IR71 Corridor Study

Final Report

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NOACA

ODOT D3 and D12

Executive Summary

Interstate 71 (IR-71) is a regionally significant highway that connects Cleveland to Columbus, Cincinnati and Louisville, Kentucky. Traffic flow and congestion along this highway corridor varies, but it generally operates near or at capacity level during the peak periods as it passes through urbanized areas such as Strongsville and Medina. Traffic congestion along IR 71 from the State Route (SR) 82 (Royalton Rd) interchange to United States Route (US)-224 has been a concern of local officials for some time. Since 1984, studies have been undertaken to address the traffic congestion problem and investigate the need for a new interchange.

The Northeast Ohio Areawide Coordinating Agency (NOACA) and the Ohio Department of Transportation (ODOT) have partnered on a study to investigate improvements on the operations of the Interstate 71 corridor by reducing congestion and improving safety. Specifically examining the high-level need for one or more interchanges in the corridor to provide the most relief in terms of congestion to increase reliability and decrease vehicle emissions.

This study consists of two phases: phase one examined the existing conditions of the study area in order to identify the congested locations during the morning (AM) and afternoon (PM) peak periods, and phase two conducted a comparative analysis for a set of selected construction scenarios.

The study area was determined to be IR-71 from IR-80 to SR-224. The first phase of this study indicated that the congestion around the South Park Mall in Strongsville is unrelated to the congestion around the Medina downtown and therefore the study area was split into northern and southern subareas for more concentrated and accurate analyses. The northern subarea contains IR-71 from IR-80 to SR-303 and W130th Street to Pearl Road (US-42). The southern subarea contains IR-71 from Hamilton Road to US-224 and US-42 to IR-71.

The study focuses on improvements with the highest return on investment, which led to six alternatives being identified for the northern subareas and two alternatives being identified for the southern subareas. The “No Build” scenario played the benchmark role for the conducted comparative analysis. Each alternative comes with a cost including construction, right of way acquisition, and maintenance costs. These costs were then decreased by estimated reduction in congestion costs, and the savings magnitude is the overall comparison indicator. This study also considered crash and emission costs for each alternative. Aggregating all these costs for each alternative and comparing them with the specified benchmark quantified the positive or negative return of each alternative. A positive return justifies the project implementation.

In the northern subarea, the six alternatives analyzed:

1. Widening Howe Road
2. Adding an I-71 southbound auxiliary lane between I-80 and westbound SR-82 exit ramp
3. Widening Howe Road and adding the above auxiliary lane
4. Adding a full interchange at Boston Road and IR-71
5. Adding a partial interchange at Boston Road and IR-71
6. All of the above alternatives together

In the southern subarea, the two alternatives analyzed:

1. Adding a full interchange at SR-57 and IR-71

2. Adding a partial interchange at SR-57 and IR-71

The alternatives in the northern subarea that have positive returns and their rankings are:

1. Adding a partial interchange at Boston Road and I-71
2. Adding a I-71 southbound auxiliary lane between I-80 and westbound SR-82 exit ramp
3. Widening Howe Road and adding the above auxiliary lane
4. Widening Howe Road

The alternatives in the southern subarea that have positive returns and their rankings are:

1. Adding a partial interchange at SR-57 and IR-71
2. Adding a full interchange at SR-57 and IR-71

It should be noted that the saving for the scenarios of the southern subarea is much higher than those of the northern subarea. This is due to the following reasons;

- The southern subarea is larger than the northern subarea and consequently includes more streets and highways
- The specified alternatives for the southern subarea are close to the congested Medina downtown and therefore, aggregated impacts of these projects is higher

Background

The Northeast Ohio Areawide Coordinating Agency (NOACA) and the Ohio Department of Transportation (ODOT) have partnered on a study to investigate improvements on the operations of the Interstate 71 (IR-71) corridor by reducing congestion and improving safety. Specifically examining the high-level need for one or more interchanges in the corridor to provide the most relief in terms of congestion.

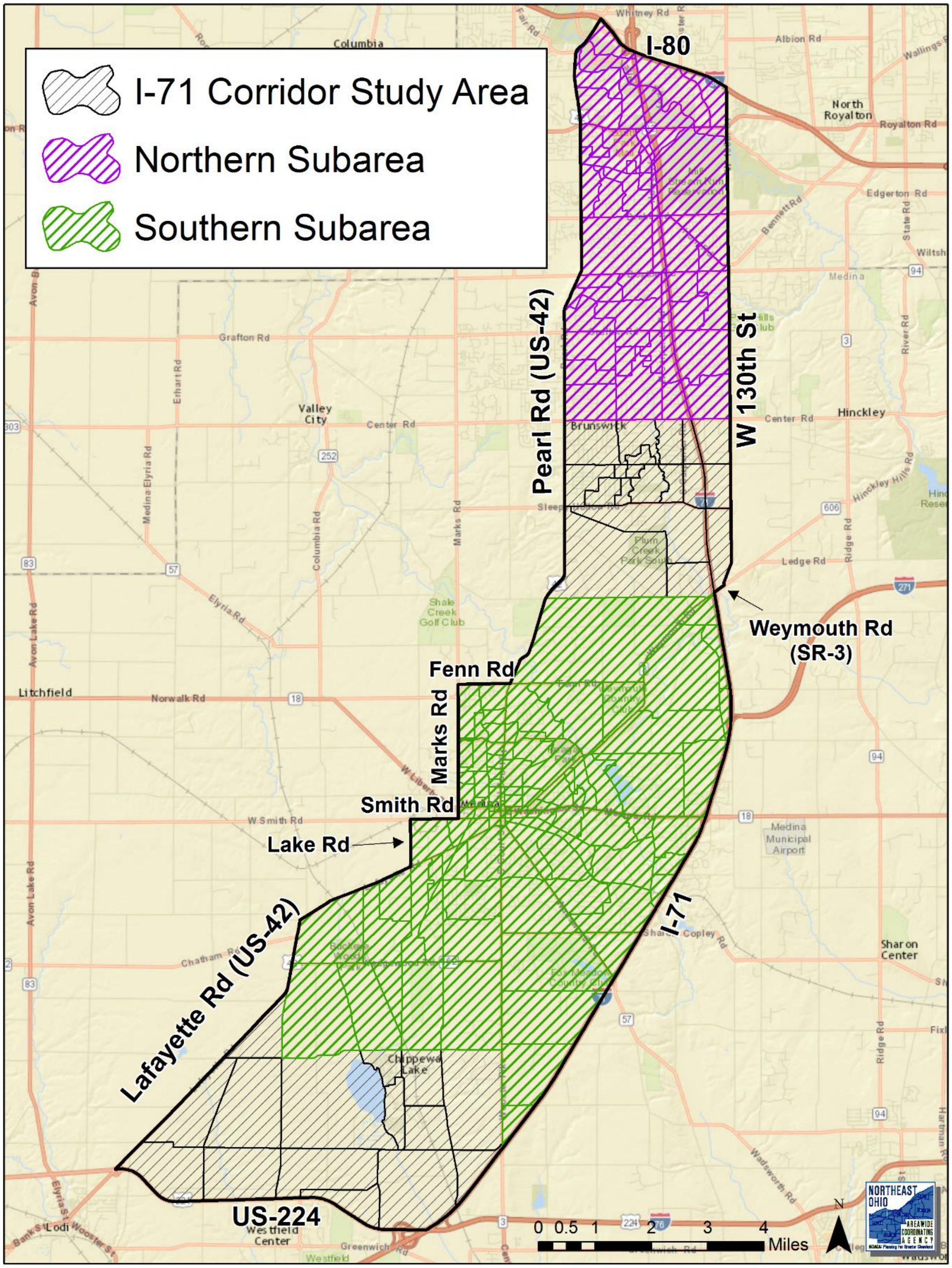
Interstate 71 is a regionally significant highway that connects Cleveland to Columbus, Cincinnati and Louisville, Kentucky. Traffic flow and congestion along this highway corridor varies, but it generally operates near or at capacity level during the peak periods as it passes through urbanized areas such as Strongsville and Medina. Traffic congestion along IR 71 from SR 82 (Royalton Rd) interchange to US-224 has been a concern of the local officials for some time due to an increase in urbanized development.

