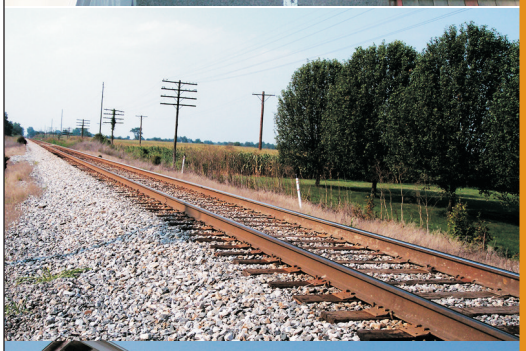
LINCOLN TRAIL AREA DEVELOPMENT DISTRICT

Final Report Glendale Area Transportation Study

November 2008



Chapters

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Executive Summary

Looming large adjacent to historic Glendale is the Glendale Economic Development Site; one of the primary economic development sites in the Commonwealth. Identified as site 093-005 by the Kentucky Economic Development Cabinet, this 1,551 acre parcel of land is zoned for Heavy Industrial District (I-2) use. Several years ago this site was a candidate for a Hyundai automotive manufacturing plant, but was not selected. Since then, state and local officials have continued to market this site. A restrictive covenant requires that the property be used for a single manufacturing, processing or assembly plant. It cannot be subdivided into an industrial or office park without legislative action.

With the proper roadway infrastructure and buffers in place, the site can blend into the surrounding rural area without compromising area mobility. This report sets forth short, medium and long range projects that can be constructed over time to distribute costs, making the plan both fiscally responsible and scalable to grow as the development grows. These recommendations are:

Short Range Highway Improvements

These improvements are strongly recommended by the Project Team to be in place on opening day of the new plant at the industrial site, and assume that Project 04-20.01 is completed. The following four (4) projects are recommended for construction as the Glendale site is developed:

- Partial Bypass Alternate 2A, the northeast quadrant bypass.
- Improve KY 1136 from Bypass (Alternate 2A) to the Ring Road Extension.
- Improve KY 222 from I-65 to the Bypass (Alternate 2A).
- The intersection of KY 222/KY 1136 in downtown Glendale will need left-turn lanes.

Medium Range Highway Improvements

These improvements are recommended to be in place soon after the new plant at the industrial site is opened. While they may not be absolutely necessary for opening day traffic, we believe they will be needed after the plant is opened:

- Replace KY 1136 bridge over I-65 providing more width and vertical clearance.
- Widen KY 1136 from US 31W to Jaggers Road for rear access to the site
- The traffic control at the intersection of KY 222/KY 1136 will need to be reviewed by KYTC. Four-way STOP control or a traffic signal could possibly need to be installed.

Long Range Highway Improvements

As the plant expands, additional development occurs, and employment increases, the roadway infrastructure will also need additional improvement:

- Complete the Bypass to one of the Full Alternates.
- Improve/widen US 31W.
- Widen I-65 to six lanes.

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Figures And Tables

Project Maps

Chapter 1 - Introduction

In August of 2007, URS Corporation and our project partner, Jordan, Jones & Goulding, Inc., were selected by the Radcliff/Elizabethtown Metropolitan Planning Organization (MPO) to perform the Glendale Area Transportation Study.

Looming large adjacent to historic Glendale is one of the primary economic development sites in the Commonwealth. Identified as site 093-005 by the Kentucky Economic Development Cabinet, this 1,551 acre parcel of land is zoned for Heavy Industrial District (I-2) use. Several years ago this site was a candidate for a Hyundai automotive manufacturing plant. Since then, state and local officials have continued to market this site. A restrictive covenant requires that the property be used for a single manufacturing, processing or assembly plant. It cannot be subdivided into an industrial or office park.

The study requested by the LTADD is one where land use and the transportation network become intertwined. The existing road network consists of all two-lane facilities. There is not one intersection in the study area that has a right or left turn lane. This includes the KY 222 interchange with I-65. Several short term upgrades will be needed to facilitate traffic generated by the 1,551 acre site. This report provides a transportation improvement plan that will meet the needs of the anticipated development as well as buffer the Glendale Historic Village.

The primary challenge of this project was to identify transportation enhancement solutions that are cost effective, can be implemented relatively quickly, and will preserve Glendale.

Purpose

This project is a system-wide transportation study for the Glendale area and has the following objectives:

- Evaluate existing roadway facilities for ability to meet existing and future travel demand;
- Develop future travel forecasts based upon projections of the economic development site and future area land uses;
- Produce a series of improvements to the roadway system within the financial capabilities of the Commonwealth of Kentucky;
- Develop a long-range plan that can be updated easily to reflect growing and changing demands on the roadway system.

Scope

The scope of this project was to conduct a comprehensive small area transportation study for Glendale and develop a financially feasible transportation plan that will accommodate projected transportation demands through the Year 2030. There were four basic components to this study:

1. Public Involvement Plan.

2. Network Deficiencies and Scenario Planning Techniques.

3. Define Alternative Solutions.

4. Develop Alternative Costs and Recommended Improvements.

The Hardin County Economic Development Site

The Hardin County Economic Development Site (the site) is 1551 acres. Identified as site 093-005 by the Kentucky Economic Development Cabinet, it is the second largest parcel available in the Commonwealth and is zoned for Heavy Industrial District (I-2) use. A restrictive covenant requires that the property be used for a single manufacturing, processing or assembly plant; it cannot be subdivided into an industrial or office park. The land was purchased by the Commonwealth of Kentucky and is currently being marketed by the Elizabethtown Industrial Foundation.

Several years ago this site was a candidate for a Hyundai automotive manufacturing plant. Since then, the site has been continually marketed.

Study Area

Glendale is located in the southern portion of Hardin County, south of Elizabethtown and approximately two miles west of I-65. The economic development site is roughly bounded by I-65 on the east, the CSX railroad on the west, KY 222 on the north, and KY 1136 on the south. The study area for the transportation facilities used the same southern boundary, and extended to US 31W to the east, to the Western Kentucky Parkway in the west and approximately two miles to the north on KY 1136. **Figure 1** shows the study area and **Figure 2** shows the context of the study area relative to the rest of Hardin County.

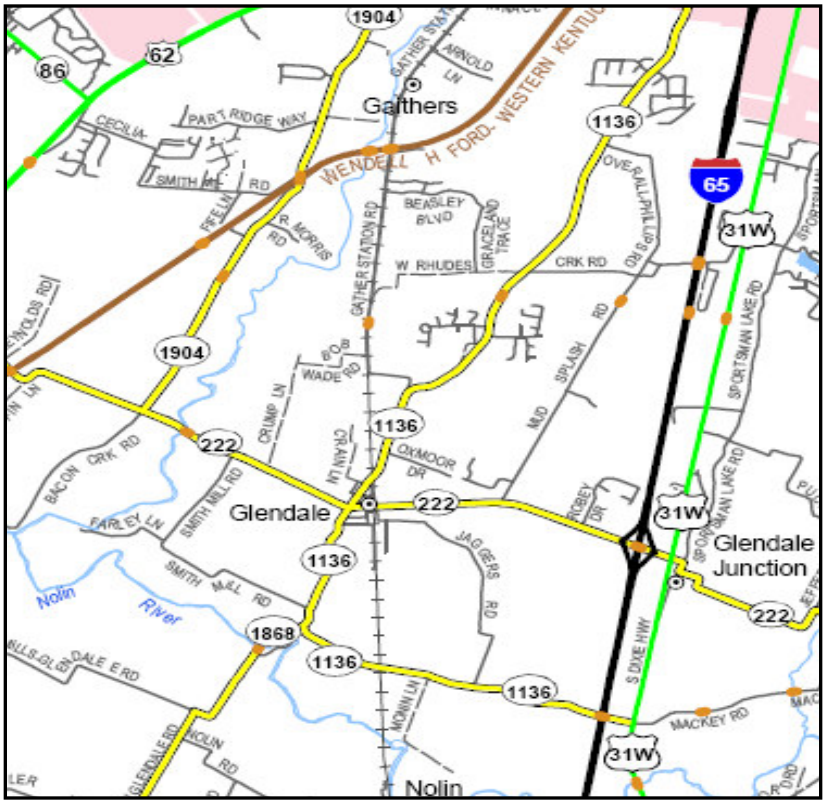


Figure 1. Project Study Area

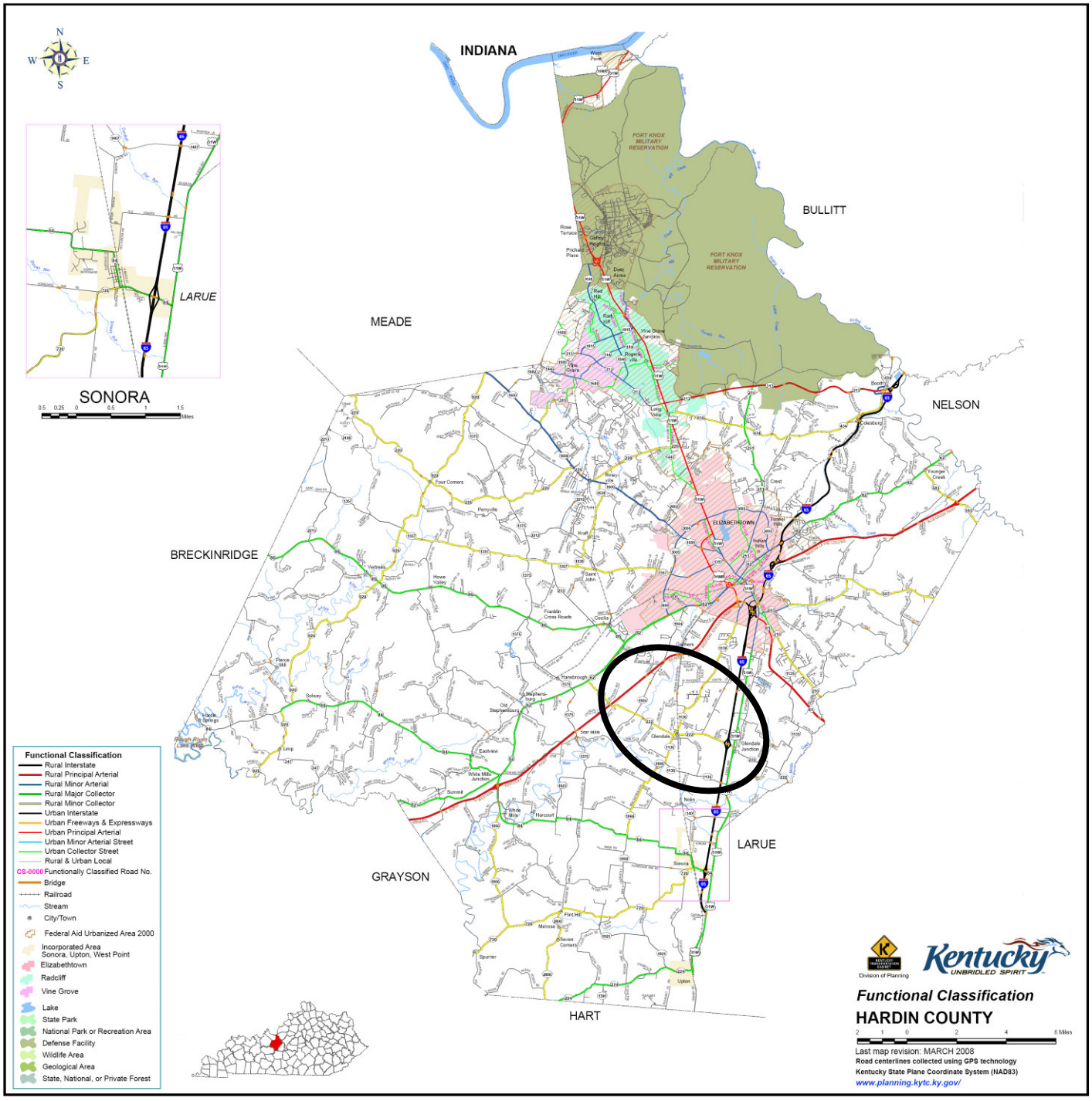


Figure 2. Study Area Context

Chapter 2 - Public Involvement Plan

Our industry has learned time and again that keeping the public informed during the transportation planning process is critical to achieving success and community support. With this in mind, we worked with the LTADD to develop a Public Involvement Plan.

