy's located in the northeast, northwest and southeast quadrants of the Linworth intersection. A new retail development (Linworth Crossing) was recently completed in the southwest quadrant. There are dedicated left-turn lanes on the east, west and north approaches to the Linworth intersection, as well as a short left turn lane on the south approach (constructed as part of the UDF redevelopment) that is not long enough to accommodate the high left-turn demand.

Section 3 (From just East of Linworth to Olentangy River Road) – This section is primarily residential with two lanes and a shared use path on the south side. The Linworth Alternative High School is in this section on the south side.

II. Purpose and Need

The purpose of the project is to improve vehicular and pedestrian mobility in the SR 161 corridor. The primary needs include reducing vehicular delay in the SR 161 corridor, especially at the SR 161 & Linworth Road intersection, improving access to and from driveways and side streets along the corridor, addressing identified rear-end crash problems and improving pedestrian connectivity and walkability in the corridor. Secondary needs for addressing mobility in the corridor include reducing delay at the railroad crossing west of Linworth Road and improving cycling facilities' quality and connectivity.

Primary Needs

Reduce vehicular delay at the SR 161 & Linworth Road intersection: A number of issues contribute to unusually high delay at the SR 161 & Linworth Road intersection. Based on 2016 traffic volumes and traffic signal operations, the calculated intersection capacity utilization is 92% in the PM Peak hour and 90% in the AM Peak hour. Using growth rate information from MORPC to project 2040 traffic volumes, the location is expected to have intersection capacity utilizations of 107% in the PM Peak hour and 104% in the AM Peak hour. This information indicates that the intersection is currently near capacity under ideal conditions but will definitely exceed capacity by 2040. The 2016 capacity utilization references one-hour time periods. Local feedback from Advisory Committee members indicate that it may be experiencing shorter duration (15 or 30 minute) capacity failures.

Signal operations at the intersection are less than ideal due to lane configurations and the proximity of an at-grade railroad crossing. The Linworth Road approaches to the intersection operate with "split phasing" because the southbound approach currently has a short left turn lane (constructed as part of the UDF redevelopment) that is not long enough to accommodate the high left-turn demand. Because of this, the southbound approach is allocated its own green time separately from the northbound green time to allow each approach to have protected left-turn

phasing. This phasing reduces the efficiency of the signal operation for the intersection. In addition to the split-phasing concern, the railroad crossing located less than 750 feet west of the eastbound stop line requires a "queue-cutter signal" to protect eastbound vehicles from stopping on the tracks during a red phase of the Linworth Road signal. As shown below in Exhibit 2, this interferes with traffic flow during the eastbound green phase at the intersection causing vehicles to take too long to clear the intersection in a timely manner (fewer vehicles reach the Linworth signal before it turns red).

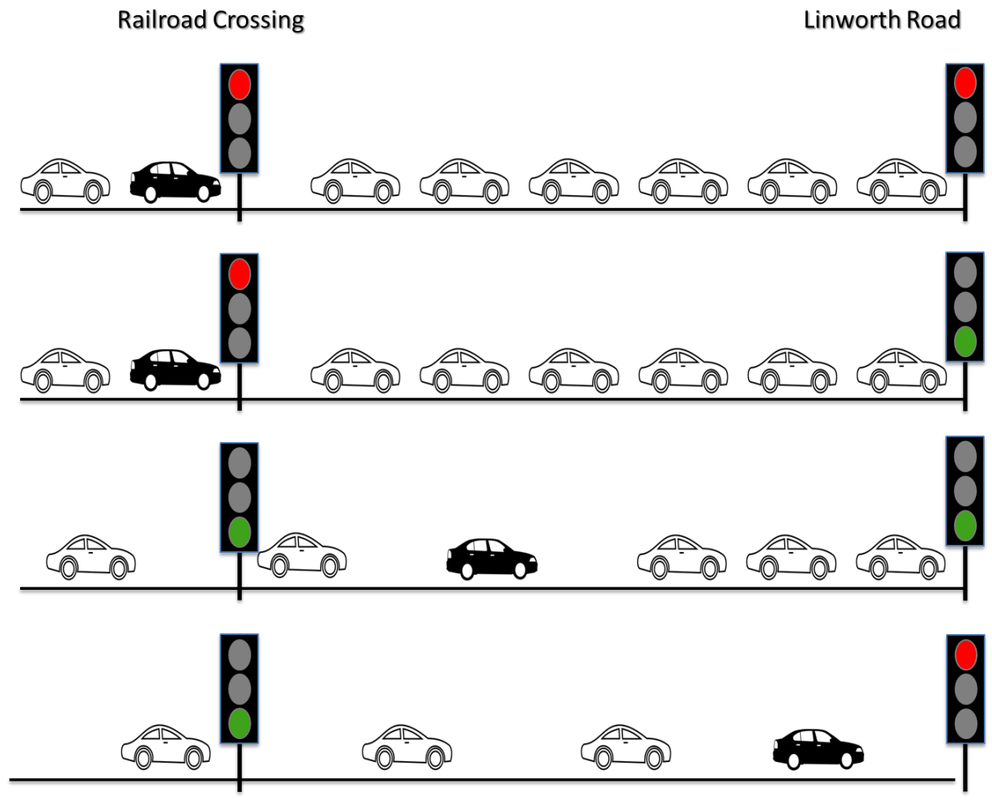

Exhibit 2 – Queue Cutter Signal

Because of the traffic demand and signalization inefficiencies, observed queues at the intersection are longer than would normally be expected for a location that has not exceeded 100% intersection capacity utilization. Observed queues for eastbound SR 161 exceed 2,000 feet during peak hours, extending through the railroad crossing and blocking a significant number of commercial driveways. Queues for westbound SR 161 extend 1,000-1,500 feet during peak hours, past the driveways for the Linworth Alternative Program High School. Linworth Road queues are directional based on time of day; the southbound AM peak queue extends 1,600 feet past the Castle Crest Drive intersection, while the northbound PM peak queue extends 850 feet.

Improve access to/from driveways and side streets: Drivers on side streets and driveways are experiencing uncomfortable delays attempting to turn left onto/off of SR 161. There are few available gaps in the traffic stream due to high volume of traffic for a single through lane in each direction with no turn movement protection. These delays encourage drivers to accept smaller-than-normal gaps to complete their turn, which can have a "ripple effect" of slowing down or stopping for the opposing traffic upstream. On the other hand, drivers uncomfortable accepting smaller-than-normal gaps will sit and block traffic on either the side street or on SR 161 until an acceptable gap occurs, thereby creating delay upstream of their direction of travel.

Address identified rear-end crash patterns: The percentage of rear-end crashes in the corridor between 2013 and 2015 was more than double the statewide average percentage for this type (2-lane, 2-way) of roadway. The primary cause for these types of crashes is related to vehicles stopping in the SR 161 through lane to make a turn. The highest rates of rear-end crashes occurred between McVey Boulevard and Linworth Road and between Linworth Road and Olentangy River Road, where lot sizes along the corridor are smaller and driveway density is greater.

Improve pedestrian connectivity and walkability: The north side of the study corridor has one small 475-foot long section of sidewalk in the commercial area of the corridor near Federated Blvd. There is no sidewalk on the north side of SR 161 in the residential areas. The south side of the study corridor has disconnected sections of sidewalk covering approximately 30% of the length of the corridor; the longest section is nearly 3,000 feet and runs from Linworth Road to Olentangy River Road in the residential section of the corridor and functions as a shared use path. There are no crosswalks to the north side of the road along this 3,000-ft length of sidewalk except at the signalized intersections at each end.

While the existing sidewalks serve pedestrian traffic generators along the south side of the corridor such as the COTA bus stop for Express Line 30 on Linworth Road, Linworth Alternative Program High School, the shopping plaza on the SE corner of the Linworth Road intersection, Linworth Park south of SR 161, there is no connectivity to the residential pedestrian traffic generators on the north side of SR 161 (Strathaven condos, Bellbrook Place subdivision, residential lots). There is also no continuous sidewalk connection from the residential properties to Thomas Worthington High School located east of SR 315. In addition to connecting to these generators located east of the railroad crossing, the Advisory Committee expressed interest in providing sidewalk connectivity from residential areas to the HTH Farm Market located on the north side of SR 161 just west of the railroad crossing.

Secondary Needs

Reduce delay at railroad crossing: The rail line carries approximately 25 trains per day, closing the crossing for approximately 2-3 minutes each time. During field studies conducted between 6am and 10pm, there were 8 closures. Crossing closures that occur during peak travel times can release around 30-40 eastbound cars to the queue for the adjacent Linworth Road signalized intersection once the rail crossing reopens, thereby causing more congestion at the intersection. In addition, westbound delays at the railroad can spill back to the Linworth Road intersection, making it difficult for westbound vehicles to clear the intersection.