NOACA first conducted a point of access study in 1984, which concluded there was sufficient justification for an additional access at IR-71 and Boston Road. In 1986, a benefit cost analysis was conducted, which showed a high economic benefit. In 1989, further analysis of the 1984 point of access study was conducted, which included an impact study of the additional access point at IR-71 and Boston Road on the freeway, adjacent interchanges, the arterial system and the environment. In 1990, a regional freeway accessibility study concluded an interchange at IR-71 and Boston was the most likely location. In 1992, traffic studies were conducted to address the impacts of the planned shopping mall (South Park Center). An interchange modification study was performed in 1999, which again concluded an interchange at IR-71 and Boston Road was justified. The study investigated four alternatives.

More recently, ODOT conducted a safety analysis in 2012 to study the IR-71 and State Route (SR) 82 interchange, which recommended short, medium and long term solutions. In 2013, an origin and destination study was done. Finally in 2015, an interchange justification study was conducted. These later ODOT studies focused on the IR-71 and SR 82 interchange only and did not consider a new interchange, but rather, were looking at lower cost, shorter term solutions to the safety and congestion issues.

This study consists of two phases: phase one examined the existing conditions of the study area in order to identify the congested locations during the AM and PM peak periods, and phase two conducted a comparative analysis for a set of selected construction scenarios.

Map1: IR-71 Corridor Study Area



Traffic Congestion Analysis

A traffic congestion analysis was conducted during the phase one of this study and its purpose was to identify the congestion locations for the current and future conditions in the study area. This analysis utilized AM and PM peak period scenarios of the base year (2015) and future year of 2040 of the NOACA travel forecasting model in order to identify the existing and future congested locations. The congestion severity was determined by the commonly used traffic engineer measures of Level of Service (LOS) during the AM and PM peak periods. LOS levels are qualitative measures that are used to stratify the quality of traffic services and are generally divided into six ranges of category A (best) through F, with LOS F being indicative of severe congestion.

The following notes were concluded based on the implemented traffic congestion analysis:

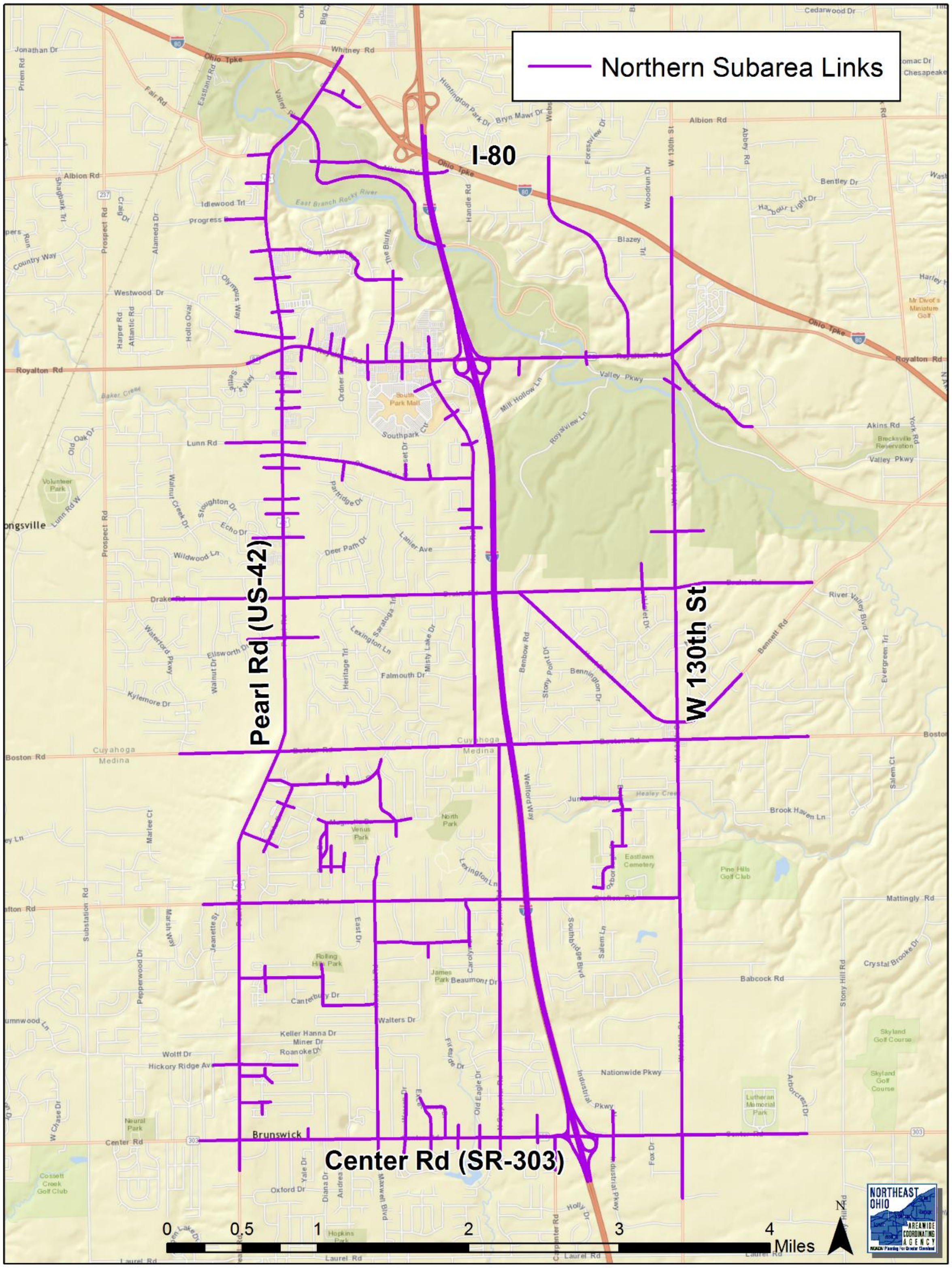
- PM peak period is more congested than AM peak period
- The congestion is more severe around the Interstate 71 interchanges at State Route 82 and Center Road (SR 303)
- Similar to other downtowns, as expected, streets approaching downtown Medina are congested during the AM and PM peak periods
- W 130th Street plays an alternative role to Interstate 71 for trips originated/destined to the east of this highway and operates over capacity (LOS F) during the AM and PM peak periods
- Similarly, Howe Road plays the western alternative to Interstate 71, especially in the AM peak period
- The distance between I71 interchanges with SR 82 and SR 303 is about five miles and considering the recent new developments in this area, local traffic is imposed on I71 between these interchanges and vehicles travel longer through the I71 rather than local streets to reach their destinations
- Interstate 71, in this study area, operates near or at capacity level during the AM and PM peak periods, and considering the same road network for the future years, congestion on this highway will be worse and operate at LOS F in the PM peak period
- Congestion in the northern portion of the study area seems unrelated to the congestion in the southern portion

This analysis led to conducting a deeper evaluation called “Select Link Analysis” during phase one. Select Link Analysis is an embedded analysis in travel demand modeling platforms for figuring out origins and destinations of vehicles traveling through a selected road segment. This approach is commonly utilized for congested road segments in order to find out the origins and destinations of vehicles causing a traffic congestion in an area.

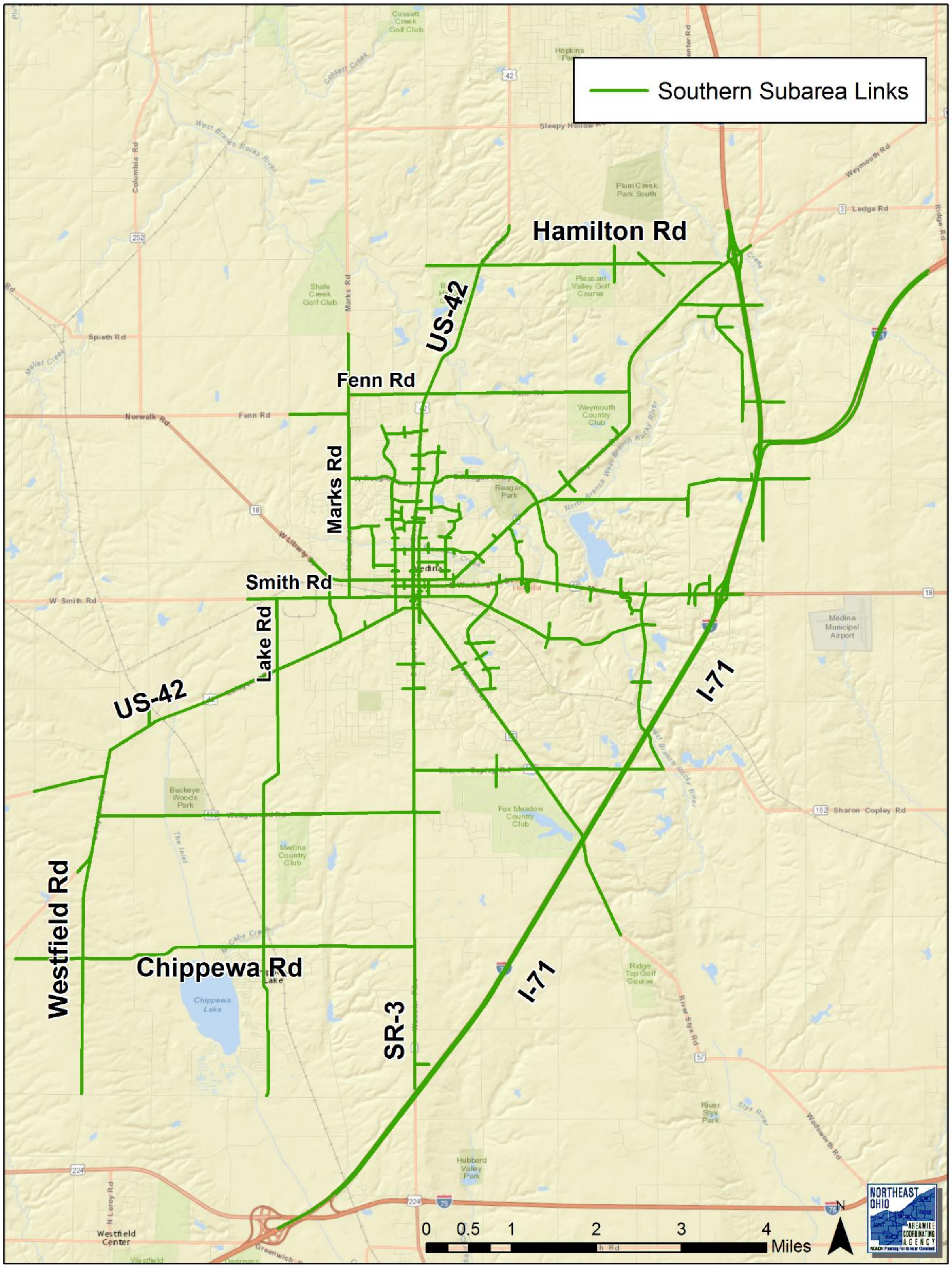
The select link analysis concluded that the street and highway network in the northern subarea are mainly used by traffic with origins and/or destinations in this subarea. Similarly, the street and highway network in the southern subarea are mainly used by traffic with origins and/or destinations in this subarea. Also, Interstate 71 is a regionally significant highway used by traffic with origins and/or destinations in the NOACA region and even other Counties.