This plan primarily consisted of meeting with the MPO Technical Advisory Committee, stakeholder interviews and a public meeting. Those attending the various MPO meetings included:

Ed Poppe	Elizabethtown Planning and Development
Scott Reynolds	City of Elizabethtown
Murray Wanner	Radcliff Planning and Development
Chris Hunsinger	Hardin County Planning and Development
Vicki Brackett	Hardin County
David Underwood	Hardin County Emergency Management
Barry House	KYTC - Division of Multimodal Programs
Mike Hall	Transportation Management Systems
Sam Clements	Transit Authority
Michael Malham	Lincoln Trail Development District
Brandon Booth	Lincoln Trail Development District
Mike Skaggs	Lincoln Trail Development District
Luis Lopez	Federal Highway Administration
Arianna Martin	Federal Highway Administration
Bernadette Dupont	Federal Highway Administration
Mike Cummins	Glendale Merchants Association President
Rachel Fortson	KYTC – District 4
Brian Gregory	KYTC – District 4
Josh Hornbeck	KYTC – District 4
Steve Hall	KYTC – District 4
David Matthews	KYTC – District 4
Toby Spalding	City of Radcliff
Gail Pollock	Fort Knox
Joe Yates	Fort Knox
Rick Games	Elizabethtown Industrial Foundation
Diane Zimmerman	Jordan, Jones & Goulding
Greg Groves	URS Corporation
Paul Slone	URS Corporation
Amanda Beiting	URS Corporation
William F. Madden	URS Corporation

Summary of Public Involvement Activities

Project Kick-off Meeting – October 10, 2007
1. Review of Proposal
2. Scope of Services

Stakeholder Interviews November 2007 – January 2008

Meeting 2 – January 10, 2008
1. Stakeholder Interview Results
2. Existing Conditions
3. Preliminary Alternatives for Future Analysis

Meeting 3 – March 19, 2008
1. Presentation of Recommendations
2. Received Comments from Group

Meeting 4 – April 29, 2008
1. Presentation of Revised Recommendations

Public Meeting – June 2, 2008

Meeting 5 – August 21, 2008
1. Presentation of Draft Report

Stakeholder Interviews

Stakeholder interviews were conducted from November 2007 to January 2008. The stakeholders were asked a variety of questions tailored to their area of knowledge. Those interviewed for this study include:

- Rick Games, Elizabethtown Industrial Foundation
- Mike Hall, Freight Consultant and Business Owner
- Mike Cummins, Glendale Merchants Association President and Restaurant Owner
- Josh Hornbeck, Kentucky Transportation Cabinet
- Chris Hunsinger, Planning and Zoning Director
- Vicki Brackett, Hardin County Engineer

Local Issues

Several local issues emerged from the stakeholder interviews. Among the concerns were:

- Preservation of the Historic District
- Tourism
- Identity
- Local split for/against development

Glendale is designated as a Historic Village on Main Street from KY 1136 to Railroad Avenue. There are 15 other buildings in the Glendale Rural Village that are on the National Register of Historic Places.

The Merchants Association conducted a study a few years ago that concluded 65 percent of the business conducted in Glendale was tourism based. In order for Glendale businesses to survive and grow, tourism must be maintained.

Many in Glendale are concerned about its identity. It is a concern of some in Glendale that the truck stops of Glendale Junction are identified as Glendale.

From the public sector, officials were concerned about freight traffic and ensuring that the existing roadways (KY 222 and KY 1136) can accommodate more and heavier traffic.

Officials also desired a plan that will grow with whatever facility locates at the site and provides other improvements for ancillary business growth as well as other planned growth in the urban area expansion zone as defined in the 2008 Comprehensive Plan.

URS hosted a Public Meeting in Glendale on June 2, 2008 at the Glendale Christian Church to present the project's progress to date and receive additional input regarding the evolving alternatives. LTADD assisted with distributing flyers in the community and placing an ad in the local newspapers. At this meeting the general public had the opportunity to provide input and contribute to the project. The Public Meeting followed the open house format where everyone felt free to ask questions, walk around the project displays, and talk with project team members one-on-one. The meeting was lightly attended and no comment forms were returned.

Chapter 3 - Existing Conditions

There are few existing traffic issues in the study area. The Historic District is a quiet tourist area that usually does not have significant peak period traffic problems. The only source of daily congestion in Glendale results from school traffic at the KY 222/KY 1136 intersection. However, Glendale does experiences significant congestion during the annual Crossings Festival in October.

Currently there are significant congestion and safety problems at the I-65/KY 222 interchange. The interchange is currently being redesigned by the KYTC to improve a variety of issues such as capacity and access management. The project's objectives are to improve traffic flow and safety. The tentative construct date is 2012 (as of the time of this report). It is important to note that this is a stand alone project to address current deficiencies and is not associated with marketing the development site.

On the south side of the development site, the KY 1136 bridge over I-65 is not wide enough to carry a high amount of truck traffic. This bridge needs to be replaced or rebuilt.

Transportation Network

All of the roadways in the study area are two-lane rural roadways. All intersections are two-way stop controlled and no intersection approaches have dedicated turn lanes. The only electronic traffic control devices in the study area are the school speed zone flashers for East Hardin Middle School and the railroad signals.

Functional Classifications

Streets and highways are grouped into classes or systems according to the character of service they are intended to provide. This is called functional classification. Integral to this process is the recognition that individual roads and streets do not serve travel independent from the rest of the highway system. Rather, most travel involves movement through a network of roads.

Functional classification can be applied in planning highway system development, determining the jurisdictional responsibility for particular systems, and in fiscal planning. Functional classification is also important in determining eligibility for Federal-aid funding.

Urban and rural functional systems are classified as such:

Principal Arterials

Principal arterials are designed to provide for major travel desires between, across, and within urban areas. Expressways within this system do not provide access to adjacent land. Principal arterials are intended to carry high traffic volumes and serve the longest trip lengths.

Minor Arterials

Minor arterials are moderate volume streets and roads that interconnect with and augment the principal arterial system. More emphasis is placed on land access than for principal arterials, but the primary emphasis is on the movement of traffic. Also, travel desires typically are shorter for minor arterials than for principal arterials.

Collectors

Collector streets penetrate neighborhoods and the urban core, collecting and distributing trips from arterials to the local street system. Collectors provide both access to adjoining land and through movement of traffic. In rural areas, collectors are further divided into two categories: **rural major collectors** and **rural minor collectors.**

Local Streets and Roads
The sole function of local streets is to provide access to abutting land. Local streets often comprise the largest portion of total street mileage in an urban area but carry only a small portion of the total vehicle-miles traveled. Local streets were not evaluated in this study.

Study Area Roadway Classifications
The following information is from the Kentucky Transportation Cabinet's Highway Information System (HIS); a database of existing roadway characteristics.

- Interstate 65 in the study area is classified as a rural interstate or principal arterial. It is median-divided with four 12-foot lanes, two in each direction, and 11-foot outside shoulders. The speed limit is 70 miles per hour (MPH).

- US 31W is a rural major collector, with 11-foot wide lanes and four-foot wide shoulders. The speed limit in the study area is 55 MPH.

- KY 222 is classified as a rural minor collector. The HIS reports that KY 222 has 10-foot lanes with three-foot wide shoulders. The speed limit in the study area varies from 35 MPH to 45 MPH. The 35 MPH zone is through the Glendale area.

- KY 1136 is also classified as a rural minor collector. It has 10-foot lanes and three-foot wide shoulders. The speed limit in the study area varies from 35 MPH to 45 MPH. Again, the 35 MPH speed zone is through the Glendale area.

Daily Traffic Volumes
A map illustrating the existing daily traffic volumes, peak hour intersection movement, and existing levels of service can be found in the Appendix document.

- I-65 39,100 Vehicles/Day (VPD)
- US 31W 3,380 VPD
- KY 222 2,480 VPD
- KY 1136 930 VPD

Existing Levels of Service

URS began the project by assembling the various data and previous studies. This includes current traffic counts for intersection and roadway segments as well as the previous traffic forecasts performed for the I-65/KY 222 interchange project and traffic forecasts for the site.

There have been three traffic forecasts performed by the KYTC. Each successive traffic forecast incorporated a change in the design of or access around the interchange and/or changes in the employment assumptions of the site. One of the forecasts evaluated constructing a new I-65 interchange at the KY 1136 bridge; however, due to spacing constraints with the KY 222 interchange, this alternative was not approved. The other forecasts focused on KY 222 remaining as the only interstate access point in the study area.

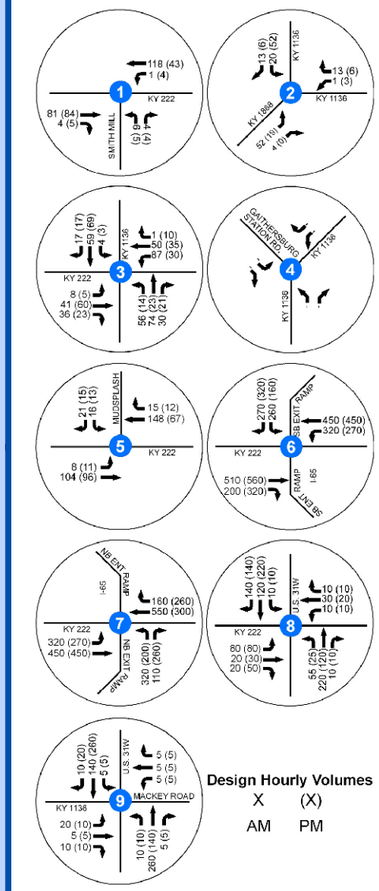
GLENDALE TRANSPORTATION STUDY

April 2008

Lincoln Trail Area Development District
613 College Street Road
Elizabethtown, KY 42701
(270) 769-2393 www.ltadd.org

CURRENT TRAFFIC COUNTS

Average Daily Traffic



Sources: Locations 1-5: URS Corp. 2008,
Locations 6-9: Kentucky Transportation Cabinet 2006

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GLENDALE TRANSPORTATION STUDY

Lincoln Trail Area Development District
613 College Street Road
Elizabethtown, KY 42701
(270) 769-2393 www.ltadd.org

2007 FACILITY LEVEL OF SERVICE

Legend

AVERAGE DAILY TRAFFIC

State Routes

Level of Service (2007)

- LOS A
- LOS B
- LOS C

Intersection Level of Service

- A/A LOS A
- C/C LOS B
- F/F LOS C

N

0 0.3 0.6 1.2 Mi.

URS

To supplement the past data, new traffic data was collected at key locations within the study area. This includes peak hour turning movement counts at:

- KY 222 & US 31W
- KY 222 & KY 1136
- KY 1136 & KY 1868

Daily traffic volumes were at multiple locations on KY 222 and KY 1136. The traffic data that has been collected over the past several years will be valuable in establishing the latest growth trends in the study area.

Level of service is a qualitative measure of traffic conditions. There are six levels of service, expressed in letter grades "A" through "F". Level of service (LOS) "A" represents the best traffic conditions – free flowing, with high travel speeds and no delays. At the other end of the spectrum, LOS "F" represents the worst traffic conditions – heavy congestion, with long delays and low travel speeds resulting from stop-and-go flow. A facility is considered to have reached its physical capacity at LOS "E." For planning, it is typically desirable to minimally maintain a LOS "D" in urban areas and a LOS "C" in rural areas.

Level of service can be computed for specific facility types (e.g. freeways, arterial streets, signalized intersections, etc.) based on methodologies prescribed in the Highway Capacity Manual (HCM). Depending on the facility type, there are a number of methods varying in complexity and accuracy that are described in the HCM and can be used to compute level of service. These methods range from generalized tables of daily traffic volumes to very detailed, data intensive operational analyses.

The intersection HCM analysis for this project was performed using the program TRAFFIX. TRAFFIX has an interactive LOS mitigation screen that allows users to explore the impacts of various traffic control strategies and lane configurations. The TRAFFIX scenario editor and report output options allow a wide range of project scenarios to be evaluated and documented concurrently.

The advantages to using this program were clear for this project. They were:

- Analysis for all intersections were contained within a single file
- Performs trip generation and distribution
- Manages and concurrently documents multiple scenarios
- Very efficient to use

The basis for LOS at intersections is delay. For roadway sections, the metric is speed. The Florida Level of Service software (FLOS) is a sketch planning tool that provides a convenient LOS tool in the form of a "look-up table." Based upon the input variables of a given roadway(s), the software performs the speed estimation calculations and presents tables that identify various volume thresholds for LOS. For many, the volume thresholds are more meaningful than speed estimates alone. The FLOS output shown in **Table 1** displays the LOS thresholds used for KY 222, KY 1136 and US 31W.