Another issue creating delay at the rail crossing is the vertical profile of SR 161 going over the tracks. The elevation of the railroad crossing is higher than the roadway, which creates a "hump" in the road that is equivalent to an 18-mph design speed. This slowdown for eastbound vehicles also causes the traffic signal at Linworth Road to "gap out" when there are still cars approaching it, which then adds to the queueing problem at the intersection and through the railroad crossing.

Improve cycling connectivity and quality: The current corridor is not accommodating to bike users due to a lack of connectivity between non-motorist facilities and due to areas with a roadway typical section that has narrow shoulders and open ditches. When combined with heavy motorized vehicular flow in each direction and high volumes of turning movements throughout the corridor, portions of the roadway corridor are not very accessible to non-motorized vehicles such as bicycles. The opportunity exists to incorporate more cycling-friendly accommodations as part of improvements in the corridor. In addition to MORPC's policy, The City of Columbus has

identified the SR 161 (Dublin-Granville Road) corridor between Linworth Road and Sawmill Road as a location for a proposed Shared Use Path in the Columbus Bike Plan. Also, the City of Worthington has expressed support for a multiuse path along SR 161 to Sawmill Road to connect to the existing Worthington trail systems in its December 2014 Bike and Pedestrian Steering Committee Recommendations to City Council. Finally, resident feedback through the Advisory Committee indicates a demand for safer and higher quality cycling facilities in the corridor to support local trips and provide connectivity to nearby cycling facilities such as the Olentangy Trail and nearby Linworth Park and Perry Park.

Goals and Objectives
The project partners' goal for the current study was to identify a series of manageable, constructible improvement projects for the SR 161 corridor between Sawmill Road and Olentangy River Road. Previous studies identified improvements that were unable to be funded and/or did not receive enough support from the public or government agencies to move beyond the analysis stage. The intention was to identify feasible improvements that can continue moving through the Project Development Process.

III. Alternatives

A. Alternatives Development

This study was scoped to address a no-build option, 16 proposed alternatives, plus an additional 6 alternatives that were likely to surface throughout the Advisory Committee/Public Involvement process. The no-build option and 16 alternatives that were to be initially evaluated (see Table 1) were:

1. *No-Build* – do nothing to the existing corridor other than routine maintenance.

2. *Enhanced 2-Lane (adding landscaping)*
   a. Add landscaping and pedestrian facilities to the existing lane configuration with a bridge to carry SR 161 over the railroad crossing, keeping the railroad at the existing elevation.
   b. Add landscaping and pedestrian facilities to the existing lane configuration with a bridge to carry the railroad crossing over SR 161, with SR 161 going down below the railroad as if in a tunnel.
   c. Add landscaping and pedestrian facilities to the existing lane configuration and maintain the existing at-grade railroad crossing.

3. *3-Lane Full Length*
   a. Widen the entire corridor to three lanes, keeping the same number of lanes where there are currently more than three lanes with a bridge to carry SR 161 over the railroad crossing, keeping the railroad at the existing elevation.
   b. Widen the entire corridor to three lanes, keeping the same number of lanes where there are currently more than three lanes with a bridge to carry the railroad crossing over SR 161, with SR 161 going down below the railroad as if in a tunnel.
   c. Widen the entire corridor to three lanes, keeping the same number of lanes where there are currently more than three lanes and maintain the existing at-grade railroad crossing.

4. *5-Lane Full Length*
   a. Widen the entire corridor to five lanes with a bridge to carry SR 161 over the railroad crossing, keeping the railroad at the existing elevation.
   b. Widen the entire corridor to five lanes with a bridge to carry the railroad crossing over SR 161, with SR 161 going down below the railroad as if in a tunnel.
   c. Widen the entire corridor to five lanes and maintain the existing at-grade railroad crossing.
5. *5-Lane Sawmill to Linworth; 3-Lane for Remainder of Corridor*
   a. Widen the corridor to five lanes from Sawmill Road to Linworth Road, and widen the remainder of the corridor (Linworth Road to Olentangy River Road) to three lanes with a bridge to carry SR 161 over the railroad crossing, keeping the railroad at the existing elevation.
   b. Widen the corridor to five lanes from Sawmill Road to Linworth Road, and widen the remainder of the corridor (Linworth Road to Olentangy River Road) to three lanes with a bridge to carry the railroad crossing over SR 161, with SR 161 going down below the railroad as if in a tunnel.
   c. Widen the corridor to five lanes from Sawmill Road to Linworth Road, and widen the remainder of the corridor (Linworth Road to Olentangy River Road) to three lanes and maintain the existing at-grade railroad crossing.

6. *Railroad Grade Separation Only*
   a. Using each of the possible lane configurations (two lanes, three lanes or five lanes), relocate SR 161 to the north of the existing railroad crossing with a bridge to carry SR 161 over the railroad crossing, keeping the railroad at the existing elevation.
   b. Using each of the possible lane configurations (two lanes, three lanes or five lanes), relocate SR 161 to the north of the existing railroad crossing with a bridge to carry the railroad crossing over SR 161, with SR 161 going down below the railroad as if in a tunnel.
   c. Using each of the possible lane configurations (two lanes, three lanes or five lanes), relocate SR 161 to the south of the existing railroad crossing with a bridge to carry SR 161 over the railroad crossing, keeping the railroad at the existing elevation.
   d. Using each of the possible lane configurations (two lanes, three lanes or five lanes), relocate SR 161 to the south of the existing railroad crossing with a bridge to carry the railroad crossing over SR 161, with SR 161 going down below the railroad as if in a tunnel.

Alternatives	Primary Needs					
	Reduce vehicular delay at SR 161 & Linworth	Improve access to/from driveways and side streets	Address identified rear-end crash patterns	Improve pedestrian connectivity and walkability	Reduce delay at railroad crossing	Improve cycling connectivity and quality
No-Build						
Enhanced 2-Lane (adding landscaping)						
Over railroad				X	X	X
Under railroad				X	X	X
At grade				X		X
3-Lane Full Length						
Over railroad	X	X	X	X	X	X
Under railroad	X	X	X	X	X	X
At grade	X	X	X	X		X
5-Lane Full Length						
Over railroad	X	X	X	X	X	X
Under railroad	X	X	X	X	X	X
At grade	X	X	X	X		X
5-Lane Sawmill to Linworth; 3-Lane for Remainder of Corridor						
Over railroad	X	X	X	X	X	X
Under railroad	X	X	X	X	X	X
At grade	X	X	X	X		X
Railroad Grade Separation Only						

Northern over RR	X	X	X	X	X	X
Northern under RR	X	X	X	X	X	X
Southern over RR	X	X	X	X	X	X
Southern under RR	X	X	X	X	X	X

Table 1 – Primary Needs for Alternatives

These alternatives were evaluated based on their ability to meet the primary purpose and need elements. The results are shown above in Table 1 with an 'x' indicating if an alternative met that element of the purpose and need. The No-Build alternative and all of the Enhanced 2-Lane alternatives were dismissed as they failed to meet over half of the primary needs established for the project, with the No-Build not meeting any of those needs.

During the progression of the study, it was determined that the entire corridor should be broken down into four logical pieces for alternative development and evaluation. Alternatives within each section were developed to function independently, allowing for a combination of alternatives to be evaluated. Alternatives were then developed and re-assessed per section of the corridor. They were:

CW (Corridor West – Sawmill Road to Aeros Drive)

1. CW1: 3-Lane with buffered bike lanes and sidewalks on both sides,
2. CW2: 3-Lane with a SUP on the south side and a sidewalk on the north side,
3. CW3: 3-Lane with a sidewalk on the south side and a SUP on the north side,
4. CW4: 5-Lane with buffered bike lanes and sidewalks on both sides,
5. CW5: 5-Lane with a SUP on the south side and a sidewalk on the north side,
6. CW6: 5-Lane with a sidewalk on the south side and a SUP on the north side,
7. CW7: Roundabouts

RR (Railroad corridor - Aeros Drive to Hutchinson Street)

1. RR1: Leave at-grade, fix vertical profile at the crossing,
2. RR2: Underpass on existing alignment, 2-Lane section,
3. RR3: Overpass on existing alignment, 2-Lane section,
4. RR4: Underpass on existing alignment, 4-Lane section,
5. RR5: Overpass on existing alignment, 4-Lane section,
6. RR6: Northern Bypass Grade Separation,
7. RR7: Southern Bypass Grade Separation.

