A Recommended Plan for Improving Transportation in Northern Campbell County, Kentucky

Prepared for

The Ohio-Indiana-Kentucky Regional Council of Governments

and

The Kentucky Transportation Cabinet

Prepared by

ENTRAN
ENGINEERING INFRASTRUCTURE SOLUTIONS

In association with
Northrop Grumman Corporation
Vivian Llambi and Associates
H. Powell and Company, Incorporated

and

The staff of the Ohio-Kentucky-Indiana Regional Council of Governments

October 2008

Acknowledgements

The successful completion of the I-471 Corridor Study was possible only through the collaborative planning, review and participation of many dedicated people. On behalf of the Project Planning Team, ENTRAN wishes to express our sincere appreciation and gratitude to all those who participated in this study and in developing the I-471 Corridor Plan.

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Campbell County Judge Executive, Steve Pendery, Chair

Participants (representatives from the following organizations participated in one or more of the Advisory Committee meetings held during this study)

Alliance for Regional Transit
Campbell County Consolidated Dispatch
Campbell County Economic Progress Authority
Campbell County Senior Center
Capital Investment Group
City of Bellevue
City of Cincinnati
City of Cold Spring
City of Dayton
City of Ft. Thomas
City of Highland Heights
City of Newport
City of Southgate
City of Wilder
East Row Historic Foundation
Harbor Greene
Kentucky Transportation Cabinet, District 6
Newport on the Levee
Northern Kentucky Area Planning Commission
Northern Kentucky Chamber of Commerce
Northern Kentucky Convention and Visitors Bureau
Northern Kentucky University
Ohio Department of Transporation, District 8
Southbank Partners, Inc.
Southwest Ohio Regional Transit Authority (SORTA)
St. Luke Hospitals
Transit Authority of Northern Kentucky (TANK)

Other Interested Agencies

Brighton Center
Castellini Company
Cincinnati USA Regional Chamber
City of Woodlawn
Federal Highway Administration - Kentucky
Hispanic Resource Center
Newport Independent Schools
Newport Steel
Northern Kentucky Tri-Ed

Invited State and National Officials

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Geoff Davis, United States Congressman

Dennis Keene, Kentucky State Representative

Katie Stine, Kentucky State Senator

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Part 1: The Planning Process

This I-471 Corridor Study consisted of the analysis and evaluation of existing, mid- and long-term future transportation demand and the assessment of transportation facilities and options in northern Campbell County, Kentucky. The corridor study area is defined by the Ohio River, the Licking River, I-471 and the AA Highway. This geographic study area encompasses portions of the incorporated communities of Newport, Bellevue, Dayton, Wilder, Woodlawn, Fort Thomas, Southgate, Highland Heights, and Cold Spring, and areas of unincorporated Campbell County.

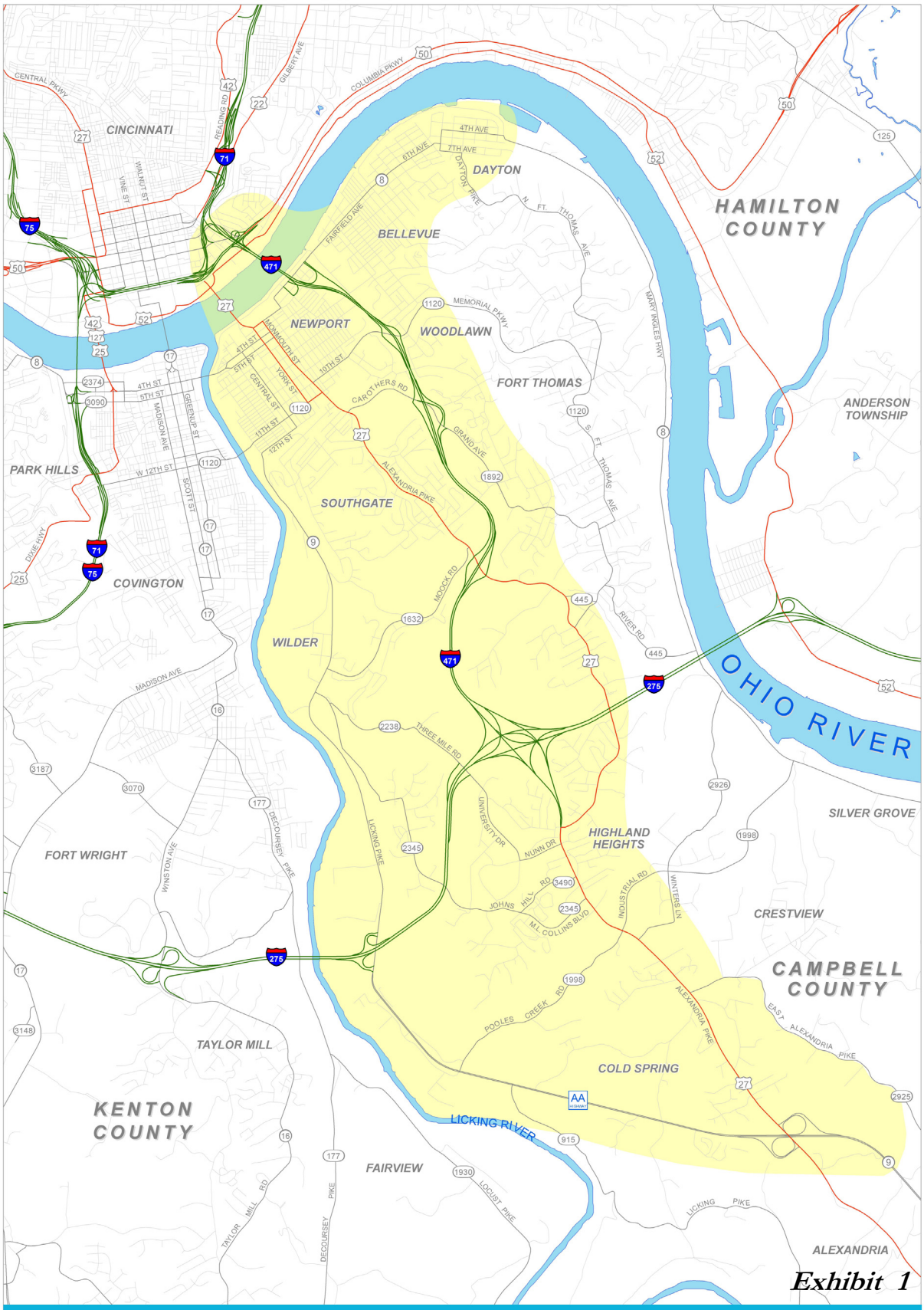
While the transportation network for this study is focused on the needs of this study area, it is also important to consider the needs from a larger perspective, including the entire northern Campbell County area, and even larger, from a regional perspective encompassing all of northern Kentucky and southwestern Ohio. Mobility, connectivity, accessibility, safety, congestion management, and air quality are all issues addressed in this study as key components of a successful transportation plan to support the quality of life and land use visions of northern Campbell County (see Exhibit 1).

BACKGROUND

The I-471 Corridor centers on one of northern Kentucky's major transportation spines, the I-471 / US 27, Alexandria Pike roadway from Fort Washington Way in Cincinnati to the KY 9 / AA Highway in Cold Spring, Kentucky. Within this nine mile long corridor, major arteries including I-471, US 27 (Alexandria Pike and Monmouth Street), I-275, KY 8 and KY 9 (Licking Pike and the AA Highway), accommodate current travel volumes of close to a million vehicles every day. The major north-south demand on three of these routes, I-471, Alexandria Pike and Licking Pike combined, accounts for over 150,000 vehicles per day. The two Ohio River bridges linking Ohio and Kentucky in this corridor, the Daniel Carter Beard (I-471) bridge and the Taylor Southgate (US 27) bridge, together handle over 110,000 vehicles per day[1].

Since the opening of I-471 twenty-seven years ago, daily Ohio River crossings have more than doubled on the two Campbell County bridges. Combined with the other three Ohio River bridges, Roebling (KY 17), Clay Wade Bailey (US 25) and the Brent Spence Bridge (I-75), an estimated 316,000 vehicles per day presently cross the river, representing an increase of over 75% since the I-471 bridge opened in 1981. Likewise travel demand throughout the corridor has also experienced dramatic growth. And there is every indication that travel demand will only continue to grow. Recent projections from initial Brent Spence Bridge studies[2] indicated that even without increasing river crossing capacities, i.e., what would be considered No Build conditions, demands will continue to escalate within the region with projections for traffic on the two Ohio River bridges in the I-471 Corridor increasing another 15% in the next 25 years.

1 Source of traffic count data: KYTC, 2004 counts and 2008 estimates.
2 Projections are for the year 2030 using the OKI's Regional Travel Demand Model.


CINCINNATI
DAYTON
BELLEVUE
NEWPORT
WOODLAWN
FORT THOMAS
HAMILTON COUNTY
ANDERSON TOWNSHIP
PARK HILLS
SOUTHGATE
COVINGTON
WILDER
OHIO RIVER
SILVER GROVE
HIGHLAND HEIGHTS
FORT WRIGHT
CRESTVIEW
CAMPBELL COUNTY
TAYLOR MILL
COLD SPRING
KENTON COUNTY
FAIRVIEW
LICKING RIVER
ALEXANDRIA
Exhibit 1
I-471 Corridor Study
OKI
Ohio · Kentucky · Indiana
Regional Council of Governments
Study Area
Campbell County
OKI Eight County Region
Legend
Interstate Highway
US State Routes
Arterial Roads
Collector Roads
This map depicts the I-471 Corridor Study area. The Recommended Corridor Plan consists of roadway, transit and ITS improvements and recommended areas of future study to address identified existing and future transportation problems and needs.
Study Area Map
March 2008
0 0.25 0.5 1 Miles
Source: OKI GIS, 2006

The I-471 Corridor Study challenge was to go beyond just searching for ways to best handle big traffic numbers like these. Its focus includes gaining a clearer understanding of the land use / transportation interrelationship and ultimately, determining how best to enhance the quality of life of the residents, businesses and communities of northern Campbell County. There are short and long term needs primarily driven by increasing safety, addressing congestion problems and improving air quality directly related to growing and projected travel demand.

New construction of homes and businesses span the I-471 Corridor study area.

Recent development opportunities span the corridor, from the recent multi-million dollar condominium, office, retail and entertainment plans in Newport and Bellevue along the Ohio Riverfront, to the expanding Technology Commercialization Triangle and Northern Kentucky University's expansion in Highland Heights. Also, interspersed throughout the corridor are advancing plans for re-development in Newport (such as Cote Brilliante and the northwest Newport riverfront areas), and on-going plans in Wilder, Dayton, Southgate, Highland Heights and Cold Spring.

In that the I-471 Corridor is a fairly highly developed corridor, critical issues also include potential socioeconomic and cultural historic impacts of any proposed changes in the transportation built network. Tucked among the study corridor's natural wooded features, rolling topography, and scenic vistas, there are eight incorporated cities: Newport, Bellevue, Southgate, Woodlawn, Wilder, Fort Thomas, Highland Heights and Cold Spring. Each has its own unique, established personality and community history. With 18 individual sites (throughout northern Campbell County) and 9 historic districts listed on the National Register of Historic Place (Newport, Bellevue, Fort Thomas and Wilder), the I-471 Corridor is rich in cultural historic resources. With this setting, an awareness of these important environmental features, resources and constraints is important in the alternatives study and evaluation and ultimately, in the recommendations to better understand what will be needed in the advancement of the recommended plans.

In the long term, efforts are underway in the corridor to better envision the future of land use development and re-development. Among the recent comprehensive plan studies and updates, Fort Thomas, Newport, Cold Spring, and Campbell County, as well as the above mentioned Northern Kentucky University (NKU) Master Plan, many stakeholders in the area are working diligently to create or refine planning blueprints to guide the vision of the future landscape of the I-471 Corridor. Transportation and land use are closely intertwined. Coordinating this transportation plan with these land use planning studies underway will be key to the success of both efforts.

Transportation needs in this area do not come as a complete surprise to anyone. The following past studies have paved the way for this I-471 Corridor Study:

- Campbell County Transportation Plan,
- Traffic Analysis of US 27, Alexandria Pike,
- The Eastern Corridor Major Investment Study,

- Fort Washington Way, and
- Northern Kentucky New Economy Marketing Strategy Study.

In addition, concurrent to this I-471 Corridor Study, there are several related recent or on-going studies, of particular relevance to this study:

- I-471/KY 8 interchange modification feasibility study;
- AA Highway (KY 9) / I-275 Connector Road near NKU;
- KY 9, Licking Pike Extension Study from I-275 to Newport;
- Campbell County Comprehensive Plan Update;
- TANK Long Range Network Study;
- Eastern Corridor Multi-modal Projects Study;
- Preliminary Brent Spence Bridge alternatives study; and
- Northern Kentucky University Master Plan.

In its most simple terms, the purpose of this study is to determine what's needed to improve capacity and safety in northern Campbell County, now and through the year 2030. Specific goals include:

- improve mobility in developing and re-developing parts of corridor;
- improve regional accessibility and connectivity;
- address safety and congestion problems on the existing road network; and
- identify solutions that will not adversely impact, or improve air quality.

Beyond the 'traditional' transportation corridor study planning for short-term, emerging 5-7 year needs, and long range, projected 20-25 year needs, this study is challenged to assess the needs of another timeframe, a mid term or 10-12 year time frame. Impending on this mid-term horizon is the potential travel demand impact of major changes in the Ohio River crossings between northern Kentucky and southern Ohio. Current studies are underway to determine the needs for reconstruction, replacement and/or relocation of the most heavily used Ohio River crossing, the Brent Spence Bridge carrying I-71 and I-75. It is likely that this reconstruction or replacement will result in some disruption of service in this mid-term time period (to accommodate construction) and this traffic demand will be diverted to the other Ohio River bridges, with much of it to the Taylor Southgate and the Daniel Carter Beard bridges. With existing and projected deficiencies in the northern Campbell County transportation network already apparent without this added burden, the I-471 Corridor Study must fully explore what can and should be done when the Brent Spence Bridge is reconstructed.

The study was conducted in two phases, Phase I Corridor Planning and Phase II Interchange Modification Study, but the Phase I schedule also encompassed the completion of two special substudies within the corridor: the US 27 Alexandria Pike Access Management Plan and the US 27 Alexandria Pike Traffic Signal Optimization Plan.

Although separate reports were completed for these two US 27 substudies, key recommendations from these studies are carried forward into the Plan recommendations and prioritization described in Part 3 of this report. The Phase II Interchange Modification study analysis and conclusions are included as part of the plan recommendations in Part 3, and discussed as a separate section, Part 4, of this Corridor Plan report.

STAKEHOLDER DRIVEN PLANNING PROCESS

ENTRAN served as the prime consultant for this study, responsible for overall technical project management, specific planning and engineering tasks, and management of specialized consultant services provided by team member subconsultants: Northrop Grumman Corporation; H. Powell and Company, Inc.; and Vivian Llambi and Associates, Inc. In addition, the OKI staff also served directly and in support of the technical studies.

However, this technical team is only one partner in this planning effort, with several other, equally important partners, being the many stakeholders who actively participated in developing this plan. These two partners were the Project Management Team (PMT) and an Advisory Committee (AC), both composed of area stakeholders, who served to provide review, guidance and direction as the plan developed.

Project Management Team

The Project Management Team was established by OKI at the project outset in August 2006 to be a hands-on working group to participate throughout the study as the key decision-making body. This group consisted of key stakeholders and representatives of OKI, the Kentucky Transportation Cabinet (KYTC), Campbell County, the City of Newport, Northern Kentucky University, the Federal Highway Administration (FHWA) and the technical study team. The PMT guided the progress of the study, providing valuable local and regional input and played an essential decision-making role throughout the duration of the study.

The **Project Management Team** members were:

Chair: Steve Pendery, Campbell County Judge Executive
Melissa Williams, Campbell County Fiscal Court
Peter Klear, Campbell County Fiscal Court
Greg Tulley, Beth Fennell, City of Newport
Rob Hans, KYTC, District 6
Mike Bezold, KYTC, District 6
Larry Blake, Northern Kentucky University
Mary Paula Schuh, Northern Kentucky University
Mary Murray, FHWA
Mark Policinski, OKI

PMT Technical Study Team Representatives:
Robert Koehler, Karen Whitaker,
Sarah Fry, Andy Johns - OKI
Craig Kowalski, Tom Creasey - ENTRAN

In addition, over the course of the study schedule, other members of the technical study team including Tony Catalina (transit) and Steve Shadix (interstate engineering) of ENTRAN and Scott Evans and Dave Besl (Intelligent Transportation Systems, ITS) of Northrop Grumman Corporation attended and participated at the PMT meetings to provide technical presentations of the key components of the study and address questions of the PMT members.

Advisory Committee

A larger Advisory Committee composed of representatives of organizations, communities, agencies and interest groups in this study also served a key role in reviewing and guiding the plan's development. This larger group was also established early in the schedule, September 2006, by OKI with input from the PMT. The Advisory Committee met at important junctures in the study to review and provide input in the planning studies and decisions (October 2006, May 2007 and March 2008). These meetings were held in a workshop format open to the public to encourage public engagement throughout the study.

The **Advisory Committee Members*** were:
Campbell County Judge Executive, Steve Pendery, Chair

Alliance for Regional Transit: John Schneider
Campbell County Consolidated Dispatch: Dale Edmondson, Marci McNay
Campbell County Economic Progress Authority: Fred Macke Jr.
Campbell County Senior Center: Marsha Dufeck
Capital Investment Group: Gregg Fusaro
City of Bellevue: Mayor Jack Meyer
City of Cincinnati: Reggie Victor
City of Cold Spring: Mayor Mark Stoeber, Tom Benke
City of Dayton: Mayor Kenneth E. Rankle, Cathy Volter
City of Ft. Thomas: Mayor Mary H. Brown
City of Highland Heights: Steve Crawford, David Whitacre
City of Newport: Mayor Thomas L. Guidugli, Beth Fennell, Robert Yoder
City of Southgate: Mayor Chuck Melville, Jim Hamberg **
City of Wilder: Terry Vance
East Row Historic Foundation: Corey Siddall
Harbor Greene: Dobbs Ackermann
KYTC, District 6: Mike Platt
Newport on the Levee: P. Ellen Prows
Northern Kentucky Area Planning Commission: Laura Mitchell, Keith Logsdon
Northern Kentucky Chamber of Commerce: Stan Lampe
Northern Kentucky Convention and Visitors Bureau: Tom Caradonio
Northern Kentucky University: Joe Wind, Katie Herschede
ODOT, District 8: Tommy Arnold
SORTA: Michael Setzer, Tim Reynolds
Southbank Partners, Inc.: Bill Scheyer, Wally Pagan
St. Luke Hospitals: Nancy B. Kremer, Mike Kuechenmeister
TANK: David B. Malone, Andrew Aiello

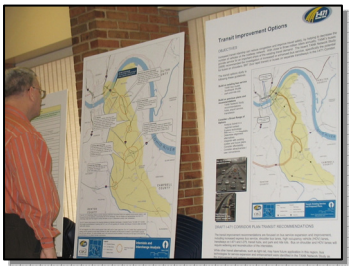
notes:
* = The first name listed is the official representative; others listed attended as an alternate or guest.
** = Jim Hamberg was elected as Mayor of Southgate, succeeding Mayor Mellville, during this study.

In addition, several PMT members attended one or more of the Advisory Committee meetings as guests.

The following other organizations were also provided information, invitations to participate as members of the Advisory Committee and notices of all Advisory Committee meetings: Brighton Center, Castellini Company, Cincinnati USA Regional Chamber, City of Woodlawn, FHWA-Kentucky, Hispanic Resource Center, Newport Independent Schools, Newport Steel, and the Northern Kentucky Tri-Ed. The following United States and Kentucky public officials were also provided information of the study as it progressed, as well as invitations to all Advisory Committee meetings:

- United States Senator James Bunning,
- United States House of Representatives Congressman Geoff Davis,
- Kentucky State Legislature Representative Dennis Keene,
- Kentucky State Legislature Senator Katie Stine.

In addition, stakeholder participation and input was obtained during the US 27, Alexandria Pike Access Management Plan substudy (separate report completed in 2007). That substudy was conducted with the active participation of a special US 27 Access Management Task Force in early 2007 (Task Force workshops were held in February, March and April 2007). Findings and recommendations from that substudy were carried forward and included in the open house public meeting held June 13, 2007. Input specifically related to access management received through that substudy process, workshops and from the open house were incorporated into the larger Corridor Study.



Close to 300 persons attended the three I-471 Corridor study open houses, providing valuable input.

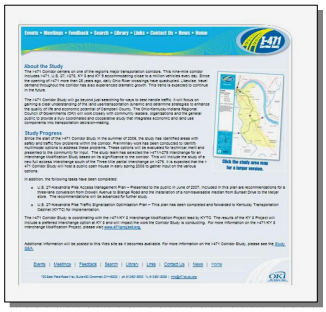
Open House Public Meetings

In addition, three open house public meetings were held in the I-471 Corridor at key points in the study to solicit public input on goal setting and problem identification, alternatives development and evaluation, and on recommendations and setting priorities for advancing the recommended plan. These open houses were held:

- October 26, 2006 at the City of Highland Heights City Building;
- June 13, 2007 at the City of Southgate Community Center; and
- March 25, 2008 at the Disabled American Veterans (DAV) Headquarters in Cold Spring.

Additional Information Exchange

In an effort to further engage stakeholders in this study and plan development, project information, announcements and study updates were regularly posted to a website specifically created for the I-471 Corridor Study (www.471study.org).



The 471study.org web site helped inform and engage study stakeholders.

Directly linked from OKI's website (www.oki.org), information available included the project background, study updates, downloadable versions of all public meeting displays, presentations and videos, answers to frequently asked questions, Advisory Committee and Open House public meeting announcements, agenda and proceedings, related news articles and project contacts. Additionally, a feedback page was provided for the public to voice additional comments or remark on project issues and recommendations. A database of over 400 area stakeholders was established. It enabled direct mail notification of the open house public meetings. As a result, from goal setting and problem identification to the development, evaluation and recommendation of a strategic long range plan, this study was focused on optimizing the input from the people who live and work in this study area and use the buses and roads to travel in and through this area every day.

PURPOSE AND NEED

The phrase *Purpose and Need* is recognized as a very important concept at the heart of sound transportation planning. Originally coined in the National Environmental Policy Act (NEPA) guidelines for environmental impact assessment studies for transportation (and other) improvements, it is intended to be a statement or document that accurately and concisely defines why an action, improvement or change is needed. It is the essence of the problem identification or conditions that need to be addressed immediately or long term. It is not a description of the proposed action or solution, but a framework for developing, evaluating and finding solutions. Setting a vision and defining goals prepares the foundation for establishing the Purpose and Need.

An important early task of this study was the establishment of project goals and the solicitation of stakeholder and public input to refine these goals. As the study progressed, these goals provided a solid foundation for the development and evaluation of project alternative solutions and ultimately the make-up of the recommended I-471 Corridor plan.

Likewise, as problems were better identified, alternatives developed and evaluated, the project goals were continually reviewed as the study's focus on the long range transportation plan improved. Every alternative solution considered for incorporation into the final Plan was examined for how well it addressed or fit with these goals.

The project goals established by the stakeholders of this study, which included the PMT, the Advisory Committee and the interested public, formed the foundation of the alternative solution development and evaluation and were integral to the decision-making process. The advancement of a recommended plan to the OKI Board of Directors for endorsement and incorporation into the regional transportation plan and the ultimate funding and implementation of any

proposed improvements depends on the plan's ability to address the established goals and purpose and need determined in this study.

At the initial PMT meeting, the group was asked to begin to formulate goals for this study. The following "planning factors" identified in the federal transportation bill, known as SAFETEA-LU[3], served as a basis for developing specific I-471 Corridor study goals.

The planning factors from SAFETEA-LU are:

1) Support Economic Vitality;
2) Increase Accessibility and Mobility;
3) Protect the Environment;
4) Enhance Modal Integration;
5) Promote Efficient System Management;
6) Preserve the Existing System;
7) Increase Safety; and
8) Increase Transportation Security.

The study vision and goal statements concurred upon by the PMT were then presented at the kick-off meeting of the Advisory Committee and at the Open House Public meeting to solicit review and comment, potential revision or enhancement, and finally concurrence. These goals were referred to throughout the study and were prominently displayed at every public meeting. The following vision and goals for the study were thus established:

Vision:

The I-471 Corridor Study will result in a well-defined strategic transportation vision to protect and enhance quality of life for residents, businesses, the communities and other stakeholders in this corridor.

I-471 Corridor Plan Goals are:

- To improve mobility in developing and re-developing parts of the county;
- To improve regional accessibility and connectivity;
- To improve safety and reduce congestion;
- To improve air quality in the region;
- To enhance economic vitality; and
- To plan transportation consistent with, and capable of assisting in the realization of comprehensive plan visions in northern Campbell County.

3 SAFETEA-LU is an acronym for the 2005 federal bill entitled: Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.

The following section of this report, the Assessment of the Existing and Projected Conditions, is the next critical step in expanding the understanding of the Purpose of Need of this I-471 Corridor Plan through a quantification of the study area's transportation problems, needs and issues.

Part 2: Assessment of Existing and Projected Conditions

This study included a thorough review of existing and projected conditions, from land use, population and employment data to traffic counts, travel patterns and transit service to a review of pertinent, recent transportations studies and on-going transportation plans that would directly impact this area. The purpose of this review was to assess the existing and future transportation conditions and to identify transportation problems and needs for the I-471 Corridor. The determination of potential solutions to consider logically flows from understanding the existing and future problems and needs. This section of the report summarizes each of the major components of this assessment.

UNDERSTANDING THE LAND USE / TRANSPORTATION RELATIONSHIP

Recent major land use changes and on-going announcements of new development plans, particularly on the north and south ends of this corridor, on the Cincinnati, Newport and Bellevue riverfront, and in the Technology Triangle in Highland Heights, have increased the urgency of transportation planning in this I-471 Corridor study. While existing transportation problems are more readily observable in terms of congestion or safety hazards, predicting the future transportation needs requires a look into what generates transportation needs. This corridor's mix of well established land uses and re-developing opportunities, along with the unique character of the eight communities linked by the I-471 spine, requires the support of sound transportation planning to address existing and projected transportation needs.

Recent and projected residential growth

There are currently over 2,000 residential units in development stages or under construction along the Ohio River, including Ovation and Southshore in Newport, Harbor Greene, WatersEdge, and Port Bellevue in Bellevue, and DCI Properties and RiverPointe in Dayton. In addition, there are currently over 3,500 residential units in development stages or under construction in three communities of south central Campbell County: Highland Heights and Cold Spring in the southern portion of the corridor study area and in Alexandria, just south of the study area. This residential growth includes:

- Highland Heights and Cold Spring
  - NKU enrollment (projected to increase from 14,000 to 23,000 students by the year 2020)
  - NKU student housing (increasing from 1,400 to over 3,000 dormitory units) on campus and in nearby vicinity
  - Site preparation for a number of future single and multi-family development along the US 27 corridor (estimated 1,300 units)

Current development in the study area includes thousands of new homes and millions of square feet of office, commercial and industrial space.

- Alexandria
  - several large scale residential, single-family home developments including Arcadia, Ameritech Homes, Summerlake and Fischer Homes (estimated 1,600 units)

Although some of the projected residential development, particularly along the riverfront, are targeted to smaller household sizes, the total projected population growth could be double what is currently shown in the existing 2030 projections.

Recent and projected employment growth

(Retail / Commercial / Office / Industrial / Institutional)

Over 70% of the projected employment growth between 2000 and 2030 in Campbell County is in five areas: the riverfront, Ft. Thomas, Highland Heights, Cold Spring and Alexandria, with almost one-quarter (24%) of that job growth to occur in the riverfront area alone. Employment opportunities that are currently under construction or in development include:

- Riverfront area
  - Over 1.4 million square feet office and almost 500,000 square feet of retail in developments such as Ovation, Southshore, Newport on the Levee (Part B), and Port Bellevue;

- Central area
  - Over 500,000 square feet (mixed uses: commercial, office) in developments such as the Newport Pavillion, St. Luke's East Hospital/Medical Complex; Southgate (Beverly Hills site), and the Silver Grove Industrial Park (23 acre industrial park located just east of the study area);

- Southern area
  - Estimated 300,000 square feet office/retail in areas such as NKU and vicinity, Highland Heights (Tech Triangle), Cold Spring (several sites undergoing preparation for development; as well as the Crossroads
  - Elementary School area and potential development along the US 27 corridor in Alexandria.

These major developments currently under construction and in the advanced stages of planning will have a significant effect on travel patterns and traffic volumes, particularly in the short and mid term time frame. Transportation and land use are intertwined; travel demand, access and congestion are directly related to land use. Existing traffic often provides a visible confirmation of this, but

changes in land use and new development are often not synchronized with improvements or projected needs in transportation networks or transit service.

A valuable tool used in this study for both measuring existing and forecasting travel demand is the OKI Regional Travel Demand Model (RTDM). This travel demand model can project how many trips, whether as vehicle traffic or transit ridership, can be expected in the future, where these trips will be coming from, and where they will be going. For example, if there is a reduction in capacity on the Brent Spence Bridge due to its reconstruction, travel demand modeling can predict how much traffic would be diverted to I-471 and other routes. Likewise, the RTDM can help visualize the impacts of transportation changes and improvements like added lanes, new roadways or expanded transit service or new facilities. In addition, the RTDM provides comparative data on regional benefits and impacts of studied scenarios such as travel delay, congestion, and air quality.

The OKI Regional Travel Demand Model uses population and employment as its primary predictors in the development of travel demand and travel patterns.

Geographically, the model is subdivided into traffic analysis zones, or TAZ's, and the socioeconomic data, specifically population and employment, are summarized for each TAZ. Trip production/attraction and travel demand assignment to the transportation facilities (traffic on roadways and riders using transit) is then based on the geographic distribution and make-up of this population and employment data. Traffic analysis zone boundaries typically follow U.S. Bureau of Census data boundaries with TAZ's comprised of an aggregation of Census blocks[4]. OKI maintains the socioeconomic data for both base year, 2005, and future year, 2030 through coordination with state, local and area planning agencies.

The OKI regional travel model contains existing and projected population and employment data for the eight counties that comprise the OKI region: Butler, Hamilton, Warren and Clermont in Ohio; Boone, Kenton and Campbell in Kentucky; and Dearborn in Indiana. While the county total population and employment forecasts are determined at the state level[5], the distribution or allocation to TAZ depends on close coordination with local conditions and plans as determined at the local level by local planners.

As comprehensive land use plans form the blueprints for development based on locally determined planning goals, it is important that these plans are accurately reflected in OKI's Regional Travel Demand Model (RTDM). With several comprehensive plans in this corridor recently updated or currently undergoing updates (including those of Campbell County, Newport, Fort Thomas and Cold Spring, as well as communities outside the study area, such

4 TAZ's do not necessarily coincide with corporate jurisdictional boundaries such as city limits, but do respect County boundaries; i.e., a TAZ can span more than one incorporated municipality, but TAZ's do not cross county lines.

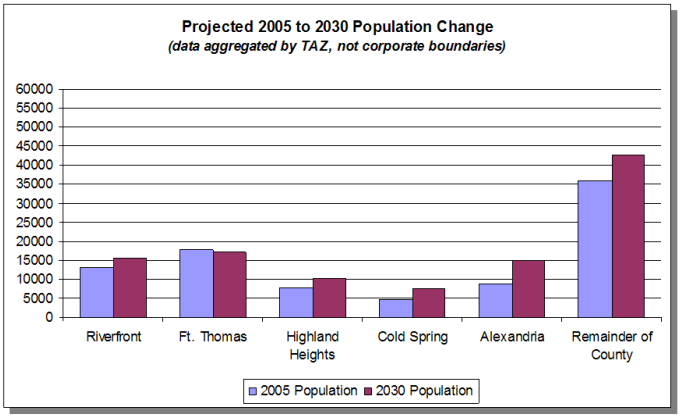
5 The Kentucky State Data Center provides this socioeconomic data for the Kentucky counties.

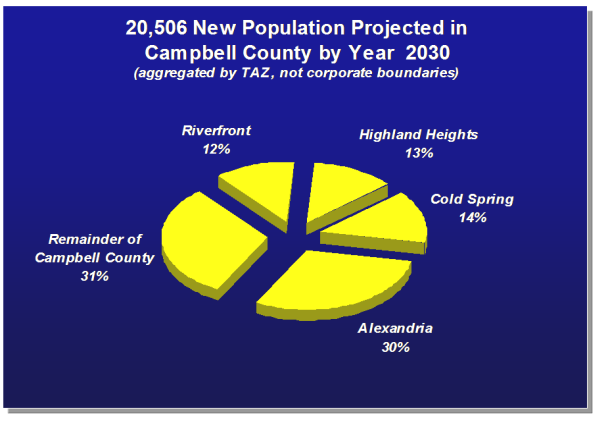
as Alexandria), this review was essential to ensuring that the identification of transportation needs and decisions will be consistent with these plans and supportive of these planning goals for land use and development.

Acknowledging recent and on-going comprehensive planning efforts throughout the corridor, as well as in witness to the recent visible changes in the corridor as discussed above, one of the first steps in this transportation planning study was a close examination of the socioeconomic data allocation by TAZ for both the base year, 2005, and the forecast year, 2030. Working with the OKI's demographers and through coordination with community planners and officials in the study area, an updated assessment of both existing and projected land use changes was completed for the corridor study area. Meetings were held with the communities of Alexandria, Bellevue, Newport, Southgate, Wilder, Cold Spring, Highland Heights, Dayton, Fort Thomas, Campbell County, as well as NKU and St. Luke's Hospital, to more accurately estimate recent population and employment changes and to determine what adjustments were needed to better reflect future comprehensive land use plans and development master plans.

From this review, a revised set of both 2005 and 2030 population and employment data by Campbell County TAZ was created (see Appendix A for the existing and projected socioeconomic data by TAZ and a map showing the TAZ boundaries). As Exhibits 2 and 3 illustrate, population is expected to increase by 23 percent from 87,518 to 108,024 persons by 2030 (growth of 20,506 persons). Of that population growth, over half is forecasted to occur south of I-275.

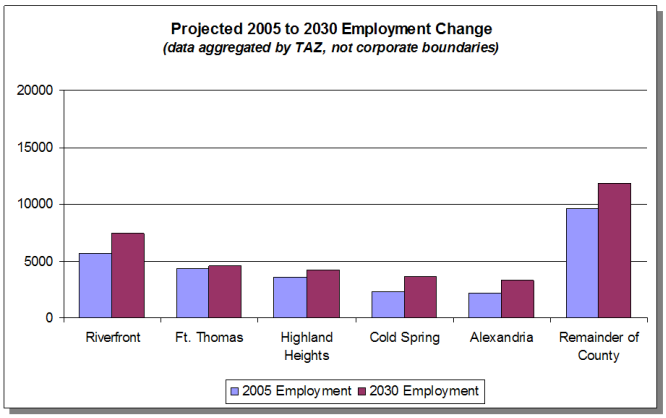
Exhibit 2: Population Change, 2005 to 2030

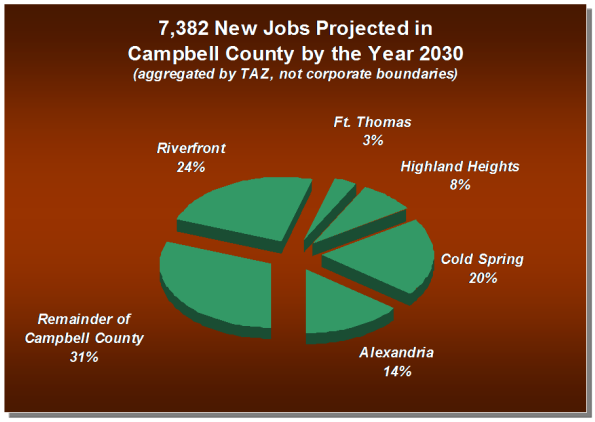




Employment is predicted to increase from 27,689 jobs in 2005 to 35,071 jobs in 2030, an increase of 27 percent (growth of 7,382 jobs). Almost one-quarter of these new jobs are projected to be in the riverfront area. In addition to Exhibits 2 and 3 illustrating the data analysis for Campbell County, Exhibits 4a-4b and 5a-5b provide a graphic display of the population and employment growth between 2005 and 2030 by TAZ for the study area and immediate surroundings.

Exhibit 3: Employment Change, 2005 to 2030





This revised socioeconomic data was then incorporated into the OKI Regional Travel Demand Model to allow for a more accurate consideration of transportation needs and problem identification. In this way, transportation plan development is better linked with the envisioned land use growth and expected demographic changes in the study area and Campbell County.

ASSESSMENT OF EXISTING TRANSPORTATION CONDITIONS

The assessment of the existing transportation conditions involved a thorough analysis of traffic flow performance, safety experience (crash data), transit service, existing ITS (ARTIMIS) operations and stakeholder observations and perceptions. Other key components of assessing the existing conditions in the Corridor included a review of environmental resources and features in the area, coordination with other current transportation improvement planning efforts affecting the study area and a review of past transportation plans and proposals for the area.

Existing Level of Service

Using the OKI RTDM 2005 base year traffic assignment and available existing traffic counts, the study area's network of state and federal roads was evaluated for performance by estimating peak hour level of service[6]. Level of Service is a qualitative measure of traffic operations and conditions that takes into account the effects of several factors including: traffic, truck volumes (as a percentage of

6 Highway Capacity Manual, Transportation Research Board, National Research Council, Washington, D.C., 2000 and LOSPLAN(2007), a package of analysis tools based on the Highway Capacity Manual was used to estimate level of service for roadways, Florida Department of Transportation, Systems Planning Office, Tallahassee, Florida (endorsed by the FHWA for use nationwide). In some cases, LOSPLAN provided a fine-tuning of the OKI model generated estimates, which in turn, helped to better identify congestion problems in the I-471 Corridor study area.

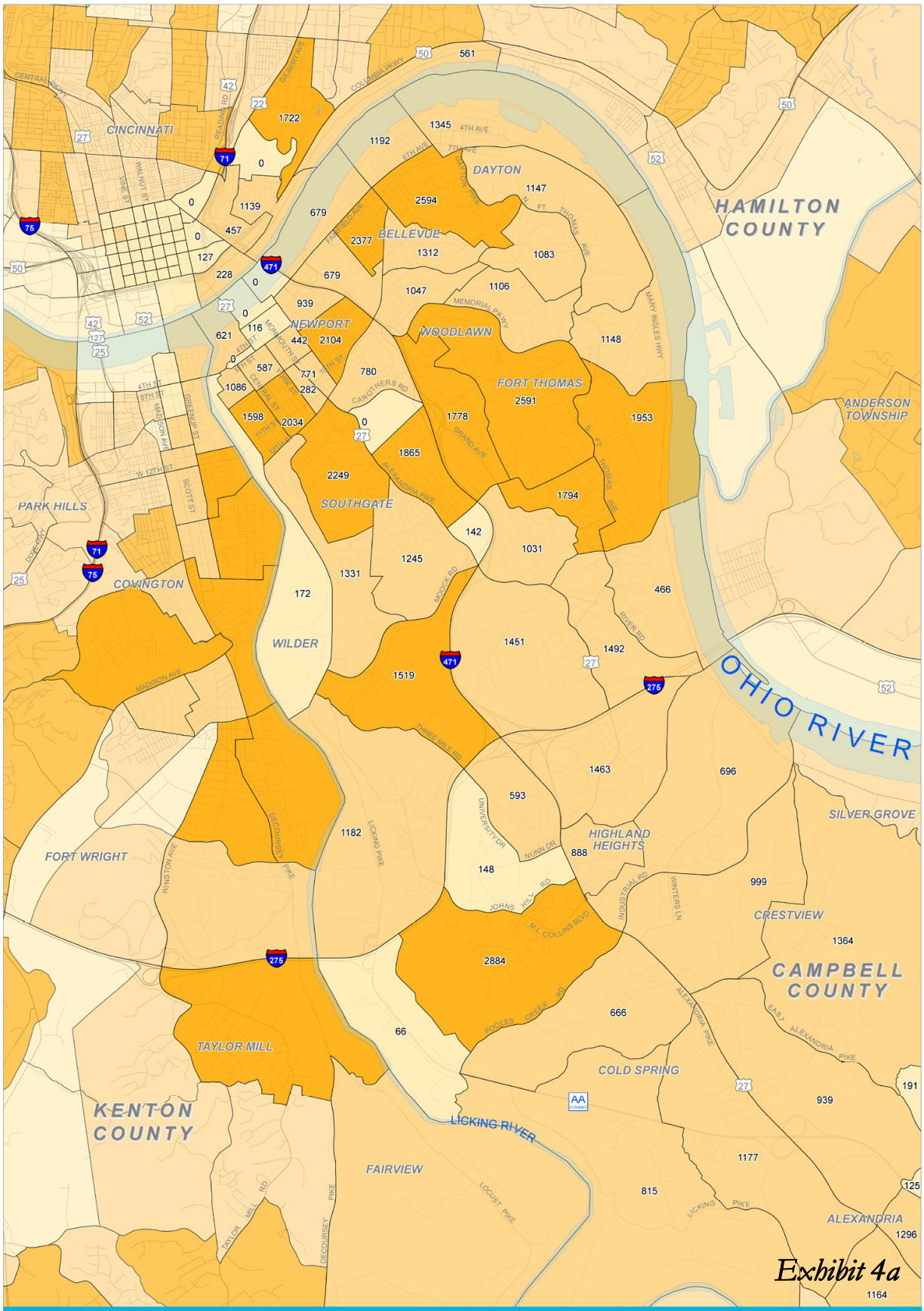

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Exhibit 4a
I-471 Corridor Study
OKI
Ohio · Kentucky · Indiana
Regional Council of Governments
Study Area
Campbell County
OKI Eight County Region
Legend
Number of People
0 - 200
201 - 1500
1501+
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Traffic Analysis Zone (TAZ) Boundary
Number of People Per Zone
2005 Population
June 2007
0 0.25 0.5 1 Miles
Source: U.S. Census Bureau, 2000 and OKI, 2006

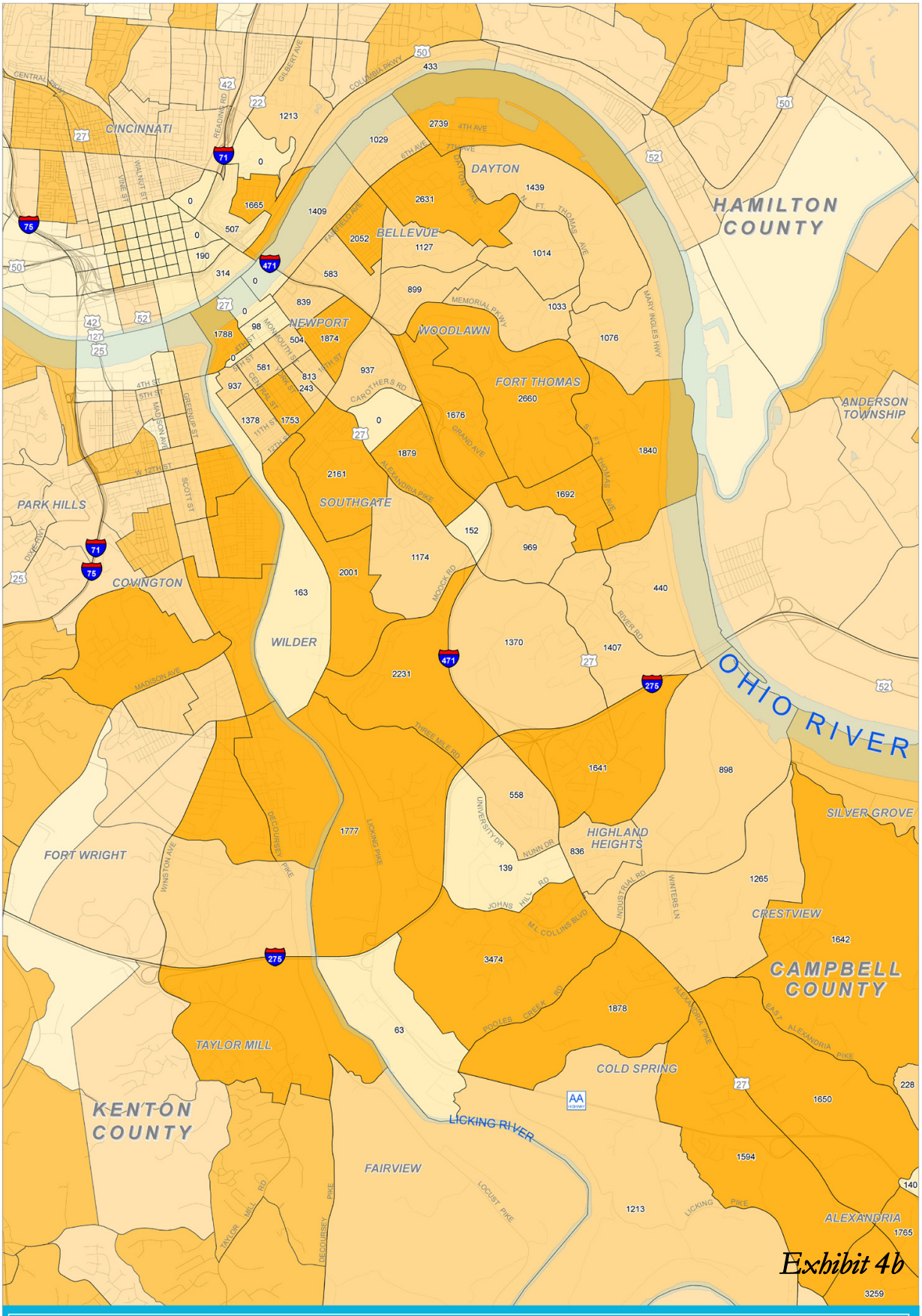
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Exhibit 4b
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Legend
Number of People
0 - 200
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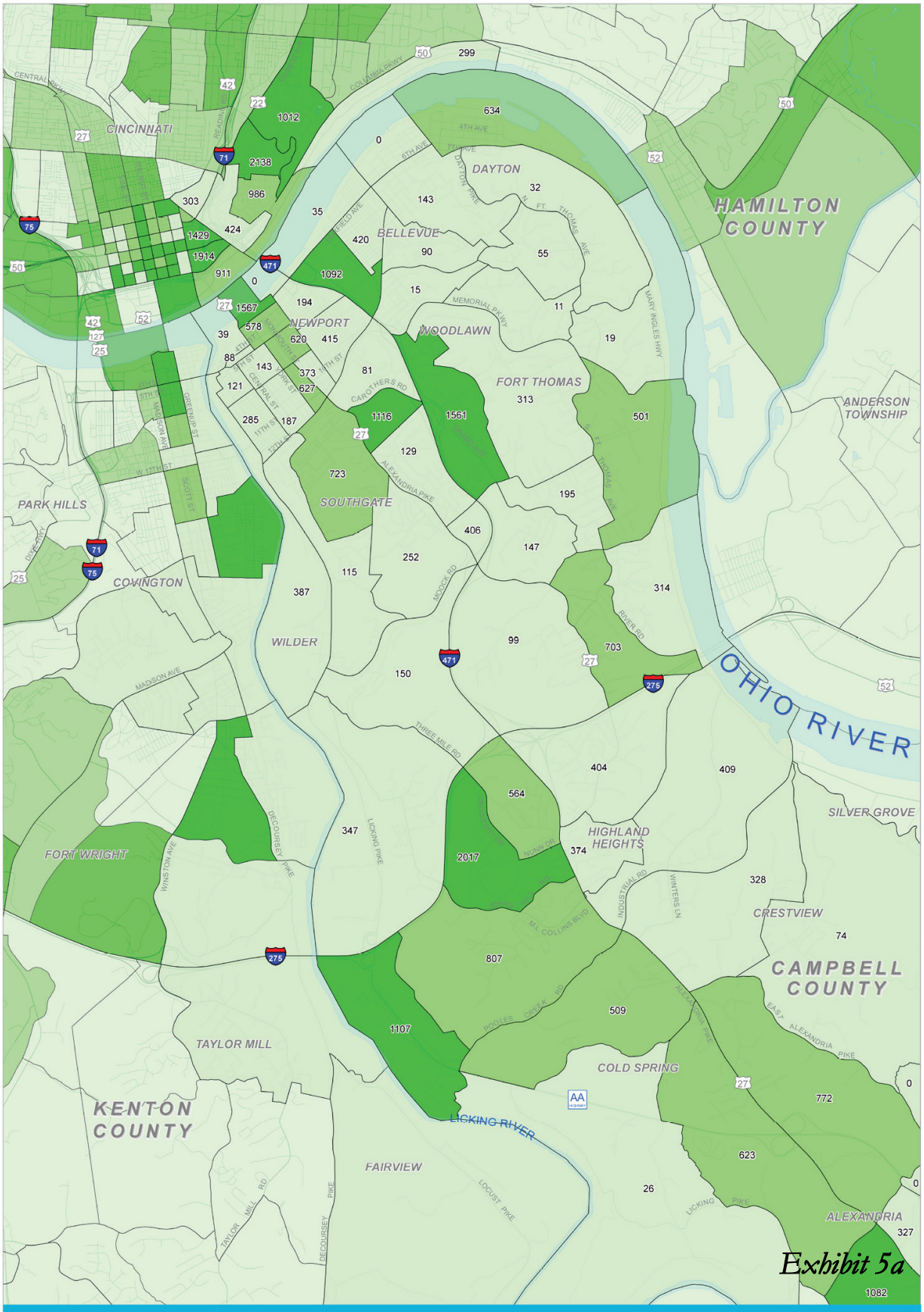
Traffic Analysis Zone (TAZ) Boundary
Number of People Per Zone
Projected 2030 Population
June 2007
0 0.25 0.5 1 Miles
Source: Kentucky State Data Center, 2000 and OKI, 2006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Number of Jobs
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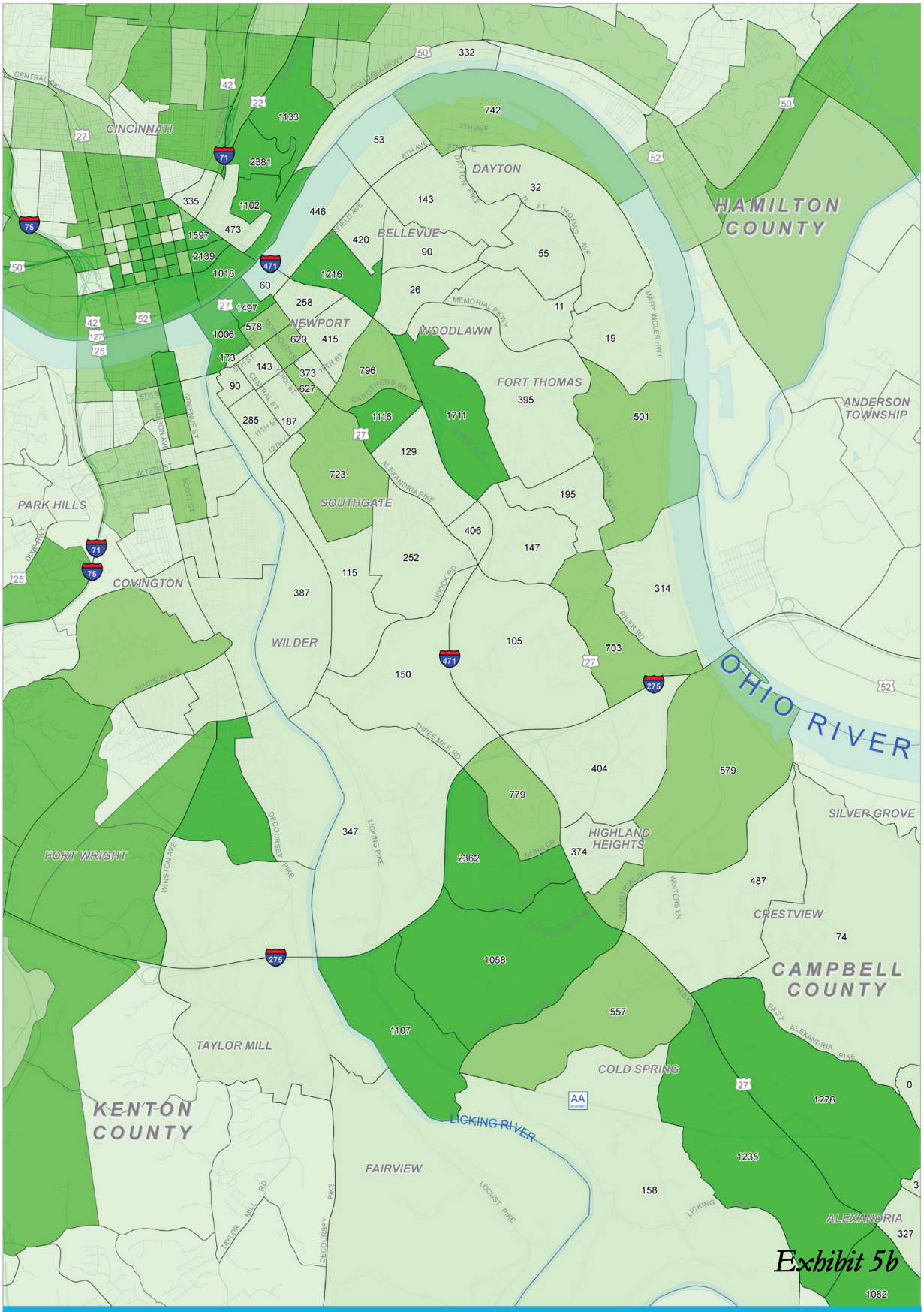
Traffic Analysis Zone (TAZ) Boundary
Number of Jobs Per Zone
Study Area
OKI Eight County Region
2005 Employment
June 2007
0 0.25 0.5 1 Miles
Source: U.S. Census Bureau, 2000 and OKI, 2006

Exhibit 5a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CAMPBELL COUNTY
ALEXANDRIA
ANDERSON TOWNSHIP
HAMILTON COUNTY
OHIO RIVER
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Exhibit 5b
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Legend
Number of Jobs
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1001+
250
Traffic Analysis Zone (TAZ) Boundary
Number of Jobs Per Zone
Projected 2030 Employment
June 2007
0 0.25 0.5 1 Miles
Source: U.S. Census Bureau, 2000 and OKI, 2006

total), speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort, convenience and operating costs. Although many of these factors are only indirectly considered, empirical data has been collected nationwide in independent studies to correlate level of service with each of these factors. Level of Service (LOS) is rated from A to F, with A being the highest level, and C being the generally accepted standard. In general, LOS A represents completely free flow conditions, where the operation of vehicles is unaffected by the presence of other vehicles and only constrained by geometric features of the facility and driver preferences. LOS C represents a range in which the influence of traffic density on operations becomes marked and the ability to maneuver within the traffic stream and to select an operating speed is clearly affected by the presence of other vehicles. Average travel speeds are reduced and minor disruptions may be expected to cause some local deterioration in service. LOS E represents operations at or near capacity, while LOS F represents forced or breakdown flow, with complete traffic stoppages often occurring.