Table 1. Roadway Segment LOS Thresholds

	Upper LOS Thresholds (ADT)				
	A	B	C	D	E
2-Lane Highway	1200	3700	8300	12100	15500
V/C Ratio	0.07	0.2	0.44	0.64	0.82

* V/C Ratio = Volume to Capacity Ratio

Roadway Safety

Crash data was reviewed on KY 222 and KY 1136 for calendar years 2005, 2006 and 2007. This data was used to calculate crash rates for roadway segments and intersections (spots) for analysis. Crash rates, expressed in terms of *crashes per 100 million vehicle-miles*, normalize the comparison by taking into account the amount of traffic on a section. The numbers in themselves are meaningless without this comparison. The total number of crashes cannot be used by itself to identify crash problems. The rates are then compared to the statewide average rates for facilities of similar types. If the crash rates match the statewide averages, then the roadway segment or spot has an average number of crashes. No better; no worse.

The question then becomes, what level above the average crash rate identifies a crash problem? The step is to calculate the Critical Crash Rate, which is a statistically derived value that the Kentucky Transportation Cabinet uses as a threshold to identify high crash locations.

The analysis revealed that there are no critical crash rates outside of the I-65/KY 222 interchange area. The current redesign of interchange will address the existing safety problems in the I-65 area.

Most of the collisions in the remaining study area were minor. The narrow shoulders and steep roadside ditches were factors in some single vehicle, run off the road incidents. A specific review of the CSX railroad crossings was performed after some injury crashes and one fatal crash were identified at some crossings.

Railroad Information and Crossing Safety

Glendale developed as a small commercial hub surrounding a stop on the Louisville & Nashville Railroad (L&N). The former L&N railroad is now part of the CSX Louisville Division mainline between Louisville and Nashville. It should be noted that CSX did not provide input regarding the analysis or recommendations of this project. The single track runs generally North/South through eastern edge of Glendale and has six at-grade crossings within the study area. Please refer to the Appendix document for a map and table of the existing at grade crossing locations.

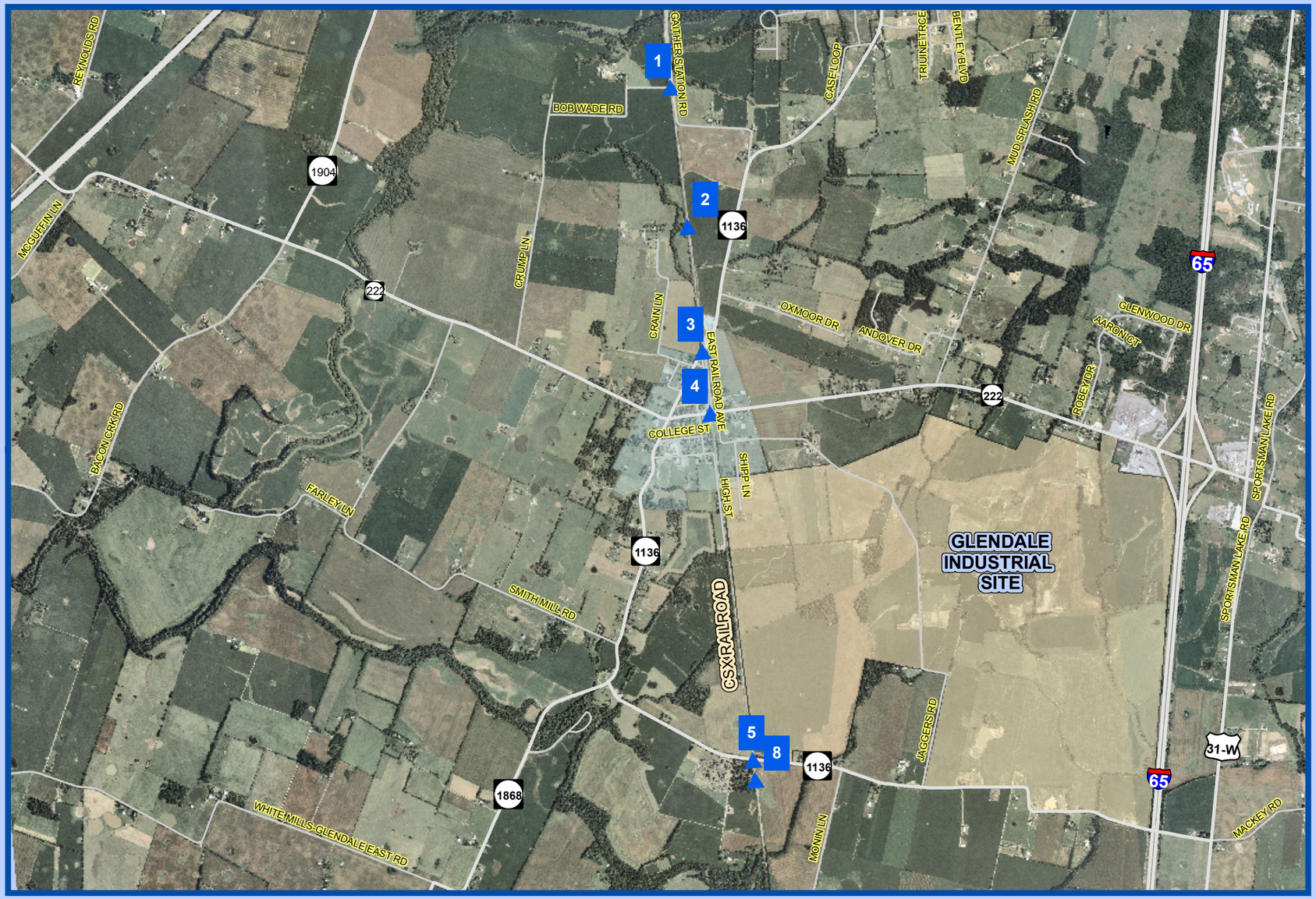
A query of the railroad crossings within the study area was performed utilizing the FRA Office of Safety Analysis Web Site http://safetydata.fra.dot.gov/officeofsafety/). The query included an analysis of crash data at each of the crossings from 1987 through 2007. There were eight incidents reported during that period with six of them occurring at the crossing of KY 222 in the heart of Glendale. Three of these incidents resulted in injuries. A motorist was struck and killed in a single incident at the crossing with KY 1136 north of the Glendale in 1996. The crossing at KY 222 features automated flashing lights and gates.

The railroad within the study area is rated for 50 mph track speed and averages approximately 30 trains per day. It is anticipate that the railroad segment within the project area will remain active within the plan year of this study and may experience an increase in volume.

GLENDALE TRANSPORTATION STUDY

RAILROAD GRADE CROSSINGS

Lincoln Trail Area Development District
613 College Street Road
Elizabethtown, KY 42701
(270) 769-2393 www.ltadd.org



NO.	CROSSING ID	CROSSING NAME	MILE POST	TOTAL INCIDENTS	INJURY INCIDENTS	FATAL INCIDENTS
1	343575U	BOB WADE RD.	4.835	0	0	0
2	156004K	PRIVATE RD.	4.895	0	0	0
3	343576B	KY 1136	4.947	1	0	1
4	343577H	KY 222	4.974	6	3	0
5	343578P	KY 1136	5.121	1	0	0
6	156005S	PRIVATE RD.	5.210	0	0	0

0 0.3 0.6 1.2 Mi.

Railroad access is an important consideration for the future development site as a manufacturing facility. Given the physical and operational significance of the railroad within the study area, it serves as a barrier to east-west travel. New roadway facilities crossing the railroad will be required to be grade separated, reutilize an existing at-grade crossing, or establish a new at-grade crossing. The later option would require closure of three existing at-grade crossings in the area to permit the establishment of a crossing at a new location per CSX policy. In general, the establishment of new at grade crossings is not recommended unless there is no other feasible alternative.

Due to the unknown status of potential development at the site, the accommodation of new rail access could not be considered in the evaluation of alternative roadway improvements. The bypass alternatives for KY 222 are planned to be located north of Glendale. These alignments could possibly conflict with future railroad access to the site.

The Industrial Element of the Hardin County Comprehensive Development Guide includes recommendations for a new grade separated crossing of KY 1136 (Gilead Church Road) south of Glendale as well as upgrading the existing at grade crossing of KY 1136 north of Glendale to accommodate a potential Glendale bypass. Both of these plan recommendations should be preserved however, the need for a new grade separation with the railroad remains highly dependent on the distribution of trips associated with the development of the site, surrounding land uses and the configuration of any rail service to the site.

Long range forecasts for KY 1136 south of Glendale do not indicate that a grade separation is necessary. The KY 1136 railroad grade separation is part of a larger project to upgrade KY 1136 included in the unfunded portion for the current MPO 2030 Long Range Transportation Plan. As envisioned in the long range plan, the project is proposed to begin at a new interchange between I-65 and KY 1136 and end at KY 220 north of Elizabethtown. Because there is not an interstate interchange on KY 1136, there are improvements necessary to KY 222, and other sections of KY 1136 north of Glendale need improvement, the any improvements for this corridor are a low priority.

Chapter 4 - Development Analysis

Scenario planning techniques were employed for this project. Scenario planning is defined as a strategic planning method used to make flexible long-term plans. It is more or less an adaptation of military planning, intelligence and training. Applied to transportation planning, the basic methodology is for a group of analysts to generate "what if" scenarios for decision makers. The scenarios combine known facts about the future; in this case the site and other planned roadway projects in Hardin County, with plausible alternative transportation options under ideal or maximized land-use planning. Scenario planning can include individual elements that are difficult to formalize, such as subjective interpretations of facts, shifts in values, demographic forecasts, etc. Some of the factors considered in developing the roadway scenarios for this study include the following.

Land-use

There are several Planning Areas identified in the 2008 Hardin County Comprehensive Plan which fall within the project study area. These include the:

- Glendale Industrial Area
- North Glendale Urban Area
- Glendale Junction (I-65)
- Glendale Rural Village

The existing land-use, natural features, public facilities and recommended land-use and development criteria for these planning areas were evaluated when forecasting future travel demand. Anticipating how these different areas would develop between now and 2030, our scenarios were developed for short, medium and long-term improvements to the roadway network.

Figure 3 is a cropped map from the 2008 Hardin County Comprehensive Plan highlighting the above mentioned zones.

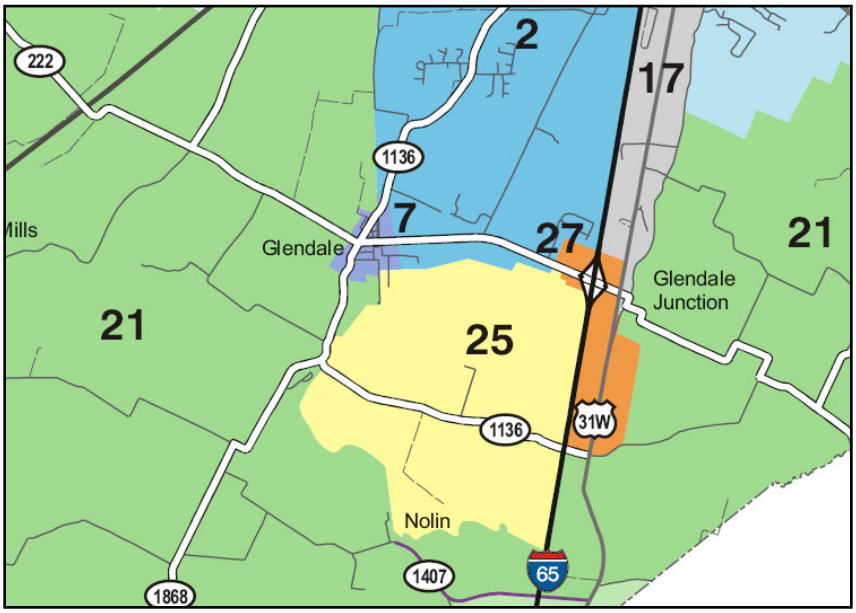


Figure 3. Long Range Land-use for Study Area

Glendale Industrial Area

The assumed potential employment at the development site utilized in planning and design of the interchange was 2,500. Based upon input from the LTADD staff and Technical Committee members, the 2,500 employment figure was assumed to be the starting employment of a facility and the "ultimate" employment at the site could be 5,000 employees by the 2030 design year. It should be noted that there are approximately 3,300 employees at the now operational Hyundai Motor Manufacturing facility near of Montgomery, Alabama. URS was not tasked with developing specific trip generation forecasts for the site, previous trip generation estimates from KYTC traffic forecasts were used.

