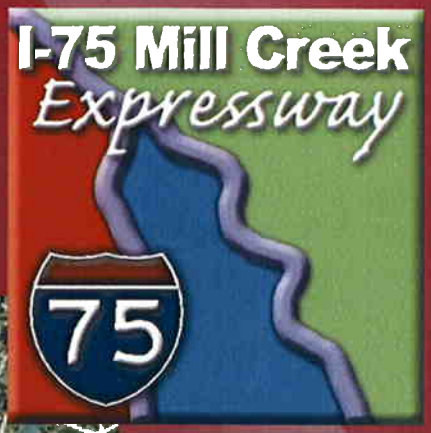
Northside Study
HAM-75-2.30



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Introduction

As part of the I-75 Mill Creek Expressway project (HAM-75-2.30, PID 76257), existing local access ramps forming partial interchanges within the I-74/I-75 system interchange are proposed to be closed and removed. The subject ramps include the Elmore Street exit, Spring Grove Avenue entrance, and Central Parkway I-74 exit and I-75 entrance ramps. The closures are necessary due to several factors among them: physical conflict with new ramp construction, lack of available space to relocate affected service ramps, low traffic utilization and prohibition of partial interchanges. Alternative Interstate access to the surrounding communities will be available at the improved full movement Hopple Street/I-75/I-74 and improved full movement Colerain Avenue/Beekman Street/I-74 interchanges.

Many Northside residents, business owners, and employees at local businesses have communicated concerns over impacts to their community resulting from reduced Interstate access. In response, the City of Cincinnati and the Ohio Department of Transportation commissioned this study to consider the effects of access changes proposed with this project on routes identified as serving redirected traffic and to recommend potential improvements to those routes deemed adversely impacted.

This report documents intersection capacity analyses, travel time assessments, and crash evaluations conducted to forecast future impacts to existing travel routes. For the purpose of providing comparisons of future year 2030 no build versus build conditions, this study defines the Baseline condition as the proposed freeway improvements with all existing subject local access ramps open, and the Build condition as the proposed freeway improvements with the subject local access ramps closed.

Northside Study Area

The area of Cincinnati referred to as Northside was originally settled in the late 1790's but did not develop into a population center until the 1820's with the completion of the Miami-Erie Canal and, later, the CH&D railroad. The town of Cumminsville grew into a bedroom community of Cincinnati which was ultimately annexed by the city of Cincinnati in 1873. By the 1920's, the community had become a busy commercial district of Cincinnati referred to as Knowlton's Corner and contained shops, merchants and manufacturing. The post-World War II industrial boom and completion of the Interstate resulted in fewer people living near to their workplaces causing a decline in housing and lower property values. By the mid-1960's, Northside industry had largely left the area. Beginning in the mid-1980's, population in-fill has occurred attracted to the lower home prices and central location in the Cincinnati Metro area.[1]

The general character of the community today is single and multi-family housing with a central business district along Hamilton Avenue between Spring Grove and Chase Avenues. The 2000 population totaled approximately 9,400 with a primary demographic of Caucasian (58%) and African-American (39%). The community is bounded by I-74 and the Mill Creek to the south, Spring Grove Cemetery east, Mount Airy Forest west and hilly terrain to the north. An asymmetric street grid exists around principal through arterials of Hamilton Avenue (north-south), William P. Dooley Bypass/Spring Grove Avenue (east-west), and Colerain Avenue (north-south). Within the local street network are primary local streets of Blue Rock Street (east-west), Chase Avenue (east-west) and Virginia Avenue (north-south).

As is typical of many older urban neighborhoods, streets are narrow with intersections closely spaced. Parking is generally on-street with sidewalks, and streets are curbed. Numerous small businesses line Hamilton Avenue including restaurants, clothing boutiques and taverns. A large mixed-use redevelopment project is currently planned for the old American Can plant at Hamilton Avenue and Blue Rock Street which will contain multi-unit housing and retail businesses. South of Blue Rock Street to the Mill Creek is a number of light manufacturing and other small industrial uses.

[1] From *The History of Northside Knowlton's Corner and Hamilton Ave.*, www.northside.net

Although not a part of Northside, the area east of I-75 along Central Parkway which includes the Cincinnati State Technical and Community College campus is impacted by the closure of the Central Parkway ramps. The Central Parkway entrance ramp does provide added access to I-75 northbound for Northside.