OKI provided level of service estimates for all key routes in the eight county OKI region by using the traffic assignment input and output data by link, or segment, corresponding to each Regional Travel Demand Model scenario. This data was initially used as the base data for assessing existing and projected future conditions.

In addition, level of service estimates were made on major I-471 study area routes using updated roadway characteristics and through application of Highway Capacity Manual procedures. Level of service measurement helps determine if a street or road has sufficient through capacity to serve the current or projected demand.

Daily traffic volumes and levels of service at key locations in the transportation study area network are shown in Table 1. Level of service estimates are for peak hour conditions, though 24-hour traffic volumes are shown. One of the assumptions of this planning application is the proportion of 24-hour traffic that occurs during peak hours. For different facility types, these were estimated based on an analysis of 24-hour traffic counts obtained from both the Kentucky Transportation Cabinet and the OKI Regional Travel Demand Model.

The following table presents the locations in the I-471 Corridor study area with level of service D, E or F, for both the existing and projected No Build conditions[7]. The term 'No Build' refers to the future conditions where the existing network of roads and transit service is maintained as they exist, but also includes the implementation of any transportation project already under development or committed to be developed and in use by the future year (2030). For this reason, the term 'Existing and Committed' is often used interchangeably with the term 'No Build.'

7 Source: Existing traffic data from KYTC; projections from OKI Regional Travel Demand Model for Year 2030 with Long Range Plan implemented; Level of Service calculated by ENTRAN, 2008.

Table 1: Traffic Volumes and Level of Service at Key Locations, 2005 and 2030

Location	2005 Base		2030 Long Range Plan		Average Daily Traffic % Change, 2005 to 2030
	Average Daily Traffic	Level of Service	Average Daily Traffic	Level of Service	
Key Routes					
I-471 Bridge	100,622	E	121,406	F	21%
I-471 South of KY 8	93,337	D	111,091	F	19%
I-471 South of KY 1120	93,665	D	110,533	F	18%
I-471 South of Grand Ave	87,099	D	102,808	E	18%
I-471 South of US 27 (Southgate)	93,621	D	107,758	E	15%
I-471 north of US 27 (471/27 Intersection)	51,598	F	59,381	F	15%
US 27 S of Sunset	54,147	F	63,480	F	17%
US 27 South of KY 3490	43,652	F	52,080	F	19%
US 27 South of KY 1998	38,100	F	47,383	F	24%
US 27 North of AA Hwy	30,894	D	39,733	F	29%
US 27 South of AA Hwy	35,022	F	47,067	F	34%
I-275 West of AA Hwy	91,523	D	117,350	D	28%
I-275 East of AA Hwy	67,345	C	90,905	D	35%
I-275 East of I-471	87,368	D	107,686	E	23%
AA Hwy South of I-275	38,847	E	54,509	E	40%
AA Hwy south of KY 915	28,377	B	43,236	E	52%
Bridges					
Taylor Southgate Bridge	18,653	C	22,585	D	21%
I-471 Bridge	100,622	E	121,406	F	21%
Suspension Bridge	13,481	F	15,086	F	12%
Brent Spence Bridge	171,371	F	239,200	E	40%
4th Street Bridge (Covington-Newport)	33,477	F	48,333	E	44%
Licking Valley Girl Scout Bridge (Covington-Newport)	27,489	F	25,320	E	-8%
Arterials					
US 27, N of 1892	33,788	F	32,157	F	-5%
KY 8, W of Taylor	22,140	F	25,134	F	14%
KY 8, E of Taylor	12,978	E	16,869	F	30%
KY 445	8,706	D	10,424	F	20%
KY 1120, E of KY 9	21,576	F	20,585	F	-5%
Highland Ave, E of 1892	11,014	F	11,778	F	7%
Highland Ave, W of I-471	7,178	D	7,327	D	2%
Covert Run Pike, E of Taylor Ave	8,194	E	8,053	D	-2%
One way					
4th Street (KY 8 westbound)	16,110	E	15,738	E	-2%

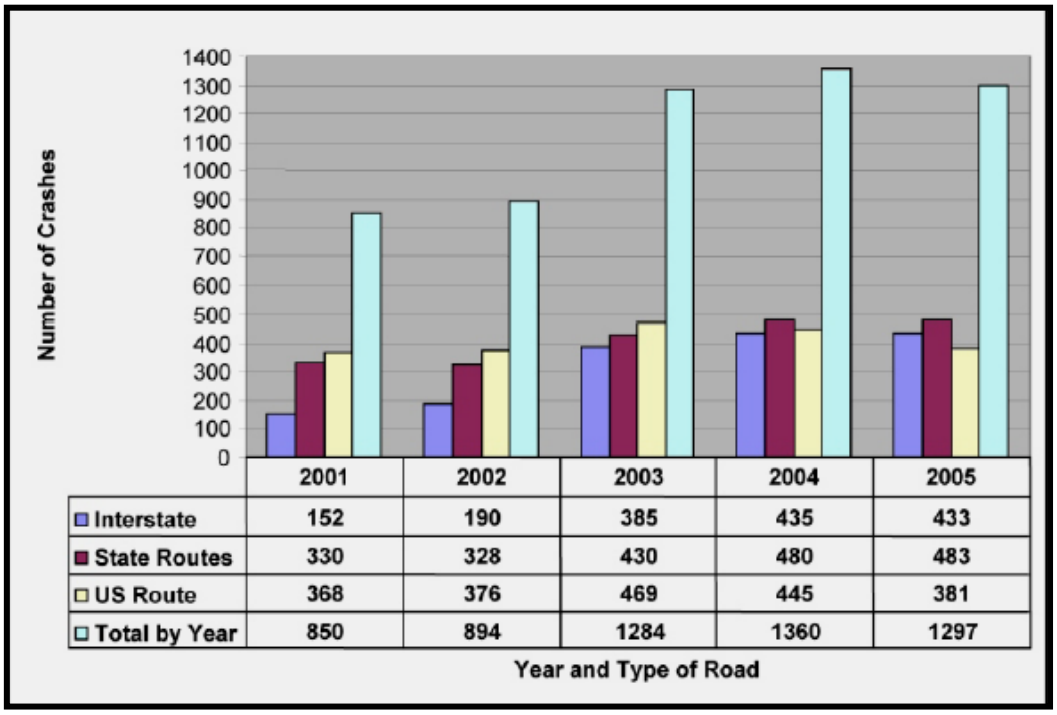
Note: In this table, the data for the 2030 Long Range Plan represents the *No Build* conditions; this scenario includes the maintenance of the existing transportation network and facilities, with improvements under development plus the committed projects in the current OKI 2030 Long Range Plan.

From Table 1, it can be seen that there are a number of routes experiencing congestion currently, as indicated by level of service ratings below C. Also, as expected with travel demand increases (projected whether or not the transportation network is improved or expanded in this corridor), existing level of service deficiencies will worsen and routes currently operating adequately, will begin to experience worsened levels of service.

Crash Analysis

An analysis of crash records was performed for the five-year period from January 1, 2001 through December 31, 2005. A total of 5,685 crashes occurred on State-maintained roads in the I-471 Corridor study area, i.e., the interstates and routes having 'US' or 'KY' designations, during this five year period according to data obtained from the Kentucky Transportation Cabinet[8]. Of this total, there were 938 crashes (17%) resulting in personal injury and there were 17 fatal crashes (0.3%). Exhibit 6 charts crashes by year and type of road. Table 2 lists the total number of crashes by year, while Table 3 shows the total number of crashes on each roadway by severity.

Exhibit 6: Crashes by Year and by Type of Road



	2001	2002	2003	2004	2005
Interstate	152	190	385	435	433
State Routes	330	328	430	480	483
US Route	368	376	469	445	381
Total by Year	850	894	1284	1360	1297

8 Data obtained from the Kentucky Traffic Safety Data Service, Kentucky Transportation Cabinet, and Division of Traffic Operations, 2006.

Route Number / Road Name Reference Note

The crash data analysis covered all portions of the state and U.S. routes that are included in the Corridor study area shown in Exhibit 1. Tables 2 through 6 include summaries of this analysis for the total length of each numbered route within the study area. Many of these routes cross jurisdictions and are often locally known by more than one common name. For reference, common road names corresponding to these route numbers are listed below:

I-471: *I-471 and the Daniel Carter Beard Bridge.*
I-275: *I-275 only (does not include Licking River bridge.*
KY 8: *4th and 5th Streets and Dave Cowens Drive in Newport; Fairfield Avenue in Bellevue; 6th Avenue in Dayton; (does not include Veterans Memorial Bridge over the Licking River).*
KY 9: *Central Street in Newport; Licking Pike, AA Highway.*
KY 915: *Licking Pike.*
KY 1120*: 10th Street, Memorial Parkway, South Ft. Thomas Avenue.*
KY 1632*: Moock Road.*
KY 1892*: Carothers Road, Grand Avenue.*
KY 1998*: Industrial Road.*
KY 2238*: Three Mile Road.*
KY 2345*: Johns Hill Road, Martha Layne Collins Boulevard.*
KY 2925*: East Alexandria Pike.*
KY 2926*: Winters Lane.*
KY 3490*: Johns Hill Road.*
US 27*: York and Monmouth Streets; Alexandria Pike.*

Table 2: Total Crashes by Year on Roadways within Study Area

Road	2001	2002	2003	2004	2005
I-275	60	88	117	128	153
I-471	92	102	268	307	280
KY 8	116	100	117	140	116
KY 9	98	107	158	169	178
KY 915	5	3	8	5	4
KY 1120	45	49	64	48	67
KY 1632	0	2	7	7	8
KY 1892	51	55	53	68	59
KY 1998	6	3	8	13	24
KY 2238	5	4	8	16	12
KY 2345	3	1	5	7	13
KY 2925	1	1	0	4	1
KY 2926	0	3	0	0	1
KY 3490	0	0	2	3	0
US 27	368	376	469	445	381
Study Area Total	**850**	**894**	**1284**	**1360**	**1297**

Table 3: Five Year Total Crashes by Severity on Roads within Study Area

Road	With Fatality	With Personal Injury	Property Damage Only	Total Crashes
I-275	4	125	417	546
I-471	5	157	887	1049
KY 8	1	95	493	589
KY 9	4	166	540	710
KY 915	0	11	14	25
KY 1120	0	32	241	273
KY 1632	0	5	19	24
KY 1892	0	43	243	286
KY 1998	1	7	46	54
KY 2238	0	6	39	45
KY 2345	0	3	26	29
KY 2925	0	2	5	7
KY 2926	0	0	4	4
KY 3490	0	0	5	5
US 27	2	286	1751	2039
Study Area Total	**17**	**938**	**4730**	**5685**

The crash data were analyzed to identify locations having potential safety problems with respect to crash history. Crash rates were developed for roadway sections and "spots" (i.e. intersections or short segments 0.3 miles in length or less). Crash rate normalizes the frequency (number) of crashes with respect to the amount of traffic. In other words, higher-volume roadways typically experience higher numbers of crashes and calculation of a crash rate allows for an equitable comparison. Crash rate is expressed in terms of *annual crashes per 100 million vehicle-miles of travel* for *roadway segments* and *annual crashes per 100 million vehicles* for *intersections or spots*.

In developing its Annual Highway Safety Plan, the Kentucky Transportation Cabinet uses the Critical Crash Rate measure to identify locations having abnormally high crash experience. Critical Crash Rate is calculated by the following formula:

Cc = Ca + K(sqrt(Ca/M)) + 1/(2M), in which
Cc = critical crash rate
Ca = average crash rate
sqrt = square root
K = constant related to level of statistical significance (a probability of 0.995 is used wherein K = 2.576)
M = exposure (for segments, M is in terms of 100 vehicle-miles (100 MVM); for spots, M is in terms of 100 million vehicles)

The average crash rate is computed on a statewide basis for similar facility types. This allows for the comparison of crash experience for different roads based on type (functional classification), traffic volume and number of lanes.

The Critical Rate Factor, or CRF, is the ratio of the calculated crash rate to the critical rate. Segments and intersections having a CRF greater than 1.0 are considered to be locations having abnormally high crash experience and should be evaluated further for safety improvements. Based on the five-year crash data from 2001 through 2005, those roadway segments, roadway spots (very short segments and intersections) and interchanges having a Critical Rate Factor greater than 1.0 are listed in Tables 4, 5 and 6.

Table 4: Summary of Roadway Segments with Critical Rate Factor Exceeding 1.0

Route	From	To	Segment Length (Miles)	Current Average Daily Traffic	Total Crashes	Critical Rate Factor
US 27	KY 2345	KY 3490	.08	40,600	59	**1.53**
US 27	I-471	KY 1892	1.46	13,200	287	**1.64**
US 27	KY 1120	5th Street	.36	7,335	225	**7.06**
KY 2925	US 27	Study Area	.23	544	6	**2.02**
KY 8	Monmouth St.	Park Ave.	.20	25,600	65	**1.78**
KY 8	Riviera Drive	Taylor Ave.	.28	27,500	75	**1.50**
KY 1120	I-471	US 27	.64	8,750	78	**2.02**
KY 1120	US 27	KY 9	.20	6,250	17	**1.38**
KY 1120	KY 9	Lowell St.	.34	6,250	48	**2.66**
KY 1120	Lowell St.	Licking Valley Bridge	.04	13,400	14	**2.02**
KY 915	AA Highway	Study Area	1.23	679	24	**2.58**

Table 5: Summary of Spot Locations with Critical Rate Factor Exceeding 1.0

Intersection of	With	Current Average Daily Traffic	Total Crashes	Critical Rate Factor
US 27	KY 2925	32,922	38	**1.59**
US 27	KY 1998	43,850	97	**3.24**
US 27	KY 2345	44,535	42	**1.39**
US 27	KY 3490	46,040	80	**2.57**
US 27	I-471 and KY 2238	56,780	221	**5.99**
US 27	KY 1892	23,700	61	**3.28**
US 27	KY 1120	21,625	153	**7.82**
KY 9	KY 1120	12,240	31	**2.35**
AA HWY	KY 1998	30,835	56	**2.12**
KY 8	Park Avenue	36,400	60	**2.32**

Table 6: Summary of Interchange Locations with Critical Rate Factor Exceeding 1.0

Interchange	With	Current Average Daily Traffic	Total Crashes	Critical Rate Factor
I-471	US 27	108,550	247	**1.14**
I-471	KY 1892	118,150	252	**1.07**
I-471	KY 8	127,050	374	**1.49**
I-275	AA HWY	109,700	338	**1.54**
US 27	AA HWY	49,400	186	**1.74**

The results identify a number of locations – both roadway segments, intersections and interchanges – that can be considered particularly problematic, based on their relative crash experience. Those locations having a crash rate more than three times the critical crash rate (i.e., CRF greater than 3.0) are:

- The segment of US 27 from KY 1120 to 5th Street (7.06)
- The intersection of US 27 and KY 1120 (7.82)
- The intersection of US 27 and I-471/KY 2238 (5.99)
- The intersection of US 27 and KY 1892 (3.28)
- The intersection of US 27 and KY 1998 (3.24)

Compared to the statewide total from 2005-2007, Campbell County has a lower percentage of both crashes with injuries and crashes with fatalities to total number of collisions. Over the past three years, Campbell County averaged 2,822 crashes per year resulting in 414 incidents with personal injury (15%) and 8 with fatalities (0.3%). During this same period, there was an average of 126,468 crashes per year in all of Kentucky with 27,525 resulting in personal injury (22%) and 843 fatalities (0.7%). According to a Kentucky Transportation Center study, overall for all drivers, the seat belt usage rate in Campbell County averaged 74.8 percent,

about 8% higher than the statewide average[9]. Although Kentucky's usage rate has increased steadily over the years, it remains one of the lowest in the country.

PROBLEM IDENTIFICATION FROM PUBLIC INPUT

At the first open house public meeting, in October 2006, a key meeting objective was to assess the public's perception of congestion and safety problems in the I-471 Corridor Study. A problem identification exercise was conducted during the meeting to encourage public input.

The exercise consisted of two maps set up in the center of the public meeting room to request observations and comments on problem areas in the corridor. Attendees were asked to place stars on each map, with one map specifically related to identifying congestion problems, and a separate map for the identification of safety problems. Many meeting attendees participated in this exercise and some valuable input was recorded on these maps and in comments scribed on large tablets corresponding to each map.

The following list and Exhibit 7 indicate the public response to the exercise. The comments have been organized into 13 geographic areas and a separate general comment category (similar and duplicate comments were combined so that each concern is only listed once). This information is a very important supplement to the technical study analyses for existing problem identification.

Map Area 1: Ft. Washington Way, Daniel Carter Beard Bridge and I-471/KY 8

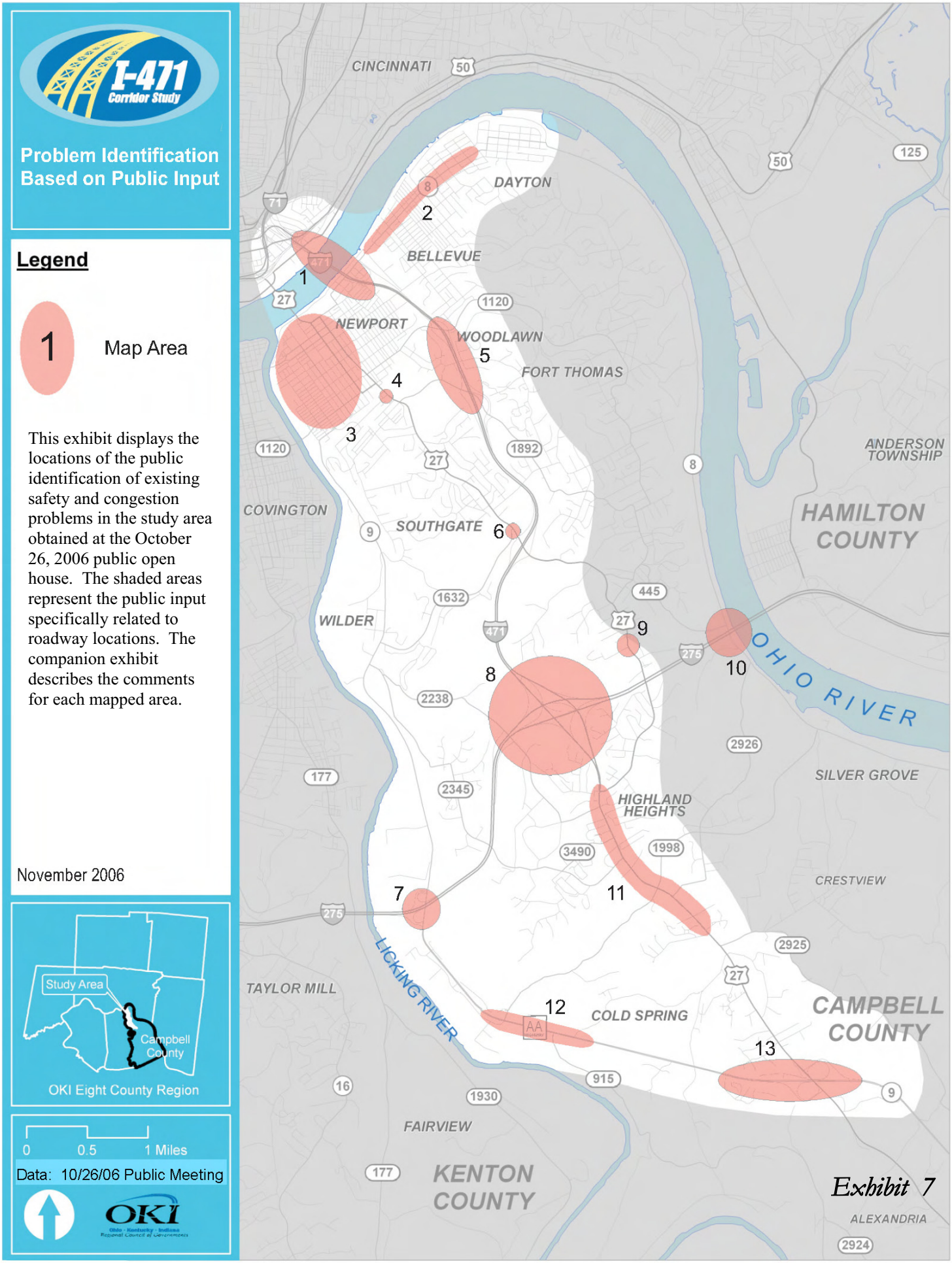
- Downtown (Ft. Washington Way) onto I-471 over the Daniel Carter Beard Bridge. (congestion, safety)
- Northbound I-471 exit onto Ft. Washington Way (congestion, safety)
- Southbound on Daniel Carter Beard Bridge, right lane exiting (congestion, safety)
- Reconstruct or relocate KY 8 interchange, southbound off ramp. (congestion, safety)
- Route 8 at Park and at Linden intersections. (congestion, safety)

KY 8 between Newport, Bellevue and Dayton is experiencing increasing traffic due to new commercial and residential development.

Map Area 2: KY 8 east of I-471

- Route 8 through Bellevue is a stumbling block to access and growth. (congestion)
- Consider the possibility of an access route to Dayton and east Route 8 via a parallel path to the existing railroad that passes through these areas. (congestion)
- Riviera Drive and Route 8 intersection. (congestion, safety)
- Consider a connector road between I-471 and Dodd Drive along the river in Bellevue and Dayton. (congestion)

9 Analysis of Traffic Crash Data in Kentucky 2002-2006, Research Report KTC-07-26/KSP2-07-1F, Kentucky Transportation Center, University of Kentucky, Lexington, Kentucky, September 2007.


I-471 Corridor Study
Problem Identification Based on Public Input
Legend
1
Map Area
This exhibit displays the locations of the public identification of existing safety and congestion problems in the study area obtained at the October 26, 2006 public open house. The shaded areas represent the public input specifically related to roadway locations. The companion exhibit describes the comments for each mapped area.
November 2006
Study Area
Campbell County
OKI Eight County Region
0 0.5 1 Miles
Data: 10/26/06 Public Meeting
OKI
CINCINNATI
DAYTON
BELLEVUE
NEWPORT
WOODLAWN
FORT THOMAS
COVINGTON
SOUTHGATE
WILDER
ANDERSON TOWNSHIP
HAMILTON COUNTY
OHIO RIVER
SILVER GROVE
HIGHLAND HEIGHTS
CRESTVIEW
TAYLOR MILL
LICKING RIVER
COLD SPRING
CAMPBELL COUNTY
FAIRVIEW
KENTON COUNTY
ALEXANDRIA
1
2
3
4
5
6
7
8
9
10
11
12
13
Exhibit 7

Map Area 2: KY 8 east of I-471 (continued)

- Limit parking time on Route 8. (congestion)
- Land use patterns continue to segregate the communities along Route 8
- 2-3 major housing projects in the works will add 1,000+ new homes in Dayton.

Map Area 3: AA Highway/KY 9 and Northwest Newport

- Extend AA to US 27 Ohio River Bridge. (congestion)

Map Area 4: US 27 north of Carothers Rd

- US 27 at railroad underpass in Newport. (congestion)

Map Area 5: Memorial/I-471 and Grand/I-471 Interchanges

- Memorial and Grand interchanges. (congestion, safety)
- I-471 northbound, remove bushes for 0.2 mi. south of Memorial Parkway to improve sight distance and eliminate slow down at bottom of hill. (safety)

Map Area 6: US 27 near Southgate Exit

- Access problems on US 27 west of I-471 at Moock Rd (access to shopping center). (congestion)

Map Area 7: I-275/ AA Highway Interchange

- 275/AA Hwy interchange – configuration causes problems. (congestion)

Map Area 8: I-275/I-471 Interchange Area

- Extend I-471 south ramp (from US. 27 Southgate) to become a second through ramp for I-471 to west I-275. (congestion)
- Consider making the exit ramp from I-471 SB to US 27 a two lane exit instead of the right lane drop that exists now. (congestion, safety)
- Consider I-275 access for new arena to use Three Mile Road half interchange. But, if the Three Mile Road area were ever to be developed, traffic flow at the Three Mile Road interchange would become a significant issue. (congestion)
- I-471/I-275 left side exit issue (southbound). (safety)
- I-471 southbound ramp to westbound I-275. (congestion, safety)
- I-471-US 27, investigate southbound US 27 to turn under I-471 ramp to merge at Sunset to reduce light. (congestion)
- I-275 from Ohio onto I-471. (congestion, safety)

Map Area 9: Ft. Thomas

- Crowell to new US 27 (at Sunset). (safety)

Map Area 10: I-275 east of I-471

- Better emergency vehicle access is needed on each leg of the I-275/I-471 interchange. There are a few median crossovers, but some are not paved

and the median is too wet and steep for fire trucks. Worst leg is I-275 toward Ohio, where they have accident runs before and after most Riverbend concerts and often can't get to the scene without going over to Kellogg Avenue in Ohio and then often get stuck in traffic. (safety)

- Consider a KY 8 ramp connection to I-275 just west of Ohio River that would remove truck traffic and create economic development opportunities for Silver Grove and other communities along the river. (congestion)

Map Area 11: US 27, from I-471 / I-275 southward, Highland Heights

- "Malfunction Junction" (US 27 at I-471 Interchange). (congestion, safety)
- Lefarge Drywall plant on KY 8 in Silver Grove sends a lot of truck traffic (approximately 200) onto KY 1998 and US 27. (congestion)
- Southbound Right turn only lane on US 27 at Nunn, needs to allow through movement. (congestion, safety)
- Consider traffic flow from NKU campus and community to US 27 via Johns Hill Road and Martha Collins Blvd. When NKU reaches 23,000 students, capacity at these two intersections may be an issue. Left turns from Martha Collins Blvd. to US 27 are already a problem. People often turn right and then immediately turn around (i.e. to go north on US 27). (congestion, safety)
- Signal coordination on US 27 to KY 1998 is greatly needed, especially near NKU. (congestion, safety)
- Relieve traffic on US 27 by making better access to stores and shopping centers with service roads. (congestion)
- Need to consider a parallel route behind businesses on east side of US 27 and tie back in near the AA Highway interchange with US 27. (congestion)
- Consideration of a "bypass" route for I-471 from its current southern terminus to a connection with the AA Hwy in the valley east of the current US 27/AA Hwy intersection. (congestion)
- Need a traffic arrow at Walgreen's intersection. (congestion)
- US 27 and Bunning Lane. (congestion)
- Do not permit streetscaping or a raised median eliminating fifth lane on US 27. (congestion)
- More consistent patrol and monitoring of "Malfunction Junction" by local police to enforce traffic rules and fines from 4-6 PM Monday through Friday. If people were ticketed, they wouldn't block the intersection. (congestion)
- Too many dump and freight trucks on US 27. (congestion)
- Need for the collection of origin-destination data.

Map Area 12: AA Highway/KY 9 South of I-275

- AA/Licking Pike 915. (safety)
- AA/Pools Creek 1998. (safety)
- AA/Dry Creek. (safety)
- Add ARTIMIS on AA Highway.

Map Area 13: AA Highway/US 27 Interchange

- AA Hwy/US 27 interchange already becoming a problem, new middle school east of US 27 behind Kohl's planned for construction, will make matters worse. (congestion)

- AA Hwy between US 27 and north to the "top of the hill" where there are at-grade intersections and more residential development underway 1,200 additional units). (congestion, safety)

General Comments

- Transitways, carpool lanes (3 people per vehicle) are needed on I-471.
- Truck traffic becoming more of an issue on the highways.
- Concerns with air quality and dust from traffic.
- Speed on I-471 is too high.
- More thought needs to be directed towards mass transportation.
- Safer bike routes.
- Pedestrian concerns.
- Road water run off and retention.
- Consider rapid population growth in south Campbell County after sewer plant.

I-471 Corridor Projected Travel Demand

Understanding the I-471 Corridor problems and developing long range solutions is dependent not only on observing and measuring current travel conditions, but on forecasting future demands and changes in travel patterns. One of the most relevant measurements of future conditions is the level of service assessment of the existing roadway network and transit facilities under forecasted demand conditions. Using the OKI Regional Travel Demand Model (RTDM) and the revised population and employment data as discussed above, the initial analysis of projected traffic volumes illustrated where existing problems will worsen and where new issues will arise. Exhibit 8 depicts projected travel demand in the study area under 2030 No Build or Existing and Committed conditions. As the exhibit illustrates, substantial traffic increases are expected throughout the Corridor resulting in increased congestion and safety problems in identified existing problem areas, as well as problems in new areas.

Table 7 depicts projected changes from the 2005 base year and 2015 and 2030 at a number of key routes in the corridor study area and vicinity[10]. The three scenarios representing future conditions are:

1) 2015 E+C (2015 Existing plus Committed) represents the regional transportation network where only those improvements currently under construction or committed are in place. The Brent Spence Bridge replacement is included, while the Eastern Corridor Multi-modal projects are not.

2) 2015 Modified represents the 2015 E+C conditions with one modification: a reduction of the I-75 / Brent Spence Bridge capacity to half of its current capacity to simulate conditions that may occur while the bridge is being

10 Projections are preliminary planning estimates and are only a part of the analysis tools used to evaluate needs and determine options.

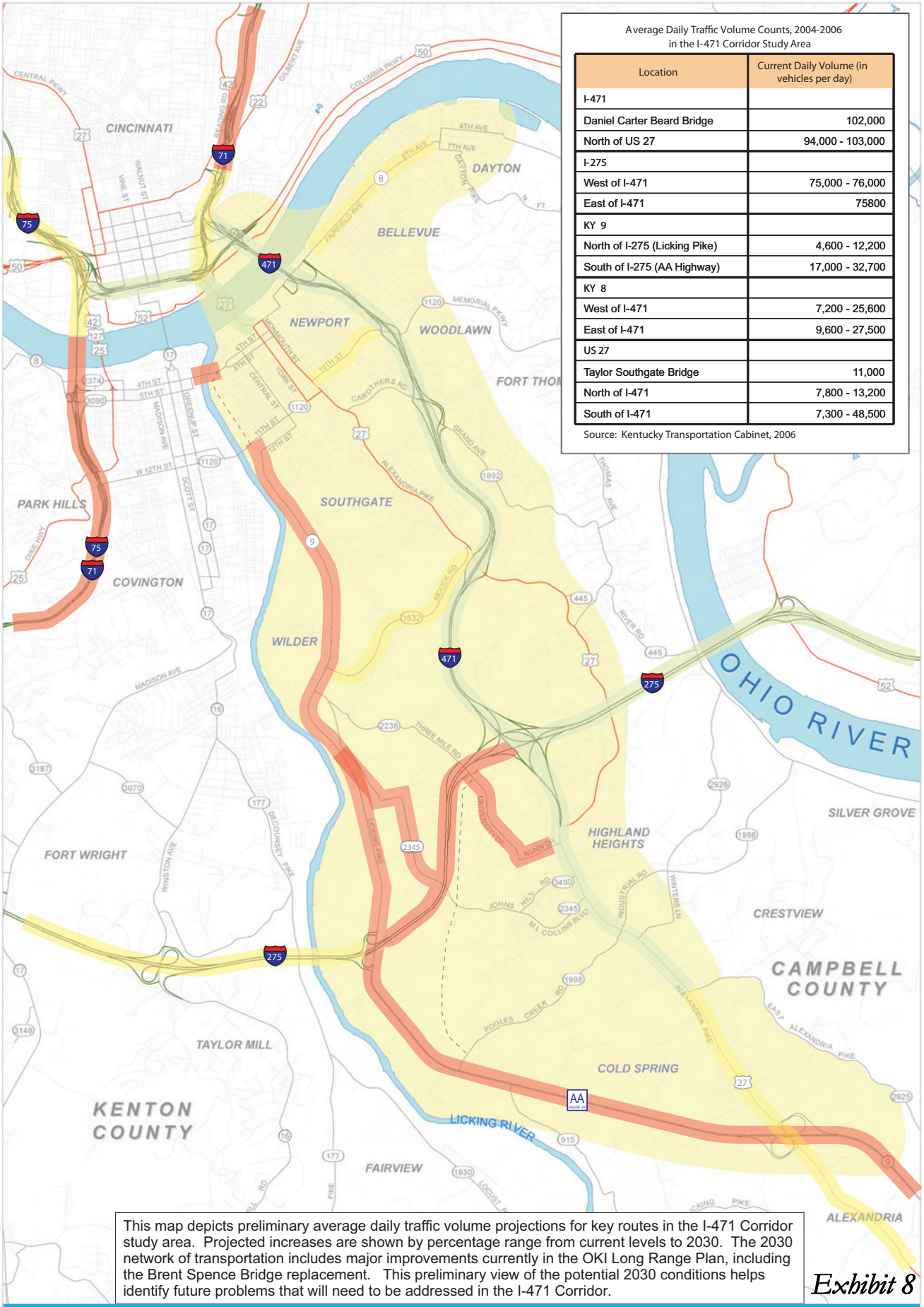
reconstructed (in other words, simulation of the effect of traffic required to be detoured during the construction period).

3) 2030 LRP with Ovation (Long Range Plan) represents the regional transportation network where all current projects in the OKI Long Range plan have been implemented (including the Brent Spence Bridge and the Eastern Corridor) and the Ovation project is in place with a connecting roadway between KY 9 and the Taylor Southgate Bridge approach.

Table 7: Preliminary Travel Demand Forecasts at Key Locations

Location	Change from 2005 Base Traffic Levels		
	2015 E+C	2015 Modified	2030 LRP with Ovation
I-471 South of KY 8	27%	27%	19%
I-471 South of KY 1120	24%	24%	18%
I-471 South of Grand Ave	22%	23%	18%
I-471 South of US 27 (Southgate)	19%	19%	15%
I-471 North of US 27	2%	2%	17%
US 27 South of Sunset	16%	16%	24%
US 27 South of KY 3490	16%	16%	24%
US 27 North of AA Highway	19%	19%	29%
US 27 South of AA Highway	13%	13%	34%
I-275 West of AA Highway	20%	22%	28%
I-275 East of AA Highway	25%	27%	35%
I-275 East of I-471	1%	13%	23%
KY 9, South of KY 1120	79%	78%	79%
AA Highway North of I-275	131%	130%	97%
AA Highway South of I-275	14%	14%	40%
KY 8 East of I-471	17%	14%	14%
Bridges			
Taylor Southgate Bridge	52%	56%	21%
Daniel Carter Beard (I-471) Bridge	30%	30%	21%
Roebling Suspension Bridge	38%	70%	12%
Clay Wade Bailey Bridge	195%	409%	102%
Brent Spence Bridge (I-75)	17%	5%	40%
Combined Ohio River Crossings (five bridges)	27%	24%	32%
Veterans Memorial (4th Street) Bridge (Covington - Newport)	12%	17%	44%
Licking Valley Girl Scout Bridge (12th Street)	19%	20%	-8%

Source: OKI Regional Travel Demand Model, 2007



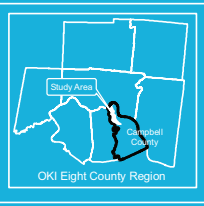
Average Daily Traffic Volume Counts, 2004-2006
in the I-471 Corridor Study Area

Location	Current Daily Volume (in vehicles per day)
I-471	
Daniel Carter Beard Bridge	102,000
North of US 27	94,000 - 103,000
I-275	
West of I-471	75,000 - 76,000
East of I-471	75800
KY 9	
North of I-275 (Licking Pike)	4,600 - 12,200
South of I-275 (AA Highway)	17,000 - 32,700
KY 8	
West of I-471	7,200 - 25,600
East of I-471	9,600 - 27,500
US 27	
Taylor Southgate Bridge	11,000
North of I-471	7,800 - 13,200
South of I-471	7,300 - 48,500

Source: Kentucky Transportation Cabinet, 2006

This map depicts preliminary average daily traffic volume projections for key routes in the I-471 Corridor study area. Projected increases are shown by percentage range from current levels to 2030. The 2030 network of transportation includes major improvements currently in the OKI Long Range Plan, including the Brent Spence Bridge replacement. This preliminary view of the potential 2030 conditions helps identify future problems that will need to be addressed in the I-471 Corridor.

Exhibit 8



Legend

Percentage Change in Average Daily Traffic, 2005 to 2030

- 15 - 25
- 26 - 35
- 35 +
- Roads in the 2030 Long Range Plan network that are not part of the 2005 network

Projected
Traffic Volume Increases,
2005 to 2030

June 2007

0 0.25 0.5 1 Miles

Source: OKI Regional Travel Demand Model, June 2007

In 2015, traffic on the five Ohio River crossings is forecasted to be 24% greater than current volumes.

The Regional Travel Demand Model provides a valuable tool in forecasting future traffic based on regional characteristics of the transportation network and the travel generated by the projected population and employment of the region. In comparing the three scenarios, the key variable being tested is the roadway and transit facilities that make up the network.

Of significance in the data shown in Table 7 is that the mid-term conditions, Year 2015, will result in a greater increase in traffic than 2030 for I-471. This effect is primarily due to the fact that many important, critical Long Range Plan projects will not yet be in place in 2015, including the KY 9 Extension, the improved connection of KY 9 with the Taylor Southgate Bridge approach, I-275 widening in northern Kentucky and the Eastern Corridor Multi-modal projects in Ohio. Each of these major projects is expected to be in place by 2030 to address the needs of the area's growing travel demand. For example, the package of roadway and transit improvements that make up the Eastern Corridor Multi-modal projects is expected to reduce some of the I-471 traffic by providing a more efficient connection between the eastern Cincinnati suburbs and downtown (via both transit and roadway) for those commuters currently using I-275 and I-471.

While the 2015 Modified and 2015 E + C projected travel increases on I-471 are shown to be similar, a closer look at the RTDM forecasts reveals a more likely result or impact of the Brent Spence Bridge reconstruction's traffic disruption. The lower half of Table 7 shows the predicted increased burden on the remaining four bridges. With most of these bridges incapable of taking on the projected increases, all the bridges will be critically over taxed. The five bridges combined will need to accommodate a 24% increased demand. The result will be increased congestion not only on the bridges but on the connecting roadways between them and throughout the area as this traffic finds alternative routes to bypass or detour the construction area and reduced capacity of the Brent Spence during construction.

Recognizing that the Regional Travel Demand Model is a valuable tool for forecasting regional traffic demands and providing a quantifiable measure of the potential effects of alternative improvement options, the data it produces must be reviewed judiciously. This review is most important when analyzing the projected changes in the more densely developed urban areas, such as the downtown areas of Cincinnati, Covington and Newport. For example, some of the projected increases, especially the 409% forecasted increases on the Clay Wade Bailey, will in reality be spread over the other four bridges. In other words, as the capacity of each bridge fills, an equilibrium among the bridges will be reached.

INTERSTATE AND INTERCHANGE ANALYSIS

Much of the existing roadway was designed and constructed many years ago; I-471 for example was designed in the 1970's and fully opened to traffic in the

early 1980's. It was designed to handle projected 1990's travel demand and with a lower speed limit than what is currently posted. Current traffic on I-471 exceeds the projected traffic for which it was originally designed. In addition, since its opening over 27 years ago, many advances in the transportation engineering field have been made for the design of safer and more efficient interstates and interchanges.

KYTC is currently conducting a separate project, the I-471 / KY 8 Interchange Project (KYTC Item Number 6-8104.00) is developing alternative improvement plans and assessing environmental impacts. A determination of a recommended plan for this interchange is targeted for late 2008. Information on the current alternatives under consideration is provided later in this report and illustrations of the alternatives currently under consideration are included in Appendix B.

This I-471 Corridor Study focused on the remaining interstate and interstate interchanges in Campbell County. The I-471 mainline and the four I-471 interchanges south of the KY 8 interchange, and the I-275 interchanges with Three Mile Road and with the AA Highway, were examined to determine what would be needed to upgrade this highway to current interstate design standards for safety and capacity and what would be needed to accommodate projected year 2030 travel demands. In other words, what would it look like if designed today, under current design standards and for projected 2030 traffic demand? Exhibit 9 illustrates some of the issues and concerns identified in this study and the basis for the Plan recommendations for the needed interstate improvements.

In general, the analysis of the existing I-471 facility and the interchanges in the study area found the following problems or deficiencies:

- Spacing between interchanges (a minimum one mile spacing between interchanges is required in urban areas);
- Spacing between surface road intersections and interchange entry/exit ramps resulting in congestion and safety problems surrounding the interstate;
- Short merging and weaving sections affect both safety and congestion;
- Narrow (or inconsistent) shoulder and narrow median widths affect both safety and congestion (and prevents bus on shoulder options discussed later in this report);
- Left side entry ramps and merging sections (safety issue in that this goes against typical driver expectations);
- Design geometrics for travel speeds and existing and projected volumes (ramps and mainline);
- Through lane and ramp capacity (see Level of Service discussion above).

