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The Northeast Ohio Areawide Coordinating Agency (NOACA) is a public organization serving the counties of and municipalities and townships within Cuyahoga, Geauga, Lake, Lorain and Medina (covering an area with 2.1 million people). NOACA is the agency designated or recognized to perform the following functions:

- Serve as the Metropolitan Planning Organization (MPO), with responsibility for comprehensive, cooperative and continuous planning for highways, public transit, and bikeways, as defined in the current transportation law.
- Perform continuous water quality, transportation-related air quality and other environmental planning functions.
- Administer the area clearinghouse function, which includes providing local government with the opportunity to review a wide variety of local or state applications for federal funds.
- Conduct transportation and environmental planning and related demographic, economic and land use research.
- Serve as an information center for transportation and environmental and related planning.
- As directed by the Board, provide transportation and environmental planning assistance to the 172 units of local, general purpose government.

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**Title & Subtitle**  
**IR-71 Corridor Study**

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**Abstracts**  
Interstate 71 (IR-71) is a regionally significant highway that connects Cleveland to Columbus, Cincinnati and Louisville, Kentucky. This study investigated improvements on the operations of the IR-71 corridor from IR-80 to SR-303 and the focus of the study was on scenarios with the highest return on construction investment. This study was conducted in three phases. The first phase compared seven construction alternatives in the northern subarea and three construction alternatives in the southern subarea. Due to the congestion in the northern subarea, the selected alternative of a partial interchange at Boston Road and IR-71 was further analyzed in the second phase. Similar to the phase one, the backbone of the second phase was a comparative analysis for a set of twelve construction design alternatives based on the future morning and afternoon peak period scenarios of the NOACA travel forecasting model. Finally, the phase three of the study identified the origins and destinations of vehicular trips travelling through the proposed Boston interchange ramps during the peak periods.

**Key Words & Document Analysis**

A. Descriptors: Corridor Study, IR-71, Comparative Analysis, Congestion Cost, Construction Cost, Level of Service, Partial Interchange, Boston Road, Origin and Destination

B. Identifiers/Open Ended Terms

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Executive Summary

In response to questions and comments during the roundtable discussion at the November 2, 2017 meeting, the Northeast Ohio Areawide Coordinating Agency (NOACA) staff implemented an additional origin-destination analysis. This short report documents the findings of this analysis.

As Boston Road is the boundary between the City of Strongsville and the City of Brunswick, the main purpose of this analysis was to identify the origins or destinations of vehicular trips traveling through the Boston partial interchange ramps during the future morning (AM) and afternoon (PM) peak periods based on the scenarios of the NOACA travel forecasting model. This analysis also specified the amount of vehicular trips originated from or destined to the Brunswick neighborhoods, traveling through the City of Strongsville street network.

The analysis considered the Boston partial interchange alternatives with positive benefits calculated in the second phase and the main targeted users during the future AM and PM peak periods.

**Alternative 1** (base alternative) was designed for the southbound return work trips and it is estimated that more than 4,800 vehicles will travel through this off-ramp during the PM peak period. The destinations of more than 50 percent of these trips will be in Brunswick. Comparing this alternative and the “No Build” scenario indicates that more than 1,000 drivers will switch their routes from Howe road and SR-42 to IR-71 and use this off-ramp to reach their destinations. The City of Strongsville streets will consequently be less congested due to the reduction in the through traffic diverted to IR-71. This off-ramp will be located at the vicinity of the south border of City of Strongsville and therefore only 20 percent of its traffic flow terminate their trips in its neighborhood.

The additional on-ramp of **Alternative 3** will mainly be used by trips originated from Brunswick during the AM peak period. More than 60 percent of vehicular trips traveling through this on-ramp have origins in Brunswick. Again this on-ramp will be located in Strongsville, but used mostly by the Brunswick residents. The AM volume of this ramp is over 3,700 vehicles.