Study Methodology

This study considers the impact on selected intersections within the study area of future freeway improvements in combination with the closure of subject local access ramps. Intersection locations were selected based on the relative importance of routes and with local agency input. The primary routes through the Northside were established as 1) Virginia Avenue, 2) Colerain Avenue, 3) William P. Dooley Bypass, 4) Spring Grove Avenue and 5) Hamilton Avenue. Focus intersections were then selected to investigate potential impacts and are listed in **Table 1** below.

This study is concerned with three areas of investigation: 1) intersection capacity, 2) travel times, and 3) intersection crash history. Intersection capacity is used to establish the level of service (LOS) for the Baseline and Build conditions. Travel times were obtained in the field for each of the affected routes. The purpose of this evaluation is to provide a relative comparison of trip duration between the Baseline and Build conditions assuming recommended intersection capacity improvements have been made and LOS will not be degraded by redistributed traffic volumes. Intersection crash history is provided to indicate whether a crash problem exists today that could be worsened with increased redistributed traffic and to identify corrective safety measures if necessary. To make this determination, crashes per million vehicles averaged over the last three years were compiled for each focus intersection and compared to the statewide average for similar intersections.

Intersection Capacities

With the proposed ramp closures, Northside motorists will be required to seek out new routes to access I-74/I-75. The redistribution of Interstate-generated trips through the Northside community raised concerns that some local street intersections may operate worse than with the Baseline condition due to changes in travel patterns. As a result, the Ohio Department of Transportation (ODOT) and City of Cincinnati requested that Transystems study and analyze sixteen (16) focus intersections within this area. The focus intersections are listed in Table 1 below, and **Appendix A, Figure 1** provides a study area map showing focus intersection locations.

Table 1: Intersection Number and Location

• (1) Colerain Avenue & Hoffner Street	• (9) Mitchell Avenue & Kenard Avenue
• (2) Colerain Avenue & Blue Rock Street	• (10) Colerain Avenue & West Fork/Virginia Avenue
• (3) Blue Rock Street & Hamilton Avenue	• (11) Colerain Avenue & Powers Street
• (4) Spring Grove Avenue & Blue Rock Street	• (12) Colerain Avenue & Elmore Street
• (5) Spring Grove Avenue & William P. Dooley Bypass	• (13) Colerain Avenue & William P. Dooley Bypass
• (6) Hamilton Avenue & Chase Avenue	• (14) Ludlow Avenue & Central Parkway
• (7) Virginia Avenue & Chase Avenue	• (15) William P. Dooley Bypass & Elmore Street
• (8) Spring Grove Avenue & Mitchell Avenue	• (16) Hoffner Street & Spring Grove Avenue

The study utilizes design year 2030 volume data at each focus intersection to determine the level of service (LOS) and volume to capacity ratios (v/c) for each intersection traffic movement for the Baseline and Build conditions based on existing site characteristics (intersection geometry, lane widths, etc.).

Level of service (LOS) is a standard measure of effectiveness used to describe operational conditions of a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic

interruptions, and comfort and convenience. Six LOS are defined for intersections using letter designations from A to F with LOS A representing the best operating conditions and LOS F the worst. Each LOS represents a range of operating conditions and the driver's perception of those conditions.

For intersections, LOS is based solely on control delay per vehicle which includes initial deceleration delay at the beginning of the red interval, queue (backup) move up time during the beginning of the green interval, stopped delay during the red interval, and final acceleration delay to the desired speed at the beginning of the green interval. **Table 2** describes the relationship between average vehicle delay and LOS. From ODOT's *Location and Design Manual, Volume 1* Guide for Selection of Minimum Design Levels of Service (Exhibit 301-1E) figure, the desired LOS for a "new" or "redesigned" road in an urban area is LOS D.

Table 2: Level of Service Delay Ranges for Signalized and Unsignalized Intersections

Level of Service (LOS)	Average Delay Range (sec/veh)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

The volume to capacity ratio (v/c) is a capacity measure of the demand traffic volume to the carrying capacity of the available lanes. A v/c ratio of 1.00 indicates 100% of the available capacity of the roadway is used by the demand traffic, i.e. the roadway is at capacity, and a v/c ratio greater than 1.00 indicates over capacity of the roadway.

When analyzing intersections, both the LOS (qualitative measure) and the v/c (quantitative measure) are considered. Each measure is independent of the other, and as a result, each is considered separately.