LI (Linworth Intersection – Hutchinson Street to Strathaven Drive)

1. LI1-3L: Align turn lanes for 3-Lane section,
2. LI1-5L: Align turn lanes for 5-Lane section,
3. LI2: Modified Superstreet to eliminate left turns off of SR 161 at Linworth,
4. LI3-3L: Roundabout for 3-Lane section,
5. LI3-5L: Roundabout for 5-Lane section.

CE (Corridor East – Strathaven Drive to Olentangy River Road)

1. CE1: 3-Lane with buffered bike lanes and sidewalks on both sides,
2. CE2: 3-Lane with a SUP on the south side and a sidewalk on the north side,
3. CE3: 5-Lane with buffered bike lanes and sidewalks on both sides,
4. CE4: 5-Lane with a SUP on the south side and a sidewalk on the north side.

Where appropriate, typical sections for alternatives are included in Appendix A.

After careful consideration, the Advisory Committee and project partners agreed to dismiss all 5-Lane options. The increase in future traffic of the 5-Lane options over the 3-Lane options (estimated to be approximately 25%), concerns about traversing additional lanes of traffic for side road drivers and pedestrians attempting to cross SR 161, as well as low cost-to-benefit ratio for the 5-Lane options in comparison to the 3-Lane options deemed the 5-Lane options undesirable.

The Advisory Committee and project partners also chose to drop alternative CW3 from future consideration due to right-of-way and environmental impacts. The Brookside Country Club Lake would be negatively impacted. This area would also require a retaining wall to minimize impacts to the lake, introducing a roadside obstacle into the corridor that the project partners didn't feel was necessary.

CW7 was also dismissed as a corridor-wide solution. Major benefits of this alternative were to reduce right-of-way impacts by maintaining only one lane in each direction and reduce rear-end collisions with a traffic island preventing left turns. However, the traffic analysis determined that each roundabout would require two lanes in each direction along SR 161 to perform satisfactorily. These lanes would need to be transitioned approaching and leaving each roundabout, thus negating the reduction of right-of-way impacts as an advantage. It was also determined that at select intersections, traffic flow along SR 161 would still overwhelm the side road traffic, making the waiting times for side road drivers to be able to safely turn onto SR 161 about the same as they are today.

All overpass and bypass options along the RR section of the corridor were also dismissed from further consideration. The impact to adjacent businesses and properties was deemed too intrusive – hurting many of the area businesses and residents that are intended to benefit from a potential project and lacked public support.

The modified Superstreet and two roundabout options for the Linworth Road intersection were dismissed from consideration as well. The modified Superstreet would not have been able to provide the desired level of service for traffic flow. It, along with the two roundabout options, also had impacts to adjacent properties that were deemed too damaging, and thus, undesirable.

The Advisory Committee and project partners also decided to add two new main alternatives for the public's evaluation. One was for the CW corridor and the other for the CE corridor. The alternative for the western corridor was a combination of the CW1 and CW2 alternatives. The CW2 alternative was used as the base, and bike lanes inserted adjacent to the through lanes. This alternative was named CW1_CW2Combined. The additional CE corridor alternative followed the same premise, with bike lanes added adjacent to the through lanes on the CE2 alternative. This alternative was named CE1_CE2Combined. The LI1-3L alternative was then modified to address the three different configurations that could tie into it; bike lanes and sidewalks on both sides (LI1-3L-1), SUP on the south side and a sidewalk on the north side (LI1-3L-2) and bike lanes, SUP on the south side and a sidewalk on the north side (LI1-3L-1-2Combined).

B. Feasible Alternatives

The alternatives that were considered feasible for presentation to the public were CW1, CW2, CW1_CW2Combined, RR1, RR2, LI1-3L-1, LI1-3L-2, LI1-3L-1-2Combined, CE1, CE2 and CE1_CE2Combined (see Appendix H and I).

IV. Key Issues

A. Traffic Analyses

i. Traffic Study

The traffic analysis study area included the SR 161 corridor from Sawmill Road to Olentangy River Road The following intersections with SR 161 were included in the traffic analysis:

- Sawmill Road
- Martin Road
- Sawmill Place Boulevard
- Federated Boulevard
- McVey Boulevard
- Linworth Road
- Olentangy River Road

While the traffic analysis does include the intersections with Sawmill Road and Olentangy River Road, improvements within the intersections were not studied and are not being proposed. Improvements from the alternatives may modify the westbound approach at Sawmill Road and the eastbound approach at Olentangy River Road. Complete intersection improvements at these two intersections will be pursued separately.

ii. Data Collected

Turning movement counts were conducted at the study intersections between May and November of 2013. The counts were conducted from 6:30 AM to 6:30 PM. Additional turning movement counts were conducted at the Federated Boulevard and Linworth Road intersections in August of 2016. Comparing these counts to those conducted in 2013, it was determined that traffic volumes in the corridor had grown by 2.5% per year between 2013 and 2016. 2013 counts at the remaining study intersections were increased by 2.5% per year to develop 2016 traffic volumes for the entire corridor. Copies of the traffic counts are located in Appendix B.

iii. Linworth Road Intersection Queues

The intersection of SR 161 and Linworth Road experiences severe congestion and long queues, particularly in the eastbound direction. Based on comments from stakeholders, it was believed that these long queues are related to the at-grade rail crossing located 800 feet west of Linworth Road. Queue lengths at the intersection were observed and found to be:

- 2,400 feet in the eastbound direction – during the PM peak hour
- 1,500 feet in the westbound direction – during the PM peak hour
- 850 feet in the northbound direction – during the PM peak hour
- 1,600 feet in the southbound direction – during the AM peak hour

From the observations it has been determined that this congestion occurs daily and is present even if a train has not crossed SR 161. During off-peak times, the Linworth Road signal will recover within one or two cycles after a train passes and longer during the peak hours. The observed train blockage was less than 2 minutes with a portion of this occurring when EB SR 161 had a red signal. This results in an actual lost green time for the EB movement of approximately one minute. While the presence of a train certainly creates longer queues, it is not the root cause of the daily congestion. A few contributing factors for the congestion have been identified.

- Split signal phases at the Linworth Road intersection – The northbound and southbound approaches at the intersection are operating with a split phase condition. Serving the northbound and southbound approaches separately reduces the amount of time the signal can be green for SR 161. If the northbound and southbound through movements operate at the same time, several additional seconds of green time can be provided to SR 161 every signal cycle. This would significantly increase the capacity of the intersection.
- Left turning vehicles – There are several driveways along SR 161 in the vicinity of the Linworth Road intersection. Without dedicated left-turn lanes, left turning vehicles at these driveways block all vehicles behind them while they wait to complete the turn. Eliminating left turns or providing dedicated left-turn lanes would keep the through traffic on SR 161 moving.
- Hump at the railroad crossing – There is a “hump” at the railroad crossing that forces vehicles to slow down as they go up and over the railroad. This slowdown creates a larger distance between vehicles traveling eastbound on SR 161 than is typically seen for signalized intersections. This larger spacing reduces the number of vehicles able to travel through the intersection, contributing to longer queues.

Addressing these issues in the Build alternatives would reduce the delay and queue lengths currently seen at the Linworth Road intersection.

iv. Traffic Volume Projections

Planning level traffic forecasts were developed for the corridor using the methodology presented in NCHRP Report 255/765. This is the same methodology used by the ODOT Office of Modeling and Forecasting for the development of certified traffic. Traffic forecasts were developed for the 2040 No-Build Alternative, 2040 3-Lane Alternative and 2040 5-Lane Alternative. Travel demand model results for the 2016 existing condition, 2040 No-Build, 2040 3-Lane and 2040 5-Lane alternatives were provided by MORPC.

The traffic forecasts for the No-Build and 3-Lane alternatives were very similar with the 3-Lane Alternative drawing about 4% more through volumes along the SR 161 corridor. With the additional capacity provided by the second through lanes in the 5-Lane Alternative, the SR 161 corridor becomes a more attractive route. 2040 traffic forecasts along the SR 161 corridor for the 5-Lane Alternative are approximately 25% higher than the 3-Lane Alternative.

2040 traffic forecasts are contained in Appendix C.

v. Capacity Analyses

Capacity Analyses were conducted for the SR 161 corridor for the 2016 Existing, 2040 No-Build, 2040 3-Lane and 2040 5-Lane alternatives during the AM and PM peak hours. *Synchro 10*, utilizing the methodologies from the *Highway Capacity Manual, 6th Edition*, was used for the analysis.

