# Eastern Corridor Segment IV(a): SR 32 Eastgate Area Improvements

(CLE-32-2.25 PID #82370)

# CONCEPTUAL ALTERNATIVES STUDY

July 2, 2012

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

TranSystems

# EASTERN CORRIDOR SEGMENT IV(A): SR 32 EASTGATE AREA IMPROVEMENTS

(CLE-32-2.25 PID #82370)

## CONCEPTUAL ALTERNATIVES STUDY

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JULY 2, 2012

# EXECUTIVE SUMMARY

This Conceptual Alternative Study (CAS) Report was prepared for the CLE-32-2.25 Project (Eastern Corridor Segment IV(a): SR 32 Eastgate Area Improvements) as part of Step 4 of the Ohio Department of Transportation's (ODOT's), Project Development Process (PDP) for Major Projects.

The CAS includes a summary of the previous documents submitted and approved by ODOT. Information and recommendations within the Eastern Corridor Tier I Environmental Impact Statement (EIS) were utilized as a strong foundation for this study of Segment IV(a). Project specific documents, including a Public Involvement Plan, Draft Purpose and Need, and Red Flag Summary, were used in the development and evaluation of several conceptual alternatives in Steps 3-4.

The subsequent section, Development of Conceptual Alternatives, summarizes the methodology utilized to develop the Conceptual Alternatives in Step 4 and provides a description of each.

The conceptual alternatives were evaluated based on design issues, traffic analyses, and preliminary environmental evaluations. The results of these analyses are summarized by issue in the Evaluation of Conceptual Alternatives section.

These analyses are summarized by alternative in the Comparison Matrices and Conclusion section. Based upon the provided evaluations and public comment, select alternatives are recommended for advancement. The Feasible Alternatives that are chosen for further work will be analyzed in greater detail, including further design based on certified traffic, environmental field studies and agency coordination, as well as an analysis of the local network improvements required as a result of the preferred alternative.

The alternatives recommended to be carried forward are:

- Alternative 2 – Interchange East of Fayard Drive.
- Alternative 4 – Interchange at Newberry Drive, with ramps at Glen Este-Withamsville Road.
- Alternative 4 – Interchange at Newberry Drive, without ramps at Glen Este-Withamsville Road.
- Alternative 5 – No Build.

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# INTRODUCTION

The purpose of the Conceptual Alternatives Study (CAS) is to develop and evaluate alternatives that avoid or minimize impacts to design and sensitive environmental areas within the study area during Step 4 of the Ohio Department of Transportation's (ODOT's) 14-Step Project Development Process (PDP) for Major Projects. A graphic of ODOT's PDP has been included in Appendix A. The CAS is the combined design and environmental document that refines and analyzes the transportation improvements that were developed and evaluated in Step 4.

At this point in the PDP, the design of concepts and evaluation of their potential impacts are based upon: mapping from aerial photography, property information from the Clermont County Auditor, geotechnical research, and information on social, economic and environmental resources available from secondary sources. Because of the range of alternatives in Step 4, field studies have been limited to a red flag field visit (windshield survey) related to geotechnical issues, traffic analysis, ecological resources, Environmental Site Assessment screening, and field reviews as needed by planners and engineers to understand existing conditions.

This report does not reflect final design details nor complete environmental studies, coordination or mitigation. It is the first major submission for early consideration of these issues, which will be expanded upon in future steps of the process.

## Project History

The SR 32 Eastgate Area Improvements, also known as the Eastern Corridor Segment IV(a) project, traces its roots to the Eastern Corridor Major Investment Study (MIS) completed in April 2000 by the Ohio-Kentucky-Indiana Regional Council of Governments (OKI), the regional planning organization in southwestern Ohio. The purpose of the MIS was to identify alternatives to meet the regional transportation needs while balancing cost, social and economic benefits, and environmental impacts. The MIS studied a 200-square-mile area and ultimately recommended a multi-modal plan for the Eastern Corridor area, including Transportation Management System improvements, new and expanded bus transit service, new rail service, and highway capacity improvements.

Building upon the recommendations of the MIS for the overall study area, a Tier 1 Environmental Impact Statement (EIS) was prepared to identify strategies for improving long-term travel mobility specifically between the City of Cincinnati and its eastern suburbs. With this refined geographic focus, the Tier 1 EIS was a detailed examination of the range of alternatives that would meet the four general recommendations of the MIS. Therefore, within a 14-square-mile study area roughly centered on SR 32, several feasible alternatives were presented by mode and geographic area, to be further developed in Tier 2 environmental analyses. Of the modes, highway capacity alternatives were divided into four segments within the study area (Segments I through IV). Specifically, alternatives in Segment IV focused on the consolidation and management of access points in order to establish an improved SR 32 as a limited access arterial roadway east of I-275 to Olive Branch-Stonelick Road. Later, the interchange at SR 32 and I-275 was broken out as a separate project, and Segment IV(a) was defined by Eastgate Boulevard to the west and Olive Branch-Stonelick Road to the east.

The SR 32 corridor, including Segment IV(a), plays an important role in the Appalachian Development Highway System, serving the movement of raw materials, finished goods, and services to and from Interstates 71 and 75 via I-275. In addition to movement of goods and services, SR 32 serves as a direct route for employees from the eastern rural communities employed at Clermont County companies. Numerous businesses and residential developments are situated along the corridor and accessed directly or indirectly from SR 32.

The Eastern Corridor Study is a program of multi-modal transportation programs integrating land use, economic development, and environmental stewardship to address the growing travel demand between downtown Cincinnati and western Clermont County. The study area includes several political jurisdictions and communities, economic and employment centers, existing and future development zones, as well as sensitive environmental resources that are all being jointly considered to develop a long-term transportation solution for the area. A comprehensive two-year planning study led by the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) was completed in 2000 and, since 2002, the Eastern Corridor has been following a tiered approach to fulfill NEPA requirements.

The Tier 1 work, as presented in the Tier 1 Final Environmental Impact Statement (EIS) for the Eastern Corridor Multi-Modal Projects, identified feasible alternatives for different multi-modal components, including:

- Transportation System Management (TSM) actions.
- Improved bus transit, including expanded bus routes, new community circulators, feeder routes to compliment rail transit, and new bus hubs.
- New rail transit capacity extending from downtown Cincinnati to Milford.
- New highway capacity from Red Bank Road at I-71 to SR 32/I-275 in the Eastgate area of Clermont County.
- New bikeway.

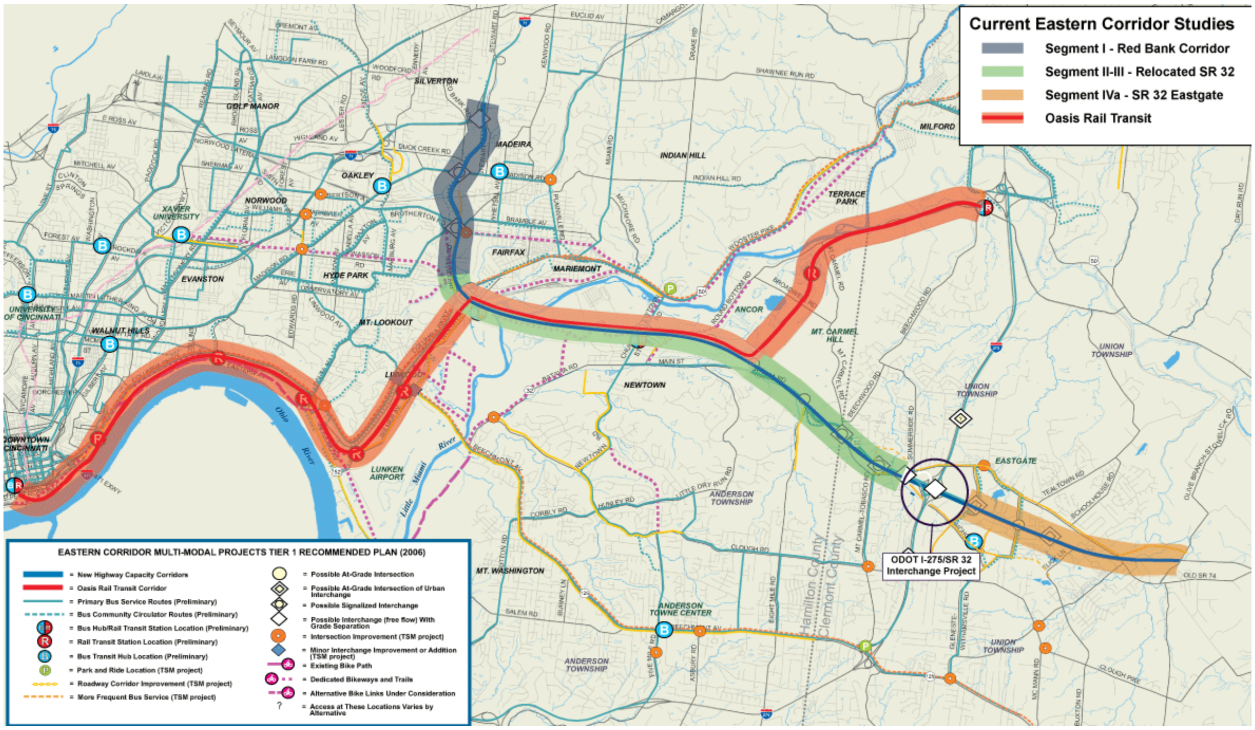
Five Eastern Corridor projects stemmed from the results of the Tier 1 Final EIS: Red Bank Corridor project (Segment I), Relocated SR 32 project (Segment II-III), I-275/SR 32 Interchange project (Segment IV); SR 32 Eastgate Area Improvements project (Segment IV(a)), and the Oasis Commuter Rail project. A graphic depicting the Eastern Corridor projects can be seen below followed by a description of each project.

**Red Bank Corridor Improvement Project (Segment I).** The Red Bank Expressway project extends 2.5 miles between US-50 in Fairfax and the I-71 ramp in Madisonville. The project includes modifications and improvements to the primary expressway, ancillary roads and key intersections to make it easier and quicker to travel through the corridor and among its businesses and neighborhoods.

**Oasis Rail Transit.** Approximately 17 miles in length, the proposed Oasis Rail Transit corridor extends between the Riverfront Transit Center in downtown Cincinnati and I-275 in the City of Milford. Currently under evaluation are feasible alignment and rail technology alternatives, travel demand and ridership projections, potential station locations and projected construction and operational costs.

**Relocated SR 32 Project (Segment II-III).** The SR-32 Relocation Project extends between US-50 in Fairfax to the I-275/SR-32 interchange in Clermont County. The project will establish a shared, multi-modal transportation corridor that will feature a new and expanded SR-32, rail and bus transit, local roadway network improvements as well as bikeway and walkway components. The project will consolidate entrance and exit points along SR-32, improving safety and decreasing travel times through the region. Also, a new interchange at US-50 (Columbia Parkway) and Red Bank Road will provide a direct connection for eastern communities with the I-71 corridor.

**Figure 1: Eastern Corridor Projects**



**I-275/SR 32 Interchange (Segment IV).** The I-275/SR 32 Interchange project (Segment IV) involves redesigning the existing interchange at this location to improve safety, congestion, and access in the Eastgate area. This project also includes the construction of a new SR 32 and Eastgate Boulevard interchange, which will include closing the access to Eastgate Square Drive from SR 32. Modifications and upgrades will also be made to Old SR 74, SR 32, and Aicholtz Road as part of the interchange improvements.

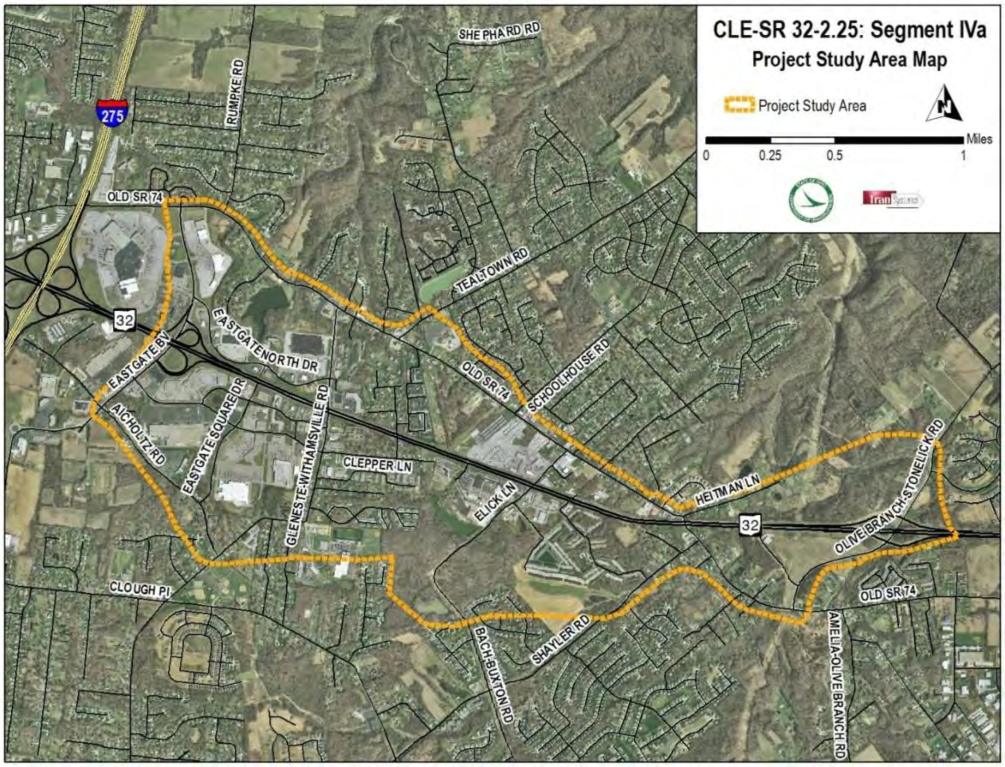
**SR 32 Eastgate Area Improvements (Segment IV(a)).** The SR-32/Eastgate Project will upgrade SR-32 to a limited access roadway between Eastgate Boulevard to Olive Branch-Stonelick Road. The project will replace existing intersections and driveways on SR-32 with a new interchange, overpasses and service drives where needed. When complete, the project will expand the roadway's capacity and make traveling through the area easier and safer.

## Study Area and Logical Termini

Based upon the identified congestion and safety problems, the termini for the proposed improvements along SR 32 are Eastgate Boulevard to the west and Olive Branch-Stonelick Road to the east. These limits for Segment IV(a) are specified as part of the Tier 1 Record of Decision for the Eastern Corridor.

Because changes to SR 32 have the potential to affect the local network and vice versa, it will be important to consider local road improvements necessary as a result of changes to the operation of SR 32. Therefore, the initial study area will incorporate the area from Old SR 74 on the north and Aicholtz Road – Clough Pike – Shayler Road – Old SR 74 on the south. (See Figure 2, Study Area Map.) Traffic studies also extend to the nearby intersection of Bach Buxton Road and Shayler Road just south of the study area.

**Figure 2: Study Area Map**



## SUMMARY OF PREVIOUS REPORTS

Prior to submission of the CAS, three reports regarding the Eastern Corridor Segment IV(a) project have been completed. The Public Involvement Plan was completed in July 2010, the latest draft of the Purpose and Need report was approved in September 2011, and the Red Flag Summary was approved in October 2010. Additionally, the Eastern Corridor Study was completed in September 2005. Each of these documents provided the foundation for the creation and determination of the project's conceptual alternatives. These are provided in Appendix E. A summary of each report follows.

## Draft Purpose and Need

The Draft Purpose and Need document (see Appendix E) contains the written determination of the problems and establishes a need for the project. It provides the underlying data to support the creation of alternatives in the following steps of the PDP. The project purpose and the identified needs are summarized as follows:

**Project Purpose.** The purpose of the Segment IV(a) project is to serve current and projected travel demand, reduce congestion and delay, and improve roadway safety, consistent with local transportation and economic development goals. The identified needs forming the basis of this purpose are each described in detail below.

**Travel Demand.** SR 32 is an urban principal arterial throughout the Segment IV(a) study corridor. The SR 32 corridor provides two lanes in each direction, divided by a grassy median, and turn lanes at each intersection. The ADT for 2010 varies between 50,520 and 56,820, increasing with proximity to the I-275 interchange at the west end of the study corridor. There are three signalized intersections on SR 32 within the project limits: Glen Este-Withamsville Road, Elick Lane/Bach Buxton Road, and Old SR 74. Certified traffic for these intersections and the SR 32 corridor was provided by ODOT Office of Technical Services in 2007 under PID 76289.

With a mix of heavy commercial, industrial and residential development within the Eastern Corridor, combined with extensive commuter traffic along SR 32, a 1995 origin-destination survey reported in the Eastern Corridor MIS found that 50% of trips during peak periods were local and 50% were external. The result is a crossing configuration in traffic patterns in which through traffic is in conflict with heavy local traffic within the corridor.

**Congestion and Delay.** The standard criterion used to define quality of traffic flow is "level of service" (LOS). This is a qualitative assessment of factors such as speed, volume, geometry, delays, and ease of maneuvering. There are six level of service grades that represent all of the possible operating conditions; these levels range from LOS A, representing the best operating condition, to LOS F, representing the worst. Typically in urbanized areas, a roadway component is seen as acceptable if the corresponding level of service is LOS D or better.

Intersection capacity analyses for the AM and PM peak hours were performed at intersections within the study area using existing (year 2010) and 2030 no-build traffic volumes, assuming existing roadway configurations and traffic control.

Based upon analyses of existing counts, most of the intersections along the SR 32 corridor are operating at a poor LOS during either the AM, PM or both peak hours. These include the signalized intersections of SR 32 with Glen Este-Withamsville Road, Elick Lane/Bach Buxton Road, and Old SR 74, where the overall intersection is at LOS E or F with several or all approaches at LOS E or F. The outbound movement from the unsignalized side streets (Fayard Drive and Glen Willow Lake Lane) experience considerable delays and operate at LOS F during either or both peak hours.

**Improve Safety.** This corridor has regularly appeared on the ODOT high crash location list, known as the Highway Safety Program (HSP). ODOT's CLE-32 2.00-4.79 Corridor Safety Study, based on the 2007 HSP, states that CLE-32 2.00-4.00 is a Hot Spot location, ranked #22, while CLE-32 2.90-4.79, ranked #76, shows up as a congestion location. For purposes of this document, crash data for SR 32 was supplied by ODOT for the years 2007-2009. After review and mapping of the crash locations, 480 crashes were determined to be located within the study area.

ODOT has undertaken various safety studies and implemented improvements to address known safety problems on the SR 32 corridor. Specifically, signal timing adjustments were implemented as part of a 2007 signal timing and phasing study. The *Pilot for Systematic Signal Timing and Phasing Program, Final Traffic Signal Timing Report for SR-32* recommended and evaluated optimized and coordinated signal timing plans on SR 32 from Glen Este Withamsville Road to Cincinnati-Batavia Pike. Separate from the operational improvements, geometric modifications have also been considered including the recent construction of an eastbound right turn lane on SR 32 at the Elick Lane intersection.

### Consistency with Local Transportation and Economic Development Goals.

***State Transportation Planning.*** The State of Ohio's Long Range Multi-Modal Transportation Plan is titled *Access Ohio 2004-2030*. It includes a comprehensive analysis of existing transportation conditions, a 26-year projection of the needs and recommendations for Ohio's multi-modal transportation system, including roads, bridges, bicycle and pedestrian trails, rail systems, and air and water ports. Its vision and the projects and recommendations identified are distilled from long-range plans researched and compiled by regional Metropolitan Planning Organizations (MPO), ODOT's Safety and Congestion analysis, ODOT's Interstate Reconstruction Program, local public transit officials, the Ohio Rail Development Commission and many others, including hundreds of projects identified by state and local officials.

Macro-Highway Corridor 21 is a 200 mile east/west route that serves southern Ohio from Cincinnati to Marietta following routes SR 32, US 50 and SR 7. The corridor has been designated by the federal government as part of the Appalachian Development Highway System (ADHS). Due to the high cost of building roadways through the Appalachian's rocky terrain, most of the region had been bypassed by the Interstate Highway System and subsequently suffered economic implications. Prior to this important four-lane, limited access highway corridor being constructed, most counties within southern Ohio were serviced with only two-lane winding roads that were slow to drive and unsafe. Today thanks to the ADHS, southern Ohio residents and businesses have access to Interstates 70, 71, 75, and 77 from Corridor 21.

***Local Transportation Planning.*** At the local level, the various project segments and actions outlined in the Eastern Corridor Tier I EIS are being coordinated with land use, development, preservation and transportation plans within the individual jurisdictions within the Eastern Corridor in Clermont and Hamilton counties. Specifically, the Eastern Corridor transportation recommendations are consistent with and are incorporated in the SR 32 Corridor Thoroughfare Plan and Access Clermont, which is Clermont County's Long Range Plan. Improvements to the local network will affect how traffic accesses

SR 32. Likewise, changes in access to the local network from SR 32 will affect how traffic utilizes the local network.

Direct local public investment in water, sewer and road infrastructure projects within the SR 32 corridor totals $89 million in completed and planned improvements. A total of $9.5 million in local road projects have recently been completed in the study area, and at least $4.8 million in planned roadway projects adjacent to the SR 32 corridor will affect SR 32.

Other local studies that are relevant to SR 32 include: *Green Infrastructure Concept Master Plan, February 2005*; *Eastgate Market Study, December 2007*; and studies provided in support of the funding application to the Transportation Review Advisory Council (TRAC) for the adjacent project CLE-275-8.90.

***Preserve and Support Local Economic Development.*** In addition to addressing critical safety, travel demand and congestion issues, transportation solutions for Segment IV(a) should also strive to preserve the economic vitality of the area. While SR 32 serves as a travel corridor for east-west commuters, it also provides local access to important commercial and retail development. The goods and services provided to local residents are as vital as the economic contributions are to the County as a whole. While the interface between the through-traffic and local traffic is the heart of the transportation problem, the challenge is to solve the problem in such a way as to minimize impact to the business community along SR 32.

## Existing and Future Conditions

### Safety

Following a review of the OH-1 reports, 13 of the 480 crashes could not be specifically logged on SR 32 or defined as intersection-related. Therefore, while the summary below captures all 480 crashes, the calculations have been based on only the 467 crashes that were verified as intersection or non-intersection related. The resulting crashes have been categorized as intersection or non-intersection crashes and were further broken down by type, location and year. The summary below indicates a trend of rear end crashes driven largely by congestion resulting from the high traffic volume and existing at-grade intersections, signalized and unsignalized, within this stretch of highway. The number of crashes by year shows a slightly higher frequency in 2007, but a generally similar trend in terms of number in each of the three years evaluated.

**Crash Type**

- 77.29% Rear End (371)
- 9.79% Side Swipe (47)
- 4.58% Angle (22)
- 3.33% Collision w/ Fixed Object (16)
- 5.00% Other (24)

**Crash Location**

- 58.75% Non-intersection (282)
- 40.21% Intersection (193)
- 0.63% Driveway Access Related (3)
- 0.42% Not Stated (2)

**Number of Crashes by Year**

- 36% in 2007 (174)
- 32% in 2008 (152)
- 32% in 2009 (154)

### Crash Rates

***Section Crash Rate.*** As part of the crash analysis, the study corridor was divided into five sections between Eastgate Square and Olive Branch-Stonelick Road, and a crash rate per million vehicles was calculated for each section. Table 4 (seen in the "Purpose and Need Statement" in Appendix E) shows the crash rates and severity index for five segments along the study corridor. The severity index is intended to highlight the proportion of severe crashes, that is, those involving injury or fatality. Severity index is computed by dividing the sum of the injury and fatality crashes by the total number of crashes on the segment. Average crash rates were obtained from ODOT's 2009 report, covering the years 2007-2009. These statewide rates exclude intersection and intersection-related crashes. The segment crash rates calculated in Table 4 below adhered to this same methodology. Four of the five segments ranked above the statewide average, while the remaining one had a severity index higher than the mean + standard deviation for the sections in this study. These entries have been highlighted in Table 4. Because the segment crash rates can be compared against the statewide averages, these results suggest that the SR 32 corridor is experiencing a substantially higher rate of crashes compared to other similar roadways in Ohio. In essence, this points to a safety problem. The severity index shows that on average 30% of the SR 32 segment crashes resulted in injury or fatality, with the easternmost segment experiencing this outcome in nearly half of the recorded crashes.