This conclusion led to splitting the study into two subareas for more concentrated and accurate analyses. As shown on Map 2 and Map 3, the boundaries for the northern subarea are I-80, SR 303 (Center Road), W130th Street, and Pearl Road (US-42) and the boundaries for the southern subarea contains IR-71 from Hamilton Road to US-224 and US-42 to IR-71.

Map 2: Model Network Links of the Northern Subarea



Map 3: Model Network Links of the Southern Subarea



Based on the discussed congestion locations and the select link analyses, and many previous studies, the following alternatives were specified as alternative scenarios and analyzed in the second phase of the study:

The northern subarea;

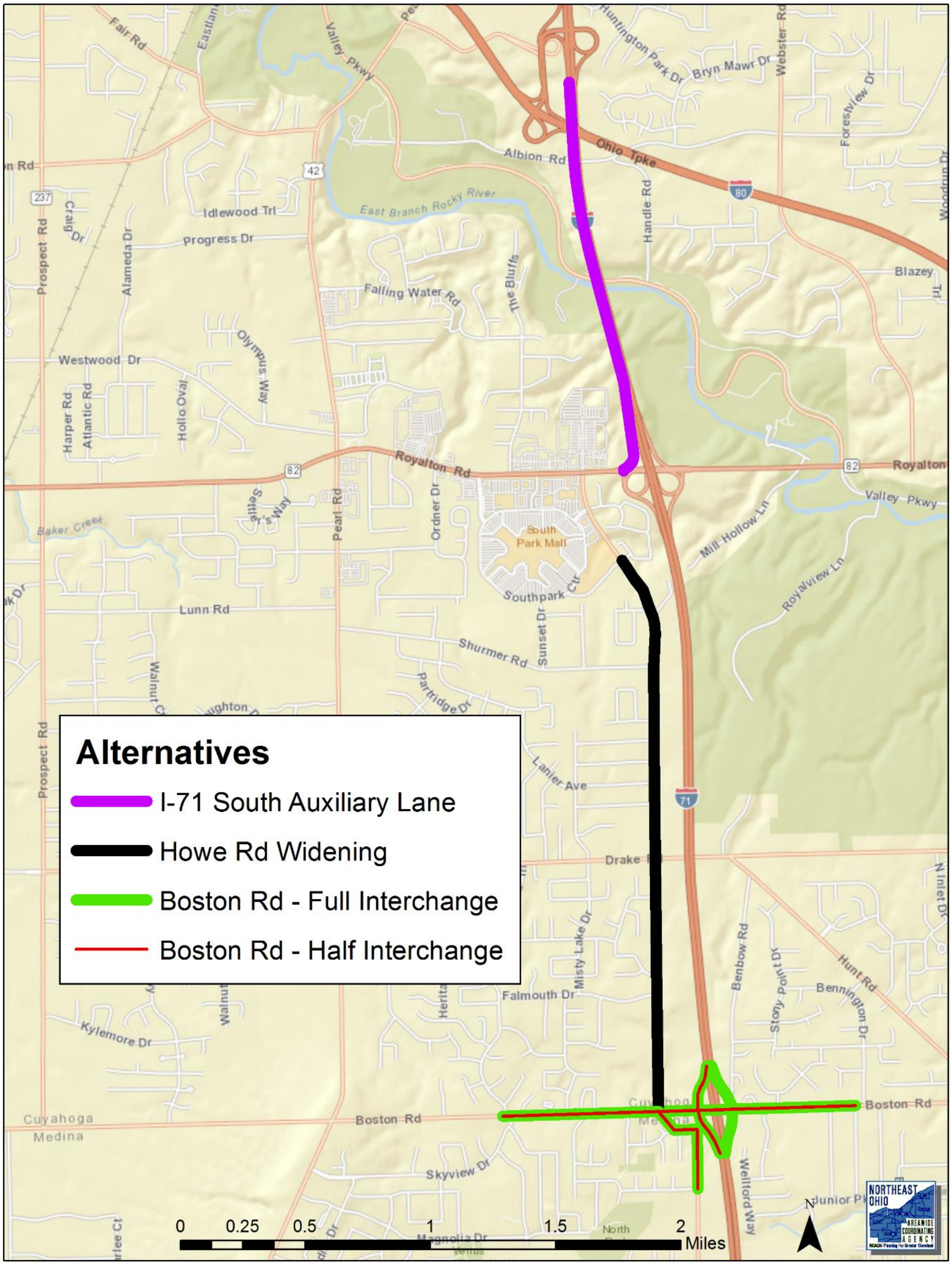
- No Build
- Widening Howe Road
- Adding a I-71 southbound auxiliary lane between I-80 and westbound SR-82 exit ramp
- Widening Howe Road and adding the above auxiliary lane
- Adding a full interchange at Boston Road and I -71
- Adding a half interchange at Boston Road and I-71
- Widening Howe Rd, adding the auxiliary lane and a full interchange at Boston Road and I-71