Table 2 shows the LOS and delay comparisons for each of the main intersections. Detailed LOS, delay and volume-to-capacity ratio results of the *Synchro* analysis for the 2016 and 2040 AM and PM peak hours are contained in Appendix D. Capacity results for the alternatives are discussed below and detailed capacity analysis outputs are contained in Appendix E.

Intersection (SR 161 and)	Peak Hour	Overall Intersection Level of Service/Delay			
		2016 Existing Conditions	2040 No-Build Conditions	2040 3-Lane Conditions	2040 5-Lane Conditions
Sawmill Road	AM	D/42.9	D/49.7	D/49.8	D/50.3
	PM	E/56.8	F/137.4	F/139.7	F/117.9
Martin Road	AM	C/20.2	C/31.4	C/30.9	C/32.6
	PM	C/29.9	E/60.3	D/52.9	D/53.8
Sawmill Place Boulevard	AM	C/21.9	C/29.5	C/29.7	C/27.3
	PM	C/27.4	E/56.3	D/57.6	D/40.5
Federated Boulevard	AM	B/12.7	B/19.0	B/18.4	B/16.5
	PM	B/13.1	D/50.1	D/42.5	D/36.0
McVey Boulevard	AM	Stop	Stop	C/26.5 *includes signal	C/23.5 *includes signal
	PM	Stop	Stop	B/17.6 *includes signal	B/13.3 *includes signal
Linworth Road	AM	D/49.1	F/172.9	D/47.3	D/41.5
	PM	D/51.1	F/185.1	D/54.0	D/46.3
Olentangy River Road	AM	E/63.0	F/110.4	F/115.5	E/73.7
	PM	D/50.0	F/89.1	F/87.0	E/72.8

Table 2 – Level of Service Matrix

No-Build Condition
In the 2016 condition, most intersections in the corridor are operating with an acceptable LOS D or better. The Sawmill Road and Olentangy River Road intersections operate at LOS E during the PM peak and the McVey Boulevard approach operates at LOS E in the AM peak. By 2040, nearly all intersections in the corridor will operate at LOS E or F. The Sawmill Road intersection will operate at LOS F in the PM peak, Martin Road and Sawmill Place Boulevard will operate at LOS E in the PM peak. McVey Boulevard, Linworth Road and Olentangy River Road will operate at LOS F in both the AM and PM peaks with average vehicle delays of 2 to 3 minutes per intersection.

3-Lane Alternative
The 3-Lane Alternative adds a two-way-left-turn-lane along the SR 161 corridor. This additional lane benefits the unsignalized intersections and driveways in the corridor by placing left turning vehicles in their own lane and preventing the disruption to through vehicles seen today. At the signalized intersections, the third lane will provide little benefit because left-turn lanes are already present. To improve the operation at the signalized intersections, the following spot improvements were included in the 3-Lane Alternative.

- SR 161 & Martin Road – Added eastbound right-turn lane on SR 161
- SR 161 & Sawmill Place Boulevard– Added eastbound right-turn lane on SR 161
- SR 161 & Federated Boulevard – Added westbound right-turn lane on SR 161
- SR 161 & Linworth Road – Added turn lanes so that all approaches have exclusive left- and right-turn lanes. Eliminate split signal phasing.
- SR 161 & McVey Boulevard – Added a traffic signal. The traffic signal at this intersection was added to the analysis to resolve the capacity issues on McVey Boulevard for the design year. A traffic signal at this location is not being recommended as a project element, but rather as a potential option at some point in the future. Also, additional unsignalized intersections in the corridor may also benefit from signalization, however, those locations have not been identified at this time. As traffic grows between now and 2040, the unsignalized intersections in the corridor should be evaluated and warrant analyses performed to determine the best locations for traffic signals.

The 3-Lane Alternative did not make any changes to the intersections at Sawmill Road and Olentangy River Road. These intersections will operate at the same LOS F as the No-Build condition. At the Martin Road, Sawmill Place Boulevard and Federated Boulevard intersections, the spot improvements proposed as part of the 3-Lane Alternative have improved the operations to LOS D. At the McVey Boulevard intersection, the traffic signal has eliminated the LOS F condition on McVey Boulevard and the intersection will operate at LOS C. The biggest improvement in the corridor is at the Linworth Road intersection. The additional left- and right-turn lanes as well as the elimination of the split signal phases have improved the intersection operation from LOS F to LOS D, and the intersection delay has improved from 185.1 seconds in the No-Build to 54.0 seconds in the 3-Lane Alternative.

5-Lane Alternative
The 5-Lane Alternative adds a two-way-left-turn-lane along the SR 161 corridor as well as a second through lane in each direction. Similar to the 3-Lane Alternative, the two-way-left-turn-lane benefits the unsignalized intersections and driveways in the corridor by placing left turning vehicles in their own lane and preventing the disruption to through vehicles seen today. The additional through lane in each direction will benefit the signalized intersections by providing additional intersection capacity. However, much of the additional capacity will be offset by increased traffic volumes in the 5-Lane Alternative. The additional capacity does eliminate the need for some of the spot improvements necessary in the 3-Lane Alternative. Based on the capacity analysis, the following spot improvements were made to the signalized intersections.

- SR 161 & Linworth Road – Added turn lanes so that all approaches have exclusive left- and right-turn lanes. Eliminate split signal phasing.
- SR 161 & McVey Boulevard – Added a traffic signal.

The 5-Lane Alternative provides some capacity improvements to the intersections at Sawmill Road and Olentangy River Road. At the Sawmill Road intersection, two through lanes will be provided in the eastbound direction. At the Olentangy River Road intersection, two through lanes will be provided in the eastbound direction. Sawmill Road will still operate at LOS F, but the delay has improved from 139.7 seconds to 117.9 seconds. The Olentangy River Road intersection will improve from LOS F to LOS E. At the Martin Road, Sawmill Place Boulevard and Federated Boulevard intersections, the intersections will operate with the same LOS as the 3-Lane Alternative, with a slight improvement in the overall intersection delay. At the McVey Boulevard intersection, the traffic signal has eliminated the LOS F condition on McVey Boulevard and the intersection will operate at LOS C. Finally, the Linworth Road intersection will operate at LOS D, the same as the 3-Lane Alternative but with a few second reduction in overall delay.

Additional Linworth Road Intersection Alternatives
In addition to traditional traffic signal improvements at the Linworth Road intersection, roundabouts and a Superstreet option were evaluated.

For the roundabout option it was found that two circulating lanes at the roundabout are required for both the 3-Lane and 5-Lane alternatives. In both alternatives, northbound and southbound left-turn lanes are required as well as two eastbound and westbound through lanes. The combination of these lanes requires two circulating lanes. The roundabout option would operate with LOS B in both the 3-Lane and 5-Lane alternatives. However, the roundabout also requires a much bigger footprint and has more property impacts than the traffic signal option.

For the Superstreet option, left turns at the Linworth Road intersection would be prohibited, creating a simple two-phase operation for the traffic signal. Left turns would instead be accommodated by U-turn signals located on Linworth Road to the north and south of SR 161. For example, a westbound vehicle wanting to turn left onto Linworth Road would instead make a right turn onto Linworth Road, travel to the U-turn signal, make a U-turn, and then travel southbound through the SR 161 signal as a through movement. For this intersection, the Superstreet option has the following operational concerns:

- The traffic volume at the SR 161 & Linworth Road intersection is very high. The Superstreet option forces all left turning vehicles to travel through the intersection twice, increasing the number of vehicles needing to be served by the intersection. Even though it would be a two-phase operation, the increase in vehicles will negate most of the benefits.
- The U-turn intersections will need to be placed between 750 and 1000 feet north and south of SR 161 in order to avoid queue back-ups blocking upstream signals. This is a very long distance that left turning vehicles would then have to travel twice. This additional travel time will negate any reduction in delay achieved at the SR 161 & Linworth Road intersection.
- There would be three traffic signals for the SR 161 & Linworth Road intersection instead of one. While the delay at each of the three intersections may be less than the delay with just a single signal, the total delay of the three signals will be similar or higher than the total delay with just a single signal.

The cumulative effect of these three concerns is that the Superstreet option will have a higher total delay and more vehicle miles of travel than the standard traffic signal option.

Roundabouts for Unsignalized Intersections

Roundabouts were also investigated throughout the SR 161 corridor as a potential treatment for the unsignalized intersections. While the roundabouts would improve left turn access to and from the side street without the need for traffic signals, it was found that single lane roundabouts as a corridor-wide solution (CW7) would be over capacity with the 3-Lane Alternative. The analysis results indicated that a single lane roundabout would work at McVey if a WB right turn lane is included. However, other intersections along the corridor have less right turn volume and more vehicles in the single lane, making the volume to capacity ratios closer to 1. In this case, the one-lane approaches on SR 161 would need to be expanded to two lanes upstream of the roundabout and then tapered back to a single lane downstream of the roundabout. For the 5-Lane Alternative, a two-lane roundabout would have acceptable operations at the minor intersections along the corridor and would be a good alternative to a traffic signal.