Ancillary commercial and industrial development is anticipated to serve the site both locally as well as regionally as suppliers and support services locate their facilities to meet the logistical demands of the site. The Industrial Element of the Hardin County Comprehensive Development Guide anticipates this growth.

The distribution of trips utilized for the interchange design assumed approximately 74 percent of the trips (47 percent form the north and 27 percent from the south) would access the site via I- 65. A trip distribution map is included in this document. The trip distribution from the KYTC traffic forecasts were adjusted with assistance from the LTADD and Hardin County staff. The original forecasts were developed with the use of the Hardin County travel demand model. At the time of this project it was believed that there were some deficiencies in the model that required manual overrides for reasonableness. It was a consensus in the group that the number of Hardin County based trips using I-65 was too heavily weighted.

Ongoing residential and commercial growth is anticipated in unincorporated areas of Hardin County south and west of Elizabethtown including the North Glendale Urban Area. These trends would be accelerated with the operation of a large tenant at the Glendale Industrial Site. Approximately half the 47 percent of trips distributed to I-65 from the north have been redistributed to KY 222 from the west and KY 1136 and Mudsplash Road from the north. Once a particular tenant and use of the site is identified, a more extensive trip generation and distribution forecast could be made to confirm the assumptions made during this study.

It is assumed that the development site will be served by a minimum of two access points on KY 222. The location of these access points will be determined by the ultimate configuration of the site by a future tenant. For purposes of this study access sites have been considered opposite the proposed bypass, Mudsplash Road, and new access roads linking relocated KY 222 to Robey Drive. It is also possible that an internal frontage road system would be constructed within the development site to distribute trips to these multiple access points. It is assumed that a least one access point to the site will be created on KY 1136 between I-65 and the CSX railroad.

The employment and commercial activity associated with a major tenant at the site is not isolated to the site itself. The multiplier of total secondary employment could be two to three times the base employment of the facility. Traffic resulting from this ancillary development will be disbursed regionally both within and outside the Commonwealth. A significant portion of this development could be expected to occur with the LTADD region and within the study area in particular.

North Glendale Urban Area

The current zoning and the Hardin County Comprehensive Development Guide anticipate this growth. Two strategic Industrial Corridors have been identified within the study area (The Western Kentucky Parkway and Interstate 65 Industrial Corridors). The 2008 Comprehensive Plan designates the North Glendale Urban area to be included within the Urban Growth Sector. This area is located south of Elizabethtown, positioned between the CSX railroad and I-65 and extending southward to KY 222. The plan states, "This area reflects a new expansion of the Urban Growth Sector reflected in the prior comprehensive plan. The expansion is based on the development trends of the past 10 years and anticipated growth associated with the Glendale Industrial Property."

This area is designated for future new and infill residential development. URS developed trip generation forecasts for additional trips originating from the available undeveloped acreage fronting KY 1136 and Mudsplash Road between KY 222 and West Rhudes Creek Road.

The Comprehensive Plan also designates a "Target Area", located on the south side of Glendale-Hodgenville Road West (KY 222) east of Glendale and north of the site in the heart of the study area. The plan states "This target area is recommended as a transitional area for the expansion of the Glendale commercial area to the area adjacent to the industrial property. The access to the "target area" can be improved with the upgrading of Jaggers Road and the construction of a loop street to connect to KY 222 at the Mud Splash Road intersection.

Glendale Junction

This planning area includes the vicinity of the I-65 and KY 222 Interchange and extends south along US 31W to KY 1136. The future land uses recommended by the Comprehensive Plan discourages residential development in this area with the goal to promote interstate commercial and industrial park type development. An overlay district has been established for this area which provides standards for development of parcels along US-31 W and KY 1136. URS developed trip generation forecasts for this area based on a mix of Industrial and Commercial land-uses by acreage, as defined in the Institute of Transportation Engineers Trip Generation Manual 7th Edition. The forecasted 2030 daily trips resulting from new commercial and industrial development within the overlay district are as follows:

- US 31W - 4,200 Commercial Trips/ 1,600 Industrial Trips
- KY 1136 - 3,000 Industrial Trips

These additional trips were assigned to US 31W and KY 1136 and distributed to the study area roadway network.

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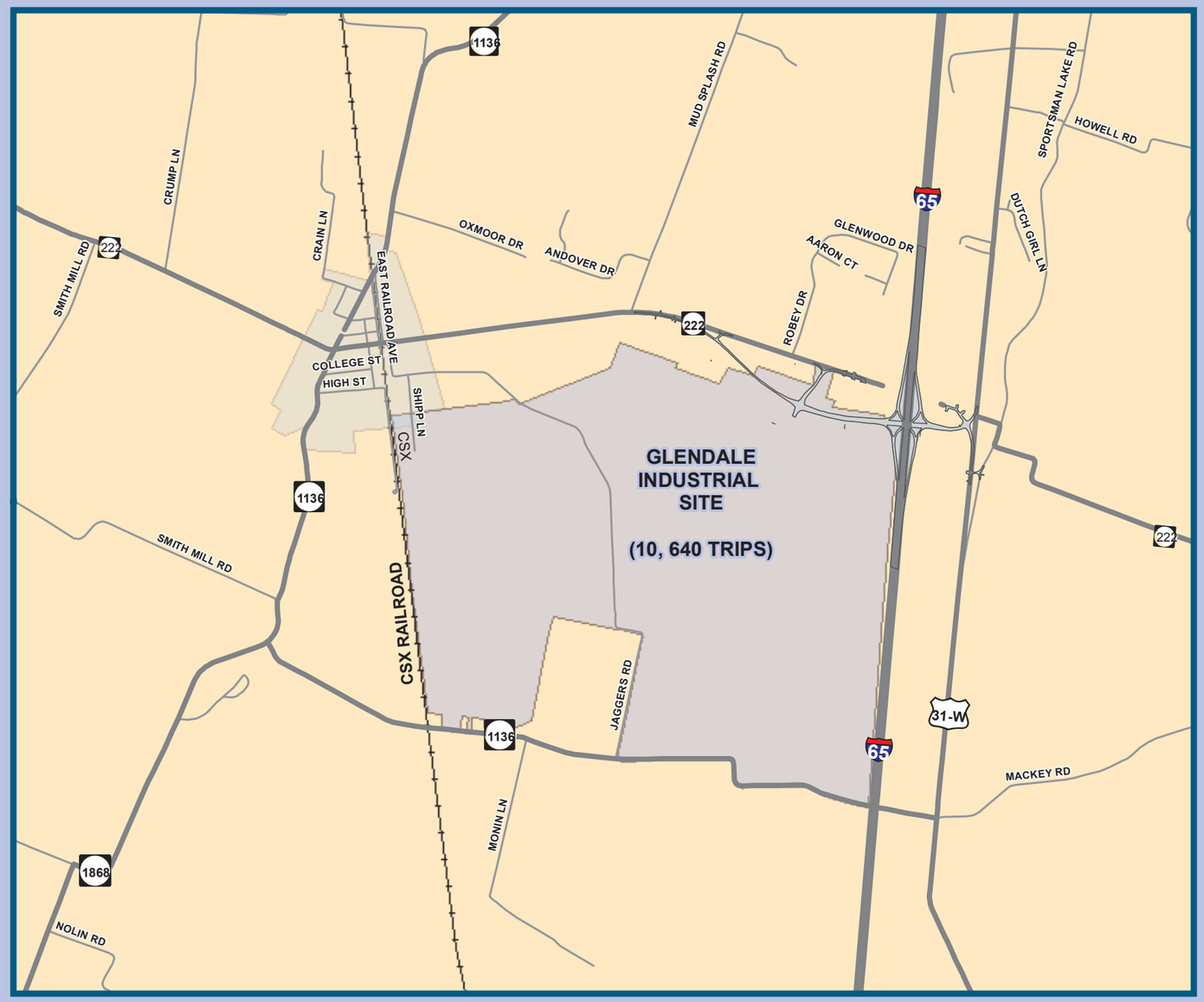

GLENDALE INDUSTRIAL SITE FORECASTED TRIP DISTRIBUTION

AM Peak	Enter	Exit	Total	Percentage
	1,465	**540**	**2,005**	100%
Approach from KY 1136 North	105	39	**144**	7%
Approach from I 65 North	351	193	**544**	24%
Approach from US 31W North	54	20	**74**	4%
Approach from KY 222 West	210	14	**224**	14%
Approach from KY 1868 South	66	16	**82**	5%
Approach from I 65 South	392	145	**537**	27%
Approach from US 31W South	115	43	**158**	8%
Approach from KY 222 East	19	7	**26**	1%
Approach from Mud Splash Rd.	153	63	**216**	10%

PM Peak	Enter	Exit	Total	Percentage
	792	**1,008**	**1,800**	100%
Approach from KY 1136 North	78	76	**154**	9%
Approach from I 65 North	205	208	**413**	23%
Approach from US 31W North	32	41	**73**	4%
Approach from KY 222 West	32	156	**188**	10%
Approach from KY 1868 South	33	49	**82**	5%
Approach from I 65 South	213	270	**483**	27%
Approach from US 31W South	62	80	**142**	8%
Approach from KY 222 East	11	13	**24**	1%
Approach from Mud Splash Rd.	126	115	**241**	13%

Daily	Enter	Exit	Total	Percentage
	5,320	**5,320**	**10,640**	100%
Approach from KY 1136 North	372	372	**745**	7%
Approach from I 65 North	1,277	1,277	**2,554**	24%
Approach from US 31W North	213	213	**426**	4%
Approach from KY 222 West	745	745	**1,490**	14%
Approach from KY 1868 South	266	266	**532**	5%
Approach from I 65 South	1,436	1,436	**2,873**	27%
Approach from US 31W South	426	426	**851**	8%
Approach from KY 222 East	53	53	**106**	1%
Approach from Mud Splash Rd.	532	532	**1,064**	10%

Source: Distribution percentages, JJG Inc. for KYTC Forecast for KY 222 Interchange, 2004.
Volumes revised by URS Corporation, April 2008.

0 0.3 0.6 1.2 Mi.

Chapter 5 - Transportation Plan Development

The overriding principle of this plan was to develop a series of small, cost effective, easily implemented projects that will meet the initial and long-term needs of study area.

Roadway Alternative Scenarios

The developed scenarios are based upon a plan to add/improve various facilities over time, keeping in mind overall goals of preserving the character and tourism of Glendale. The primary scenarios that were evaluated included:

- A No-Build Scenario.
- A Partial Bypass of Glendale.
- A Complete Bypass of Glendale.
- Other Miscellaneous improvements to KY 222, KY 1136 and US 31W when they may be required.

I-65 Industrial Site Access Only (No Build Scenario)

This scenario assumes that the existing interchange on I-65 at Glendale is reconstructed and no additional improvements to the transportation network are made. The interchange is currently in the design phase and identified as KYTC Six Year Plan Project 04-20.01. The proposed project relocates KY 222 to the south, and rebuilds the existing diamond interchange into a single-point urban interchange ("SPUI"). KY 222 is rebuilt on new alignment between a point approximately 0.75 miles west of I-65 eastward to US 31W.

Figure 4. Planned Interchange Reconstruction

No Build Scenario - Alternate 1

This alternate assumes the development site has a tenant, the I-65 interchange has been re-built, but no other roadway improvements are built. Due to the traffic generated by the site, in addition to all of the ancillary development traffic to follow, such as housing, support services, satellite factories, etc. the congestion through Glendale will become unacceptable.

Traffic congestion and delays will increase, especially at the intersection of KY 222 and KY 1136. Truck traffic will become problematic on the existing narrow roadways and for Glendale tourism. Several roadway sections carry a LOS of D. For these reasons, the Project Team felt the section of KY 222 between the interstate and Glendale will require reconstruction and at least a partial bypass is needed. Therefore, a "no-build" scenario is not recommended as part of this project. A map showing the Alternate 1 future Levels of Service can be found in the Appendix.