***Intersection Crash Rate.*** The SR 32 study corridor has seven intersections that were determined to be evaluated for intersection crash rates. Table 5 (seen in the "Purpose and Need Statement" in Appendix E) shows the crash rates for the six intersections, as well as the mean + standard deviation for the sample set. It should be noted that ODOT does not have statewide intersection crash rates available for comparison on an accidents per million entering vehicles basis. Two intersections (Glen Este-Withamsville Road and Elick Lane/Bach Buxton Road) have crash rates higher than the mean + standard deviation value of 1.09 and are thus highlighted in the table as critical crash locations. This indicates that these two intersections have experienced an unusually high rate of crashes as it relates to the SR 32 study corridor.

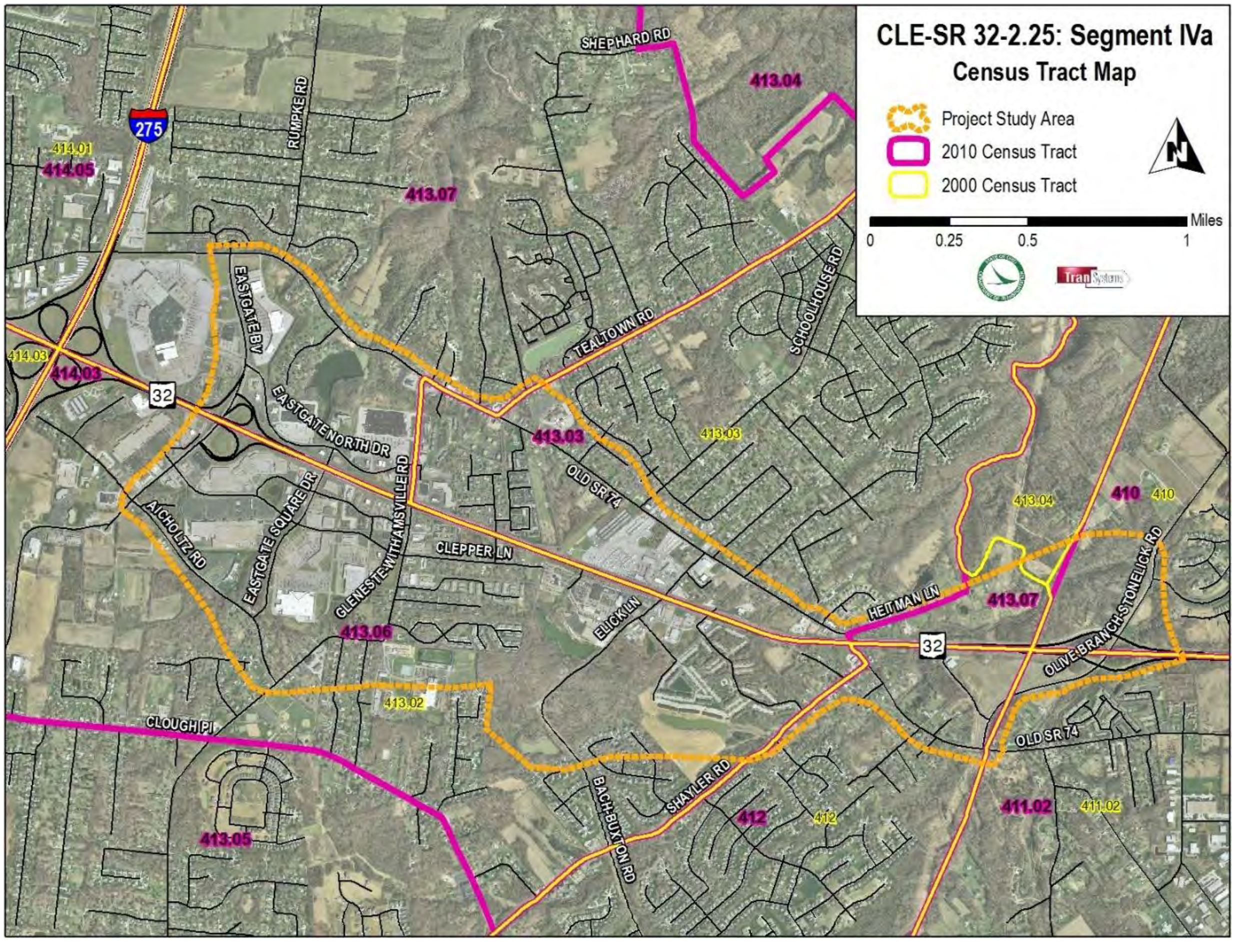
## Social and Economic Conditions

Social and economic data were collected for the nine Census Tracts that are within the study area: 410, 411.02, 412, 413.02, 413.03, 413.04, 413.05, 413.06, and 413.07. (Because of changes to the boundaries of the Census Tracts between 2000 and 2010, there are some differences between the 2000 and 2010 Census Tract boundaries so more Census Tracts were included to accurately compare the 2000 and 2010 data; this is why nine Tracts are included in the analysis even though currently there are only seven Census Tracts within the study area.) Additionally, two cities, Batavia and Milford, along with Clermont County and State of Ohio data were collected for comparison. Data collected was from the 2000 and 2010 United States Decennial Census and the 2010 American Community Survey (ACS) 5-year estimates to establish current conditions and determine population trends.

All the Census Tracts are within Batavia and Union Township in Clermont County. Census Tracts 410 and 411.02 are both located at the eastern end of the study area and are in Batavia Township. Census

Tracts 412, 413.02, 413.03, 413.04, 413.05, 413.06, and 413.07 are located in Union Township. The map below shows the locations of each Census Tract and the differences between the 2000 and 2010 boundaries.

**Figure 3: Census Tract Map**



**Population Characteristics.** According to the 2000 and 2010 Census, the average population in the study area went up by 17.88%. This is more of an increase than was seen by any Batavia, Milford, Clermont County, or the State of Ohio. Census Tract 410 had the highest population change at 47.80% while Census Tracts 413.04 and 413.07 had the lowest at a 5.90% decline (compared to 2000 Census Tract 413.04). The average percentage of the population under the age of 18 for the study area is 24.39%, which is relatively similar to Batavia, Milford, Clermont County, and Ohio. The average percentage of the population age 65 and over in the study area, at 9.76%, is lower than the averages in Batavia, Milford, Clermont County, and Ohio, all of which are over 11%. The male/female ratio in the study area (48.21% male and 51.79% female) is also consistent with the larger areas, all of which have a higher percentage of females than males.

## Table 1: Population Characteristics

| Census Tract / Location | 2000 Population | 2010 Population | % Change (2000-2010) | % Under 18 (2010) | % 65 + (2010) | % Male (2010) | % Female (2010) |
|---|---|---|---|---|---|---|---|
| 410 | 5,079 | 7,507 | 47.80% | 25.18% | 11.62% | 50.86% | 49.14% |
| 411.02 | 4,199 | 4,656 | 10.88% | 32.26% | 6.59% | 45.98% | 54.02% |
| 412 | 7,165 | 8,350 | 16.54% | 24.54% | 13.05% | 48.62% | 51.38% |
| 413.02 | 6,974 | * | 25.49%* | n/a | n/a | n/a | n/a |
| 413.03 | 4,628 | 5,028 | 8.64% | 27.88% | 7.72% | 49.34% | 50.66% |
| 413.04 | 5,183 | 37** | -5.90%** | 21.62% | 2.70% | 43.24% | 56.76% |
| 413.05 | * | 4,466 | 25.49%* | 21.97% | 11.93% | 48.88% | 51.12% |
| 413.06 | * | 4,286 | 25.49%* | 18.74% | 12.58% | 49.25% | 50.75% |
| 413.07 | ** | 4,840 | -5.90%** | 22.93% | 11.90% | 49.46% | 50.54% |
| **Study Area Tract Total / Average** | **33,228** | **39,170** | **17.88%** | **24.39%** | **9.76%** | **48.21%** | **51.79%** |
| | | | | | | | |
| Batavia | 1,617 | 1,509 | -6.68% | 24.52% | 13.52% | 47.12% | 52.88% |
| Milford | 6,284 | 6,709 | 6.76% | 21.40% | 21.87% | 45.24% | 54.76% |
| Clermont County | 177,977 | 197,363 | 10.89% | 25.63% | 11.78% | 49.31% | 50.69% |
| Ohio | 11,353,140 | 11,536,504 | 1.62% | 23.67% | 14.06% | 48.82% | 51.18% |

Source: United States Census Bureau

* 2000 Census Tract 413.02 was split into Tracts 413.05 and 413.06 for the 2010 Census. Although Tract 413.05 is not in the study area, it was included to get an accurate comparison to the 2000 numbers for Tract 413.02. The "% Change" for these Tracts were calculated from 2000 Tract 413.02 population versus 2010 Tracts 413.05 and 413.06 populations combined.

** 2000 Census Tract 413.04 was split into Tracts 413.04 and 413.07 for the 2010 Census. 2010 Tract 413.04 is no longer in the study area but was included to get an accurate comparison to the 2000 numbers. The "% Change" for these Tracts were calculated from 2000 Tract 413.04 population versus 2010 Tracts 413.04 and 413.07 populations combined.

**Housing Characteristics.** The average household size in the study area is 2.54, which is above most of the comparables (Batavia, Milford, and Ohio) and only slightly lower than the average for Clermont County (2.61). The percentage of occupied units (93.76%) is higher than the averages of the others, especially Batavia (88.20%) and the state average (89.80%). The average percentage of owner occupied units in the study area (64.18%) is higher than Batavia (59.90%) and Milford (52.40%), but lower than the county (74.60%) and state (67.60%) averages. The median home value for the study area is $157,388 which is on par with Milford ($157,300) and Clermont County ($162,000) and somewhat higher than Batavia ($132,000) and Ohio ($136,400). Additionally, many of the individual Census Tracts have a median home value that is above the median home value for Clermont County with the exception of Census Tract 413.04 that is substantially lower than all the rest (at $99,500); however, this Census Tract only contains 14 units.

### Table 2: Housing Characteristics

| Census Tract / Location | Total Units / Households | Avg. HH Size | Total Families | % Units Occupied | % Units Vacant | % Owner Occupied | % Renter Occupied | Median Home Value |
|---|---|---|---|---|---|---|---|---|
| 410 | 2,645 | 2.81 | 1,949 | 93.60% | 6.40% | 86.80% | 13.20% | $185,500 |
| 411.02 | 1,868 | 2.59 | 1,264 | 93.70% | 6.30% | 41.90% | 58.10% | $161,200 |
| 412 | 3,660 | 2.47 | 2,267 | 92.50% | 7.50% | 71.70% | 28.30% | $175,100 |
| 413.03 | 1,920 | 2.76 | 1,352 | 94.90% | 5.10% | 80.20% | 19.80% | $161,000 |
| 413.04 | 14 | 2.64 | 10 | 100.00% | 0.00% | 64.30% | 35.70% | $99,500 |
| 413.05 | 1,962 | 2.4 | 1,242 | 94.60% | 5.40% | 61.00% | 39.00% | $154,400 |
| 413.06 | 2,180 | 2.14 | 952 | 88.60% | 11.40% | 35.20% | 64.80% | $179,700 |
| 413.07 | 2,071 | 2.54 | 1,358 | 92.20% | 7.80% | 72.30% | 27.70% | $142,700 |
| **Study Area Tract Total / Average** | **16,320** | **2.54** | **10,394** | **93.76%** | **6.24%** | **64.18%** | **35.83%** | **$157,388** |
| Batavia | 713 | 2.37 | 411 | 88.20% | 11.80% | 59.90% | 40.10% | $132,000 |
| Milford | 3,291 | 2.12 | 1,572 | 91.70% | 8.30% | 52.40% | 47.60% | $157,300 |
| Clermont County | 80,656 | 2.61 | 53,800 | 92.80% | 7.20% | 74.60% | 25.40% | $162,000 |
| Ohio | 5,127,508 | 2.44 | 2,991,629 | 89.80% | 10.20% | 67.60% | 32.40% | $136,400 |

Source: United States Census Bureau

**Racial Characteristics.** The racial characteristics for the study area are relatively similar to the larger, surrounding geographic areas, except for the state which has a much lower overall percentage of white (Caucasian) residents and a higher minority population. This difference is predominately seen in the lower average percentage of black residents in the study area (at 1.43%) compared to the state average of 12.04%. Two Census Tracts with higher percentages of minority populations were 411.02 and 413.06. Census Tract 411.02 had a substantially higher percentage of residents with two or more races (3.46%) compared to the average for the entire study area (1.36%) and the larger, surrounding areas. Census Tract 413.06 had a much higher Asian population (3.15%) than the study area average (1.32%) and the larger, surrounding areas. The average Hispanic population in the study area (1.38%) is higher than that of Batavia (0.86%) and Milford (1.15%) and about the same as that of Clermont Count (1.47%), but is less than half of the state (3.07%).

### Table 3: Racial Characteristics

| Census Tract / Location | 2010 Population | % White | % Black | % American Indian / Alaskan | % Asian | % Hawaiian / Pacific Islander | % Other | 2 or More Races | % Hispanic* | % Minority |
|---|---|---|---|---|---|---|---|---|---|---|
| 410 | 7,507 | 95.74% | 1.07% | 0.27% | 0.87% | 0.00% | 0.03% | 0.99% | 1.05% | 4.26% |
| 411.02 | 4,656 | 91.19% | 2.90% | 0.24% | 0.60% | 0.04% | 0.09% | 3.46% | 1.48% | 8.81% |
| 412 | 8,350 | 94.79% | 0.83% | 0.13% | 1.56% | 0.02% | 0.07% | 1.14% | 1.46% | 5.21% |
| 413.03 | 5,028 | 93.60% | 1.19% | 0.10% | 1.77% | 0.00% | 0.10% | 1.27% | 1.97% | 6.40% |
| 413.04 | 37 | 100.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| 413.05 | 4,466 | 92.39% | 1.99% | 0.07% | 1.86% | 0.00% | 0.13% | 1.57% | 1.99% | 7.61% |

| Census Tract / Location | 2010 Population | % White | % Black | % American Indian / Alaskan | % Asian | % Hawaiian / Pacific Islander | % Other | 2 or More Races | % Hispanic* | % Minority |
|---|---|---|---|---|---|---|---|---|---|---|
| 413.06 | 4,286 | 91.02% | 2.05% | 0.44% | 3.15% | 0.05% | 0.14% | 1.35% | 1.80% | 8.98% |
| 413.07 | 4,840 | 95.08% | 1.45% | 0.17% | 0.76% | 0.02% | 0.10% | 1.14% | 1.28% | 4.92% |
| **Study Area Tract Total / Average** | **39,170** | **94.23%** | **1.43%** | **0.18%** | **1.32%** | **0.02%** | **0.08%** | **1.36%** | **1.38%** | **5.77%** |
| | | | | | | | | | | |
| Batavia | 1,509 | 92.91% | 3.45% | 0.40% | 0.60% | 0.00% | 0.00% | 1.79% | 0.86% | 7.09% |
| Milford | 6,709 | 93.95% | 2.30% | 0.12% | 0.85% | 0.01% | 0.12% | 1.51% | 1.15% | 6.05% |
| Clermont County | 197,363 | 94.92% | 1.13% | 0.18% | 0.96% | 0.03% | 0.10% | 1.22% | 1.47% | 5.08% |
| Ohio | 11,536,504 | 81.13% | 12.04% | 0.18% | 1.65% | 0.03% | 0.13% | 1.76% | 3.07% | 18.87% |

Source: United States Census Bureau

*% Hispanic population includes multiple races (other races listed don't include Hispanic population) and is included in the Minority percentage.

**Economic and Labor Force Characteristics.** The breakdown of employment by industry within the study area is similar to the breakdowns in Batavia, Milford, Clermont Count, and Ohio. Management, business, science, and arts occupations are the most predominate in the study area at an average of 31.1% followed closely by sales and office occupations at 31.0%. Production, transportation, and material moving occupations are the next prominent in the study area at 15.2%, closely followed by service occupations (15.1%). Natural resources, construction, and maintenance occupations hold the fewest employees at 7.7%. The average unemployment rate within the study area is 5.4%, which is lower than Batavia, Milford, Clermont County, and Ohio.

**Table 4: Economic and Labor Force Characteristics**

| Census Tract / Location | Total Employed | % Unemployed | % Management, business, science, and arts occupations | % Service occupations | % Sales and office occupations | % Natural resources, construction, and maintenance occupations | % Production, transportation, and material moving occupations |
|---|---|---|---|---|---|---|---|
| 410 | 3,471 | 6.9% | 34.8% | 16.5% | 23.6% | 10.8% | 14.4% |
| 411.02 | 2,158 | 14.5% | 28.3% | 20.5% | 32.2% | 10.1% | 8.9% |
| 412 | 4,840 | 6.0% | 41.9% | 14.7% | 27.9% | 5.0% | 10.5% |
| 413.03 | 2,824 | 4.7% | 35.7% | 13.9% | 35.7% | 5.0% | 9.7% |
| 413.04 | 54 | 0.0% | 22.2% | 0.0% | 38.9% | 0.0% | 38.9% |
| 413.05 | 2,223 | 3.2% | 31.2% | 11.2% | 33.6% | 10.6% | 13.4% |
| 413.06 | 2,040 | 5.0% | 29.8% | 19.0% | 27.9% | 12.6% | 10.7% |
| 413.07 | 3,007 | 3.0% | 24.9% | 24.8% | 28.2% | 7.1% | 15.1% |
| **Study Area Tract Total / Average** | **20,617** | **5.4%** | **31.1%** | **15.1%** | **31.0%** | **7.7%** | **15.2%** |
| | | | | | | | |
| Batavia | 729 | 7.3% | 33.9% | 17.2% | 29.4% | 11.8% | 7.7% |

| Census Tract / Location | Total Employed | % Unemployed | % Management, business, science, and arts occupations | % Service occupations | % Sales and office occupations | % Natural resources, construction, and maintenance occupations | % Production, transportation, and material moving occupations |
|---|---|---|---|---|---|---|---|
| Milford | 3,275 | 7.0% | 33.2% | 14.4% | 29.9% | 5.8% | 16.6% |
| Clermont County | 101,712 | 6.9% | 34.2% | 15.5% | 26.2% | 10.4% | 13.7% |
| Ohio | 5,889,779 | 8.6% | 33.4% | 17.1% | 25.3% | 8.2% | 16.0% |

Source: United States Census Bureau

## Red Flag Summary

A Red Flag Summary (found in Appendix E) was developed in order to document previously identified critical issues that would need to be considered in the development and evaluation of alternatives. The Red Flag Summary was completed in October 2010.

A comprehensive records review determined that three parks, three reservoirs, and three cemeteries were found to be in or adjacent to the study area. None of the alternative should impact the cemetery or the parks. One of the reservoirs may potentially be impacted by Alternative 2. Additional Red Flag Summary research was done through the Ohio Environmental Protection Agency and Ohio State Fire Marshal Bureau of Underground Storage Tank Regulation (BUSTR) and identified numerous hazardous material and UST/LUST sites of concern located throughout the study area that will require further investigation to determine if they are impacted by any alternative. There were no mapped landfills, superfund sites, or other large hazardous material sites of concern noted in the study area. The study area also falls within an ODOT MS4 Regulated Area as well as a basic non-attainment area.

## Public Involvement Plan

In ODOT's Project Development Process (PDP), involving the public early and often is critical to helping the surrounding community understand transportation studies so it can, in turn, provide meaningful input to help shape the study. Two basic objectives include disseminating information and soliciting input. The Public Involvement Plan must address both. The Public Involvement Plan for the Segment IV(a) project will:

- Solicit public input to identify problems and solutions to project objectives.
- Provide the public with information on the decision-making process.
- Provide information on the potential impacts and benefits of each transportation solution under consideration.
- Solicit input on the conclusions and recommendations of the alternatives analysis.

In order to achieve these goals, the Project Team continues to use several methods during the planning phase of the project. Methods used include utilizing mailing lists to send out notifications, identifying Implementation Partners to help with decision making, forming a Stakeholder Committee to help represent communities in or near the study area, holding public open house meetings to present ideas to the public and get their feedback, and posting updates on the existing website for the overall Eastern

Corridor project. These methods are detailed within the Public Involvement Plan (available in Appendix E).

# DEVELOPMENT OF CONCEPTUAL ALTERNATIVES

## Methodology

The Eastern Corridor Tier I EIS recommended the addition of a new interchange on SR 32 at the intersection with Bach Buxton Road. The Tier 2 phase of work reopened the development of concepts and explored the interchange options that would be feasible in this area along SR 32. Following these evaluations, five interchange alternatives were carried forward to be considered and evaluated in Step 4. The following table lists the alternatives that were carried forward to Step 4.

**Table 5: Alternatives Studied in Step 4**

| Alternative | Description |
|---|---|
| Alternative 1 | Widen existing SR 32 and improve existing at-grade intersections along SR 32. |
| Alternative 2 | Interchange East of Fayard Dr. |
| Alternative 3 | Interchange at Elick/Bach Buxton. |
| Alternative 4 | Interchange at Newberry Drive and ramps at Glen Este-Withamsville. |
| Alternative 5 | No improvements to SR 32 (no build). |

In addition to the alternatives listed above, the option to include partial-access at Glen Este-Withamsville Road was added in Step 4. These partial access ramps were added as a concept for Segment IV(a) due to the public's preference (81% in favor) to maintain additional access to/from SR 32 in the heavily commercialized Glen Este-Withamsville corridor. Design criteria applied in the development of alternatives is shown in the sections below. The design approach is consistent with the LDM and AASHTO A Policy on Geometric Design of Highways and Streets 2004 (hereafter referred to as the "Green Book") for given roadway classifications and design speeds. Geometric layouts were developed using design-level aerial mapping supplied by ODOT Office of Aerial Engineering as well as the model TIN (terrain model) used to generate profiles and cross sections.

### *Conceptual Design Designations*

The following table summarizes the project design designations.

**Table 6: Design Designations**

| | SR 32 | Ramps | Side Roads | |
|---|---|---|---|---|
| **Design Element:** | **Value** | **Value** | **Value** | **Value** |
| Design Functional Class | Principal Arterial | Urban Ramp | Local | Collector |
| Access Permit | State | State | Local | Local |
| Design Speed | 55 MPH | 45 MPH | 40 MPH | 45 MPH |
| Design Year | 2030 | 2030 | 2030 | 2030 |
| Design Vehicle | WB-62 | WB-62 | WB-62 | WB-62 |
| Desirable Design LOS | D | D | D | D |
| Minimum Design LOS | Existing | Existing | Existing | Existing |

| | SR 32 | Ramps | Side Roads | |
|---|---|---|---|---|
| **Design Element:** | **Value** | **Value** | **Value** | **Value** |
| Projected Traffic Volumes | Refer to Traffic Analysis section. | | | |

Notes: The Design Vehicle used shall be a WB-62 based on roadway classification.

## *Design Criteria*

A basis for design must be assumed even though ODOT may not have approved design criteria for the project at the initial steps of the PDP. In order to design to specific standards of the LDM, values for curvature, grades, transitions, lane and shoulder widths, etc. were determined based upon known or assumed design designations. The following table summarizes the LDM criteria used for project conceptual design:

**Table 7: Design Criteria**

| Design Element: | SR 32 | Ramps | Local Side Roads | Collector Side Roads | L&D Ref. |
|---|---|---|---|---|---|
| **Horizontal Alignment** | | | | | |
| Max Deflection without Horizontal Curve | 1°00' | 1°45' | 2°15' | 1°45' | Fig. 202-1 |
| Maximum Degree of Curve | 5°30' | 8°00' | 10°45' | 8°00' | Fig. 202-2 |
| Max Curve without Superelevation | 0°39' | 5°40' | 7°42' | 5°40' | Fig. 202-3 |
| Maximum Superelevation | 0.06 | 0.08 | 0.08 | 0.08 | Fig. 202-7 |
| **Vertical Alignment** | | | | | |
| Maximum Grade | 6% | 7% | 8% | 7% | Fig. 203-1 |
| Maximum Vertical Deflection without Vertical Curve | 0.40% | 0.55% | 0.75% | 0.55% | Fig. 203-2 |
| **K-Values** | | | | | |
| Crest Vertical Curve | 114 | 61 | 44 | 61 | Fig. 203-3 |
| Sag Vertical Curve | 115 | 79 | 64 | 79 | Fig. 203-6 |
| **Clearances** | | | | | |
| Vertical Clearance | 16.5' | 16.5' | 16.5' | 16.5' | Fig. 302-1 |
| **Lanes** | | | | | |
| Number of Thru Lanes | 6-10 | 1-3 | (existing) | 2-4 | |

Notes: (1) Vertical alignment maximum grade assumes arterial rolling terrain. (2) Lane configuration given is a range covering the current design configurations for all of the alternatives.