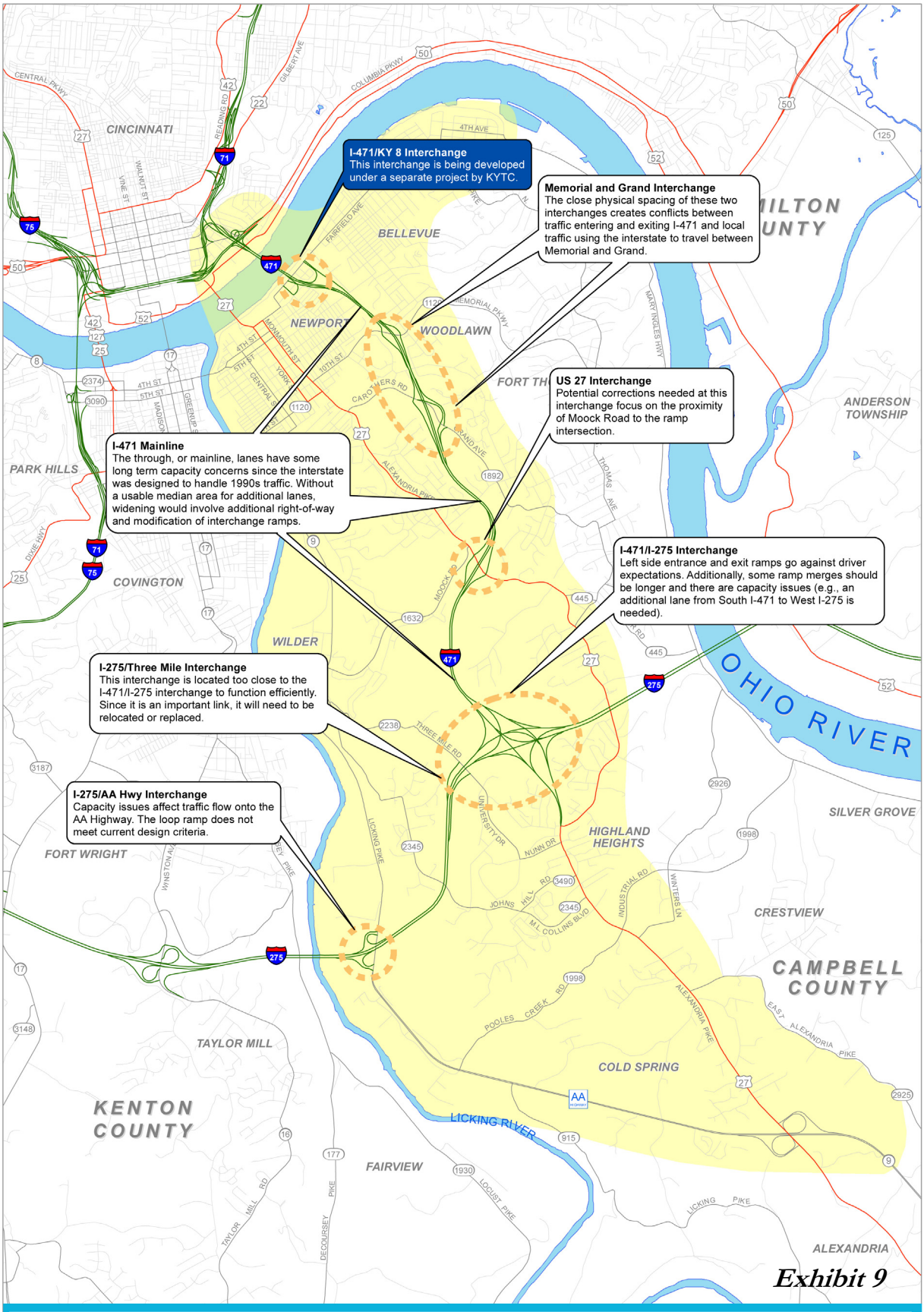

I-471/KY 8 Interchange
This interchange is being developed under a separate project by KYTC.
Memorial and Grand Interchange
The close physical spacing of these two interchanges creates conflicts between traffic entering and exiting I-471 and local traffic using the interstate to travel between Memorial and Grand.
US 27 Interchange
Potential corrections needed at this interchange focus on the proximity of Moock Road to the ramp intersection.
I-471 Mainline
The through, or mainline, lanes have some long term capacity concerns since the interstate was designed to handle 1990s traffic. Without a usable median area for additional lanes, widening would involve additional right-of-way and modification of interchange ramps.
I-471/I-275 Interchange
Left side entrance and exit ramps go against driver expectations. Additionally, some ramp merges should be longer and there are capacity issues (e.g., an additional lane from South I-471 to West I-275 is needed).
I-275/Three Mile Interchange
This interchange is located too close to the I-471/I-275 interchange to function efficiently. Since it is an important link, it will need to be relocated or replaced.
I-275/AA Hwy Interchange
Capacity issues affect traffic flow onto the AA Highway. The loop ramp does not meet current design criteria.
CINCINNATI
BELLEVUE
NEWPORT
WOODLAWN
FORT THOMAS
ANDERSON TOWNSHIP
PARK HILLS
COVINGTON
WILDER
FORT WRIGHT
HIGHLAND HEIGHTS
SILVER GROVE
CRESTVIEW
CAMPBELL COUNTY
TAYLOR MILL
COLD SPRING
KENTON COUNTY
FAIRVIEW
ALEXANDRIA
OHIO RIVER
LICKING RIVER
Legend
Interstate Highway
US State Routes
Arterial Roads
Collector Roads
Interchange Analysis Areas
Study Area
Campbell County
OKI Eight County Region
Interstate and Interchange Analysis
March 2008
0 0.25 0.5 1 Miles
Source: OKI GIS, 2006

Exhibit 9

Specific interchange deficiencies and problems, by location, are described below.

I-471 / Memorial Parkway and I-471 / Grand Avenue

These two interchanges, due to their close proximity, function together. However, their close spacing leads to congestion and safety problems in the weaving and merging areas. In addition, the interchange at Memorial Parkway also has a spacing problem with the KY 8 interchange to its north. Alternative improvement options under consideration for the I-471 / KY 8 interchange project will need to address the spacing problems with the Memorial interchange. Observation and stakeholder input showed that these interchanges are further complicated by their common local use as a short bypass of surface streets, wherein many drivers will enter at one of the two interchanges and exit at the next without entering into the through traffic lanes. This action exacerbates the weaving / merging issues and creates more hazardous conditions in this high volume area.

I-471 / US 27, Alexandria Pike

Although this interchange also fails to meet adequate spacing requirements with its adjacent interchanges to the north and south, its primary problem is related to the location of the entry / exit ramp junction with US 27 (to the west of I-471) and the adjacent surface street intersection of Moock Road. The short spacing between these two intersections results in congestion and safety problems on both US 27 and the I-471 exit ramp.

I-471 / I-275 and I-275 / Three Mile Road

Due to the close proximity of these two interchanges, the full I-471 / I-275 interchange and the partial I-275 / Three Mile Road interchange, these interchanges were analyzed together. Known capacity deficiencies have already advanced the widening of the I-471 southbound to I-275 westbound ramp to be included in the KYTC Six Year Plan. However, other capacity and design issues also exist. One of the safety problems is the use of left turn exits and entrances, which are discouraged by KYTC and FHWA, since these are inconsistent with driver expectations and often lead to crashes and traffic slow downs. In addition, several ramps do not provide sufficient merging and weaving distances, specifically:

- northbound I-471 through with northbound I-471 to eastbound I-275;
- northbound I-471 to westbound I-275 with westbound I-275 through; and
- eastbound I-275 with southbound I-471 to eastbound I-275.

Furthermore, the I-275 / Three Mile Road interchange only provides for two movements, the northbound I-275 exit to Three Mile Road and the southbound I-275 entrance from Three Mile Road. The remaining two movements must be made either at the I-275 / AA Highway interchange to the southwest or the US 27 ramps to I-471 to the east (several miles away via surface roads).

I-275 / KY 9 (AA Highway)

This interchange is located at the southwestern corner of the study area, but serves heavy travel demands. In addition to capacity deficiencies, as evidenced in existing peak hour traffic back-ups, its geometric design layout includes very tight radius loops for two of the major movements. The original layout was designed to fit in an area of difficult terrain, which prohibited an economical solution for a more standard diamond configuration.

For the most part, due to interchange spacing closer than recommended design standards, design geometrics and capacity deficiencies, I-471 is well below the required state and federal standards for an interstate facility. In fact, given the current state and federal design standards and the present traffic demands, this interstate if built today would look very different.

CONSIDERATION OF MULTI-MODAL OPTIONS

Beyond the interstate and major arterials evaluated in this study, multi-modal options need to be explored as part of the solution to handle travel demands in and through the Corridor. The multi-modal study component began with an assessment of the existing, available transit service and plans in and around the study area, including:

- Coordinating with the recently completed TANK Network Study;
- Evaluating ways to build on success of the Southbank Shuttle; and
- Considering the long range potential for interconnecting with regional improvements under consideration, specifically, the Eastern Corridor multi-modal studies.

Existing Transit Service

Bus transit service in Campbell County and Northern Kentucky is primarily provided by the Transit Authority of Northern Kentucky (TANK) via a fixed route network and shared ride door-to-door services for the senior citizens and the disabled. However, additional express bus route service through the study area via I-275 and I-471 is provided by two other transit agencies. Metro, the Cincinnati bus service of the Southwest Ohio Regional Transit Authority

TANK operates the Southbank Shuttle and daily bus service on close to 30 fixed routes in the study area.

(SORTA) operates Metro Routes 75x and 82x and the Clermont Transportation Connection, a publicly owned transit organization in Clermont County, Ohio, operates express bus routes 2x and 4x[11]. These express bus routes traverse through the corridor connecting Cincinnati's southeastern suburbs with downtown Cincinnati via I-275 and I-471, but do not provide bus stops within the study area.

Since 1973, TANK has provided bus transit services to Boone, Campbell and Kenton counties as well as downtown Cincinnati. The route service types include: regular (radial) fixed route service, express service, and circulator / shuttle bus service.

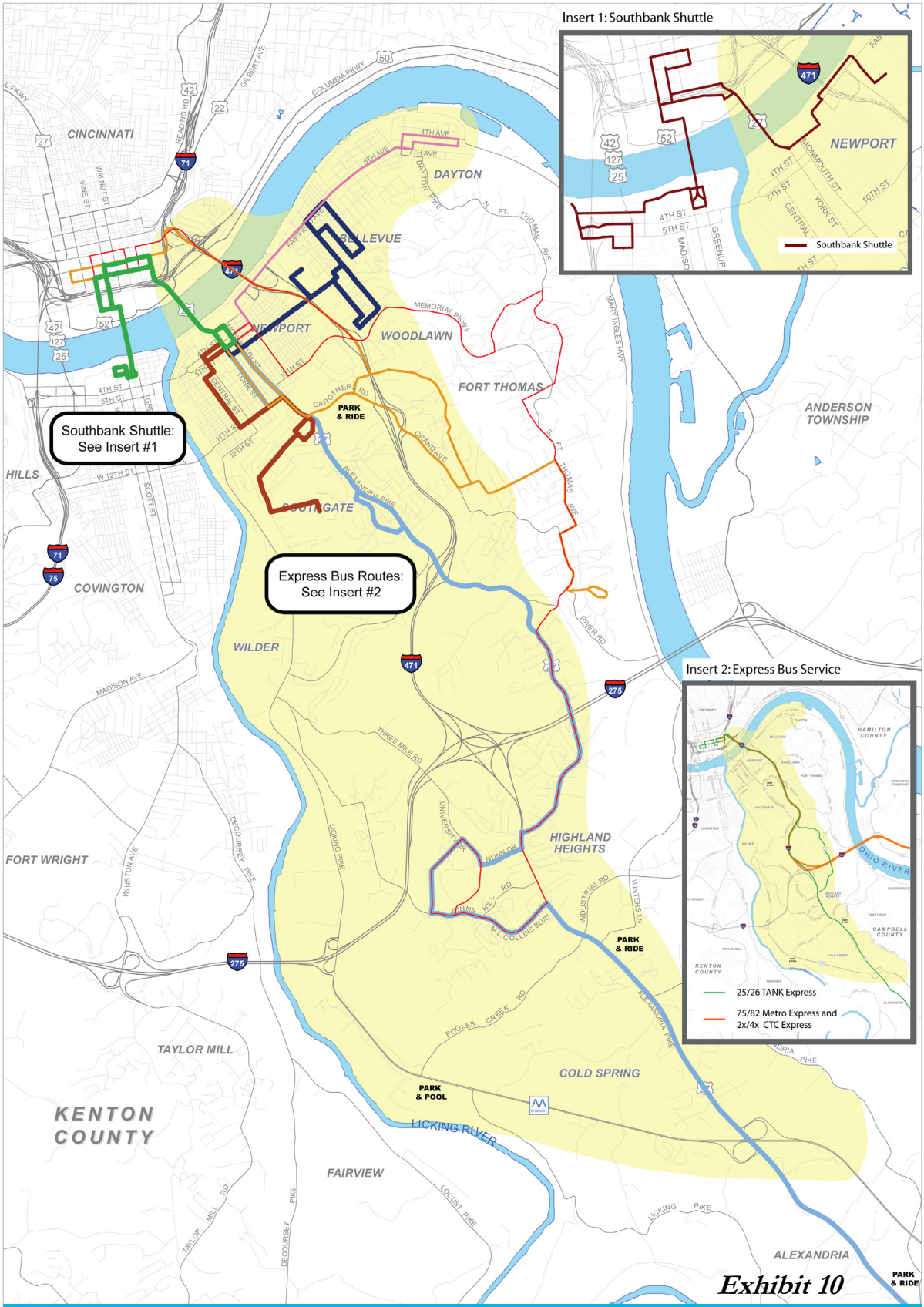
TANK operates 27 fixed routes, through 19 park-and-ride locations, 365 days a year[12]. TANK Express buses travel the expressway, providing more direct access to the downtown Cincinnati Central Business District (CBD). Within the study area, TANK provides service on 7 regular routes and 2 express routes and has park-and-ride lots located in Newport and Cold Spring. Exhibit 10 depicts the existing transit service in the corridor and a listing of routes is included in the Appendix C. The cost for the Southbank Shuttle and regular fixed route service is $1.25 per ride, while cost for express service is $1.50 (2008). There are also reduced fares for students, the elderly, and the disabled and there are multiple ticket book and pass pricing discounts available.

TANK operates more than 130 buses throughout the three county region on both regular and express routes. During the 2004 Fiscal Year, TANK carried 3.6 million passengers to destinations throughout Northern Kentucky and downtown Cincinnati. Today in Campbell County alone, TANK ridership exceeds 1.2 million per year and it has experienced a 13% increase in ridership, largely related to new non-traditional methods of service such as reverse commute and smaller circulators.

In early August 2007, TANK and Northern Kentucky University (NKU) partnered to establish a new program, called U-PASS. U-PASS allows all NKU faculty, staff, and students to ride TANK buses for free. The U-PASS program includes all TANK buses and riding is unlimited. Anyone with a valid NKU All-Card can ride for free by showing the card to the driver. In the fall of 2008, the U-Pass program is being expanded to include University of Cincinnati students, faculty and staff in this program and expanding the U-pass to include free rides on all TANK and Metro bus routes.

11 Clermont Transportation Connection's Amelia Express Route 4x replaces the Metro Express Route 75x in August 2008.

12 TANK announced service reduction of some routes in Kenton and Boone Counties in June 2008; no changes in the Campbell County service were announced.


Insert 1: Southbank Shuttle
Southbank Shuttle
Insert 2: Express Bus Service
25/26 TANK Express
75/82 Metro Express and 2x/4x CTC Express
Southbank Shuttle: See Insert #1
Express Bus Routes: See Insert #2
CINCINNATI
BELLEVUE
DAYTON
NEWPORT
WOODLAWN
FORT THOMAS
ANDERSON TOWNSHIP
SOUTHGATE
COVINGTON
WILDER
HILLS
FORT WRIGHT
HIGHLAND HEIGHTS
TAYLOR MILL
COLD SPRING
FAIRVIEW
ALEXANDRIA
KENTON COUNTY
PARK & RIDE
PARK & POOL
OHIO RIVER
LICKING RIVER
Exhibit 10
TANK Surface Routes
11
12
16
20
23
25
11, 12, 16
20, 23, 25
Existing Transit Service
September 2007
Miles
0 0.25 0.5 1
Source: Transit Authority of Northern Kentucky, Metro, and Clermont Transportation Connection, 2008
I-471 Corridor Study
OKI
Ohio · Kentucky · Indiana
Regional Council of Governments
Study Area
Campbell County
OKI Eight County Region

TANK's express service travels along I-471 offering bus transportation between the downtown area and parts of Campbell County accessible to the corridor. Regular daily scheduled bus service is provided to the entire urban area of Campbell County from Alexandria north to Newport. Express service extends farther south to Grants Lick where a park-and-ride lot exists.

Two additional transit services are offered by TANK. The first is the Southbank Shuttle (operating since 1998) which circulates between the downtowns of Newport (it serves the Newport on the Levee Entertainment Complex and other new riverfront development), Covington and Cincinnati. The second is the demand responsive, special needs services, the Day Tripper Program (active since 1999) for senior citizens 60 years of age and older and the RAMP (Regional Area Mobility Program) for the disabled citizens. These two programs are designed to address service needs in areas where traditional fixed route services are not a very efficient solution. These additional transit services benefit both residents and visitors to the area and provide a viable alternative to the personal car.

TANK has become increasingly popular in recent years because of the convenience and cost savings in comparison to existing parking costs downtown. With recent increases in gas costs, transit is becoming even more attractive. Personal car driving costs in dollars per mile per gallon and parking fees compared to transit fares result in significant savings achievable by using the bus instead of a car.

TANK's bus system operates seven days a week, including holidays. The hours of revenue service operation for the majority of bus routes is from 5:30 AM to 9:00 PM on weekdays, with minimal service on a few routes from as early as 4:00 AM to as late as 12:30 AM Weekend and holidays service for the majority of routes is from 6:00 AM to 9:00 PM However, a few routes start as early as 5:00 AM and run as late as 12:00 AM Headways for bus operations range from 5 to 30 minutes during the AM and PM peak periods, and from 20 to 60 minutes during off-peak periods. Express bus routes operated by TANK, Metro and CTC generally run only Monday through Friday and during morning and afternoon peak hours.

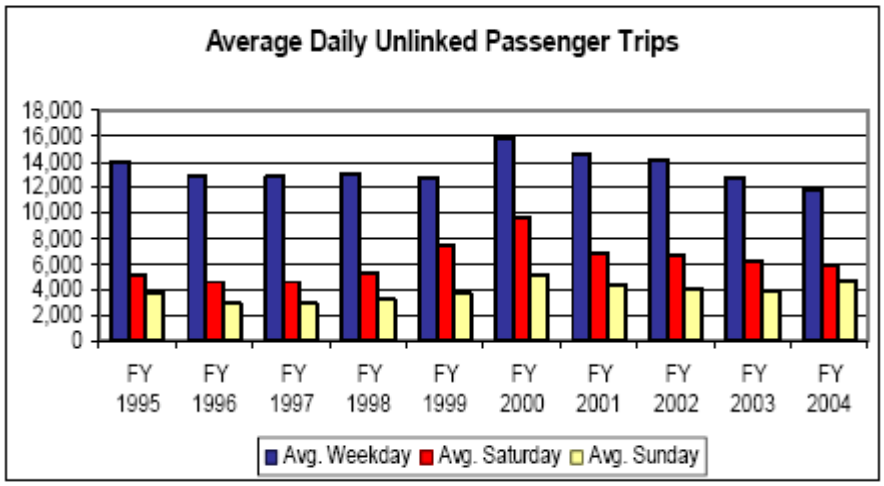
Although TANK currently operates a number of bus routes that serve many portions of the study area, as the area redevelops, there will be a need to re-evaluate the service provided. In particular, accessibility to current and future jobs and homes should be considered.

Ridership

An evaluation of TANK daily ridership, 1995 to 2004, indicated that ridership

peaked in the year 2000 but then began to decrease[13]. Exhibit 11 shows 2004 ridership had decreased 12.5% since that peak in 2000. This trend encouraged planners at TANK to re-evaluate the transit network in a variety of ways.

Exhibit 11: Average Daily TANK Ridership, 1995-2004



Source: TANK Network Study, Existing Conditions, 2006

Updated ridership information from TANK shows ridership has begun an upward climb since 2005, as shown in Table 8. In addition, TANK's systemwide ridership for the first quarter of 2008 is almost 6% above the first quarter levels in 2007. Metro's first quarter ridership was down 4%, while the U.S. total was up 3.4%. However, according to the most recent data, Metro's express route service in the I-471 corridor was over 20% higher in August 2008 than in August 2007[14].

Table 8: Annual Ridership, 2004 to 2007

Year	2004	2005	2006	2007
Increase from previous year	-4.5%	-4.3%	+5.1%	+1.4%
Fixed Route	2,991,760	2,905,104	3,028,890	3,043,892
Southbank Shuttle	561,586	490,035	537,040	571,656
Special Services	88,820	89,878	96,237	98,188
All Modes	**3,642,166**	**3,485,017**	**3,662,257**	**3,713,736**

Source: TANK Annual Report, 2007

13 TANK, Transportation Network Study (TNS) - Existing Conditions Report, 2006. An unlinked transit passenger trip is a trip on one transit vehicle regardless of fare or transfer. A person who takes one bus from one origin to one destination takes one unlinked passenger trip; a person who transfers to a second bus, takes two unlinked trips. The APTA (American Public Transportation Association) estimates that the number of persons riding transit on an average weekday is 45% of the number of unlinked passenger trips.

14 APTA Ridership Report, First Quarter 2008. Metro Express Route (82x) update for August: SORTA, 2008.

The methods used to analyze the various routes included a cost per passenger trip table, a route cost recovery table, a passenger trips per service hour table and a passenger per route mile table. The results of this investigation helped provide TANK planners the most efficient, the most economically viable, and the most utilized routes in the TANK system. This information can help make sound decisions concerning cutting or expanding routes.

Exhibit 12 provides an indication of successful and underperforming bus routes in the TANK system. Five routes were identified as under performing or lacking ridership: #4 Park Hills/Fort Wright, #22X Walton Express, #23 South Bellevue, #29X Hebron Express and #11 Ft. Thomas/NKU. The top five routes (most riders) are : 1X Florence Express, 2X Airport Express, 17X Villa Hills, 29X Hebron Express and 32X Burlington Express.

TANK routes that operate in I-471 Corridor in Campbell County are the Southbank Shuttle, Fixed routes: 11, 12, 16, 20, 23, and Express routes: 25(X), 26(X). These routes account for almost a third of the 2004 ridership. Several of these routes are high performers with the Southbank Shuttle route and routes 11, 12, 16 in the top ten in TANK ridership. Routes 20, 23, 25X/26X are at the bottom of the ridership list.

Exhibit 12: Ranking of TANK Ridership by Route (2004)

Route		2004 Ridership	Monthly Average
1	Florence/Erlanger	547,165	45,597
Southbank	Southbank Shuttle	433,829	36,152
7	Rosedale/Latonia	262,396	21,866
25	Alexandria/Grants Lick	171,439	14,287
8	Eastern/Latonia Center	167,923	13,994
12	Dayton	158,882	13,240
2x	Airport Express	157,360	13,113
5	Holman/City Heights	131,708	10,976
16	Grand Towers/Carmel Manor	114,265	9,522
11	Fort Thomas/NKU	100,930	8,411
17x	Villa Hills Express	95,880	7,990
1x	Florence Express	90,699	7,558
3	Ludlow/Bromley	69,006	5,751
25x/26x	Alexandria/Grants Lick	58,830	4,903
33	St Elizabeth/Crestview Hills	58,678	4,890
9	Taylor Mill/Independence	54,090	4,508
29x	Hebron Express	48,651	4,054
30x	Independence Express	36,614	3,051
32x	Burlington Express	26,230	2,186
18x	Edgewood Express	23,922	1,994
19x	Beechgrove Express	22,437	1,870
23	South Bellevue	22,379	1,865
28x	Empire Drive Express	20,098	1,675
22x	Walton Express	19,744	1,645
20	South Newport	18,487	1,541
4	Park Hills/Fort Wright	16,354	1,363
Totals		2,927,996	244,000

Source: TANK Network Study, Existing Conditions, 2006

In addition, ridership on the express bus service offered by Cincinnati's Metro and Clermont Transportation Connection utilizing I-275 from Ohio to I-471, then I-471 to the Cincinnati Central Business District (and the return service) without any stops in Campbell County has been considered a promising service with significant ridership potential. Estimates in mid-2008 by CTC and Metro indicate that the three existing express bus routes are providing a valuable service with over 18,400 riders per month, ranging from over 700 riders per month on CTC's 2x (New Richmond to Cincinnati CBD) to almost 5,400 per month on Metro's 82x (Eastgate Express) and over 12,300 per month on Metro's express routes 75x (Amelia Express).

Rideshare

OKI's Rideshare Program[15] began in the 1970's serving the entire OKI region with vanpool and carpool coordination. In Fiscal Year 2008, 414 new Rideshare applications were filed. Currently around 1,300 patrons are listed in the office's database. Since the program's inception, some 8,000 people have used the service (breakdown by location is not reported).

In an effort to encourage employees and employers to institute rideshare programs at work, a consulting program was put into place. Under this program, OKI staff members hold workshops at local places of employment. During a workshop, a spatial analysis is conducted to chart each employee's travel to work. This spatial study provides a quick overview of the carpooling options available to employees. Companies are also informed of governmental tax breaks and of Metro/TANK's Guaranteed Ride Home Policy.

Vanpools, operated by local firm VPSI have 19 vans that serve the OKI region. In 2006, Rideshare reported a goal of 8 additional pools per year (breakdown by location is not reported).

EXISTING INTELLIGENT TRANSPORTATION SYSTEM (ITS)

A potentially invaluable transportation improvement tool already employed in the region as well as in this study area, is a combination of software and hardware components for traffic management that make up Intelligent Transportation Systems (ITS). Locally the most recognizable ITS in place in this area is ARTIMIS, the Advanced Regional Traffic Interactive Management and Information System. It is in use along Fort Washington Way and I-275 and I-471 in the project corridor. The most noticeable feature is the electronic message signs over the highways. However, it is more than just the signs.

15 OKI Regional Council of Governments, 2007-2008.

The three basic goals of ARTIMIS are inline with the goals of this corridor study: improve air quality, improve overall safety, and improve motorists' travel times. Improved air quality has resulted from reducing the time motorists sit in backups due to major incidents. Analysis of road closure incidents is performed at ARTIMIS using conservative cost factors. The longer the closure, the greater effect ARTIMIS has had on reducing emissions by re-routing traffic around the affected roadway. Improved safety is applicable to the motorist, passengers, roadway workers, and public safety officials that patrol and respond to freeway incidents. The system is designed to provide information, alerts, and warnings to travelers concerning the current roadway conditions. Improved travel times are attained through effective transmission of freeway conditions via the highway advisory radio, changeable message signs, and travel advisory telephone service.

Local commuters will normally select alternate routes based on known congestion areas. By providing effective information, traffic demands in the congested areas can be reduced and travel times improved.

The existing ARTIMIS system supports the following major operations to meet these goals:

- Traffic Management Operations
  - Facilitate Incident Management
  - Traveler Information Management and Dissemination

- System Performance Monitoring Operations
  - Monitor System Performance

Traffic management encompasses a variety of ARTIMIS functions to minimize traffic delays and congestion, improve safety, and make more effective utilization of roadway capacity, particularly in increasing the operational efficiency of the freeway network. Traffic management is accomplished through surveillance of interstate and expressway traffic flow and adjustment of traffic control parameters and sequences to balance, optimize, or reroute/divert traffic flow on the OKI regional freeway network.

Traffic status and road condition information leads to a more informed roadway user and potentially improves travel safety, economic productivity and efficiency, and air quality. This service is provided in the form of travel-related information collection, management, and dissemination to freeway network users. The system supports this service through traffic surveillance (cameras, planes, commuter probes, freeway service patrols, and interfaces to public safety agencies) and information management techniques to provide timely and accurate information delivery to freeway users and interfacing agencies. The primary means of accomplishing this is through the use of changeable message signs on the freeways, called DMS for Dynamic Message Signs, and a wide-area highway

advisory radio system, also referred to by the acronym, HAR. Exhibit 13 shows the locations of existing ARTIMIS components in the study area.

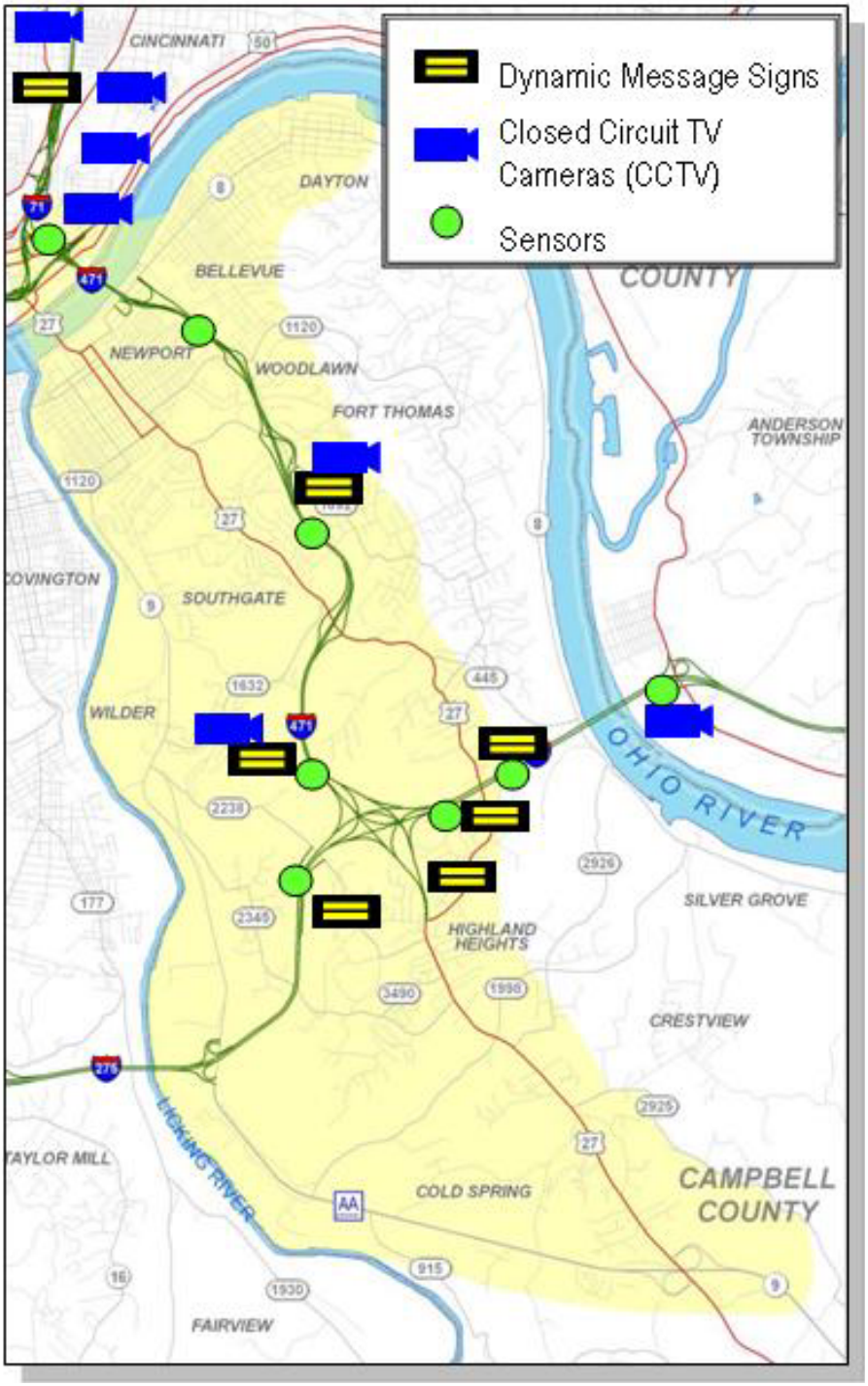
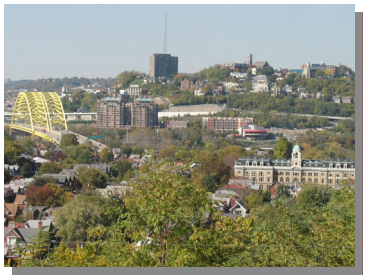


Exhibit 13: Existing ITS (ARTIMIS)

RECOGNIZING ENVIRONMENTAL ISSUES AND OPPORTUNITIES



The consideration of transportation improvements needs to be sensitive to the context of both the built and natural environment of the I-471 Corridor study area.

An awareness of the environmental features and resources within the study area corridor is critical to finding the opportunities and constraints that will shape the development, evaluation and ultimate transportation plan decisions. While natural features such as the Ohio and Licking Rivers, other streams and the wooded, rolling terrain played a significant part in shaping the existing transportation network of northern Campbell County, the I-471 Corridor is a highly developed area of homes, businesses and institutions. This multi-faceted landscape requires that the consideration of transportation infrastructure improvements be sensitive to the context of both the built and natural environment features and resources.

The Built Environment

Tucked among the study corridor's natural wooded features, rolling topography, and scenic vistas, there are nine incorporated cities, Newport, Bellevue, Dayton, Southgate, Woodlawn, Wilder, Fort Thomas, Highland Heights and Cold Spring, as well as some unincorporated areas, each with its own unique, established personality, community history and treasured built resources. I-471 weaves through densely developed land uses of homes, businesses, institutions and open spaces. Interspersed among the population clusters are over fifty such open spaces, including parks, recreational features, golf courses, cemeteries, and institutional or educational facilities within the study area. These public and private 'built' resources range from the larger, more visible land uses like the Northern Kentucky University campus, St. Luke's Medical complex, the Newport on the Levee entertainment complex and the Highland Country Club, to the many smaller resources such as many public and private schools, the Southgate Community Center / athletic fields, and the Town and Country Soccer complex. As Exhibit 14 shows, these features span the study area.

In addition, there are many cultural historic resources in the study area. The National Register of Historic Places (NRHP) is a list of properties determined significant in American history, architecture, archaeology, engineering, or culture, by virtue of design or architectural criteria, association with historical persons and events, and/or value for historic or prehistoric information. With 18 individual sites (throughout northern Campbell County) and 9 historic districts listed on the National Register of Historic Place (Newport, Bellevue, Fort Thomas and Wilder), the I-471 Corridor is rich in cultural historic resources. In addition to those listed on the National Register, there are likely many more that are considered eligible for listing. Under state and federal law, NRHP-listed and NRHP-eligible properties are afforded protection, either through preservation, or avoidance or minimization of impact from state or federal actions, such as

transportation improvement construction. Exhibit 14 displays these cultural resources as well as other important resources, like parks and open space, in the study area and vicinity. Appendix D includes a brief description of the cultural historic resources information compiled for this study[16].

In addition, there are archaeological resources throughout the study area and Campbell County that also warrant consideration. These locations have not been mapped for this study, in accordance with State Historic Preservation Office (SHPO) restrictions on public dissemination of this information to protect the resources from potential vandalism. As projects advance, coordination with the SHPO will be required to identify the presence and extent of archaeological resources and any required mitigation if a project impact is unavoidable.

The Natural Environment

Other important natural environmental features and resources in the corridor include: streams, wetlands, ponds, lakes, threatened and endangered plants and animal species, springs, water wells, hydric soils, Federal Emergency Management Agency (FEMA)-mapped 100-Year Floodplain, woodlands and farmland. These natural resources also warrant protection from impact and mitigation where impact is unavoidable. The following paragraphs provide more details on some of these important natural features and resources.

Streams

Streams, creeks, runs, swales, ditches, etc., are channels that carry water off the land to larger bodies of water such as the Ohio River. Streams are natural corridors that provide habitat for fish, insects, and wildlife, and recreational benefits to people such as hunting, fishing, boating, bird watching, as well as, aesthetic benefits. Streams also provide drinking water for wild animals, livestock, and people. A number of USGS (United States Geologic Survey) designated, named and/or classified as blue line streams (water courses that have flowing water in them for most or part of the year) exist in Campbell County, including the Ohio River and Licking River which establish two of the study area's boundaries. Numerous smaller streams such as Three Mile Creek and Pooles Creek and tributaries exist in the study area.

Wetlands

Wetlands are places where water stands for a period of time long enough for the growth of plants adapted to wet conditions. These can be ponds, lakes, marshes, bogs, swamps, and similar areas. Wetlands are havens for wildlife, aid in controlling floods, act as natural water purifiers (filters for groundwater supplies),

16 Source of data: H.Powell and Company, Incorporated conducted the cultural historic resources research and assisted in the mapping of these resources in the study area.

and are places for recreational activities such as hunting, boating, fishing, bird watching and walking. Wetlands abound in the study area and will need to be considered for avoidance or mitigation as plans become projects.

Federal and State Threatened and Endangered Species

State and federal agencies classify plants and animals as threatened or endangered[17] when their numbers are low or declining due to direct destruction (from development or pollution, for example) or loss or degradation of suitable habitat. Special efforts to protect these listed species are required when federally funded actions, such as transportation improvements, are considered.

The United States Department of Interior Fish and Wildlife Service (USFWS) reports the occurrence, or potential occurrence due to the presence of suitable habitat, of eight Federal Endangered Species in Campbell County:

- Pink mucket pearly mussel (*Lampsilis orbiculata);*
- Rough pigtoe (*Pleurobema plenum)*;
- Tuberculed-blossom pearly mussel (*Epioblasma torulosa torulosa)*;
- White wartyback pearly mussel *(Plethobasus cicatricosus)*;
- Orange-footed pearly mussel (*Plethobasus cooperianus);*
- Ring pink (*Obovaria retusa)*;
- Fanshell (*Cyprogenia stegaria)*; and
- Clubshell (*Pleurobema clava*).

In addition the Kentucky Fish and Wildlife Service also list two additional species in Campbell County as federally endangered: the Peregrine Falcon (*Falco peregrinus*) and the Sharp-shinned Hawk (*Accipiter striatus*). The state listings also include 13 other species in Campbell County as endangered, threatened or of special concern.

Floodplains

The one hundred-year floodplain is a designated width along a stream or river in which a flood is expected to occur on average once every 100 years (based on stream studies). Floodplains are protected to prevent any increase in the risks or severity of possible future floods and to maintain their natural and ecological benefits. State and federal regulations require that transportation improvements, such as roads, structures, in or traversing a floodplain, must be carefully designed to minimize impacts to floodplains. The Federal Emergency Management Agency (FEMA) maintains mapping of these floodplains. FEMA 100-year floodplain exists along most of the Ohio River and Licking River, as well as portions of other smaller streams such as Three Mile Creek in the area.

17 Source of Threatened and Endangered species data: US Fish and Wildlife Services and the Kentucky Department of Fish and Wildlife Resources, Frankfort, Kentucky, 2008.

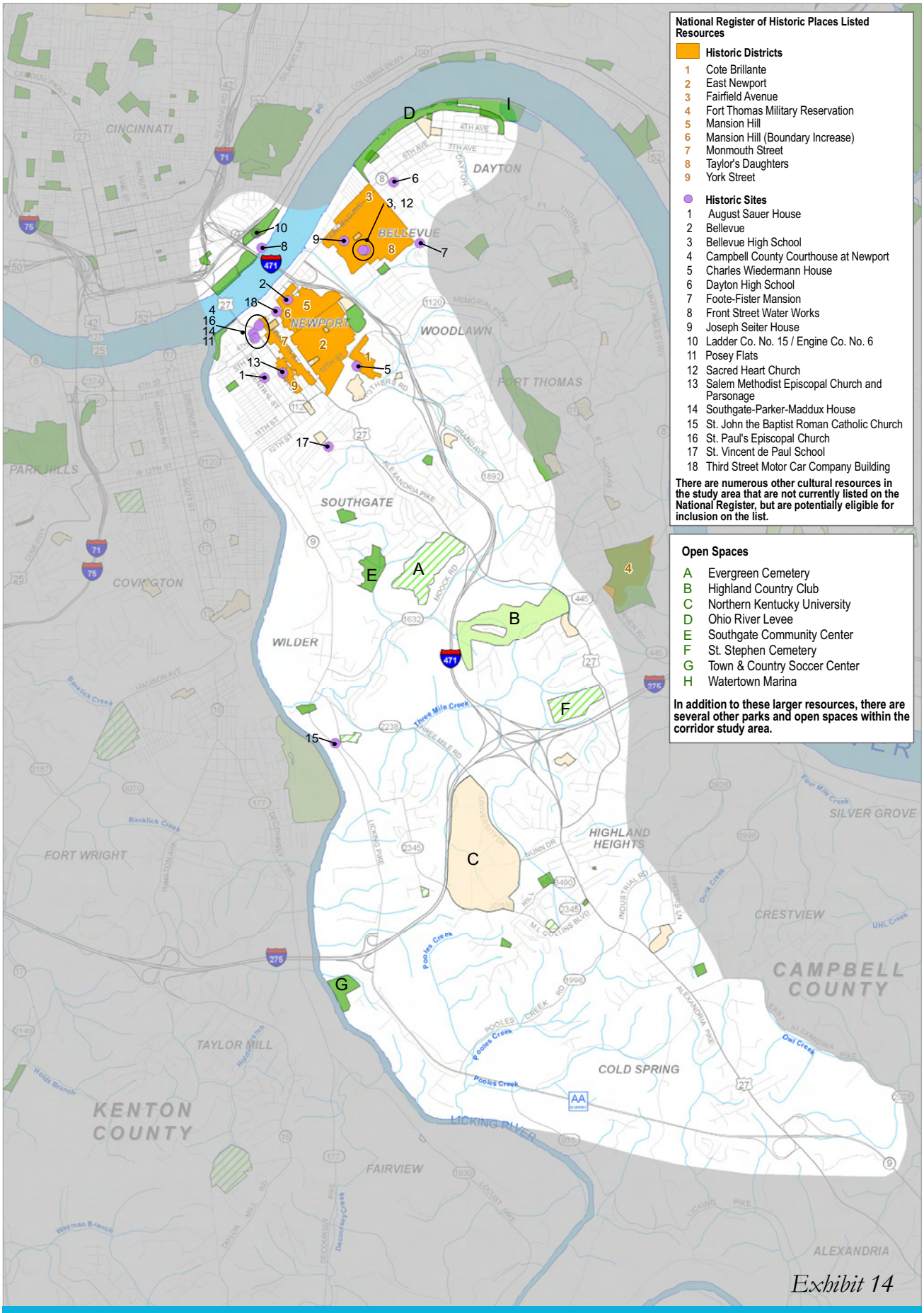

National Register of Historic Places Listed Resources
Historic Districts
1 Cote Brillante
2 East Newport
3 Fairfield Avenue
4 Fort Thomas Military Reservation
5 Mansion Hill
6 Mansion Hill (Boundary Increase)
7 Monmouth Street
8 Taylor's Daughters
9 York Street
Historic Sites
1 August Sauer House
2 Bellevue
3 Bellevue High School
4 Campbell County Courthouse at Newport
5 Charles Wiedermann House
6 Dayton High School
7 Foote-Fister Mansion
8 Front Street Water Works
9 Joseph Seiter House
10 Ladder Co. No. 15 / Engine Co. No. 6
11 Posey Flats
12 Sacred Heart Church
13 Salem Methodist Episcopal Church and Parsonage
14 Southgate-Parker-Maddux House
15 St. John the Baptist Roman Catholic Church
16 St. Paul's Episcopal Church
17 St. Vincent de Paul School
18 Third Street Motor Car Company Building
There are numerous other cultural resources in the study area that are not currently listed on the National Register, but are potentially eligible for inclusion on the list.
Open Spaces
A Evergreen Cemetery
B Highland Country Club
C Northern Kentucky University
D Ohio River Levee
E Southgate Community Center
F St. Stephen Cemetery
G Town & Country Soccer Center
H Watertown Marina
In addition to these larger resources, there are several other parks and open spaces within the corridor study area.
CINCINNATI
DAYTON
BELLEVUE
NEWPORT
WOODLAWN
FORT THOMAS
PARK HILLS
SOUTHGATE
COVINGTON
WILDER
FORT WRIGHT
HIGHLAND HEIGHTS
SILVER GROVE
CRESTVIEW
CAMPBELL COUNTY
TAYLOR MILL
KENTON COUNTY
COLD SPRING
FAIRVIEW
ALEXANDRIA
LICKING RIVER
Three Mile Creek
Poole's Creek
Owl Creek
Banklick Creek
Four Mile Creek
Duck Creek
UHL Creek
Legend
Streets and Roads
Rivers and Streams
Historic Districts
Historic Sites
Golf Course
Cemetery
Schools and Institutions
Parks and Open Spaces
Study Area
Campbell County
OKI Eight County Region
Environmental Resources
October 2006
0 0.25 0.5 1 Miles
Source: National Register of Historic Places and OKI, 2006

Exhibit 14

This identification and mapping of important environmental resources presents a start in understanding what environmental issues need to be considered, through a visual, GIS-based, illustration of the known resources warranting protection and preservation consideration as plans are developed and evaluated. Beyond this planning study, as recommended projects are advanced toward implementation, detailed environmental impact assessment following the National Environmental Protection Act (NEPA) guidelines will be required for transportation improvements that will be using state and federal funds. In addition to the resources and features discussed here, other potential impacts will need to be addressed including air quality, noise, socioeconomic (land use, property takes, population and employment displacement, relocation, community cohesion, environmental justice, etc.), hazardous materials and other natural resources such as groundwater, wells and water quality, topographic and geologic conditions and limitations (e.g., hillsides and karst).

COORDINATION WITH RELATED STUDIES AND CONCURRENT PROJECTS

The I-471 Corridor planning study is built on past studies, such as the Campbell County Transportation Plan, OKI's Congestion Management Systems Analysis, the TANK (the Transit Authority of Northern Kentucky) Transit Network Study, the NKU Master Plan, the OKI Regional Long Range Plan Update and comprehensive land use plans of the communities in the corridor. This study is also intertwined with important, related studies and projects now underway that directly impact the I-471 Corridor, including:

- I-471/KY 8 interchange modification project;
- KY 9 Extension, northwest Newport, project;
- AA Highway – I-275 Connector near NKU project;
- Eastern Corridor Multi-modal Projects; and
- Brent Spence Bridge Replacement / Rehabilitation project.

KYTC Six Year Plan Projects (2008 - 2014)

There are several important transportation improvement projects already underway either within or integral to the I-471 Corridor Study area. The following projects are in the current Kentucky Transportation Cabinet's Six Year

Plan, (the current status of these projects is further discussed following this listing):

NKU Vicinity

- ***Improvements to Johns Hill Road***
  Improvements to provide for future traffic flow, safety and access, including selective widening and re-alignment.
- ***New Road NKU Loop***
  Proposed by the NKU Master Plan, this road will parallel I-275 and will provide better inter-campus circulation.
- ***Extension of University Boulevard***
  This new alignment will extend University Boulevard south to Johns Hill Road.
- ***Connector between Johns Hill and Pooles Creek Road***
  This extension will provide additional access to and from NKU and the general public from Johns Hill to KY 1998 and southern US 27.

KY 8 / I-471 Area

- ***New Interchange I-471 to Cowens Drive / KY 8***
  The comprehensive plan calls for changes to be made to the overburdened exit ramp (see below for further discussion and status).

Brent Spence Bridge and related

- ***Interchange Improvements I-75***
  Reconfiguration of approaches to Brent Spence Bridge in Cincinnati is proposed.
- ***New Bridge / Replacement***
  Brent Spence Bridge Replacement is proposed.

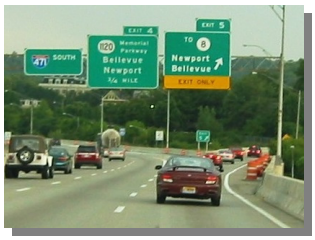
KY 9 (Licking Pike) Extension

- ***Reroute of Licking Pike / KY 9 (4 lanes)***
  KY 9 is proposed to be re-routed on a different set of city streets or on new alignment between 4th and 11th Streets.

In addition, major pavement rehabilitation is scheduled for I-471 and I-275 in the study area.

PROJECT UPDATES

Each of the following active projects has important implications to transportation plans in the I-471 Corridor. As part of this planning study, close review of meetings, public forums and in several cases, coordination with the project teams has been maintained and information obtained has been shared with the I-471 Corridor stakeholders as pertinent findings or conclusions have developed. For the purposes of long range planning, the implementation of all these projects has been assumed by 2030, and in several cases, by 2015. The following paragraphs



The I-471 / KY 8 interchange project is focused on eliminating the southbound queuing back-up on Daniel Carter Beard Bridge.

provide the latest updates. In addition, three of these projects currently maintain active websites with periodic information updates[18].

I-471 / KY 8 Interchange Project

The I-471 / KY 8 project is a KYTC Six Year Plan programmed project (KYTC Item Number 6-8104) to improve the existing interchange to address congestion and safety needs. This project recently held an Interchange Advisory Committee and Section 106 Consulting Parties meeting on January 10, 2008 and a follow-up public meeting on January 16, 2008. At these meetings, details of the preliminary alternatives under consideration were presented and preliminary traffic operations analysis findings were discussed. Three Build alternatives (see Appendix B for illustrations) and the No Build alternative are being advanced for further engineering and environmental impact studies.

Although the KY 8 project's established purpose and need is primarily focused on developing a solution to the current unsafe traffic queuing of southbound vehicles on the Daniel Carter Beard Bridge intending to exit via the KY 8 exit ramp to Newport and Bellevue, projected traffic analysis and coordination with the I-471 Corridor study has prompted the consideration of broader needs, specifically I-471 through traffic needs.

Projected 2030 travel demand increases clearly indicate that the existing congestion and substandard level of service on I-471 will worsen and that capacity enhancements need to be considered. Based on this, the Kentucky Transportation Cabinet has agreed that the KY 8 interchange improvement alternatives will need to be developed to be capable of accommodating future additional interstate lanes. The KY 8 project Build alternatives as presented at the January meetings do accommodate the additional I-471 through lane in the southbound direction, but do not account for the additional lane in the northbound direction. At this stage, pending further studies now underway, there are no plans to revise the KY 8 Build alternatives to accommodate the additional northbound lane.

The KY 8 project schedule targets late 2008 for the determination of a preferred alternative. A public involvement meeting is planned for late 2008. Environmental through design studies will continue and the current schedule targets 2014 for the opening of the reconstructed interchange to traffic.

This project is of critical importance to the I-471 Corridor Plan, being not only in the study area, but one of the most heavily traveled I-471 interchanges, and

18 Active websites of current projects include: the I-471 / KY 8 project at www.471project.org and the Brent Spence Bridge at www.brentspencebridgecorridor.com ; and although currently on hold, information on the Eastern Corridor project is maintained on www.easterncorridor.org .

gateway to the second most heavily traveled Ohio River crossing in northern Kentucky. Several issues or items of concern need to be acknowledged regarding their impact on the Corridor Plan development and recommendations (further discussed later in Part 3 of this report), including:

- the interchange project plans have developed more slowly than originally scheduled, wherein the KY 8 project team had anticipated having determined a preferred alternative by late 2007, but that is now targeted for late 2008 or early 2009;

- the currently considered KY 8 project alternatives are proceeding based on a limited or more narrowly focused project purpose and need to address only one of the interchanges identified problems, the southbound exit ramp congestion and safety issues; although the KY 8 project has identified a northbound congestion and safety issue, the proposed interchange improvements will not include a solution to that problem; and

- the Build alternatives as presented thus far have not included details of the analysis or proposed associated improvements that may be necessary to address local street access changes due to the proposed interchange modification and project plans for the I-471 interchange immediately south of the KY 8 interchange, the I-471 / Memorial Parkway interchange.