The additional on-ramp of **Alternative 4** will be located in Brunswick but more than 50 percent of its users will start their trips from Strongsville or terminate there. The Brunswick share of trips will be about 20 percent. The total number of AM and PM volumes of this on-ramp is equal to the AM volume of the alternative 3 on-ramp.
The automobile trips traveling through the off-ramp of Alternative 5 originate from the residential and employment centers that are south of the City of Brunswick, such as City of Medina or the southern counties outside of the NOACA region. During the AM peak period, about 60 percent of trips traveling through this ramp are destined to the employment centers in the City of Strongsville. In the PM peak period, 60 percent of the Strongsville residents who work in the south will use this ramp to complete their return work commutes. The total number of AM and PM trips using this ramp is about 2,000 and that is much less than the AM volume of the alternative 3 on-ramp.

All the analyzed ramps will also be used by automobile trips with origins or destinations in other cities, but their total volume shares are less than one-third.

Finally, considering

- The alternative costs and benefits which were calculated in the second phase of this study,
- The traffic congestion reduction produced by the alternatives at the street network level,
- The ramp estimated traffic flows, and their origins and destinations, and
- Alternative 4 has the highest benefit based on the comparative analysis of the second phase. However, the negative impacts to the residential neighborhood in the north of Brunswick due to the proposed realignment of Carpenter Road are substantial. In addition, this analysis concluded that the on-ramp of this option will be used by a small percentage of Brunswick residents. These unfavorable outcomes make this option less desirable from Brunswick’s perspective,

Therefore, Alternative 3 without the Boston Road median lane is the recommended alternative due to:

- The high benefit calculated in the second phase of the IR-71 Corridor study
- The highest traffic improvements on Howe Road and SR 82 in the City of Strongsville,
- The high traffic volumes of its on-ramp and off-ramp and used heavily by residents of the City of Brunswick.
**Background**

In response to questions and comments during the roundtable discussion at the November 2, 2017 meeting, the Northeast Ohio Areawide Coordinating Agency (NOACA) staff implemented an additional origin-destination analysis. This short report documents the findings of this analysis.

As Boston Road is the boundary between City of Strongsville and City of Brunswick, the purposes of this analysis were:

- To identify the origins or destinations of vehicular trips traveling through the proposed Boston partial interchange ramps during the future morning (AM) and afternoon (PM) peak periods based on the scenarios of the NOACA travel forecasting model, and
- To identify the amount of vehicular trips traveling through the City of Strongsville street network and the Boston partial interchange ramps during the AM and PM peak periods to reach the Brunswick neighborhoods.

Similar to other cities, the residents of City of Strongsville and City of Brunswick generate mainly work trips to the employment centers during the peak periods and there are several employment centers and other land use types in these cities which attract vehicular trips. Figure 1 schematically illustrates the major origins and destinations of these trips and according to these locations, the on/off ramps of the alternatives are analyzed.
Figure 1: Locations of Major Origins and Destinations
Table 1 shows the alternatives and their associated analyzed ramps are marked in red.

Table 1: Alternatives and their Associated Analyzed Ramps

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Analyzed Ramp</th>
<th>Peak Period</th>
<th>Boston Road</th>
<th>Major Trip Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>PM</td>
<td>With Median</td>
<td>Southbound Return Work Trips</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>AM</td>
<td>Without Median</td>
<td>Northbound Work Trips</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>AM</td>
<td>Without Median</td>
<td>Southbound Work Trip</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>Without Median</td>
<td>Southbound Return Work Trip</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>AM</td>
<td>With Median</td>
<td>Northbound Work Trip</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>With Median</td>
<td>Northbound Return Work Trip</td>
</tr>
</tbody>
</table>

Based on the second phase of the Interstate 71 (IR-71) corridor study, the above alternatives had the positive benefits.
Origin & Destination

The identified alternatives in the previous section were analyzed based on the trip origins and destinations in City of Strongsville and City of Brunswick. Any origin or destination outside these two cities were categorized as “Other Cities”. Table 2 illustrates the number of vehicular trips originated from City of Strongsville, City of Brunswick and other cities traveling through the selected ramps.