Partial Bypass Scenario – Alternate 2A

Scenario 2 was devised as a partial bypass of Glendale. Since KY 1136 travels north of Glendale to Elizabethtown and parallel to I-65, it was estimated that a high percentage of traffic would use KY 1136 to the north in lieu of using KY 222 to the west of Glendale. The partial bypass concept is shown as a T-intersection on existing KY 222 east of downtown Glendale, and traverses the countryside around the northeast of Glendale to intersect KY 1136 northeast of the CSX railroad crossing. In the event that the site grows to the ultimate 5,000 employee level, this alternate can be modified and extended to form a full bypass around Glendale. A map showing the Alternate 2A future Levels of Service can be found in the Appendix.

This alternative also provides an opportunity for a fourth leg on the KY 222 end of the bypass. A fourth leg to the south could serve as a direct access point into the site; allowing all traffic from KY 1136 to immediately enter the site and avoid traveling on KY 222 toward the main site access near I-65.

Partial Bypass Scenario – Alternate 2B

This alternative achieves the same connectivity between KY 222 and KY 1136; however it is longer and affects more parcels. Another constraint is that intersecting near Mudsplash Road would create a five-legged intersection or two very closely spaced intersections. Due to the difficulty of intersection design on the east end of the bypass, Alternate 2B is not recommended. A map showing the Alternate 2A future Levels of Service can be found in the Appendix.

Full Bypass – Alternate 3A

This alternate is an extension of Alternate 2A, creating a full bypass around Glendale. It bridges both the CSX railroad tracks and KY 1136, and ends at Smith Mill Road. This alternative would significantly impact a number of properties and require a substantial amount of earth work to create elevated approaches to a new railroad bridge. The bridge would be relatively long to span both KY 1136 and the railroad, making this a costly alternative. In order for there to be an intersection between the bypass and KY 1136, a "jug-handle" type design would have to be used. Without an intersection between the bypass and KY 1136, all of the KY 1136 traffic to the site and business zones will have to travel through Glendale to access KY 222, which would not be a desirable situation. A map showing the Alternate 3A future Levels of Service can be found in the Appendix.

Full Bypass Scenario – Alternate 3B

This alternative also bypasses Glendale to the north; however it uses an at-grade crossing at the CSX railroad. This would be considered an upgrade of the existing crossing because the bypass would cross at a right angle compared to the skewed crossing that exists today. In order to accomplish this, KY 1136 will have to be broken and have two intersections with the bypass (one on each side of the railroad. While breaking route continuity in this manner is unorthodox, it has several advantages such as a much less costly at-grade intersection and a more southerly track that has fewer property impacts. This alternative also would be the easiest to construct assuming Alternative 2A is constructed for the opening of the site development. A map showing the Alternate 3B future Levels of Service can be found in the Appendix.

GLENDALE TRANSPORTATION STUDY

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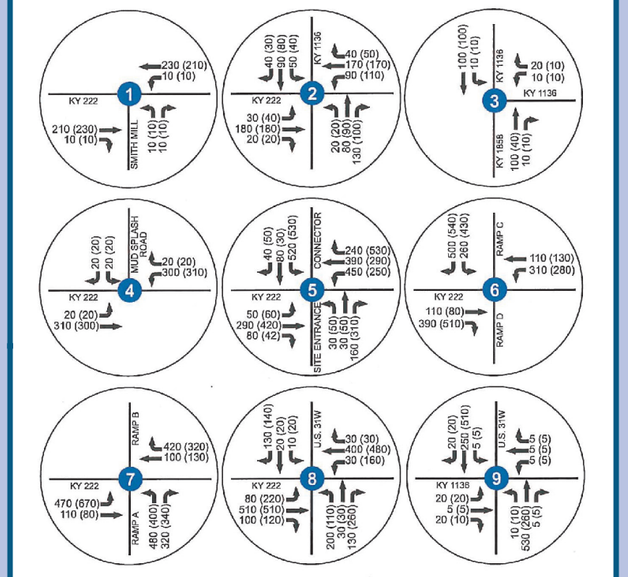
2030 FORECASTED INTERSECTION TURNING MOVEMENTS "NO BUILD"



Design Hourly Volumes
X (X)
AM PM

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GLENDALE TRANSPORTATION STUDY

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2030 FACILITY LEVEL OF SERVICE ALTERNATIVE 1 NO BUILD

Legend

AVERAGE DAILY TRAFFIC

State Routes

ALT1_LOS

- A
- B
- C

Intersection Level of Service

- A/A — LOS A OR B
- C/C — LOS B
- F/F — LOS C

N

0 0.3 0.6 1.2 Mi.

URS

GLENDALE TRANSPORTATION STUDY

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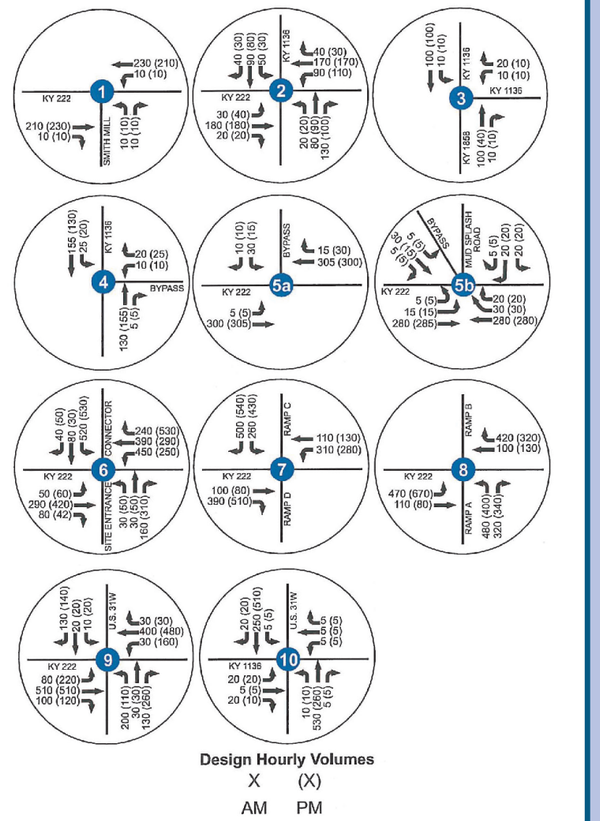
2030 FORECASTED INTERSECTION TURNING MOVEMENTS PARTIAL BYPASS



Design Hourly Volumes
X (X)
AM PM

Intersection Turning Movements at 5a and 5b include alternative termini for the Partial Bypass

0 0.3 0.6 1.2 Mi.

URS

GLENDALE TRANSPORTATION STUDY

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2030 FACILITY LEVEL OF SERVICE ALTERNATIVE 2A PARTIAL BYPASS

Legend

AVERAGE DAILY TRAFFIC

Level of Service

- A
- B
- C
- D
- F

Intersection Level of Service

- A/A — LOS A/B
- C/C — LOS C
- D/D — LOS D
- F/F — LOS E/F

0 0.3 0.6 1.2 Mi.

GLENDALE TRANSPORTATION STUDY

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2030 FACILITY LEVEL OF SERVICE ALTERNATIVE 2B PARTIAL BYPASS

Legend

AVERAGE DAILY TRAFFIC

Level of Service

- A
- B
- C
- D
- F

Intersection Level of Service

- A/A — LOS A/B
- C/C — LOS C
- D/D — LOS D
- F/F — LOS E/F

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GLENDALE TRANSPORTATION STUDY

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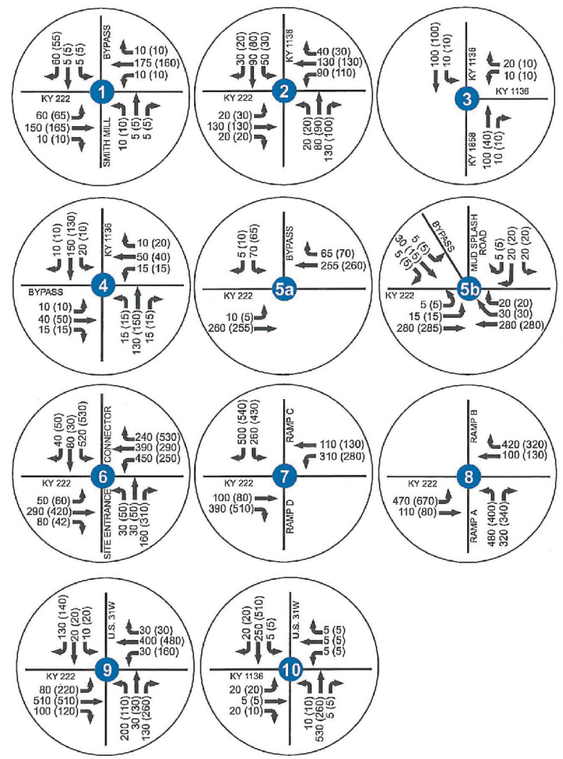
2030 FORECAST INTERSECTION TURNING MOVEMENTS FULL BYPASS



Intersection Turning Movements at 5a and 5b include alternative termini for the Full Bypass

0 0.3 0.6 1.2 Mi.

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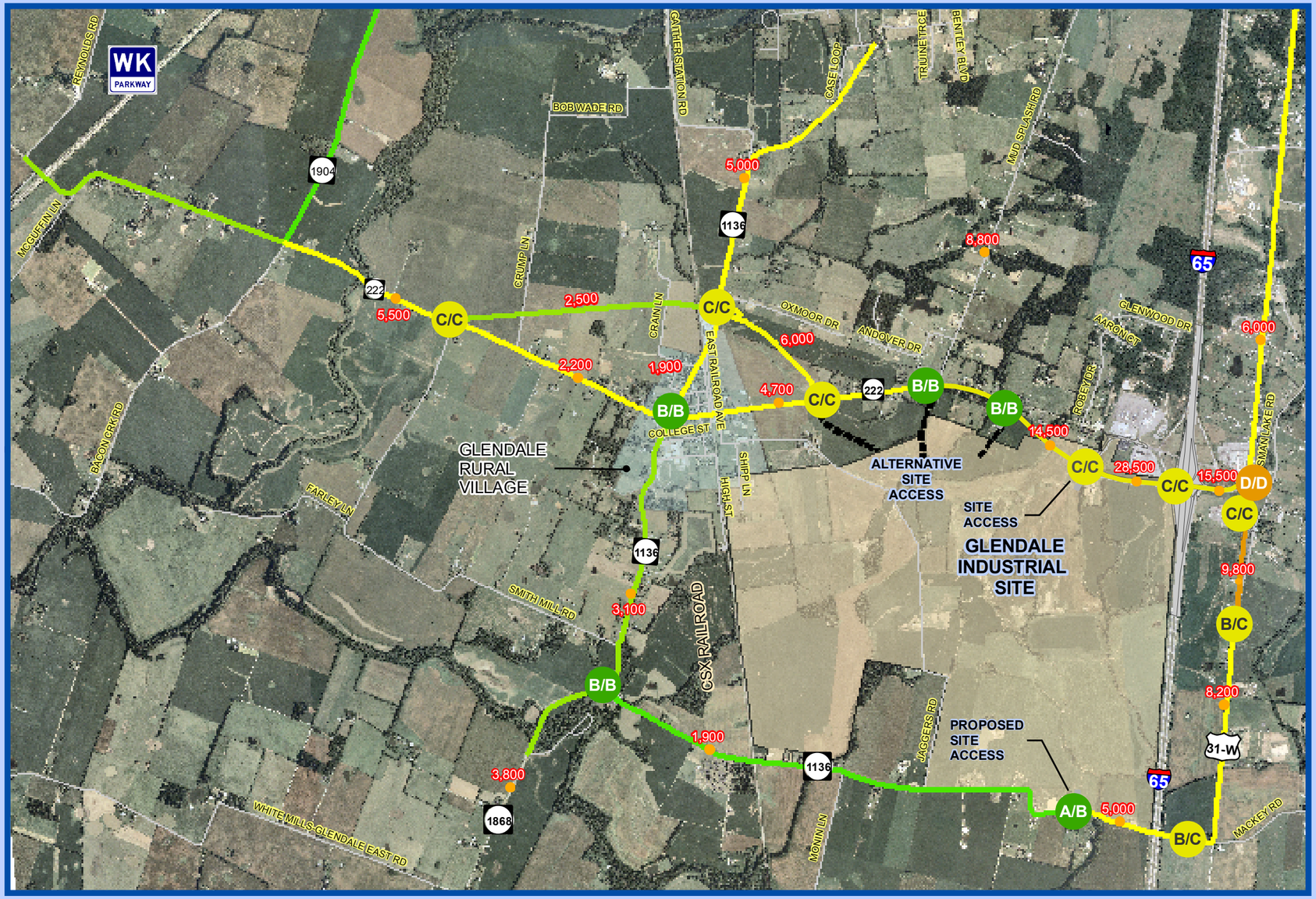
2030 FACILITY LEVEL OF SERVICE ALTERNATIVE 3A FULL BYPASS



Legend

AVERAGE DAILY TRAFFIC

Level of Service

- A
- B
- C
- D

Intersection Level of Service

- A/A LOS A/B
- C/C LOS C
- D/D LOS D
- F/F LOS E/F

0 0.3 0.6 1.2 Mi.