KY 9, Licking Pike Extension

This project, also in the Six Year Plan (KYTC Item Number 6-8101), involves the development of a four or five lane extension of KY 9, also known as Licking Pike. The project length runs from its current terminus at KY 1120 in Wilder northward through Newport to connect to KY 8 to improve traffic flow, safety and connectivity. The proposed improvement would also include bike lanes. At an October 2007 public meeting, three alternatives were presented:

- Alternative 1 following Lowell Street, parallel to the Licking River;
- Alternative 2 connecting to Brighton Street through Central Avenue; and
- Alternative 3 carrying traffic north on Central Avenue and south on Isabella Street.

Since then, continued study has determined Alternative 1 as the preferred alternative. Current studies are underway to determine the northernmost connection to KY 8 and consideration of tying into the Ovations property roadway to better connect with the Taylor Southgate Bridge approach. Potential implementation has been estimated to be at least five years away pending completion of the environmental and design studies and funding availability.

The I-471 Corridor Plan has assumed the completion of this project in the assessment of future travel demand conditions in the corridor. In fact, the Corridor Plan studies have also explored options to improve KY 9 connections to the US 27, Taylor Southgate Bridge, via the connecting local roadway proposed for the Ovations project in the northwest corner of the City of Newport.

AA Highway to I-275 Connector

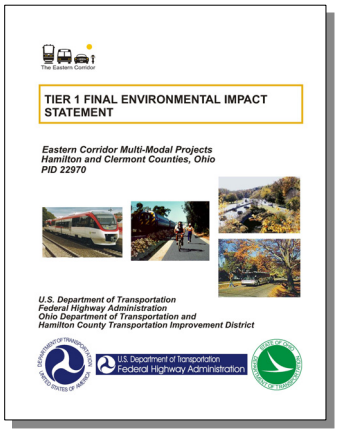
This project is also in the Six Year Plan (KYTC Item Number 8105), consisting of the development of new connecting roads near the NKU campus, connecting Pooles Creek Road, John Hills Road and Three Mile Road to provide for improved access to NKU and to relieve some of the traffic burden on I-275 between the AA Highway and the partial interchange at Three Mile Road. In addition, this new connector will reduce traffic demands on US 27 on the east side of NKU. The project known as the AA Highway to I-275 Connector is currently in the design stage having recently determined the roadway width requirements. Based on traffic projections to the year 2030, the Connector Road will be required to provide 3 lanes (2 northbound and one southbound) from the AA Highway to Johns Hill Road and 2 lanes with a center turn lane from Johns Hill Road to Three Mile. Design options for intersections with Johns Hill Road and Three Mile Road are currently under consideration including signalized with turn lanes or roundabouts. A two way, multiuse path for bicyclists and pedestrian will be included along the east side for the entire route. Environmental studies have been substantially completed. Final plans are anticipated by spring 2009 with potential opening to traffic being targeted for 2011.

For the purposes of the I-471 Corridor Plan, coordination with this project and with Northern Kentucky University has been conducted to explore proposed changes to the I-471 / I-275 and I-275 / Three Mile Road interchanges.

Eastern Corridor Multi-modal Projects

The Eastern Corridor project, in Hamilton and Clermont Counties, in southwestern Ohio, is a major transportation project in this region and has a significant effect on transportation planning in the I-471 Corridor. This study is being conducted to develop plans for improving long-term travel mobility between the City of Cincinnati and its eastern suburbs. The Eastern Corridor study area extends from the Cincinnati downtown and riverfront area in Hamilton County, east to the I-275 outerbelt corridor in Clermont County, near the communities of Milford to the north, Batavia to the east, and Amelia to the south. With I-275 and I-471 currently providing an important route serving the Cincinnati's eastern suburbs to the Cincinnati CBD travel demand, multi-modal transportation improvements in that project corridor are forecasted to benefit the I-471 study area by providing roadway and transit improvements north of the

Ohio River that will more directly serve this travel demand, and thus relieve some of the travel demand on I-471.



The I-471 Corridor area will benefit from regional highway and transit improvements such as the Eastern Corridor Multi-modal Projects.

The Eastern Corridor Multi-modal Projects has recently received approval of the Tier 1 environmental impact study, which included a comprehensive environmental assessment of the corridor, preliminary engineering and alternatives studies, extensive public involvement and benefit cost analysis. This approval clears the way to advance for more in-depth alternative analysis and Tier 2 final environmental impact studies. However, this next stage of study awaits funding and authorization.

This project is in the OKI Long Range Plan and is expected to proceed toward implementation over the next 20 years. A major component of the project is transit, both expanded bus service and passenger rail. The Riverfront Rail portion of the study, also known as the Oasis Rail line, has recently been advanced for continued study. This component of the larger Eastern Corridor study provides for the preliminary evaluation of an approximately one mile rail transit connection extending along the Cincinnati riverfront area from the Boathouse restaurant area on Riverside Drive to the Riverfront Transit Center under Second Street. The remainder of the multi-modal projects study, including highway and bike components, awaits authorization to continue into in-depth alternatives analysis and the next level of environmental study.

The I-471 Corridor plan development has incorporated the Eastern Corridor project plans in both their effects on I-471 and I-275 traffic and on regional transit needs.

Brent Spence Bridge Replacement

The Brent Spence Bridge Replacement study is in the Kentucky Six Year Plan (KYTC Item Number 6-17) as well as in the Ohio Department of Transportation's current Preliminary Development Process (ODOT Project Identification Number 75119; HAM-71/75-0.00/0.22). According to the project team[19]:

> The purpose of the Brent Spence Bridge project is to address the roadway aspect of the regional mobility plan for the corridor. All alternatives do not preclude the future plans for the modal alternatives identified for the region. HOV lanes will be investigated in future steps if warranted by the capacity analysis of the alternatives. Transit alignments are east of Brent Spence Bridge on Clay Wade Bailey Bridge, over 2nd and 3rd Street and under Brent Spence Bridge at the transit center.

19 Brent Spence Bridge website: www.brentspencebridgecorridor.com .

This project is currently evaluating several alternatives and conducting environmental and preliminary engineering and traffic studies. This project recently held a public meeting in February 2008 to present the studies completed to date. Five alternative alignments are under consideration with two of the alternatives utilizing a new river crossing location west of the existing bridge and the other three essentially reconstructing the new bridge in its present location. The schedule for this project calls for a narrowing of alternatives in late 2008, the completion of the environmental impact document in 2011 and proposed construction in 2015. However, there are efforts underway to try to expedite the process to move the construction date up.

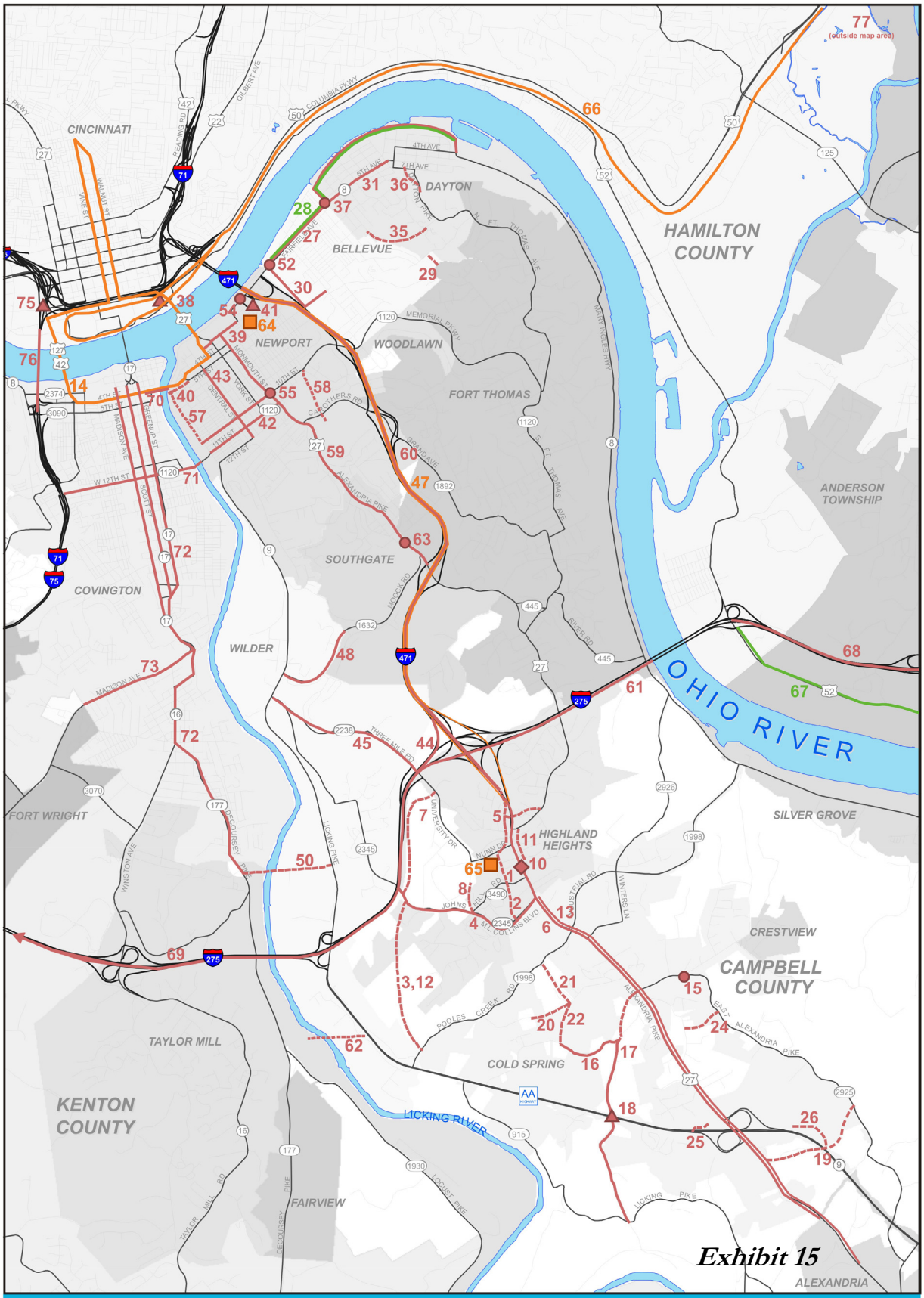
The details of the alternatives under consideration in this project are not of as critical importance to the I-471 Corridor planning efforts, as the proposed schedule for the construction of any of the alternatives. The I-471 Corridor Plan includes special considerations to address potential traffic changes in 2015 due to the anticipated traffic disruptions at this river crossing during construction.

REVIEW OF PAST TRANSPORTATION IMPROVEMENT PLANS

There have been numerous transportation improvement plans proposed over the years by local communities, Campbell County, TANK, OKI and the State. These projects were either locally proposed in plans such as comprehensive plans, part of the recommendations of area or county plans, on the Kentucky Unscheduled Projects List[20], past KYTC Six Year Plans or OKI 2030 Regional Transportation Plan (OKI's long range plan). In addition, there are project proposals from surrounding areas and jurisdictions, for example, City of Cincinnati, Metro, and ODOT, that could have significant effect on the study area's transportation. Several of these projects have progressed toward programming for implementation, i.e., are included in the current Six Year Plan and OKI's Transportation Improvement Program (TIP).

A compilation of these plans was made and presented to the PMT, the Advisory Committee and the public to gauge the relevance or continued interest in these projects as potential alternative solutions to incorporate into the I-471 Corridor Plan. There are over 60 projects listed, including those that are either in the current KYTC Six Year Plan or OKI's current Long Range Plan. Exhibit 15 illustrates the locations of these projects and Table 9 includes brief descriptions and available status information.

20 KYTC maintains an "Unscheduled Projects List (UPL)" listing highway, bikeway, pedestrian, multimodal and intelligent transportation system (ITS) projects. In addition, safety projects, bridge projects, and other operations and maintenance projects may also be included. For the purposes of this compilation, maintenance projects have not been included.


CINCINNATI
DAYTON
BELLEVUE
NEWPORT
WOODLAWN
FORT THOMAS
HAMILTON COUNTY
ANDERSON TOWNSHIP
SOUTHGATE
COVINGTON
WILDER
FORT WRIGHT
HIGHLAND HEIGHTS
SILVER GROVE
CRESTVIEW
CAMPBELL COUNTY
TAYLOR MILL
COLD SPRING
KENTON COUNTY
FAIRVIEW
ALEXANDRIA
OHIO RIVER
LICKING RIVER
Exhibit 15
Legend
Road Improvement
New Road
Bicycle Route
Transitway
Pedestrian Crossing
New Interchange
Improved Intersection
Transit Center / Park & Ride
Proposed Transportation Improvements From Area Plans
June 2007
From Community, County, Regional and State Plans 1997-2007
0 0.25 0.5 1 Miles
Source: OKI GIS, 2006
Study Area
Campbell County
OKI Eight County Region

I-471 Corridor Study: Planned or Programmed Transportation Improvements in Northern Campbell County and Vicinity

Transportation improvements proposed in community, county, regional and state plans, 1997 - 2007

This table compiles transportation improvement recommendations from local communities in the project area, Campbell County, TANK, OKI and KYTC. Several of these projects have been advanced into the KYTC 6 Year Plan and OKI's Transportation Improvement Program (TIP), some are programmed for funding, and several others have been adopted in OKI's 2030 Long Range Transportation Plan.

Note: Some projects are related (or duplicated by similar recommendations from other plans). Where this occurs, each recommendation is shown, and the Map numbers of the related projects are also shown to provide a cross-reference to the related project(s).

Map Number (see Map)	Project	Plan Where Project Cited	Comment (based on information from plan)	KYTC 6 Year Plan / OKI TIP	OKI Long Range Plan	Status
Campbell County, Kentucky						
1	**Extension** of Clara Street from Nunn Drive to Johns Hill Road	Highland Heights (2000)	The configuration and design of a new connector through the NKU development will be determined.			
2	**Connector** between Johns Hill and M.L. Collins Boulevard	Highland Heights (2000)	This road will provide access between two major collector roads and will facilitate the development of currently undeveloped land zoned for residential development.			
3,12	**Connector** between Johns Hill and Pooles Creek No.1	Highland Heights (2000)	This extension will provide additional access to and from NKU and the general public from Johns Hill to KY 1998 and southern US 27. The result will be an additional option for traffic distribution and other access options. See also Number 12.	✔		**Under current study**
4	**Improvements** to Johns Hill Road	Highland Heights (2000), Cold Spring (2005), Campbell County (2003)	Johns Hill Road is a very important collector road and its role in managing traffic flow and access will increase in the future. The growth and expansion of the NKU campus, including the convocation center, athletic fields and garage, and the extension/realignment of University Boulevard to Johns Hill Road will increase traffic in this area. In addition, town center generated traffic will use Johns Hill Road to access US 27 and to go west towards Wilder. Johns Hill Road will require improvements for selective widening, alignment, and increased safety.	✔		
5	**New Roads** (Gateway West/East Connector)	Highland Heights (2000)	A new ramp off I-275/I-471 will bring direct access to Gateway West and further south to Nunn Drive through a right-hand merging provision.			
6, 13	**Landscaped Median US 27**	Highland Heights (2000), Cold Spring (2005)	Both Cold Spring and Highland Heights recommend the installation of a landscaped median in the portion of US 27 from its intersection with Nunn Drive to Johns Hill Road. The remaining portions of US 27 are also recommended for a center-lane median.			**Under current study**
7	**New Road** NKU Loop	Highland Heights (2000)	Proposed by the NKU Master Plan, this road will parallel I-275 and will provide better inter-campus circulation.	✔		**Under current study**
8	**Extension** of University Boulevard	Highland Heights (2000), Cold Spring (2005)	This new alignment will extend University Boulevard south to Johns Hill Road.			
10	**Pedestrian Upgrades** around Town Center	Highland Heights (2000)	Mid-block crossings and better pedestrian crossings are to be installed in the heart of the proposed Town Center.			
11	**Extension of Old US 27**	Highland Heights (2000)	An extension of Old US 27 is recommended for better circulation around proposed town center.			
12, 3	**New Road** Construction AA to 275	Cold Spring (2005), Campbell County (2000)	New Technology Triangle/NKU access road from the AA Highway from Pooles Creek Road north.	✔		**Under current study**

I-471 Corridor Study: Planned or Programmed Transportation Improvements in Northern Campbell County and Vicinity

Transportation improvements proposed in community, county, regional and state plans, 1997 - 2007

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Note: Some projects are related (or duplicated by similar recommendations from other plans). Where this occurs, each recommendation is shown, and the Map numbers of the related projects are also shown to provide a cross-reference to the related project(s).

Map Number (see Map)	Project	Plan Where Project Cited	Comment (based on information from plan)	KYTC 6 Year Plan / OKI TIP	OKI Long Range Plan	Status
13, 6	**Improvements on US 27**	Cold Spring (2005)	Access management, controlled curb cuts and improved pedestrian safety via streetscape upgrades.			**Under current study**
14	**Proposed Street Car Route -** Newport	OKI 2030 Plan (2007), Kenton County Transportation Plan (2003)	The Central Area Streetcar is recommended to travel at-grade within the existing right-of-way, mixing with other traffic (part of route proposed for Covington and Cincinnati).		✔	
15	**Roundabout -** East Alexandria Pike	Cold Spring (2005)	To improve the safety and flow of traffic (vehicular and pedestrian) at the intersection of Goetz, Dodsworth, East Alexandria Pike and the entrance to City Hall, a modern roundabout is proposed; roundabouts are capable of managing traffic at intersections, such as this one, where roads enter at odd angles.			
16	**Improvements** on Dry Creek Road	Cold Spring (2005)	Widen and re-align road from Murnan Road west to proposed access to the Granite Spring development (i.e., to address inadequate lane widths and horizontal/vertical curves, etc). Where Dry Creek Road connects with the Granite Springs development, this portion of the road should be classified as a local street to the AA Highway. Any improvements to Dry Creek Road in this area should be made in accordance with public street standards. It is therefore recommended that emphasis on using this road for major access to the AA Highway be removed in favor of increasing access at Murnan Road via a new interchange (see recommendations for Murnan Road, Numbers 17 and 18).			
17	**Improvements** on Murnan Road	Cold Spring (2005)	Realign with East Alexandria Pike at U.S. 27. Improve Murnan Road from East Alexandria Pike at U.S. 27 to the AA Highway as an urban collector street, inclusive of 2 to 3 lanes, sidewalks and landscaping.			
18	**New Interchange** Murnan Rd / AA Hwy	Cold Spring (2005)	Widen and provide access to the AA Highway. Possible options include a half or full interchange, and the provision of new access roads to the AA Highway. Some of these options may result in the need to reroute the entrance drives into Glenridge, Shadow Lake and Ivy Ridge residential developments from the AA Highway to alternate access roads leading to Murnan Road.			
19	**New Road** between US 27 and AA Hwy.	Cold Spring (2005)	New road proposed to provide an alternate access between U.S. 27 and East Alexandria Pike in the vicinity of Rockyview Drive via a new/improved intersection on the AA Highway.			
20	**Extension of Darlas Drive to Buning Drive**	Cold Spring (2005)	New roadway extending Darlas Drive from its current terminus to U.S. 27 via Buning Lane or other local streets is proposed.			
21	**Extension of Buning Lane to Pooles Creek**	Cold Spring (2005)	Buning Lane extension north is a new roadway extending Buning Lane from its current terminus, north to Pooles Creek Road.			
22	**Extension of Buning Lane south**	Cold Spring (2005)	Extension proposed to provide a new roadway from Buning Lane south to Dry Creek Road.			

I-471 Corridor Study: Planned or Programmed Transportation Improvements in Northern Campbell County and Vicinity

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Note: Some projects are related (or duplicated by similar recommendations from other plans). Where this occurs, each recommendation is shown, and the Map numbers of the related projects are also shown to provide a cross-reference to the related project(s).

Map Number (see Map)	Project	Plan Where Project Cited	Comment (based on information from plan)	KYTC 6 Year Plan / OKI TIP	OKI Long Range Plan	Status
23	**Extension of St. Michael Drive**	Cold Spring (2005)	New roadway is proposed extending St. Michael Drive from its current terminus, northwest to Pooles Creek Road.			
24	**Connector** East Alexandria Pike/Ripple Creek Road	Cold Spring (2005)	New connector proposed between these existing streets, south of Sabre Drive and north of Keating Drive.			
25	**Extension** of Plaza Drive	Cold Spring (2005)	An extension of Plaza is proposed to connect with the AA Highway via an easement through private property as per recent development plan approval.			
26	**Extension** of Crossroads Blvd.	Cold Spring (2005)	Extension of Crossroads to connect with the AA Highway.			
27	**Road Improvements -** Fairfield Avenue	Bellevue (2000)	Construction of center turn lanes on Fairfield Avenue to aid in traffic flow is proposed.			
28	**Bicycle Route** on Dodd Drive and KY 8	Bellevue (2000)	Improvements to sidewalks along Fairfield Avenue and Taylor Avenue. The recently completed OKI Regional Bicycle Plan identifies Kentucky 8 (Fairfield Avenue), which passes through the urban areas of Kenton and Campbell counties, as potentially serving bicyclists traveling through the area.			
29	**Connector** Covert Run to Lincoln Rd	Bellevue (2000)	To address the issue of north - south access, this plan recommends a new road connection between Lincoln Avenue and Covert Run Pike. Bridges over the CSX railroad were replaced between 1995 and 1998.			
30	**Road Improvements- Donnermeyer and Riviera Drives**	Bellevue (2000)	Riviera Drive should be widened and curb cuts on Donnermeyer Drive, especially those on the south side should be improved. Riviera Drive has minimal area for widening to meet accepted standards for collector streets. However, any widening and/reconstruction should result in improved traffic flow conditions.			
31	**Road Improvements** 6th Street	Dayton (1998)	One of the recommendations for KY 8 is to continue on Sixth Avenue to Main Street and utilize Main Street for one block, north from Sixth Street to Fifth Street and then utilize Fifth Street, instead of Fourth Street to connect to Mary Inglis Highway. Currently it turns north one block earlier at Clay Street and takes Fourth Avenue to connect to the highway.			
35	**Connector** Chateau Road	Dayton (1998)	A proposed connection is recommended to extend Chateau Drive from the intersection with Dayton Avenue to O'Fallon Avenue via Walnut and Tenth Streets. The purpose of this proposed collector is to provide another means of access from southern Dayton to KY 8.			

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Map Number (see Map)	Project	Plan Where Project Cited	Comment (based on information from plan)	KYTC 6 Year Plan / OKI TIP	OKI Long Range Plan	Status
36	**Realignment** Dayton Pike	Dayton (1998)	Dayton Pike is recommended to be realigned to the west of existing Dayton Pike, from approximately 700 feet south of Seventh Avenue connecting to Main Street, utilizing the existing railroad overpass. Main Street then connects directly with existing KY 8. This realignment would become the major north-south artery for the city. It is also recommended that existing Dayton Pike, south of the realignment, be upgraded to include widening to a width of 22 feet with parking prohibited, and the improvement of shoulders or construction of new curbs and gutters.			
37	**Intersection Improvement** 6th Street and O'Fallon	Dayton (1998)	Improvement to the intersection of O'Fallon Avenue and KY 8 is proposed to accommodate major left-turn movements northbound on O'Fallon Avenue. In the short term, this could consist of removing on-street parking along both sides of the street approaching this intersection to provide for a left-turn storage lane and the ability for motorists to bypass this storage lane proceeding eastbound on KY 8			
38	**New Interchange** Taylor Southgate Bridge with I-71 on Ohio side of river	Newport (2006)	In order to filter traffic off of the I-471 bridge, a ramp from I-71 to the Taylor Southgate bridge is proposed. The objective would be to provide better access to an alternative Ohio River crossing (to I-471) to provide access to Newport (help alleviate back-up on Daniel Carter Beard bridge).			
39	**Realignment** of Third Street	Newport (2006)	Since the Newport Housing Authority site has been cleared, the chance to realign 3rd street is possible. Currently 3rd Street stops abruptly at Columbia Street. The realignment will allow for increased capacity and more options for turn lanes.			
40	**New Road -** Eastbound Bridge from Covington	Newport (2006)	With the increase east west flow of traffic both Newport and Covington are experiencing, a bridge for KY 8 across the Licking River is proposed. This bridge would effectively link 5th Street in Covington with 5th street in Newport. This would eliminate the need for many inefficient turns necessary to travel between the two cities.			
41,54	**New Interchange I-471 to Cowens Drive / KY 8**	Newport (2006)	Congestion on I-471 due to vehicles exiting onto Cowens Drive is heavy during certain hours. The comprehensive plan calls for changes to be made to the overburdened exit ramp. The remaining solution will be complex as nearby historical residences limit the ramp's alignment. See also Number 54.	✔		**Under current study**
42	**Road Improvements** 10th and 11th Streets	Newport (2006)	To improve east/west circulation, these streets are vital for proper traffic flow. Suggested here aren't alignment or volume improvements, but changes in signalization via computer monitoring.			

I-471 Corridor Study: Planned or Programmed Transportation Improvements in Northern Campbell County and Vicinity

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43,57	**Reroute of Liking Pike/KY 9 (4 lanes)**	Newport (2006), OKI 2030 Plan (2007)	Currently KY 9 runs through residential areas of Newport. To better serve commercial traffic and the residents of neighborhoods affected, KY 9 is proposed to be re-routed on a different set of city streets (or on new alignment, see Project 57). The plan will also allow for a better connection with KY 8. OKI calls for a new four lane route between 4th and 11th Streets.	✔		**Under current study**
44	**Road Improvement** I-471 Southbound Ramp	OKI 2030 Plan (2007)	The addition of one lane to ramp (SB 471 to WB 275) is proposed to provide required capacity.		✔	**Under current study**
45	**Road Improvements** Three Mile Road	Wilder (1997)	This proposed improvement includes realignment to straighten curves and widening to accommodate a more standard facility. Included in this project are improvements to bridge crossings over Three Mile Creek.			
46	**Road Improvements/ Realignment** John's Hill Road	Wilder (1997)	This proposed improvement is to correct 90 degree curve at Feldman Lane, from Licking Pike to the city of Highland Heights.			
47	**Exclusive Bus Lane** I-471	Campbell County Transportation Plan (2003), TANK Transit Network Study (TNS) (2006)	One of the key components of TANK Transit Network Study (TNS) is the recommendation of major transitways in the region, which are defined as "exclusive rights-of-way for transit vehicles" (for trains, light rail vehicles, or buses). One of two major transitways recommended as part of the network study is the I-471 Corridor.			**Recommended for further study in current Corridor Study**
48	**Realignment** of Moock Rd	Wilder (1997)	Reconstruction of Covington Waterworks Road and connection from Licking Pike to Moock Road is proposed.			**Partially completed**
49	**Extension** of Gloria Terrell Drive	Wilder (1997)	This proposed improvement is the extension of Gloria Terrell Drive north to Banklick Road. This route is planned to pass under the I-275, Licking River bridge, thus, providing another north-south connection, other than Licking Pike to serve properties located along the Licking River.			
50,62	**New Connector** Kenton County to Licking Pike	Wilder (1997)	KY 16 to KY 9 (Licking Pike) Connector has been proposed in the past. This route would be located north of I-275 and include a bridge over the Licking River to connect with Kenton County via Banklick Road within the city of Wilder. See also Number 62 for another alignment proposed.			
52	**Road Improvement** Expand Turning Radius on Riviera Drive	KYTC 6 Year Plan	This is a proposed intersection improvement.		✔	
54,41	**Road Improvements** Park Avenue New Left Turn Lane onto KY 8	KYTC 6 Year Plan	See also Number 41. Proposed improvements are associated with I-471 / KY 8 interchange needs.			**Under current study**
55	**Intersection Improvement US 27 and 11th Street**	OKI 2030 Plan (2007)	Reconstruct Intersection at KY 1120 and US 27		✔	

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57,43	**New Connector** Lowell Street to KY 8	Campbell County Transportation Plan (2003); KYTC 6 Year Plan	A new connection of KY 9 is proposed. See also Number 43.			**Under current study**
58	**New Road** From 10th St. to South of Carothers Rd	Campbell County Transportation Plan (2003)				
59	**Reconstruction US 27 From I-471 to Ohio River**	Campbell County Transportation Plan (2003)				
60	**Widen /add lanes I-471** From US 27 to Ohio Border	Campbell County Transportation Plan (2003)				
61	**Add Lanes I-275** From I-75 to Ohio River	Campbell County Transportation Plan (2003)	Pavement repairs and upgrade is in KYTC 6 Year Plan.			
62,50	**New Bridge** AA Hwy to CSX Site	Campbell County Transportation Plan (2003)	See also Number 50.			
63	**Intersection Improvement** US 27 and Overlook Dr.	Campbell County Transportation Plan (2003)				
64	**Proposed Transit Center or Park and Ride** Downtown Newport	Campbell County Transportation Plan (2003), TANK Transit Network Study (TNS) (2006)	Existing transit services convene in downtown Newport around the intersection of Monmouth Street and Third Street. The area could be enhanced to serve as a Transit Hub/Super Stop and serve as a focal point for a Newport Circulator.		✔	**Recommended for further study in current Corridor Study**
65	**Proposed Transit Center or Park and Ride** NKU	Campbell County Transportation Plan (2003), TANK Transit Network Study (TNS) (2006)	The TANK TNS states that US 27 near NKU is a logical location for a Transit Hub / Station in the I-471 Corridor. Specific location of the hub / station would be dependant upon the future development of an NKU circulator route for bus transit, though it would be utilized by several existing routes serving the local area. Pedestrian movements to/from the transit hub would be a consideration, as a pedestrian crossing of US 27 would need to be addressed if the hub were to be located along that route. The TNS acknowledges that the location of the hub merits study, and would be developed at a location where transit vehicles can easily ingress and egress an interstate, limited access highway, busway, or BRT corridor.		✔	**Recommended for further study in current Corridor Study**

Hamilton County, Ohio

66	**Eastern Corridor Oasis Line**	OKI 2030 Plan (2007)	Diesel unit rail and enhanced bus service is proposed.		✔	
67	**US 52 Bike Route**	Anderson Township Comprehensive Plan (2005)				

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Map Number (see Map)	Project	Plan Where Project Cited	Comment (based on information from plan)	KYTC 6 Year Plan / OKI TIP	OKI Long Range Plan	Status
68	**Increased Capacity I-275**	OKI 2030 Plan	Additional 2 lanes from US 52 to Clermont County Line is proposed.		✔	
75	**Interchange Improvements I-75**	OKI 2030 Plan	Reconfigure approaches to Brent Spence Bridge in Cincinnati are proposed. See also number 76.		✔	
77	**Eastern Corridor Multi-modal Plans**	OKI 2030 Plan (2007)	Multi-modal improvements between Eight Mile Road and I-71 including new highway and transit components are proposed.		✔	
Kenton County, Kentucky						
69	**Increased Capacity I-275**	OKI 2030 Plan (2007), Kenton County Transportation Plan (2003)	Additional 2 lanes from I-75 to AA Highway are proposed.		✔	
70	**Increased Capacity KY 8**	OKI 2030 Plan (2007), Kenton County Transportation Plan (2003)	Additional 3 lanes on 4th Street bridge over Licking River are proposed.		✔	
71	**Road Improvement KY 1120**	OKI 2030 Plan (2007), Kenton County Transportation Plan (2003)	Reconstruction of KY 1120 with 4 through lanes is proposed.	✔		
72	**Traffic Management improvements Covington**	OKI 2030 Plan (2007), Kenton County Transportation Plan (2003)	Madison, James, Decoursey, Scott, Greenup Streets improvements to traffic operations are proposed.		✔	
73	**Reconstruction KY 17**	OKI 2030 Plan (2007), Kenton County Transportation Plan (2003)	Reconstruction and adding one lane to KY 17 From Latonia Avenue to 26th Street is proposed.		✔	
76	**New Bridge / Replacement**	OKI 2030 Plan, Kenton County Transportation Plan (2003)	Brent Spence Bridge Replacement is proposed (see also number 75).		✔	

Part 3: Alternatives Analysis and Recommended Plan

Transportation improvement alternatives for roadway, transit service and ITS components were developed to address identified safety and capacity issues in the corridor, both currently and in the projected 2030 planning year. In addition, special consideration was given to addressing projected 2015 needs, particularly related to the likely disruption of traffic in the region due to the Brent Spence Bridge replacement construction anticipated in that time period. The following section describes the alternatives in each of these areas followed by the results of the evaluation: the recommended I-471 Corridor Plan, prioritization and cost estimates.

DEVELOPMENT OF I-471 CORRIDOR IMPROVEMENT ALTERNATIVES

Improvement alternatives to be developed for consideration came from several sources:

- stakeholder input on existing problem identification, including input from the PMT, the Advisory Committee and the public at large (see Exhibit 7);
- the assessment of the existing and projected conditions described in the previous section of this report (level of service and crash analysis critical rate factor);
- the review of study area comprehensive plans;
- a compilation of previously proposed improvements from local comprehensive plans, past transportation studies in Campbell County, KYTC's Unscheduled Projects List and Six Year plans, and the OKI Long Range Plan (see Exhibit 15);
- a design engineering analysis of the existing I-471 and the study area's interstate interchanges;
- a review of the TANK Long Range Network Study and an assessment of transit service (as described in the previous section of this report); and
- a review of the existing ITS tools, in use in the study area the OKI region (ARTIMIS), and nationwide.

The following section of this report describes the development and evaluation of improvement alternatives and the ultimate Plan recommendations for roadway, transit and ITS individually. Prioritization of these recommendations and cost estimates are also provided for all components of the I-471 Corridor Plan.

ROADWAY

The development and evaluation of potential roadway improvements to meet existing and projected needs was focused on three fronts:

- I-471 and I-275 and their interchanges;
- Major arterials in the study area (US 27, KY 8, KY 9 and others); and
- Ohio River crossings in the study area, the I-471 Daniel Carter Beard Bridge, and the US 27 Taylor Southgate Bridge.

As described in Part 2, this evaluation included the consideration of both capacity and safety needs, as identified by the stakeholders, as measured by level of service and critical crash rate analysis and, in the case of the interstate highways and their interchanges, as shown in the design engineering assessment of the comparison of the existing geometrics and configuration to current design standards.

Interstates and Interchanges

Being the conveyors of the largest daily traffic volumes in the study area, I-471 and I-275 were closely studied to determine what improvements or changes would need to be made to allow these routes to provide for safer and more efficient travel. As described in Part 2, this evaluation began with the assessment of the geometric design and layout compared to what the current design standards would call for if the interstates and interchanges were built today.

A number of interstate and interchange improvement alternatives were considered and are described below with information on the stakeholder input received leading to the plan recommendations. While much of the focus of this study was on identifying design deficiencies and improvements to address those deficiencies, future project level studies of each interchange will include more detailed traffic operations analysis to determine what other improvements may be required to meet traffic demand.

I-471 / Memorial Parkway and I-471 / Grand Avenue Interchanges

The upgrading of these two interchanges, due to the closeness of the spacing between them (as well as their closeness to the KY 8 interchange), present a difficult challenge. In fact, these interchanges operate in conjunction with each other, serving more than the typical interstate access for which interstate interchanges are designed. Much of the traffic demand in this area uses the interchanges as a short, higher speed, alternate route for short distance trips within the communities in this area. This local access traffic conflicts with the through interstate traffic.

- **Memorial and Grand Interchange Alternatives Considered**
  - Connect Memorial and Grand interchanges to function as one interchange (requires elimination of I-471 access between the two interchanges – see Exhibit 16)
  - Close Memorial interchange, expand Grand interchange ramps to full length.

Although it was recognized that there are existing problems in this area, and these are primarily due to the present configuration and spacing, it was also recognized that changes to this area would be very difficult in light of the existing development and the impacts these changes would have. Based on PMT review and discussion, further study of improvements to these interchanges was advanced to be a part of the recommendations, but the alternative of closing one or the other interchange was not advanced. It was also noted that the KY 8 interchange project is currently studying the potential effect the KY 8 interchange improvement alternatives will have on the I-471 / Memorial Parkway interchange. The City of Newport passed a resolution (see Appendix E) and provided a copy to the PMT stating the City's opposition to closing either the Memorial or Grand interchanges.

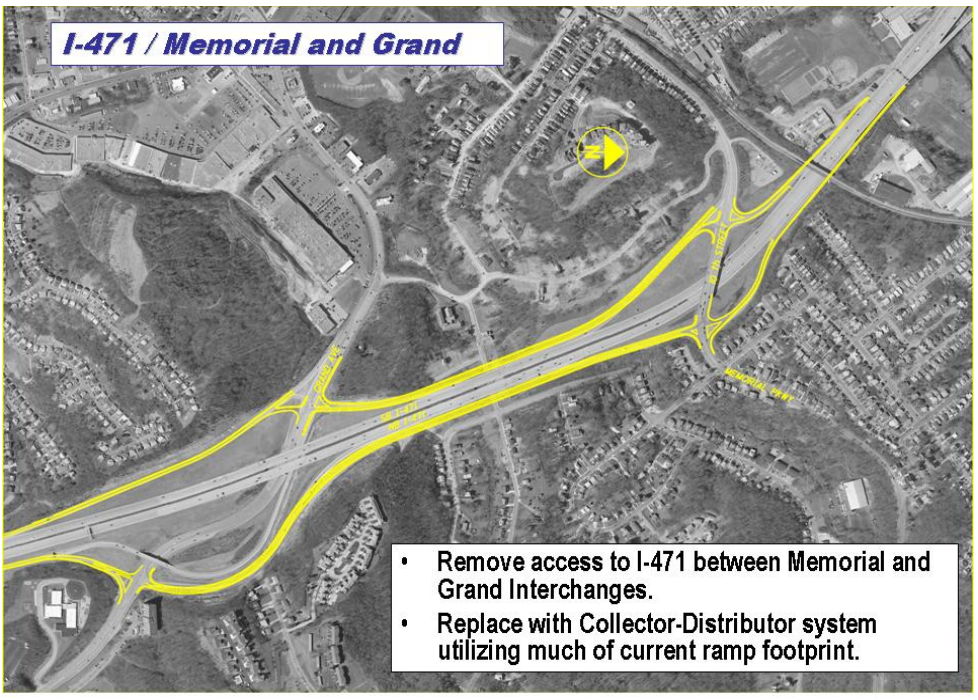


Exhibit 16: Conceptual alternative for Memorial and Grand interchanges

I-471 / I-275 Interchange

With the two routes carrying the highest volumes in the study area converging at this location, the I-471 / I-275 interchange is not only the largest I-471 interchange in land coverage, but also the most important.

- **I-471 / I-275 Interchange Upgrade Alternatives**
  - Widen ramp from southbound I-471 to westbound I-275
  - Extend ramp from southbound I-471 to eastbound I-275
  - Realign ramp from southbound I-471 to eastbound I-275
  - Extend ramp from northbound I-471 to westbound I-275
  - Extend ramp from westbound I-275 to southbound I-471
  - Realign and widen ramp from eastbound I-275 to northbound I-471.

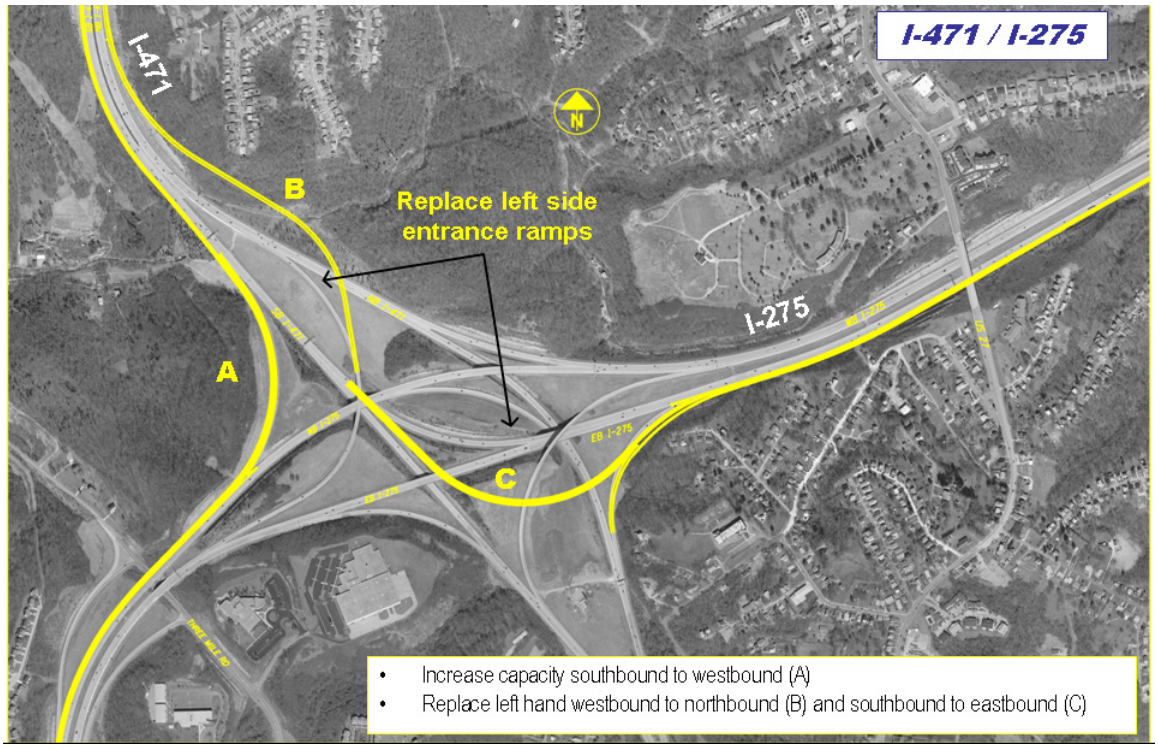


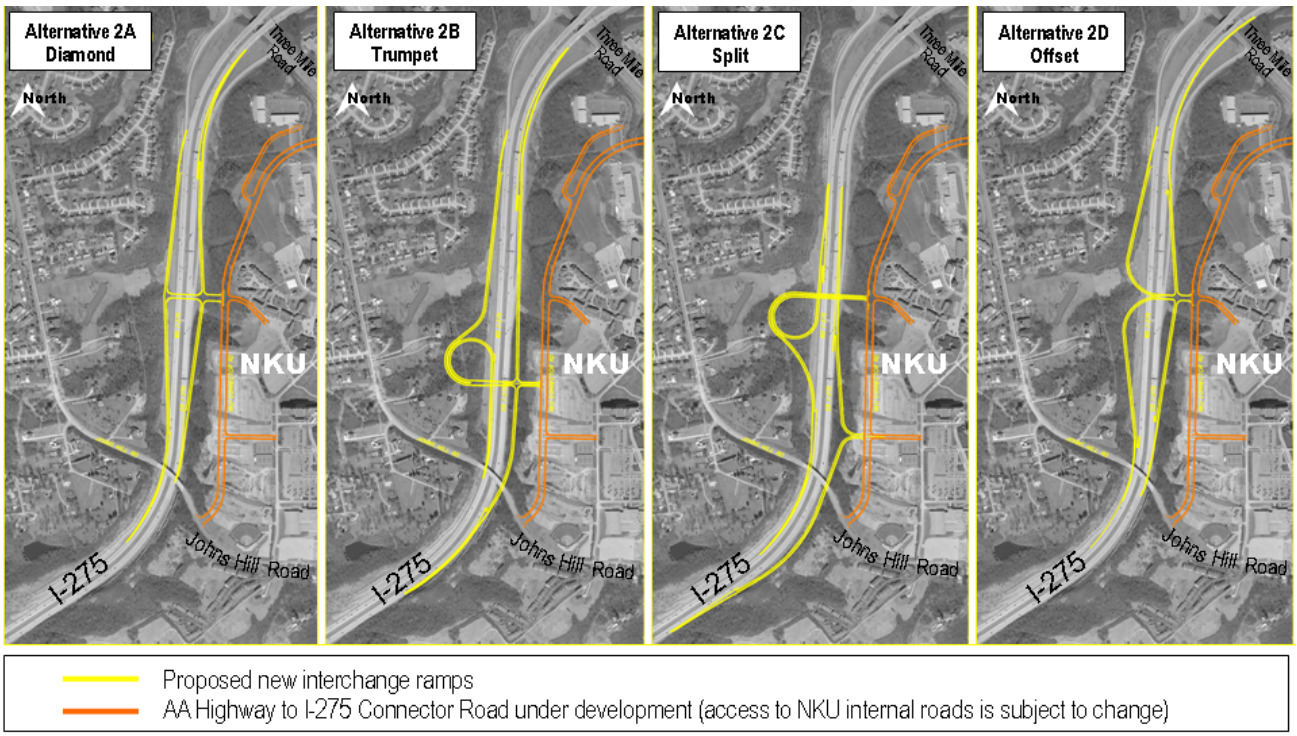
Exhibit 17: Improvement Alternative for I-471 / I-275
Configuration upgrades required to meet design, capacity and safety needs

Exhibit 17 depicts one of the conceptual alternatives for upgrading this interchange. Any improvement to this interchange will require the removal of the I-275 / Three Mile Road partial interchange located immediately adjacent to the southwestern portion of the I-471 / I-275 interchange, due to its spacing failing to meet current design standards for safe operations. The I-471 / I-275 interchange was selected by the Project Management Team for

advancement to Phase II of this Corridor Plan for further study, based on its high existing and projected traffic volumes, design, capacity needs and safety issues. As part of that decision to further study this interchange, the evaluation of potential replacement of the I-275 / Three Mile Road interchange was recommended for inclusion in the Phase II study (see also the following discussion of the I-275 / NKU interchange conceptual alternatives). Part 4 of this report provides the analysis and findings of the Phase II study.

Exhibit 18: Build Alternative 2 Configuration Options for New I-275 Interchange South of Three Mile Road

A new full access interchange located to the south of the existing Three Mile Road partial interchange would provide improved access to NKU, a direct tie-in to the new AA Highway to I-275 Connector Road, and reduce traffic demand on US 27 at the eastern entrance to NKU.



I-275 / NKU Interchange

As mentioned, improvements to the I-471 / I-275 interchange will necessitate removal of the partial interchange of I-275 / Three Mile Road. However, this change opens up the possibility of replacing that partial interchange with a new full access interchange properly spaced between I-471 and the AA Highway interchanges.

- **I-275 / NKU Interchange Alternatives**
  - Add new full access interchange on I-275 south of I-471 interchange

- Remove existing partial interchange at Three Mile Road (currently ramps to /from Three Mile Road only provide two movements: northbound I-275 exit and I-275 southbound entrance)
- Provide direct tie-in to AA Highway to I-275 Connector Road, coordinating with NKU internal circulation system.

Exhibit 18 depicts four possible concepts for a new full access interchange on I-275, just south of the I-471 / I-275 interchange, to replace the existing partial I-275 interchange at Three Mile Road that would be required to close when I-471 / I-275 upgrades occur. In the exhibit, the orange lines represent the AA Highway to I-275 Connector Road currently under development along the western edge of the Northern Kentucky University (generally north–south oriented orange lines) with preliminary locations of connections to the internal campus parking and circulation system (general east–west oriented orange lines). The locations of the connections to campus are for illustration only, since NKU is currently updating its campus master plan and detailed information is not yet available. The yellow lines represent the proposed interchange configurations under consideration with a direct connection to the new Connector road.

Functionally, this new interchange would alleviate existing safety issues and connectivity problems with the partial Three Mile Road interchange and would allow for needed improvements to the operations of the I-471 / I-275 interchange (and the I-275 / AA Highway interchange) by providing better spacing between interstate interchanges, consistent with state and federal design standards. The potential benefit of this alternative NKU access (an alternate route to the existing main entrance at the base of I-471 / I-275 and US 27) is that traffic demand on the interchange ramps and US 27 would be decreased.

Coordination with representatives of Northern Kentucky University and their campus master plan consultant team were conducted as the Corridor Plan was being developed. Although NKU's master plan studies are on-going at this time, and it is recognized that a new interchange is not programmed for implementation, the PMT recommended that further study of the potential for a new interchange at this location was warranted and included this study in the Phase II study of the I-471 / I-275 interchange. Part 4 of this report includes the results of that next step in the further analysis.

I-275/ KY 9 (AA Highway) Interchange

This interchange not only carries a very high volume of traffic and has a high crash rate (see Part 2), it also was designed to interstate standards that are no longer considered sufficient. Exhibit 19 depicts the enlargement of the radius of the westbound I-275 loop off ramp to AA Highway and the on ramp to westbound I-275 from the AA Highway for more efficient and safer operation.