## *Consideration of Design Exceptions*

At this stage in the project, no design exceptions were needed in designing any of the interchange alternatives. As designs are further refined in future steps, design exceptions may be considered and evaluated.

## Description of Alternatives

The proposed interchange location will be coordinated with other Eastern Corridor projects including the Relocated SR 32 Project (Segment II/III) and the I-275/SR 32 Interchange Reconstruction Project (Segment IV) as part of the overall Eastern Corridor Study.

Based on the recommendations from the Eastern Corridor Tier I EIS, a variety of interchange configurations and locations were considered along the SR 32 Eastgate corridor. After meetings with ODOT, the CCTID, and stakeholders, certain interchange concepts were considered and dismissed and ultimately narrowed down to five alternatives. These interchange alternatives are discussed in detail under this section. For an overview image of each alternative, see the figures following each alternative description below; for detailed drawings of each alternative, see Appendix A.

### *Alternative 1*

This alternative does not involve any grade separation or a new interchange on SR 32. Instead, this alternative widens the footprint of SR 32 to accommodate future traffic volumes. This requires up to five through lanes in each direction on SR 32 throughout the majority of the corridor. Additionally, three left-turn lanes and two right-turn lanes are needed on SR 32 eastbound at the Glen Este-Withamsville Road intersection. The footprint required with this alternative would also require a large amount of right-of-way acquisition the whole length of the corridor. Due to the extensive addition of through lanes and excessive turn lanes required to meet operational and geometric standards, Alternative 1 is not being recommended for further study.

**Figure 4: Alternative 1**

Key features of Alternative 1 are:

- Major lane additions on SR 32.
- Major lane additions and at-grade intersection upgrades at:
    - Glen Este-Withamsville Road.
    - Old SR 74.

- Elick Lane.

Advantages of Alternative 1 include:

- No structure costs.

Disadvantages of Alternative 1 include:

- Requires median barrier installation on SR 32.
- Extensive right-of-way/property impacts because of large footprint.
- Major roadway widening on both the mainline and cross roads.
- Dual and triple left- and right-turn lane movements.
- Inadequate horizontal and stopping sight distances.

### *Alternative 2*

This alternative involves the construction of a new classic diamond interchange with a north-south connector road (the "Bach Buxton extension") that extends from the existing Bach Buxton Road on the south and connects to Old SR 74 to the north. The interchange would be located near Fayard Drive, between the existing Glen Este-Withamsville Road and Elick Lane/Bach Buxton Road (Figure 5). Glen Este-Withamsville Road and Old SR 74 would be overpasses over SR 32 and all other intersections along SR 32 in the Eastgate corridor would be closed off. This alternative would require SR 32 to be three lanes in each direction throughout the corridor. This option also includes two new access roadways: the Heitman Lane extension (which would extend Heitman Lane east until it met Olive Branch-Stonelick Road at Lexington Run Drive) and the Aicholtz Road extension (which extends Aicholtz Road east of Glen Este-Withamsville Road, tying into the southern end of the Bach Buxton extension).

**Figure 5: Alternative 2**

Key features of Alternative 2 are:

- New interchange at Bach Buxton extension.
- Overpass at Glen Este-Withamsville.
- Overpass at Old SR 74.
- Future Aicholtz Road extension.
- Heitman Lane extension.

Advantages of Alternative 2 include:

- Low-speed ramp curves.
- Avoids weaving segments with the SR 32 exit ramps.
- All routes from/to SR 32 are supported.
- Grade separation at Glen Este-Withamsville.
- Grade separation at Bach Buxton Extension.
- Grade separation at Old SR 74.
- New east-west roadway connection with the Aicholtz Road widening/extension south of SR 32.
- New east-west roadway connector with the Heitman Lane extension north of SR 32.

Disadvantages of Alternative 2 include:

- Too close to Glen Este-Withamsville Road to allow for partial access to/from SR 32.
- Close proximity to apartments west of interchange.

## *Alternative 3*

This alternative involves the construction of a new interchange at the existing location of Elick Lane/Bach Buxton Road. Proposed SR 32 entrance and exit ramps would be installed east of the Elick Lane/Bach Buxton Road overpass with access to/from Old SR 74 to the north and to/from the Clepper Lane extension to the south (Figure 6). The Clepper Lane extension would begin at Glen Este-Withamsville Road at the existing Clepper Lane and, going east, tie in with the Elick Lane/Bach Buxton Road overpass and on to the new interchange ramps. The Clepper Lane extension would primarily be a 2-lane road, widening to 3 lanes at the intersections. Glen Este-Withamsville Road and Old SR 74 would be overpasses over SR 32 and all other intersections along SR 32 in the Eastgate corridor would be closed off. This alternative would require SR 32 to be three lanes in each direction throughout the corridor.

This alternative also has the potential for partial access to/from SR 32 at Glen Este-Withamsville Road. If this access is included, westbound traffic on SR 32 could get off at Glen Este-Withamsville Road through a ramp that ties in to Ryan's Way and Wyler Park Drive (going under the elevated Glen Este-Withamsville Road); this would also provide a connection to neighborhood off of Fayard Drive to the north. Vehicles wanting to go eastbound on SR 32 would have a connection off of Clepper Lane, just east of Glen Este-Withamsville Road.

**Figure 6: Alternative 3**

**Note: Displays of Alternative 3 shown at public meetings did not show the optional partial-access ramps at Glen Este Withamsville Road (they were shown with Alternative 4). This is the case in the graphic above as well as in the graphic in Appendix A.*

Key features of Alternative 3 are:

- SR 32 entrance and exit ramps east of Elick Lane/Bach Buxton Road.
    - Ramps tie into Old SR 74 to the north.
    - Ramps tie into Mirian Drive and the new Clepper Lane extension to the south.
- Overpass at Elick Lane/Bach Buxton Road.
- Overpass at Old SR 74.
- Overpass at Glen Este-Withamsville Road.
- New east-west roadway connection to new interchange with the Clepper Lane extension.
- Future Aicholtz Road extension (to be done by Clermont County).
- Possibility for partial-access ramp option at Glen Este-Withamsville Road:
    - Entrance ramp to SR 32 EB via Clepper Lane.
    - Exit ramp from SR 32 WB to Eastgate North Drive.

Advantages of Alternative 3 include:

- Low-speed ramp curves.
- Avoids weaving segments with the SR 32 exit ramps.
- All routes from/to SR 32 are supported.
- Grade separation at Glen Este-Withamsville.
- Grade separation at Elick Lane/Bach Buxton Road.
- Grade separation at Old SR 74.
- New east-west roadway connection to new interchange with the Clepper Lane extension.
- Possibility for partial access at Glen Este-Withamsville Road.

Disadvantages of Alternative 3 include:

- Ramps do not tie into grade separation/overpass at Elick Lane/Bach Buxton Road.

### *Alternative 4*

This alternative would involve the construction of a new interchange along SR 32 between near Newberry Drive. The connector road would be just east of the existing Newberry Drive and would connect to Marian Drive and Bach Buxton Road on the south and curves into Old SR 74 to the north (Figure 4). A new T-intersection is formed on the east of the connector road with Old SR 74. The north movement is continuous and curves westward tying into the existing Old SR 74 with an 8-degree horizontal curve. The completed interchange would provide for full movements at the new connector road with straight ramps. The ramp intersections would be closely spaced and signals would be coordinated. Glen Este-Withamsville Road and Old SR 74 would be overpasses at SR 32 and all other intersections along SR 32 in the Eastgate corridor would be closed off. This alternative would require SR 32 to be three lanes in each direction throughout the corridor.

An east-west roadway connection south of SR 32 would also be constructed. This connection of Clepper Lane would begin at Glen Este-Withamsville Road at the existing Clepper Lane, going east to Bach Buxton Road/Elick Lane, and then tying into the new interchange (Figure 4). The extension would primarily be a 2-lane road and would widen to 3 lanes at the intersections.

This alternative also has the potential for partial access to/from SR 32 at Glen Este-Withamsville Road. With this access, westbound traffic on SR 32 could get off at Glen Este-Withamsville Road through a ramp that ties in to Ryan's Way and Wyler Park Drive (going under the elevated Glen Este-Withamsville Road); this would also provide a connection to the neighborhood off of Fayard Drive to the north. Vehicles wanting to go eastbound on SR 32 would have a connection off of Clepper Lane, just east of Glen Este-Withamsville Road.

**Figure 7: Alternative 4**

Key features of Alternative 4 are:

- New interchange between Elick Lane/Bach Buxton Road and Old SR 74.

- Overpass at Old SR 74.
- Overpass at Glen Este-Withamsville Road.
- New east-west roadway connection to new interchange with the Clepper Lane extension.
- Future Aicholtz Road extension (to be done by Clermont County).
- Possibility for partial-access ramp option at Glen Este-Withamsville Road:
    - Entrance ramp to SR 32 EB via Clepper Lane.
    - Exit ramp from SR 32 WB to Eastgate North Drive.

Advantages of Alternative 4 include:

- Avoids weaving segments with the SR 32 exit ramps.
- All routes from/to SR 32 are supported.
- Reduces extent of limited access restrictions on the arterial network.
- Left turn storage provided outside of ramp intersections.
- Grade separation at Glen Este-Withamsville Road.
- Grade separation at Newberry Drive.
- Grade separation at Old SR 74.
- New east-west roadway connection with the Clepper Lane extension.
- Possibility for partial access at Glen Este-Withamsville Road.

Disadvantages of Alternative 4 include:

- Low speed ramp curves are eliminated.
- Requires retaining walls (which results in increased costs).
- Old SR 74 is no longer continuous but now tees into new interchange.

### *Alternative 5*

This is the "no build" scenario, which would not include any roadway/geometric improvements. The roadways would remain in existing condition regardless of increased projected traffic and crashes. Alternative 5 will be carried forward for further evaluation.

# EVALUATION OF CONCEPTUAL ALTERNATIVES

The following sections summarize the engineering and red-flag environmental issues associated with the proposed project. Where the impacts vary by alternative, the impact of each option is discussed.

## Design Guidelines & Issues

The proposed interchange location for the Eastern Corridor Segment IV(a) project between Eastgate Boulevard and the existing interchange at Olive Branch-Stonelick Road has been carefully selected and analyzed based on various factors such as the proximity to the adjacent existing and proposed interchanges. Distances between acceleration/deceleration lanes and the adjacent interchanges have also been evaluated in order to provide sufficient distances for the new interchange and ramp locations. Traffic impacts have been analyzed for every different geometric layouts and alternatives (for detailed traffic analyses, see Appendices C & D).

**Design Guidelines.** Design speed for local roads are 45 mph, low speed urban collector per ODOT L&D Volume I. Design speed for SR 32, urban principal arterial, is 60 mph. Curb and gutter installation for local roads. No design exceptions were necessary at this conceptual stage. The lanes were assumed 12 feet with 4 feet offset to face of curb. Limited access will extend minimum 600' from center of ramp. An 8 degree max horizontal curve was used at local roads and interchange arterial. The lane configurations for each alternative were based on design year 2030 traffic information.

**Design Issues.** Some of the design issues encountered within the project are maintaining existing drives on Glen Este-Withamsville based on the raised profile for new construction of the overpass structure. A few drives have been removed or closed due to the higher profile. In addition, a few properties have been identified as potential property takes due to being landlocked and having their driveway access removed. These same impacts also occur on Old SR 74 with the construction of the overpass at SR 32. In addition, the proposed skewed structure/alignment at OLD SR 74 creates an undesirable intersection with existing Heitman Lane.

## Traffic Analysis

The travel demand model was utilized to develop traffic volumes for the various Segment IV(a) alternatives. The improvements at the Eastgate Boulevard interchange as part of CLE-275-10.15 project were incorporated in all the alternative evaluations. Capacity analyses were performed using Highway Capacity Software (HCS, Version 5.5). Traffic volumes and capacity analyses results for various alternatives are discussed below. Traffic volumes are included in Appendix C and the HCS printouts have been provided in Appendix D.

### Traffic Volumes

Traffic volumes for the No-Build and the Build alternatives for the design year (2030) were obtained in July 2011 from the travel demand models prepared by HNTB. Five alternatives were analyzed as shown in the table below with a brief description and the volume source. Manual adjustments were made for two of the alternatives and are explained later.

| Alternative | Description | Volume Source – 2030 HNTB Synchro Model |
|---|---|---|
| 1 | Improvements at existing at-grade intersections. | No-Build |
| 2 | Interchange east of Fayard Drive. | Alt 7 |
| 3 | Interchange at Elick/Bach Buxton. | Alt 8 L1 modified* |
| 4 | Interchange near Newberry Drive and ramps at Glen Este-Withamsville. | Alt 8 A1 modified* |
| 5 | No improvements. | No-Build |

*Traffic volumes provided by HNTB were adjusted manually.

**Alternative 1** is where the existing at-grade intersections are retained and improvements required to achieve an overall level of service (LOS) D were determined. **Alternatives 2, 3, and 4** assume that all the existing at-grade intersections from Eastgate Boulevard to Olive Branch-Stonelick Road are eliminated and a new interchange is provided between Glen Este-Withamsville Road and Old SR 74. In addition to a full interchange at Elick/Bach Buxton and Newberry Drive, Alternatives 3 and 4 have ramps at Glen Este-Withamsville Road providing access to and from SR 32 east of Glen Este. **Alternative 5** is the no-build condition with the existing at-grade intersections without improvements. The traffic analyses methodologies and results for the five alternatives are discussed below.

Traffic volumes for Alternatives 1, 2, and 5 were used as-is from the HNTB models shown above. Traffic volumes for Alternatives 3 and 4 were manually adjusted.

Modifications made to Alternative 3 Volume Network include:

- Removed Heitman Road extension.
- Provided overpass at Old SR 74.
- Provided eastbound on ramp from the new interchange location at Elick Lane/Bach Buxton Road.

Modifications made to Alternative 4 Volume Network include:

- Removed Heitman Road extension.
- Provided overpass at Old SR 74.
- Provided westbound off-ramp and eastbound on-ramp at Glen Este-Withamsville Road.
- Assumed Clepper Road extension connected to new interchange.

The table below shows the AM and PM peak hour traffic volumes along various segments on SR 32 for the different alternatives. Detailed traffic volume plates are contained in Appendix C.

## Table 8: 2030 Peak Hour Traffic Volumes along SR 32

| | | | Alternatives 1 & 5 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---|---|---|---|---|---|
| | **2030 HNTB Volume Model Name →** | | No-Build | Alt 7 | Alt 8-L1* | Alt 8-A1* |
| **Direction** | **SR 32 Segment** | **Peak Hour** | **Volume (vph)** | **Volume (vph)** | **Volume (vph)** | **Volume (vph)** |
| **SR 32 Eastbound** | Eastgate Entrance to Glen Este Rd | AM | 2329 | — | — | — |
| | | PM | 3386 | — | — | — |
| | Eastgate Entrance to Bach Buxton/Elick Exit | AM | — | 2289 | — | — |
| | | PM | — | 4006 | — | — |
| | Eastgate Entrance to Glen Este Entrance | AM | — | — | 2380 | 2380 |
| | | PM | — | — | 4025 | 4030 |
| | Glen Este Entrance to Bach Buxton/Elick Exit | AM | — | — | 2580 | 2580 |
| | | PM | — | — | 4365 | 4370 |
| | Bach Buxton/Elick Exit to Bach Buxton/Elick Entrance | AM | — | 1747 | 2240 | 2130 |
| | | PM | — | 3040 | 3745 | 3670 |
| | Old SR 74 to Olive Branch-Stonelick Exit | AM | 2404 | — | — | — |
| | | PM | 3699 | — | — | — |
| | Bach Buxton Entrance to Olive Branch-Stonelick Exit | AM | — | 1992 | 2450 | 2400 |
| | | PM | — | 3346 | 4045 | 4145 |
| **SR 32 Westbound** | Olive Branch-Stonelick Entrance to Old SR 74 | AM | 2290 | — | — | — |
| | | PM | 1915 | — | — | — |
| | Olive Branch-Stonelick Entrance to Bach Buxton/Elick Exit | AM | — | 3327 | 4155 | 3905 |
| | | PM | — | 2270 | 3125 | 3100 |
| | Bach Buxton/Elick Exit to Bach Buxton/Elick Entrance | AM | — | 2823 | 3605 | 3255 |
| | | PM | — | 1911 | 2765 | 2600 |
| | Bach Buxton/Elick Entrance to Glen Este Exit | AM | — | — | 4205 | 4200 |
| | | PM | — | — | 3200 | 3200 |
| | Glen Este Exit to Eastgate Exit | AM | — | — | 3940 | 3935 |
| | | PM | — | — | 2795 | 2790 |
| | Bach Buxton/Elick Entrance to Eastgate Exit | AM | — | 3906 | — | — |
| | | PM | — | 2664 | — | — |
| | Glen Este Intersection to Eastgate Exit | AM | 3478 | — | — | — |
| | | PM | 2738 | — | — | — |

* Modified

## Capacity Analysis

HCS analyses were performed for each of the alternatives. Figures 8 through 12 summarize the level of service (LOS) and lane usage for each of the five alternatives based on design year traffic volumes computed by the travel demand model. Results are being included for freeway segments, ramp junctions, and key intersections for each alternative. The truck percentage used in the analyses is 3% on SR 32.

**Alternative 1** – Figure 8 shows the improvements required at the existing at-grade signalized intersections along SR 32 with 2030 traffic volumes. In order to achieve LOS D, extensive lane improvements will be required, including four to five through lanes on SR 32 and double or triple lefts at the major signalized intersections.

**Alternative 2** – Figure 9 shows the lane usage and traffic operations for Alternative 2 interchange layout. Freeway segments, ramp junctions, and ramp intersections are shown. SR 32 will need to have three through lanes in each direction.

**Alternative 3** – Traffic operations and required lane usage for Alternative 3 are shown in Figure 10. SR 32 will need to be three through lanes in each direction. This alternative has ramps at Glen Este-Withamsville Road providing access to and from SR 32 east of Glen Este-Withamsville. All the ramp junctions and freeway segments will operate at LOS D or better.

**Alternative 4** – Figure 11 shows the LOS summary and lane usage for Alternative 4, which is a tight diamond interchange east of Elick Lane/Bach Buxton Road with partial ramps at Glen Este-Withamsville Road. As with Alternatives 2 and 3, SR 32 will need to have three through lanes in each direction. All the ramp junctions, freeway segments, and ramp intersections will operate at LOS C or better.

**Alternative 5** – Figure 12 shows the 2030 level of service and delay at intersections with existing lane usage and traffic control (no build). All the three signalized intersections on SR 32 between Eastgate Boulevard and Olive Branch interchanges will operate at failing condition (LOS F) with excessive delays.

**Figure 8: Alternative 1 Capacity Analysis**

Figure 9: Alternative 2 Capacity Analysis

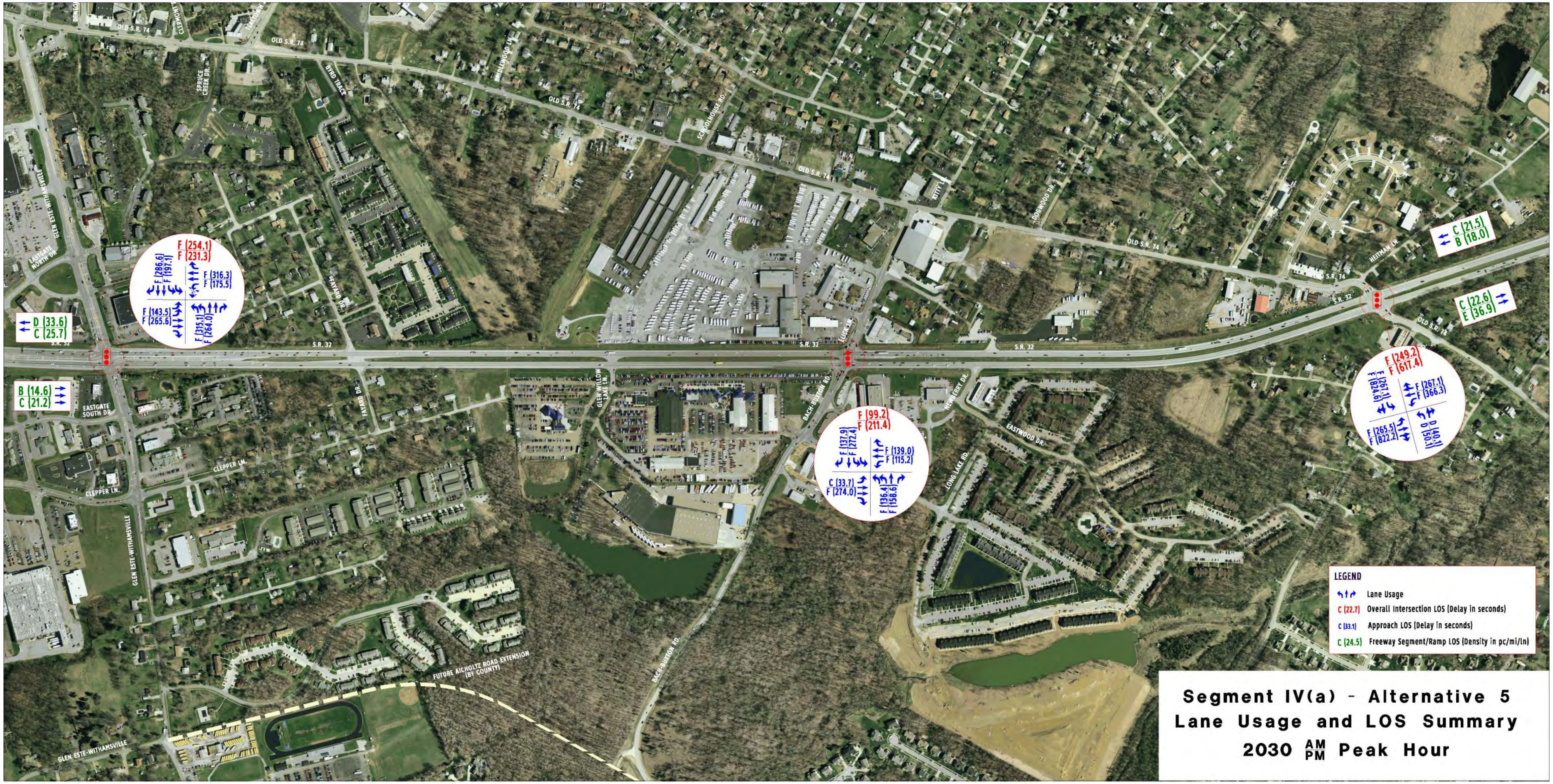
**Figure 10: Alternative 3 Capacity Analysis**

**Figure 11: Alternative 4 (with Glen Este ramps) Capacity Analysis**

Segment IV(a) - Alternative 4
Lane Usage and LOS Summary
2030 AM/PM Peak Hour

**Figure 12: Alternative 4 (without Glen Este ramps) Capacity Analysis**

**Figure 13: Alternative 5 Capacity Analysis**



## Social and Community Impacts

The Segment IV(a) project study area extends through Union and Batavia Townships. The primary impacts to the communities within the study area are expected to be realized due to access changes and potential property impacts and relocations. However, the impacts from this project will mostly be felt by the neighborhoods in Union Township that are within the study area. This section will focus on the community impacts of proposed changes to access. Each of the remaining impacts is discussed in greater detail elsewhere in this document.

**Union Township.** Union Township was established in 1811 and is located centrally in Clermont County along the western border with Hamilton County. The township has a population of almost 46,500 (as of 2010) within 29 square miles. SR 32 essentially bisects the township. Union Township consists of predominately residential and agricultural land uses, with some commercial and industrial areas that are mostly found within the project area, along SR 32.

Access to many of the residential streets that currently intersect SR 32 in the Eastgate area will experience some changes as part of this project. Because the project aims to make SR 32 limited access, many of the existing intersections along SR 32 between Eastgate Boulevard and the Olive Branch-Stonelick interchange will be closed off; access to these streets will instead be through the new interchange, or one of the existing interchanges at either end of the study area. Access to all streets in the area will still be maintained.

**Batavia Township.** Batavia Township is just over 41 square miles in area with a population of slightly over 17,503 (as of 2000). Batavia Township is centrally located within Clermont County and borders Union Township to the west. Batavia Township consists primarily of agricultural land uses with some residential, commercial, and industrial land uses around the township.