As noted above, the study focused on performing capacity analyses at each of the sixteen intersections using design year traffic for the AM and PM design hours under the "Baseline" and "Build" conditions. To determine the design year traffic, manual turning movement counts were taken during the AM and PM peak periods in November 2004 and August 2006 at each intersection listed in Table 1. The overall peak hour for each time period was determined, and the volumes were smoothed between adjacent intersections. The count volumes were then used in conjunction with the Ohio-Kentucky-Indiana (OKI) regional travel demand model to determine the "Baseline" and "Build" condition 2030 design hour volumes, as it has the ability to simulate the future distribution of traffic to all roadways for either condition.

Based on the results of the capacity analyses, intersections were grouped into three categories for the Base and Build conditions. The three categories are: (1) No change or improved LOS; (2) Worse LOS and LOS D or better; and (3) Worse LOS and LOS E or F. Category (1) intersections do not merit correction and no improvements are recommended. Category (2) intersections with v/c ratios equal or greater than 1.00 for any movement and Category (3) intersections are recommended for capacity improvement.

Baseline 2030 Condition

The "Baseline" condition denotes the scenario where the affected existing ramps remain in place in the 2030 design year. This condition assumes improvements to I-74, I-75, and the system interchange. Additionally, existing geometry was assumed at all analyzed intersections. **Table 3** details the LOS and average delays for each of the intersections. Highway Capacity Software (HCS+ v. 5.21), which is based on the 2000 Highway Capacity Manual, was used to complete the capacity analyses. The results show that, for both the AM and PM design hours, fourteen

of the intersections show a LOS D or better. However, the intersection of Mitchell Avenue & Spring Grove Avenue shows LOS F in the PM design hour, and the intersection of Mitchell Avenue& Kenard Avenue shows LOS E in the PM design hour.

Additionally, three other intersections show v/c ratios of greater than 1.0 for at least one movement, meaning that at least one movement exceeds capacity. These intersections are Hamilton Avenue and Chase Avenue in the PM design hour, Colerain Avenue and West Fork Road/Virginia Avenue in the AM design hour, and Hoffner Street and Spring Grove Avenue in the PM design hour. The HCS reports for the "Baseline" condition are found in **Appendix B**.