The southern subarea;

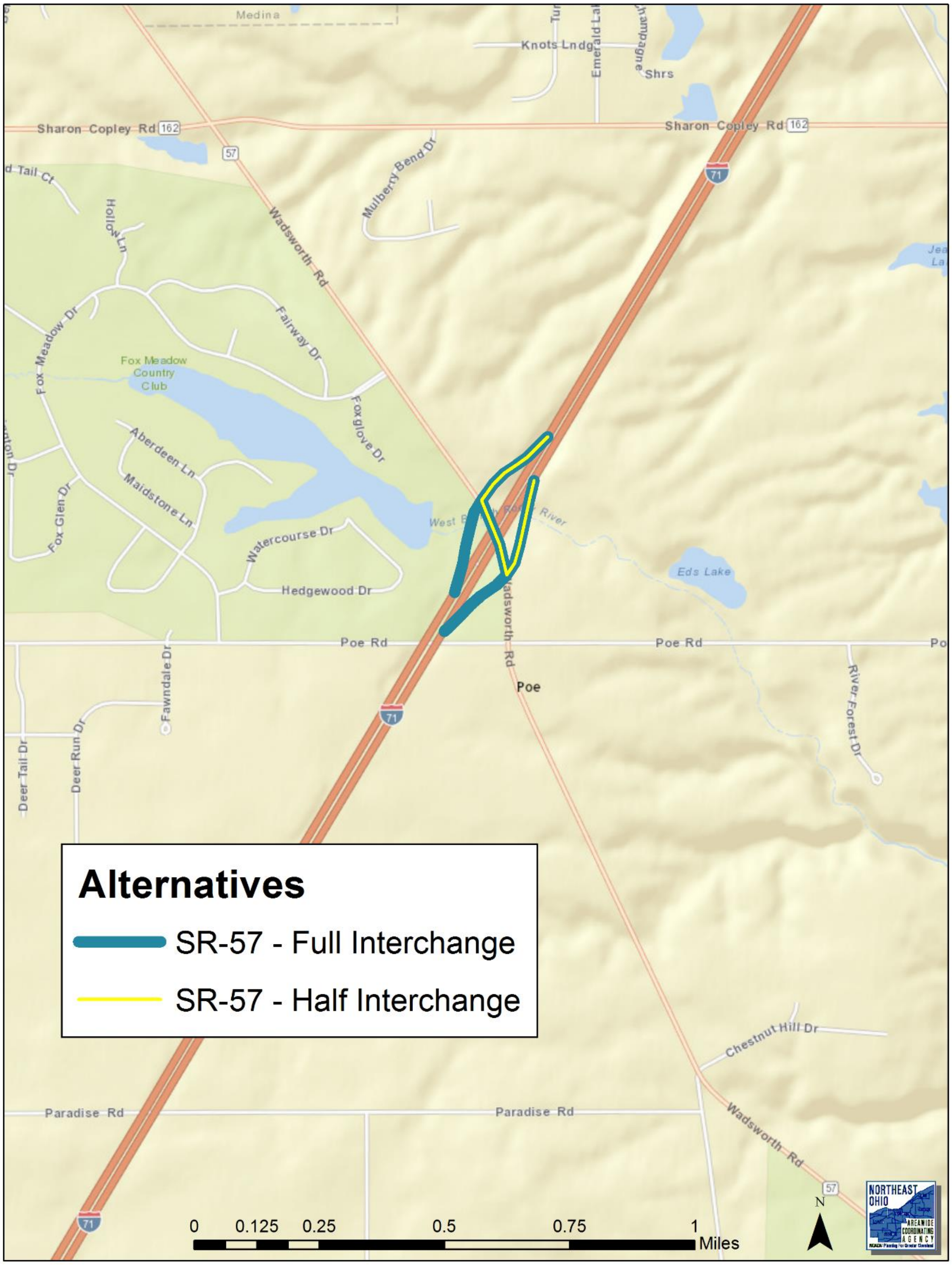
- No Build
- Adding a full interchange at SR 57 Road and I -71
- Adding a half interchange at SR 57 Road and I-71

Map 4 and Map 5 illustrate the locations of the above road additions, widening and interchanges.

Map 4: The Alternatives Locations in Northern Subarea



Map 5: The Alternatives Locations in Southern Subarea



Safety Analysis

The crash risk in congested areas within the project boundaries was considered for the IR-71 corridor study in Cuyahoga and Medina counties. To properly approach safety mitigation in the region, ODOT and NOACA used crash data to screen the network for sites with potential for improvement and propose countermeasures (if applicable) to reduce the frequency of crashes, resulting in overall improvements to the system leading to enhanced safety and mobility.