Because the part of the Segment IV(a) study area that falls within Batavia Township is the area surrounding the Olive Branch-Stonelick interchange off of SR 32, there will be few access impacts to those in the township. The biggest change in access that drivers in Batavia Township will experience is that they will no longer being able to access Old SR 74 to or from SR 32; instead, they will have to use the new interchange or the existing Olive Branch-Stonelick interchange to access Old SR 74.

## Environmental Justice

Environmental justice (EJ) laws, regulations, and policies are found in Title VI of the Civil Rights Act of 1964, the National Environmental Policy Act of 1969, Title 23 of the United States Code, Section 109(h), the Uniform Relocation and Real Properties Acquisitions Policy Act of 1970, and, most recently, Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations (1994).

The Federal Highway Administration (FHWA) and Executive Order 12898 specifically identify minority (racial and national origin, including black, Hispanic, Asian American, and American Indian and Alaskan Native) and low-income populations as disadvantaged populations. OKI also includes elderly, disabled, and households without a personal vehicle in their EJ analyses. EJ principles, as defined by the FHWA are in place to:

- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

EJ data was collected for each Census Tract in the study area from the 2010 United States Census Bureau. For this analysis, minority persons include any person who is not solely a non-Hispanic Caucasian. Low-income populations are those households with incomes at or below the U.S. Department of Health and Human Services (HHS) poverty guidelines. In this case, this would be a median household income at or below $16,620 for the average household size in the study area of 2.54 persons (this is the average of the 2011 HHS Poverty Guidelines for a 2-person family and a 3-person family, to get close to a 2.54-person family). The following table shows the key disadvantaged populations within each Census Tract as well as the larger surrounding areas of Batavia, Milford, Clermont County, and the State of Ohio.

**Table 9: Environmental Justice Characteristics**

| Census Tract / Location | % Minority | Median HH Income | Per Capita Income | % Persons Poverty | % 65 + | % Disabled | % No Vehicles |
|---|---|---|---|---|---|---|---|
| 410 | 3.21% | $66,617 | $29,857 | 8.30% | 11.62% | Data not available from 2010 Census. | 1.92% |
| 411.02 | 7.32% | $35,911 | $15,549 | 38.00% | 6.59% | | 2.50% |
| 412 | 3.75% | $63,140 | $26,292 | 4.70% | 13.05% | | 0.44% |
| 413.03 | 4.44% | $68,859 | $29,086 | 4.20% | 7.72% | | 0.56% |
| 413.04 | 0.00% | $59,375 | $35,231 | 0.00% | 2.70% | | 0.00% |
| 413.05 | 5.62% | $62,315 | $34,006 | 2.20% | 11.93% | | 0.80% |
| 413.06 | 7.19% | $43,382 | $28,870 | 10.10% | 12.58% | | 0.96% |
| 413.07 | 3.64% | $64,342 | $29,506 | 4.50% | 11.90% | | 0.00% |
| **Study Area Tract Total / Average** | **4.40%** | **$57,993** | **$28,550** | **9.00%** | **9.76%** | **n/a** | **0.90%** |
| | | | | | | | |
| Batavia | 6.23% | $42,583 | $23,430 | 14.50% | 13.52% | Data not available from 2010 Census. | 1.37% |
| Milford | 4.90% | $39,898 | $28,504 | 11.20% | 21.87% | | 4.45% |
| Clermont County | 3.62% | $58,472 | $27,900 | 9.30% | 11.78% | | 1.55% |
| Ohio | 15.80% | $47,358 | $25,113 | 14.20% | 14.06% | | 2.81% |

Source: United States Census Bureau

Based upon the information obtained from the 2010 United States Census, no Census Tract has a median household income below the Department of Health and Human Services poverty guidelines. The study area average for each remaining EJ population (minorities, persons in poverty, age 65+, and without a vehicle) is well below the corresponding state percentages. However, 38% of people in Census Tract 411.02 are in poverty, which is more than double the state average of 14.20%. Additionally, 2.50% of the population in this same Census Tract has no vehicle, which is just below the state average at 2.81%. While these EJ statistics make this Census Tract notable, the Tract is located on the far east end of the study area and no of its population should be adversely impacted through this project.

## Parks and Recreation (Section 4(f))

Section 4(f) refers to consideration of property that is publicly owned parks and recreational lands, wildlife and waterfowl reserves and historic properties. From the initial Red Flag review and project area mapping, Section 4(f) areas were identified. This includes two parks and three reservoirs in or near the study area. Three cemeteries were also identified within the study area. This section of this report is not intended to serve as a Section 4(f) evaluation, but merely to present information on the resources present within the project area based on secondary source research. Should any of these resources be impacted, the Section 4(f) process will be used to ensure that no feasible and prudent alternative to the use of the land exists and that the action includes all possible planning to minimize harm to the property.

Veterans Park is a recreational park with ball fields and other sports facilities located in the northeast quadrant of the Clough Pike and Glen Este-Withamsville Road intersection. Ivy Point Park is located at Ferguson Drive near Clough Pike. Both parks are owned by Union Township and are just outside the study area, so they should not be impacted by any of the alternatives. Recreational fishing occurs at three reservoirs: Glen Willow Lake and Wuerdeman Lakes are located off of Bach Buxton Road, and Jackson Lake is located at Old State Route 74 near Eastgate Mall. Alternative 2 may potentially affect the western end of Glen Willow Lake. All three cemeteries are adjacent to the study area, along or adjacent to Olive Branch-Stonelick Road. None of the cemeteries will be impacted by the proposed alternatives.

Through this phase of the project, no Section 4(f) determinations have been made. A Section 4(f) evaluation will be conducted during the next step of the ODOT PDP.

## Cultural Resources

The study area was examined through on-line resources for previously identified cultural resources. The Ohio State Historic Preservation Office's (OSHPO) on-line mapping service was used to identify any historic structures, archaeological sites, or National Register of Historic Places (NRHP) registered sites within the study area. The interchanges at either end of the Segment IV(a) study area (the Eastgate Boulevard and Olive Branch-Stonelick Road interchanges) were previously surveyed, but none of the conceptual alternatives between them have been surveyed. This mapping identified three previously recorded cemeteries, eight previously recorded history/architecture sites and seven previously identified archaeological sites. No properties on the National Register of Historic Places are known to exist in the study area; however, the study area has not been previously surveyed for cultural resources. A cultural literature review map can be found in the Red Flag Summary (see Appendix F). The following tables list the Ohio Historical Inventory (OHI) buildings, the Ohio Genealogical Society (OGS) cemeteries, and the Ohio Archaeological Inventory (OAI) sites that have been identified in or near the study area.

**Table 10: OHI Buildings**

| OHI # | Present Name | Address | Style | Use | Date | Condition |
|---|---|---|---|---|---|---|
| CLE0053006 | Rose House | 947 Old SR 74 | Vernacular | Single Dwelling | 1865 | Destroyed |
| CLE0052906 | William Jones Bldg | 951 Old SR 74 | Vernacular | Unknown Use | 1860 | Destroyed |
| CLE0067606 | null (formerly West Property) | 1378 Old SR 174 | Vernacular | Single Dwelling | 1945 | Destroyed |
| CLE0067807 | Hunt Property | Stonelick-Olive Branch Rd | Vernacular | Barn | 1840 | In use |
| CLE0067907 | Potrafke Property | 4409 Stonelick-Olive Branch Rd | Vernacular | Single Dwelling | 1865 | Destroyed |
| CLE0068007 | Hunt Property | Stonelick-Olive Branch Rd | Vernacular | Single Dwelling | 1945 | Destroyed |
| CLE0057907 | Lake Allyn of Camp Allyn | Amelia-Olive Branch Rd | null | Other Use | 1902 | Partially destroyed |
| CLE0067707 | West Property | 1384 Old SR 74 | Vernacular | Single Dwelling | 1945 | Occupied |

**Table 11: OGS Cemeteries**

| OGS # | Present Name | Address | Condition |
|---|---|---|---|
| 1753 | Old Apple-German-Old Olive Branch | End of Old Depot Road | Destroyed/moved |
| 1767 | Olive Branch | 4225 Olive Branch-Stonelick Road | Active |
| 14498 | Old Cemetery | Nine Mile Road | Destroyed/moved or mislocated |

**Table 12: OAI Sites**

| OAI # | Name | Time Period | Type | Condition |
|---|---|---|---|---|
| CT0596 | null | Prehistoric | Open Site | Partially destroyed |
| CT0597 | null | Prehistoric | Open Site | Destroyed |
| CT0547 | null | Prehistoric | Open Site | Partially destroyed |
| CT0548 | null | Historic | Open Site | Partially destroyed |
| CT0581 | null | Prehistoric | Open Site | Partially destroyed |
| CT0170 | Wiederhold Mound / Pfarr Site | Prehistoric | Open Site | Destroyed |
| CT0172 | Wiederhold Site | Prehistoric | Open Site | Destroyed |

None of the history/architecture or archaeological sites are known to be eligible for the NRHP. As of now, none of these sites are located within the boundaries of the alternatives. When the exact right-of-way limits are defined for the preferred alternative, a Phase I archaeological reconnaissance survey and history/architecture survey will be completed. Should any historic properties be identified, Section 4(f) coordination will be completed.

## Ecological Resources

The aquatic resources and terrestrial habitats, as well as endangered and threatened species were examined according to the Ohio Department of Transportation (ODOT), Ecological Manual (2005a). Preliminary findings are presented below. During the next phases of this project, the ecological impacts for the feasible alternatives will be refined and presented in the Ecological Survey Report for review by regulatory agencies. Subsequent coordination will determine appropriate mitigation for impacts.

**Aquatic Resources.** The project area is within the East Fork Little Miami River watershed. Salt Run and Shayler Run are also within the study area and are designated WWH-aquatic life use, AWS & IWS-water supply use, PCR-recreation use. Salt Run is a Section 303(d) impaired water. Numerous unnamed streams also exist within the area. There are no designated Wild or Scenic Rivers located within one mile of study area. The Little Miami River, a state and national scenic river, is over 3 miles from the project study area.

There are possible impacts to wetland areas and cat tails within the study area. NWI and soil survey maps indicate a presence of wet areas throughout the study area. Previous field investigations indicate the presence of wet areas throughout the study area. Wetland and soil mapping can be found in the Red Flag Summary (see Appendix E). Cat tails are also present in potential areas of disturbance (i.e. roadside ditches as well as potential wetland areas and retention pond fringes).

**Terrestrial Habitats.** The study area consists mostly of existing right-of-way and residential/commercial lands with some wooded riparian corridors and open riparian corridors, oldfield and newfield land uses, and upland woodlands and wooded fence row. Since the exact right-of-way impacts are not yet known, it is not known how much of each terrestrial habitat will be affected. In the next phase, the terrestrial habitats for necessary new right-of-way can be calculated.

**Endangered and Threatened Species.** Based on information from the US Fish and Wildlife Services, there are seven (7) federally listed species in Clermont County. This list includes Indiana bat (endangered), running buffalo clover (endangered), pink mucket pearly mussel (endangered), fanshell (endangered), rayed bean (candidate), sheepnose (candidate), and snuffbox (species of concern). Potential Indiana bat habitat may be present throughout portions of the study area. Based on correspondence with the Ohio Department of Natural Resources (ODNR), there are no records of rare or endangered species within the study area. Coordination with ODNR is available in the Red Flag Summary (see Appendix E).

## Hazardous Materials

Preliminary research, including online reviews of the US Environmental Protection Agency's Enviromapper and the Ohio State Fire Marshal Bureau of Underground Storage Tank Regulation (BUSTR) database, was completed to identify suspect parcels within the Segment IV(a) study area. Through this research, no mapped landfills or superfund sites were identified; however, numerous hazardous material and UST/LUST sites of concern were identified as being located throughout the study area. The identified sites of concern are listed in the tables below.

## Table 13: Hazardous Waste Sites of Concern

| Site Name | Address |
|---|---|
| Civacon A Dover Resources Co. | 4595 E. Tech Drive, Cincinnati |
| Custom Colors Auto Service | 1124A Old SR 74, Batavia |
| Dynamics Corp of America Ellis & Watts Div. | 4400 Glen Willow Lake Lane, Batavia |
| Eastgate Motors Inc. | 4468 Eastgate Boulevard, Cincinnati |
| Environmental Chemical Corp. | 3235 Omni Drive, Cincinnati |
| Firestone | 4625 Eastgate Boulevard, Cincinnati |
| Hempleman's Auto Body | 4413 Kitty Lane, Batavia |
| Holman Motors, Inc. | 4387 Elick Lane, Batavia |
| Jeff Wyler Buick Pontiac | 1117 SR 32, Batavia |
| Jerry's Autobody Carstar Inc. | 4425 Aicholtz Road, Cincinnati |
| Kroger #902 | 4530 Eastgate Boulevard, Cincinnati |
| Lucas Automotive | 3241 Omni Drive, Cincinnati |
| Meijer #148 (gas station) | 887 Eastgate North Road, Cincinnati |
| Meijer #148 (store) | 4445 Glen Este-Withamsville Road, Cincinnati |
| Midwest Auto Exchange | 4584 Summerside Road, Cincinnati |
| Pep Boys #260 | 4436 Glen Este-Withamsville Road, Cincinnati |
| Sam's Club #6528 | 815 Clepper Lane, Cincinnati |
| Sears #1810 | 4595 Eastgate Boulevard, Cincinnati |
| Summer's Body and Paint | 1107 Old SR 74, Batavia |
| Tealtown Exxon | 1006 Cincinnati-Batavia Pike, Batavia |
| Terminix Branch 2020 | 4440 Glen Este-Withamsville Road, Cincinnati |
| Trentec Inc. | 4600 E. Tech Drive, Cincinnati |
| Vivi-Color Inc | 665 Cincinnati-Batavia Pike, Cincinnati |
| Wal-Mart #1443 | 4370 Eastgate Square Drive, Cincinnati |
| West Clermont | 4342 Glen Este-Withamsville Road, Cincinnati |
| Wyler Jeff Nissan Inc. | 861 Wyler Park Drive, Cincinnati |

## Table 14: UST/LUST Sites of Concern

| Facility ID | Site Name | Address |
|---|---|---|
| 13000126 | Sunoco #0043-8820 | 1006 Cincinnati-Batavia Pike, Batavia |
| 13010072 | Tealtown Exxon | 1006 Old SR 74, Batavia |
| 13004027 | Saul's Construction Co., Inc. | 1077 Cincinnati-Batavia Pike, Batavia |

| Facility ID | Site Name | Address |
|---|---|---|
| 13000113 | Glen Este Marathon | 1098 Cincinnati-Batavia Pike, Batavia |
| 13000010 | Jeff Wyler Auto Center | 1117 SR 32, Batavia |
| 13010103 | Big Mike's Gas-N-Go | 1147 Marian Drive, Batavia |
| 13000026 | Clermont Distributing Co. | 1155 Old SR 74, Batavia |
| 13002579 | Speedway #9674 | 1269 Old SR 74, Batavia |
| 13002615 | United Dairy Farmers #139 | 957-961 Cincinnati-Batavia Pike, Batavia |

In the next phases/step of the project, an ESA Screening will be undertaken in accordance with the ODOT Environmental Site Assessment Guidelines (April 2009) to further determine the potential of encountering hazardous substances from the suspect parcels prior to construction activities.

## Traffic Noise

The purpose of Part 772 of the Code of Federal Regulations (CFR) is to provide procedures for noise studies and noise abatement measures in order to help protect the public health and welfare, to supply noise abatement criteria and to establish requirements for information to be given to local officials for use in the planning and design of highways approved pursuant to title 23 of the United States Codes (USC) (23 CFR 772.1). The noise analysis for this project will be conducted in accordance with the FHWA Federal Aid Policy Guide, Subchapter H, Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise and the ODOT guidelines contained in its Analysis and Abatement of Highway Traffic Noise document dated June 7, 2011 and subsequent clarifications dated January 27, 2012.

There are several single-family and multi-family residential developments within the project study area as well as a school, cemetery, and park. Noise abatements may be feasible but a more detailed analysis determining what exactly is needed will be completed during the next phases of the project.

## Air Quality

Part 81 of the CFR provides procedures on air quality matters, which affect the public health and welfare and environmental quality of the natural and built habitat. The 1990 Clean Air Act is the cornerstone of these procedures and enforced by the U.S. Environmental Protection Agency (USEPA). Ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter and lead are the six pollutant defined as indicators of air quality by the USEPA. Threshold concentrations are established for these pollutants and designated as National Ambient Air Quality Standards (NAAQS).

USEPA air quality designations are categorized by area as: non-attainment, attainment or unclassifiable. When an area does not meet the air quality it is designated as a non-attainment area. The 1-Hour Ozone Standard and the new 8-Hour Ozone Standard require monitoring of pollutant concentration being released into the atmosphere. Clermont County is a basic non-attainment county – it is in the $PM_{2.5}$ nonattainment area and the 8-hour ozone nonattainment area.

The OEPA/ODOT agreement states that a quantitative CO analysis is recommended for projects that modify existing facilities that cause an increase in Average Daily Traffic of more than 10,000 vehicles between project completion and ten years hence. Based on preliminary traffic numbers, it appears that the ten-year traffic increase will exceed the 10,000-vehicle maximum. As a result, it is anticipated that a quantitative CO analysis will be required. A Qualitative MSAT Analysis will be required to be prepared and coordinated with OEPA. PM2.5 coordination with approval from OEPA, USEPA, and FHWA will be required as well. The preparation of a PM 2.5 Hotspot Analysis is not anticipated to be required.

## Geotechnical Issues

There are few geologic hazards that have been noted within the project area: evidence of rock strata, the possibility of unsuitable materials, and the possibility of subgrade stabilization or an undercut appearing to be needed. Existing geologic and subsurface information indicated that bedrock in the area is relatively shallow, and rock is exposed in the streambeds. Since the area is highly developed, it is anticipated that fill soils will be encountered. Subgrade stabilization or an undercut may potentially be needed based on a review of existing subsurface explorations which indicated that the near surface native soils were typically wetter at the time the borings were drilled. The appendices of the Red Flag Summary include further information.

## Utility Issues

While specifics have not yet been identified, it has been assumed that pole lines, sewers, and water lines that run along the anticipated work area will need to be relocated. Utilities that are currently within the existing right-of-way will likely require additional right-of-way to accommodate their relocation. These details will be coordinated throughout the design process in later phases of the project, regardless of which alternative is chosen.

## Cost

Alternative 1 involves only widening SR 32 and intersection improvements (i.e., no involve grade-separations or interchange) and is estimated at $22,550,000. Because Alternatives 2-4 all involve two grade-separations (at Glen Este-Withamsville and at Old SR 74), a new interchange and a third lane on SR 32 in each direction, the costs for each alternative are roughly the same at Step 4 level of detail. Therefore, the costs for Alternatives 2-4 are estimated at $65,850,000. Funding is expected to come from local, state, and federal levels.

## Public Input

Two public open houses have been held for the Segment IV(a) project: one on October 6, 2010 and one on September 28, 2011.

The first open house was held at the Union Township Civic Center to introduce the public to the Segment IV(a): SR 32 Eastgate Area Improvements study and to obtain their initial comments. Representatives from Clermont County, the Clermont County Transportation Improvement District (CCTID), Ohio Department of Transportation (ODOT) District 8, and TranSystems Corporation were available to answer questions about the project and solicit feedback from attendees. The open house was held from 5:00 to 7:00 PM. Sign-in sheets from the meeting listed 70 people as being in attendance. Exhibits displayed at the meeting included boards explaining the purpose of the meeting and describing the comment procedure, the SR 32 Eastgate Area Improvements Study Area, environmental impacts, current and future levels of service (LOS) in the study area, crash data from the study area for the past three years, and the overall Eastern Corridor project improvements. Following the public meeting, there was a two-week period for the public to submit comments; the study team received comments from 21 people.

The second open house was also held at the Union Township Civic Center and was presenting the five conceptual alternatives for this project to the public to gain their feedback on them. Representatives from Clermont County, the Clermont County Transportation Improvement District (CCTID), Ohio Department of Transportation (ODOT) District 8, and TranSystems Corporation were available to answer questions about the project and solicit feedback from attendees. The open house was held from 5:00 to 7:00 PM. Sign-in sheets from the meeting listed 251 people as being in attendance. Exhibits displayed at the meeting included boards explaining the purpose and need of the project, environmental impacts, displays of Alternatives 1-4, a detailed display of the optional ramps at Glen Este-Withamsville Road, boards about the I-275/SR 32 interchange project, and the overall Eastern Corridor project improvements. Following the meeting, there was a four-week public comment period; the study team received comments from 82 people. The biggest issue brought up at this open house was concern over possible impacts of this project on the new Union Township Library branch located on Glen Este-Withamsville Road, just north of SR 32.

Both meetings were held in an open house style, so members of the public could attend at any time during the open house hours and browse the exhibits at their leisure; there was no formal presentation given at either open house. Exhibits from both meetings are available in Appendix A and comment forms received from both meetings are included in Appendix B. A table showing the general feedback regarding the study area (received at the first open house) followed by figures showing the public's preferences on the alternatives examined in this step of the project (received at the second open house) are below.

**Table 15: Comments from Open House 1**

| Important Problems in Study Area |
|---|
| Respondent is concerned with traffic congestion on SR 32. (8 comments) |
| Respondent is concerned with speed and congestion on Old SR 74 and Olive Branch-Stonelick Road now that Old SR 74 goes through to the UC branch campus. (2 comments) |
| Respondent is concerned with turning across traffic [on local roads feeding to SR 32]. (2 comments) |
| Respondent is concerned with traffic signals not corresponding with the volume of traffic – suggests access roads with no signals along SR 32, which would allow for bypassing SR 32 and still being able to access businesses. (1 comment) |
| Respondent is concerned with the traffic signal at Old SR 74 and SR 32, at the Speedway. (1 comment) |
| Respondent is concerned with the disturbance that will be created. (1 comment) |
| Respondent is concerned about still being able to provide access to existing businesses. (1 comment) |
| Respondent is concerned with noise issues. (1 comment) |

| |
|---|
| Respondent believes that there are too many lights within the study area. (1 comment) |
| Respondent believes an overpass at SR 32 and Old SR 74 by the Speedway and Heitman Lane will alleviate some of the back-up for people, especially those living on Heitman Lane. (1 comment) |
| Respondent believes that growth in the area will be inhibited due to congestion on SR 32 and safety issues. (1 comment) |
| Respondent believes overpasses will alleviate traffic problems currently caused by traffic lights. (1 comment) |
| Respondent notes that there are not safe sidewalks in the area. (1 comment) |
| Respondent is concerned with the cost to tax payers, the feasibility of the project, and the impact to the flow of traffic in the area. (1 comment) |
| Respondent is concerned with the traffic lights in the study area and believes that they contribute to the traffic and accidents in the area. (1 comment) |
| **Ideas to Consider When Developing Alternatives** |
| Respondent would like service roads next to SR 32 to access businesses. (4 comments) |
| Respondent suggests overpasses at the intersections over SR 32. (3 comments) |
| Respondent is concerned with the impact to businesses. (2 comments) |
| Respondent is concerned with the impact this will have on the local homeowners and does not want to have a highway next to their house. (1 comment) |
| Respondent suggests closing the Old SR 74 intersection with SR 32, or at least making it a RIRO. (1 comment) |
| Respondent suggests closing off Old SR 74 or making it one-way. (1 comment) |
| Respondent suggests developing Old SR 74, Aicholtz Road, and Clough Pike to handle traffic before starting SR 32 construction. (1 comment) |
| Respondent suggests opening a ramp/interchange at Armstrong Boulevard and SR 32. (1 comment) |
| Respondent suggests sitting at each driveway off Old SR 74 to check of safety regarding clearance for viewing. (1 comment) |
| Respondent believes that safety of the citizens needs to be a top concern (re: speeding, congestion). (1 comment) |
| Respondent likes the proposed Elick/Bach Buxton extension interchange as a way to move people across SR 32 while allowing a convenient access point to SR 32. (1 comment) |
| Respondent would like to see sidewalks. (1 comment) |
| Respondent would like to see a better flow for through traffic. (1 comment) |
| **Other General Comments/Concerns** |
| Respondent feels that closing the at-grade intersection of Glen Este-Withamsville will be very detrimental to the established businesses currently being served by that intersection. (1 comment) |
| Respondent commented that the maps were ok, but having someone explain would be better; stated that with larger groups, it was difficult to get close enough to see details. (1 comment) |
| Respondent was concerned that the alternatives looked at in the original study were not shown at this meeting and that it seemed to focus on spreading the construction. They also noted that collectors work well in other cities. (1 comment) |
| Respondent thinks that the service roads should be at least 2 lanes in each direction; begin at I-275 and extend beyond the congested demography; have a speed limit of 35 MPH; and provide opportunity for plenty of curb cuts. (1 comment) |
| Respondent believes that Fayard Drive and Clepper Lane need to be part of this redevelopment plan. (1 comment) |
| Respondent is concerned with the impact this project will have to their home/o-property value as well as the resale potential of it in the future. Respondent also wants to know if the county will purchase their property for this project. (1 comment) |

**Figure 14: Interchange Preferences from Open House 2**

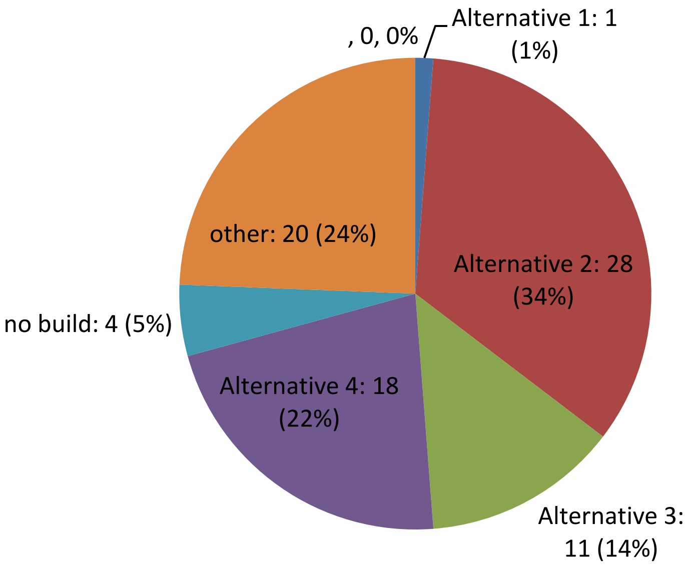
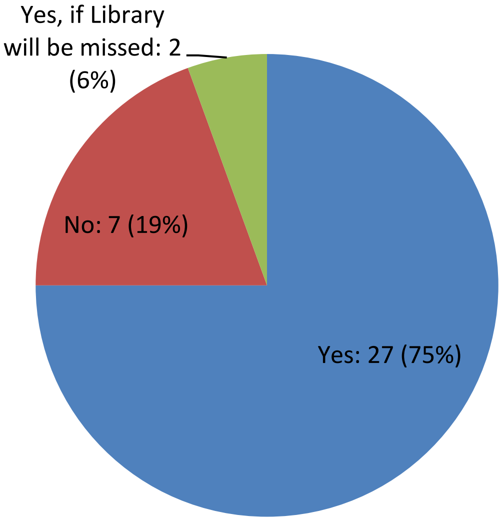


**Figure 15: Glen Este Ramp Preferences from Open House 2**



## CONCLUSIONS AND COMPARISON MATRIX

The five Conceptual Alternatives were further developed and evaluated during Step 4 of the Project Development Process. The findings of the evaluations were presented by discipline in the preceding section of this document ("Evaluation of Conceptual Alternatives"). This section will summarize the conclusions by alternative, with a matrix at the end of this section summarizing the evaluation factors for each option.