Table 2: Number of Vehicular Trips Traveling through the Selected Ramps and Their Origins

<table>
<thead>
<tr>
<th>Origin of Trips</th>
<th>Alternative 3 – Ramp to NB IR-71 AM Peak Period</th>
<th>Alternative 4 - Ramp to SB IR-71 AM Peak Period</th>
<th>Alternative 4 – Ramp to SB IR-71 PM Peak Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Strongsville</td>
<td>443 (12%)</td>
<td>893 (56%)</td>
<td>988 (49%)</td>
</tr>
<tr>
<td>City of Brunswick</td>
<td>2,316 (61%)</td>
<td>359 (22%)</td>
<td>407 (20%)</td>
</tr>
<tr>
<td>Other Cities</td>
<td>1,009 (27%)</td>
<td>360 (22%)</td>
<td>640 (31%)</td>
</tr>
<tr>
<td>Total of Trips</td>
<td>3,768 (100%)</td>
<td>1,612 (100%)</td>
<td>2,035 (100%)</td>
</tr>
</tbody>
</table>
Similarly Table 3 shows the number of vehicular trips and percentages destined to City of Strongsville, City of Brunswick and other cities traveling through the selected ramps.

**Table 3: Number of Vehicular Trips Traveling through the Selected Ramps and Their Destinations**

<table>
<thead>
<tr>
<th>Destination of Trips</th>
<th>Alternative 1 – Ramp From SB IR-71 PM Peak Period</th>
<th>Alternative 5 – Ramp from NB IR-71 AM Peak Period</th>
<th>Alternative 5 – Ramp from NB IR-71 PM Peak Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Strongsville</td>
<td>932 (19%)</td>
<td>213 (59%)</td>
<td>930 (58%)</td>
</tr>
<tr>
<td>City of Brunswick</td>
<td>2,569 (53%)</td>
<td>118 (33%)</td>
<td>437 (27%)</td>
</tr>
<tr>
<td>Other Cities</td>
<td>1,376 (28%)</td>
<td>28 (8%)</td>
<td>227 (14%)</td>
</tr>
<tr>
<td>Total of Trips</td>
<td>4,877 (100%)</td>
<td>359 (100%)</td>
<td>1,594 (100%)</td>
</tr>
</tbody>
</table>

- Boston Road          | With Median                                       | With Median                                      | With Median                                      |
Trips From/To City of Brunswick

The second purpose of the additional analysis was to specify the percentage and number of trips originated from or destined to Brunswick traveling through the selected ramps and the City of Strongsville street network.

Base Year (2015)

Over 12,000 vehicle trips start their journeys from the City of Brunswick during the AM peak period. As indicated on Map 1 more than two-thirds of those trips are leaving the city from the northern, eastern and southern borders through IR-71 and other major streets. The other one-third of trips are either internal trips or using minor roads. As shown, about 600 (5%) trips travel through Howe Road and then merge on the IR-71 at State Route (SR) 82 ramps. The northbound volumes of Howe Road increase from 660 to 2,000 cars starting from Boston Road to SR 82. For the southern portion of Howe Road, the traffic from Brunswick dominates the northbound volumes, but more traffic from Strongsville joins Howe Road from south to north.

The destination for about half of the trips is to the north of Brunswick and 17 percent of trips travel south.
Map 1: Outbound Vehicular Trip Percentages Originated from Brunswick - 2015 AM peak Period
In addition, vehicular trips from Brunswick heading north or south use Pearl Road (SR-42) during the AM peak period. The number of cars starting from Brunswick and traveling north through SR-42 is over 1,500. Similar to Howe Road, 70% of the traffic volume on the southern portion of Pearl Rd in Strongsville originates from Brunswick, but it reduces to less 50% in the northern portions of Pearl Rd as merges to IR-71.

Similar number of cars travel south from Brunswick during the AM peak period. The only difference between the north direction and the south direction is that almost all the traffic on the southbound of SR-42 is generated from Brunswick.