Traffic Analysis Summary

The 3-Lane and 5-Lane alternatives will both adequately address the capacity concerns along the SR 161 corridor and both will provide a significant improvement to the biggest capacity concern, which is the Linworth Road intersection. The 5-Lane Alternative has lower delays at the signalized intersections than the 3-Lane Alternative and accommodates more overall vehicles. However, the 5-lane alternative would result in an average delay per vehicle similar to the existing conditions and would not substantially reduce congestion on SR 161. For the Linworth Road intersection, a traditional traffic signal with left- and right-turn lanes was found to have fewer impacts to adjacent property than alternatives such as roundabouts and a Superstreet concept. Finally, roundabouts installed at unsignalized intersections along the corridor are a viable option to future traffic signals, but only for the 5-Lane Alternative.

vi. Crash Analysis

Crash analysis for the three-year period from 2013-2015 was conducted for the SR 161 study area. Crash report numbers were provided by the GIS Crash Analysis Tool (GCAT) and the OH-1 forms were retrieved from the Ohio Department of Public Safety website. From 2013 to 2015, there were 144 crashes in the corridor. Of the 144 crashes, 41 (29 percent) were injury crashes. There were no reported fatalities in the study area during these years. 51 crashes occurred in 2013, 51 in 2014 and 42 in 2015. Table 3 shows the percentage of each type of crash compared to the statewide average percentage of crashes by type for non-freeway crashes. Crash diagrams for the entire study area are shown in Appendix F.

Condition	# of crashes 2013-2015	% of crashes 2013-2015	% of Statewide Crashes (Non-Freeway Systems) 2010-2014
Nighttime	22	15.3	27.8
Wet pavement	21	14.6	21.2
Injury	42	28.5	26.1
Crash Type			
Rear-end	90	62.5	31.1
Angle	23	16.0	16.0
Fixed Object	11	7.6	14.1
Left-Turn	8	5.6	5.3
Sideswipe-Passing	7	4.9	8.7

Table 3 - Study Area Crash Types Compared to Statewide Averages

The predominant crash type in the study area was rear-end crashes, which account for over 62 percent of the total crashes. All other crash types and conditions were near or below the statewide average. Intersections with discernable crash patterns are detailed below.

SR 161 and Martin Road

From 2013 through 2015, there were 18 reported crashes at the intersection of SR 161 and Martin Road. There were eight crashes in 2013, seven in 2014 and three in 2015. Four of the 18 (22.2 percent) crashes resulted in injury. Table 4 shows the percentage of each type of crash at this intersection compared to the statewide average percentage of crashes by type for non-freeway facilities.

The percentage of angle collisions that occurred at this intersection are more than twice the percentage of angle collisions in the entire study area and the statewide average. Similarly, the percentage of left-turn crashes was four times the statewide average and accounts for a quarter of all left-turn crashes in the study area. The protected-permissive left-turn phasing likely is a contributing factor to the number of left-turn collisions.

All other crash types and conditions at this intersection were near or below the statewide average for non-freeway locations.

Condition	# of crashes 2013-2015	% of crashes 2013-2015	% of Statewide Crashes (Non-Freeway Systems) 2010-2014
Nighttime	5	27.8	27.8
Wet pavement	4	22.2	21.2
Injury	4	22.2	26.1
Crash Type			
Rear-end	7	38.9	31.1
Angle	6	33.3	16.0
Fixed Object	-	-	14.1
Left-Turn	4	22.2	5.3
Sideswipe-Passing	-	-	8.7

Table 4 – SR 161 and Martin Road Intersection Crash Types

SR 161 between Federated Boulevard and McVey Boulevard

There were a number of rear-end collisions at unsignalized intersections between Federated Boulevard and McVey Boulevard including:

- Eastbound at Maplebrook Lane (4 crashes)
- Eastbound at Brookdown Drive (2 crashes)
- Westbound at Brookdown Drive (5 crashes)
- Westbound at Fiesta Drive (4 crashes)
- Eastbound at Nicholas Drive (2 crashes)
- Westbound at Nicholas Drive (2 crashes)

The lack of turn lanes are likely contributors to these crashes, especially at side streets with higher traffic volumes than other locations in the corridor.

SR 161 between McVey Boulevard and Linworth Road

Between 2013 and 2015, 18 rear-end crashes occurred in this approximately 0.5-mile roadway segment. Based on the OH-1 crash report narratives, these crashes were a result of the large number of access points, especially near the railroad tracks, and the congestion that occurs on SR 161 during the peak hours. Locations where patterns of rear-end crashes occur include:

- Eastbound at Thompson Street (5 crashes)
- Westbound at the Valvoline Instant Oil Change parking lot (2 crashes)
- Eastbound at Linworth Lumber Company parking lot (2 crashes)
- Eastbound at Hutchinson Street (3 crashes)
- Eastbound at The Crafty Pint parking lot (4 crashes)

Only two of the 18 crashes resulted in injuries indicating that congestion or slow-moving traffic is a contributor to these rear-end collisions.

SR 161 and Linworth Road

Between 2013 and 2015, 19 crashes occurred at the intersection of SR 161 and Linworth Road. In 2013, there were six crashes, five in 2014, and eight in 2015. Six of the 19 crashes (31.6 percent) resulted in injury. Table 5 shows the percentage of each type of crash at this intersection compared to the statewide average percentage of crashes by type for non-freeway facilities.

Condition	# of crashes 2013-2015	% of crashes 2013-2015	% of Statewide Crashes (Non-Freeway Systems) 2010-2014
Nighttime	1	5.3	27.8
Wet pavement	-	-	21.2
Injury	6	31.6	26.1
Crash Type			
Rear-end	11	57.9	31.1
Angle	3	15.8	16.0
Fixed Object	1	5.3	14.1
Left-Turn	1	5.3	5.3
Sideswipe-Passing	2	10.5	8.7

Table 5 – SR 161 and Linworth Road Intersection Crash Types

The percentage of rear-end crashes at this intersection is nearly twice the statewide average for non-freeway locations; however, it is less than the percentage of rear-end collisions in the entire study area. Congestion likely contributes to these rear-end collisions. These crashes occurred throughout the hours of 10 AM and 8 PM with three rear-end collisions occurring during the 1 PM hour. There were no other discernable patterns relative to the time of crash occurrence.

All other crash types and conditions at this intersection were near or below the statewide average for non-freeway locations.

SR 161 between Linworth Road and Olentangy River Road

Between 2013 and 2015, 15 rear-end crashes occurred in this approximately 0.5-mile roadway segment. Based on the OH-1 crash report narratives, these crashes were a result of the large number of access points, especially closer to the Linworth Road intersection, and the congestion that occurs on SR 161 during the peak hours. Locations where patterns of rear-end crashes occur include:

- Westbound at the Linworth Animal Hospital driveway (2 crashes)
- Westbound at Flora Villa Drive (4 crashes)
- Westbound at Bellbrook Place (2 crashes)

Only one of the 15 rear-end crashes resulted in injury which indicates that congestion is a likely contributor to crashes.

Three sideswipe-passing crashes occurred along westbound SR 161 where the two lanes merge to one. One of these crashes resulted in injury.

Highway Safety Manual Analysis

Using ODOT's Economic Crash Analysis Tool (ECAT), an analysis was conducted using the methodologies outlined in the Highway Safety Manual (HSM). The following three factors are calculated from the HSM analysis:

- Predicted Crash Frequency ($N_{predicted}$) – How the site would be expected to perform relative to 1,000 similar sites with comparable volumes.
- Expected Crash Frequency ($N_{expected}$) – Average performance of the site over an extended period of time based on actual crash history.
- Potential for Safety Improvement (PSI) – Difference between expected crash frequency and predicted crash frequency. A positive PSI indicates that the location is performing poorly compared to similar locations and safety improvements would likely have a significant impact in reducing the crash frequency.

The corridor was broken up by intersections and segments for analysis purposes. The results from the HCM Analysis are summarized in Table 6.

It should be noted that for this analysis, Federated Boulevard was analyzed as an unsignalized intersection. The signal at this location was not installed until 2016, which was after the crashes in this analysis occurred.