### Alternatives

**Alternative 1** – This alternative would maintain the access points along SR 32, including signals at the intersections with Glen Este-Withamsville Road, Elick Lane/Bach Buxton Road, and Old SR 74. It would upgrade the roadway to handle future traffic volumes, adding a number of through and turn lanes in all directions. The number of lanes required to handle traffic volumes, however, would not do much to improve safety conditions in the area. There would be some impacts associated with this alternative because of how much wider the road would need to be in order to handle the traffic volumes. Construction costs would potentially be less than other alternatives because there are no structures (overpasses) involved with this alternative, but exact costs and property impacts are not yet known.

**Alternative 2** – This alternative adds a classic diamond interchange along SR 32 between Glen Este-Withamsville Road and Elick Lane/Bach Buxton Road. It makes SR 32 limited access by adding overpasses at Glen Este-Withamsville Road and Old SR 74 and closing the remaining intersections along SR 32. Consolidating the existing access points on SR 32 into one new interchange would result in SR 32 being able to better handle future traffic volumes. While access points along SR 32 are closed, access to all these areas is still maintained; Heitman Lane and Aicholtz Road extension projects help provide access to areas affected by intersection closures. It also improves safety in the corridor as there are fewer conflict points. One reservoir (used for recreational fishing) may potentially be impacted. Exact property impacts and construction costs are not yet known.

**Alternative 3** – This alternative adds an overpass at Elick Lane/Bach Buxton Road that functions with entrance/exit ramps that are added just east of the overpass along SR 32. It makes SR 32 limited access by also adding overpasses at Glen Este-Withamsville Road and Old SR 74 and closing the remaining intersections along SR 32. Consolidating the existing access points on SR 32 into one new interchange would result in SR 32 being able to better handle future traffic volumes. While access points along SR 32 are closed, access to all these areas is still maintained; Clepper Lane and Aicholtz Road extension projects help provide access to areas affected by intersection closures on SR 32. Additionally, partial access may still be provided at Glen Este-Withamsville Road from SR 32 westbound and to SR 32 eastbound. This alternative improves safety in the corridor as there are fewer conflict points. Exact property impacts and construction costs are not yet known.

**Alternative 4** – This alternative adds a full-movement TUDI on SR 32 between Elick Lane/Bach Buxton Road and Old SR 74. It makes SR 32 limited access by also adding overpasses at Glen Este-Withamsville Road and Old SR 74 and closing the remaining intersections along SR 32. Consolidating the existing access points on SR 32 into one new interchange would result in SR 32 being able to better handle future traffic volumes. While access points along SR 32 are closed, access to all these areas is still maintained; Clepper Lane and Aicholtz Road extension projects help provide access to areas affected by intersection closures on SR 32. Additionally, partial access may still be provided at Glen Este-Withamsville Road from SR 32 westbound and to SR 32 eastbound. This alternative improves safety in the corridor as there are fewer conflict points. Exact property impacts and construction costs are not yet known.

**Alternative 5** – This alternative would not provide any improvements to SR 32 in the Eastgate area. Roadway capacity and safety issues will not be improved in the area. Access through the study area will not be changed. There are no property impacts or construction costs with this alternative.

## Conclusions

Based upon the evaluations and public comment, select alternatives are recommended for advancement. The Feasible Alternatives that are chosen for further work will be analyzed in greater detail, including further design based on certified traffic, environmental field studies and agency coordination, as well as an analysis of the local network improvements required as a result of the preferred alternative.

The alternatives recommended to be carried forward are:

- Alternative 2 – Interchange East of Fayard Drive.
- Alternative 4 – Interchange at Newberry Drive, with ramps at Glen Este-Withamsville Road.
- Alternative 4 – Interchange at Newberry Drive, without ramps at Glen Este-Withamsville Road.
- Alternative 5 – No Build.

Alternative 1 is not being carried forward because of the increased number of lanes needed throughout the corridor. Furthermore, maintaining (larger) at-grade intersections would not improve safety along the SR 32 corridor as outlined in the Purpose and Need. Alternative 3 is not being carried forward as there are no major benefits over Alternative 2 or Alternative 4, Alternative 3 has the highest ROW impacts and there is lack of public support for this alternative.

# Alternatives Comparison Matrix

## Conceptual Alternatives Study

| Impacts/Issues | Impact/Issue Description | Alternative 1 | Alternative 2 | Alternative 3* | Alternative 4* | Alternative 5 |
|---|---|---|---|---|---|---|
| | | Widen Existing SR 32 | Interchange East of Fayard Drive | Interchange at Elick/Bach-Buxton | Interchange at Newberry Drive | No Build |
| **Key Design Issues** | The Key Design Issue(s) for each alternative. | 1) Major lane additions throughout corridor | 1) New interchange between Glen Este & Elick/Bach Buxton. 2) Overpasses at Glen Este & Old SR 74. | 1) SR 32 entrance/exit ramps east of Elick/Bach Buxton. 2) Overpasses at Glen Este, Elick/Bach Buxton, & Old SR 74. 3) Possible partial access at Glen Este. | 1) New interchange between Elick/Bach Buxton & Old SR 74. 2) Overpasses at Glen Este & Old SR 74. 3) Possible partial access at Glen Este. | None. |
| **Traffic Analysis** | 2030 with Improvements – there are a different number of segments with each alternative; this represents the furthest east & west segments, AM & PM (8 total). | LOS B - 4 segments;<br>LOC C - 4 segments | LOS B - 3 segments;<br>LOS C - 4 segments;<br>LOS D - 1 segment | LOS B - 3 segments;<br>LOS C - 4 segments;<br>LOS D - 1 segment | LOS B - 3 segments;<br>LOS C - 5 segments | LOS B - 2 segments;<br>LOS C - 4 segments;<br>LOS D - 1 segment;<br>LOS E - 1 segment |
| **Social & Community Impacts** | This includes primarily the impacts to the communities due to proposed access changes. | No potential impacts. | SR 32 will become limited access, so some streets may no longer have direct access from SR 32, but access to all streets in the area will still be maintained. | | | No potential impacts. |
| **Environmental Justice** | This includes the impacts to environmental justice populations in the study area. | While the project is proposed to affect residential parcels in several census tracts, no one tract or environmental justice population bears disproportionate effects. | | | | |
| **Parks & Recreation - Section 4(f)** | The consideration of property that is publicly owned parks and recreation lands, wildlife and waterfowl reserves and historic properties. | No potential impacts. | 1 reservoir (used for recreational fishing) may potentially be impacted. | No potential impacts. | No potential impacts. | No potential impacts. |
| **ROW Impacts** | The additional amount of ROW necessary to meet ODOT standards per alternative. | Approximately 57 parcels. | Approximately 85 parcels. | Approximately 113 parcels. | Approximately 108 parcels. | No potential impacts. |
| **Potential Relocations** | The number of residential & commercial properties affected by each alternative. | The number of residential & commercial properties that will be affected are not known at this point. | | | | No potential impacts. |
| **Cultural Resources** | Those properties determined to be history/architecture sites requiring further study to determine eligibility for NRHP status. | To be determined when preferred alternative is selected. | | | | No potential impacts. |
| **Ecological Resources** | Those ecological resources, including aquatic resources, terrestrial habitats and endangered and threatened species potentially impacted. | There are numerous wetland areas and streams throughout the study area and the exact impacts to these are not yet known. | | | | No potential impacts. |
| **Hazardous Materials** | Sites recommended for Phase I ESA. | 5 potential haz-mat and 2 potential UST/LUST sites of concern. | 6 potential haz-mat and 3 potential UST/LUST sites of concern. | 9 potential haz-mat and 4 potential UST/LUST sites of concern. | 10 potential haz-mat and 4 potential UST/LUST sites of concern. | No potential impacts. |
| **Traffic Noise** | Noise impacts resulting from this project. | There are several single-family and multi-family residential developments within the project study area as well as a school, cemetery, and park. Noise abatements may be feasible but a more detailed analysis determining what exactly is needed will be done in later steps of this project. | | | | |
| **Air Quality** | Air quality impacts resulting from this project. | The OEPA/ODOT agreement states that a quantitative CO analysis is recommended for projects that modify existing facilities that cause an increase in Average Daily Traffic of more than 10,000 vehicles between project completion and ten years hence. Based on preliminary traffic numbers, it appears that the ten-year traffic increase will exceed the 10,000-vehicle maximum. As a result, it is anticipated that a quantitative CO analysis will be required. A Qualitative MSAT Analysis will be required to be prepared and coordinated with OEPA. PM2.5 coordination with approval from OEPA, USEPA, and FHWA will be required as well. The preparation of a PM2.5 Hotspot Analysis is not anticipated to be required. | | | | |
| **Geotechnical Issues** | Significant geologic hazard within the project area. | The majority of the study area consists of Illinoian-age loam-till soil and landslides may occur in oversteepend, wet areas. There is also evidence of bedrock in the study area. | | | | No potential impacts. |
| **Utility Issues** | Utilities that may require relocation as part of this project. | Many utilities exist within the suburban setting of the project study area and will most likely require relocation. At this particular stage of design, specifics beyond this are not known. | | | | No potential impacts. |
| **Costs** | Step 4 level of detail estimates | $22,550,000 | $65,850,000 | | | None. |

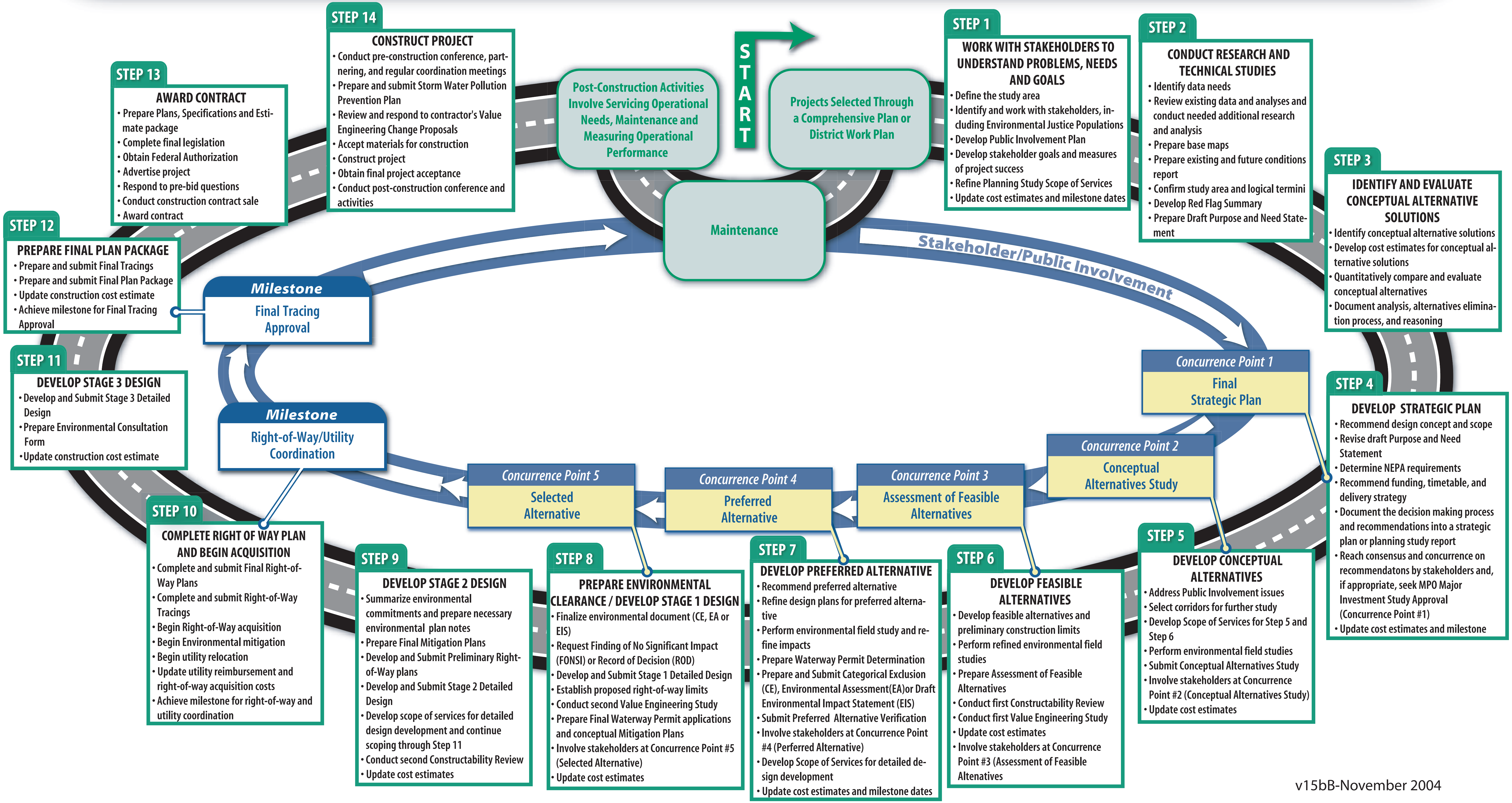
*Alternatives 3 and 4 include impacts associated with the proposed optional ramps at Glen Este-Withamsville Road

# APPENDIX A: EXHIBITS (ALSO ON CD)

- ODOT Project Development Process (PDP) for Major Projects
- Eastgate Area Improvements
- Segment IV(a) Project Study Area
- Segment IV(a) Census Tract Map
- Open House 1 Displays
    - Eastern Corridor Improvements
    - Crash History
    - Environmental Features
    - Level of Service (LOS)
    - Level of Service (LOS) Definition
    - Purpose of Meeting
    - Study Area
- Open House 2 Displays
    - Purpose & Need
    - Alternative 1
    - Alternative 2
    - Alternative 3
    - Alternative 4
    - Glen Este-Withamsville Road Ramp Options

## Ohio Department of Transportation

# Project Development Process (PDP) for Major Projects



**START**

Projects Selected Through a Comprehensive Plan or District Work Plan

**STEP 1**

### WORK WITH STAKEHOLDERS TO UNDERSTAND PROBLEMS, NEEDS AND GOALS

- Define the study area
- Identify and work with stakeholders, including Environmental Justice Populations
- Develop Public Involvement Plan
- Develop stakeholder goals and measures of project success
- Refine Planning Study Scope of Services
- Update cost estimates and milestone dates

**STEP 2**

### CONDUCT RESEARCH AND TECHNICAL STUDIES

- Identify data needs
- Review existing data and analyses and conduct needed additional research and analysis
- Prepare base maps
- Prepare existing and future conditions report
- Confirm study area and logical termini
- Develop Red Flag Summary
- Prepare Draft Purpose and Need Statement

**STEP 3**

### IDENTIFY AND EVALUATE CONCEPTUAL ALTERNATIVE SOLUTIONS

- Identify conceptual alternative solutions
- Develop cost estimates for conceptual alternative solutions
- Quantitatively compare and evaluate conceptual alternatives
- Document analysis, alternatives elimination process, and reasoning

*Concurrence Point 1*

Final Strategic Plan

**STEP 4**

### DEVELOP STRATEGIC PLAN

- Recommend design concept and scope
- Revise draft Purpose and Need Statement
- Determine NEPA requirements
- Recommend funding, timetable, and delivery strategy
- Document the decision making process and recommendations into a strategic plan or planning study report
- Reach consensus and concurrence on recommendatons by stakeholders and, if appropriate, seek MPO Major Investment Study Approval (Concurrence Point #1)
- Update cost estimates and milestone

*Concurrence Point 2*

Conceptual Alternatives Study

**STEP 5**

### DEVELOP CONCEPTUAL ALTERNATIVES

- Address Public Involvement issues
- Select corridors for further study
- Develop Scope of Services for Step 5 and Step 6
- Perform environmental field studies
- Submit Conceptual Alternatives Study
- Involve stakeholders at Concurrence Point #2 (Conceptual Alternatives Study)
- Update cost estimates

*Concurrence Point 3*

Assessment of Feasible Alternatives

**STEP 6**

### DEVELOP FEASIBLE ALTERNATIVES

- Develop feasible alternatives and preliminary construction limits
- Perform refined environmental field studies
- Prepare Assessment of Feasible Alternatives
- Conduct first Constructability Review
- Conduct first Value Engineering Study
- Update cost estimates
- Involve stakeholders at Concurrence Point #3 (Assessment of Feasible Altenatives)

*Concurrence Point 4*

Preferred Alternative

**STEP 7**

### DEVELOP PREFERRED ALTERNATIVE

- Recommend preferred alternative
- Refine design plans for preferred alternative
- Perform environmental field study and refine impacts
- Prepare Waterway Permit Determination
- Prepare and Submit Categorical Exclusion (CE), Environmental Assessment(EA)or Draft Environmental Impact Statement (EIS)
- Submit Preferred Alternative Verification
- Involve stakeholders at Concurrence Point #4 (Perferred Alternative)
- Develop Scope of Services for detailed design development
- Update cost estimates and milestone dates

*Concurrence Point 5*

Selected Alternative

**STEP 8**

### PREPARE ENVIRONMENTAL CLEARANCE / DEVELOP STAGE 1 DESIGN

- Finalize environmental document (CE, EA or EIS)
- Request Finding of No Significant Impact (FONSI) or Record of Decision (ROD)
- Develop and Submit Stage 1 Detailed Design
- Establish proposed right-of-way limits
- Conduct second Value Engineering Study
- Prepare Final Waterway Permit applications and conceptual Mitigation Plans
- Involve stakeholders at Concurrence Point #5 (Selected Alternative)
- Update cost estimates

**STEP 9**

### DEVELOP STAGE 2 DESIGN

- Summarize environmental commitments and prepare necessary environmental plan notes
- Prepare Final Mitigation Plans
- Develop and Submit Preliminary Right-of-Way plans
- Develop and Submit Stage 2 Detailed Design
- Develop scope of services for detailed design development and continue scoping through Step 11
- Conduct second Constructability Review
- Update cost estimates

**STEP 10**

### COMPLETE RIGHT OF WAY PLAN AND BEGIN ACQUISITION

- Complete and submit Final Right-of-Way Plans
- Complete and submit Right-of-Way Tracings
- Begin Right-of-Way acquisition
- Begin Environmental mitigation
- Begin utility relocation
- Update utility reimbursement and right-of-way acquisition costs
- Achieve milestone for right-of-way and utility coordination

*Milestone*

Right-of-Way/Utility Coordination

**STEP 11**

### DEVELOP STAGE 3 DESIGN

- Develop and Submit Stage 3 Detailed Design
- Prepare Environmental Consultation Form
- Update construction cost estimate

**STEP 12**

### PREPARE FINAL PLAN PACKAGE

- Prepare and submit Final Tracings
- Prepare and submit Final Plan Package
- Update construction cost estimate
- Achieve milestone for Final Tracing Approval

*Milestone*

Final Tracing Approval

**STEP 13**

### AWARD CONTRACT

- Prepare Plans, Specifications and Estimate package
- Complete final legislation
- Obtain Federal Authorization
- Advertise project
- Respond to pre-bid questions
- Conduct construction contract sale
- Award contract

**STEP 14**

### CONSTRUCT PROJECT

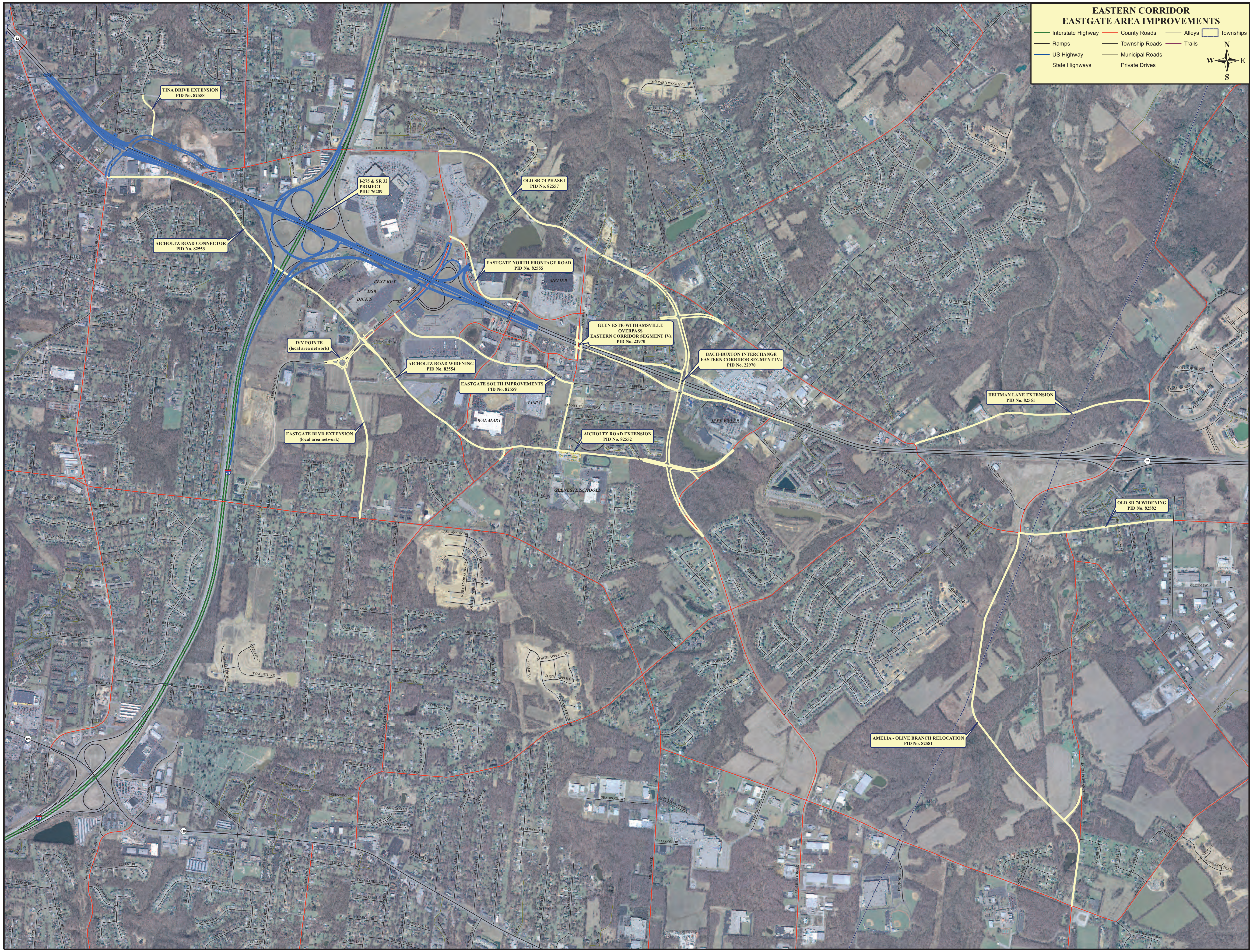
- Conduct pre-construction conference, partnering, and regular coordination meetings
- Prepare and submit Storm Water Pollution Prevention Plan
- Review and respond to contractor's Value Engineering Change Proposals
- Accept materials for construction
- Construct project
- Obtain final project acceptance
- Conduct post-construction conference and activities