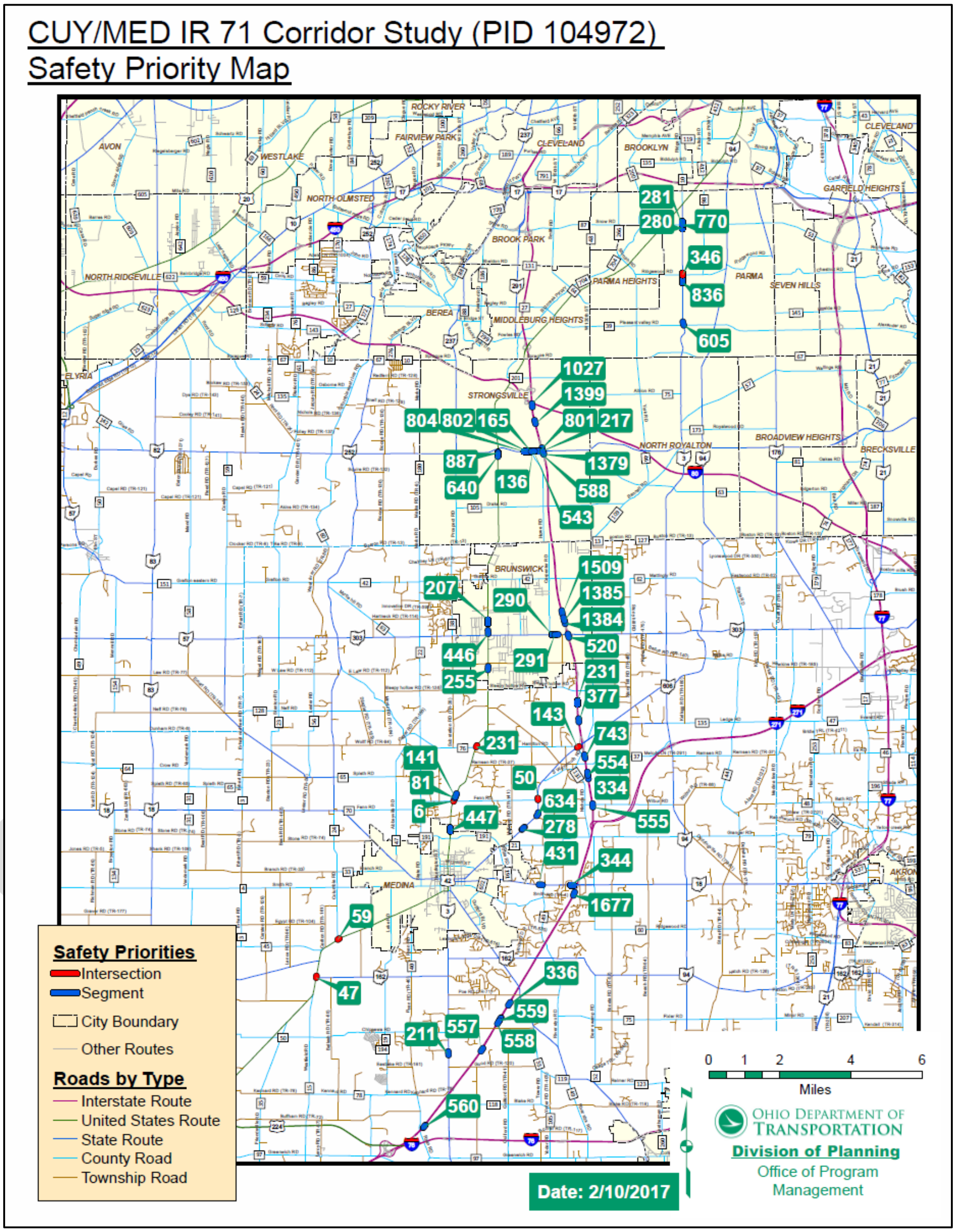
All crash data included in the safety analysis for this interchange study was provided through ODOT's GIS Crash Analysis Tool (GCAT). GCAT uses Geographic Information Systems (GIS) to connect crashes reported by law enforcement agencies to a geographic location. Crash data provides the basis for all safety analysis done in this report.

Using statistical methods in conjunction with existing data, it is possible to compare the crashes that are expected to occur on a roadway (the expected crash frequency) to the crash frequency that was reported to have occurred on a roadway. The difference between the expected crash frequency and reported crash frequency is referred to as the excess crash frequency. The excess crash frequency quantifies how many more (or fewer) crashes have occurred on a specified type of roadway or intersection to the crash frequency that would be expected for that type of roadway. This method is used so that factors that influence safety, such as the volume and geometry, can be quantified and more accurately represented. Using the excess crash frequency, ODOT and NOACA can screen large roadway networks for a positive excess crash frequency, or roadways having more crashes occurring than the number of crashes that would be expected. Sites with a positive excess crash frequency are referred to as a site with potential (SwiP).

Every year ODOT ranks existing intersections and roadways by type of roadway (Rural Intersection, Rural Non-Freeway, Rural Freeway, Urban Intersection, Urban Non-Freeway, and Urban Freeway) from the highest excess crash frequency to the lowest crash frequency to prioritize locations for safety improvements. ODOT studies the top 50 locations with the highest excess crash frequency based on the three most recent years of available data. ODOT has included in this report all sites with potential as of 2015 (based on data from 2013 to 2015) that fall within the study area. NOACA has also screened its area for intersections that could be sites with potential. See Map 6, which shows all crashes mapped to the study area.

With reported crashes referenced to a specific location, it is then possible to identify crash patterns and propose a safety countermeasure to reduce the crash frequency at these locations. More specifically, based on the type, severity, and frequency of crashes occurring, a countermeasure is chosen that is expected to cause a reduction in crashes and provide a benefit greater than the cost of the countermeasure.

Map 6: Safety Priority Map



Summary Statistics

All summary statistics have been provided for crashes from 2011 through 2016 having occurred on state roadways within the study area. All available data was utilized to be more thorough, complete, and potentially provide more insight when comparing crash trends in the study area and on roadways in the study area. The number of crashes having been recorded on each roadway can be found summarized in Table 1.

Table 1: Number of Crashes by Route

ROUTE	SLM BEGIN	SLM END	Length	GCAT Crashes
CUYAHOGA IR 71	0	3.93	**3.93**	**579**
MEDINA IR 71	7.999	26.679	**18.68**	**1216**
CUYAHOGA US 42	0	4.67	**4.67**	**763**
MEDINA US 42	3.06	26.94	**23.88**	**2000**
CUYAHOGA SR 82	2.22	4.83	**2.61**	**927**
MEDINA US 224	6.33	16.279	**9.949**	**193**
MEDINA SR 3	5.19	17.29	**12.10**	**892**
MEDINA SR 18	11	15.51	**4.51**	**871**
MEDINA SR 57	9	12.7	**3.70**	**220**
MEDINA SR 162	12.43	19.59	**7.16**	**133**
MEDINA SR 303	6.88	9.82	**2.94**	**830**

These crashes do not take into account contributing or exposure factors (such as the volume of traffic on the roadway) but do provide a good scope for planning possible safety improvements, representing the current status of safety for these roadways. From crash data we can observe that the highest frequency of crashes occurs on Medina US 42. When considering the length of the roadways, the highest frequency of crashes per mile occurs on Cuyahoga SR 82. The severity of crashes can play a significant role in economic and societal impacts. A summary showing the distribution of crashes by severity can be found in Table 2.