	Fatal and Incapacitating Injury Crashes	Non-Incapacitating Injury Crashes	Possible Injury Crashes	Property Damage Only Crashes	Total
SR 161 between Sawmill Road and Martin Road					
$N_{predicted}$	0.0221	0.0563	0.0541	0.4059	0.5385
$N_{expected}$	0.0220	0.0557	0.0534	0.3711	0.5022
PSI	**0.0000**	**-0.0003**	**-0.0005**	**-0.0349**	**-0.0357**
SR 161 and Martin Road					
$N_{predicted}$	0.1582	0.7237	1.0147	5.0129	6.9095
$N_{expected}$	0.1559	0.7585	0.9649	4.8699	6.7492
PSI	**-0.0024**	**0.0348**	**-0.0496**	**-0.1429**	**-0.1601**
SR 161 between Martin Road and Sawmill Place Boulevard					
$N_{predicted}$	0.0155	0.0459	0.5450	0.3941	0.5099
$N_{expected}$	0.0155	0.0455	0.0541	0.3563	0.4717
PSI	**0.0000**	**-0.0004**	**-0.0007**	**-0.0377**	**-0.0388**
SR 161 and Sawmill Place Boulevard					
$N_{predicted}$	0.1517	0.6947	0.9748	4.8015	6.6227
$N_{expected}$	0.1497	0.6850	0.8946	3.8583	5.5876
PSI	**-0.0020**	**-0.0097**	**-0.0801**	**-0.9433**	**-1.0351**
SR 161 between Sawmill Place Boulevard and Federated Boulevard					
$N_{predicted}$	0.0211	0.0622	0.0733	0.5409	0.6975
$N_{expected}$	0.0210	0.0614	0.0720	0.4732	0.6276
PSI	**-0.0001**	**-0.0007**	**-0.0013**	**-0.0677**	**-0.0698**
SR 161 and Federated Boulevard					
$N_{predicted}$	0.0381	0.1619	0.2312	0.9567	1.3879
$N_{expected}$	0.0379	0.1691	0.2301	1.0263	1.4634
PSI	**-0.0001**	**0.0074**	**-0.0013**	**0.0694**	**0.0754**
SR 161 between Federated Boulevard and McVey Boulevard					
$N_{predicted}$	0.3999	0.9621	0.9032	6.8386	9.1038
$N_{expected}$	0.3844	1.2188	1.4489	6.9291	9.9812
PSI	**-0.0154**	**0.2566**	**0.5458**	**0.0907**	**0.8777**
SR 161 and McVey Boulevard					
$N_{predicted}$	0.03410	0.1514	0.2204	0.9126	1.3185
$N_{expected}$	0.03390	0.1592	0.2101	1.0868	1.4900
PSI	**-0.0002**	**0.0079**	**-0.0102**	**0.1742**	**0.1717**
SR 161 between McVey Boulevard and Linworth Road					
$N_{predicted}$	0.1857	0.4399	0.4109	3.0413	4.0778
$N_{expected}$	0.1823	0.4876	0.4219	4.5213	5.6131
PSI	**-0.0033**	**0.0476**	**0.0110**	**1.4802**	**1.5355**
SR 161 and Linworth Road					
$N_{predicted}$	0.1589	0.7063	0.9775	4.8612	6.7039
$N_{expected}$	0.1602	0.6910	0.9580	5.0419	6.8511
PSI	**0.0012**	**-0.0156**	**-0.0195**	**0.1808**	**0.1469**
SR 161 between Linworth Road and Olentangy River Road					
$N_{predicted}$	0.2482	0.5926	0.5557	4.1407	5.5371
$N_{expected}$	0.2422	0.5928	0.4942	5.6545	6.9837
PSI	**-0.0060**	**0.0003**	**-0.0615**	**1.5136**	**1.4464**

Table 6 – HSM Analysis Results for SR 161 Corridor

The analysis indicates there is potential for safety improvements in specific locations along the corridor; however, no one location is performing significantly worse than similar locations (all PSI are less than 1.5 crashes per year).

B. Bike and Pedestrian Assessment

The main differences between the feasible alternatives from a roadway standpoint were simply whether to include bike lanes adjacent to the through lanes or not, and how to address pedestrians along the south side of the road, i.e. sidewalk or SUP. Improving pedestrian connectivity and walkability is one of the primary needs along the corridor and all the feasible alternatives provided such an improvement. The demand for on-road bike lanes versus the ability for users to use the SUP was difficult to establish. However, the project partners ultimately decided that the additional cost of materials and right-of-way impacts did not justify having both bike lanes and a SUP on the south side of the road. And true to the corridor's goals, businesses and existing neighborhoods, the partners decided that a SUP would better serve the type of pedestrians and cyclists that would be using the corridor.

C. Bridges/Retaining Walls Assessment

Specific bridge and retaining wall types were not evaluated in this Feasibility Study – but simply where they would be located and approximate lengths. These were present for all of the grade separation alternatives, with no significant differences in location or length between any of the appropriate alternatives.

D. Maintenance of Traffic Assessment

It was determined that regardless of which alternatives were selected, the maintenance of traffic component did not impact the advantages and disadvantages of one alternative versus another.

E. Right-of-Way Assessment

Beyond the initial exploration into right-of-way impacts for the original alternatives, this did not play a major part in establishing the recommendations for this corridor. Two areas of exception to this are at the railroad crossing and the intersection between SR 161 and Linworth Road. All overpass and bypass options along the RR section of the corridor were deemed too intrusive to adjacent businesses and properties. A similar result was seen for the modified Superstreet and roundabout intersection alternatives at the LI section.

Right-of-way impacts will be a very large component of this corridor as the project continues. The design that moves forward, however, can better utilize information available at that time (development plans, land use changes, etc.) to adjust the road's footprint to minimize property impacts throughout the corridor.

F. Railroad Assessment

The railroad played a large part in this study. Originally, many people thought that the railroad was either a large contributor to the delays at the SR 161 and Linworth Road intersection or the entire reason behind it. As discussed previously, it was discovered that this is not the case. Once it was determined that the issues with the delays at that intersection are driven by geometry and signal phasing, the grade separations lost their allure as part of the corridor-wide solutions. Creating a grade separated crossing would address the secondary need of reducing delay at the railroad crossing, but would come at a steep price, both literally and figuratively. The impacts outweigh the benefits due to cost, business impacts and lack of public official support for those impacts. The underpass options would also require a temporary railroad runaround to maintain rail traffic while a new railroad structure could be built over a lowered SR 161.

G. Utility Assessment

As part of the utility coordination efforts, the Ohio Utilities Protection Service (OUPS) was called to request utility information from owners within the project limits. After initial responses were received, follow-up emails and phone calls were placed to owners who did not send plans or information. At this time, either plan information from each utility on the OUPS list or confirmation that a particular utility is clear of the project area as currently studied has been received. Additional inquiries were sent to CSX and the National Pipeline Mapping System (NPMS) for any information regarding underground utilities within the study limits. CSX confirmed that they have no existing plan sets for underground facilities in the field. CSX stated that utility locates are accomplished by mark outs in the field. Further survey will be needed at the railroad crossing to determine if private lines exist within the railroad's right-of-way. Also, the NPMS showed no gas transmission or hazardous liquid pipelines within the study limits.

The project will include utility impacts and relocations. However, it was determined that regardless of which alternatives were selected, the utility impact component did not greatly impact the advantages or disadvantages of one alternative versus another.

H. Environmental Analysis

The environmental analysis for the SR 161 corridor involved a literature review of previous environmental studies and a desktop review of secondary sources (see Appendix J).

Ecological Resources

Background information about ecological resources has been obtained from a review of previous studies and secondary sources, including the National Hydrography Dataset. Water resources along the study corridor include an approximately 4.9-acre lake on the Brookside Golf & Country Club Estates property, several wetlands, and an unnamed stream that is a tributary to the Olentangy River. Vegetation in the study corridor is dominated by beech-maple forest. A Level 1 Ecological Survey will need to be prepared once the Preferred Alternative is known.

Environmental Site Assessment

In December 2016, the study team conducted a database search and field review to determine the likelihood of hazardous substances within the study area. This review identified 15 sites of concern within the overall study area, listed in Table 7. An ESA Screening (or Regulated Materials Review) will be required in future phases of project development to verify whether these sites, if impacted, warrant Phase I ESAs.