Post-Construction Activities Involve Servicing Operational Needs, Maintenance and Measuring Operational Performance

Maintenance

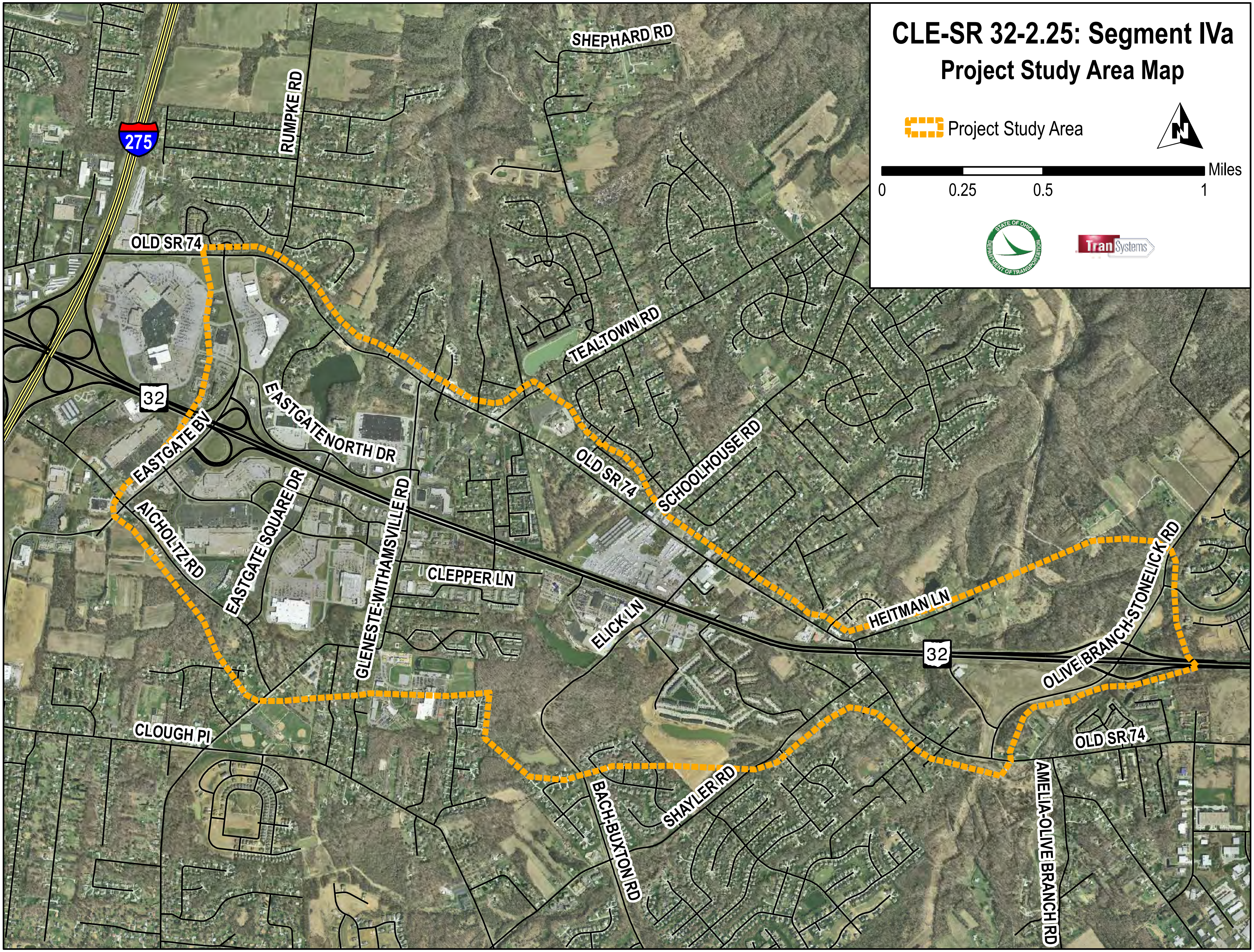
Stakeholder/Public Involvement

v15bB-November 2004


EASTERN CORRIDOR
EASTGATE AREA IMPROVEMENTS
Interstate Highway
Ramps
US Highway
State Highways
County Roads
Township Roads
Municipal Roads
Private Drives
Alleys
Trails
Townships
N
W
E
S
TINA DRIVE EXTENSION PID No. 82558
I-275 & SR 32 PROJECT PID# 76289
OLD SR 74 PHASE I PID No. 82557
AICHOLTZ ROAD CONNECTOR PID No. 82553
EASTGATE NORTH FRONTAGE ROAD PID No. 82555
BEST BUY
DSW
DICK'S
MEIJER
GLEN ESTE-WITHAMSVILLE OVERPASS EASTERN CORRIDOR SEGMENT IVa PID No. 22970
IVY POINTE (local area network)
AICHOLTZ ROAD WIDENING PID No. 82554
EASTGATE SOUTH IMPROVEMENTS PID No. 82559
BACH-BUXTON INTERCHANGE EASTERN CORRIDOR SEGMENT IVa PID No. 22970
SAM'S
WAL MART
JEFF WYLER
EASTGATE BLVD EXTENSION (local area network)
AICHOLTZ ROAD EXTENSION PID No. 82552
GLENESTE SCHOOLS
HEITMAN LANE EXTENSION PID No. 82561
OLD SR 74 WIDENING PID No. 82582
AMELIA - OLIVE BRANCH RELOCATION PID No. 82581
32
275
125

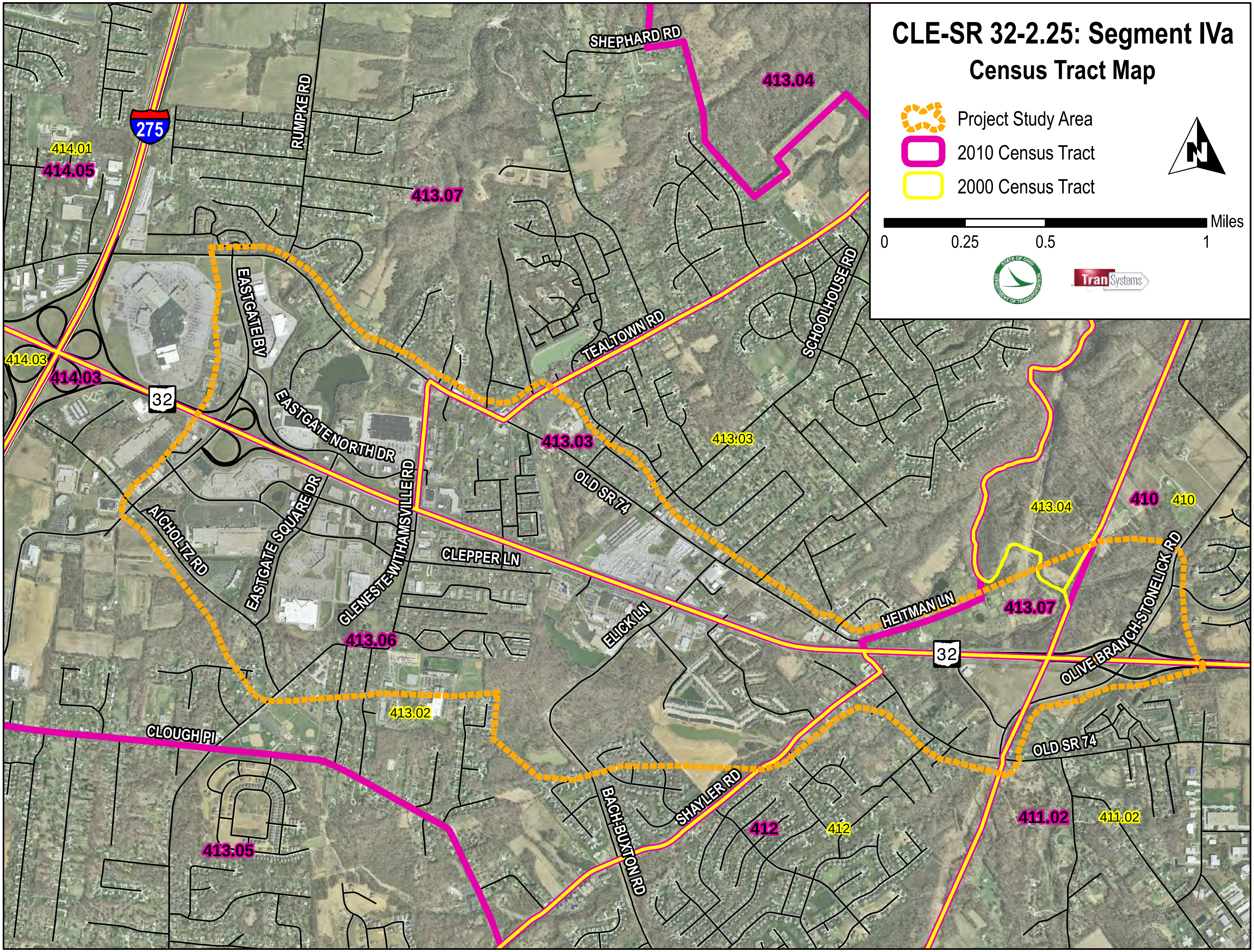
# CLE-SR 32-2.25: Segment IVa

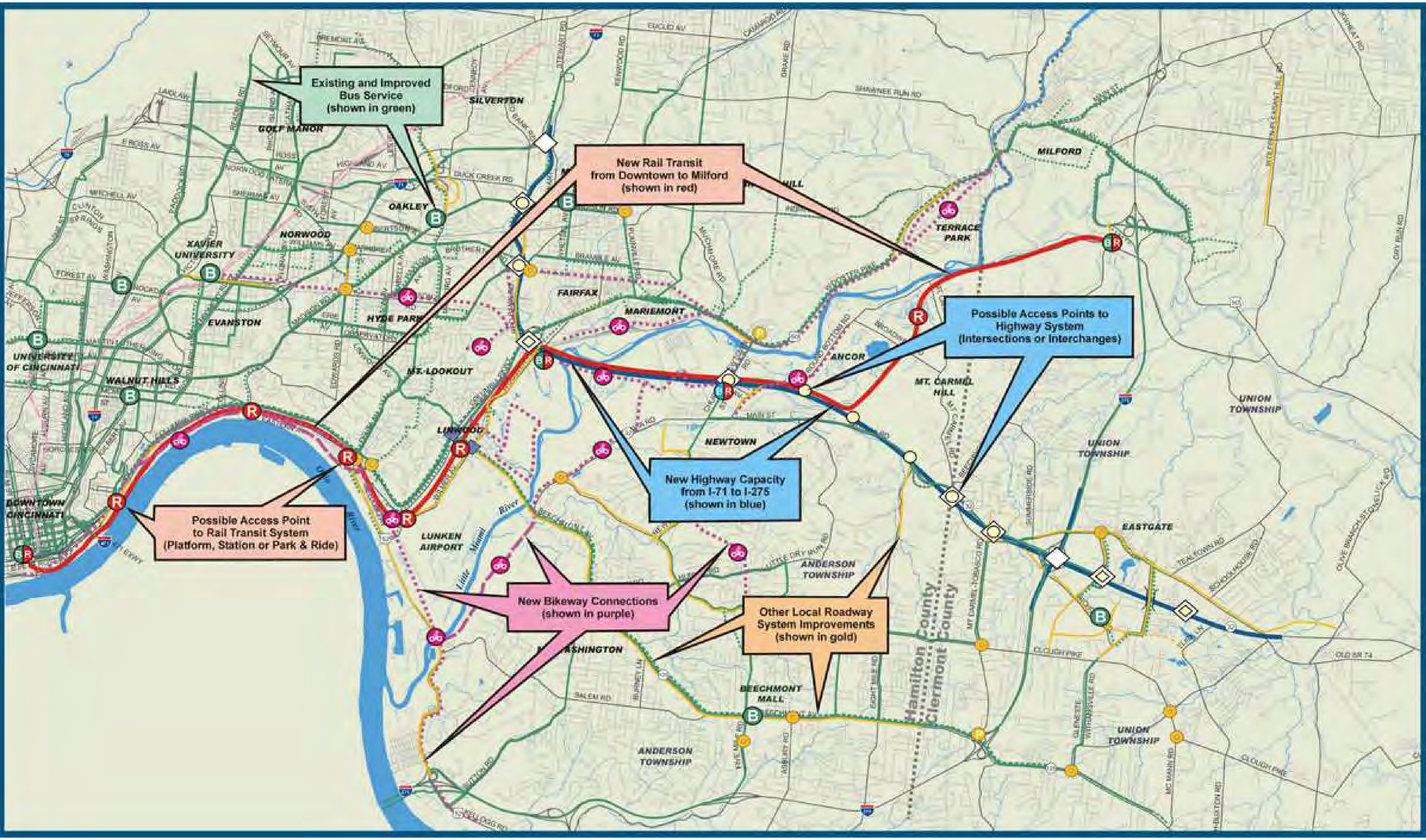
## Project Study Area Map



# CLE-SR 32-2.25: Segment IVa

## Census Tract Map




Existing and Improved Bus Service (shown in green)
New Rail Transit from Downtown to Milford (shown in red)
Possible Access Points to Highway System (Intersections or Interchanges)
New Highway Capacity from I-71 to I-275 (shown in blue)
Possible Access Point to Rail Transit System (Platform, Station or Park & Ride)
New Bikeway Connections (shown in purple)
Other Local Roadway System Improvements (shown in gold)
SILVERTON
GOLF MANOR
OAKLEY
NORWOOD
XAVIER UNIVERSITY
EVANSTON
HYDE PARK
UNIVERSITY OF CINCINNATI
WALNUT HILLS
MT. LOOKOUT
FAIRFAX
MARIEMONT
LINWOOD
DOWNTOWN CINCINNATI
LUNKEN AIRPORT
NEWTOWN
ANCOR
MT. CARMEL HILL
MILFORD
TERRACE PARK
UNION TOWNSHIP
EASTGATE
ANDERSON TOWNSHIP
BEECHMONT MALL
MT. WASHINGTON
Hamilton County
Clermont County
Little Miami River
EUCLID AV
SHAWNEE RUN RD
DUCK CREEK RD
CLOUGH PIKE
OLD SR 74
SALEM RD
KELLOGG RD
BEECHMONT AV

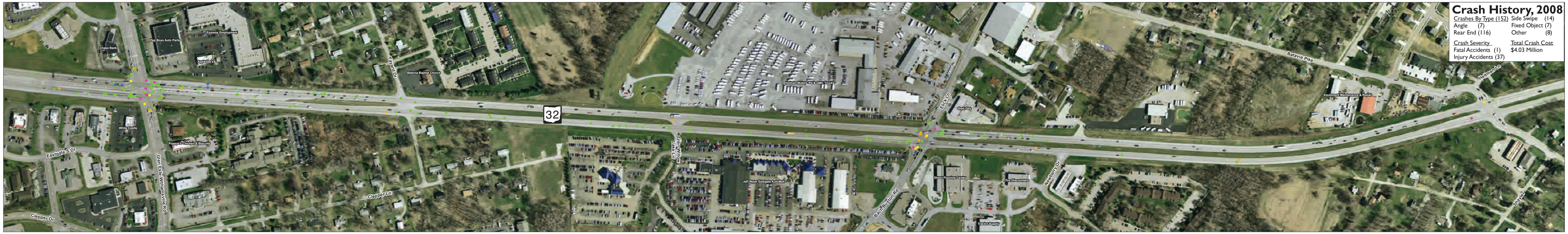
# Crash History, 2007-2009

## Crash History, 2007

Crashes By Type (174)
Angle (9)
Rear End (136)
Side Swipe (12)
Fixed Object (7)
Other (10)

Crash Severity
Fatal Accidents (0)
Injury Accidents (48)

Total Crash Cost
$4.95 Million

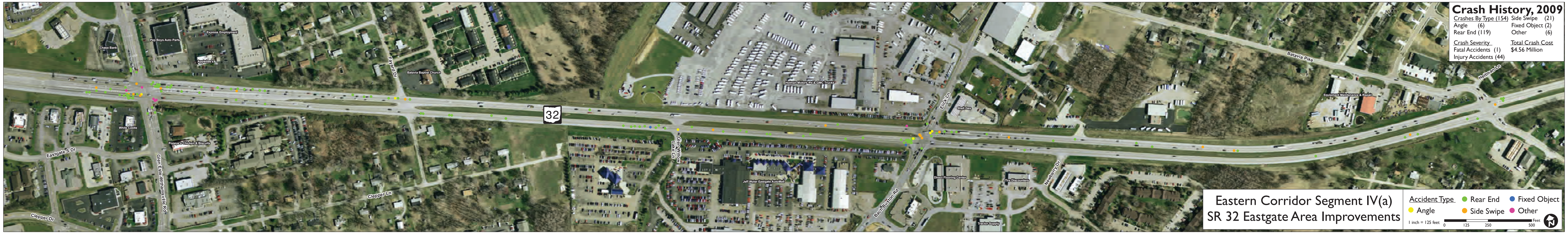


## Crash History, 2008

Crashes By Type (152)
Angle (7)
Rear End (116)
Side Swipe (14)
Fixed Object (7)
Other (8)

Crash Severity
Fatal Accidents (1)
Injury Accidents (37)

Total Crash Cost
$4.03 Million



## Crash History, 2009

Crashes By Type (154)
Angle (6)
Rear End (119)
Side Swipe (21)
Fixed Object (2)
Other (6)

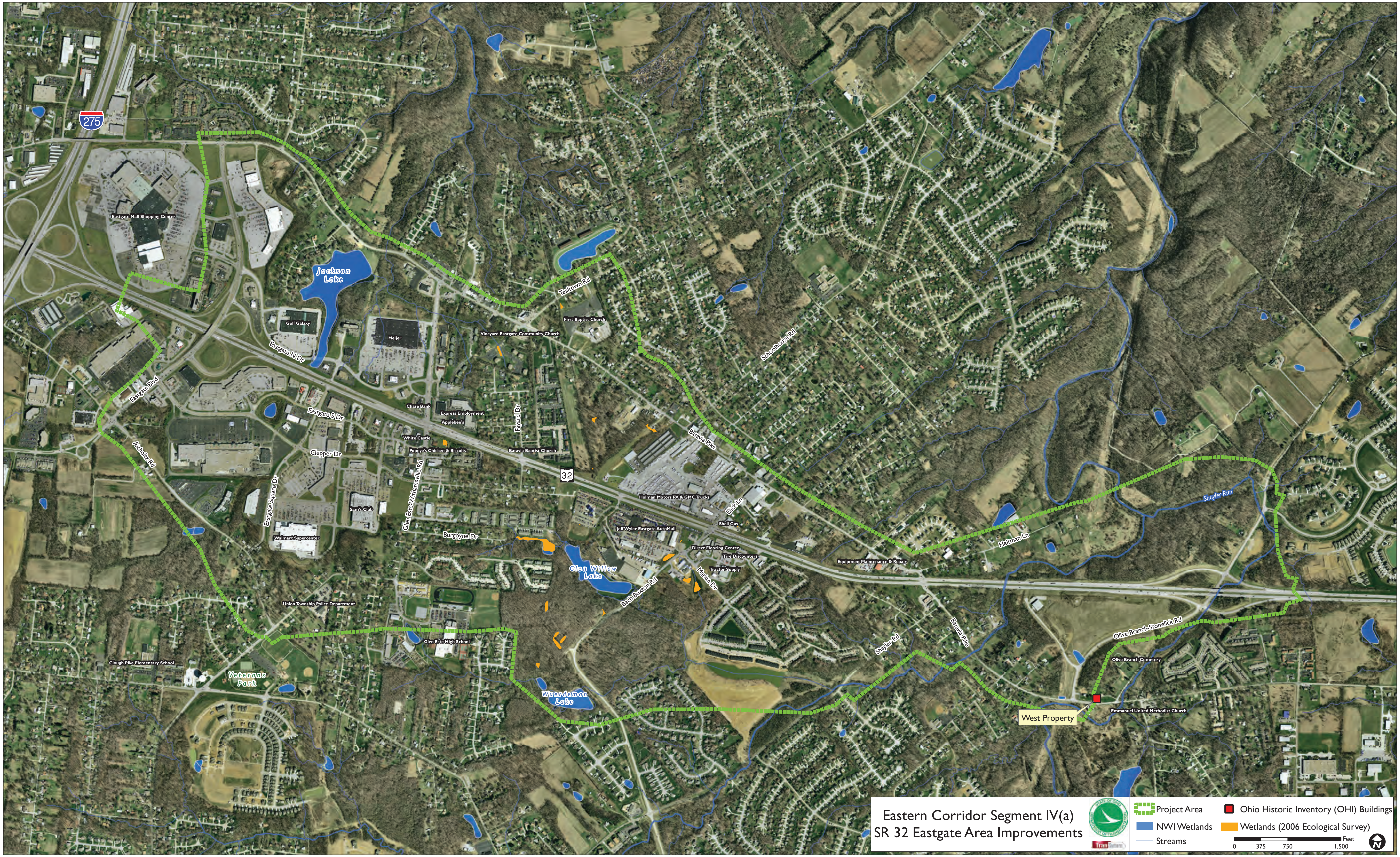
Crash Severity
Fatal Accidents (1)
Injury Accidents (44)

Total Crash Cost
$4.56 Million

Eastern Corridor Segment IV(a)
SR 32 Eastgate Area Improvements

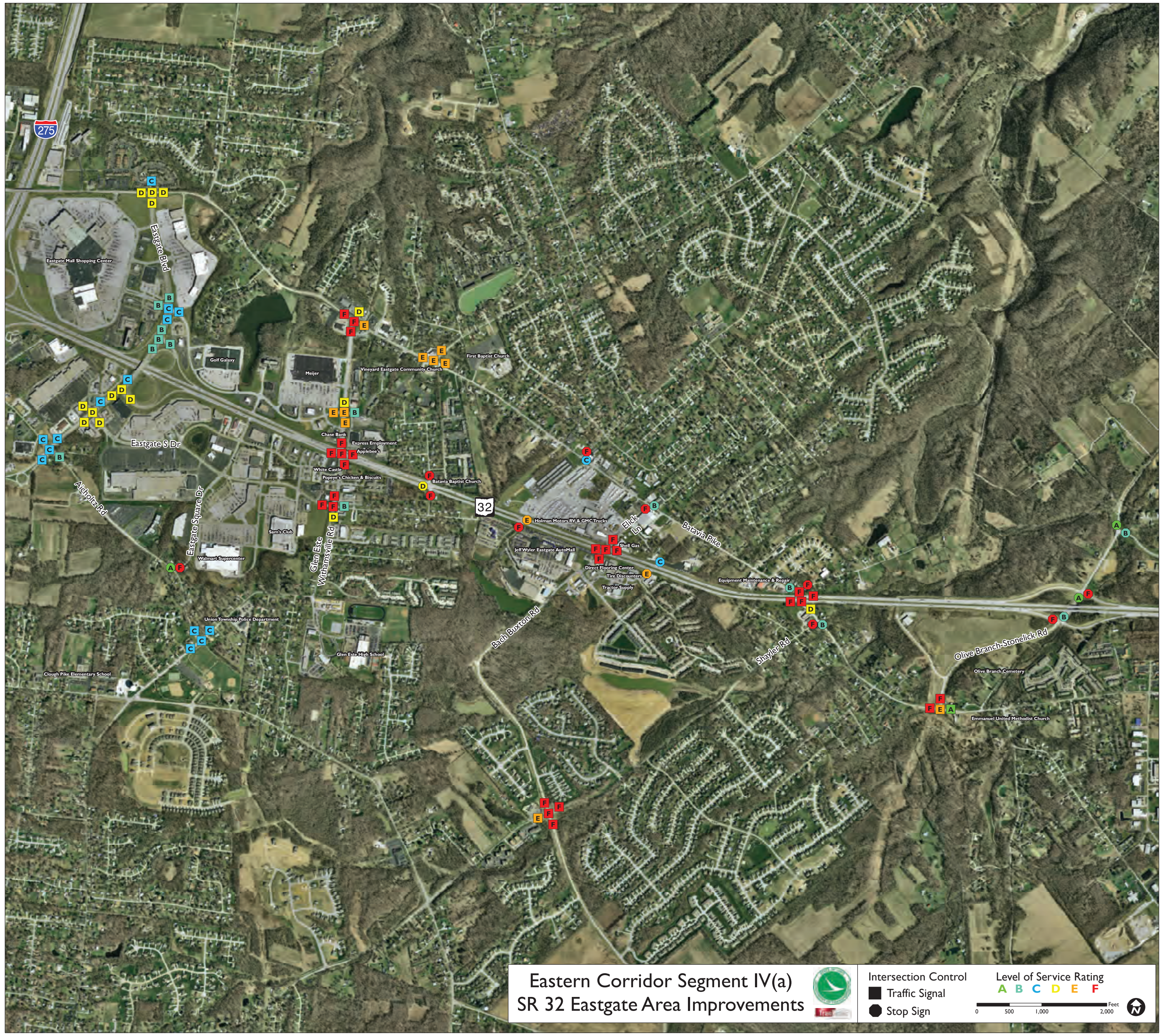
Accident Type
● Angle
● Rear End
● Side Swipe
● Fixed Object
● Other

# Environmental Features



# Intersection Levels of Service - PM Peak 2010

# Intersection Levels of Service - PM Peak 2030



# Levels of Service

Level of Service (LOS) is a tool that measures the quality of operations for different roadway types, features, and controls. The Level of Service is computed from variables including speed, geometry and traffic volume.