GLENDALE TRANSPORTATION STUDY

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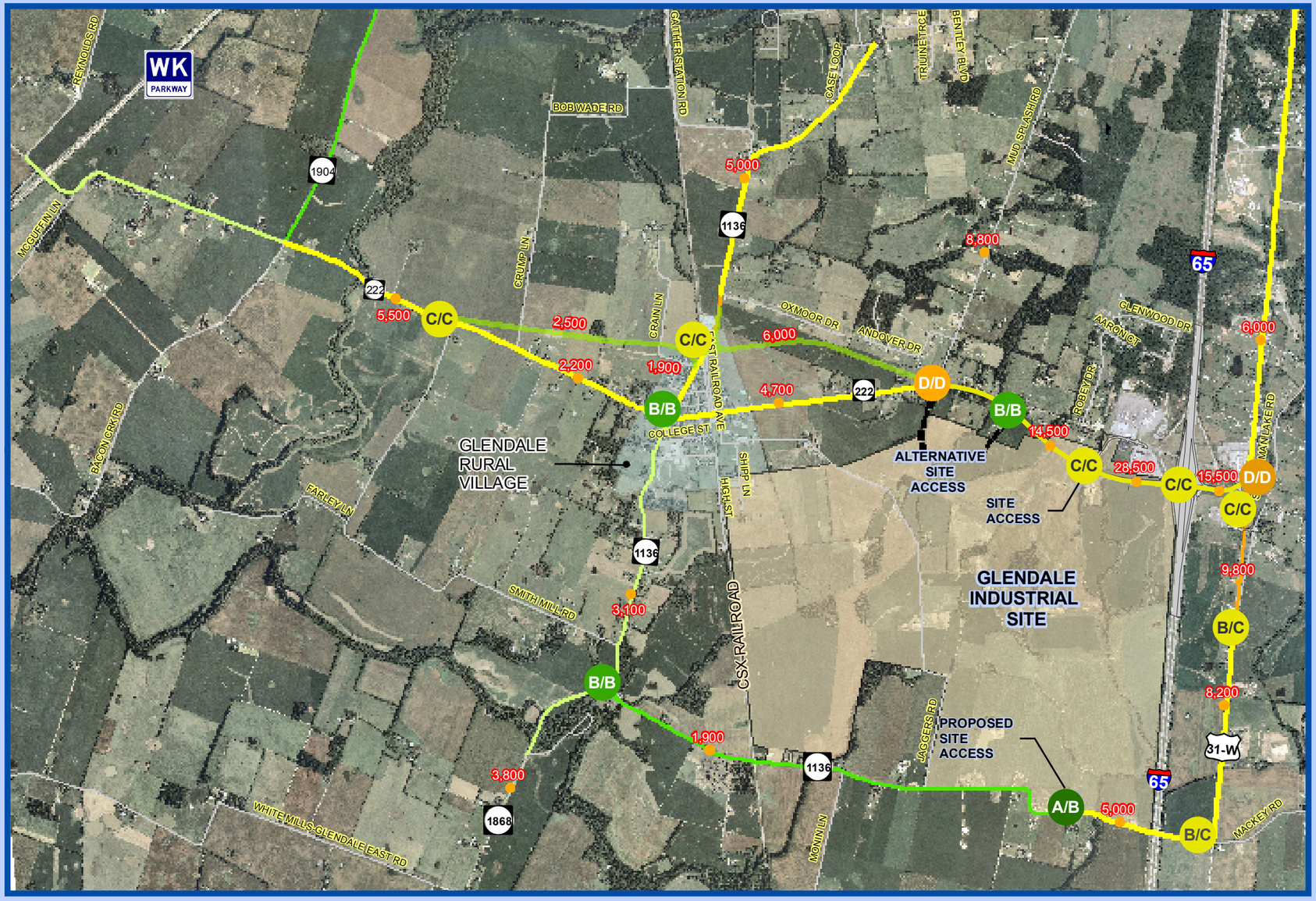
2030 FACILITY LEVEL OF SERVICE ALTERNATIVE 3B FULL BYPASS



Legend

AVERAGE DAILY TRAFFIC

Level of Service

- A
- B
- C
- D

Intersection Level of Service

- A/A — LOS A/B
- C/C — LOS C
- D/D — LOS D
- F/F — LOS E/F

0 0.3 0.6 1.2 Mi.

Full Bypass Scenario with WK Parkway Interchange – Alternate 4

This alternate includes the full northern bypass, along with a new interchange with the Western Kentucky Parkway (WK Parkway). This alternative was eliminated early in the process as very costly, would not facilitate enough traffic to be worthy of such an expense, would have significant land impacts, require improvements along the entire length of KY 222, and makes the interchanges on the WK Parkway too closely spaced.

Analysis and Evaluation of Alternative Scenarios

The following is a summary of the advantages and disadvantages of each alternative.

Alternate	Advantages	Disadvantages
Bypass 2A Partial	• Minimal Construction • Diverts Traffic West to North and South to East • Most Affordable – closest to Glendale, fewest impacts, shortest route • Compatible with future Full Bypass • Could provide western access to site	• Does not divert all through traffic from Historic District • Does not improve railroad grade crossing on KY 1136
Bypass 2B Partial	• Diverts Traffic West to North and South to East • Compatible with Full Bypass 3A or 3B	• Does not divert all through traffic from Historic District • Does not improve railroad grade crossing on KY 1136 • Creates odd 5-leg intersection
Bypass 3A Full	• Grade separation at railroad • Best traffic diversion • Compatible with other plans • Grade separation creates jug-handle interchange	• Bridge over railroad very expensive • More construction/land impacts
Bypass 3B Full	• Improved railroad grade crossing • Best traffic diversion • Compatible with Alternate 2B	• Railroad crossing remains at grade • Disjointed KY 1136 • May adversely impact tourism

The detailed evaluation matrix used for estimating the impacts and preliminary costs for these and other recommended improvements is included in the Appendix.

Recommended Transportation Plan

KYTC Six Year Plan Project 04-20.01, reconstruct the existing interchange on I-65 at Glendale to improve safety and increase capacity for existing and future needs, is already in the design phase. The proposed project relocates KY 222 to the south, and rebuilds the existing diamond interchange into a single-point urban interchange ("SPUI"). KY 222 is rebuilt on new alignment between a point approximately 0.75 miles west of I-65 eastward to US 31W.

Short Range Highway Improvements

These improvements are strongly recommended by the Project Team to be in place on opening day of the new plant at the industrial site, and assume that Project 04-20.01 is completed. The following four (4) projects are recommended for construction as the Glendale site is developed:

- Partial Bypass Alternate 2A.
- Improve KY 1136 from Bypass (Alternate 2A) to the Ring Road Extension.
- Improve KY 222 from I-65 to the Bypass (Alternate 2A).
- The intersection of KY 222/KY 1136 in downtown Glendale will need left-turn lanes.

Medium Range Highway Improvements

These improvements are recommended to be in place soon after the new plant at the industrial site is opened. While they may not be absolutely necessary for opening day traffic, we believe they will be needed after the plant is opened:

- Replace KY 1136 bridge over I-65 providing more width and vertical clearance.
- Widen KY 1136 from US 31W to Jaggers Road for southern access to the site.
- The traffic control at the intersection of KY 222/KY 1136 will need to be reviewed by KYTC. Four-way STOP control or a traffic signal could possibly need to be installed.

Long Range Highway Improvements

As the plant expands, additional development occurs, and employment increases, the roadway infrastructure will also need additional improvement:

- Complete full bypass around Glendale that extends the partial bypass to KY 222 & Smith Mill Road west of Glendale.
- Improve (add turn lanes and shoulders to US 31W between reconstructed KY 222 intersection and KY 1136.
- Widen I-65 to six lanes.

GLENDALE TRANSPORTATION STUDY

RECOMMENDED IMPROVEMENTS

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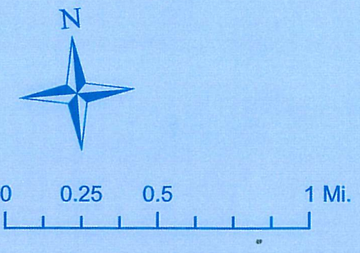
Map Key	Project Description
Short Range Highway Improvements	
A	Constructed Partial Bypass (Option 2-A) Linking KY 222 just east of Glendale to KY 1136 north of Glendale.
B	Improve KY 1136 to three lanes with shoulders on existing alignment from proposed Partial Bypass 2A northward to the proposed Ring Road Extension.
C	Improve KY 222 from proposed Partial Bypass (Option 2A) to I-65 interchange improvements.
D	Provide left turn lanes at the intersection of KY222 & KY 1136 in Glendale.
Medium Range Highway Improvements	
E	Replace existing KY 1136 bridge over I-65 to provide two lanes with shoulders and increased clearance over I-65.
F	Widen KY 1136 to three lanes with shoulders on existing alignment from proposed site entrance eastward to US 31W.
G	Review Traffic Control at the intersection of KY222 & KY1136. Four way traffic control or signalization may be required.
Long Range Highway Improvements	
H	Complete full bypass around Glendale that extends the partial bypass to KY 222 & Smith Mill Road west of Glendale.
I	Improve (add turn lanes and shoulders to US 31W between reconstructed KY 222 intersection and KY 1136.
J	Widen Interstate 65 to six lanes.



Recommendations Outside of Study Area

When the plant is built, the traffic generated will create a strong need for Ring Road in Elizabethtown to be extended to I-65. Currently Ring Road is being extended to the WK Parkway. There are three corridors under evaluation by the KYTC to continue the Ring Road extension to I-65. This will connect the existing industrial areas in Elizabethtown to the interstate as well as provide access for a reserved industrial corridor between the WK Parkway and I-65.

As a matter of preservation in the Glendale area, it is a recommendation of this study that the support businesses to the site be located in the Ring Road corridor before allowing other development in the industrial overlay zone along US 31W east of the site.

This improvement to the area roadway network will increase the connectivity of the plant to the local roadway system, facilitating freight movement to and from the interstate. This will also allow KY 1136 to better serve as an alternate route to I-65 during incidents on the interstate.

Conclusion

The south-central section of Hardin County has a tremendous asset in the Economic Development Site. Strategically located in the I-65 corridor, the site is well suited to be a manufacturing, final point of assembly, or other facility that uses roadway and/or railway modes for shipping and receiving freight.

With the proper infrastructure in place, the site will better blend into the surrounding rural area without compromising area mobility. This report sets forth a short, medium and long range projects that can be constructed over time to distribute costs, making the plan fiscally responsible, and scalable to grow as development grows.