As shown in Map 2, the number of return trips is about 22,000 during the 2015 PM peak period and the share percentages are similar to those of the morning peak period. There are over 880 cars leaving IR-71 at SR-82 ramps and traveling through Howe Road to reach their destinations in Brunswick. The southbound volumes of Howe Road are from 3,800 to 900 cars starting from north to south during the PM peak period. South of SR-82, IR-71 southbound carries about 15,800 cars during the PM peak period, with more than 3,700 of those destined for Brunswick. These vehicles diverge from IR-71 at State Route (SR) 303 ramps. The return PM southbound trips have almost identical percentages compared to the morning trip percent.
Map 2: Inbound Vehicular TripPercentages Destined to Brunswick - 2015 PM peak Period

- Total Trips to Brunswick = 21,883
- Minor roads and internal Brunswick trips = 33%

2015 PM Peak Period

Interchange
City of Brunswick
No-Build Alternative

The future trips starting from or terminating to Brunswick will use the same routes as the current travel pattern. Traffic volume percentages shown on Map 3 and 4 are similar to those of the 2015 scenario. As expected, there is about 5 to 7 percent growth from the 2015 to 2040.
Map 3: Outbound Vehicular Trip Percentages Originated from Brunswick – 2040 AM peak Period – No Build

Total Trips from Brunswick = 12,687

Minor roads and internal Brunswick trips = 30%

Interchange
City of Brunswick
Map 4: Inbound Vehicular Trip Percentages Destined to Brunswick – 2040 PM peak Period – No Build
Alternative 1 (Base Alternative)

As indicated in Table 1, Alternative 1 will mainly be used by the southbound return work trips. Comparing the volumes of the Alternative 1 with those of the “No Build” scenario indicates that more 1,000 drivers switch their routes from Howe road and SR-42 to IR-71 and the suggested southbound ramp at Boston Road. The reduction on Howe Road is more apparent than SR-42. The number of cars changing from Howe Road to IR-71 is more than 650 cars and only 400 cars switch from SR-42 to IR-71.

Map 5 shows the traffic volume percentages destined to Brunswick through the selected major highways and streets.
Map 5: Inbound Vehicular Trip Percentages Destined to Brunswick – 2040 PM peak Period – Alternative 1

Total Trips to Brunswick = 23,577

- US-42: 9%
- IR-71: 23%
- SR-303: 5%
- IR-71: 8%
- Howe Rd: 1%
- W 130th St: 4%

Minor roads and internal Brunswick trips = 33%
Alternative 4

In addition to the alternative 1 off-ramp, Alternative 4 adds an on-ramp from Boston Road to IR-71 southbound. During the 2040 AM and PM peak periods, the additional ramp will not have any noticeable impacts on the routes taken by the drivers leaving or returning to Brunswick.

Maps 6 and 7 illustrate traffic volume percentages originated from and destined to Brunswick during the 2040 AM and PM peak periods.
Map 6: Inbound Vehicular Trip Percentages Destined to Brunswick – 2040 PM peak Period – Alternative 4
Map 7: Outbound Vehicular Trip Percentages Originated from Brunswick – 2040 AM peak Period – Alternative 4

Total Trips from Brunswick = 12,648

Minor roads and internal Brunswick trips = 29%

Interchange
City of Brunswick
Alternative 3

Alternative 3 adds an on-ramp to IR-71 northbound from Boston Road. As Table 1 indicated, the additional ramp is mainly used by the vehicular trips during the AM peak period. The number of cars traveling through this additional on-ramp is over 3,700. The origins for more than 60 percent of these trips are in Brunswick.

About 800, 400, and 450 cars divert from SR-42, Howe Road and W 130th Street to this ramp and IR-71 respectively. The origins of 1,200 of those diverted trips are in Brunswick.
Map 8: Outbound Vehicular Trip Percentages Originated from Brunswick – 2040 AM peak Period – Alternative 3