Table 3: 2030 Baseline HCS Results							
Intersection	Time Period	Eastbound LOS (Delay)	Westbound LOS (Delay)	Northbound LOS (Delay)	Southbound LOS (Delay)	Overall LOS (Delay)	Any V/C > 1.0?**
Colerain Avenue & Hoffner Street	AM	B (19.9 sec)	C (20.6 sec)	B (19.5 sec)	C (21.0 sec)	C (20.5 sec)	No
	PM	C (20.1 sec)	B (19.0 sec)	C (20.0 sec)	B (18.6 sec)	B (19.4 sec)	No
Colerain Avenue & Blue Rock Street	AM	N/A	C (22.9 sec)	N/A	A (8.8 sec)	N/A	No
	PM	N/A	B (14.5 sec)	N/A	A (9.5 sec) [L]	N/A	No
Blue Rock Street & Hamilton Avenue	AM	C (22.4 sec)	B (15.8 sec)	B (10.5 sec)	C (22.2 sec)	B (19.6 sec)	No
	PM	C (23.0 sec)	C (34.0 sec)	C (30.5 sec)	A (7.1 sec)	C (25.1 sec)	No
Spring Grove Avenue & Blue Rock Street	AM	N/A	A (7.8 sec) [L]	A (9.6 sec)	N/A	N/A	No
	PM	N/A	A (8.0 sec) [L]	B (11.1 sec)	N/A	N/A	No
Spring Grove Avenue & William Dooley Bypass	AM	B (14.2 sec)	N/A	B (14.5 sec)	B (14.3 sec)	B (14.4 sec)	No
	PM	B (16.1 sec)	N/A	B (15.4 sec)	B (16.6 sec)	B (16.1 sec)	No
Hamilton Avenue & Chase Avenue	AM	B (16.4 sec)	B (16.0 sec)	B (10.5 sec)	B (17.5 sec)	B (15.6 sec)	No
	PM	C (29.1 sec)	C (27.6 sec)	**E (58.5 sec)**	A (4.1 sec)	D (42.9 sec)	Yes (NB=1.09)
Virginia Avenue & Chase Avenue	AM	N/A	B (13.4 sec)	N/A	A (7.9 sec) [L]	N/A	No
	PM	N/A	C (17.1 sec)	N/A	A (8.4 sec) [L]	N/A	No
Mitchell Avenue & Spring Grove Avenue	AM	D (48.9 sec)	D (41.4 sec)	D (47.0 sec)	C (23.2 sec)	D (42.8 sec)	Yes (WB Right=1.06)
	PM	**F (82.2 sec)**	**F (86.9 sec)**	**F (83.0 sec)**	**F (82.7 sec)**	**F (84.2 sec)**	Yes (WB Right=1.41)
Mitchell Avenue & Kenard Avenue	AM	C (30.1 sec)	C (23.4 sec)	C (28.6 sec)	C (28.0 sec)	C (26.4 sec)	No
	PM	**E (74.0 sec)**	**E (65.5 sec)**	**E (77.2 sec)**	**E (66.0 sec)**	**E (70.4 sec)**	Yes (NB Thru=1.09)
Colerain Avenue & West Fork Road/ Virginia Avenue	AM	D (48.3 sec)	D (49.3 sec)	B (14.1 sec)	D (51.5 sec)	D (44.2 sec)	Yes (SB Thru=1.03)
	PM	C (34.2 sec)	C (33.5 sec)	D (36.5 sec)	C (33.8 sec)	D (35.4 sec)	No
Colerain Avenue & Powers Street	AM	B (13.1 sec)	N/A	B (11.6 sec)	B (13.5 sec)	B (12.8 sec)	No
	PM	B (12.9 sec)	N/A	B (12.4 sec)	B (13.0 sec)	B (12.7 sec)	No
Colerain Avenue & Elmore Street	AM	B (13.5 sec)	B (11.6 sec)	N/A	B (13.9 sec)	B (13.2 sec)	No
	PM	B (19.9 sec)	A (9.2 sec)	N/A	B (19.2 sec)	B (13.4 sec)	No
Colerain Avenue & William Dooley Bypass	AM	B (16.9 sec)	N/A	A (9.0 sec)	B (16.7 sec)	B (14.9 sec)	No
	PM	B (13.4 sec)	N/A	B (11.0 sec)	B (13.6 sec)	B (12.1 sec)	No
Ludlow Avenue & Central Parkway	AM	C (21.1 sec)	B (12.5 sec)	C (21.9 sec)	N/A	B (19.4 sec)	No
	PM	B (18.1 sec)	B (16.7 sec)	B (18.5 sec)	N/A	B (17.4 sec)	No
William Dooley Bypass & Elmore Street	AM	N/A	C (22.3 sec)	A (7.5 sec)	C (22.6 sec)	B (15.1 sec)	No
	PM	N/A	C (21.5 sec)	C (21.2 sec)	C (22.6 sec)	C (21.8 sec)	No
Hoffner Street & Spring Grove Avenue	AM	C (29.0 sec)	C (29.8 sec)	A (8.7 sec)	C (30.6 sec)	C (26.1 sec)	No
	PM	D (42.2 sec)	D (40.9 sec)	D (44.6 sec)	B (14.7 sec)	D (37.5 sec)	Yes (NB Thru=1.04)

* [L] = LOS and Delay are for left turn only

**Worst v/c for intersection shown. There may be other v/c ratios greater than 1.0. Please see HCS reports in Appendix A for further details.

Build 2030 Condition

The "Build" condition denotes the scenario where the affected existing ramps in and around the I-74/I-75 systems interchange are closed or relocated on either I-74 or I-75. In this scenario, improvements to I-74, I-75 and the systems interchange were again assumed. Additionally, existing geometry was assumed at all analyzed

intersections except Colerain Avenue and Powers Street and Colerain Avenue and Dooley Bypass. With the removal of the I-74 exit ramp, the Colerain Avenue and Powers Street intersection no longer requires a traffic signal as it becomes a three-leg intersection with Powers Street one way away from Colerain Avenue. Therefore, this intersection was not analyzed. At the intersection of Colerain Avenue and Dooley Bypass, the I-75 southbound entrance ramp is eliminated, changing the geometry of that intersection; the new geometry is reflected in the analyses. **Table 4** details the LOS and average delays for each of the intersections. The results show that, for the 2030 AM and PM design hours, ten of the intersections show LOS D or better. As with the "Baseline" condition, the intersections of Mitchell Avenue and Kenard Avenue and Mitchell Avenue and Spring Grove Avenue show levels of service E or F in one or both of the design hours. Additionally, the intersections of Blue Rock Street and Hamilton Avenue, Hamilton Avenue and Chase Avenue, and Hoffner Street and Spring Grove Avenue all show LOS E in the PM design hour.

No additional intersections show v/c ratios of greater than 1.0 for any movements in either of the design hours. The HCS reports for the "Build" condition are found in Appendix B.