This draft report will have some enhancements to make the final report. Those enhancements will include:

- Final cost estimates in an ala carte (or line item) form with supportive calculations
- Improved map backgrounds for Figures 3 through 7
- Incorporated comments from LTADD

Study References

KYTC – I-65/KY 222 Interchange Modification Report

KYTC Six Year Plan (2006)

2008 Hardin County Comprehensive Plan

APPENDIX

Evaluation Matrix

GLENDALE TRANSPORTATION STUDY

Conceptual Cost Estimate - Miscellaneous

Alternative	Description	Length (miles)	Area (Acres)	Stream Restoration (ft))	Stream Restoration	Utility Relocations	Totals
					Price per LF	Lump Sum	
Relocated KY 1136	Two lane new route for KY 1136 located immediately east of Glendale village District with intersections at Jaggers Road, KY 222 and Bypass Alternative 2	0.17	1.2	80.0	$400	$5,000	$37,000
KY 1136 Improvments MP 0.00 to 0.50	Improve roadway geometry and full shoulders with center turn lane as needed from US-31 to Industrial Site Access. Replace bridge over I-65	0.50	3.6	120.0	$400	$100,000	$148,000
KY 1136 Improvments MP 4.26 to 7.60 (CSX Railroad to Ring Rd. Extension **)	Improve roadway geometry and full shoulders with center turn lane as needed from CSX Railroad to Ring Rd. Extension	3.34	24.3	1940.0	$400	$175,000	$951,000
Jaggers Road Extension	Two lane new connection from Jaggers Road beginning north of the development parcel northeastwardly to the intersection of KY 222 and Mudsplash Road	0.24	1.8	200.0	$400	$2,000	$82,000
Bypass Alt 3A Full	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale and following an alignment parallel to Oxmoor Rd. grade separated over the CSX Railroad and ending at the intersection of KY 222 and Smith Mill Road	0.54	3.9	120.0	$400	$250,000	$298,000
Bypass Alt. 3B Full	Two lane new route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale with modification of the grade crossing at CSX Railroad and KY 1136 ending at the intersection of KY 222 and Crump Ln.	0.63	4.6	250.0	$400	$6,000	$106,000
Bypass Alt 2A Partial	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale ending at a new the intersection with KY 1136 south of Oxmoor Road	0.19	1.4	120.0	$400	$2,000	$50,000
Bypass Alt 2B Partial	New two lane route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale ending at a modification of the grade crossing at CSX Railroad and KY 1136.	0.33	2.4	240.0	$400	$2,000	$98,000
US 31W Improvments MP 6.75 to 8.00	Widening and Access Management Improvements KY 222 to KY 1136	1.25	13.0	100.0	$400	$65,000	$105,000

Notes:
Utility relocation for Bypass Alternative 1 Full assumes relocation of KY highvoltage transmission line in the vicinity of aerial structure

GLENDALE TRANSPORTATION STUDY

Conceptual Cost Estimate - Bridges

Alternative	Description	Length (miles)	Area (Acres)	Bridge Length	Bridge Width	Bridge Area	Cost	Totals
				Price per Mile	Price per mile		Per SF Deck	
Relocated KY 1136	Two lane new route for KY 1136 located immediately east of Glendale village District with intersections at Jaggers Road, KY 222 and Bypass Alternative 2	0.17	1.2	0	0	0	70	$0
KY 1136 Improvments MP 0.00 to 0.50	Improve roadway geometry and full shoulders with center turn lane as needed from US-31 to Industrial Site Access. Replace bridge over I-65	0.50	3.6	200	44	8,800	90	$792,000
KY 1136 Improvments MP 4.26 to 7.60 (CSX Railroad to Ring Rd. Extension **)	Improve roadway geometry and full shoulders with center turn lane as needed from CSX Railroad to Ring Rd. Extension	3.34	24.3		0	0	70	$0
Jaggers Road Extension	Two lane new connection from Jaggers Road beginning north of the development parcel northeastwardly to the intersection of KY 222 and Mudsplash Road	0.24	1.8	0	0	0	70	$0
Bypass Alt 3A Full	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale and following an alignment parallel to Oxmoor Rd. grade separated over the CSX Railroad and ending at the intersection of KY 222 and Smith Mill Road	0.51	3.7	400	44	17,600	70	$1,232,000
Bypass Alt. 3B Full	Two lane new route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale with modification of the grade crossing at CSX Railroad and KY 1136 ending at the intersection of KY 222 and Crump Ln.	0.64	4.7	0	0	0	70	$0
Bypass Alt 2A Partial	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale ending at a new the intersection with KY 1136 south of Oxmoor Road	0.19	1.4	0	0	0	70	$0
Bypass Alt 2B Partial	New two lane route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale ending at a modification of the grade crossing at CSX Railroad and KY 1136.	0.33	2.4	0	0	0	70	$0
US 31W Improvments MP 6.75 to 8.00	Widening and Access Management Improvements KY 222 to KY 1136	1.25	13.0	0	0	0	70	$0

GLENDALE TRANSPORTATION STUDY

Conceptual Cost Estimate - Traffic Signals

Alternative	Description	Length (miles)	Signalized Intersections (new)	Signalized Intersections (modify)	New Signals	Modify Signals	Totals
					Each	Each	
Relocated KY 1136	Two lane new route for KY 1136 located immediately east of Glendale village District with intersections at Jaggers Road, KY 222 and Bypass Alternative 2	0.17	2		$65,000	$10,000	$130,000
KY 1136 Improvments MP 0.00 to 0.50	Improve roadway geometry and full shoulders with center turn lane as needed from US-31 to Industrial Site Access. Replace bridge over I-65	0.50	1	1	$65,000	$10,000	$75,000
KY 1136 Improvments MP 4.26 to 7.60	Improve roadway geometry and full shoulders with center turn lane as needed from CSX Railroad to Ring Rd. Extension	3.34	2		$65,000	$10,000	$130,000
Jaggers Road Extension	Two lane new connection from Jaggers Road beginning north of the development parcel northeastwardly to the intersection of KY 222 and Mudsplash Road	0.24		1	$65,000	$10,000	$10,000
Bypass Alt 3A Full	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale and following an alignment parallel to Oxmoor Rd. grade separated over the CSX Railroad and ending at the intersection of KY 222 and Smith Mill Road	0.51	3		$65,000	$10,000	$195,000
Bypass Alt. 3B Full	Two lane new route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale with modification of the grade crossing at CSX Railroad and KY 1136 ending at the intersection of KY 222 and Crump Ln.	0.64	3		$65,000	$10,000	$195,000
Bypass Alt 2A Partial	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale ending at a new the intersection with KY 1136 south of Oxmoor Road	0.19	2		$65,000	$10,000	$130,000
Bypass Alt 2B Partial	New two lane route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale ending at a modification of the grade crossing at CSX Railroad and KY 1136.	0.33	2		$65,000	$10,000	$130,000
US 31W Improvments MP 6.75 to 8.00	Widening and Access Management Improvements KY 222 to KY 1136	0.33	2	3	$65,000	$10,000	$160,000

GLENDALE TRANSPORTATION STUDY

Conceptual Cost Estimate - Traffic Control

Alternative	Description	Length (miles)	Area (Acres)	Pavement Markings	Signs	Pavement Markings	Signs	Totals
				Price per Mile	Price per mile			
Relocated KY 1136	Two lane new route for KY 1136 located immediately east of Glendale village District with intersections at Jaggers Road, KY 222 and Bypass Alternative 2	0.17	1.2	$10,000	$32,500	$1,655	$5,380	$7,035
KY 1136 Improvments MP 0.00 to 0.50	Improve roadway geometry and full shoulders with center turn lane as needed from US-31 to Industrial Site Access. Replace bridge over I-65	0.50	3.6	$10,000	$32,500	$5,000	$16,250	$21,250
KY 1136 Improvments MP 4.26 to 6.59 (CSX Railroad to West Rhuds Creek Rd.)	Improve roadway geometry and full shoulders with center turn lane as needed from CSX Railroad to West Rhuds Creek Rd.	3.34	24.3	$10,000	$32,500	$33,400	$108,550	$141,950
Jaggers Road Extension	Two lane new connection from Jaggers Road beginning north of the development parcel northeastwardly to the intersection of KY 222 and Mudsplash Road	0.24	1.8	$10,000	$32,500	$2,428	$7,891	$10,319
Bypass Alt 3A Full	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale and following an alignment parallel to Oxmoor Rd. grade separated over the CSX Railroad and ending at the intersection of KY 222 and Smith Mill Road	0.51	3.7	$10,000	$32,500	$5,148	$16,730	$21,878
Bypass Alt. 3B Full	Two lane new route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale with modification of the grade crossing at CSX Railroad and KY 1136 ending at the intersection of KY 222 and Crump Ln.	0.64	4.7	$10,000	$32,500	$6,428	$20,891	$27,319
Bypass Alt 2A Partial	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale ending at a new the intersection with KY 1136 south of Oxmoor Road	0.19	1.4	$10,000	$32,500	$1,858	$6,038	$7,896
Bypass Alt 2B Partial	New two lane route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale ending at a modification of the grade crossing at CSX Railroad and KY 1136.	0.33	2.4	$10,000	$32,500	$3,275	$10,643	$13,917
US 31W Improvments MP 6.75 to 8.00	Widening and Access Management Improvements KY 222 to KY 1136	1.25	13.0	$15,000	$48,000	$18,750	$60,000	$78,750

GLENDALE TRANSPORTATION STUDY

Conceptual Cost Estimate - Drainage

Alternative	Description	Length (miles)	Area (Acres)	Culverts Small	Culverts Medium	Culverts Large	Culverts Small	Culverts Medium	Culverts Large	Underdrains Cost per Mile	Underdrains Total Cost	Totals
Relocated KY 1136	Two lane new route for KY 1136 located immediately east of Glendale village District with intersections at Jaggers Road, KY 222 and Bypass Alternative 2	0.17	1.2	2	1		$6,000	$7,500	$0	$75,000	$12,415	$25,915
KY 1136 Improvments MP 0.00 to 0.50	Improve roadway geometry and full shoulders with center turn lane as needed from US-31 to Industrial Site Access. Replace bridge over I-65	0.50	3.6	2		1	$6,000	$0	$12,000	$75,000	$37,500	$55,500
KY 1136 Improvments MP 4.26 to 7.60 (CSX Railroad to Ring Rd. Extension **)	Improve roadway geometry and full shoulders with center turn lane as needed from CSX Railroad to Ring Rd. Extension	3.34	24.3	10	5	5	$30,000	$37,500	$75,000	$75,000	$250,500	$393,000
Jaggers Road Extension	Two lane new connection from Jaggers Road beginning north of the development parcel northeastwardly to the intersection of KY 222 and Mudsplash Road	0.24	1.8	4	1	2	$12,000	$7,500	$24,000	$75,000	$18,210	$61,710
Bypass Alt 3A Full	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale and following an alignment parallel to Oxmoor Rd. grade separated over the CSX Railroad and ending at the intersection of KY 222 and Smith Mill Road	0.51	3.7	8	2	1	$24,000	$15,000	$12,000	$75,000	$32,926	$83,926
Bypass Alt. 3B Full	Two lane new route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale with modification of the grade crossing at CSX Railroad and KY 1136 ending at the intersection of KY 222 and Crump Ln.	0.64	4.7	9	3	2	$27,000	$22,500	$24,000	$75,000	$48,210	$121,710
Bypass Alt 2A Partial	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale ending at a new the intersection with KY 1136 south of Oxmoor Road	0.19	1.4	3		1	$9,000	$0	$12,000	$75,000	$13,935	$34,935
Bypass Alt 2B Partial	New two lane route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale ending at a modification of the grade crossing at CSX Railroad and KY 1136.	0.33	2.4	5	1	2	$15,000	$7,500	$24,000	$75,000	$24,560	$71,060
US 31W Improvments MP 6.75 to 8.00	Widening and Access Management Improvements KY 222 to KY 1136	1.25	13.0	1	3		$3,000	$22,500	$0	$75,000	$93,750	$119,250

GLENDALE TRANSPORTATION STUDY

Conceptual Cost Estimate - Pavement

Alternative	Description	Length (miles)	Area (Acres)	Asphalt /DGA	Asphalt/DGA	Totals
				Price per Mile	Price Total	
Relocated KY 1136	Two lane new route for KY 1136 located immediately east of Glendale village District with intersections at Jaggers Road, KY 222 and Bypass Alternative 2	0.17	1.2	$1,418,421	$234,792	$234,792
KY 1136 Improvments MP 0.00 to 0.50	Improve roadway geometry and full shoulders with center turn lane as needed from US-31 to Industrial Site Access. Replace bridge over I-65	0.50	3.6	$1,063,816	$451,316	$451,316
KY 1136 Improvments MP 4.26 to 6.59 (CSX Railroad to West Rhuds Creek Rd.)	Improve roadway geometry and full shoulders with center turn lane as needed from CSX Railroad to West Rhuds Creek Rd.	3.34	24.3	$1,063,816	$3,553,145	$3,553,145
Jaggers Road Extension	Two lane new connection from Jaggers Road beginning north of the development parcel northeastwardly to the intersection of KY 222 and Mudsplash Road	0.24	1.8	$1,418,421	$344,397	$344,397
Bypass Alt 3A Full	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale and following an alignment parallel to Oxmoor Rd. grade separated over the CSX Railroad and ending at the intersection of KY 222 and Smith Mill Road	0.51	3.7	$1,418,421	$622,708	$622,708
Bypass Alt. 3B Full	Two lane new route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale with modification of the grade crossing at CSX Railroad and KY 1136 ending at the intersection of KY 222 and Crump Ln.	0.64	4.7	$1,418,421	$911,765	$911,765
Bypass Alt 2A Partial	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale ending at a new the intersection with KY 1136 south of Oxmoor Road	0.19	1.4	$1,418,421	$263,536	$263,536
Bypass Alt 2B Partial	New two lane route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale ending at a modification of the grade crossing at CSX Railroad and KY 1136.	0.33	2.4	$1,418,421	$464,479	$464,479
US 31W Improvments MP 6.75 to 8.00	Widening and Access Management Improvements KY 222 to KY 1136	1.25	13.0	$2,450,000	$3,062,500	$3,062,500

Notes:

Except where noted, new full depth pavement, KY-1136 improvements assume full depth in widened pavemet in combination with overlay of the existing pavement.