Address	Current Use	Potential Sources of Contamination
6300 Sawmill Road	Tansky Toyota car dealership	• Current auto sales/ repair • RCRA CORRACTS / RCRA CESQG • 1 LUST (1 NFA)
3709 W. Granville Road	Firestone auto service	• Current auto repair facility • RCRA CESQG • Historic Auto Station
2756 Festival Lane	Multi-tenant: Panera, Barnes & Noble	• Historic dry cleaners
2815-2827 W. Dublin-Granville Road	Beightler Armory	• RCRA SQG / NonGen (no violations) • ERNS (spill of jet-A fuel) • DERR (Emergency Response Program) • 7 LUST (6 NFA; 1 Disproved) • 9 USTs removed • 5 SPILLS
2665 W. Dublin-Granville Road	NAPA Auto & Truck Parts and distribution center	• Historic Auto Station • RCRA SQG
2475 W. Dublin-Granville Road	Advanced Auto Body & Paint Center	• Current auto repair & painting facility • RCRA CESQG
2245-2299 W. Dublin-Granville Road	Multi-tenant: retail (vacant)	• Former filling station / auto sales and repair • RCRA SQG / NonGen (no violations) • 2 LUST (2 NFA) • 9 USTs (removed)
6130 W. Dublin Granville Road	Wendy's	• Former filling station • 3 LUST (NFA, RPT, SCK)
2177 W. Dublin Granville Road	Multi-tenant retail: Dublin Cleaners	• Current dry cleaners • US Historic Cleaners
2182-2204 W. Dublin-Granville Road	Vacant (former United Dairy Farmers filling station)	• Former filling station • 2 LUST (1 Site Check & 1 Tier 1 Investigation) • 3 USTs currently in use
2230 W. Dublin-Granville Road	BP filling station	• RCRA SQG • 1 LUST (1 NFA)

		• 5 USTs removed; 2 USTs in use
D K Erwin Properties LLC	2278 W. Dublin Granville Road	• Current copy/ printing facility • Former auto storage
2347-2360 W. Dublin-Granville Road	Valvoline Instant Oil	• Current auto repair • RCRA CESQG (no violations)
2396 W. Dublin-Granville Road	COW Autobody Collision	• Current auto repair • 1 LUST (1 Site Check) • Historic Auto Station
3524 W. Dublin-Granville Road	Multi-tenant: One Way Cleaner	• Current dry cleaners

Table 7 – Summary of ESA Sites of Concern

Cultural Resources
Phase I archeological reconnaissance was conducted for the SR 161 study corridor during development of the 1997 Environmental Assessment (EA). A Phase II eligibility assessment was then conducted for two archeological sites that were within the area of potential effect of the previous proposed project on the SR 161 corridor. The Phase II eligibility assessment concluded that one site located in the northwest quadrant of the Olentangy River Road intersection with SR 161 (Site 33Fr1272) may be likely to yield information important to prehistory, and is eligible for listing in the National Register of Historic Places (NRHP).

Previous studies identified 22 historic architectural sites along the SR 161 corridor. The Linworth Alternative School was the only site identified that met the criteria for inclusion in the NRHP.

Environmental Justice
Based on the USEPA EJScreen data reviewed September 2017, the project is located in an area with a 4 to 29% minority population and with 1 to 13% of the population below poverty. The residents of all communities adjacent to the proposed project, including environmental justice populations, would benefit from improvements to SR 161 as a result of improved mobility and improved facilities for pedestrians and cyclists in the area. The alternatives considered in this feasibility study do not appear to have any disproportionately high and adverse impacts on minority or low-income populations, but the potential for Environmental Justice impacts will need to be reviewed in future phases of project development.

Section 4(f)
There are several publicly-owned properties along the SR 161 corridor. The Ohio State University Airport, also known as the OSU Don Scott Airport, is located at 2160 West Case Road. The airport is owned and operated by the Ohio State University. Ohio State University owns property along the SR 161 right-of-way. However, the parcels that contain the airport facility are buffered from the SR 161 corridor by other parcels owned by Ohio State, the Ohio National Guard, and private landowners. The airport facility itself is located approximately 0.5 mile from the SR 161 corridor and would not be impacted by any of the alternatives developed during the feasibility study.

Linworth Park is a 13-acre park located at 5971 Linworth Road, just south of the SR 161/Linworth Road intersection. The park is managed by the City of Worthington and features a baseball diamond, basketball court, soccer field, playground, tennis courts, and a multi-use trail. Improvements to the SR 161/Linworth intersection may result in the need for Section 4(f) coordination for Linworth Park due to access issues during construction or potential extension of sidewalk or path facilities. No impacts to the park property are anticipated at this time.

The Linworth Alternative Program High School is eligible for listing in the NRHP. The previous project only impacted the driveway/frontage and the previous finding was “no effect” under Section 106. ODOT prepared Section 4(f) for this property in 2001. Widening of the SR 161 corridor may result in the need for updated Section 4(f) coordination for the Linworth Alternative Program High School.

V. Public Involvement

A Public Involvement Plan (PI Plan) was prepared in July 2016 for the FRA-161-5.77 corridor study. The public involvement approach included sending property owner notification letters, creating and updating a study fact sheet, forming an Advisory Committee, and holding a public meeting.

Property Owner Notification Letters
In August 2016, the project team sent letters to property owners within 500 feet of the study corridor in order to provide background information about the study and notify recipients of upcoming field work. In addition, the letters provided contact information for ODOT’s Real Estate Administrator and extended an opportunity to sign up for the project e-mail list and/or submit comments to the project team.

Fact Sheet
A Fact Sheet was developed in June 2016 and updated several times throughout the course of the study. The Fact Sheet was distributed to members of the Advisory Committee and other key stakeholders and provided background information about the study, schedule information, and study updates.

Advisory Committee
The study team formed an Advisory Committee with members from each of the jurisdictions and neighborhood groups along the corridor. The Advisory Committee’s role was to inform the study team and advise the decision-makers. Five meetings were originally planned for the Advisory Committee but meeting #4 needed to be broken into two parts due to the amount of material to be covered, resulting in six meetings total between August 2016 and July 2017.

Advisory Committee Meeting #1 was held Wednesday, August 31, 2016 at 2:30 p.m. at the Worthington Education Center. At this meeting, the study team provided an introduction to the study, discussed the Advisory Committee’s role, and sought input from the committee on issues of concern that should be considered during the study.

Advisory Committee Meeting #2 was held Thursday, November 17, 2016 at 2:30 p.m. at the Worthington Education Center. The study team discussed their data collection and analysis efforts completed to date and asked the committee to provide feedback on the transportation needs to be addressed.

Advisory Committee Meeting #3 was held on Thursday, January 12, 2017 at 3:15 p.m. at Linworth Alternative Program High School. The purpose of this meeting was to conduct an “Alternatives Workshop” where the committee members would propose conceptual alternatives for the study team to further develop for discussion at the next committee meeting.

The study team presented over 20 preliminary concepts at Advisory Committee #4-A held Tuesday, March 14, 2017 at 2:30 p.m. at the Worthington Education Center. Preliminary concepts were developed for the western end of the corridor, the eastern end of the corridor, the Linworth intersection, and the CSX railroad crossing. The preliminary concepts included 3-lane and 5-lane cross section alternatives, railroad underpass and overpass alternatives, and innovative intersection alternatives at Linworth, including a modified Superstreet and a roundabout. Attendees provided comments on the preliminary concepts at the meeting and through email following the meeting.

Advisory Committee Meeting #4-B was held Wednesday, April 19, 2017 at 2:30 p.m. at the Brookside Golf & Country Club. The purpose of this meeting was to review the comparison of preliminary concepts and discuss

suggested concepts to carry forward to the public meeting. The Advisory Committee was generally in agreement that a 5-lane cross-section did not fit the character of the corridor and was not necessary to eliminate the bottleneck at Linworth Road. The Advisory Committee also expressed concern over the potential impacts of an overpass at the CSX rail line and a roundabout at the Linworth intersection, which would need to accommodate two lanes of traffic in each direction in order to function effectively. These alternatives were removed from further consideration. There was general consensus from the committee members that accommodating pedestrians and cyclists in the corridor was important, but there was not consensus on how best to do so. The study team suggested that this question be presented at the public meeting with alternatives showing different bicycle and pedestrian options.

The final Advisory Committee Meeting was held following the public meeting. Advisory Committee Meeting #5 was held Wednesday, July 19, 2017 at 2:30 p.m. at the Ohio Emergency Management Agency. The purpose of this meeting was to discuss comments from the June 6th public meeting, discuss recommendations of the study team, and provide feedback for the funding partners to consider as they decide what project(s) to develop further and seek funding.