There are six level of service grades that represent all of the possible operating conditions; these levels range from LOS A, representing optimum operation, to LOS F, representing congested or unstable flow. Typically, in urbanized areas, a roadway component is seen as adequate if the corresponding level of service is D or better, while LOS results E and F indicate near failure and failure, respectively.

| LOS | | Definition |
|---|---|---|
| **Acceptable** | **A** | Represents a free-flow operation. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. |
| | **B** | Represents reasonably free-flow operation. The ability to maneuver within the traffic stream is slightly restricted. |
| | **C** | Represents a traffic flow with speeds near or at free-flow speed. Ability to maneuver within the traffic stream is noticeably restricted. |
| | **D** | Represents speeds that begin to decline with increased density. Ability to maneuver within the traffic stream is noticeably limited. |
| **Unacceptable** | **E** | Represents operation at its capacity. Vehicles are closely spaced within the traffic stream and there are virtually no useable gaps to maneuver. |
| | **F** | Represents a breakdown of vehicle flow. This condition exists within queues forming behind the breakdown points. |

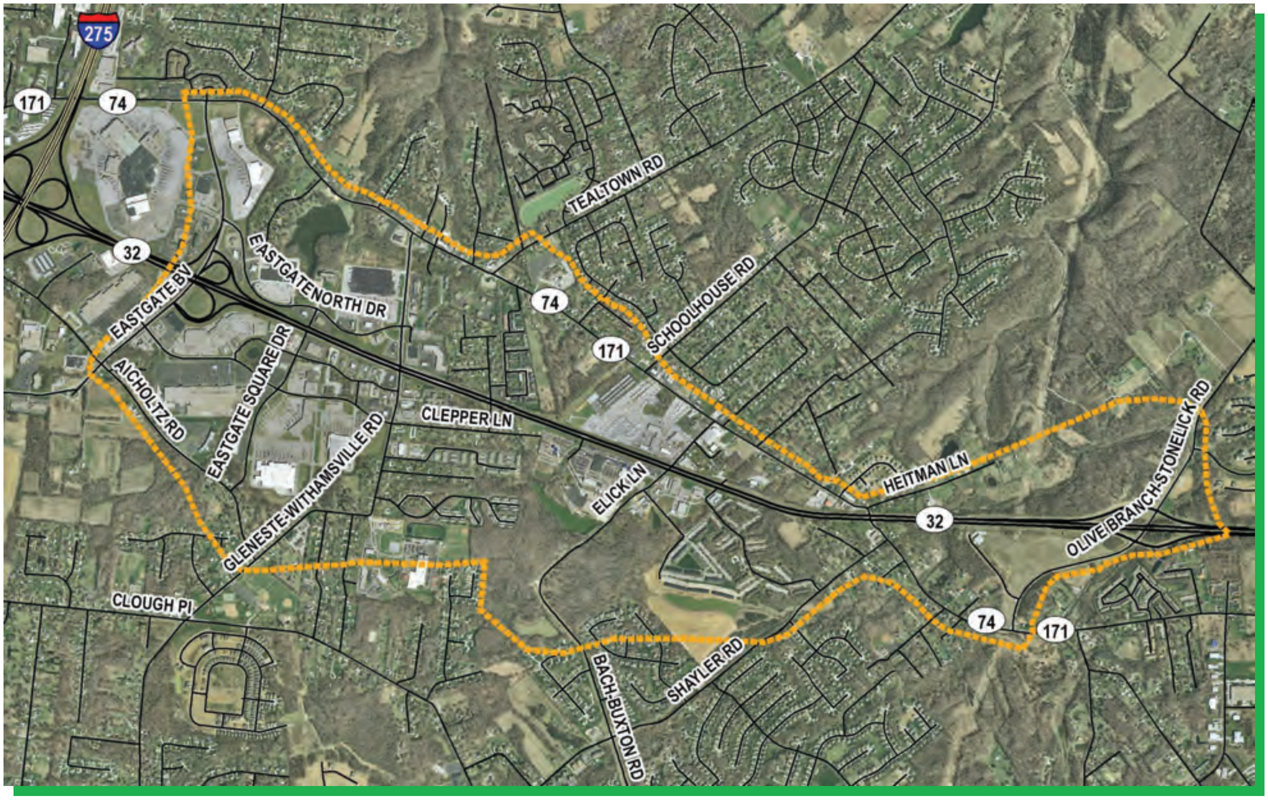
# Purpose of the Meeting

The purpose of this open house is to introduce you to the SR 32 Eastgate Area Improvements study and seek your feedback on the issues that should be considered before we develop alternatives. The area under study is along State Route 32 from Eastgate Boulevard to Olive Branch-Stonelick Road.

The goals of the study are to reduce congestion and improve safety, consistent with local transportation and economic goals. The project will coordinate with regional plans regarding rail, public transit, community development, and environmental restoration.

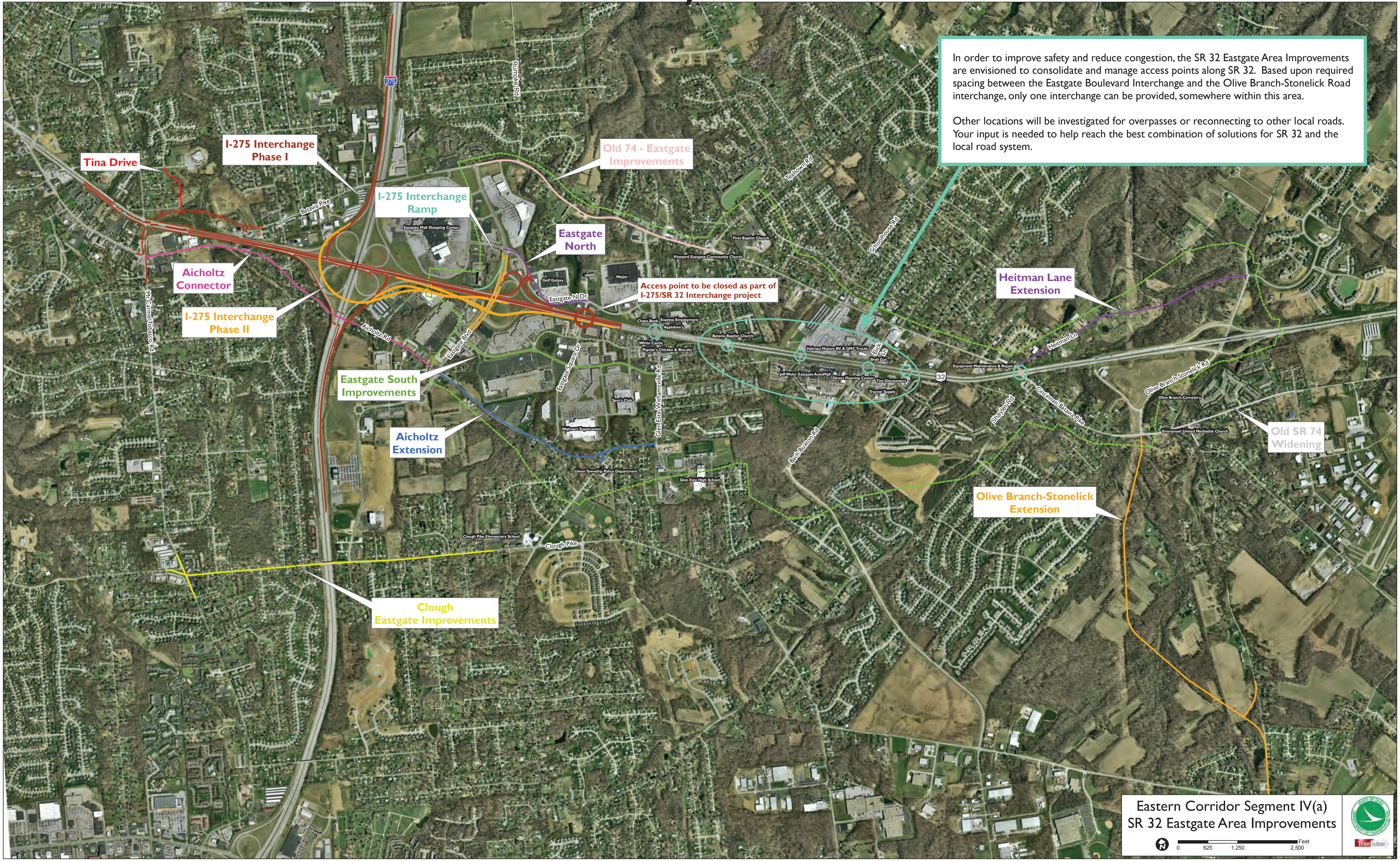
This meeting is your opportunity to learn more about the project and provide the study team with your input, which will be used to help guide the alternatives being developed.

**Study Area for the SR 32 Eastgate Area Improvements**



# Please Sign In!

# Study Area

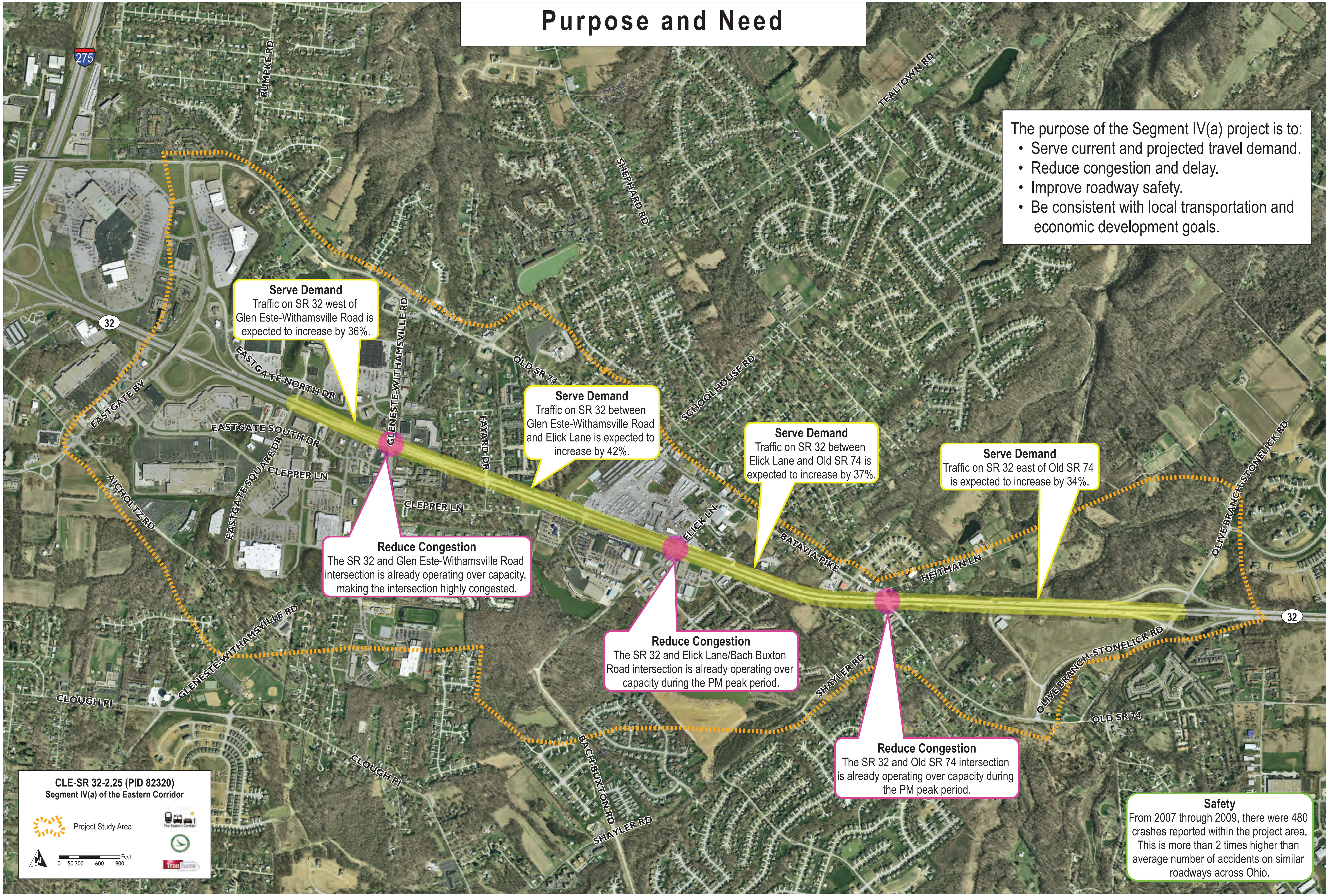


In order to improve safety and reduce congestion, the SR 32 Eastgate Area Improvements are envisioned to consolidate and manage access points along SR 32. Based upon required spacing between the Eastgate Boulevard Interchange and the Olive Branch-Stonelick Road interchange, only one interchange can be provided, somewhere within this area.

Other locations will be investigated for overpasses or reconnecting to other local roads. Your input is needed to help reach the best combination of solutions for SR 32 and the local road system.

Eastern Corridor Segment IV(a)
SR 32 Eastgate Area Improvements

# Purpose and Need



The purpose of the Segment IV(a) project is to:

- Serve current and projected travel demand.
- Reduce congestion and delay.
- Improve roadway safety.
- Be consistent with local transportation and economic development goals.

**Serve Demand**
Traffic on SR 32 west of Glen Este-Withamsville Road is expected to increase by 36%.

**Serve Demand**
Traffic on SR 32 between Glen Este-Withamsville Road and Elick Lane is expected to increase by 42%.

**Serve Demand**
Traffic on SR 32 between Elick Lane and Old SR 74 is expected to increase by 37%.

**Serve Demand**
Traffic on SR 32 east of Old SR 74 is expected to increase by 34%.

**Reduce Congestion**
The SR 32 and Glen Este-Withamsville Road intersection is already operating over capacity, making the intersection highly congested.

**Reduce Congestion**
The SR 32 and Elick Lane/Bach Buxton Road intersection is already operating over capacity during the PM peak period.

**Reduce Congestion**
The SR 32 and Old SR 74 intersection is already operating over capacity during the PM peak period.

**Safety**
From 2007 through 2009, there were 480 crashes reported within the project area. This is more than 2 times higher than average number of accidents on similar roadways across Ohio.

**CLE-SR 32-2.25 (PID 82320)**
**Segment IV(a) of the Eastern Corridor**

# Alternative 1

(Not Recommended for Further Study)

CLE-SR 32-2.25 (PID 82320)
Segment IV(a) of the Eastern Corridor
Alternative 1

# Alternative 2

CLE-SR 32-2.25 (PID 82320)
Segment IV(a) of the Eastern Corridor
Alternative 2

# Alternative 3

CLE-SR 32-2.25 (PID 82320)
Segment IV(a) of the Eastern Corridor
Alternative 3

# Alternative 4

# Glen Este-Withamsville Ramp Options

OPTIONAL RAMPS FOR ALTERNATIVES 3 OR 4.

GLEN ESTE-WITHAMSVILLE OVERPASS

CLE-SR 32-2.25 (PID 82320)
Segment IV(a) of the Eastern Corridor
Glen Este-Withamsville Options

The Eastern Corridor

TranSystems

# APPENDIX B: PUBLIC INVOLVEMENT (ON CD)

- Open House 1 – October 6, 2010
    - Meeting Handout
    - Questionnaire
    - Sign-in Sheets
    - Comments Received
    - Resident's Requests & Responses
- Open House 2 – September 28, 2011
    - Meeting Handout
    - Comment Sheet
    - Sign-in Sheets
    - Comments Received
    - Resident's Requests & Responses

# SR 32 Eastgate Area Improvements
## Eastgate Boulevard to Olive Branch-Stonelick Road
## Eastern Corridor, Segment IV(a) – CLE-32-2.25, PID 82370

## Public Open House October 6, 2010

### Purpose of the Meeting

The purpose of this open house is to introduce you to the State Route 32 Eastgate Area Improvements Study and seek your feedback on the issues that should be considered before we develop alternatives.

### Project Purpose and Goals

The goals of the SR 32 Eastgate Area Improvements are to reduce congestion and improve safety, consistent with local transportation and economic goals. The project will coordinate with regional plans regarding rail, public transit, community development and environmental restoration.

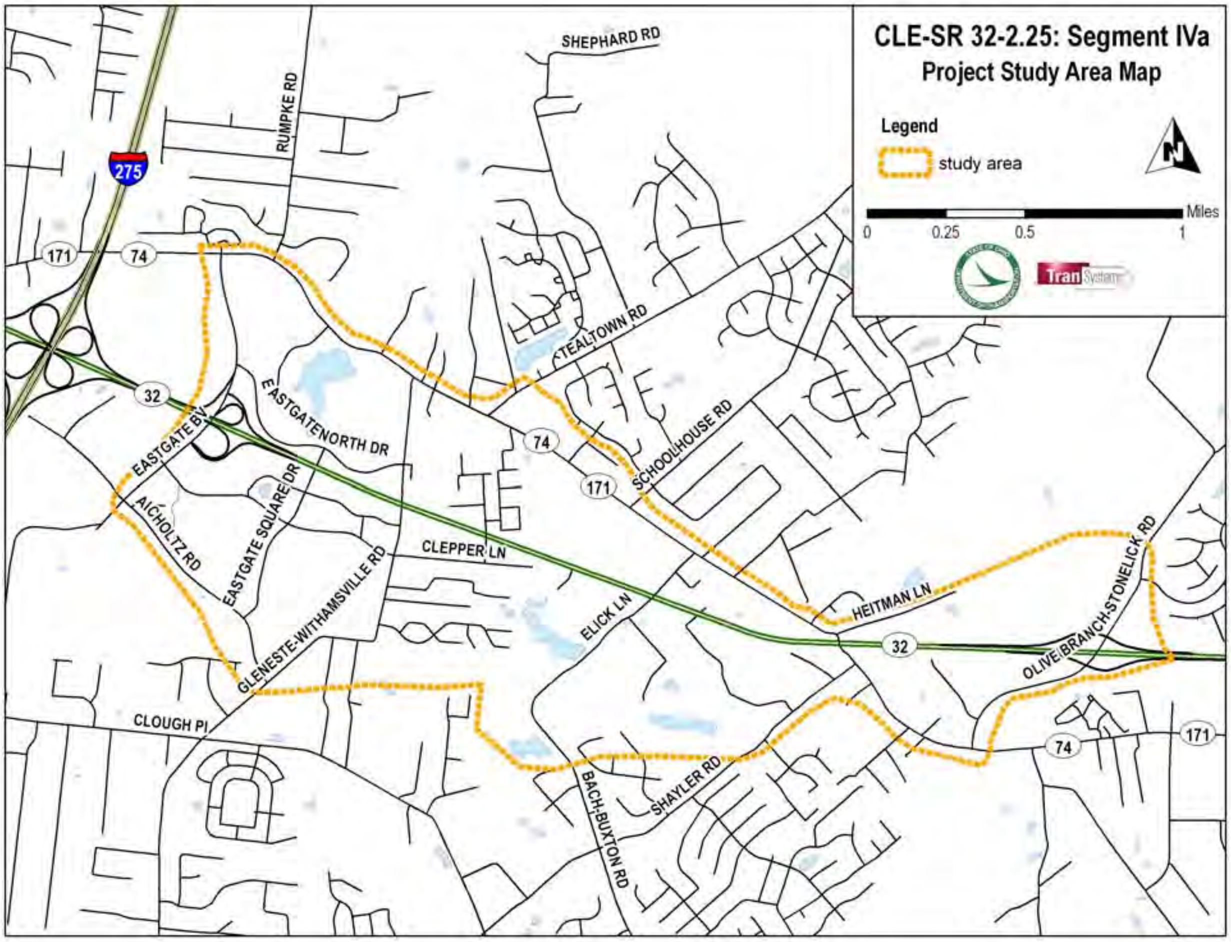
**DID YOU KNOW?**

Within the SR 32 corridor from Eastgate Boulevard to Olive Branch-Stonelick Road, 480 accidents were logged from 2007 through 2009. These crashes included two with fatalities and 129 with reported injuries.

The high frequency of traffic accidents coupled with high traffic volumes further intensifies the problem of congestion.

### Study Area

The current study is focused on SR 32 from the Eastgate Boulevard interchange to the Olive Branch-Stonelick Road interchange. Improvements to local roads or the construction of new local connectors may be included as part of the project. Therefore, the study area also includes areas north and south of SR 32 as shown.



## Background

In November 2004, the Ohio Department of Transportation (ODOT) published *Access Ohio 2004-2030, Statewide Transportation Plan*. The statewide plan recognized SR 32 as an important trade and travel corridor. In 2006, ODOT completed the Eastern Corridor Study, in cooperation with Clermont County, Hamilton County, and the City of Cincinnati. The Eastern Corridor Study was a comprehensive look at the transportation needs between Cincinnati and western Clermont County.

As part of a multi-modal transportation strategy, this study included a recommendation to consolidate and manage access points to establish SR 32 as a limited access arterial roadway, including elimination of access at SR 32/Glen Este-Withamsville Road, with planned local road improvements implemented separately in support of this improvement. The current SR 32 Eastgate Area Improvement Study seeks to build upon the previous study by evaluating solutions for this area in detail.

### Did You Know?

Previous studies for the Eastern Corridor are available at **www.easterncorridor.org**.

Materials from this open house are available on ODOT's website. A link is provided at **www.tid.clermontcountyohio.gov**.

### Project Schedule

**Summer 2006**

Federal Highway Administration issues a Record of Decision for the Tier 1 Eastern Corridor Environmental Impact Statement, which includes recommendations for SR 32 Corridor in the Eastgate area

**Spring 2009**

Funding Identified and Programmed thru TRAC

**Spring 2010**

ODOT Assembles Consultant Team and Implementation Committee

**Fall/Winter 2010/2011**

Technical Studies Conducted and Alternatives Developed

**Summer 2011 – Fall 2012**

Preliminary Design and Environmental Approvals

## Next Steps

The project team will collect public comments and begin development of alternatives, including evaluation of effects on travel patterns and traffic volumes. In early 2011, a second open house will be held to get your input on the alternatives.