US31W improvements assume full depth pavement replacement

GLENDALE TRANSPORTATION STUDY

Conceptual Cost Estimate -Erosion Control

Alternative	Description	Length (miles)	Area (Acres)	Erosion Control	Erosion Control	Seeding/Protection	Seeding/Protection	Totals
				Price per 100k Earthwork		Price/SY		
Relocated KY 1136	Two lane new route for KY 1136 located immediately east of Glendale village District with intersections at Jaggers Road, KY 222 and Bypass Alternative 2	0.17	1.2	$3,000	$2,789	$1	$5,827	$8,616
KY 1136 Improvments MP 0.00 to 0.50	Improve roadway geometry and full shoulders with center turn lane as needed from US-31 to Industrial Site Access. Replace bridge over I-65	0.50	3.6	$3,000	$3,534	$1	$17,600	$21,134
KY 1136 Improvments MP 4.26 to 6.59 (CSX Railroad to West Rhuds Creek Rd.)	Improve roadway geometry and full shoulders with center turn lane as needed from CSX Railroad to West Rhuds Creek Rd.	3.34	24.3	$3,000	$23,606	$1	$117,568	$141,174
Jaggers Road Extension	Two lane new connection from Jaggers Road beginning north of the development parcel northeastwardly to the intersection of KY 222 and Mudsplash Road	0.24	1.8	$3,000	$8,051	$1	$8,547	$16,597
Bypass Alt 3A Full	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale and following an alignment parallel to Oxmoor Rd. grade separated over the CSX Railroad and ending at the intersection of KY 222 and Smith Mill Road	0.51	3.7	$3,000	$20,385	$1	$18,120	$38,505
Bypass Alt. 3B Full	Two lane new route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale with modification of the grade crossing at CSX Railroad and KY 1136 ending at the intersection of KY 222 and Crump Ln.	0.64	4.7	$3,000	$17,121	$1	$22,627	$39,748
Bypass Alt 2A Partial	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale ending at a new the intersection with KY 1136 south of Oxmoor Road	0.19	1.4	$3,000	$6,160	$1	$6,776	$12,936
Bypass Alt 2B Partial	New two lane route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale ending at a modification of the grade crossing at CSX Railroad and KY 1136.	0.33	2.4	$3,000	$8,722	$1	$11,527	$37,616
US 31W Improvments MP 6.75 to 8.00	Widening and Access Management Improvements KY 222 to KY 1136	0.51	3.7	$3,000	$17,098	$1	$18,120	$35,218

GLENDALE TRANSPORTATION STUDY

Conceptual Cost Estimate - Roadway

Alternative	Description	Length (miles)	Area (Acres)	Cut/fill Avg. Depth (ft)	Cut/fill Avg. Depth Price per mile	Clearing Grubbing Per Acre	Totals
Relocated KY 1136	Two lane new route for KY 1136 located immediately east of Glendale village District with intersections at Jaggers Road, KY 222 and Bypass Alternative 2	0.17	1.2	5	$543,529	$2,500	$92,980
KY 1136 Improvments MP 0.00 to 0.50	Improve roadway geometry and full shoulders with center turn lane as needed from US-31 to Industrial Site Access. Replace bridge over I-65	0.50	3.6	4	$217,412	$2,500	$117,797
KY 1136 Improvments MP 4.26 to 7.60	Improve roadway geometry and full shoulders with center turn lane as needed from CSX Railroad to Ring Rd. Extension	3.34	24.3	4	$217,412	$2,500	$786,883
Jaggers Road Extension	Two lane new connection from Jaggers Road beginning north of the development parcel northeastwardly to the intersection of KY 222 and Mudsplash Road	0.24	1.8	10	$1,087,059	$2,500	$268,356
Bypass Alt 3A Full	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale and following an alignment parallel to Oxmoor Rd. grade separated over the CSX Railroad and ending at the intersection of KY 222 and Smith Mill Road	0.51	3.7	12	$1,304,471	$2,500	$679,488
Bypass Alt. 3B Full	Two lane new route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale with modification of the grade crossing at CSX Railroad and KY 1136 ending at the intersection of KY 222 and Crump Ln.	0.64	4.7	8	$869,647	$2,500	$570,699
Bypass Alt 2A Partial	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale ending at a new the intersection with KY 1136 south of Oxmoor Road	0.19	1.4	10	$1,087,059	$2,500	$205,349
Bypass Alt 2B Partial	New two lane route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale ending at a modification of the grade crossing at CSX Railroad and KY 1136.	0.33	2.4	8	$869,647	$2,500	$290,730
US 31W Improvments MP 6.75 to 8.00	Widening and Access Management Improvements KY 222 to KY 1136	1.25	13.0	3	$429,882	$2,500	$569,929

GLENDALE TRANSPORTATION STUDY

Conceptual Cost Estimate

Lincoln Trail Area
Devleopment Disrict 613
College Street Rd.
Elizabethtown, KY 42701

Alternative	Description	ADT	Length (miles)	Area (Acres)	Int.	Construction Cost Categories												TOTAL
						Roadway	Erosion Control	Pavement	Drainage	Traffic Control	Traffic Signals	Bridges	Stream Rest.	Subtotal	MOT	Railroad Coord.	Misc.	KY 222 Improvements	
Relocated KY 1136	Two lane new route for KY 1136 located immediately east of Glendale village District with intersections at Jaggers Road, KY 222 and Bypass Alternative 2	TBD	0.17	1.2	3	$93,000	$9,000	$235,000	$26,000	$7,000	$130,000	$0	$37,000	$537,000	$5,000	$0	$59,000	$0	$601,000
KY 1136 Improvments MP 0.00 to 0.50	Improve roadway geometry and full shoulders with center turn lane as needed from US-31 to Industrial Site Access. Replace bridge over I-65	5,000	0.50	3.6	2	$118,000	$21,000	$451,000	$56,000	$21,000	$75,000	$792,000	$148,000	$1,682,000	$17,000	$0	$185,000	$0	$1,884,000
KY 1136 Improvments MP 4.26 to 7.60 (CSX Railroad to Ring Rd. Extension **)	Improve roadway geometry and full shoulders with center turn lane as needed from CSX Railroad to Ring Rd. Extension	5,000	3.34	24.3	10	$787,000	$141,000	$3,553,000	$393,000	$142,000	$130,000	$0	$951,000	$6,097,000	$61,000	$0	$671,000	$0	$6,829,000
Jaggers Road Extension	Two lane new connection from Jaggers Road beginning north of the development parcel northeastwardly to the intersection of KY 222 and Mudsplash Road	TBD	0.24	1.8	2	$268,000	$17,000	$344,000	$62,000	$10,000	$10,000	$0	$82,000	$793,000	$8,000	$0	$87,000	$0	$888,000
Bypass Alt 2A Partial	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale ending at a new the intersection with KY 1136 south of Oxmoor Road	3,500	0.19	1.4	2	$205,000	$13,000	$264,000	$35,000	$8,000	$130,000	$0	$50,000	$705,000	$7,000	$0	$78,000	$0	$790,000
Bypass Alt 2B Partial	New two lane route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale ending at a modification of the grade crossing at CSX Railroad and KY 1136.	3,500	0.33	2.4	2	$291,000	$38,000	$464,000	$71,000	$14,000	$130,000	$0	$98,000	$1,106,000	$11,000	$0	$122,000	$0	$1,239,000
Bypass Alt 3A Full	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale and following an alignment parallel to Oxmoor Rd. grade separated over the CSX Railroad and ending at the intersection of KY 222 and Smith Mill Road	6,000	0.51	3.7	4	$679,000	$39,000	$623,000	$84,000	$22,000	$195,000	$1,232,000	$298,000	$3,172,000	$32,000	$50,000	$399,000	$0	$3,653,000
Bypass Alt. 3B Full	Two lane new route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale with modification of the grade crossing at CSX Railroad and KY 1136 ending at the intersection of KY 222 and Crump Ln.	6,000	0.64	4.7	3	$571,000	$40,000	$912,000	$122,000	$27,000	$195,000	$0	$106,000	$1,973,000	$20,000	$120,000	$337,000	$0	$2,450,000
US 31W Improvments MP 6.75 to 8.00	Widening and Access Management Improvements KY 222 to KY 1136	1.25	1.25	13.0	6	$570,000	$35,000	$3,063,000	$119,000	$79,000	$160,000	$0	$105,000	$4,131,000	$41,000	$120,000	$574,000	$0	$4,866,000

Notes:
Except where noted, all alternatives assume 2 12' asphalt lanes with 10' shoulders on both sides and no sidewalks. US-31 W improvements assume 4 -12 lanes.
A 400' long bridge is assumed for Bypass Alternative 3-A over KY 1136 and the CSX Railroad
A 200' long bridge replacement is assumed for KY 1136 over I-65
These costs do not include costs for right of way
These costs do not include any roadway/pedestrian lighting
Bypass Alternative 2 Full assumes relocation of the existing at grade crossing of the CSX Railroad and KY-1136

GLENDALE TRANSPORTATION STUDY

Conceptual Cost Estimate - Miscellaneous

Alternative	Description	Length (miles)	Area (Acres)	Stream Restoration (ft))	Stream Restoration	Utility Relocations	Totals
					Price per LF	Lump Sum	
Relocated KY 1136	Two lane new route for KY 1136 located immediately east of Glendale village District with intersections at Jaggers Road, KY 222 and Bypass Alternative 2	0.17	1.2	80.0	$400	$5,000	$37,000
KY 1136 Improvments MP 0.00 to 0.50	Improve roadway geometry and full shoulders with center turn lane as needed from US-31 to Industrial Site Access. Replace bridge over I-65	0.50	3.6	120.0	$400	$100,000	$148,000
KY 1136 Improvments MP 4.26 to 7.60 (CSX Railroad to Ring Rd. Extension **)	Improve roadway geometry and full shoulders with center turn lane as needed from CSX Railroad to Ring Rd. Extension	3.34	24.3	1940.0	$400	$175,000	$951,000
Jaggers Road Extension	Two lane new connection from Jaggers Road beginning north of the development parcel northeastwardly to the intersection of KY 222 and Mudsplash Road	0.24	1.8	200.0	$400	$2,000	$82,000
Bypass Alt 3A Full	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale and following an alignment parallel to Oxmoor Rd. grade separated over the CSX Railroad and ending at the intersection of KY 222 and Smith Mill Road	0.54	3.9	120.0	$400	$250,000	$298,000
Bypass Alt. 3B Full	Two lane new route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale with modification of the grade crossing at CSX Railroad and KY 1136 ending at the intersection of KY 222 and Crump Ln.	0.63	4.6	250.0	$400	$6,000	$106,000
Bypass Alt 2A Partial	Two lane new route beginning at KY 222 approximately 1/3 of mile east of Glendale ending at a new the intersection with KY 1136 south of Oxmoor Road	0.19	1.4	120.0	$400	$2,000	$50,000
Bypass Alt 2B Partial	New two lane route beginning at the intersection of KY 222 and Mudsplash Road and following an alignment north of Glendale ending at a modification of the grade crossing at CSX Railroad and KY 1136.	0.33	2.4	240.0	$400	$2,000	$98,000
US 31W Improvments MP 6.75 to 8.00	Widening and Access Management Improvements KY 222 to KY 1136	1.25	13.0	100.0	$400	$65,000	$105,000

Notes:
Utility relocation for Bypass Alternative 1 Full assumes relocation of KY highvoltage transmission line in the vicinity of aerial structure