Exhibit 3 – July 19, 2017 Advisory Meeting #5

<u>Public Meeting</u>
An open-house style public meeting was held on Tuesday, June 6, 2017 at Thomas Worthington High School from 5:00 to 7:00 p.m. Attendance at the public meeting totaled 185, including 162 members of the public and 23 representatives of the funding partners and project team. As proposed in the PI Plan, outreach methods for the public meeting included mailed invitations to residents within 500 feet of the study area and emailed invitations to the Advisory Committee members and other interested parties that provided their contact information. Fact sheets, exhibits, and project staff were available at the public meeting to provide information about the study and answer questions. A comment station, with comment forms and comment boxes, was also available at the public meeting. Attendees had the option to submit handwritten comments in person or to mail or email in their comments to ODOT for 30 days following the meeting.

Once the Feasibility Study is accepted by ODOT, the future steps of the design and construction of the project will be scheduled as it advances through the ODOT PDP, and additional informational meetings will be held with the stakeholders and the public.

Exhibit 4 – June 6, 2017 Public Meeting

VI. Comparison of Feasible Alternatives

The feasible alternatives were evaluated based on their ability to meet the primary needs of the project, right-of-way impacts (impacts to drives, land, and buildings) and a combination of construction and right-of-way costs. These are summarized in the Comparison of Alternatives matrix below.

Alternatives	Categories									
					Primary Needs					
	No. of Parcels Impacted	No. of Drives Impacted	No. of Relocations	Construction and Right-of-Way Costs (millions)	Reduce vehicular delay at the SR 161 & Linworth intersection	Improve access to/from driveways and side streets	Address identified rear-end crash patterns	Improve pedestrian connectivity and walkability	Reduce delay at railroad crossing	Improve cycling connectivity and quality
Corridor West										
CW1	63	38	0	$16.0		X	X	X		X
CW2	**52**	38	0	**$14.5**		X	X	X		X
CW1_CW2Combined	67	38	0	$17.0		X	X	X		X
Railroad Corridor										
RR1	**12**	**14**	**0**	**$0.2**	X			X	X	x
RR2	32	33	13	$19.8	X				x	X
Linworth Intersection										
LI1-3L-1	23	15	1	$4.2	X	X	X	X		X
LI1-3L-2	**19**	15	**0**	**$3.9**	X	X	X	X		X
LI1-3L-1-2Combined	23	15	1	$4.5	X	X	X	X		X
Corridor East										
CE1	34	25	0	$3.7		X	X	X		X
CE2	34	25	0	**$3.2**		X	X	X		X
CE1_CE2Combined	34	25	0	$4.0		X	X	X		X

Numbers in **bold** represent the lowest quantitative value where there is a difference between alternatives.

Table 8 – Comparison of Alternatives Matrix

VII. Recommendations

The overall corridor consists of areas with different characteristics, however, certain aspects are recommended throughout. These are included as part of the *CW2, RR1, LI1-3L-2* and *CE2* options and include:

1. Roadway
   - i) East of Federated Blvd., include a center two-way-left-turn (TWLT) lane throughout.
   - ii) Add needed left- and right-turn lanes at the intersection with Linworth Road.
   - iii) Align opposing lanes at Linworth Road intersection and eliminate the existing split phase.
   - iv) Add targeted left- and right-turn lanes at spot locations as identified by traffic analysis.
   - v) Extend the existing, second eastbound through lane from Sawmill Road to Federated Blvd.
   - vi) Extend the second westbound through lane from Martin Road to Federated Blvd.
   - vii) Extend the existing, second westbound through lane from Olentangy River Road, with length of extension to be evaluated.
2. Shared Use Path (SUP):
   - i) At the western end, the SUP begins on the north side to meet up with the path at Sawmill Road.
   - ii) Cross the path to the south side at some point between Federated Blvd. and Brookdown Road. Evaluate the location for the crossing during implementation.
   - iii) SUP on the south side from its crossing location to Olentangy River Road.
3. Sidewalk:
   - i) Sidewalk proposed on the north side beginning where the SUP crosses to the south.
   - ii) During implementation, an evaluation should be performed section-by-section to determine where to include the sidewalk and where to omit it based upon jurisdiction and more detailed impact information.
4. Railroad Crossing:
   - i) Improve the roadway profile at the railroad crossing to allow for vehicles to safely cross at the legally posted speed, thus improving the traffic flow.

A Railroad Grade Separation is NOT recommended at this time but may warrant future consideration pending potential land and pedestrian use changes in the corridor. An adequate level of service CAN be achieved without a grade separation with the railroad (see Appendix D for LOS information), but development options may warrant another look if the land use of the area changes significantly before the project comes to fruition.

VIII. Next Steps

The SR 161 corridor lends itself to being broken down into multiple projects, or buildable units, that can be pieced together for any number of reasons (immediate safety impacts, budgetary constraints, jurisdictional funding and/or schedules, maintenance of traffic, etc.). In all scenarios, the projects should be done as total reconstruction (except where otherwise specified) to allow profile revisions that will support a closed drainage system and eliminate right-of-way impacts solely due to the need for open channel ditches. The projects listed below are in the suggested order of construction (see Appendix L for graphics):

Project 1: Linworth Intersection (Hutchinson Street to Strathaven Drive)

- Add turn lanes and upgrade the signal.
- Optimize the alignment of the intersection to minimize property impacts.
- Evaluate the green space (i.e. “tree lawn”) area for required width and treatments based upon jurisdiction.
- Include a SUP on the south side, incorporating the existing path where practical.
- Evaluate whether to include or omit sidewalk on the north side based on jurisdiction’s requirements and more detailed impact information.
- Evaluate whether to include sidewalk/path along Linworth Road.
- Determine the proposed crosswalk treatments.
- Investigate utility relocation issues and the potential for burying utilities.
- Update traffic counts and forecasts to obtain certified traffic.

Project 2: Railroad Crossing (Aeros Drive to Hutchinson Street)

Note: Suggest combining Projects 1 and 2 for implementation, depending on availability of funding.

- Evaluate the roadway profile to smooth the crossing while minimizing property impacts.
- Add a center TWLT lane.
- Evaluate the green space (i.e. “tree lawn”) area for required width and treatments based upon jurisdiction.
- Add a SUP on the south side.
- Evaluate whether to include or omit sidewalk on the north side based on jurisdictional requirements, regulations and more detailed impact information.
- Investigate utility relocation issues and the potential for burying utilities.

Project 3: Corridor East (Strathaven Drive to Olentangy River Road)

- Add a center TWLT lane.
- Extend the second westbound through lane from Olentangy River Road farther to the west and re-evaluate required length during implementation.
- Evaluate the alignment to determine whether to widen symmetrically or more to the south to minimize impacts to homes.
- Evaluate the green space (i.e. “tree lawn”) area for required width and treatments based upon jurisdiction.
- Evaluate re-use of the existing SUP on the south side in coordination with widening optimization.
- Evaluate whether to include or omit sidewalk on the north side based on jurisdiction’s requirements and more detailed impact information.
- Update traffic counts and forecasts to obtain certified traffic.

Project 4a: (Sawmill Road to Federated Blvd.)

- Extend the second eastbound through lane from Sawmill Road to Federated Blvd.
- Extend the second westbound through lane from Martin Road to Federated Blvd.
- Add the SUP on the north side and sidewalk on the south side.
- SR 161 & Martin Road – Add eastbound right-turn lane on SR 161
- SR 161 & Sawmill Place Boulevard– Add eastbound right-turn lane on SR 161
- Update traffic counts and forecasts to obtain certified traffic.

Project 4b: Corridor West (Federated Blvd. to Aeros Drive)

- Add a center TWLT lane.
- Evaluate the alignment to determine whether to widen symmetrically or more to one side to minimize impacts.
- SR 161 & Federated Boulevard – Add westbound right-turn lane on SR 161
- Evaluate the green space (i.e. “tree lawn”) area for required width and treatments based upon jurisdiction.
- Add a SUP. Evaluate where to cross from the north to the south side between Federated Blvd. and Brookdown Drive.
- Further evaluate property impacts resulting from proposed sidewalks in these areas:
  - Federated Blvd. to Maplebrook Lane (if path on south side)
  - Maplebrook Lane to Brookdown Drive (if path on south side)
  - Brookdown Drive to Fiesta Drive
  - Fiesta Drive to McVey Blvd.
  - McVey Blvd. to Aeros Drive
- Evaluate signal warrants to determine if additional intersections meet warrants for traffic signals.
- Evaluate potential for shared access between Brookdown Drive, Fiesta Drive and Nicholas Drive.
- Update traffic counts and forecasts to obtain certified traffic. Re-evaluate unsignalized intersections using the most recent capacity analysis methodology.

The funding partners will meet to review the Feasibility Study and discuss potential funding options and apply for competitive funding.