Table 2: Severity of Crashes

CRASH_SEVERITY	Number	%
Fatal Crash	**15**	0.2%
Injury Crash	**1443**	22.6%
Property Damage Crash	**4937**	77.2%
Grand Total	**6395**	**100.0%**

The relatively high severity distribution of crashes in the project area suggests that there is the potential for safety improvement(s). The severity of the crashes is, in a way, governed by the type of crash occurring. For example, Angle, Head-On, Overturning, and Left Turn crashes are typically found to be of higher severity than Sideswipe, Backing, or Rear End crashes. Evaluating the type of crashes is used to address safety concerns and assign appropriate countermeasures.

Table 3 shows the types of crashes that have occurred in the study area. From the crash types in the study area, over half of all crashes are rear end and angle crashes. These crash types are typically associated with intersections and driveways, both as vehicles pass through the intersection and as vehicles queue to an intersection. It is possible that addressing congestion issues in the area could reduce the number of Rear-End crashes. Angle crashes are high severity and should also be addressed.

Table 3: Type of crashes

TYPE_OF_CRASH	Number	%
Rear End	**2453**	38.4%
Angle	**985**	15.4%
Fixed Object	**829**	13.0%
Sideswipe - Passing	**563**	8.8%
Animal	**560**	8.8%
Backing	**222**	3.5%
Left Turn	**193**	3.0%
Other Non-Collision	**167**	2.6%
Sideswipe - Meeting	**127**	2.0%

Parked Vehicle	**92**	1.4%
Other Object	**73**	1.1%
Overturning	**40**	0.6%
Head On	**37**	0.6%
Pedestrian	**27**	0.4%
Pedalcycles	**23**	0.4%
Unknown	**3**	0.0%
Train	**1**	0.0%
Grand Total	**6395**	**100.0%**

Comparative Analyses

A future year modeling scenario was developed for each specified alternative project and model runs were implemented. Based on the outputs of the NOACA travel forecasting model runs, two separate comparative analyses were conducted for northern and southern subareas based on the following cost items:

- Congestion Cost
- Construction Cost
- Maintenance Cost
- Crash Cost
- Emissions Cost

The next sections document a short description for each cost estimation procedure.

Congestion Cost

As demand approaches the capacity of a road (or of the intersection along the road), extreme traffic congestion sets in. Traffic congestion causes longer trip times, slower speed and increased delay. Traffic engineering and financial indicators of travel delay and wasted fuel due to congestion were combined as a robust performance measure of congestion cost. This combined measure was calculated based on the following assumptions and procedure.

Assumptions:

Average Fuel Cost = $2.5 per Gallon

Average miles a vehicle can travel on one gallon of fuel = 25.73 miles per gallon. According to several sources, in 2015, the average Ohio gasoline consumption per day per capita was about 1.059 gallons, and therefore the calculated daily fuel consumption for the NOACA region is 2,145,911 gallons. The 2015 total Vehicle Mile Traveled (VMT) was about 55,224,583 vehicle miles and therefore the average miles per gallon is the quotient of VMT divided by total daily gasoline consumption.

Median Value of time per hour = $12.27

The 2015 median annual income in the NOACA region was about $51,049 which results in $24.54 per hour. The US Department of Transportation and other sources indicate a range of 30 to 60 percent of average earnings for value of travel time.

Auto occupancy varies during the peak and off-peak periods of a day. The NOACA travel forecasting model estimates a range of 1.21 to 1.485 for average auto occupancy during the five periods of AM peak, midday, PM peak, Night time, and early morning modeling scenarios.

The congestion cost procedure utilizes the NOACA travel forecasting model, and a set of assumptions to calculate the additional times that are required to travel a road segment due to traffic congestion conditions.

The following steps were implemented to calculate the total congestion costs:

The average road segment delay is the difference between the estimated travel time under actual (often congested) conditions and under uncongested conditions.

$$Average\ Road\ Segment\ Delay\ (hr) = \frac{Length\ of\ the\ road\ Segment\ (miles)}{Modeled\ Road\ Segment\ speed\ (mph)} - \frac{Length\ of\ the\ road\ Segment\ (miles)}{Free\ Flow\ Speed\ (mph)}$$

The total delay on a road segment is product of the average delay and total vehicles traveling this segment.

$$Road\ Segment\ Delay\ (hr) = Average\ Road\ Segment\ Delay\ \times Total\ Traffic\ Volume$$

The road segment delay cost is calculated by multiplying the estimated road segment delay by average passenger car occupancy and the occupants’ average value of time.

$$Road\ Segment\ Delay\ Cost\ (\$) = Road\ Segment\ Delay\ \times Average\ auto\ occupancy\ \times Average\ Value\ of\ time$$

Vehicles waste additional fuel when they are under congested conditions. The additional consumed fuel cost can be estimated using the above calculated delay and auto operating cost.

$$Road\ Segment\ Fuel\ Cost\ (\$) = Road\ Segment\ Delay\ \times Modeled\ Road\ Segment\ Speed\ \times\ auto\ Operating\ cost$$

The average auto operating cost is estimated by dividing the fuel cost per mile by the average miles a vehicle can travel on one gallon of fuel.

Finally, the total road segment congestion cost comprises of two elements; delay cost and fuel cost.

$$Road\ Segment\ Congestion\ Cost\ (\$) = Road\ Segment\ Delay\ Cost + Road\ Segment\ Fuel\ Cost$$

Construction Cost

The construction, right of way acquisition and maintenance costs were estimated based on the assumed unit costs for different road types and area of additional roadway. These costs were calculated based the following assumptions;

- $18 per square foot for additional at-grade roadway construction and right of way acquisition,
- $40 per square foot of additional freeway interchange construction and right of way acquisition,
- $4 per square foot of additional road maintenance in three periodical intervals of the 20-year horizon.