- **I-275/ KY 9 (AA Highway) Interchange alternatives**
  - Enlarging westbound I-275 on ramp (A in Exhibit 19)
  - Reconfigure westbound I-275 off ramp (B in Exhibit 19)

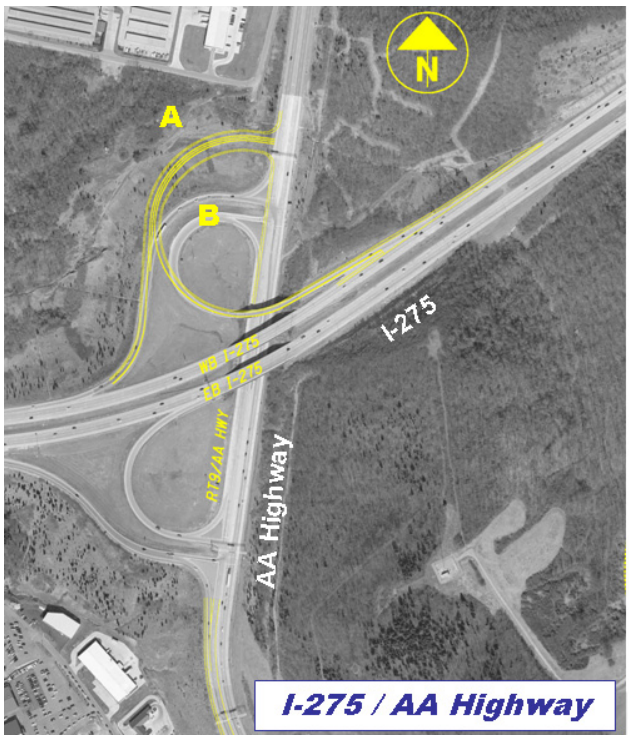


Exhibit 19: I-275 / AA Highway Improvement Alternative

The PMT, noting this interchange's safety and congestion problems, especially the eastbound off ramp, debated advancing it to the Phase II study instead of the I-471 / I-275 interchange. Although it was ultimately decided that the I-471 / I-275 interchange would take priority due to its higher traffic volumes, it was noted that upgrading the I-275 / KY 9 interchange is also of critical need.

I-471 Mainline

Widening the entire length of I-471 to add a continuous fourth through lane in each direction, combined with interchange upgrades, would result in improved safety and capacity, and represents the one proposal with the most potential to significantly decrease congestion in the study area. Level of service benefits have been estimated using the OKI RTDM and show the improvement capable of bringing the I-471 and the Daniel Carter Beard Bridge to peak hour Level of Service rating of D, whereas the projected 2030 conditions without the interstate widening and interchange upgrades, are projected to be levels of E and F. Level of service D is considered an acceptable level in urban areas; for I-471, the projected level of service of D would represent an improvement over the existing levels. In addition, this widening would allow for the reconstruction of the interstate shoulders to allow for the provision of express bus service on the shoulders (discussed later),

also one of the most important options to reducing congestion in this area. However, these benefits must be weighed against the capital costs for this alternative and the impacts of its right-of-way needs.

- **I-471 Mainline Alternatives**
  - Widen I-471 one additional lane (to four through lanes) in each direction and upgrade Grand, Memorial and US 27 interchanges and curve upgrade to 65 mph design
  - Widen I-471 one additional lane (to four through lanes), with closure of Memorial interchange, upgrade to the Grand and the US 27 interchanges and curve upgrade to 65 mph design
  - Upgrade curve to 65 mph design speed between Highland Avenue overpass and US 27 interchange (without I-471 widening)

With existing level of service and crash experience problems identified and projected traffic demand expected to increase substantially, the PMT included the widening of I-471 in the plan recommendations. As discussed in Part 2, the KY 8 / I-471 interchange project has agreed, at KYTC's recommendation, to develop improvement designs for that interchange capable of accommodating the future widening of the interstate for an additional mainline through lane in each direction. However, as also mentioned in Part 2, the KY 8 project plans at present do not provide for this capability in the northbound direction. Difficult geometries on both sides of the Ohio River provide challenges for the KY 8 interchange and I-471 widening. Northbound travel currently experiences AM congestion due in large part, to poor merge conditions between the on ramp from KY 8 in Newport and the off ramp to US 50 in Cincinnati. To truly improve traffic flow in this vicinity, a long term solution needs to include improvements on both sides of the Ohio River as was recognized throughout the study by both the public and the project management team. Reconfiguration of either of these ramps is possible, but solutions would be challenging due to cost and potential impacts to the surrounding area. To the extent possible, the redesign plans for the KY 8 interchange need to preserve future options for both the southbound and northbound travel. In addition, the ramp metering recommendation presented later in Table 18 will provide some congestion relief. It should also be noted that the City of Newport has issued a resolution opposing the additional interstate lanes through the City of Newport (see Appendix E).

Major Arterials and Connectors

While much of the focus is on the development of improvement options for I-471 (and I-275), this study also considered needed improvements to the surface street network, specifically the state and US routes in the study area. Many transportation improvement plans have been proposed over the years throughout the study area and immediate vicinity. An exhibit at the public meeting in June

2007 depicted over 60 projects that have been proposed by local, state and regional agencies (see Exhibit 15 and Table 9 in Part 2 of this report). While these projects all have merit in providing for safety and capacity and connectivity needs, including those needs identified in this study, funding realities mandate that collaborative prioritization is needed to advance these into the region's long range plan and ultimately to implementation. These projects included roadway, transit and ITS improvements; transit and ITS projects are discussed later in this section.

Recognizing that most, if not all, of these projects are merited, the PMT was asked to rank the projects, nonetheless, giving preference to those with the most potential regional or countywide benefit. The PMT was also asked to add to the list if other projects warranted consideration. Ultimately, this 'universe' of projects was pared down to the most important projects in terms of addressing the needs identified in this study. Those projects then became part of the recommended plan discussed later in this section.

The following projects, determined to be part of the Corridor Plan are described in more detail below to better explain the consideration and reasoning for their inclusion.

Ohio River Crossings

Improved connections to the Taylor Southgate Bridge will result in better use of this four lane Ohio River crossing.

The first represents a potential major new connection with regional benefit, through the better utilization of Ohio River bridge crossing capacity that currently exists in the Corridor study area at the four lane Taylor Southgate Bridge (US 27). The current traffic demand on this bridge, approximately 11,000 to 12,000 vehicles per day, is well below the capacity that this bridge could handle safely and efficiently. The current traffic demand on the adjacent I-471, Daniel Carter Beard Bridge, around 102,000 to 105,000 vehicles per day, exceeds the capacity of this crossing.

Potential reconfiguration and improvement at the southern approach to the Taylor Southgate Bridge could result in better local connections and utilization of this Ohio River crossing, thus taking on some of the Daniel Carter Beard burden. Exhibit 20 depicts a modern roundabout configuration option to tie-in to the proposed connector road through the Ovations development to the KY 9 extension (12th Street to KY 8, the KYTC project under development) near the foot of the Veterans Memorial Bridge (Fourth Street) over the Licking River. Several potential connections were reviewed by the PMT including a more traditional four way signalized intersection design just west of the Taylor Southgate approach (in the general vicinity of where the roundabout is shown in Exhibit 20).

In addition, reconfiguration of this intersection may also allow for direct access to the Newport on the Levee parking garage from the west, which could lessen the

KY 8 congestion at the east side parking garage access. The KY 9 Extension project is also looking into options to improve this connection to the Taylor Southgate Bridge.

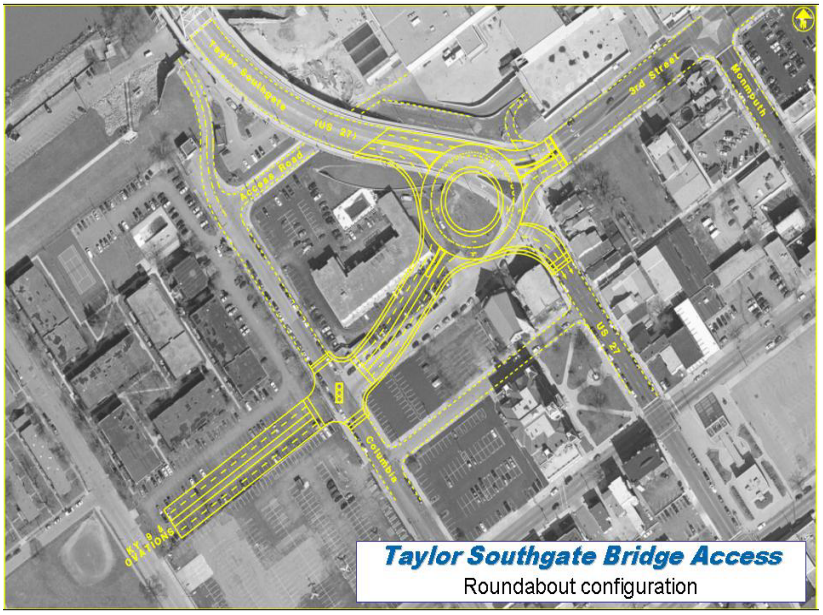


Exhibit 20: Taylor Southgate Bridge Southern Approach Option
This improvement could promote more efficient use of this Ohio River crossing.

In addition, the northern approach to this bridge warrants further study to improve access from the north. One potential improvement considered was the addition of a left turn lane or signal phase at the existing I-71 southbound exit ramp approach to Broadway Street, to allow for traffic movement to the Taylor Southgate Bridge. Currently, this movement is prohibited. The KY 8 / I-471 interchange project study reported that there has been discussion with the City of Cincinnati regarding making this movement available to help relieve the southbound traffic issues on the I-471 bridge and the KY 8 exit ramp. However, the City has no plans to make this change and cited concerns included the potential left turn queuing backing up along this exit ramp. The PMT recommended that further study of both the north and south connections to the Taylor Southgate Bridge is warranted, in light of the potential benefit these improvements would have on congestion on I-471 through better use of the Taylor Southgate Bridge.

US 27 and Moock Road Improvement

In evaluating the I-471 interchanges and in response to stakeholder input on local use of Moock Road (KY 1632), the operations at US 27 and Moock Road were investigated. While the I-471 / US 27 interchange was not found in need of major upgrading, it was noted that the proximity of the Moock Road intersection at US 27, coupled with the observed volume of traffic demand from the

southbound I-471 off ramp, turning right onto US 27 westbound, then needing to cross over two lanes of traffic to be in position to make a left turn onto Moock Road, results in a localized congestion and safety problem area. Exhibit 21

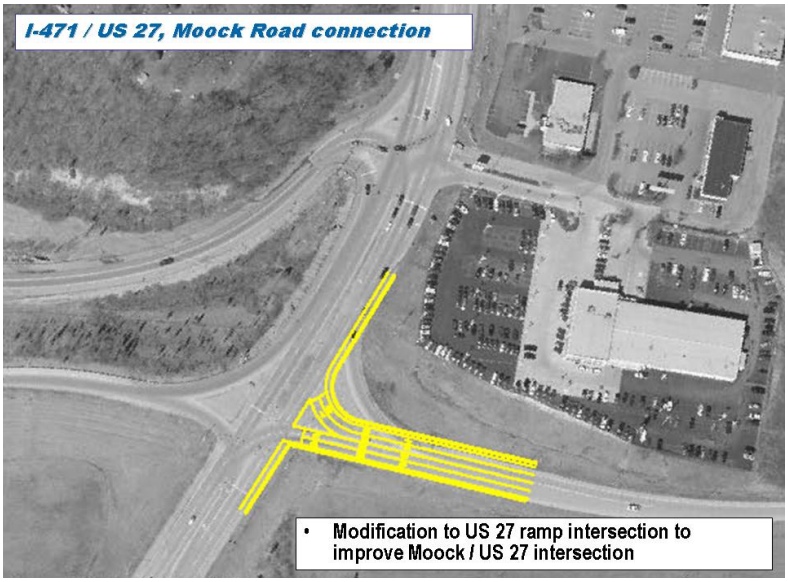


Exhibit 21: I-471 / US 27 and Moock Road Improvement
This reconfiguration of the I-471 southbound off ramp at US 27 would improve operations at the US 27 intersection with Moock Road.

illustrates a relatively minor improvement to the exit ramp's approach to US 27 that would alleviate this problem. The proposed reconfiguration lengthens the distance between the exit ramp intersection and the Moock Road intersection to improve the lane change movement between the intersections without adversely affecting the interstate off ramp movement. The PMT included this project in the Plan recommendations.

Recommendations of US 27 Substudies to Advance

As mentioned in Part 1, the I-471 Corridor Study included two special substudies, completed in 2007: the ***US 27 Signal Optimization Study*** and the ***US 27 Alexandria Pike Access Management Plan***. Recommendations from both of these studies have been forwarded by the PMT to be included in the I-471 Corridor Plan. The following paragraphs summarize the components of these recommendations.

The ***US 27 Signal Optimization Study*** resulted in a short range plan to improve traffic flow along US 27 from Sunset Avenue to the AA Highway through the synchronization (and re-timing those that operate independently) of thirteen signalized intersections. A separate report for this substudy has been

Recommendations from the two US 27 substudies completed in 2007 are advancing.

submitted to OKI and KYTC and the signal timing is programmed for KYTC's implementation. It is included as one of the Plan recommendations due to its recognized congestion management and safety benefits.

The objectives of this study were to:

- Improve traffic progression by minimizing impedance from turning movements and cross street traffic;
- Minimize overall delay for the corridor as well as delay at each of the individual signalized intersections; and
- Provide an indirect benefit of reduced crash frequency through reduced traffic congestion and more consistent traffic flow.

New signal timing plans have been developed to replace plans operating during peak traffic periods Monday through Friday at a total of thirteen signalized US 27 intersections:

- Alexandria Pike/Sunset Drive,
- Louie B. Nunn Drive/Hidden Valley Drive,
- Marshall Lane,
- Johns Hill Road (KY 3490),
- Bon Jan Lane,
- Martha Layne Collins Boulevard,
- Furniture Fair Entrance,
- KY 1998, Pooles Creek Road/Industrial Road,
- St. Michael Drive,
- East Alexandria Pike,
- Plaza Drive/Crossroads Boulevard,
- KY 9 ("AA Highway") eastbound ramps, and
- Meijer store entrance.

Traffic signal timing optimization is a practical and cost-effective way to maximize system performance and efficiency and when combined with other access management improvements and techniques, provides both safety and capacity benefits. Numerous national case studies have demonstrated that signal re-timing can reduce congestion and delay 15 to 20 percent, a very positive return for a relatively low-cost investment.

The second substudy, the ***US 27 Alexandria Pike Access Management Plan*** resulted in a number of project recommendations. This substudy (also documented in a separate report in 2007), covered a section of US 27 from Crowell Avenue in Fort Thomas to the AA Highway in Cold Spring. It was scoped at the Corridor Plan's outset for special study due to high and increasing traffic volumes and crash experience and its numerous driveway and intersection access points. The goal of an access management plan is to provide for necessary access for land development while preserving safety and mobility along the through roadway. This Access Management Plan was developed with extensive

stakeholder participation and public review. In brief, the recommendations of the resultant plan consisted of both short and long range plans to eliminate unneeded access points to US 27, proposed locations for future service roads parallel to US 27 to consolidate access, and policy guidelines based on statewide and national standards for better controlling future access issues arising as properties in this US 27 corridor develop or redevelop.

Of particular significance to this I-471 Corridor Plan are these key recommendations made in this substudy:

- Implementation of the US 27 access management plan site specific recommendations for driveway consolidation and future service roads, and the development of guidelines and policy to better manage future access;
- The endorsement and expansion of access management guidelines and policy countywide; and
- Two major capital improvements for US 27: the three lane conversion north of Sunset Avenue and the installation of a non-traversable median south of that intersection.

The following paragraphs provide details on these recommendations.

Implementation of the Access Management Plan for US 27 and Countywide Access Management Study

Access management can significantly improve traffic flow and safety. Case studies have shown reduction in crashes by as much as 50 percent, increases in roadway capacity by 25 to 30 percent, reductions in travel time and delay by as much as 40 to 60 percent, as well as fuel savings in the thousands of gallons per mile per year range. Table 10 illustrates some of the benefits achieved.

Recognizing the need and benefit of access management and having reviewed the results of the substudy plan for correcting existing access problems and issues in the US 27 Alexandria Pike area, the PMT has forwarded the implementation of the US 27 plans and the study of countywide access management guidelines and policy as recommendations of the I-471 Corridor Plan.

Implementation of the US 27 Access Management Plan is envisioned as a two-tiered process. The first step in implementation of the Plan at the upper tier is formal adoption by OKI as the area's Metropolitan Planning Organization (MPO).

At the upper tier, the Plan serves as a framework for access management for the entire study corridor. A list of recommended, prioritized actions in the form of strategies, programs and retrofit capital projects is offered. Where state and federal funds would be used, these actions must be further prioritized and

programmed through the MPO's Transportation Improvement Program and Long-Range Transportation Plan. Some of the recommended actions can be undertaken immediately through initiatives by the District Six Office of the Kentucky Transportation Cabinet. At the District Office level, requests for access permits should be considered within the framework of the US 27 Access Management Plan and the Kentucky Access Management Program.

Table 10: Summary of Research on the Effects of Access Management Techniques [21]

Treatment	Effect
Add continuous two way left turn lane (TWLTL)	35% reduction in total crashes 30% decrease in delay 30% increase in capacity
Add non-traversable median	>55% reduction in total crashes >30% decrease in delay >30% increase in capacity
Replace TWLTL with a non-traversable median	15%-57% reduction in crashes on 4-lane roads 25%-50% reduction in crashes on 6-lane roads
Add a left-turn bay	25% to 50% reduction in crashes on 4-lane roads up to 75% reduction in total crashes at unsignalized access 25% increase in capacity
Type of left-turn improvement a) painted b) separator or raised divider	 32% reduction in total crashes 67% reduction in total crashes
Add right-turn bay	20% reduction in total crashes Limit right-turn interference with platooned flow, increased capacity
Increase driveway speed from 5 mph to 10 mph	50% reduction in delay per maneuver; less exposure time to following vehicles
Visual cue at driveways, driveway illumination	42% reduction in crashes
Prohibition of on-street parking	30% increase in traffic flow 20%-40% reduction in crashes
Long signal spacing with limited access	42% reduction in total vehicle-hours of travel 59% reduction in delay 57,500 gallons fuel saved per mile per year

21 Access Management Manual, Transportation Research Board, National Academies (TRB), Washington, D.C., 2004.

To be fully functional at the lower tier, access management initiatives should be implemented by local governments in the corridor – the City of Fort Thomas, the City of Highland Heights, the City of Cold Spring, and the Campbell County Fiscal Court. Access management programs should be developed by each of these entities and could be either specific to the US 27 corridor or area-wide programs that would include US 27. Local access management initiatives should be consistent with both the US 27 Access Management Plan and the Kentucky Access Management Program.

Local access management initiatives can be implemented in a variety of ways. A stand-alone access management ordinance can be developed as an overlay for the US 27 corridor through each community or on an area-wide basis so that it can be applied to other routes throughout the county as well.

Local entities may develop and implement access management initiatives through other avenues as well. Through local comprehensive plans, access management initiatives can be implemented through the goals and objectives, transportation element, and land use element. At a minimum, future updates to the local community comprehensive plans should incorporate access management principles as much as possible.

Access management can be implemented through zoning regulations with respect to land use types, number of allowable access points, restrictions on flag lots, connectivity and frontage requirements. Through subdivision regulations, access management principles can be implemented in establishing criteria for driveway widths, minimum throat length, cross connections, and joint access.

With respect to US 27, implementation of the Access Management Plan requires a partnership among the Kentucky Transportation Cabinet, the OKI Regional Council of Governments (as the area's Metropolitan Planning Organization), local governments, and other stakeholders. This study provides those partners with the tools and a framework to implement access management within the US 27 corridor.

The countywide study would include incorporation of the *Kentucky Model Access Ordinance*[22] that has been created to assist Kentucky cities and counties in developing their own access management ordinances. This ordinance addresses Kentucky's most-used access treatments. Cities and counties are urged to tailor the ordinance to meet specific local needs and to develop additional language as necessary.

22 Source: Kentucky Transportation Cabinet, Division of Planning, 2007. http://transportation.ky.gov/planning/traffic/am.asp

Major Capital Improvements on US 27 Alexandria Pike

In addition, the Access Management Plan included two major capital improvement recommendations: 1) the conversion of a section of the four lane US 27 between Crowell Avenue and Blange Road, to a three lane roadway cross section with bike lanes; and 2) the installation of a non-traversable median on US 27 from Sunset Drive to the AA Highway, with openings at intersections and consideration of selected locations for mid-block u-turning provisions. Exhibit 22 illustrates these two projects which are further described below.

Crowell Avenue to Blange Road: Conversion to Three Lane Roadway

The northernmost section of US 27 in this study area, currently a four lane, undivided roadway, with significantly lower traffic volumes (8,000 vehicles per day) than the other subsegments of US 27 under study, presented an unique opportunity to improve traffic flow and access by reducing the number of through travel lanes.

The concept, sometimes called a "road diet," consists of converting the existing four lanes to two through lanes and a continuous center left turn lane within the existing pavement width. In addition, there is often sufficient width to allow for

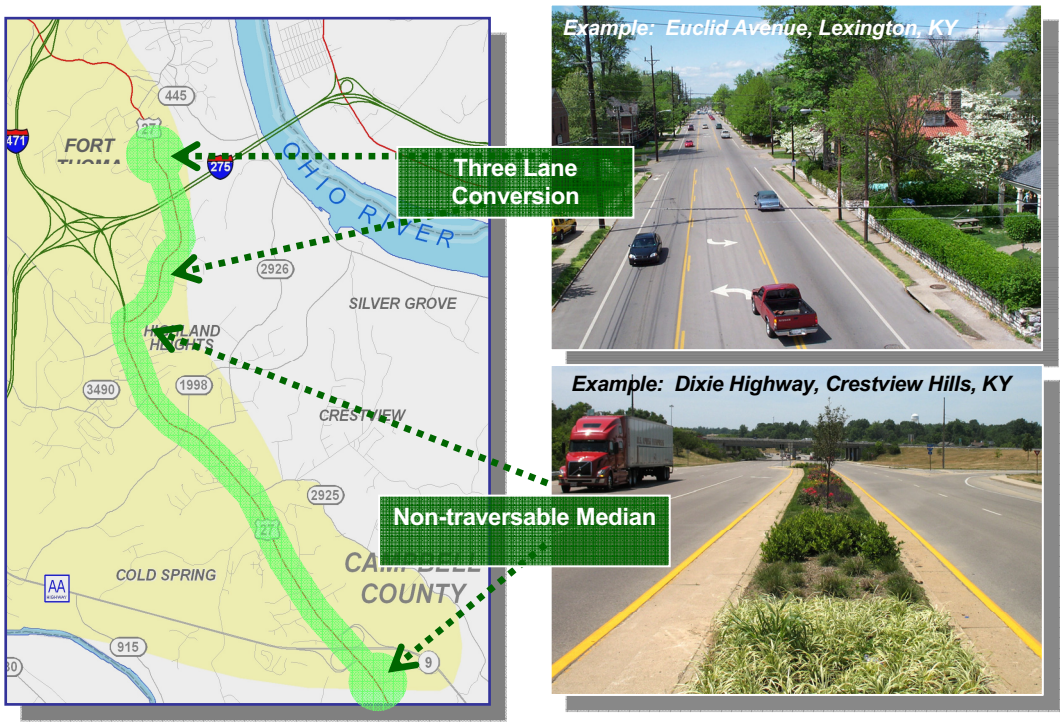


Exhibit 22: US 27 Improvement Recommendations
This illustration depicts two major US 27 improvement recommendations to be advanced from the US 27 Alexandria Pike Access Management Plan.

the provision of bike lanes on each side adjacent to the travel lane. As illustrated in Exhibit 22 (in the Euclid Avenue in Lexington, Kentucky example shown), the resultant three lane facility provides not only an enhanced aesthetic character, but better traffic movement and safety with adjacent property access benefits. Nationwide case studies where similar roadway conversions have been implemented have demonstrated significant benefits.

As Table 10 depicted some research findings from the Transportation Research Board for various access management improvements, nationwide case study research found that adding a continuous two way left turn lane achieved:

- 35% reduction in total crashes;
- 30% decrease in delay; and
- 30% increase in capacity.

The US 27 Task Force, Advisory Committee and public input on review of this recommendation was very positive; in fact, there was support for consideration of extending the three lane concept farther north into Fort Thomas.

The PMT included this US 27 Access Management Plan recommendation for the further study of this three lane conversion and the possible extension of the concept northward for advancement to the I-471 Corridor Plan. However, the Kentucky Transportation Cabinet realized an opportunity existed that would allow the implementation of the three laning this fall. This section of US 27, actually a longer section extending from the Sunset Avenue intersection approach to South Fort Thomas Avenue, KY 1120 in Fort Thomas, was scheduled for resurfacing this season. Recognizing that the cost of implementing this improvement is relatively low, since no new right-of-way would be required (the improvement fits in the current width of the existing roadway), KYTC proposed re-striping this section of US 27 for three lanes instead of the existing four after the resurfacing. Plan details such as repositioning overhead traffic signal heads over the re-aligned lanes were developed by KYTC and this three lane conversion project has now been completed.

Before September 2008 *After September 2008*

This September, the Kentucky Transportation Cabinet completed the three lane conversion of US 27 between Sunset Avenue in Highland Heights and KY 1120 (South Ft. Thomas Avenue) in Fort Thomas in conjunction with the scheduled re-surfacing of US 27.

However, while the resurfacing and restriping to three lanes will provide for the traffic flow, safety and access management benefits, insufficient existing roadway width did not allow for bike lanes within the roadway space. The future addition of bike lanes will require reconstruction of this section of US 27.

Sunset Drive to Meijer Entrance: Non-traversable Median

The second major capital improvement for US 27 is also illustrated in Exhibit 22. Currently, US 27 between Sunset Drive and the Meijer store entrance, south of the AA Highway, has a cross section providing four travel lanes divided by a painted center median two way left turn lane. This continuous center turn lane provides a delineated area for the access needs of the many adjoining properties, consisting of over 170 existing access points. However, as traffic volumes and access needs have increased, the continuous two way left turn lane can no longer provide the safety benefits needed. A non-traversable median not only provides a safety buffer between the two directions of traffic, but also allows for better channelization of turn lanes at key intersections. An added feature is the aesthetic enhancement which can result in increased property values of the abutting properties and surrounding area.

Table 10 also includes research findings from the Transportation Research Board 2004 study indicating the measurable benefits of replacing a continuous center two way left turn lane median with a non-traversable median. The nationwide case study research found the following significant safety improvements:

- 15-57% reduction in total crashes on 4 lane roads; and
- 25-50% reduction in total crashes on 6 lane roads.

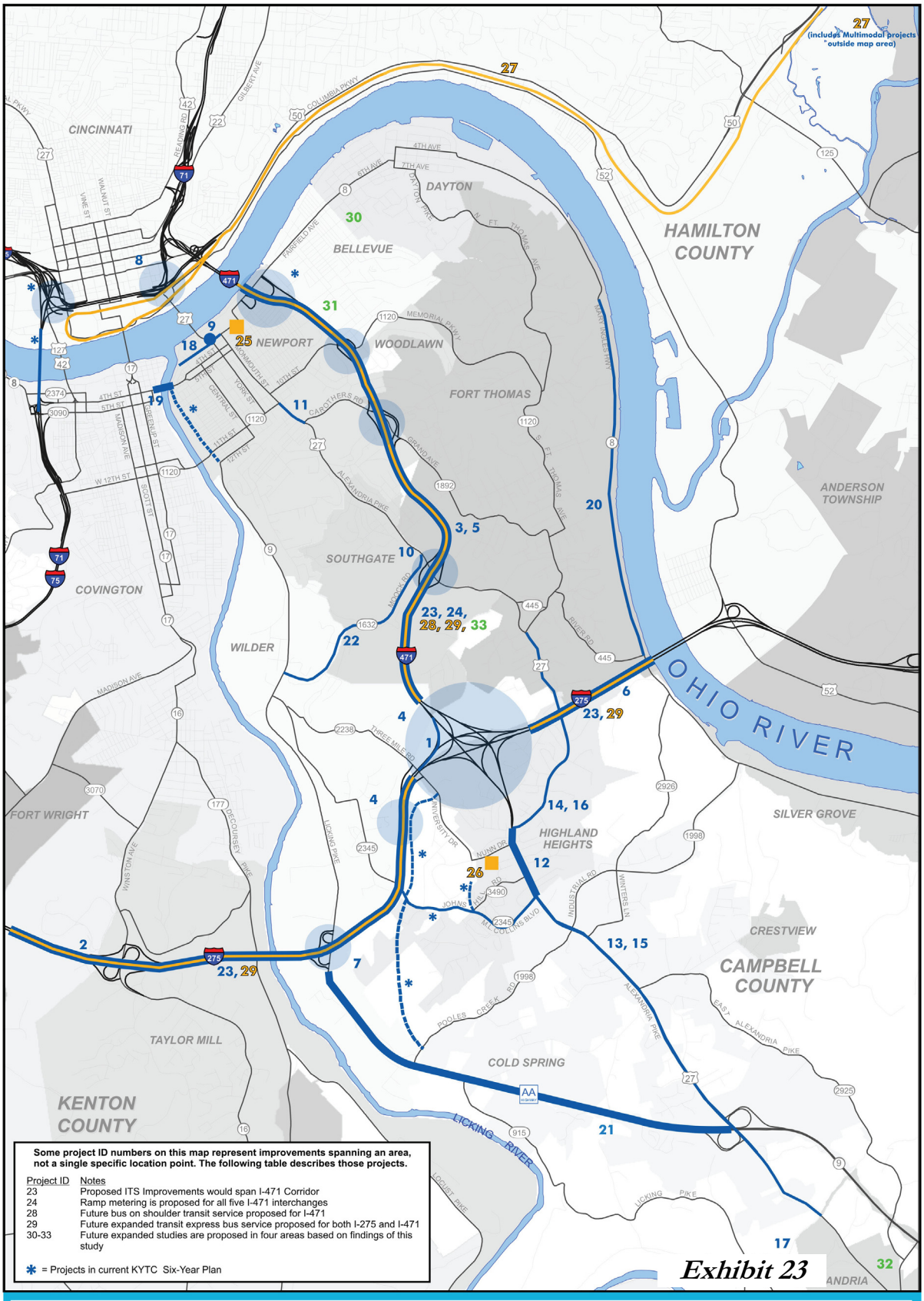
The PMT included the recommendation for the installation of the non-traversable median for advancement to the I-471 Corridor Plan recommendations. Further study and design is needed to determine the construction requirements for this recommendation, including median width, left turn lane length and location, potential for mid-block u-turn provisions, drainage and right-of-way requirements.

Roadway Recommendations

Table 11 lists 22 roadway improvement recommendations for incorporation into the I-471 Corridor Plan. Exhibit 23 depicts the full I-471 Corridor Plan including the locations of these Roadway recommendations by reference to the map identification number in the left column of the table.

Table 11: Recommended Plan: Roadway Recommendations

Map Id. #	Project	Description
Roadway Recommendations: Interstate		
1	**Ramp from I-471 Southbound to I-275 Westbound**	Widen ramp one additional lane to provide increased capacity.
2	**I-275**	Add one lane in each direction from I-75 to AA Highway.
3	**I-471 mainline and interchanges at Memorial, Grand and US 27**	Widen one lane in each direction from I-275 to Ohio state line and upgrade three interchanges.
4	**I-471 / I-275 interchange**	Upgrade I-471 / I-275 interchange, including I-275/NKU access enhancements. Due to inadequate spacing, the Three Mile Road partial interchange would be eliminated when I-471 / I-275 is upgraded.
5	**I-275 and I-471**	Expand ARTIMIS capability along I-275 and I-471, upgrading equipment and adding fiber optic cable, cameras and detectors.
6	**I-275**	Add one lane in each direction from AA Highway to Ohio state line.
7	**I-275 / KY 9 Interchange**	Reconstruct interchange for safety and capacity improvements.
8	**Taylor Southgate Bridge approach (north)**	Reconfigure Taylor Southgate / 3rd Street (Kentucky approach) and I-71 southbound left turn to Broadway (Ohio approach) to improve bridge access.
9	**Taylor Southgate Bridge approach (south)**	Provide new KY 9 connection through Ovations property and bridge approach intersection.
10	**I-471 / US 27 interchange** - southbound exit ramp	Reconfigure southbound off ramp to US 27 westbound to improve safety to Moock Road access.
Roadway Recommendations: Arterials		
11	**US 27**	Reconstruct US 27 from KY 1892 (Carothers Road) to KY 1120 (11th Street); including sidewalks on the east side of US 27.
12	**US 27**	Add one lane in each direction from KY 2345 (Martha Layne Collins Blvd.) to I-471.
13	**US 27**	Implement traffic signal optimization from Sunset Avenue to Meijer entrance - Highland Heights and Cold Spring.
14	**US 27**	Sunset to KY 1120: Three lane conversion (KYTC completed September 2008 by re-surfacing to include re-striping to 3 lane).
15	**US 27**	Sunset to AA Highway: implementation of non-traversable median with mid-block U-Turns at some locations.
16	**US 27**	Implement Crowell to AA Highway access management plan recommendations.
17	**Access Management Policy**	Develop Access Management Policy Countywide for future guidance on new access.
18	**KY 8**	Realign KY 8 from the Veterans Memorial (4th Street) Bridge to US 27.
19	**KY 8**	Add three lanes to Veterans Memorial Bridge to provide three lanes in each direction.
20	**KY 8**	Reconstruction from Tower Hill Road to KY 445.
21	**KY 9**	Add one lane each direction from I-275 to US 27.
22	**KY 1632 (Moock Road)**	Reconstructed KY 1632 from KY 9 to US 27.


27
(includes Multimodal projects outside map area)
CINCINNATI
DAYTON
BELLEVUE
NEWPORT
WOODLAWN
FORT THOMAS
HAMILTON COUNTY
ANDERSON TOWNSHIP
SOUTHGATE
COVINGTON
WILDER
OHIO RIVER
FORT WRIGHT
HIGHLAND HEIGHTS
SILVER GROVE
CRESTVIEW
CAMPBELL COUNTY
TAYLOR MILL
COLD SPRING
KENTON COUNTY
LICKING RIVER
30
31
8
9
18
25
11
19
20
3, 5
10
23, 24, 28, 29, 33
22
4
1
6
23, 29
14, 16
12
26
2
7
13, 15
21
17
32
Some project ID numbers on this map represent improvements spanning an area, not a single specific location point. The following table describes those projects.
Project ID Notes
23 Proposed ITS Improvements would span I-471 Corridor
24 Ramp metering is proposed for all five I-471 interchanges
28 Future bus on shoulder transit service proposed for I-471
29 Future expanded transit express bus service proposed for both I-275 and I-471
30-33 Future expanded studies are proposed in four areas based on findings of this study
* = Projects in current KYTC Six-Year Plan
Exhibit 23
I-471 Corridor Study
OKI
Ohio · Kentucky · Indiana
Regional Council of Governments
Study Area
OKI Eight County Region
Legend
Road Improvement
Major Widening
New Road
Improved / Upgraded Interchange
Improved Intersection
Transit Hub
Transit Improvement
Roadway Improvements
Transit Improvements
Areas of Future Study
I-471 Corridor Plan
March 2008
0 0.25 0.5 1 Mile
Source: OKI GIS, 2006

INTELLIGENT TRANSPORTATION SYSTEMS ENHANCEMENT

An important, potentially invaluable transportation tool for improved congestion management and safety is the expansion and increased use of ITS, intelligent transportation systems. Currently, the Advanced Regional Traffic Interactive Management and Information System (ARTIMIS) is in use along Fort Washington Way, I-275 and I-471 in the project corridor and immediate vicinity. This system is the first ITS in the nation to operate seamlessly across state boundaries. In the I-471 Corridor, expansion of ARTIMIS is already underway to add two additional ARTIMIS closed circuit cameras, one at the I-471 /I-275 interchange and one above the US 27 bridge over I-275.

Additional improvements and enhancements of the existing ITS have great potential to assist in short- and mid-term traffic management, and may be especially useful in helping to handle the anticipated traffic diversion in this corridor when the Brent Spence Bridge replacement is under construction (see Part 2, Table 7 and discussion of the forecasted extent of the traffic diversion).

Development of Intelligent Transportation System (ITS) Options

ITS technologies provide four primary functions:
- Motorist information (dynamic signing, radio alerts)
- Incident management (monitoring, dispatch)
- Traffic management (ramp metering, pricing, speed sensors)
- Planning (volume sensors, weather sensors)

Table 12 depicts the ITS options that may have potential application in the I-471 Corridor Plan. All of these technologies are in use in other areas of the country and the world, while several are in use in this region.

Table 12: ITS Technology with Potential Application in I-471 Corridor

ITS Technology	Description
Fiber Optic Communication Path	Dedicated, physical communications path
Wireless Communication Path(s)	Dedicated wireless communications to devices
Traffic Sensors	Provides traffic volume/speed data
Closed Circuit TV Coverage (CCTV)	Video monitoring of roadways
Large Dynamic Messaging Signs (DMS)	Signs over freeway – provides route guidance
Small Dynamic Messaging Signs (DMS)	Signs on arterials – provides route guidance
Wide Area Highway Advisory Radio (HAR)	Common radio message through region
Localized Highway Advisory Radio (HAR)	Specialized messages for events, work areas, etc.
WIZARD (CB radio alert broadcasts)	Broadcasts warnings, etc. over CB 19 during dead air
511	Phone system containing traffic conditions
Ramp Metering	Controlled access to freeways

Table 13: Other ITS Technology Considered

ITS Technology	Description
Traffic Signal Coordination	Arterials signals at interchanges adjusted based on need
VSLS (variable speed limit signing)	Variable speed limit sign
Video Analytics	Software analyzes video and triggers alarms, functions
RWIS (Road Weather Information Systems)	Gathers weather and pavement data
Automated Gates	Automated physical barriers at interchanges to prevent access
Congestion Pricing	Road use fees based upon time of day to smooth out peaks
Direct Vehicle Interface	Vehicles interact with infrastructure automatically

Table 13 displays some other ITS technology that were considered for potential use in the I-471 Corridor, but were determined not suitable at this time. These techniques are in use in other areas of the United States, and although not recommended at this time, may have some future application in this region.

I-471 Corridor Plan ITS Recommendations

ARTIMIS is dependent on field devices for acquiring traffic data and disseminating traveler information. For ARTIMIS to support traffic flow throughout the corridor, the following freeway management system components are recommended. Some of these technologies currently exist as part of the ARTIMIS system.

Recommended improvements or enhancement to the existing ARTIMIS ITS include (Exhibit 24 depicts the existing and recommended ITS components and Table 14 lists the Plan recommendations):

Install Fiber Optics
The primary communications means for ARTIMIS is fiber optics in a ring topology. The addition of fiber optics along I-471 and I-275 will permit a full ring to be established to provide more efficient communication. In areas where fiber optics is not installed, wireless or telephone circuits will be required to link back to the ARTIMIS Operations Control Center (OCC).

Add Traffic Sensors
Several technologies exist in ARTIMIS for gathering traffic data (i.e., volume, speed, and occupancy). Currently in the I-471 corridor, there are six traffic sensors. Two additional sensors are recommended to be strategically placed on either side of the Ohio River to aid in detecting and monitoring recurring congestion in that area.

Increase Closed Circuit TV (CCTV) Coverage
ARTIMIS currently monitors CCTV cameras through the corridor to provide operators a visual indication of traffic and incidents on the roadways. Cameras support full motion, color video capability. The absence of fiber requires black and white images at reduced resolution to be sent over phone circuits using compressed video. All cameras allow pan/tilt/zoom control from the operator's console. ARTIMIS currently operates five cameras along the study area (with two additional under installation now) and recommends the addition of five to seven cameras, strategically placed to improve monitoring capabilities.

Add Highway Advisory Radio
ARTIMIS currently operates three Highway Advisory Radio (HAR) stations. Only authorized personnel have the permissions necessary to modify HAR messages. During normal operations, HAR transmissions consist of pre-programmed English messages in a human generated voice. For incident management activation, authorized personnel have the capability to record a new message for any HAR station, and send the message(s) to the HAR. Once an incident is cleared and the system has returned to normal, the incident related message is removed and the pre-programmed messages resume.

There is a master HAR station at I-75 and I-275 in Ohio and two slave stations, one at I-275 and I-71/75 in Kentucky, the other at I-71 and Red Bank. The same message is broadcast simultaneously from all stations. The power of the transmitters is such that there is optimum coverage of the entire region within the I-275 beltway and along the major freeways coming into the area. For the I-471 corridor, a low-wattage unit is recommended to be placed near the Ohio River to provide information specific to this area.

Add Dynamic Message Signs (DMS)
ARTIMIS currently controls seven large DMS in the immediate study area and two others that impact the study area. Of those nine signs, two are intended for traffic leaving the study area. No additional large DMS are recommended. There are currently no small DMS in the area. However, in the area of the Ohio River, up to three small DMS should be added. More information is provided in the Ramp Monitoring discussion.

Implement Ramp Monitoring
A combination of technologies is recommended to help manage recurring congestion in the area of I-471 and the Ohio River. Installation of traffic sensors on the I-471 southbound exit ramps to KY 8 can be set to monitor for stopped traffic. An automated system should be designed to activate a message on a small DMS on the North side of the river that states "KY 8 Ramp Full". The same configuration should be installed on the northbound exit ramp to Fort Washington Way, with a sign on the south side of the river. An automated system should be designed to activate a message that states "Ft Wash Ramp Full". This messaging would advise drivers to seek an alternative route, which would relieve the demand on the ramp and more quickly restore traffic flow on the interstate.

This improvement could be implemented in the near term, well before the KY 8 interchange improvements under study will be implemented.

Increase Freeway Service Patrols
Freeway Service Patrol hours are recommended to be increased for the Corridor. Presently, the patrols operate only during the peak hours in the morning and evening. The hours should be increased to be commensurate with the other routes which run from 6 AM to 7 PM Monday through Friday.

Ramp Metering
Ramp meters should be explored for all I-471 entrance ramps as a short and long term congestion management solution

Further discussion of the benefits of ramp metering, particularly to address short- and mid-term needs, is included later in this report, in the section entitled, *2015 Plans to Address Brent Spence Bridge Reconstruction Impact.*

Table 14: Recommended Plan: Intelligent Transportation Systems (ITS) Recommendations

Map Id. #	Project	Description
Intelligent Transportation Systems (ITS) Recommendations		
23	**I-471 and I-275**	Package (fiber optics, additional messaging signs, incident management upgrades); these ITS improvements are in addition to those in Project #5.
24	**I-471 interchanges**	Ramp Metering (potential short and long term implementation)

TRANSIT IMPROVEMENTS

Increased transit ridership can reduce congestion and improve travel safety by helping to decrease the number of vehicles on the roadway network. With close to three million riders annually, buses currently provide service for an important share of the existing travel demand in and through the I-471 Corridor. The recent TANK Network Study (2006) recommended the investigation of increased or enhanced bus service, specifically the potential for buses on shoulders, bus rapid transit (BRT) or buses on separate transitways in the I-471 Corridor.

The considerations of transit improvement options followed the direction set by the TANK Network Study:

- Build on existing bus service
  - TANK bus routes, Southbank Shuttle, and park-and-ride lots; and
- Build on previous plans and the TANK Network Study recommendations: hubs, airport service, transitways.

The transit improvement recommendations are focused on bus service expansion and improvement, including increased express bus service, shoulder bus lanes, on I-471 and I-275, transit hubs, and park and ride lots. Bus on shoulder, high occupancy vehicle (HOV) lanes and dedicated transitways will require widening and reconstruction of the interstates. While other transit alternatives, such as light rail, may have application in this region in the future, the appropriate population density needed to support light rail type transit is not present nor projected in this study area. For that reason, bus technologies for service expansion and enhancement were identified in the TANK Network Study as the improvements and options recommended for continued study.

These improvements need to focus on issues that will foster increased transit ridership in the corridor by improving access and mobility, which will ultimately reduce single occupancy vehicle demand on the existing transportation network.

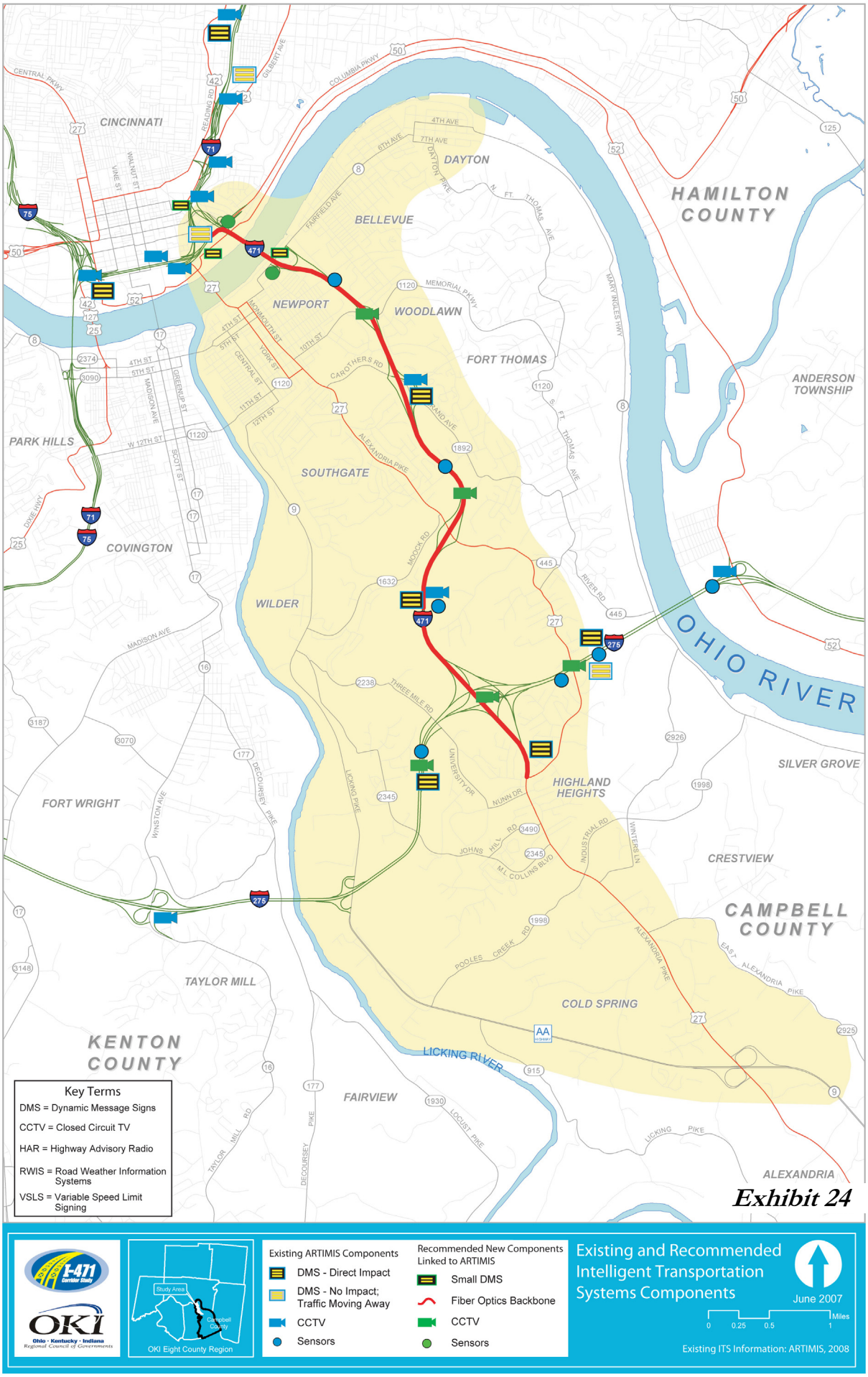

CINCINNATI
DAYTON
BELLEVUE
NEWPORT
WOODLAWN
FORT THOMAS
HAMILTON COUNTY
ANDERSON TOWNSHIP
PARK HILLS
SOUTHGATE
COVINGTON
WILDER
OHIO RIVER
SILVER GROVE
HIGHLAND HEIGHTS
FORT WRIGHT
CRESTVIEW
CAMPBELL COUNTY
TAYLOR MILL
COLD SPRING
KENTON COUNTY
FAIRVIEW
LICKING RIVER
ALEXANDRIA
Key Terms
DMS = Dynamic Message Signs
CCTV = Closed Circuit TV
HAR = Highway Advisory Radio
RWIS = Road Weather Information Systems
VSLS = Variable Speed Limit Signing
I-471 Corridor Study
OKI
Ohio · Kentucky · Indiana
Regional Council of Governments
Study Area
Campbell County
OKI Eight County Region
Existing ARTIMIS Components
DMS - Direct Impact
DMS - No Impact; Traffic Moving Away
CCTV
Sensors
Recommended New Components Linked to ARTIMIS
Small DMS
Fiber Optics Backbone
CCTV
Sensors
Existing and Recommended Intelligent Transportation Systems Components
June 2007
0 0.25 0.5 1 Miles
Existing ITS Information: ARTIMIS, 2008

Exhibit 24

Preliminary Bus Use of Shoulder Feasibility

The success experienced in bus use of shoulder in many metropolitan areas, including the most recent implementation in the I-71 Kenwood to Kings Island corridor just north of Cincinnati, warrants further investigation of this technique for application in the I-471 corridor. However, an investigation of current

Bus on shoulder has demonstrated success in many states (Minnesota depicted here), including in the I-71 corridor in Cincinnati.

Existing shoulders on I-471 are not suitable for bus travel due to narrowness and insufficient structural capability to handle continuous traffic.

Exhibit 25: Long Range Transit Option: Bus on Shoulder

physical conditions of the shoulders in the I-471 Corridor found that this option is not feasible for immediate implementation. Several issues and concerns must be addressed before this technique could be implemented.

Engineering Issues:

- The existing I-471 shoulders have not been constructed to accommodate regular use by large vehicles, such as buses. Most buses are 8.5 feet wide (10 feet with mirrors). Existing paved shoulder widths for the outside (right) emergency lane along I-471 vary, ranging between as narrow as 4 feet (bridge sections) and as wide as 12 feet. A general travel lane of less than 12 feet is not desirable. The inside (left) shoulder is primarily 10 feet wide. Concrete barrier and guardrail also exists throughout the length of I-471 further limiting the useful width for bus travel.

- Existing drainage cross slope of the shoulder is not designed for travel lane use.
- In many cases, the super elevation ends in the middle of the existing shoulder lane and would need to be modified for use as a bus lane.
- The pavement design and structure of the shoulder is not compatible for travel lane use. Based on discussions with KYTC, the shoulder pavement has not been designed to the same strength and thickness as the general traffic lane pavement.
- I-471 median is below current interstate standards, practically non-existent in some areas, which affects the ability to widen the freeway for shoulder use.

Cost Issues:

- Widening the shoulders only is not a realistic option, in that it would constitute major reconstruction of the interstate, especially since I-471 is elevated along a substantial portion of its length.

Operational and Traffic Safety Issues:

- For inside shoulder use, station stopping (a mode of bus operation on freeways where buses on a route make stops at most interchanges along the corridor) would be difficult to achieve due to the need for the bus to weave across travel lanes to exit the highway. For that reason, express bus service would function best on I-471. The recently implemented bus on shoulder demonstration project by Metro on I-71 in Cincinnati (between Kenwood and Kings Island) operates on the inside shoulder but is utilized for longer express routing.
- Use of outside shoulders requires care to avoid conflicts at on- and off-ramps, which may require the bus to merge back into general travel lanes.
- The establishment of good operating protocols, training of bus drivers, and good signage also is needed to minimize safety issues.

Legal and Enforcement Issues:

- Based on previous discussions with study team participants, TANK and KYTC, legislation needs to be introduced at the state level to allow the use of shoulders for public transit along freeways.
- Permitting only buses to use shoulders for travel while general purpose vehicles are slowed or stopped may present enforcement issues. Without enforcement, abuses are inevitable. Implementation of bus use shoulders needs to include a framework to enforce regulations.

The issues and concerns summarized above would need to be addressed before implementation of bus use of shoulder on I-471. Interstate widening, one of the roadway plan recommendations, would allow for these issues to be addressed in

the design of that improvement. The Metro service operating on I-71 provides a good source of study for future consideration in northern Kentucky. Metro has reported very positive public response on the I-71 experience (although any ridership increase directly attributable to this service has not been determined). The PMT has recommended including the further exploration of the bus on shoulder potential in the I-471 Corridor.

Other Transit Options Explored

Other potential transit improvement options were reviewed during this planning study. Although other future options such as the following may merit more detailed feasibility study in the future, these options were not included in the transit recommendations for the Corridor Plan:

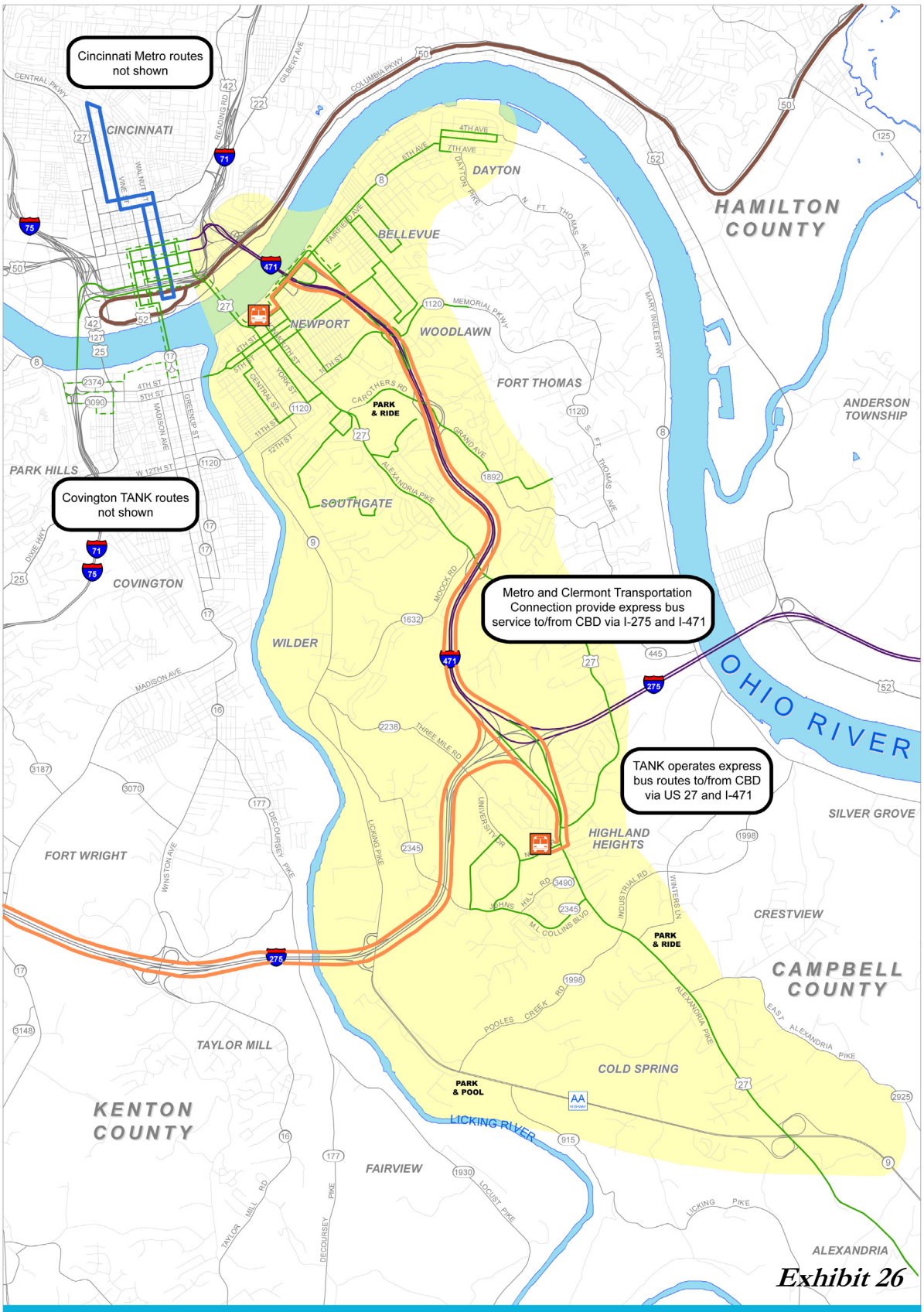
- Transitways / Busways
- HOV Lanes or Managed Lanes
- Bus Shoulder Lanes (on a separate lane adjacent to the shoulder)
- Bus Lanes on Arterials
- Transit Priority Treatments / Smart Corridors

These concepts are deemed either not feasible now or considered beyond the scope of this Corridor Planning effort. Future transit feasibility planning activities will need to revisit some of these options. The major objective of the transit feasibility study is to identify significant transit alternatives that meet the needs of the study area and which should be advanced for implementation. Major improvements would be subject to more detailed alternatives analysis, environmental impact assessment, as well as detailed fiscal and financial plan development.

Table 15 lists transit recommendations for consideration (see Exhibit 26):

Table 15: Recommended Plan: Transit or Multi-modal Recommendations

Map Id. #	Project	Description
Transit or Multi-modal Recommendations		
25	**Newport Transit Center**	New transit hub and circulator service in the vicinity of Monmouth and Third Streets.
26	**NKU Transit Center**	New transit hub and circulator serving NKU and connecting routes.
27	**Eastern Corridor Multi-modal Projects**	Multi-modal improvements between Eastgate and I-71 including new highway, passenger rail and bus transit components.
28	**I-471 Bus on Shoulder (requires interstate re-construction)**	With the I-471 additional lane in each direction (US 27 to Ohio River), full shoulders would be constructed which would allow for future transit on shoulder use
29	**Express Route service I-275 and I-471**	Promotion of existing express bus routes on I-471 and I-275 (TANK, METRO, and CTC).


Cincinnati Metro routes not shown
Covington TANK routes not shown
Metro and Clermont Transportation Connection provide express bus service to/from CBD via I-275 and I-471
TANK operates express bus routes to/from CBD via US 27 and I-471
CINCINNATI
DAYTON
BELLEVUE
NEWPORT
WOODLAWN
FORT THOMAS
HAMILTON COUNTY
ANDERSON TOWNSHIP
PARK HILLS
SOUTHGATE
COVINGTON
WILDER
OHIO RIVER
SILVER GROVE
HIGHLAND HEIGHTS
FORT WRIGHT
CRESTVIEW
CAMPBELL COUNTY
TAYLOR MILL
COLD SPRING
KENTON COUNTY
FAIRVIEW
ALEXANDRIA
LICKING RIVER
PARK & RIDE
PARK & POOL
Exhibit 26
Existing
TANK Routes
Express Bus Routes TANK, Metro and CTC
Southbank Shuttle
Proposed
Express Bus Service
Cincinnati Streetcar
Eastern Corridor Oasis Line
Transit Hub
Recommended Transit Improvements (includes continuation of existing bus service)
March 2008
Miles
0 0.25 0.5 1
Existing service information: Transit Authority of Northern Kentucky, Metro, Clermont Transportation Connection and OKI, 2007-8
OKI Eight County Region
Study Area
Campbell County
Ohio - Kentucky - Indiana Regional Council of Governments

RECOMMENDATIONS FOR FURTHER STUDIES

In addition, several important recommendations deal with the need for more detailed studies to address issues and concerns identified in this Corridor Plan. These additional studies are either beyond the scope and schedule of the Corridor Study or are subject to other actions or studies not yet complete in the area. Table 16 lists the recommendations for future studies (Exhibit 23 also indicates the locations of these recommendations).

During the course of this Corridor Study, the southern banks of the Ohio River have witnessed considerable development, as wall as recent announcements of additional development scheduled for the near future. The current primary street connection to this development area is KY 8. Recognizing the existing traffic congestion now increasing, a traffic / access management study needs to be initiated. The PMT included the further study of KY 8 from Bellevue through Dayton as a recommendation of the I-471 Corridor Plan.

The schedule of the KY 8 / I-471 project and the array of alternatives currently under consideration prevented a focused assessment of the need for potential changes to the existing street system surrounding the interchange. Depending on the final configuration of the interchange improvement, reconnections to and from I-471 may have a significant effect on traffic operations on the street network that will need to be addressed. For that reason, the PMT included the further traffic study of Northern Campbell County, particularly in the Newport, Bellevue, Fort Thomas areas surrounding the KY 8 interchange area, as an I-471 Plan recommendation.

The US 27 Access Management Plan substudy of this Corridor Plan demonstrated the benefits of access management and the need to address these issues elsewhere in the study area. Besides the recommended further study of KY 8 mentioned above, the PMT included the recommendation of an access management study for the other area experiencing new growth and development, southern Campbell County, immediately south of the I-471 Corridor Study area's southern boundary, the AA Highway.

Beyond the Transit recommendations included in Tables 15, the Corridor Study explored the potential for bus on shoulder and even future high occupancy vehicle (HOV) lanes on I-471. However, both of these options would require reconstruction of the interstate to create the needed pavement widths to accommodate these kinds of improvements. The Plan includes the recommendation for further study of both options to be conducted alongside the necessary planning and engineering studies that would be completed to advance the recommendation of the widening I-471.

Table 16: Recommended Plan: Further Studies Recommended

Map Id. #	Project	Description
Recommended to advance for future detailed study		
30	**KY 8 Traffic / Access Management Studies**	KY 8 through Bellevue and Dayton
31	**Northern Campbell County Traffic Study**	Review of surface street connection needs: Riviera, Donnermeyer, 6th Street (after I-471 / KY 8 Interchange Project recommendation determined)
32	**Southern Campbell County Access Management study**	Access Management study of US 27, south of AA Highway / US 27
33	**Long Range Transit HOV and Bus on Shoulder study**	Study potential for High Occupancy Vehicle (HOV) lanes during peak hours and Bus on interstate shoulder when I-471 additional lanes recommendation implemented

FINAL PRIORITIZATION

Stakeholder input was solicited from the PMT, the Advisory Committee and the public on setting priorities for advancing the identified recommendations to the next steps toward implementation. Combining the limitations of current state and federal funding resources for transportation, the uncertainty of future levels uncertain, and the increasing costs of construction, the competition for funding for worthwhile, needed projects has greatly increased in recent years. In addition, the OKI 2030 Long Range Plan is federally mandated to be fiscally constrained, meaning that the projected costs for the region's transportation plans must be within the projected revenues. For these reasons, the I-471 Corridor Plan stakeholders were asked to prioritize the Plan recommendations. Specifically, a high, medium, or low ranking was requested for each of the 33 recommendations that make up the Plan. Three projects: the US 27 Signal Optimization Plan, the three lane conversion of US 27 and the Eastern Corridor Multi-modal Projects, were included in the list of 33 recommendations and the prioritization ranking even though these projects are already advancing. Their inclusion does not have an adverse effect on the ranking of the other projects.

A consensus ranking for each recommendation was determined from the input received. Tables 17 -19 display the prioritization results. Each recommendation was ranked, High, Medium and Low. Within each priority category, no further ranking was determined. The listings are ordered by the Map Identification Numbers (lowest first) to facilitate reference to Exhibit 23, the I-471 Corridor

Plan. It should also be noted that although cost data is included in these tables, the development of the Plan alternatives, recommendations, and prioritization was completed without consideration of costs. This process was deliberately followed to ensure that projects and proposals that make up the I-471 Corridor Plan and the prioritization reflected stakeholder preference based on benefit in terms of identified transportation needs and the ability to address project goals. Further discussion of cost estimating follows the prioritization tables.

Table 17: High Priority Recommendations

Map Id. #	Project	Cost ($)	Year
1	**Ramp from I-471 Southbound to I-275 Westbound widening** Add one lane to ramp to provide increased capacity	**10,530,000**	**2015**
4	**I-471/I-275 Interchange improvement** I-471/I-275 interchange upgrade, including I-275/NKU access enhancements	**288,592,000**	**2030**
5	**I-275 and I-471 ITS expansion** Expand ARTIMIS capability along I-275 and I-471, upgrading equipment and adding fiber optic cable, cameras and detectors	**2,690,000**	**2015**
7	**I-275/KY 9 Interchange improvement** Reconstruct interchange to address safety and capacity deficiencies	**35,100,000**	**2015**
8	**Taylor Southgate Bridge Approach (north) improvement** Taylor Southgate/3rd St. reconfiguration and I-71 southbound left turn to Broadway improvement	**119,000**	**2015**
9	**Taylor Southgate Bridge approach (south) improvement** New KY 9 connector through Ovations property	**12,220,000**	**2015**
13	**US 27 improvement** Traffic Signal Optimization from Sunset to Meijer entrance	**- - -**	**2008**
14	**US 27 improvement** Sunset to KY 1120: three lane conversion	**- - -**	**2008**
18	**KY 8 improvement** Realign KY 8 from Veterans Memorial (4th Street) Bridge to US 27	**3,980,000**	**2015**
26	**NKU Transit Center** New transit hub and circulator serving NKU and connecting routes	**2,340,000**	**2015**
30	**KY 8 Traffic/Access Management Studies** KY 8 through Bellevue and Dayton	**104,000**	**2009**
31	**Northern Campbell County Traffic Study** Review of surface street connection needs	**156,000**	**2009**

Notes for Table 17:

- Costs were estimated in 2008 values and then adjusted to the potential year of implementation.
- For each recommendation, a year of potential implementation was estimated. This year was then used to adjust 2008 cost estimates for annual inflation to the year of implementation to provide costs for planning and programming.
- Cost are not shown for Recommendations #13 and 14, since these projects are already underway by the Kentucky Transportation Cabinet.

Table 18: Medium Priority Recommendations

Map Id. #	Project	Cost ($)	Year
2	**I-275 widening** Additional 2 lanes from I-75 to AA Highway	**204,000,000**	**2030**
3	**I-471 mainline and interchange at Memorial, Grand and US 27 improvements** Major widening for 2 additional lanes from I-275 to Ohio state line, including upgrades of three interchanges	**151,238,000**	**2030**
10	**I-471/US 27 Interchange re-configuration** Re-configuration of southbound off ramp to US 27 westbound to improve Moock Road access	**257,000**	**2015**
12	**US 27 widening** Major widening from KY 2345 (Martha Lane Collins Boulevard) to I-471	**32,900,000**	**2030**
15	**US 27 improvement** Sunset to AA Highway; implementation of non-traversable median with mid-block U-turns at some locations	**1,930,000**	**2030**
16	**US 27 improvement** Crowell to AA Highway; access management recommendations	**1,369,000**	**2030**
17	**Access Management Policy Implementation**	**62,000**	**2009**
19	**KY 8 bridge widening** Veterans Memorial (4th Street) Bridge widening to 6 lanes	**26,840,000**	**2030**
24	**ITS I-471 Interchanges improvement** Ramp metering	**1,369,000**	**2015**
25	**Newport Transit Center** New transit hub and circulator service in the vicinity of Monmouth and Third Streets	**2,340,000**	**2015**
28	**I-471 bus on shoulder** With the I-471 additional lane in each direction, full shoulders would be constructed which would allow for future transit on shoulder use	**246,000**	**2030**
29	**Express route service I-275 and I-471** Promotion of existing express bus routes on I-471 and I-275 (TANK and Metro)	**684,000**	**2015**
33	**Long Range Transit: HOV and Bus on Shoulder Study** Study potential for HOV lanes during peak hours and bus on interstate shoulder when I-471 additional lanes recommendation implemented	**62,000**	**2009**

Notes for Table 18:

- Costs were estimated in 2008 values and then adjusted to the potential year of implementation.
- The cost estimate for Recommendation #16 is based on a preliminary estimate for the implementation of the recommendations of the US 27 Access Management Plan substudy such as access consolidation, driveway changes and service roads. As noted in that study, many of the costs of access improvements for new or re-developing properties can be absorbed by the private property owner if coordinated early in the developer's site planning process. In that way, the design and construction of access points and service roads consistent with the access management policy guidelines can often be completed without additional cost to the developer over what would have been spent for access anyway (regardless of design).

Table 19: Low Priority Recommendations

Map Id. #	Project	Cost ($)	Year
6	**I-275 widening** Major widening for 2 additional lanes from AA Hwy to Ohio state line	**69,270,000**	**2030**
11	**US 27 improvement** Reconstruction from KY 1892 (Carothers Rd) to KY 1120 (11th St.) including sidewalks on the east side of US 27	**14,460,000**	**2030**
20	**KY 8 improvement** Reconstruction from Tower Hill Road to KY 445	**32,660,000**	**2030**
21	**KY 9 widening** Major widening from I-275 to US 27	**31,590,000**	**2015**
22	**KY 1632 (Moock Road) widening** Reconstruction from KY 9 to US 27	**33,710,000**	**2030**
23	**ITS I-471 and I-275 improvement** Fiber optics, additional messaging signs, incident management upgrades	**161,000**	**2015**
27	**Eastern Corridor Multimodal Projects** Multimodal improvements between Eastgate and I-71 including new highway and transit components	**1,300,000,000**	**2030**
32	**Southern Campbell County Access Management Study** Access management study of US 27, south of AA Highway/US 27	**104,000**	**2009**

Notes for Table 19:

- Costs were estimated in 2008 values and then adjusted to the potential year of implementation.
- Recommendation #27 is for proposed transportation benefits outside the I-471 Corridor study area.

COST ESTIMATES FOR RECOMMENDED I-471 CORRIDOR PLAN

While the development of the Plan alternatives, recommendations, and prioritization was completed without a full consideration of costs, capital costs are a critical factor in the implementation of these recommendations. In fact, cost estimates are required to advance recommendations to OKI's fiscally constrained long range plan. Preliminary cost estimates have been developed for the Plan components and are displayed in Table 20. For the purposes of providing the most accurate estimate possible, the cost estimates were calculated in current dollar value and adjusted for future costs based on an estimate of the year each project could conceivably be implemented. This estimated year of expenditure is for planning purposes only; many factors will ultimately affect the timing of implementation including local and regional prioritization, funding sources and availability. An inflation factor of 4% per year was then applied to the 2008 costs.

Cost estimates include construction and contingencies, but do not include costs for right-of-way, utilities, environmental studies, and any impact mitigation that may be required. Although these additional costs can be significant, these associated project costs cannot be accurately determined at this stage of planning.

Table 20: Cost Estimates for I-471 Corridor Plan Recommendations

Estimated Year	I-471 Corridor Plan Recommendation	Cost ($)	Road	Transit	ITS	Further Studies	Outside study area*
High Priority Recommendations							
2008-09	Recommendations #13,14,30,31	260,000	**			260,000	
2015	Recommendations #1,5,7,8,9,18,26	66,979,000	61,949,000	2,340,000	2,690,000		
2030	Recommendation #4	288,592,000	288,592,000				
Subtotal High Priority Recommendations		355,831,000	350,541,000	2,340,000	2,690,000	260,000	
Medium Priority Recommendations							
2008-09	Recommendations #17,33	124,000				124,000	
2015	Recommendations #10,15,16,24,25,29	7,949,000	3,556,000	3,024,000	1,369,000		
2030	Recommendations #2,3,12,15,16,19,28	415,224,000	414,978,000	246,000			
Subtotal Medium Priority Recommendations		423,297,000	418,534,000	3,270,000	1,369,000	124,000	
Low Priority Recommendations							
2008-09	Recommendation #32	104,000				104,000	
2015	Recommendations #20,21,22,23	98,121,000	97,960,000		161,000		
2030	Recommendations #6,11,27	1,383,730,000	83,730,000				1,300,000,000
Subtotal Low Priority Recommendations		1,481,955,000	181,690,000		161,000	104,000	1,300,000,000
I-471 Plan (all recommendations)							
2008-09	Recommendations #13,14,17,30,31,32.33	488,000				488,000	
2015	Recommendations #1,5,7,8,9,10,15,16,18,20,21,22,23,24,25,26,29	173,049,000	163,465,000	5,364,000	4,220,000		
2030	Recommendations #2,3,4,6,11,12,19,27,28	2,087,546,000	787,300,000	246,000			1,300,000,000
Total I-471 Plan Recommendations		$2,261,083,000	$950,765,000	$5,610,000	$4,220,000	$488,000	$1,300,000,000

* = Eastern Corridor Multi-modal Projects includes both roadway and transit improvements.

** = Cost for Recommendations # 13 and 14 not included since these two projects are already underway by KYTC.

The Brent Spence Bridge reconstruction in 2015 will substantially restrict capacity at this Ohio River crossing.

2015 Plans to Address Brent Spence Bridge Reconstruction Impact

The Brent Spence Bridge reconstruction or replacement is expected in 2015. In anticipation of the disruption in I-75 / I-71 traffic during the construction period, plans to accommodate the diversion of traffic to alternate Ohio River bridges need to be developed now.

Although the I-471 Corridor Plan includes projects to address long range transportation needs to the year 2030, some of the recommendations can and should be considered for advanced implementation sooner to help address the traffic impacts during the Brent Spence Bridge construction period. Three projects are considered critical and feasible for short term implementation consideration: increased express bus service, ramp monitoring, and ramp metering.

Express Bus Service

Currently, TANK (Transit Authority of Northern Kentucky), Metro (Southwest Ohio Regional Transit Authority) and CTC (Clermont Transportation Connection) operate express bus routes on I-275 and I-471 through Campbell County. Increased bus service in the future will help handle increasing travel demands.

Ramp Monitoring

Ramp monitoring consists of using sensors and dynamic message signs to observe peak congestion periods and direct motorists to alternate routes. Monitoring could be of benefit at two locations on I-471, to better handle current traffic and future traffic while the Brent Spence Bridge undergoes reconstruction. These areas are (Exhibit 27 depicts ramp monitoring DMS and sensor locations):

- Southbound I-471, just north of KY 8, and
- Northbound I-471, just south of Fort Washington Way.
- A "Ramp Full" message would alert motorist to proceed to the next ramp to prevent stopped traffic backing up into the through lanes.

Ramp Metering

Ramp metering consists of using traffic signals on interstate entrances to regulate the timing of vehicles merging onto the highway. Ramp meters during peak hours can have significant benefits in accommodating more vehicles per hour on the

Exhibit 27: I-471 Ramp Monitoring North and South of Daniel Carter Beard Bridge

interstate, helping traffic move at a steadier speed, shortening commute times, and providing a higher degree of safety.

Ramp metering has been successfully employed in over 4,000 U.S. locations, including the Columbus, Ohio location depicted here.

Ramp metering has been used for over 40 years and is currently in use in over 30 metropolitan areas in the U.S., as well as in several cities around the world (there are over 4,000 ramps metered in the U.S.). Currently, ramp meters are in use in over 20 locations in Columbus, Ohio. The Ohio Department of Transportation is currently implementing a ramp metering project in this area at several ramps on I-74 west of Cincinnati (Colerain/Beekman, Montana and North Bend entrances). Equipment and signing installation is underway and this project is expected to be in operation later this year.

Recent case studies[23] in the United States have shown ramp metering has resulted in crash reductions of up to 50% and in travel time improvements (through improved interstate speeds) of 60%.

In developing the ITS recommendations for this I-471 Corridor Plan, quantifiable measures were developed to assess the potential benefits of various ITS improvement options, specifically ramp metering and dynamic messaging signs.

23 Sources for ramp metering benefit findings: City of Columbus, Ohio, 2008; Ohio, Minnesota and Georgia Departments of Transportation, 2001-08; Regional Transportation Commission of Southern Nevada, 2008; and the US Department of Transportation / Federal Highway Administration, 2005.

A planning tool developed for the Federal Highway Administration called IDAS, which stands for ITS Deployment Analysis System (IDAS), provides comparative data to evaluate the potential congestion management benefits of ITS investments such as reduction in hours of delay, in pollutant emissions and in vehicle crashes. Using data from the OKI Regional Travel Demand Model., the IDAS evaluation found positive benefit-to-cost ratios for both ramp metering and for additional DMS installation. The IDAS benefit-to-cost findings were:

- Pretimed Ramp Meters: 1.7 : 1
- Actuated Ramp Meters: 1.1 : 1
- Ramp Monitoring with Dynamic Message Signs: 99 : 1

These positive results were for the base year (existing conditions) and would be expected to be even more beneficial for the future years as traffic demand and congestion is projected to increase.

I-471 Corridor Plan Benefits: Achieving Goals

The thirty-three recommendations that comprise the I-471 Corridor Plan were developed with the intent to address the key goals defined at the study outset. The stated goals of I-471 Corridor Plan are:

- ☑ To improve mobility in developing and re-developing parts of the county;
- ☑ To improve regional accessibility and connectivity;
- ☑ To improve safety and reduce congestion;
- ☑ To improve air quality in the region;
- ☑ To enhance economic vitality; and
- ☑ To plan transportation consistent with, and capable of assisting in the realization of comprehensive plan visions in northern Campbell County.

Throughout this planning study, the PMT, the Advisory Committee and all stakeholders were reminded to keep these goals in mind in their consideration, evaluation and prioritization of proposed transportation improvements. Based on their participation, review and input during this study, every one of these recommendations has been advanced because of its ability to address these goals.

While measuring the Plan's success at meeting these goals is qualitative in many respects and the full assessment of their ultimate achievement awaits the results of implementation, some quantitative data, specifically in addressing congestion relief and the ability to improve air quality, has been developed. The goal of improving air quality is particularly important in this region due to existing conditions that have resulted in the Greater Cincinnati area being classified as in

"nonattainment" status for ozone and particulate matter pollutants.

The U.S. Environmental Protection Agency (USEPA) has classified six different compounds as criteria pollutants due to their potential to affect human health and the environment: carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide and inhalable particulate matter. In order to protect public health, the USEPA has established the National Ambient Air Quality Standards (NAAQS), which set the maximum allowable levels for each pollutant. If measured levels of the criteria pollutants are below the maximum allowable levels, the area is in attainment status. If levels rise above allowable amounts, the area is in nonattainment. The Greater Cincinnati area is in attainment status for all criteria pollutants except for ozone and particulate matter.

Decreasing congestion will directly result in improved air quality. Pollutant emissions associated with inefficient traffic flow and excessive idling of vehicles in stop and go traffic conditions (low levels of service, particularly LOS E and F) are reduced by transportation improvements that reduce congestion (improve level of service to D or higher). Most of the Plan recommendations are aimed at addressing congestion by improving levels of service through increasing travel speeds and reducing travel delay.

Quantifying the related air quality benefits in terms of reduction in pollutant emissions has not been specifically determined for each recommendation due to data limitations. However, the benefits of one of the key recommendations have been determined and illustrate the positive impact achievable. The US 27 Signal Optimization plan analyzed the peak hour signal timing and operations of thirteen signalized intersections between I-471 and the AA Highway. This one recommendation will result in over 14% reduction in vehicle emissions[24]. The three pollutants of interest are VOC's (volatile organic carbons), NOx (oxides of nitrogen), and PM2.5 (fine particulates); VOC and NOx are ozone precursors.

Other recommendations that will result in significant congestion relief and positive air quality benefit include: the US 27 conversion of four lane width to three lane width; the installation of non-traversable median along US 27; the interstate and interchange upgrades; the Intelligent Transportation Systems improvements; the expansion of express bus service; access management and future improvements such as bus on shoulder and HOV that could be accomplished with the upgrade of the I-471. Individually, each of these improvements will have a positive effect on reducing congestion with related air quality benefit; with the components of the Plan in combination, the effect will be

24 OKI derived pollutant emissions reduction benefit for the US 27 Signal Optimization improvements by determining the pollutant levels of VOC, NOx and PM2.5 before (existing) and after signal optimization at thirteen intersections addressed in the US 27 substudy. Reduction levels were calculated in pounds per day: 72.1 VOC; 38.98 NOx and 0.46 PM2.5; these reductions amount to a 14.4% reduction per day of each pollutant.

cumulative. National case studies have shown substantial congestion reduction benefits of 30% or more for improvements such as the converting a four lane, undivided roadway to three lanes and the installation of a non-traversable median. Similar levels of reduction have been found for many of the other improvements that have been incorporated into the I-471 Plan. A corresponding reduction in pollutants can also be expected with each of the congestion reducing recommendations.

Many of the recommendations are also directed toward improving safety. As mentioned earlier, improvements such as the US 27 conversion of four lanes to three lanes, the US 27 non-traversable median, the US 27 access management recommendations can have significant impact on reducing vehicular crashes by up to 60% according to national case studies of cities and counties where these kinds of improvements have been implemented. Likewise, there is a direct correlation between improved safety, in terms of reduction in crashes, and decreased congestion.

Part 4: Preliminary Interchange Modification Study

One of the first recommendations of the I-471 Corridor Plan was the determination to begin a study of needed transportation improvements at one of the I-471 interchanges south of the KY 8 interchange. In fact, an important task of the Phase I studies was to identify the interchange to advance to more in-depth study as Phase II of the Corridor study. In December 2007, the I-471 / I-275 interchange was selected by the Project Management Team based on its high service volumes, potential design and capacity needs and safety issues.

The Federal Highway Administration (FHWA) retains all approval rights to the control of access to the interstate system. This means that FHWA approval is required when access on the Interstate system is added or modified. Interchange reconfiguration or modification is considered to be a change in access even though the number of access points may not change.

Formal access change requests must be submitted to the FHWA and must address eight individual policy points[25]:

1. The existing interchanges and/or local roads in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design year traffic demands while at the same time providing the access intended by the proposal.

2. All reasonable alternatives for design options, location and transportation system management type improvements (such as ramp metering, mass transit, and HOV facilities) have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.

3. The proposed access point does not have a significant adverse impact on the safety and operation of the interstate facility based on an analysis of current and future traffic. The operational analysis for existing conditions shall, particularly in urbanized areas, include analysis of sections of the interstate to and including at least the first adjacent existing or proposed interchange on either side. Crossroads and other roads shall be included in the analysis to the extent necessary to assure their ability to collect and distribute traffic to and from the interchange with new or revised access points.

4. The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" for special purposes access for transit vehicles, for HOV's, or into park and ride lots may be

25 Source: Federal Highway Administration, 2008.

considered on a case-by-case basis. The proposed access will be designed to meet or exceed current standards for Federal-aid projects on the Interstate System.

5. The proposal considers and is consistent with local and regional land use and transportation plans. Prior to final approval, all requests for new or revised access must be consistent with the metropolitan and/or statewide transportation plan, as appropriate, the applicable provisions of 23 CFR part 450 and the transportation conformity requirements of 40 CFR parts 51 and 93.

6. In areas where the potential exists for future multiple interchange additions, all requests for new or revised access are supported by a comprehensive interstate network study with recommendations that address all proposed and desired access within the context of a long-term plan.

7. The request for a new or revised access generated by new or expanded development demonstrates appropriate coordination between the development and related or otherwise required transportation system improvements.

8. The request for new or revised access contains information relative to the planning requirements and the status of the environmental processing of the proposal.

The access request is to be a stand-alone document – either an Interchange Justification Report (IJR) for a new interchange or an Interchange Modification Report (IMR), where the request involves an alteration to an existing interchange.

The FHWA approval constitutes a federal action and therefore requires that National Environmental Policy Act (NEPA) procedures are followed (i.e., appropriate environmental impact assessment studies will need to be completed). Final approval of access cannot precede the completion of NEPA requirements.

Though Phase II of this Corridor Plan study involved a more in-depth study of the I-471/I-275 interchange (and the potential of a new interchange on I-275 in conjunction with changes to that interchange), it does not constitute a formal Interchange Modification Study that will result in a request for access modification. It does not include detailed operational analyses of adjacent interchanges and an in-depth environmental assessment was not performed. These were beyond the scope of the study. These important study components were not included in this scope since changes to the interstate interchanges under

consideration are not yet projects included in the OKI Transportation Improvement Program (TIP), KYTC's Six Year Plan or OKI's Long Range Transportation Plan (LRTP).

The Phase II study was performed, however, in a manner that is consistent with Federal requirements as spelled out in the eight policy points to the extent possible at this time. Components of this study included detailed traffic operations analyses of current and projected future traffic conditions, preliminary engineering, cost estimation, and identification of environmental resources potentially affected by the construction of interchange improvements. This Phase II study was primarily focused on the determination of viable alternatives to advance to a full Interchange Modification study and project level studies in the future. At the time of a formal access request, this study would be updated as part of a full Interchange Modification Study.

DEVELOPMENT OF CONCEPTUAL ALTERNATIVES

As described in Part 3, the Corridor Plan study explored the need for design, safety and capacity improvements at the I-471 / I-275 interchange based on a comparison of the existing configuration with current state and federal design standards and an initial analysis of existing and projected level of service deficiencies. The Phase II study further assessed two Build alternatives and the No Build alternative. The No Build alternative includes the regular maintenance of the existing facility and only those improvements in the study area that are already committed for implementation. The only significant improvement in the immediate vicinity of the I-471 / I-275 interchange study area included in the No Build condition is the construction of the AA Highway to I-275 Connector Road (currently under development) that will provide a direct connection between KY 9 and Three Mile Road[26].

In addition to the No Build, two Build alternatives that include improvements to the I-471 interchange with I-275 were considered. The two build alternatives are referred to as Alternatives 1 and 2 and are shown in Exhibits 28 and 29.

The initial version of Alternative 1 included the following improvements:

- Widen I-471 north of I-275 to four lanes in each direction.

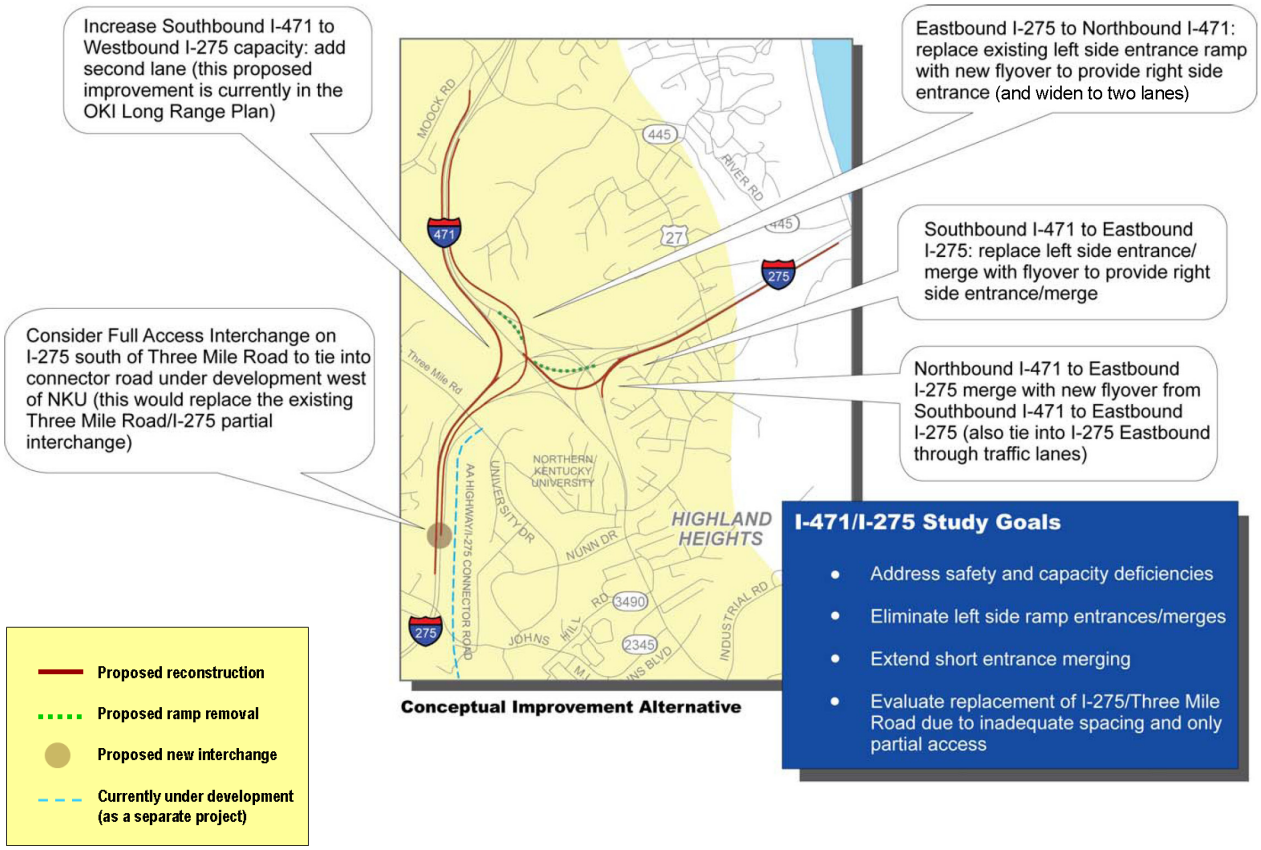
26 Although the connector road is the only future committed project in the immediate vicinity of the interchange, traffic projections and analysis of this Phase II study are based on the No Build or 2030 Existing and Committed scenario that takes into account the larger region. This larger context includes a number of regionally significant transportation improvements, such as the Brent Spence Bridge replacement, the Eastern Corridor Multi-modal projects, and the KY 9 widening between I-275 and Newport, as well as other improvements, that are considered committed projects that will have a significant affect on the I-471 Corridor.

- Widen the southbound I-471 to westbound I-275 directional ramp from one lane to two lanes.
- Convert the eastbound I-275 to northbound I-471 directional ramp from a left-side entry to a flyover ramp that connects on the right side of I-471.
- Convert the southbound I-471 to eastbound I-275 directional ramp from a left-side entry to a flyover ramp that connects on the right side of I-275.
- Remove the existing partial interchange on I-275 at Three Mile Road.

The Build Alternative 2 consisted of the same improvements with one addition. Alternative 2 also included a new, full-access interchange on I-275 between Three Mile Road and Johns Hill Road. This interchange will provide better access to Northern Kentucky University as it will serve travel to and from I-275 and I-471, whereas the existing Three Mile interchange only serves travel to and from the west. In addition, Alternative 2 provides a replacement of the lost access due to the elimination of the Three Mile Road interchange, necessitated by the improvements of the I-471 / I-275 interchange (Exhibit 29 depicts concepts).

Exhibit 28: Build Alternatives

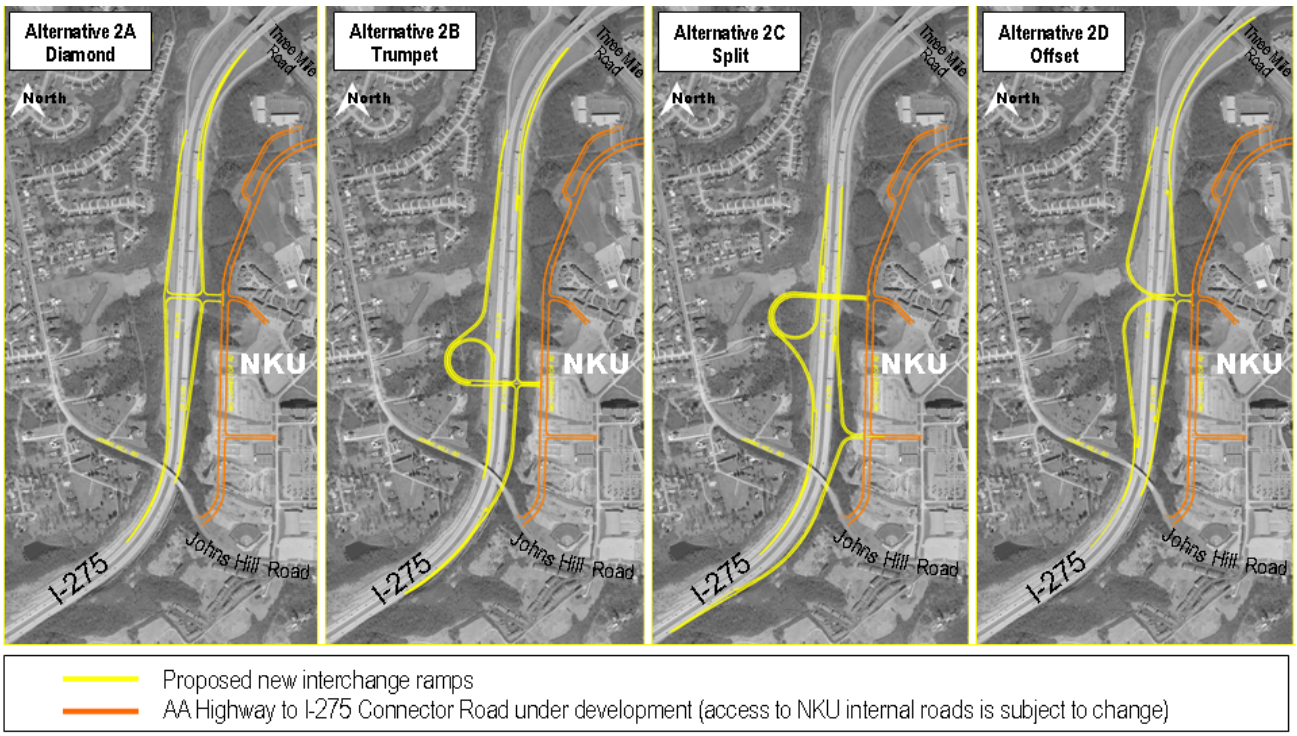
Alternatives 1 and 2 include the same improvements to the I-471 / I-275 interchange, but Alternative 2 also includes the addition of a full access interchange on I-275 south of the eliminated Three Mile Road partial interchange (this new I-275 interchange location is marked with a circle on this exhibit; Exhibit 29 depicts details of the possible configurations of this new interchange).



During the initial traffic operations evaluation of the build alternatives, it was determined that the eastbound I-275 to northbound I-471 ramp would not be capable of accommodating future demand if it remained a single lane. The preliminary alternatives already included widening the ramp carrying traffic in the opposite direction (southbound I-471 to westbound I-275) to two lanes because of a heavy volume of vehicles during the PM peak. It was determined that the eastbound I-275 to northbound I-471 ramp should also be widened to accommodate the heavy AM peak volume of traffic.

Exhibit 29: Build Alternative 2 Configuration Options for New I-275 Interchange South of Three Mile Road

A new full access interchange located to the south of the existing Three Mile Road partial interchange would provide improved access to NKU, a direct tie-in to the new AA Highway to I-275 Connector Road, and reduce traffic demand on US 27 at the eastern entrance to NKU.



In Exhibit 29, the orange lines represent the AA Highway to I-275 Connector Road currently under development along the western edge of the Northern Kentucky University (generally north–south oriented orange lines) with preliminary locations of connections to the internal campus parking and circulation system (general east–west oriented orange lines). The locations of the connections to campus are for illustration only, since NKU is currently updating its campus master plan and detailed information is not yet available. The yellow lines represent the proposed interchange configurations under consideration with a direct connection to the new Connector road.

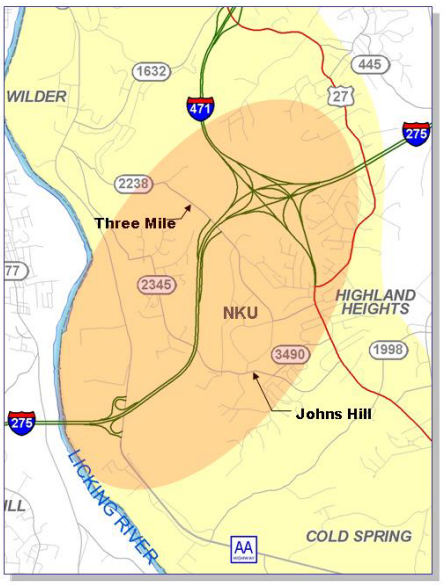
Functionally, this new interchange would alleviate existing safety issues and connectivity problems with the partial Three Mile Road interchange and would allow for needed improvements to the operations of the I-471 / I-275 interchange (and the I-275 / AA Highway interchange) by providing better spacing between interstate interchanges, consistent with state and federal design standards. The potential benefit of this alternative NKU access (an alternate route to the existing main entrance at the base of I-471 / I-275 and US 27) is that traffic demand on the interchange ramps and US 27 would be decreased.

Coordination with representatives of Northern Kentucky University and their campus master plan consultant team were conducted as the Corridor Plan was being developed. Although NKU's master plan studies are on-going at this time, and it is recognized that a new interchange is not programmed for implementation, the PMT recommended that further study of the potential for a new interchange at this location was warranted and included this study in the Phase II study of the I-471 / I-275 interchange. At this stage of the planning studies, the final geometric layout of a new I-275 interchange near NKU has not been determined; however, the operational analysis of this Phase II preliminary study is applicable to any of these conceptual designs.

TRAFFIC OPERATIONS ANALYSIS METHODOLOGY

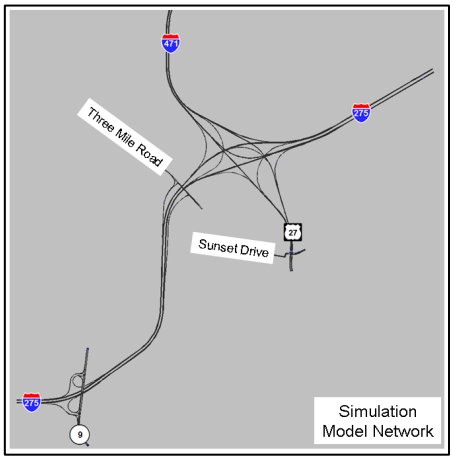
The purpose of this preliminary interchange modification study is to identify and evaluate potential improvements for the I-471/I-275 interchange to better accommodate anticipated long-term traffic conditions. This section discusses the methodology used to analyze the alternatives under consideration and the analysis results. The study area is depicted in Exhibit 30.

Exhibit 30: Phase II Study Area



The Ohio-Kentucky-Indiana Regional Council of Governments (OKI) maintains a regional travel demand model (RTDM) that replicates existing travel patterns and forecasts future traffic volumes on roadways throughout the eight county region. This model was utilized to develop a base year (2005) and 2030 E+C (Existing plus Committed scenario, representing the No Build conditions). A traffic simulation model[27] was created using this RTDM data to focus the analysis of the interchange to the immediate local area around the I-471 / I-275 interchange. The limits of this simulation model area include just south of the US 27 (Alexandria Pike) interchange to the north, west of the I-275 interchange with KY 9 (AA Highway) to the west, south of Sunset Drive to the south, and east of I-471 on I-275 to the east. The simulation model network is shown in Exhibit 31.