Crash Cost

The crash risk in congested areas within the northern and southern subareas was considered and corresponding costs were calculated. The reported crashes referenced to a specific location were used to identify crash patterns and more specifically, severity, and frequency of crashes. A crash severity scale known as the KABCO scale shown in Table 4, provided by the Federal Highway Administration, was considered to calculate the potential costs as a measure of safety analysis. The KABCO injury scale was developed by the National Safety Council (NSC) and frequently used by law enforcement for classifying injuries:

K: Fatal

A: Incapacitating injury

B: Non incapacitating injury

C: possible injury

O: No injury (property damage only)

Table 4: Comprehensive Crash Costs

Injury/ Severity Level	Comprehensive Crash Cost

Fatality (K)	$4,008,900
Disabling Injury (A)	$216,000
Evident Injury (B)	$79,000
Possible Injury (C)	$44,900
Property Damage only (O)	$7,400

<u>Emission Cost</u>

The emission costs were calculated using the most recent version of the US Environmental Protection Agency's (US EPA) mobile emissions modeling software, named MOVES2014a. Emissions factors for all vehicle class types (e.g. passenger vehicles, buses, heavy-duty trucks) were developed for nitrogen oxides (NOx), volatile organic compounds (VOCs), and fine particulate matter (PM2.5) that are the main mobile emissions of concern in Northeast Ohio. These emissions factors estimate the grams of each pollutant released per mile (g/mi) for each vehicle class, under various parameters. Emissions factors were selected for vehicles traveling 27.5-32.5 miles per hour (mph), which is approximately the average travel speed for vehicles in the US, according to the US Department of Transportation (US DOT) Department of Transportation Statistics. Emission factors were also selected for buses traveling 12.5-17.5 mph, which is the average travel speed for buses in the NOACA region.

The selected emission factors (in g/mi) were then multiplied by the total Vehicle Miles Traveled (VMT) associated with each scenario alternative. It is worth mentioning that the VMT is an indicator of the travel levels on the roadway system by motor vehicles, and varies by subarea and scenario alternative. These VMT values are calculated using the NOACA travel demand model and are broken down into vehicle classes. This step also provided estimates of total grams of each pollutant per day, for each scenario alternative.

In order to calculate the total social costs associated with these emission estimates, first the estimated grams per day for each scenario were converted into total metric tons per year and then multiplied by the most recent costs per ton for NOx, VOCs, and PM2.5 from the Federal Highway Administration. Table 5 shows the utilized emission costs.

Table 5: Main Mobile Emission Costs

Main Mobile Emission	Emission Cost per ton (2017 $)

VOCs	2,032
NOx	8,010
PM2.5	366,414

Total Cost Comparison

A comparative analysis was conducted based on the total of all the cost items including construction, right of way acquisition, maintenance, crash and emission costs. The total cost of each alternative was compared with that of the "No Build" scenario as the benchmark.

In fact, each scenario envisages that additional lanes or interchanges will reduce congestion in the associated subarea network, however, these road additions will impose some construction costs. The comparative analyses illustrate that if the estimated construction, right of way acquisition, and maintenance costs are justified by the reduction in congestion costs and the savings magnitude is the overall comparison indicator. It should also be noted that the crash and emission costs depend on road network characteristics such as road types, number of conflicting points, geometry and traffic volumes.

All the estimated costs for six scenarios of the northern subarea and two scenarios of the southern subarea were compared with the "No Build" 2040 scenario as a benchmark.

Table 6 and Table 7 show the estimated cost items for each scenarios and the last columns in these Tables present the saved cost as the project selection indicator.

Table 6: Cost Comparison for the Northern Subarea Scenarios

Scenario \ Cost item	Congestion Cost (2017 $)	Construction Cost (2017 $)	Maintenance Cost (2017 $)	Crash Cost (2017 $)	Emission Cost (2017 $)	Saved Cost (2017 $)
No Build	460,877,700	0	0	6,079,174	38,112,084	0
Howe Rd Widening	445,840,850	4,812,826	3,211,762	7,184,992	38,109,796	5,908,732
Auxiliary Lane	445,865,700	1,756,339	1,172,056	5,706,368	38,183,772	12,384,714
Howe Rd Widening & Auxiliary Lane	441,521,350	6.569.165	4,383,827	4,466,344	38,171,936	9,956,336
Boston Interchange	435,074,350	18,627,840	5,593,946	15,475,898	38,653,343	-8,356,419
Boston Partial Interchange	426,564,550	10,264,320	3,082,378	10,322,850	38,431,961	16,402,899
All Projects (Boston Interchange + Howe Rd Widening + Auxiliary Lane)	424,703,500	25,197,005	9,977,773	13,202,320	39,099,563	-7,111,202

Table 7: Cost Comparison for the Southern Subarea Scenarios

Cost item / Scenario	Congestion Cost (2017 $)	Construction Cost (2017 $)	Maintenance Cost (2017 $)	Crash Cost (2017 $)	Emission Cost (2017 $)	Saved Cost (2017 $)
No Build	458,157,750	0	0	7,837,302	49,187,644	0
SR 57 Partial Interchange	359,084,300	10,897,920	3,272,649	17,844,467	50,968,398	73,114,962
SR 57 Interchange	354,848,350	19,261,440	5,784,216	17,502,646	51,070,010	66,716,034

Conclusion

As discussed, the six scenarios for the northern subarea and two scenarios for the southern subarea were compared with the “No Build” scenario as the benchmark of study and the total costs of each scenario was compared with that of “No Build” scenario.

As illustrated in the last column of Table 6, the saved costs of the following alternatives in the northern subarea have positive returns and their rankings are;

1. Adding a partial interchange at Boston Road and I-71
2. Adding a I-71 southbound auxiliary lane between I-80 and westbound SR-82 exit ramp
3. Widening Howe Road and adding the above auxiliary lane
4. Widening Howe Road.

Alternatively, the projects in the above list may be interpreted as their construction, right of way acquisition and maintenance costs are offset by the congestion cost savings.

As illustrated in the last column of Table 7, the saved costs of the following alternatives in the southern subarea have positive returns and their rankings are;

1. Adding a partial interchange at SR-57 and IR-71
2. Adding a full interchange at SR-57 and IR-71

It should be noted that the saving for the alternatives of the southern subarea is much higher than those of the northern subarea. This is due to the following reasons:

- The southern subarea is larger than the northern subarea and consequently includes more streets and highways
- The specified projects for the southern subarea are close to the congested Medina downtown and therefore, aggregated impacts of these projects is higher