Exhibit 31: Traffic Simulation Model Network



The regional travel demand model cannot provide the level of detail required by the simulation software for details of interchange configuration analysis. For example, turn lanes or acceleration/deceleration lanes on the freeway segments are not included in the demand model and were added to the simulation model to more accurately reflect existing geometric conditions. With the geometric modifications completed, additional traffic data collected during the I-471 Corridor study and provided by KYTC were incorporated into the model. These data included traffic counts and traffic signal timing plans.

Trip interchanges for all possible origin-destination ("O-D") combinations are stored in an O-D matrix, which the traffic models use to load or "assign" traffic to the network. The simulation model then uses these matrices as an estimate of the demand for travel through the network, and the values stored within the matrices are simulated as hourly flow rates. As traffic volumes tend to fluctuate somewhat from one day to the next, the software allows a standard deviation factor to be specified to determine to what extent the volumes may vary between simulation runs. This standard deviation is used to randomize the number of trips

27 The traffic simulation model for this Phase II analysis was created using the TransModeler software package, a product of Caliper Corporation.

generated from the matrix for each individual simulation run, resulting in a different number of trips generated for each run.

The assigned volumes then were compared to the traffic counts for individual links and model adjustments were made until there was a favorable agreement between projected assignments and counts. The Root Mean Square Error (RMSE) test was used in this calibration; in practice, a RMSE of 30% or less is considered acceptable for an area-wide model, but in smaller simulation networks better results can be obtained. For the base year traffic simulation models, RMSE for estimated volumes on individual links with known traffic volumes was obtained. An average RMSE of 0.06% was obtained for the AM peak matrix and 0.06% was computed for the PM peak matrix. It was determined that the base year O-D matrices were calibrated to within acceptable limits and that assignment of these matrices by the models reasonably reflects observed traffic volumes.

EXISTING CONDITIONS

Models initially were developed to simulate typical weekday AM and PM peak hour traffic conditions for the base year. These were calibrated to the point where the models accurately reflected known traffic conditions. In the AM peak hour, which is typically somewhere between the hours of 7:00 AM and 9:00 AM depending on the area in question, the model includes a total of 17,836 trips. This represents the demand for travel during morning peak hour. In the PM peak hour, which typically occurs somewhere between 4:00 PM and 6:00 PM, the model includes a total of 20,383 trips. As discussed previously, the actual number of trips generated during each simulation run is random, but the results from a number of simulation runs produces an average number of trips similar to the demand stored in the O-D matrix.

The simulation model program allows users the ability to define the composition of the vehicle fleet which will be simulated. Table 21 includes the distribution of vehicle types used in the simulations.

Table 21: Vehicle Fleet Assumptions for Peak Hour Simulation Models

Name	Description	Percentage of Fleet
PC1	High performance passenger cars	25.0
PC2	Medium performance passenger cars	29.7
PC3	Low performance passenger cars	20.0
PU	Pickup trucks or utility vehicles	15.0
ST	Single-unit trucks	4.0
TT	Tractor/semi-trailer trucks	5.0
B	Buses	1.0
M	Motorcycles	0.3

The simulation model program also has the ability to simulate specific bus routes, including scheduled route stops, but this information was not included in the models. However, buses as a percentage of the overall traffic stream (an assumed one percent) were included.

There are many performance measures that can be extracted from the simulation model output. Table 22 presents a summary of some of the network-wide statistics that were reported for the existing simulation models.

Table 22: Performance Measures for the Existing Peak Hour Simulation Models

Peak Period	Completed Trips	Incomplete Trips	Percent Completed Trips	Vehicle-Miles Traveled (mi)	Vehicle-Hours Traveled (hrs)	Total Delay (hrs)	Average Speed (mph)
AM Peak	16,938	1,907	89.9%	45,474	929	241	49.0
PM Peak	17,884	3,639	83.1%	47,086	1,506	792	31.3

Note the "trips" reported in Table 22 do not necessarily reflect existing traffic "counts," but indicate the randomly generated, average number of trips estimated to travel through the simulation network during a one-hour peak period. Completed trips are those that enter and exit the model network within a one-hour simulation period. Incomplete trips include those that are loaded in the network at the end of the model run or those that are unable to load into the network because of congestion, particularly at or near the model boundaries. A one-hour simulation will never result in all trips being completed as there will always be vehicles remaining in the network or waiting to enter the network. However, completed trips closer to 100 percent indicates a transportation network is more capable of accommodating the travel demand.

The overall results suggest that traffic congestion is currently an issue within the study area, particularly during the PM peak. Nearly 90 percent of the trips are completed during the AM peak hour, but just over 84 percent are completed in the afternoon peak. Total delay is nearly three times higher in the PM, increasing from nearly 241 hours of delay in the AM to over 792 hours in the PM Relatively high average travel speeds of 49 MPH are maintained, but the PM decreases to 31 MPH.

FUTURE CONDITIONS

A future-year scenario was developed for the study area that assumes no significant changes to the transportation network. This scenario can be considered a "No Build" scenario in that it considers no improvements to the existing transportation network and includes only background traffic growth that

is anticipated to occur within the area. Traffic forecasts were developed for 2030, the horizon scenario year. Using the OKI demand model network, screen lines were created and travel across these lines was quantified for both the base year and 2030 future year. Growth factors for traffic across these lines were developed and stored in a separate matrix. The growth factors matrix then was applied to the base year simulation model AM and PM O-D matrices in order to create year 2030 O-D matrices. It should be noted that the OKI model is a peak period model, however, 24-hour traffic assignments were provided for the 2005 base year and the 2030 forecast year. For this analysis, it was assumed that growth in peak hour traffic volumes will be similar to the growth in total daily traffic volumes.

Table 23 presents a summary of the existing and anticipated 2030 trips stored in the O-D matrices for the study area, including a comparison of the average growth forecast.

Table 23: Summary of Existing and Anticipated No Build 2030 Trips

Year	AM Trips	PM Trips
Existing	17,836	20,383
2030 (No Build)	24,729	28,046
Increase	39%	38%

Overall, the OKI model predicts strong growth in travel within the study area. This is evidenced by the anticipated 39% growth in AM peak hour trips and the 38% growth in PM peak hour trips between now and 2030. As the alternatives depict slightly different model networks, separate matrices were developed for each alternative's peak hours of travel.

ALTERNATIVES ANALYSIS AND EVALUATION

Traffic simulation models were developed to replicate the two build alternatives. The No Build and Alternative 1 and Alternative 2 model networks were simulated using the future year 2030 traffic O-D matrices. The simulation results are found in Table 24.

As would be expected based on the anticipated growth in travel within the study area, the results from the 2030 simulation models suggest that traffic conditions will worsen significantly under a No Build condition. Comparing the No Build to existing conditions (see Table 22), the percentage of trips completed decreases during both peak periods. Vehicle-miles of travel (VMT) decreases slightly, but vehicle-hours of travel (VHT) increases by over 90 percent in the AM and 73 percent in the PM. This suggests that congestion will be significantly worse under the No Build scenario as fewer vehicles are able to travel through the network and vehicles spend more time attempting to complete their trips. Average travel

speeds decrease by over 50 percent as traffic increases, and overall delay increases significantly during both peak hours.

Both build alternatives will improve travel conditions when compared to the No Build scenario. Alternative 1 results in an increased percentage of completed trips during both peak hours, and Alternative 2 further approaches the existing conditions with nearly 88 percent of the trips completed during the AM peak and 74 percent during the PM peak. Both alternatives see increased VMT and decreased VHT compared to the No Build, with Alternative 2 performing slightly better than Alternative 1. Total delay, while still higher than today, is significantly decreased with the build alternatives. Average speeds are also improved, with Alternative 2 performing slightly better than Alternative 1.

Table 24: Performance Measures for the 2030 Peak Hour Simulation Models

Alternative	Completed Trips	Incomplete Trips	Percent Completed Trips	Vehicle-Miles Traveled (mi)	Vehicle-Hours Traveled (hrs)	Total Delay (hrs)	Average Speed (mph)
AM Peak							
No Build	15,967	6,264	71.8%	41,574	1,784	1,153	23.3
Alternative 1	18,553	3,350	84.7%	50,946	1,365	589	37.3
Alternative 2	20,731	2,880	87.8%	54,495	1,376	535	39.6
PM Peak							
No Build	16,162	10,777	60.0%	40,755	2,617	1,994	15.6
Alternative 1	19,561	6,873	74.0%	52,107	2,426	1,623	21.5
Alternative 2	19,600	6,998	73.7%	51,518	2,324	1,520	22.2

Table 25 presents a summary of the average travel times and travel speeds for vehicles completing trips between the freeway entries and exits. For example, the first set of columns represents the travel times and speeds for eastbound vehicles that entered the model network on I-275 west of the KY 9 interchange and exited the network on I-275 east of I-471. With few exceptions, both Alternative 1 and Alternative 2 result in decreased travel times and increased travel speeds for each freeway origin-destination pair. The only exception is southbound I-471 to eastbound I-275 during the PM peak, where the alternatives have slightly higher times and lower speeds than the No Build alternative. This is likely due to more trips being completed in the build alternatives with no improvements to I-275 east of I-471.

Table 25: Average Travel Times and Speeds

Alternative	Eastbound I-275 to Eastbound I-275		Eastbound I-275 to Northbound I-471		Southbound I-471 to Eastbound I-275		Southbound I-471 to Westbound I-275		Westbound I-275 to Westbound I-275		Westbound I-275 to Northbound I-471	
	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed
AM Peak												
No Build	11.0	21.9	15.2	14.9	4.5	37.6	5.9	37.1	6.8	35.8	7.0	22.9
Alternative 1	3.7	66.3	3.9	57.8	2.9	61.0	3.6	61.5	6.7	36.7	6.7	23.9
Alternative 2	3.7	65.3	4.0	56.2	3.1	57.2	3.5	62.0	6.6	37.2	6.0	26.7
PM Peak												
No Build	12.3	19.7	14.7	15.4	5.2	32.7	6.3	34.8	3.9	62.3	3.0	53.6
Alternative 1	3.9	62.2	3.5	65.8	5.4	32.4	6.3	34.5	3.8	64.3	3.2	50.4
Alternative 2	3.7	64.9	4.1	56.1	5.8	30.1	6.3	34.8	3.7	65.7	2.7	60.5

Table 25 notes:

Travel time is in minutes; speed is in miles per hour.

Values represent average times and speeds between entries and exits to/from the model network. Locations are consistent between alternatives.

Table 26: Freeway Density and Levels of Service

Peak Period	I-275 West of KY 9				I-275 East of KY 9				I-275 East of I-471				I-471 North of I-275			
	Eastbound		Westbound		Eastbound		Westbound		Eastbound		Westbound		Northbound		Southbound	
	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS
AM Peak																
Existing	25.9	C	17.4	B	21.4	C	19.4	C	12.3	B	38.2	E	38.5	E	18.6	C
No Build	122.4	F	15.1	C	112.1	F	17.8	B	10.5	A	103.5	F	43.1	E	79.0	F
Alternative 1	31.3	D	18.2	C	24.0	C	16.6	B	9.6	A	99.1	F	28.3	D	19.7	C
Alternative 2	29.6	D	18.7	C	25.1	C	17.8	B	10.3	A	100.9	F	30.5	D	21.6	C
PM Peak																
Existing	37.1	E	20.4	C	25.5	C	20.0	C	23.7	C	17.2	B	25.8	C	92.2	F
No Build	124.6	F	18.8	C	107.3	F	17.7	B	12.0	B	23.2	C	38.8	E	97.6	F
Alternative 1	72.5	F	19.3	C	21.6	C	18,9	C	12.1	B	20.9	C	27.3	D	98.5	F
Alternative 2	36.4	E	19.0	C	24.2	C	21.8	C	13.1	B	17.2	B	23.2	C	97.5	F

Table 26 Notes:

Alternative 1 is the upgrade improvements to the I-471 / I-275 interchange.

Alternative 2 includes the improvements of Build 1 plus a new full access interchange on I-275 between Three Mile Road and Johns Hill Road. At this level of analysis, Alternative 2 data applies to any of the four alternative configurations under consideration.

Density is in vehicles per mile per lane.

LOS is Level of Service.

Table 26 presents freeway mainline statistics for I-275 and I-471, including vehicle density and level of service (LOS). Similar to school letter grades, LOS indicates the quality of traffic flow and varies from A to F. LOS A represents free-flow traffic conditions and LOS F represents severe congestion. For freeway segments, LOS is based on density in terms of passenger cars per mile per lane (pc/mi/ln), with higher densities indicating more congested conditions and therefore decreased LOS. Typically, LOS of D or better is considered acceptable in an urban area. LOS thresholds for basic freeway segments are[28]:

LOS	Density (pc/mile/lane)
LOS A:	0 – 11
LOS B:	> 11 – 18
LOS C:	> 18 – 26
LOS D:	> 26 – 35
LOS E:	> 35 – 45
LOS F:	> 45

According to the simulation output for existing conditions, several freeway mainline segments currently operate at LOS E or F, including:

- westbound I-275, east of I-471,
- northbound I-471, north of I-275, during the AM peak,
- eastbound I-275, west of KY 9, and
- southbound I-471, north of I-275, during the PM peak.

Under the No Build scenario, additional segments operate at LOS E or F, including:

- eastbound I-275, west and east of KY 9,
- southbound I-471, in the AM peak, and
- eastbound I-275, east of KY 9, during the PM peak.

The build alternatives improve operations to LOS D or better on all freeway mainline segments with three exceptions:

- westbound I-275, east of I-471, which is not improved under the build alternatives, is anticipated to operate at LOS F during the AM peak in 2030,
- eastbound I-275, west of KY 9, during the PM peak (LOS E or F), and
- southbound I-471, during the PM peak (LOS E or F).

Simulation of a complex freeway interchange such as the I-471 / I-275 interchange often demonstrates how a bottleneck at one location within the system results in degraded travel conditions upstream of the congested location. Such occurrences would be overlooked if analyzed through traditional Highway

28 Highway Capacity Manual, Transportation Research Board, 2008.

Capacity Manual (HCM) techniques as each segment in the system would be analyzed individually. Additionally, bottlenecks can also obstruct traffic from reaching a would-be congested location downstream, making that location appear to operate more efficiently than it would if the demand traffic volumes were able to reach it.

An example demonstrating these phenomenon would be the connection between both eastbound and westbound I-275 to northbound I-471. The eastbound I-275 to northbound I-471 ramp currently consists of a single lane. The westbound I-275 ramp to northbound I-471, consisting of two lanes, merges on the right of northbound US 27 (also two lanes) forming three through lanes. The eastbound I-275 ramp then merges on the left. Within a distance of less than one-quarter of a mile, five lanes merge down to three lanes. This short distance combined with the heavy AM peak traffic volumes destined for the north results in a significant bottleneck in this area. In the No Build scenario in particular, traffic upstream is subjected to lengthy delays even if it is not traveling through the bottleneck as traffic that is waiting to traverse the bottleneck blocks access to adjacent through lanes on I-275. Downstream of the bottleneck, traffic on northbound I-471 appears to operate only slightly worse than under existing conditions, but the actual volume of traffic served is effectively "metered" by the upstream bottleneck.

It should also be noted that this preliminary analysis is based on no other improvements to the I-471 or I-275 system. As part of the Corridor Plan, I-471 recommendations include: adding a fourth through lane in each direction for the entire length of I-471; substantial interchange upgrades to the I-471 interchanges at US 27, Grand, Memorial (as well as the current KYTC project developing improvement plans for KY 8); and the reconstruction of the I-275 interchange at AA Highway.

ENVIRONMENTAL CONSIDERATIONS

The implementation of improvements to an interstate interchange will require in-depth environmental impact assessment. As part of this alternatives analysis / preliminary interchange modification study, an initial review of the potential environmental considerations reveals some of the issues that will need to be further examined. For the most part, environmental impacts are anticipated to be relatively minor since the proposed interchange improvement alternatives can be constructed substantially within the existing right-of-way of the current interchange. However, preliminary estimates indicate that some right-of-way will be required, especially where fly-over ramps are proposed, where ramps require widening and in the area of a new interchange south of Three Mile Road.

Environmental issues in the vicinity of the proposed alternative improvements are primarily related to the geology and topography of the area (steep slopes) and

the existing Three Mile Creek crossings and related flood prone areas. Although the areas of new right-of-way are devoid of built resources, environmental studies will be needed to address buried resources such as hazardous materials and cultural archaeological features. Beyond the required new right-of-way areas, other environmental impact concerns that will need to be fully addressed include air quality and highway noise.

COST ESTIMATES

Preliminary cost estimates were determined for both Build Alternatives. Cost estimates include construction and contingencies, but do not include costs for right-of-way, utilities, environmental studies, any impact mitigation that may be required. Although these additional costs can be significant, these associated project costs cannot be accurately determined at this stage of planning.

Cost estimates were made in 2008 dollars and then adjusted to a potential future year for construction. A potential construction year is difficult to estimate given the current state and federal funding limitations. For comparison, costs for the Build alternatives are presented in Table 27 for both 2015 and 2030. In addition, four separate costs are shown for Alternative 2, representing the four interchange configurations for the I-275 interchange at NKU presented in Exhibit 29. All four Alternative 2 options include the same Alternative 1 improvements to the I-471 / I-275 interchange.

Table 27: Interchange Cost Estimates

Build Alternative		2015 Cost ($)	2030 Cost ($)
1	I-471 / I-275 improvements	113,486,000	204,382,000
2A	Alternative 1 plus I-275 / NKU (diamond)	142,187,000	256,070,000
2B	Alternative 1 plus I-275 / NKU (trumpet)	145,748,000	262,484,000
2C	Alternative 1 plus I-275 / NKU (split)	160,245,000	288,592,000
2D	Alternative 1 plus I-275 / NKU (offset)	146,269,000	263,423,000

It should be noted that these costs are for planning purposes only and significant cost savings could be achieved with an earlier implementation year or if project staging was pursued.

STUDY LIMITATIONS

This Alternatives Analysis / Preliminary Interchange Modification study is so named, since it does not represent a complete Interchange Modification Study (IMS). A full IMS would require a more comprehensive traffic data collection, whereas this study was limited to selected locations for traffic counts on the existing ramps and intersections supplemented with data from the OKI regional travel demand model traffic assignment output and available KYTC traffic data

(which was confined to through movement data). Where existing traffic data were unavailable, estimates were developed through application of growth factors derived from the OKI RTDM traffic assignments for the base and design years. Additionally, potential improvements to the I-275 interchange with the AA Highway (KY 9) and the remaining I-471 interchanges to the north, US 27 (Alexandria Pike), Grand Avenue, and Memorial Parkway (as described and recommended in the I-471 Corridor Plan) and KY 8 (as under development in a separate KYTC project, as discussed herein), have not been considered in this analysis although improved traffic operations at these locations would have an effect on the ultimate operations of the I-471 / I-275 interchange.

Once an improvement scenario is selected for further study, and a project level effort is programmed into the KYTC Six Year Plan, a more complete IMS will be required to demonstrate the operational and engineering "acceptability" of the preferred alternative. Ultimately, the IMS should consider the impacts associated with improvements to the adjacent interchanges.

The preliminary studies conducted for this Phase II analysis, consisting of conceptual schematics, preliminary engineering drawings, studies and detailed cost estimates have been compiled in electronic format and will be provided to the KYTC for future reference and use when the programming for the interchange is determined.

I-471 / I-275 AND I-275 / NKU RECOMMENDATIONS

It should be noted that this preliminary analysis is based on no other improvements to the I-471 or I-275 system. As part of the overall Corridor Plan, I-471 recommendations include adding a fourth through lane in each direction for the entire length of I-471 and substantial interchange upgrades to the I-471 interchanges at US 27, Grand Avenue, Memorial Parkway, and KY 8 and the I-275 interchange at AA Highway (KY 9).

It is anticipated that unimproved mainline freeway sections will not be capable of accommodating the forecasted long-term travel demand in the area, and in the case of I-471, widening to four lanes in each direction may still be unable to provide the desirable operational performance. However, both build alternatives evaluated in this preliminary IMS result in improved traffic operation when compared to the No Build scenario. In general, Alternative 2 tends to operate better than Alternative 1.

The overall benefits of the proposed I-275 interchange near NKU in Alternative 2 were not fully investigated in this study. In essence, the traffic operations of the I-471 / I-275 interchange can be improved with the studied upgrades with or without a new interchange to the south. However, this new interchange was included in this preliminary IMS for two reasons:

- Any improvement to the I-471 / I-275 interchange will require the elimination of the partial interchange on I-275 at Three Mile Road due to the lack of sufficient spacing to safely accommodate movements for both interchanges.

- The anticipated benefit of the I-275 / NKU interchange is most noticeable in the larger Corridor Plan perspective, particularly in the benefit of adding improved freeway access to and from the north and east. This benefit is manifested in the reduction of projected travel demand on US 27 along the east side of NKU. Preliminary traffic modeling results forecasted that US 27 daily volumes between Martha Layne Collins Boulevard and Sunset Avenue could be reduced significantly, in the range of 10% or more.[29]

From this preliminary interchange modification / alternatives analysis, it is concluded that the recommendation to further pursue the I-471 / I-275 interchange upgrade and the potential new I-275 / NKU interchange should be forwarded as part of the I-471 Corridor Plan recommendations.

29 Traffic modeling was not conducted for any other changes to the network in conjunction with the I-471 / I-275 interchange improvements and the new I-275 / NKU interchange; therefore, the potential benefit to routes such as US 27 are preliminary.

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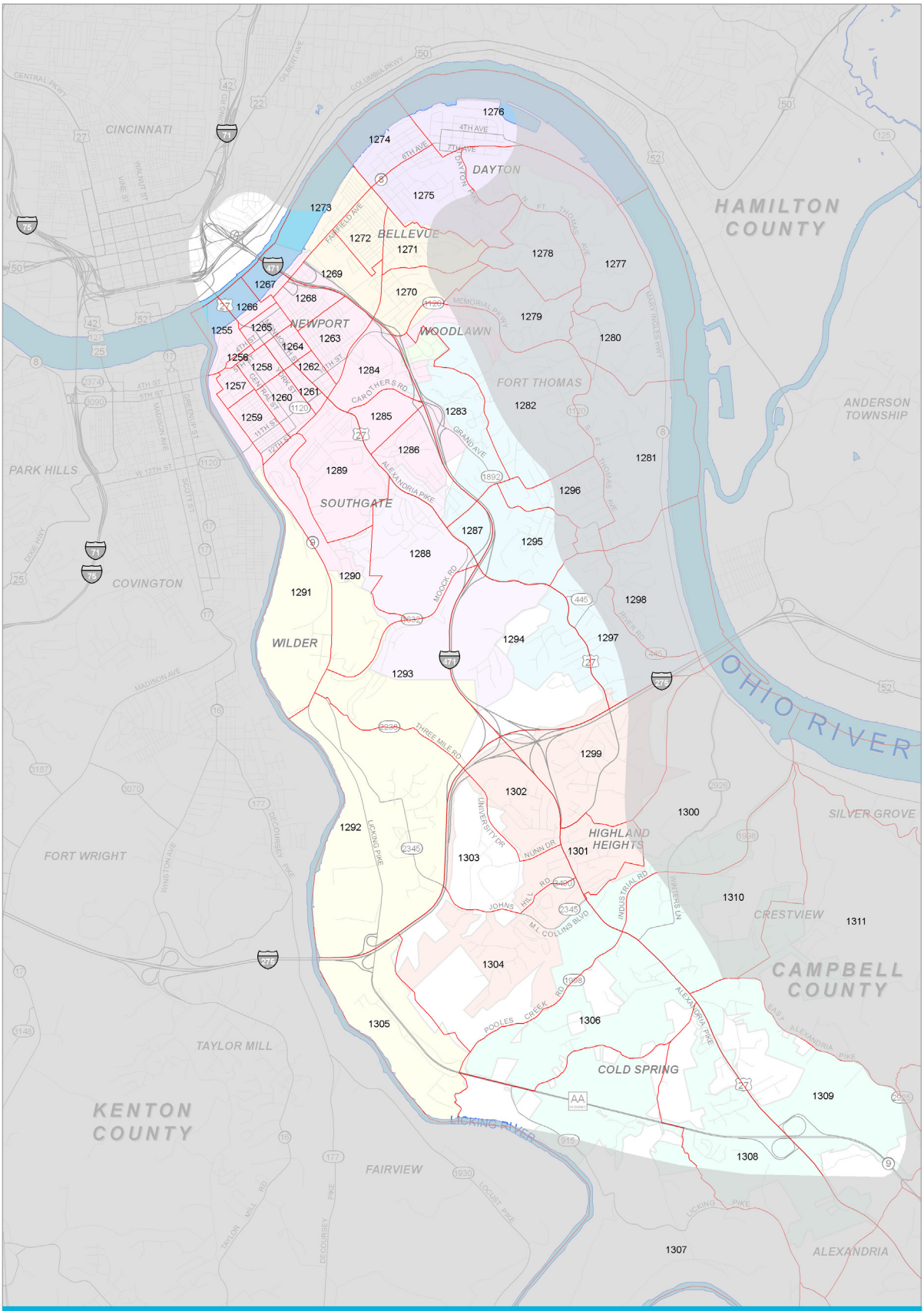
Appendix A

OKI Socioeconomic Data for Campbell County 2005 and 2030 by Traffic Analysis Zone

Campbell County Socioeconomic Data, 2005 and 2030, OKI Regional Travel Demand Model Input Summary										
Traffic Analysis Zone	Geographic Reference [1]	2005	2005	2030	2030	Percent Change		2005	2030	Percent Change
		Households	Population	Households	Population	Households	Population	Employment	Employment	Employment
1255	NEWPORT-CBD-W	296	621	906	1,788	206%	188%	39	1,006	2459%
1256	NEWPORT-CBD-W	0	8	0	8	---	0%	88	173	97%
1257	NEWPORT-CBD-W	487	1,086	447	937	-8%	-14%	121	90	-26%
1258	NEWPORT-CBD-W	267	770	281	764	5%	-1%	143	143	0%
1259	NEWPORT-CBD-W	610	1,598	559	1,378	-8%	-14%	285	285	0%
1260	NEWPORT-CBD-W	789	2,040	723	1,759	-8%	-14%	187	187	0%
1261	NEWPORT-CBD-E	125	301	115	262	-8%	-13%	627	627	0%
1262	NEWPORT-CBD-E	339	771	380	813	12%	5%	373	373	0%
1263	NEWPORT-CBD-E	944	2,104	894	1,874	-5%	-11%	415	415	0%
1264	NEWPORT-CBD-E	215	482	261	544	21%	13%	620	620	0%
1265	NEWPORT-CBD-E	55	119	50	101	-10%	-15%	578	578	0%
1266	NEWPORT-CBD-E	0	3	0	3	---	0%	1,567	1,497	-4%
1267	NEWPORT-CBD-E	0	0	0	0	---	---	0	60	---
1268	NEWPORT-CBD-E	461	939	438	839	-5%	-11%	194	258	33%
1269	DAYTON-BELLEVUE	310	679	283	583	-9%	-14%	1,092	1,216	11%
1270	DAYTON-BELLEVUE	519	1,047	474	899	-9%	-14%	15	26	71%
1271	DAYTON-BELLEVUE	565	1,312	516	1,127	-9%	-14%	90	90	0%
1272	DAYTON-BELLEVUE	1,058	2,378	971	2,053	-8%	-14%	420	420	0%
1273	DAYTON-BELLEVUE	277	679	611	1,409	121%	108%	35	446	1174%
1274	DAYTON-BELLEVUE	441	1,192	405	1,029	-8%	-14%	0	53	---
1275	DAYTON-BELLEVUE	1,033	2,599	1,114	2,636	8%	1%	143	143	0%
1276	DAYTON-BELLEVUE	548	1,394	1,186	2,788	116%	100%	634	742	17%
1277	FT.THOMAS-N	448	1,147	597	1,439	33%	25%	32	32	1%
1278	FT.THOMAS-N	443	1,083	441	1,014	0%	-6%	55	55	-1%
1279	FT.THOMAS-N	476	1,106	473	1,033	-1%	-7%	11	11	-1%
1280	FT.THOMAS-N	422	1,148	421	1,076	0%	-6%	19	19	-2%
1281	FT.THOMAS-N	828	1,954	829	1,841	0%	-6%	501	501	0%
1282	FT.THOMAS-N	1,199	2,591	1,308	2,660	9%	3%	313	395	26%
1283	FT.THOMAS-N	1,043	1,797	1,045	1,695	0%	-6%	1,561	1,711	10%
1284	SOUTHGATE	311	780	397	937	28%	20%	81	796	881%
1285	SOUTHGATE	0	0	0	0	---	---	1,116	1,116	0%
1286	SOUTHGATE	853	1,866	913	1,880	7%	1%	129	129	0%
1287	SOUTHGATE	81	279	92	289	14%	3%	406	406	0%
1288	SOUTHGATE	520	1,249	521	1,178	0%	-6%	252	252	0%
1289	SOUTHGATE	1,039	2,432	1,062	2,344	2%	-4%	723	723	0%
1290	SOUTHGATE	535	1,331	856	2,001	60%	50%	115	115	0%
1291	WILDER	74	177	74	168	0%	-5%	387	387	0%
1292	WILDER	505	1,182	807	1,777	60%	50%	347	347	0%
1293	WILDER	930	1,519	1,452	2,231	56%	47%	150	150	0%
1294	FT.THOMAS-S	665	1,451	668	1,370	0%	-6%	99	105	6%
1295	FT.THOMAS-S	426	1,032	426	970	0%	-6%	147	147	0%
1296	FT.THOMAS-S	820	1,794	822	1,692	0%	-6%	195	195	0%
1297	FT.THOMAS-S	696	1,572	698	1,487	0%	-5%	703	703	0%
1298	FT.THOMAS-S	186	625	187	599	0%	-4%	314	314	0%
1299	HIGHLAND-HEIGHTS	642	1,463	766	1,641	19%	12%	404	404	0%
1300	HIGHLAND-HEIGHTS	290	696	398	898	37%	29%	409	579	42%
1301	HIGHLAND-HEIGHTS	384	890	384	838	0%	-6%	374	374	0%
1302	HIGHLAND-HEIGHTS	308	593	308	558	0%	-6%	564	779	38%
1303	HIGHLAND-HEIGHTS	58	1,548	58	3,139	0%	103%	2,017	2,362	17%
1304	HIGHLAND-HEIGHTS	1,528	3,129	1,957	4,119	28%	32%	807	1,058	31%
1305	HIGHLAND-HEIGHTS	25	66	25	63	0%	-6%	1,107	1,107	0%
1306	HIGHLAND-HEIGHTS	317	666	951	1,878	200%	182%	509	557	9%
1307	SILVER-GROVE	315	815	498	1,213	58%	49%	26	158	505%
1308	SILVER-GROVE	479	1,177	689	1,594	44%	35%	623	1,235	98%
1309	SILVER-GROVE	351	939	656	1,650	87%	76%	772	1,276	65%
1310	SILVER-GROVE	388	1,002	522	1,268	35%	27%	328	487	48%
1311	SILVER-GROVE	520	1,374	666	1,652	28%	20%	74	74	-1%
1312	SILVER-GROVE	511	1,216	745	1,669	46%	37%	293	479	63%
1313	SILVER-GROVE	248	695	335	862	35%	24%	16	89	454%
1314	SILVER-GROVE	71	191	90	228	27%	19%	0	0	---
1315	SILVER-GROVE	74	166	94	198	27%	19%	19	53	179%
1316	SILVER-GROVE	42	125	50	140	19%	12%	0	3	---
1317	SILVER-GROVE	457	1,296	662	1,765	45%	36%	327	327	0%
1318	ALEXANDRIA-W	469	1,164	1,395	3,259	198%	180%	1,082	1,082	0%
1319	ALEXANDRIA-W	263	624	336	751	28%	20%	161	161	0%
1320	ALEXANDRIA-W	213	593	220	577	4%	-3%	58	58	1%
1321	ALEXANDRIA-E	327	866	480	1,196	47%	38%	166	166	0%
1322	ALEXANDRIA-W	611	1,618	1,082	2,696	77%	67%	60	184	207%
1323	ALEXANDRIA-W	311	849	683	1,751	119%	106%	44	132	201%
1324	ALEXANDRIA-E	369	912	553	1,283	50%	41%	823	1,087	32%
1325	ALEXANDRIA-E	32	90	42	111	31%	23%	0	26	---
1326	ALEXANDRIA-E	185	547	564	1,564	204%	186%	13	53	300%
1327	ALEXANDRIA-E	542	1,559	949	2,565	75%	65%	143	690	384%
1328	ALEXANDRIA-E	523	1,213	779	1,698	49%	40%	440	859	95%
1329	ALEXANDRIA-E	202	634	304	899	51%	42%	0	53	---
1330	ALEXANDRIA-E	556	1,722	838	2,441	51%	42%	41	41	0%
1331	ALEXANDRIA-E	88	232	252	624	187%	170%	0	25	---
1332	NEW-RICHMOND-KY	318	816	403	973	27%	19%	87	64	-26%
1333	NEW-RICHMOND-KY	237	683	306	830	29%	21%	13	79	496%
1334	NEW-RICHMOND-KY	160	429	195	490	22%	14%	11	42	273%
1335	CALIFORNIA	244	680	319	832	31%	22%	38	79	108%
1336	CALIFORNIA	200	542	200	511	0%	-6%	72	132	83%
1337	CALIFORNIA	311	909	390	1,071	25%	18%	10	26	160%
1338	CAMPBELL-CO.PARK	383	995	693	1,691	81%	70%	114	149	31%
1339	CAMPBELL-CO.PARK	566	1,556	604	1,564	7%	1%	320	425	33%
	Campbell County total	**35,954**	**87,518**	**46,141**	**108,024**	**28%**	**23%**	**27,689**	**35,071**	**27%**

Notes:
[1] = The names of the Traffic Analysis Zones do not correspond to corporate boundaries, but are general references to familiar community names or locations to provide an approximate indication of the geographic area. See TAZ map for corresponding boundaries.

Source: ENTRAN and OKI, March 2007


CINCINNATI
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BELLEVUE
NEWPORT
WOODLAWN
FORT THOMAS
SOUTHGATE
WILDER
COVINGTON
PARK HILLS
HAMILTON COUNTY
ANDERSON TOWNSHIP
HIGHLAND HEIGHTS
SILVER GROVE
CRESTVIEW
CAMPBELL COUNTY
COLD SPRING
FORT WRIGHT
TAYLOR MILL
KENTON COUNTY
FAIRVIEW
ALEXANDRIA
OHIO RIVER
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1311
Legend
1200
Traffic Analysis Zone (TAZ) Boundary
TAZ ID Number
Study Area
Campbell County
OKI Eight County Region
Campbell County Traffic Analysis Zones
June 2007
0 0.25 0.5 1 Miles
Source: OKI GIS, 2006

Appendix B

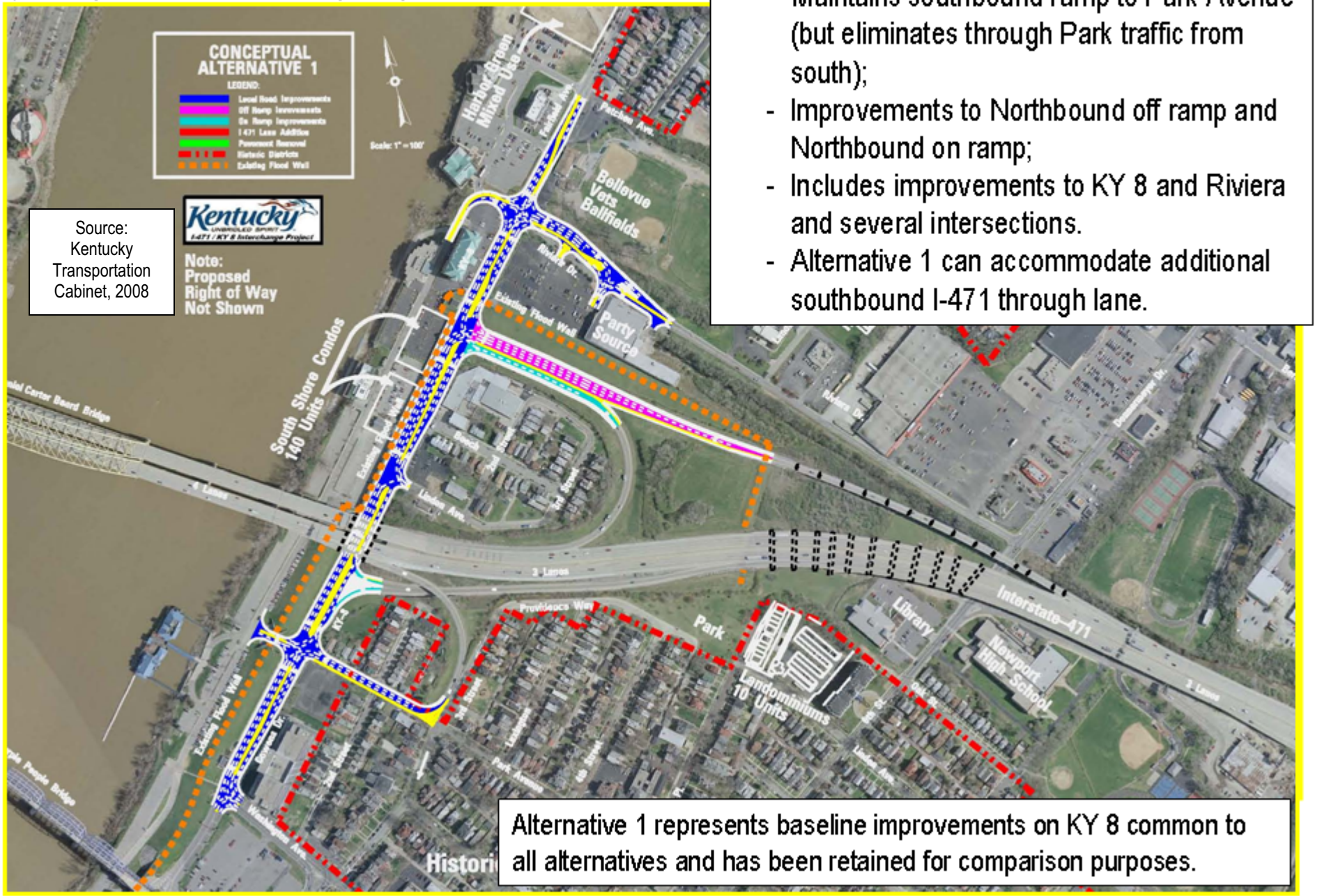
I-471 / KY 8 Transportation Improvement Alternatives Currently Under Consideration, July 2008

I-471 / KY 8 Alternate 1

(Currently under consideration, July 2008)

Components:

- Maintains southbound ramp to Park Avenue (but eliminates through Park traffic from south);
- Improvements to Northbound off ramp and Northbound on ramp;
- Includes improvements to KY 8 and Riviera and several intersections.
- Alternative 1 can accommodate additional southbound I-471 through lane.



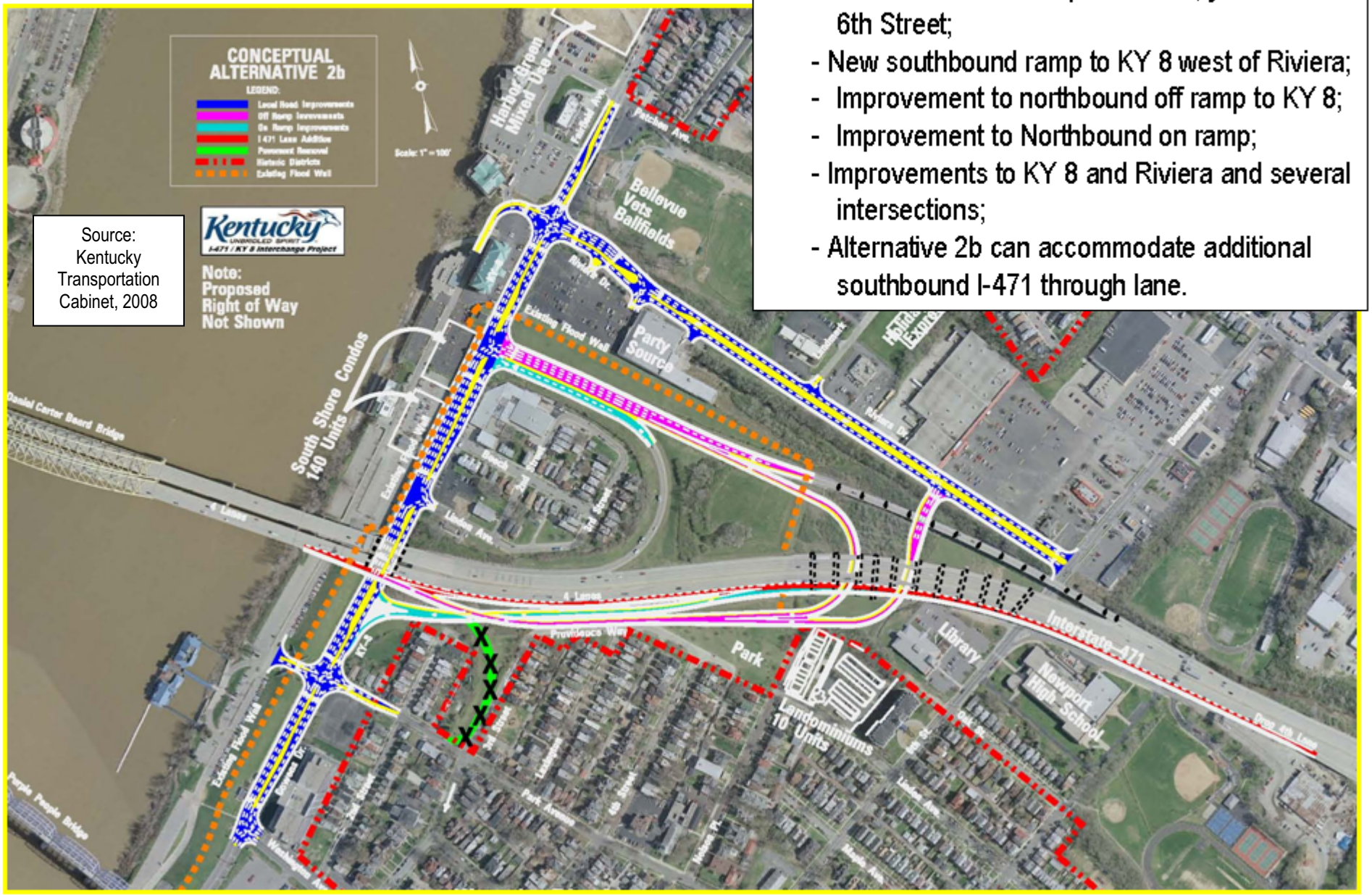
Alternative 1 represents baseline improvements on KY 8 common to all alternatives and has been retained for comparison purposes.

I-471 / KY 8 Alternate 2b

(Currently under consideration, July 2008)

Components:

- Southbound ramp to Park Avenue removed;
- New southbound ramp to Riviera, just south of 6th Street;
- New southbound ramp to KY 8 west of Riviera;
- Improvement to northbound off ramp to KY 8;
- Improvement to Northbound on ramp;
- Improvements to KY 8 and Riviera and several intersections;
- Alternative 2b can accommodate additional southbound I-471 through lane.

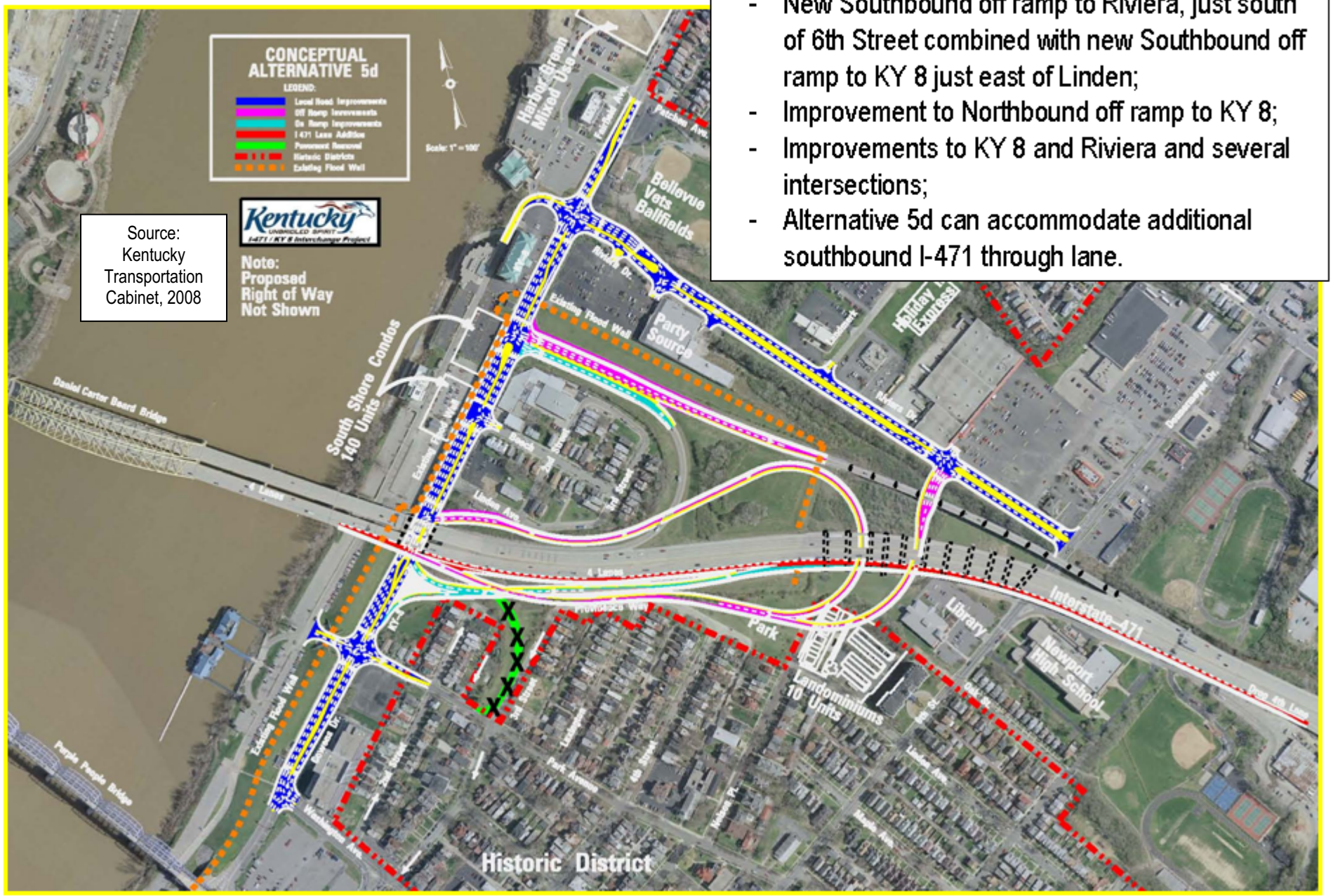


I-471 / KY 8 Alternate 5d

(Currently under consideration, July 2008)

Components:

- Southbound off ramp to Park Avenue removed;
- New Southbound off ramp to Riviera, just south of 6th Street combined with new Southbound off ramp to KY 8 just east of Linden;
- Improvement to Northbound off ramp to KY 8;
- Improvements to KY 8 and Riviera and several intersections;
- Alternative 5d can accommodate additional southbound I-471 through lane.



Appendix C

Current Listing of Bus Routes

Current Bus Service

The Transit Authority of Northern Kentucky (TANK) operates the following bus routes in the I-471 Corridor[1].

Route 11: Ft. Thomas-Northern Kentucky University operates between the Covington Transit Center and Northern Kentucky University. Stops along this route serve downtown Cincinnati, Newport, Memorial Parkway and Ft. Thomas Avenue. The weekday inbound express route operates via I-471 from 10th street in Newport.

Route 12: Dayton operates between the Covington Transit Center and Dayton, Kentucky. Stops on this route serve downtown Cincinnati, Newport and Bellevue via KY 8/Fairfield/6th Street.

Route 16: Grand Towers, St. Luke East – Carmel Manor operates between the Covington Transit Center and Grand Towers. Stops along this route serve downtown Cincinnati, St. Luke Hospital East, Newport Shopping Center, Newport Plaza, Grand Avenue, South Ft. Thomas Avenue and Carmel Manor. The weekday outbound express route operates via I-471 to Grand Avenue.

Route 20: South Newport operates between the Covington Transit Center and south Newport. Stops along this route serve downtown Cincinnati, Barkley Ridge Apartments and Isabella Street.

Route 23: South Bellevue operates between the Covington Transit Center and south Bellevue. Stops along this route serve downtown Cincinnati, Medical Arts Building, 6th Street/Donnermeyer, Taylor Avenue and Newport.

Route 25: Alexandria operates between the Covington Transit Center and Alexandria. Stops along this route serve downtown Cincinnati, US 27, Newport, the Newport Shopping Center, Northern Kentucky University, and the Village Green Shopping Center.

Route 25x/26x: Alexandria Express/South Campbell County Express operates between the Covington Transit Center and southern Campbell County. Stops along this route serve US 27, Cold Spring Park & Ride, Village Green Shopping Center, Alexandria Park & Ride and the Race Track Road Park & Ride.

Southbank Shuttle is a circulator route that travels the riverfront cities of Newport, Cincinnati and Covington. The Shuttle runs two routes:

- The first route begins in Covington on Philadelphia St. in front of Goebel Park in the Main Strasse Village and travels through Covington, Cincinnati and Newport, ending at the Bellevue Medical Arts Park & Ride lot.
- The second route begins at the Bellevue Medical Arts Building and travels through Newport, Cincinnati and Covington.

The Southbank Shuttle stops at each stop on the route every 15 minutes seven days a week. The Shuttle also operates for extended hours and/or added service for special events, such as Reds and Bengals games.

Express bus route service is also provided through the study area via I-275 and I-471 by two other transit agencies. Metro, the Cincinnati bus service of the Southwest Ohio Regional Transit Authority (SORTA) operates Metro Routes 75 and 82 and the Clermont Transportation Connection, a publicly owned transit agency in Clermont County, Ohio, operates express bus routes 2x and 4x. These express bus routes traverse through the corridor connecting Cincinnati's southeastern suburbs with downtown Cincinnati via I-275 and I-471, but do not provide bus stops within the study area.

[1] The source for these route descriptions is http://www.tankbus.org .

Appendix D

Cultural Historic Resources in the I-471 Corridor Study Area

TECHNICAL MEMORANDUM
OVERVIEW OF SITES LISTED
ON THE NATIONAL REGISTER OF HISTORIC PLACES
IN STUDY AREA FOR I-471
NEWPORT AND CAMPBELL COUNTY, KENTUCKY

by

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for

ENTRAN
525 West Fifth Street
Suite 218
Covington, Kentucky 41011
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January 2007

Table of Contents

I. SITES AND DISTRICTS LISTED ON THE NATIONAL REGISTER

Peter Barth Farm (CP-109), Lower Tug Fork Road, Alexandria
The Peter Barth Farm was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Peter Barth Farm is outside of the I-471 Corridor study area.

Baumann House (CP-52), Four Mile Pike, Camp Springs
The Baumann Farm, also known as the Martz House, was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Baumann House is outside of the I-471 Corridor study area.

Bellevue (CPN-223), 335 E. 3rd Street, Newport
Bellevue, which is also known as the General James Taylor House or Vonderhaar and Setter Funeral Home, was listed on the National Register in 1976 with a boundary of three acres. It was also included in the Mansion Hill Historic District which was listed on the National Register in 1980. See Exhibit 1 for its location within the I-471 Corridor study area.

General James Taylor (1769-1848) was one of the first settlers of present-day Campbell County. Taylor is considered the founder of Newport, for which he donated 160 acres and surveyed lots in 1795. Taylor was the first county clerk for Newport, serving from 1794 until 1824.Taylor served as a quarter-master general during the War of 1812 in the Northwestern Army. Taylor amassed a considerable fortune through land speculation in Ohio and Indiana.

Taylor's original dwelling, called Bellevue, was a modest log house which overlooked the Ohio River. By 1812, Taylor wanted a larger house for his growing family. The mansion house, said to have been designed by Latrobe, was constructed on the site of the original log dwelling. In 1842, Taylor's second house burned. Taylor's third house on the site is the present-day large, brick, Greek Revival dwelling. According to local history, a tunnel extended from the basement of the house to the river to facilitate the delivery of goods from the river into the house with minimal disruption. Some traditions indicate that the tunnel was later used as part of the underground railroad. The tunnel was partially destroyed by the 1937 flood and filled in.

General Taylor's son, Colonel James Taylor, inherited Bellevue and most of his father's business concerns. Upon Colonel James Taylor's death in 1883, the property was inherited by Barney Taylor, a prominent banker, who sold the house in 1888. Colonel Taylor's daughter, Mary Keturah (Mrs. Thomas Laurens) Jones built a house known as Mount St. Martin in the late nineteenth century. (See the Jones House, which is also listed on the National Register.) By 1888, the Taylor House had been altered so that the primary facade faced Newport instead of the Ohio River. By 1919, the area around Bellevue had been subdivided and was known as "Mansion Hill". Bellevue was purchased by Vonderhaar and Stetter who converted it into a funeral home.

Bellevue High School (CPB-21), Washington and Center Streets, Bellevue
Bellevue High School, which is also known as Center Street School, was listed on the National Register in 1986 with a boundary of one acre. See Exhibit 1 for its location within the I-471 Corridor study area.

The old Bellevue High School is the oldest unaltered public building in the city of Bellevue and is one of several important early-twentieth century school buildings in the Northern Kentucky area. The school building is associated with the prominent Northern Kentucky architecture firms of Bausmith and Weber as well as E.C. and G.T. Landberg. The main part of the school was under construction from 1905 to

1907 with a renovation in 1937 of the stairwells to conform with fire codes.

The building was used as a high school until 1933, was an elementary school until the 1960s and then was briefly a junior high school. In 1970, the school board closed the school and sold the building to the city of Bellevue. The old high school became a recreation/ community center. At the time of the National Register nomination, the building was to be sold to a developer and converted to housing for elderly citizens.

Bishoff House (CP-66), Upper Eight Mile Road, Camp Springs
The Bishoff House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Bishoff House is outside of the I-471 Corridor study area.

Blau's Four Mile House (CP-61), Four Mile Pike, Camp Springs
Blau's Four Mile House, also known as the Reitman House, was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. Blau's Four Mile House is outside of the I-471 Corridor study area.

Blenk House (CP-53), Four and Eight Mile Road, Alexandria
The Blenk House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Blenk House is outside of the I-471 Corridor study area.

Braun House (CP-64), Eight Mile Road, Camp Springs
The Braun House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Braun House is outside of the I-471 Corridor study area.

Camp Spring House (CP-71), Four Mile Pike, Camp Springs
Camp Spring House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. Camp Spring House is outside of the I-471 Corridor study area.

Campbell County Courthouse at Newport (CPN-142), 4th and York Streets, Newport
The Campbell County Courthouse at Newport was listed on the National Register in 1988 with a boundary of one acre. See Exhibit 1 for its location within the I-471 Corridor study area.

Newport's Courthouse Square has been the seat of justice for more than two centuries. The first courthouse was completed in 1797. It was replaced in 1815. By the late 1870s, the second courthouse had fallen into disrepair and planning began for a third courthouse. By 1884, the third and present-day courthouse had been completed.

Campbell County is one of the two Kentucky counties which maintain dual county seats. Although Newport was the county's original seat of government, a second courthouse was established in the centrally-located community of Alexandria. The Newport courthouse contains the county's main offices, as well as the district and circuit courts.

The present-day Campbell County Courthouse, built circa 1883-1884 with an addition in 1912, is a primary landmark in the city of Newport. Significant architectural elements include a tall bell tower, eclectic masonry details, interior marble staircase, and a cathedral glass window. Its design represents the major work of A.C. Nash, a prominent Cincinnati architect. It is also associated with L.H. Wilson, a Newport architect.

Cote Brillante Historic District, Newport

The Cote Brillante Historic District was listed on the National Register in 2005 with a boundary of 29 acres. The district contains 127 contributing and 6 non-contributing buildings or structures. See Exhibit 1 for its location within the I-471 Corridor study area.

The Cote Brillante's period of significance begins in 1889 with the platting of the subdivision and ends in 1950. Typical of towns along the Ohio River, Newport's early growth was concentrated along the river front in the lowlands. In 1872, the Louisville, Cincinnati, and Lexington Railroad opened its new bridge across the Ohio River, connecting Newport and Cincinnati. Newport began to expand and to develop new suburbs, including Ingalls Park and Cote Brillante. Cote Brillante was established east of Newport on a hillside which overlooked both Newport and Cincinnati. The main promoter of the new development was Samuel Bigstaff (1845-1912), a Confederate veteran and lawyer, who had embarked upon a career as Newport's most prominent real estate speculator. He was the executor of the vast General James Taylor estate and was instrumental in the platting of Mansion Hill and the eastern Gateway areas which would eventually be annexed by the city. Bigstaff borrowed the name of a St. Louis neighborhood which was derived from the French words for "shining hill", a term which commemorated a Native American Indian mound. The developers wished to create a new middle class suburb which had easy access to Newport, Covington, and Cincinnati. A portion of the neighborhood, known as Ingalls Park, abutted Cote Brillante and was included in the National Register district. The largest property erected in Cote Brillante is the mansion built by the widow of Newport brewer George Wiedemann, but occupied by her son, Charles Wiedemann (1867-1928).The Wiedemann House was listed on the National Register as an individual property in 1984. Most of the dwellings in the district were built prior to 1910 and include examples of Italianate, Colonial Revival, and Craftsman styles. The neighborhood was primarily German Catholic and worshiped at St. Steven's Church in Newport. Cote Brillante was annexed by Newport in 1936.

Dayton High School (CPD-15), 8th and Walnut Streets, Dayton

Dayton High School, also known as the Old Dayton High School, was listed on the National Register in 1985 with a boundary of one acre. See Exhibit 1 for its location within the I-471 Corridor study area.

The former Dayton High School building is a three-story structure which features elements of Collegiate-Tudor Revival architectural style. The school was built rapidly circa 1924-25 on the same site of a school from the 1890s which had burned down. The school was so important to the community that funds for the gymnasium-auditorium were raised voluntarily when the School Board decided that it could not afford to incorporate these elements within the building program. It is believed that the architects were E.C. Landberg and Associates from Newport. Dayton is a fairly old, close-knit, largely German-Catholic community and the high school was used for over fifty years until a replacement was completed nearby in 1982-83. At the time of the National Register nomination, its proposed reuse was to be apartments.

East Newport Historic District, Newport

The East Newport Historic District includes approximately 1,000 buildings and 115 acres within its boundaries. The district was listed on the National Register in 1983. See Exhibit 1 for its location within the I-471 Corridor study area.

The East Newport Historic District is Newport's largest and most intact collection of historic architecture and is the city's best preserved 19th century neighborhood. The district, which reflects Newport's greatest period of expansion and prosperity from 1870 to 1900 contains many fine examples of a variety of architectural styles, including Italianate, Queen Anne, Colonial Revival, and American

Foursquare. Homes in the East Newport District were built by German craftsmen who were masters of brick, stone, and wrought iron construction.

During the settlement era, present-day Newport was first a staging area and supply post for several significant military campaigns. It then became a bustling river boat and commercial center. In 1837, James Taylor, whose father had purchased 2,500 acres at the confluence of the Ohio and Licking Rivers in 1780, built a mansion which overlooked the Ohio River and included most of present-day Newport as its back yard.

Until circa 1870, Newport's development was limited to the "Original Plan" or the historic heart of the city. Beyond the city's eastern boundary (present-day Washington Avenue), lay the vast undeveloped acreage of the Taylor estate. During the 1870s, the Taylor family began to sell plots from its land holdings with the stipulation that a house be built on each lot within two years. The new subdivisions which were platted included the James Taylor East Row Addition (1870-1899); Taylor's Heirs Addition (1899-1927); Bellevue Addition (1875-1884); the new Bellevue Addition (1875-1890); the Turnpike Addition (1874-1884); and the Mansion Hill Addition (circa 1882).

John Faha House (CP-79), Lower Tug Fork Road, Alexandria

The John Faha House, also known as the Pelle House, was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Faha House is outside of the I-471 Corridor study area.

Fairfield Avenue Historic District, Bellevue

The Fairfield Avenue Historic District, which includes 106 buildings, was listed on the National Register in 1988. See Exhibit 1 for its location within the I-471 Corridor study area.

The Fairfield Avenue Historic District contains a diverse collection of buildings dating from circa 1880 to 1933. It is unique in Northern Kentucky in its blend of commercial and residential architecture. Fairfield Avenue, known as "The Avenue" by the residents, is the most important gateway or entry to City of Bellevue, carrying KY 8 eastward from Newport to Dayton. The development of Fairfield Avenue was determined by the unique topography of the street. As part of the Ohio River terrace, the north side of the street is level. As a result, the buildings on the north side of the street (both commercial and residential) have shallow or no setbacks. On the south side, which includes a sharp rise in elevation, most residential buildings were built on the crest of the slope, with long, deep front yards. The setback provided greater privacy for homeowners. Most of the district's substantial dwellings were built on the south side. Commercial structures were built at the front lot lines to have greater visibility and easier access. The western edge of the district contains part of the city's early (pre-1885) development and the street's earliest buildings are located there.

Foote-Fister Mansion (CPB-22), 801 Lincoln Road, Bellevue

The Foote-Fister Mansion, also known as Fister Mansion, was listed with a boundary of 2.2 acres on the National Register in 1988. See Exhibit 1 for its location within the I-471 Corridor study area.

The Foote-Fister Mansion, built by a descendant of James Taylor, dates from circa 1870 and was one of the first houses to be built in the Bellevue vicinity. The property possesses area-wide significance as one of Northern Kentucky's few surviving Victorian-era estates. It is also notable as one of the three surviving dwellings built by members of the Taylor family, founders and developers of the City of Bellevue. At one time, the Taylor family were the largest landowners in Northern Kentucky, owning property which included the present-day cities of Newport, Bellevue, and Southgate.

The earliest deeds to the Foote-Fister property were not recorded. The first recorded deed was a transfer to Gus J. Fister in 1894. The Fisters were related by marriage to the Taylors. Gus Fister was one of the partners in the Bellevue-Dayton Land Company, a syndicate that developed the hillside areas of south Bellevue at the turn of the century. The nomination noted that the dwelling retained much of its original ornamentation, but was in deteriorated condition.

Fort Thomas Military Reservation District, Fort Thomas

The Fort Thomas Military Reservation District, also known as The Post and The Fort, was listed on the National Register in 1986 with a boundary which includes 35 buildings and 61 acres. See Exhibit 1 for its location within the I-471 Corridor study area.

The Fort Thomas Military Reservation District is located within Tower Park, but does not include the entire park, excluding wooded hillsides and the areas to the north and east which contain the Army Reserve Building and the Field and Track area. The district includes the Fifth Barracks Building built in 1935 (the present-day Veterans' Administration Hospital Nursing Home); the Drill Hall or Gymnasium dating from 1896; Commandant's Quarters and other administrative officers' quarters; Officers Row on Greene Street; Non-Com Row on Pearson Street; the Mess Hall built in 1891 (which was listed on the National Register as an individual property in 1980); the stable; the Fort Thomas Water Tower; and the Alexander Circle area. The existing buildings in the district represent a considerable portion of the permanent structures built during the Army post's existence from 1887 until 1964.

Gubser-Schuchter Farm (CP-81), Four Mile Pike Area, Camp Springs

The Gubser-Schuchter Farm, also known as the Mincey Farm, was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Gubser-Schuchter Farm is outside of the I-471 Corridor study area.

Heiert Farm (CP-65), Upper Eight Mile Pike, Camp Springs

The Heiert Farm was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Heiert Farm is outside of the I-471 Corridor study area.

Elijah Herndon House (CP-45), Washington Trace Road, California

The Elijah Herndon House was listed on the National Register in 1983. The Herndon House is outside of the I-471 Corridor study area.

Hilbert Farm (CP-58), Gunkel Road, Camp Springs

The Hilbert Farm was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Hilbert Farm House is outside of the I-471 Corridor study area.

Thomas and Mary Jones House (CPN-261), 15th and Monmouth Streets, Newport

The Jones House, also known as Mount Saint Martin, was listed on the National Register in 1979, but has been demolished.

Kort Grocery (CP-63), Four Mile Pike, Camp Springs

The Kort Grocery was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Kort Grocery is outside of the I-471 Corridor study area.

Frederich Kremer House (CP-80), 317 Poplar Ridge Road, Alexandria
The Frederich Kremer House, also known as Stony Vista, was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Frederich Kremer House is outside of the I-471 Corridor study area.

Matthais Kremer House (CP-59), Four and Twelve Mile Pike, Camp Springs
The Matthais Kremer House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Matthais Kremer House is outside of the I-471 Corridor study area.

Nicholas Kremer House (CP-55), Four and Twelve Mile Pike, Alexandria
The Nicholas Kremer House, also known as the Williams House, was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Nicholas Kremer House is outside of the I-471 Corridor study area.

Leick House (CP-91), Four Mile Pike, Camp Springs
The Leick House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Leick House is outside of the I-471 Corridor study area.

Mansion Hill Historic District, Newport
The Mansion Hill Historic District, also known as Mansion Hill, was listed on the National Register in 1980 with a boundary encompassing 373 major buildings and 49 acres. See Exhibit 1 for its location within the I-471 Corridor study area.

The overwhelming majority of the buildings within the district were built for one- or two- family use. Only thirteen of the structures were built as commercial buildings. One of the commercial structures is a large three-story factory in which watch cases were manufactured in the 1880s. There are eight apartment buildings and one school.

Present-day Newport was part of a 2,500-acres owned by James Taylor of Virginia in 1780. By 1804, an Arsenal, Magazine, and Barracks, the first structures of the "Newport Barracks", had been erected the land at the confluence of the Licking and Ohio Rivers. Access to the Ohio River fostered an economy in Newport which was based on iron and steel production. After the Civil War, Newport began to grow outward to the south and the east from its "Original Plan". The Original Plan is the core area whose 180 lots were platted in 1792, four years after Newport's founding. The Original Plan extended south from the Ohio River to present-day Fifth Street (then called Madison Street), and east from the Licking River to present-day Washington Avenue (then called East Row).

Most of the land east of East Row, including the General James Taylor House (Bellevue), was owned by the Taylor family. By the late 1870s, Newport's expansion to the south had been stifled by steep hillsides. Colonel James Taylor, the son of General James Taylor, began subdividing his land holdings The first development was James Taylor's East Row Addition which was the first subdivision in the present-day Mansion Hill Historic District. Lots in the Mansion Hill Addition were sold as early as 1882, but few houses were built until East Third Street was extended east from Washington Avenue. Almost all of the houses in the Mansion Hill Addition date from the 1890s. R.W. Nelson began to acquire land for the Nelson Place Addition in 1886 and the first lot was sold in 1896.

The oldest house in the district is Bellevue, also known as the General James Taylor House, which was completed circa 1837. It was altered extensively in 1890. Two other dwellings, the Saunders Mansion at

Fourth and Washington and a large Italianate dwelling at 522 Overton date from 1873 and 1874, respectively and predate the major subdivision of the Taylor estate.

The typical dwelling from the 1880s is a tall, boxy, two-and-one-half-story structure with horizontal, bracketed cornices and rectangular, segmentally arched windows. A local soft brick was used for exterior walls and stone lintels are common, usually with Eastlake detailing. The most prevalent form of this house has a two-bay main facade. The main entrance is on the side facade and leads into a vestibule and stairwell between the front room (parlor) and the second room. A less-common form has a three-bays with the entry on one or the other sides of the main facade.

By the 1890s, fewer two-bay houses were built. Until 1900, the houses reflected an eclectic combination of many architectural styles with turrets, towers, bays, oriels, ornate porches, steep wall gables, complicated roof lines, finials, and asymmetrical arrangements of elements. Facades are pressed brick and roofs are covered with slate.

During the first decades of the twentieth century, houses became more horizontal and cube-like. Simpler Colonial Revival or Classical Revival elements reappeared as Greek porches or Palladian windows. Ornamentation was severely limited.

Mansion Hill Historic District (Boundary Increase), Newport

The Mansion Hill Historic District (Boundary Increase), which includes 50 contributing buildings within a boundary of 6 acres, was listed on the National Register in 1985. See Exhibit 1 for its location within the I-471 Corridor study area.

The Mansion Hill Extension contains an architecturally significant, diverse group of buildings dating from circa 1845 to 1900. Most of the Mansion Hill Extension is located in the extreme southeast corner of the Original Plan. The area within the district is architecturally consistent with the Mansion Hill Historic District and is considered locally to be part of the Mansion Hill neighborhood.

Monmouth Street Historic District, Newport

The Monmouth Street Historic District, which contains 143 properties and covers 8 acres, was listed on the National Register in 1996. See Exhibit 1 for its location within the I-471 Corridor study area.

In the years after the Civil War, industrial expansion and transportation improvements, including a railroad, a streetcar system, and two Ohio River bridges, brought prosperity to Newport. As the city expanded in the third quarter of the nineteenth century, its land use patterns shifted. By the 1860s, Monmouth Street had begun to replace York and Front Streets as the city's commercial center. York Street, because of its proximity to the courthouse, remained a location for professional offices. Retailing and services were concentrated on Monmouth Street. The majority of the businesses were located between Fifth and Seventh Streets.

The Monmouth Street District meets criterion A and is significant in the area of Commerce for its importance as the commercial and financial center of Newport and Campbell County. Its period of significance begins circa 1830 with the construction of the oldest contributing building and concludes in 1950 with the city's population decline and construction of a shopping center on the edge of town. Through the mid-twentieth century, Monmouth Street served as the "Main Street" of Campbell County.

Newport and Cincinnati Bridge (CPN-153), Ohio River, Newport

The Newport and Cincinnati Bridge, also known as the Louisville and Nashville Bridge, was listed on

the National Register in 2001. See Exhibit 1 for its location within the I-471 Corridor study area. The Louisville and Nashville (L&N) Bridge spans the Ohio River between the Daniel Beard (I-471) Bridge to the east and the Taylor-Southgate-Bridge to the west, linking the cities of Newport, Kentucky and Cincinnati, Ohio. The structure possesses the unique status of being the only bridge designed and built for dual highway and railroad use in the Commonwealth of Kentucky. Its present configuration consists of both adjacent and connected roadway and railroad trusses with a pedestrian walkway between suspended between them. Construction on the present-day bridge was completed in February 1897 by the Newport and Cincinnati Bridge Company. The only elements retained from an earlier 1872 structure were the limestone piers.

Ort-Heeb Farm (CP-51), Four Mile Pike, Alexandria
The Ort-Heeb Farm, also known as Sandfos Farm, was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Ort-Heeb Farm is outside of the I-471 Corridor study area.

The Posey Flats (CPN-148), 101-103 E. Third Street, Newport
The Posey Flats, two apartment buildings with a boundary of less than an acre, was listed on the National Register in 198, but has been demolished.

Reitman House (CP-78), Reitman Road, Alexandria
The Reitman House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Reitman House is outside of the I-471 Corridor study area.

Reitman's St. Joseph House (CP-60), Four Mile Pike, Camp Springs
Reitman's St. Joseph House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. Reitman's St. Joseph House is outside of the I-471 Corridor study area.

Andrew Ritter Farm (CP-92), Four Mile Pike, Alexandria
The Andrew Ritter Farm was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Andrew Ritter Farm is outside of the I-471 Corridor study area.

Roth Farm (CP-68), Lower Eight Mile Road, Camp Springs
The Roth Farm was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Roth Farm is outside of the I-471 Corridor study area.

Sacred Heart Church (CPB-11), 337 Taylor Avenue, Bellevue
Sacred Heart Church, also known as Herz Jesu Kirche, was listed on the National Register in 1974. See Exhibit 1 for its location within the I-471 Corridor study area.

The first church on the site was completed in 1874 and served a Roman Catholic parish which was half German and half Irish. The present-day church was built in 1892-93. Its original name was Herz Jesu Kirche because it ministered to a population which was increasingly German-speaking. An English-speaking (predominantly Irish) congregation had established the rival St. Anthony's Church in 1889. The architecture of Sacred Heart Church, designed by Cincinnati architect Louis Pickett, is traditionally associated with the Cologne Cathedral, but it also has associations with provincial Bavarian churches. The tower and high nave of the church are conspicuous landmarks of Bellevue, but its interior is considered its most important feature. It preserves the character of a typical late nineteenth century

German Gothic church with an emphasis on tall, slender columns which divide the nave and aisles. Sacred Heart also has preserved lavish adornment in its wood-carving, plaster work, and frescoes.

Salem Methodist Episcopal Church and Parsonage (CPN-39), 810 York St., Newport

Salem Methodist Episcopal Church, also known as Salem United Methodist Church and Salem Methodist Church was listed on the National Register in 1986. See Exhibit 1 for its location within the I-471 Corridor study area.

The church was organized in 1847 by a small group of German families. The small congregation met in a frame structure on Todd Street (present-day Sixth Street) from 1848 until 1854. Most of the services were conducted entirely in German, and the church is identified on old city maps as "Salem Kirche" or "German Church". In 1854, the Salem church built a more substantial building on the corner of West Seventh and Mayo Streets. In 1881, a new site was chosen and Hannaford engaged as the architect. The church's cornerstone was laid in 1882. By the early twentieth century, the church's German associations began to decline. The use of the German language in services was discontinued during the wave of patriotic (and anti-German) fervor that accompanied World War I.

The Salem Methodist Church is a central Newport landmark because its location on the highest point in the city's West End gives it great visual prominence. Both the church and the adjacent pastor's house are works of Samuel Hannaford, a significant Cincinnati architect. Hannaford was a prolific designer who worked in a wide variety of styles, but the Salem Methodist Church appears to be his only surviving ecclesiastical building executed in the Gothic style. The church is also significant because of its long association with the German-American community of Newport.

August Sauer House (CPN-401), 832 Central Avenue, Newport

The August Sauer House was listed on the National Register in 1997. See Exhibit 1 for its location within the I-471 Corridor study area.

The Sauer House appears to have been built circa 1886 by August Sauer, a plasterer by trade, who lived here for forty years. The August Sauer House is significant as a distinguished example of the Queen Anne style. The house represents the style as interpreted by local builders for middle-class clients during the mid 1880s through the early 1900s. The house retains many original features, including elaborate interior appointments. Most of the alterations have been minor. The property retains one of the few carriage houses in the city.

Sauser Farm (CP-73), Upper Tug Fork Road, Alexandria

The Sauser Farm was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Sauser Farm is outside of the I-471 Corridor study area.

Joseph Seiter (CPB-20), 307-309 Berry Avenue, Bellevue

The Joseph Seiter House was listed on the National Register in 1986. See Exhibit 1 for its location within the I-471 Corridor study area.

The Joseph Seiter House is significant for its association with a prominent early resident of Bellevue who played a pioneering role in the development of the city from 1868 until his death in 1903. In 1867, Seiter purchased a tract of undeveloped land from Albert S. Berry which was to become Seiter's Addition. Although the Seiter House has undergone alterations, it remains one of the more elaborate and stylish Queen Anne residences in the city.

Southgate-Parker-Maddux House (CPN-147), 24 E. Third Street, Newport
The Southgate-Parker-Maddux House, also known as Knights of Columbus Hall, was listed on the National Register in 1977. See Exhibit 1 for its location within the I-471 Corridor study area.

The Southgate-Parker-Maddux House (Knights of Columbus) is significant for its association with Colonel Richard Southgate who lived here from 1812 until 1857. Richard Southgate (1773-1857) purchased land in Kentucky in 1792 and moved here no later than 1795. He was licensed to practice law in Campbell County in 1797 and was appointed Commonwealth attorney in 1798. Southgate became a significant landowner in northern Kentucky. In addition to his land speculation, he also owned a dry goods store in Newport.

The second owner of the house, from 1857 until 1869, was Mrs. Frances Mary Taliaferro Parker who inherited the property from her father, Richard Southgate.
The house was significantly altered after the Civil War by the addition of a third story with a mansard roof and entrance tower. During most of its first one hundred years, the dwelling was owned by a member of the Southgate family, after whom the nearby community of Southgate was named.

St. John's Lutheran Cemetery (CP-74), Upper Tug Fork Road, Alexandria
St. John's Lutheran Cemetery was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. St. John's Lutheran Cemetery is outside of the I-471 Corridor study area.

St. John the Baptist Roman Catholic Church (CP-1), 641 Licking Pike, Wilder
St. John the Baptist Roman Catholic Church was listed on the National Register in 1980. See Exhibit 1 for its location within the I-471 Corridor study area.

St. John the Baptist Roman Catholic Church is located in the tiny community of Johns Hill. Built in 1858, the nave plan church is two-stories in height and seven bays deep. Built of coursed rubble stone, the central entrance is set within a slightly projecting pavilion. Above the entry is a frame bell tower.

St. Joseph's Catholic Church and Cemetery (CP-62), Four Mile Pike, Alexandria
St. Joseph's Catholic Church and Cemetery was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. St. Joseph's Catholic Church and Cemetery is outside of the I-471 Corridor study area.

St. Paul's Episcopal Church (CPN-151), 15 Court Place, Newport
St. Paul's Episcopal Church was listed on the National Register in 1980. See Exhibit 1 for its location within the I-471 Corridor study area.

St. Paul's Episcopal Church was organized in 1844. The present church is the second one on the site. Designed by J.R. Neff and completed in 1871, St. Paul's is an example of the effect of the impact of the Gothic Revival on church architecture in Kentucky. Built of rough cut stone, the church has a buttressed entrance tower and sides as well as a nave plan with an end transept.

St. Vincent de Paul School (CPN-260), 117 Main Street, Newport
St. Vincent de Paul School was listed on the National Register in 1989 with a boundary of 1.2643 acres. See Exhibit 1 for its location within the I-471 Corridor study area.

The present-day St. Vincent de Paul Parish in Clifton was originally part of Newport's St. Stephen parish.

In 1910, several residents of Clifton organized to request their own parish and to build a church-school. They organized the St. Anthony's Men's Society and the St. Ann's Ladies Society to raise funding. In 1916, Father Herman Wetzel was appointed to manage the building project. An architect, Harold McClory, was hired to design a building which would be suitable for use as both a church and a school. The cornerstone was laid in April 1916. The two-and-one-half-story, brick building consisted of two large classrooms on the second floor, a church with a capacity for 250 people on the first floor, and a basement playground. In 1927, a wing was added to the original building. As the parish continued to grow, a rectory was built in 1922. In 1923, a basement church with the capacity for 420 people was built. This structure was intended to serve as the foundation for a separate church building, but the new church was not completed until 1957. The school building was closed in 1984 due to the reorganization of the Catholic schools in Newport.

The St. Vincent de Paul School Building is significant as a good example of an architectural style known as Jacobean Revival due to its presence on an educational structure. Jacobean Revival was popular in the early twentieth century for schools, especially college campuses. The style of St. Vincent de Paul School can be related to more pervasive architectural trends in domestic and commercial architecture popular in the years 1915 to 1925. These influences can be traced to the Craftsman style . Among Catholic schools in the Newport area, this building is the only example of the design mode and retains a high degree of integrity. The school building is important for showing local acceptance among Catholic Church officials for secular design styles which were tremendously popular and malleable during the years immediately before and after World War I.

Taylor's Daughters Historic District, Newport

Taylor's Daughters Historic District was listed on the National Register in 1988. The district contains 1165 buildings and occupies approximately 140 acres in central Bellevue. See Exhibit 1 for its location within the I-471 Corridor study area.

The Taylor's Daughters Historic District represents the historic core of Bellevue. The name of the river town is derived from the James Taylor family, which named many of the streets after their daughters and granddaughters during the post Civil War era . Examples include Berry, Washington, Foote, Ward, Van Voast, O' Fallon, and Taylor.

The Taylor's Daughters District, built primarily between circa 1885 and 1910, is large and diverse. Most of the buildings in the district are built close to the front lot lines, with shallow setbacks. Single and duplex residences predominate. In the district, frame construction was utilized by most of the vernacular houses and brick by the more stylish. The most prevalent style in the district is the T-plan, built in the 1880s and ornamented by Victorian vernacular. Eastlake or spindlework entry porches are common. Many of these houses feature alternating bands of clapboard and decorative wood shingles. Another common house type from this period is the "Newport-Covington House" which is basically a local interpretation of the Italinante style. These narrow, two-bay townhouses with side gabled roofs stand two-and-one-half stories high. Many have side entrances which are contained in shallow ells.

Third Street Motor Car Company Building (CPN-409), 216 E. 3rd Street, Newport

The Third Street Motor Car Company Building was listed on the National Register in 2002. See Exhibit 1 for its location within the I-471 Corridor study area.

The Third Street Motor Car Company was built in 1916. For the next decade, the Third Street Motor Car Company, an automobile dealership and garage, operated at 216 East Third Street. In the 1930s, the Third Street building became the home of the Newport Auto Service Garage, which occupied the

building until 1945.

The Third Street Motor Car Company meets criterion C. It is architecturally significant as a well-preserved and locally uncommon example of the small-scale, utilitarian structures built to display and service cars. By the early twentieth century, the automobile had gained widespread availability and acceptance in American life. These early showrooms and garages are generally simple on character, modest in scale and horizontal in orientation. They are similar in form and detailing to other commercial and industrial resources of the era, in particular, livery stables and warehouses.

Tiemeyer House (CP-89), KY 8, Melbourne
The Tiemeyer House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Tiemeyer House is outside of the I-471 Corridor study area.

Trutschell House (CP-87), KY 8, Melbourne
The Trutschell House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Trutschell House is outside of the I-471 Corridor study area.

Trutschell House (CP-88), KY 8, Melbourne
The Trutschell House, also known as the DeMoss House, was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Trutschell House is outside of the I-471 Corridor study area.

U.S. Army Fort Thomas Mess Hall (CPFT-44), Cochran Avenue, Fort Thomas
U.S. Army Fort Thomas Mess Hall was listed on the National Register in 1980 and was also included within the Fort Thomas Military Reservation District which was listed on the National Register in 1986. See Exhibit 1 for its location within the I-471 Corridor study area.

The Fort Thomas U.S. Army Mess Hall is an example of the well-designed institutional architecture of the late nineteenth century. For 53 years, between 1887 and 1940, this post served as headquarters for the Southern Division of the U.S. Army and played an important role in the development of the city of Fort Thomas.

The site for the U.S. Army's first permanent base in the vicinity of northern Kentucky and southern Ohio was Fort Washington which was completed in 1789. By 1803, the nearby community of Cincinnati had grown and the threat of Indian attacks had diminished. The Army left the northern shore of the Ohio River and re-established its headquarters in the Newport Barracks, a six-acre site on the eastern bank of the Licking River near its confluence with the Ohio River.

Frequent flooding of the site created the need for the Barracks to be relocated to higher ground. General Phillip Sheridan visited the area and approved the purchase of property four miles to the south which overlooked the rivers. Congress appropriated the funding for the purchase of land and construction in 1887. The construction period lasted from 1888 to 1894 with most buildings completed by 1892. The Mess Hall was in constant used until the Veterans' Administration obtained the property after World War II.

Uebel House (CP-76), Upper Tug Fork, Alexandria
The Uebel House, also known as Stephen's House, was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Uebel House is outside of the I-471 Corridor study area.

Walter House (CP-56), Gunkel Road, Melbourne
The Walter House was listed on the National Register in 1983 as part of the German Settlement Area Multiple Resources Area nomination. The Walter House is outside of the I-471 Corridor study area.

Charles Wiedemann House (CPN-249), 1102 Park Avenue, Newport
The Wiedemann House, also known as Wiedemann Mansion was listed on the National Register in 1984 with a boundary of 5.6 acres. See Exhibit 1 for its location within the I-471 Corridor study area.

The Charles Wiedemann House was built circa 1893-1895 for Agnes Rohmann Wiedemann, widow of George Wiedemann, Sr., the founder of the George Wiedemann Brewing Company of Newport. It was occupied for almost thirty years by George Wiedemann's eldest son, Charles Wiedemann. In 1890, Charles Wiedemann took over the leadership of the brewing company, which had been established in Newport in the 1870s. He continued to expand the firm while maintaining its high quality of its product until Prohibition. The family-controlled firm was absorbed by a Wisconsin brewery in 1967 which closed the Newport plant in 1983.

Wiedemann chose a site which overlooked the entire Cincinnati-Northern Kentucky basin at the juncture of the Ohio and Licking Rivers as well as the Wiedemann Brewery. The design of the house is attributed to Samuel Hannaford and Sons, a leading Cincinnati architectural firm. The design of the house retains late Victorian features, with Richardsonian Chateauesque, Queen Anne, and Colonial Revival elements.

After being owned by the Wiedemann family for several generations, the dwelling was acquired by the Diocese of Covington in the 1950s as a residence for Bishop William T.
Mulloy.

York Street Historic District, Newport
The York Street Historic District, which contains 64 buildings, was listed on the National Register in 1995 with a boundary of seven acres. See Exhibit 1 for its location within the I-471 Corridor study area.

Many of Newport's wealthiest citizens and government leaders once lived in the three block area included in the York Street Historic District. The district contains a solid inventory of locally typical middle- and upper-class domestic architecture of the second half of the nineteenth century, as well as some more notable examples of domestic, institutional, and commercial architecture. While most of the buildings reflect the Greek Revival and Italianate styles, there are also examples of Second Empire, Gothic Revival, Queen Anne, and Neo-Classical Revival architecture. The district's period of significance extends from 1848 to 1939.

The York Street District contains an unrivaled collection of Greek Revival residences. Greek Revival houses are scattered through central and west Newport, but no other part of the city displays so many intact examples of the mid-nineteenth century style. At one time, many Greek Revival houses stood along the waterfront and on the fringes of downtown, but most have been lost to urban renewal and flood wall construction.

By the 1860s, the Italianate style overtook Greek Revival and remained popular until the early 1880s. The Newport Italianate houses combine classical symmetry with a new emphasis on verticality and more varied ornamentation. Nearly all Newport Italianate houses feature bracketed cornices and are built on the side-passage or Covington-Newport floor plan.

By the mid-1880s, Queen Anne houses became popular. These dwellings were complex in plan, eclectic in ornamentation, and incorporated a variety of textures and materials. Newport Queen Anne houses employ decorative masonry, varied window forms, art glass, and one or more ornate porches.

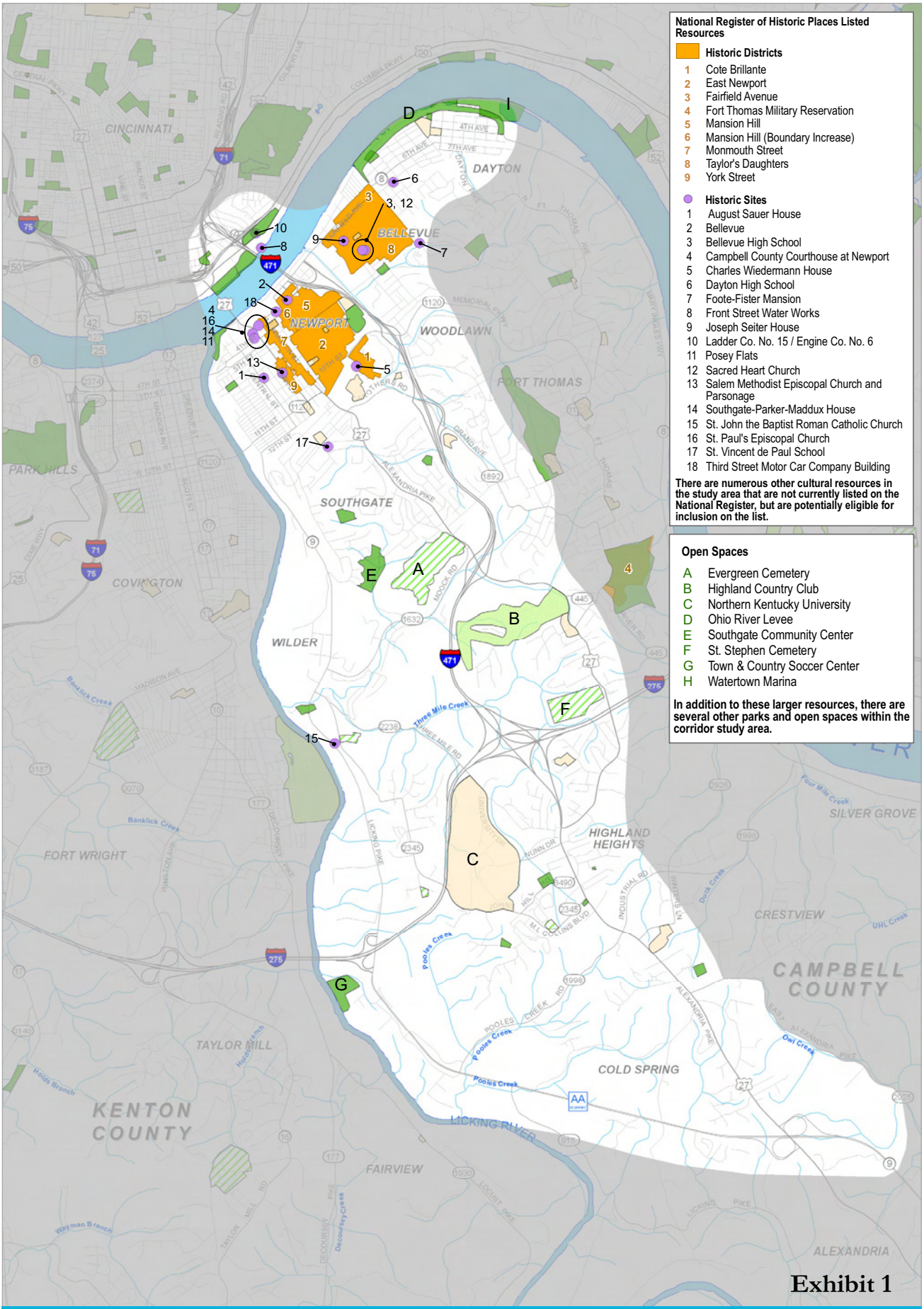
National Register of Historic Places Listed Resources
Historic Districts
1 Cote Brillante
2 East Newport
3 Fairfield Avenue
4 Fort Thomas Military Reservation
5 Mansion Hill
6 Mansion Hill (Boundary Increase)
7 Monmouth Street
8 Taylor's Daughters
9 York Street
Historic Sites
1 August Sauer House
2 Bellevue
3 Bellevue High School
4 Campbell County Courthouse at Newport
5 Charles Wiedermann House
6 Dayton High School
7 Foote-Fister Mansion
8 Front Street Water Works
9 Joseph Seiter House
10 Ladder Co. No. 15 / Engine Co. No. 6
11 Posey Flats
12 Sacred Heart Church
13 Salem Methodist Episcopal Church and Parsonage
14 Southgate-Parker-Maddux House
15 St. John the Baptist Roman Catholic Church
16 St. Paul's Episcopal Church
17 St. Vincent de Paul School
18 Third Street Motor Car Company Building
There are numerous other cultural resources in the study area that are not currently listed on the National Register, but are potentially eligible for inclusion on the list.
Open Spaces
A Evergreen Cemetery
B Highland Country Club
C Northern Kentucky University
D Ohio River Levee
E Southgate Community Center
F St. Stephen Cemetery
G Town & Country Soccer Center
H Watertown Marina
In addition to these larger resources, there are several other parks and open spaces within the corridor study area.
CINCINNATI
DAYTON
BELLEVUE
NEWPORT
WOODLAWN
FORT THOMAS
PARK HILLS
SOUTHGATE
COVINGTON
WILDER
FORT WRIGHT
HIGHLAND HEIGHTS
SILVER GROVE
CRESTVIEW
CAMPBELL COUNTY
TAYLOR MILL
COLD SPRING
KENTON COUNTY
FAIRVIEW
ALEXANDRIA
Three Mile Creek
Poole's Creek
Owl Creek
LICKING RIVER
Legend
Streets and Roads
Rivers and Streams
Historic Districts
Historic Sites
Golf Course
Cemetery
Schools and Institutions
Parks and Open Spaces
Study Area
Campbell County
OKI Eight County Region
Environmental Resources
October 2006
0 0.25 0.5 1 Miles
Source: National Register of Historic Places and OKI, 2006

Exhibit 1

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Appendix E

Project Management Team Record of Decisions

I-471 Corridor Study
Project Management Team
Record of Decision

Record of Decision Description	Action	Comments
ROD #1 ***August 9, 2006***		
Study Area Approval of study area, following modification to the map presented.	consensus	
ROD #2 ***August 9, 2006***		
Advisory Committee Approval of list of Advisory Committee member agencies to invite to participate.	consensus	
ROD #3 ***August 9, 2006***		
Voting Approval that PMT decisions will be made by consensus.	consensus	
ROD #4 ***August 9, 2006***		
Logo Approval of use of study logo.	consensus	
ROD #5 ***August 9, 2006***		
Web Site Approval to secure www.471study.org and www.471study.com for a 3-year period.	consensus	
ROD #6 ***September 27, 2006***		
Goals and Objectives Concurrence with the goals for the study.	consensus	
ROD #7 ***January 17, 2007***		
Traffic Signalization Optimization Plan Concurrence with the plan.	consensus	
ROD #8 ***October 24, 2007***		
Access Management Plan Consensus that the access management recommendations be advanced for further study.	consensus	
ROD #9 ***October 24, 2007***		
Phase II IMS Concurrence with the recommendation to advance the I-471/I-275 interchange with an I-275/NKU full access interchange replacing the I-275/Three Mile Road interchange to Phase II of the study.	consensus	
ROD #10 ***March 3, 2008***		
Project Prioritization Concurrence with presenting the project listing to the Advisory Committee and public.	consensus	
ROD #11 ***May 2, 2008***		
Project Prioritization Concurrence with the final project prioritization listing.	consensus	Approval requested by e-mail. Adopted by virtue of no adverse comments by May 2 deadline. Prioritization will be incorporated into the final report.

Appendix F

City of Newport Resolutions, 2007 and 2008, Relating to the I-471 Corridor Study

COMMISSIONERS RESOLUTION NO. R-2007-072

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE CITY OF NEWPORT, KENTUCKY, OPPOSING THE CLOSING OF EXIT AND ENTRANCE RAMPS AT MEMORIAL PARKWAY (10th STREET) AND GRAND AVENUE ON I-471 IN THE CITY OF NEWPORT, KENTUCKY.

WHEREAS, the City of Newport has consistently moved forward with the redevelopment of the City's urban core to become a symbol of urban economic growth and redevelopment in the region; and

WHEREAS, the City's Newport on the Levee and the Newport Aquarium attract approximately 4 million visitors a year to the City; and

WHEREAS, more than $1 billion in development is on-going in the City, including the Ovation Project, Newport Pavilion and the Southshore Condominium Project; and

WHEREAS, the existing development and the projects under development at this time have created thousand of jobs in the City and will create thousands more which jobs significantly contribute to the local and regional economy; and

WHEREAS, the existing development and the projects under development are the result of partnering with federal. State and local government in the form of rebates, abatements, loans and grants which will all be for naught if there are ramp closures; and

WHEREAS, the cities of Fort Thomas, Bellevue and Dayton are equally dependent on these ramps for similar redevelopment as well as the primary access points of ingress and egress for their residents; and

WHEREAS, the initial critical point addressing such project developments is the traffic flow planning and placement of an improved connections with the surrounding area not the elimination of connections;

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners of the City of Newport, Kentucky, as follows:

SECTION 1. That the City of Newport opposes the closure of exit and entrance ramps at Memorial Parkway (10th Street) and Grand Avenue along the I-471 corridor through the City as is being discussed under the I-471 PMT Agenda and the City immediately requests that OKI, the Commonwealth of Kentucky and the Kentucky Department of Transportation continue planning for improved access points along this corridor rather than their elimination.

SECTION 2. That this Order shall be signed by the Mayor, attested by the City Clerk, recorded and effective upon adoption.

ADOPTED: November 5, 2007

~~MAYOR THOMAS L. GUIDUGLI~~
VICE MAYOR JERRY PELUSO

ATTEST:

Q. EVONE BRADLEY
CITY CLERK

April 7, 2008

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE CITY OF NEWPORT, KENTUCKY OPPOSING THE ADDITION OF A FOURTH LANE ON I-471 IN THE CITY OF NEWPORT, KENTUCKY

WHEREAS, it is evident that a majority of the rush hour traffic on I-471 comes from eastern Hamilton County and Clermont County, Ohio; and

WHEREAS, the previous OKI Eastern Corridor Study does not recommend the addition of a fourth lane on I-471 through the City of Newport to handle this traffic; and

WHEREAS, it is a stated objective by OKI that all studies coordinate their recommendations; and

WHEREAS, the construction of additional lanes would have a negative impact not only upon the City of Newport Historic District, but would also increase noise, vibrations and pollution to unacceptable levels for the eastern section of the City; and

WHEREAS, historically increasing the number of lanes of interstate has minimal impact on traffic congestion, travel time, does not operate generally as a solution and comes at a significant cost of construction of such lanes; and

WHEREAS, the City of Newport believes it is prudent to delay the undertaking/implementation of such a recommendation until such time as the original Eastern Corridor Study recommendation can be implemented.

NOW, THEREFORE, BE IT RESOLVED:

BY THE CITY OF NEWPORT, KENTUCKY THAT the City of Newport, Kentucky opposes the construction of additional lanes to I-471 as a proposed solution to the increased traffic of the Eastern Corridor.

Commissioner Frank Peluso

Commissioner Beth Fennell

Commissioner Jan Knepshield

Commissioner Jerry Peluso

Mayor Thomas L. Guidugli

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