## Your Opinions are Needed

This is an opportunity to provide input before alternatives are developed. Written comments may be submitted at the meeting, e-mailed, faxed or mailed to the study team. Please submit your comments by October 22, 2010 to:

**SR 32 Study Team**
**TranSystems**
**4555 Lake Forest Drive, Suite 540**
**Blue Ash, OH 45242**

**Phone:** **513-621-1981, ask for extension 32103**

**Fax:** **513-621-2901**

**E-mail:** ssdaniels@transystems.com

**Materials are available on the ODOT website, via a link at: www.tid.clermontcountyohio.gov**

## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name ______________________________________________

Address ____________________________________________

E-mail _____________________________________________

Organization (if any) ________________________________

1. What forms of transportation do you use in the study area? Choose all that apply.

   o Walk
   o Bicycle
   o Bus
   o Automobile
   o Carpool
   o Other______________________________

2. What are your destinations within the study area? Choose all that apply.

   o Home
   o Work
   o School
   o Shopping
   o Restaurants
   o Medical appointments
   o Other ______________________________

3. How satisfied are you with the time it takes to travel through the study area?

   o Very satisfied
   o Somewhat satisfied
   o Neither satisfied or unsatisfied
   o Somewhat unsatisfied
   o Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?

   o Eastgate Boulevard Interchange
   o Eastgate Square Drive
   o Glen Este-Withamsville Road
   o Elick Lane
   o Old SR 74 (Speedway)
   o Olive Branch-Stonelick Road Interchange
   o Other ____________________
   o None – I travel through this area on SR 32
   o None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?

   o Eastgate Boulevard Interchange
   o Eastgate Square Drive
   o Glen Este-Withamsville Road
   o Elick Lane
   o Old SR 74 (Speedway)
   o Olive Branch-Stonelick Road Interchange
   o Other ____________________
   o None – I travel through this area on SR 32
   o None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?

   o Very concerned
   o Somewhat concerned
   o Neither concerned nor unconcerned
   o Somewhat unconcerned
   o Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.

   ☐ Safety
   ☐ Traffic flow and travel time
   ☐ Environmental impacts
   ☐ Impacts on property and businesses
   ☐ Opportunities for new development
   ☐ Other travel modes (bus, bike, etc.)
   ☐ Impacts on local roads
   ☐ Aesthetics or appearance
   ☐ Construction impacts (noise, traffic, etc.)
   ☐ Cost
   ☐ Other __________________________

8. What do you think are the most important transportation problems within this study area?

9. What ideas should we consider when developing alternatives?

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

---

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

# SR 32 Eastgate Area Improvements

Public Open House
October 6, 2010

TranSystems

| Name | Address | Email/Phone | Organization (if any) | How did you hear of this meeting? |
|---|---|---|---|---|
| RICH WHELEN | 1027 CLEPPER LN | 513 347 3470<br>RICH@RICHWHELEN.COM | | POSTCARD |
| Charles Rubkey | 4483 Forest Trail | 688-1716 | | |
| PAT MANGER | 2381 Clermont Ctr. Drive | 732-8068 | County Engr | |
| John Rhoney | 853 EASTGATE N. Dr. | 947-8882 | LONGHORN | POSTCARD |
| Kathy Baker | White Castle Eastgate DR. | 513-615-3035 | White Castle | Newspaper |
| JOELLAN MACK | 5377 St. Rt. 132 BATAVIA | 513-753-6944 | | POSTCARD |
| GARY MACK | 5377 St. Rt. 132 BATAVIA | 513-753-6944 | | POSTCARD |
| ALLAN DANIEL | 1001 JOYCE DR. BATAVIA 45103 | | | POSTCARD |
| Jean Gauthier | 1289 old St 74 | 752-0519 | | " |
| Mike & Helen Hager | 4317 Glen Este-Withamsville | 753-5789 | | " |
| Kelly & Jeff Bond | 4344 Glenoak Withamsville | 753-8424 | | |
| Richard Arnold MSP | 3700 PARK 42 DR Suite 190 B CINTI | 759-3247 | McGill Smith Punshon | email |
| Rita & Roger Walden | 4433 Fayard Dr. Batavia OH 45103 | 752-3388 | | POSTCARD |
| RODNEY SAYLOR | 4589 GREENSBURY CT. BATAVIA OH 45103 | | | POST CARD |
| [illegible] Wright | 4350 Aicholtz | 947-7323 | UT | |
| Richard J. Mart | 4880 Rumpke Rd | | | |
| Deb Osborne | 1848 Summit Rd. | dosborne@entran.us | ENTRAN | |
| Ron [illegible] | 8427 SCHWALLIE ROAD | 937-446-2160 | | |
| Steven Shadix | 1848 Summit Rd | sshadix@entran.us | ENTRAN | |
| JAMES Cole | 9760 Winnebago Trail | JMC931@Gmail.Com | Self | Post Card |

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## SR 32 Eastgate Area Improvements

Public Open House
October 6, 2010

TranSystems

| Name | Address | Email/Phone | Organization (if any) | How did you hear of this meeting? |
|---|---|---|---|---|
| Mary Stone | 4206 N. Gensen Loop | mstone@ sibcycline.com | Sibcy Cline | E-mail |
| Karen Meyer | | Kmeyer@sibcycline com | Sibcy Cline Eastgate | " |
| Roy + Irene Gaddis | 1390 Old St. Rt. 74 | 732-1099 | | mail |
| KEN GIES | 4350 Aicholtz | 513-752-1741 | Union Twp | |
| Wm Woodward | 424 Wards Corner Rd | Bill@CincinnatiCM.com | | |
| Scot Lahrmer | 101 E. Main St | SLAHRMER@co.clermont.oh.us | BCC | email |
| LYdia WARD | 996 PAUL ST. BATAVIA OH 45103 | barneysmom@fuse.net | | mail |
| RON ROEWER | 768 MELCREST DR | | | mail |
| Wilanna Roewer | 768 Melcrest Dr | | | mail |
| HOWARD SPURLOCK | 1303 OSR 74 | (513) 732-0394 | | MAIL |
| | 101 E Main St Batavia | 513-732-7300 | CCTID | |
| Larry & Jan | 1307 AUTUMNVIEW DR | 513-732-1436 | MT CARMEL BAPTIST | MAIL |
| JEFF BAUMGARTH | 1077 S.R.28 ste 202 Milford | 513-248-8350 | Myers Y. Cooper | Mail |
| STEVE BORGMAN | 6336 DUSTYWIND LN, LOVELAND | STEVE.BORGMAN@HDRINC.COM | HDR | / |
| Lou Gaddis | 4393 Aicholtz Rd | | | |
| Ray Ayer | 640 Sonny | Ayer_r@westcler.org | | MAIL |
| ANITA NEFF | 1234 OLD STATE ROUTE 74 | 513/616-4250<br>anita@nefflandscape.com | | mail |
| Carol Stricker DVM | 1404 Old 74 | | Clermont Animal Hosp. | Client |
| Willa Sue Puckett | 11 Grove Dr | | | |
| James & Barbara Kattine | 4465 Aicholtz Rd | Barb.Kattine@Kroger.com | | A friend |

(10)

# SR 32 Eastgate Area Improvements

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| Name | Address | Email/Phone | Organization (if any) | How did you hear of this meeting? |
|---|---|---|---|---|
| JILL ACKLEY | 1326 OLD 74 | 732-1100 | | POST CARD |
| James Hargis | 4396 Aicholtz Rd. | | | |
| Fran Breedlove | 4404 Fayard Dr. | 753-3555 | | Post Card |
| Charles H Hirschauer | 1290 Heitman Lane | 752-3840 | | |
| Randy Cooper | 1077 SR28 Suite 202 45150 | 248-8350 | | |
| Curt + April Frasure | 1244 Traction Ln Batavia, OH | 753-3411 | | Post Card |
| JoAnn Montgomery | 993 Joyce DR Batavia O. | 752-9054 | | PostCARD |
| PETER EDDINGTON | 4311 GLEN ESTE WITHAMSVILLE | peter_eddington@ucg.org | | POSTCARD |
| Robert Cooper | 1035 Clepper LN Batavia OH 45103 | 513-617-0860 | | Post card |
| Steve Wharton | 175 E. MAIN - BATAVIA OH | ed3c@fuse.net | CCTID | |
| Duane Ferguson | 901 TREVINO CT | FERGDEV@YAHOO.COM | | NEWSPAPER |
| SAMANTHA HARVEY | 901 TREVINO Ct | | | Duane Ferguson |
| Brian Lawson | 1124 OLD ST. RT. 74 | | | MAIL |
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# SR 32 Eastgate Area Improvements

Public Open House
October 6, 2010

| Name | Address | Email/Phone | Organization (if any) | How did you hear of this meeting? |
|---|---|---|---|---|
| Alta Murphy | 4404 Aicholtz Rd | 752-5360 | – | Post Card |
| Richard Hiebert | 1020 Clepper | Marketprep107@AOL.com | | Mail – |
| JAMES L COX | 4340 AICHOLTZ Rd | 752 3817 | | MAIL |
| Edward Willenbrink | 1038 Clepper Lane | ewillenbrink1@cinci.rr.com | | |
| Jane Dickerson | 892 CinT. BATO | 752-1557 | | mail |
| Leonard R Dickerson | 892 Cinti. Bat. Pk. | ″ | | ″ |
| mary Swafford | 463 Breezy Ln | 528.1443 | | ˌˌ |
| Ruby Yoh | 480 BLOSSOM La. | | | |
| Beth Henry | 4689 Dearth Rd, Franklin OH 45005 | bhshop@woh.rr.com | | Mail |
| Dave Young | 3900 Fulton Grove Rd. | | | walk-in |
| Mary Hassel | 1404 Glencastle Williamsville | | Cin Neurological & Spine | mail |
| Amanda Schott | 1039 Clepper Ln | aschott@zoomtown.com | N/A | mail |
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## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name Kelly + Jeff Bond

Address 4344 Gleneste-Withamsville Rd, Cinti, OH 45245

E-mail

Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ● Walk
   - ● Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other
2. What are your destinations within the study area? Choose all that apply.
   - ● Home
   - ● Work
   - ● School
   - ● Shopping
   - ● Restaurants
   - ● Medical appointments
   - ○ Other
3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ● Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ○ Completely unsatisfied
4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ● Eastgate Square Drive
   - ● Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ● None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
6. How concerned are you about roadway safety within the study area?
   - ○ Very concerned
   - ● Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned
7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - 2 Safety
   - 3 Traffic flow and travel time
   - 4 Environmental impacts
   - 1 Impacts on property and businesses
   - 5 Opportunities for new development
   - 6 Other travel modes (bus, bike, etc.)
   - 7 Impacts on local roads
   - 8 Aesthetics or appearance
   - 9 Construction impacts (noise, traffic, etc.)
   - 10 Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

TRaffic lights do not Correspond with traffic volume. An access road with no lights could run down 32 and not involve 32 businesses. The driver could bypass All other aspects of 32.

9. What ideas should we consider when developing alternatives?

The impact it is going to have on homeowners. We do not want to have a highway next to our house.

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

letter

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

Newspaper

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

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The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name JAmes R Cole

Address 9760 Winnebago Trail Cincinnati, OH 45241

E-mail JMC931@Gmail.Com

Organization (if any) Self.

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ☒ Automobile
   - ○ Carpool
   - ○ Other________________

2. What are your destinations within the study area? Choose all that apply.
   - ☒ Home
   - ○ Work
   - ○ School
   - ○ Shopping
   - ☒ Restaurants
   - ☒ Medical appointments
   - ○ Other ________________

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ☒ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ☒ Eastgate Boulevard Interchange
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   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ☒ Old SR 74 (Speedway)
   - ☒ Olive Branch-Stonelick Road Interchange
   - ○ Other ________________
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ☒ Old SR 74 (Speedway)
   - ☒ Olive Branch-Stonelick Road Interchange
   - ○ Other ________________
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ☒ Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - ☒ Safety
   - ☒ Traffic flow and travel time
   - ☐ Environmental impacts
   - ☐ Impacts on property and businesses
   - ☒ Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - ☐ Impacts on local roads
   - ☐ Aesthetics or appearance
   - ☐ Construction impacts (noise, traffic, etc.)
   - ☐ Cost
   - ☐ Other ________________

8. What do you think are the most important transportation problems within this study area?

Light @ old 74 and Rt 32 at Speedway

9. What ideas should we consider when developing alternatives?

Close the old 74 crossing of 32 make Right in and right out only. The Best would be to eliminate

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

Letter or e-mail.

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

None that I know. Most would prefer to complain after the fact.

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

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Name JAMES L. COX

Address 4340 AICHOLTZ Rd CNTI 45245

E-mail

Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.

○ Walk
○ Bicycle
○ Bus
○ Automobile
○ Carpool
○ Other

2. What are your destinations within the study area? Choose all that apply.

● Home
○ Work
○ School
● Shopping
● Restaurants
○ Medical appointments
○ Other

3. How satisfied are you with the time it takes to travel through the study area?

○ Very satisfied
○ Somewhat satisfied
○ Neither satisfied or unsatisfied
● Somewhat unsatisfied
○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?

● Eastgate Boulevard Interchange
○ Eastgate Square Drive
● Glen Este-Withamsville Road
○ Elick Lane
○ Old SR 74 (Speedway)
○ Olive Branch-Stonelick Road Interchange
○ Other
○ None – I travel through this area on SR 32
○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?

● Eastgate Boulevard Interchange
○ Eastgate Square Drive
● Glen Este-Withamsville Road
○ Elick Lane
○ Old SR 74 (Speedway)
○ Olive Branch-Stonelick Road Interchange
○ Other
○ None – I travel through this area on SR 32
○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?

○ Very concerned
● Somewhat concerned
○ Neither concerned nor unconcerned
○ Somewhat unconcerned
○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.

☐ Safety
1 Traffic flow and travel time
☐ Environmental impacts
3 Impacts on property and businesses
☐ Opportunities for new development
4 Other travel modes (bus, bike, etc.)
2 Impacts on local roads
☐ Aesthetics or appearance
☐ Construction impacts (noise, traffic, etc.)
☐ Cost
☐ Other

8. What do you think are the most important transportation problems within this study area?

too many cars - not enough roads

9. What ideas should we consider when developing alternatives?

DEVELOPE OLD 74, AICHOLTZ RD - CLOUGH PIKE TO HANDLE THE TRAFFIC
BEFORE CONSTRUCTION OF 32

10. How would you prefer to get updates on this project? ([✓ Letter], e-mail, website, [✓ newspaper, etc.])

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

| | |
|---|---|
| **Please return completed surveys to:** | **Or contact the team:** |
| SR 32 Study Team<br>TranSystems<br>4555 Lake Forest Drive, Suite 540<br>Blue Ash, OH 45242 | Susan Daniels<br>ssdaniels@transystems.com<br>513-621-1981 – extension 32103<br>Fax to: (513) 621-2901 Attn: SR 32 Study Team |

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Name PETER EDDINGTON

Address 4311 GLEN ESTE WITHAMSVILLE

E-mail peter_eddington@ucg.org

Organization (if any) ____

1. What forms of transportation do you use in the study area? Choose all that apply.

○ Walk
○ Bicycle
○ Bus
☒ Automobile
○ Carpool
○ Other ____

2. What are your destinations within the study area? Choose all that apply.

☒ Home
○ Work
☒ School
☒ Shopping
☒ Restaurants
☒ Medical appointments
○ Other ____

3. How satisfied are you with the time it takes to travel through the study area?

○ Very satisfied
○ Somewhat satisfied
○ Neither satisfied or unsatisfied
☒ Somewhat unsatisfied
○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?

☒ Eastgate Boulevard Interchange
☒ Eastgate Square Drive
☒ Glen Este-Withamsville Road
○ Elick Lane
○ Old SR 74 (Speedway)
○ Olive Branch-Stonelick Road Interchange
○ Other ____
○ None – I travel through this area on SR 32
○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?

○ Eastgate Boulevard Interchange
○ Eastgate Square Drive
☒ Glen Este-Withamsville Road
○ Elick Lane
○ Old SR 74 (Speedway)
○ Olive Branch-Stonelick Road Interchange
○ Other ____
○ None – I travel through this area on SR 32
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6. How concerned are you about roadway safety within the study area?

○ Very concerned
☒ Somewhat concerned
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7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.

1 Safety
2 Traffic flow and travel time
☐ Environmental impacts
3 Impacts on property and businesses
☐ Opportunities for new development
☐ Other travel modes (bus, bike, etc.)
4 Impacts on local roads
☐ Aesthetics or appearance
☐ Construction impacts (noise, traffic, etc.)
☐ Cost
☐ Other ____

8. What do you think are the most important transportation problems within this study area?

CONGESTION ON RT. 32 DURING PEAK HOURS

9. What ideas should we consider when developing alternatives?

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

e-mail + web site

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

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Fax to: (513) 621-2901 Attn: SR 32 Study Team

## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name Roy E. Gaddis
Address 1390 Old State Route 74
E-mail Batavia, Oh. 45103
Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other
2. What are your destinations within the study area? Choose all that apply.
   - ● Home
   - ○ Work
   - ○ School
   - ● Shopping
   - ● Restaurants
   - ● Medical appointments
   - ○ Other
3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied used to be
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ○ Completely unsatisfied too many accidents
4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ● Old SR 74 (Speedway)
   - ● Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ● Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
6. How concerned are you about roadway safety within the study area?
   - ● Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned
7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - ☒ Safety
   - ☐ Traffic flow and travel time
   - ☐ Environmental impacts
   - ☐ Impacts on property and businesses
   - ☐ Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - ☐ Impacts on local roads
   - ☐ Aesthetics or appearance
   - ☐ Construction impacts (noise, traffic, etc.)
   - ☐ Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

My concern is Olive Branch Speedway. now that 74 is open to the College the traffic is problems are speeding and traffic backed up to Stoddard at certain times of the day. in addition to huge speeding trucks on highway

9. What ideas should we consider when developing alternatives?

Opening a direct ramp or interchange of Armstrong on to 32 and to keep them off the residential road of 74. To set at each driveway off 74 to check of safety regarding clearance for viewing

10. How would you prefer to get updates on this project? ([✓ Letter], e-mail, website, newspaper, etc.)

Letter is the only way for me.

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

Kyla Hucker
1320 Minx Dr.
Batavia, OH 45103
October 6, 2010

To Whom It May Concern,

This letter is in regard to Old State Route 74 between the new U.C. Clermont entrance and State Route 32 at Speedway. It includes safety concerns and suggestions. My name is Kyla Hucker. I travel the area of road mentioned above almost daily and need to make you aware of the concern I have for the safety and lives of my family, friends, and myself.

The area of Old State Route 74 from just above the Olive Branch United Methodist Church to the new interchange has become dangerous. Traffic travels much too fast regardless of the posted speed limit, and the speeding traffic is now worse due to the new access to U.C. Clermont. Trees in bloom can block the vision of someone trying to enter Old 74 from both Amelia Olive Branch and the old Stonelick Olive Branch roads. Poison ivy and brush grow up beside the creek and guardrail at the bridge and often impede a driver's vision depending on the season and the make of the vehicle someone is driving.

These safety concerns are not mere observations, they are threats to the lives of citizens that live in and use that area of our community. Traffic comes so constantly along Old 74 it is difficult to pull out from Amelia Olive Branch unless a car coming from the left is turning onto Amelia Olive Branch. The same situation occurs when trying to turn left from the old Stonelick Olive Branch. To safely turn left onto Old 74, the light at the interchange must have just changed and a car needs to be turning left from Old 74 onto Amelia Olive Branch. This will often give enough time to safely make a left-hand turn. Sometimes it is even dangerous to make a right hand turn from old Stonelick Olive Branch onto Old 74 due to vehicles coming over the hill that is just up from the church. This past summer my vision was obstructed by poison ivy growing up the electrical pole at the corner of the bridge. The vine had gotten so full it would not allow for clear vision when checking for traffic up the road. I have had horns blown at me, I have been cussed at, and I have been told "You're gonna get killed doing that!" all while waiting to turn left into my parents' driveway.

During the school year, my son gets on and off the bus at his grandparents' house. My parents and I have witnessed drivers going past my son's bus while the bus is stopped, the stop sign is out, and the red lights are flashing. Last year, a driver decided to stop at the last minute which resulted in the car behind him, who was also disregarding school bus law, to hit him. When it was over, three cars were involved in the wreck. I was on my knees thanking God that my son's bus was not hit and that he and his bus driver were not hurt or killed. I beg you to imagine my son's body and the body of his bus driver, if that car had hit the bus or if it had been or ever will be a semi involved in that accident or one like it. After something like that, what would be left for me or my family?

Questions were raised in the past as to why the Stonelick interchange was not located at Armstrong Boulevard near the commercial complex and the Clermont County airport where much of the traffic along Old 74 is either going to or coming from. Using that area would have put the mass traffic near its destination, not forced citizens from their homes, and not put lives in unnecessary danger. If that area is the safer option, is it not better to make the change now? Is it not better to change plans if it is realized a safer option is available rather than unnecessarily lose even one life?

I do not know what you have planned for Old 74 or the citizens that live there and travel its roads. I do know the safety of the citizens should be the top priority. Something needs to be done about the mass traffic speeding along residential houses. Citizens must be able to enter and leave their property safely. The lives of children should not be put in jeopardy merely because they are getting on or off a school bus. Decisions need to be made based on the welfare of the citizens.

Respectfully,
Kyla Hucker
Kyla Hucker
513-732-0905

# SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name LARRY C JONES

Address 1307 AUTUMNVIEW DR. BATAVIA oh 45103

E-mail

Organization (if any) BATAVIA BAPTIST

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ☑ Automobile
   - ○ Carpool
   - ○ Other

2. What are your destinations within the study area? Choose all that apply.
   - ☑ Home
   - ☑ Work
   - ○ School
   - ○ Shopping
   - ☑ Restaurants
   - ☑ Medical appointments
   - ☑ Other church

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ☑ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ☑ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ☑ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ☑ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ☑ Old SR 74 (Speedway)
   - ☑ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ○ Very concerned
   - ☑ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - 2 Safety
   - 1 Traffic flow and travel time
   - ☐ Environmental impacts
   - 3 Impacts on property and businesses
   - ☐ Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - 4 Impacts on local roads
   - ☐ Aesthetics or appearance
   - ☐ Construction impacts (noise, traffic, etc.)
   - ☐ Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

CONGESTION

9. What ideas should we consider when developing alternatives?

OVER PASS AT INTERSECTIONS

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

LETTER

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

# SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name May Nassef

Address

E-mail

Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other

2. What are your destinations within the study area? Choose all that apply.
   - ○ Home
   - ● Work
   - ○ School
   - ○ Shopping
   - ○ Restaurants
   - ○ Medical appointments
   - ○ Other

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ● Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ● Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - 2 ☑ Safety
   - 1 ☑ Traffic flow and travel time
   - 9 ☐ Environmental impacts
   - 3 ☐ Impacts on property and businesses
   - 6 ☐ Opportunities for new development
   - 10 ☐ Other travel modes (bus, bike, etc.)
   - 5 ☐ Impacts on local roads
   - 4 ☐ Aesthetics or appearance
   - 7 ☐ Construction impacts (noise, traffic, etc.)
   - 8 ☐ Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

the disturbance it will create

9. What ideas should we consider when developing alternatives?

How it will effect business

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

newspaper

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

door to door visit

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name Wm Woodward
Address 424 Wards Corner Rd
E-mail bill@cincinnatcm.com
Organization (if any) Eastgate Property Owner

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ☒ Automobile
   - ○ Carpool
   - ○ Other ______

2. What are your destinations within the study area? Choose all that apply.
   - ○ Home
   - ☒ Work
   - ○ School
   - ○ Shopping
   - ☒ Restaurants
   - ○ Medical appointments
   - ○ Other ______

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ☒ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ☒ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other ______
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ☒ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other ______
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ○ Very concerned
   - ☒ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with 1 being most important.
   - 2 Safety
   - ☐ Traffic flow and travel time
   - ☐ Environmental impacts
   - 1 Impacts on property and businesses
   - 3 Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - 4 Impacts on local roads
   - ☐ Aesthetics or appearance
   - ☐ Construction impacts (noise, traffic, etc.)
   - ☐ Cost
   - ☐ Other ______

8. What do you think are the most important transportation problems within this study area?

PROVIDING ACCESS TO EXISTING BUSINESSES

9. What ideas should we consider when developing alternatives?

IF ACCESS POINTS ARE ELIMINATED PLEASE PROVIDE FOR STRONG FRONTAGE ROADS

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

eMAIL

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

I Feel CLOSING THE AT-GRADE INTERSECTION OF GLEN ESTE WITHAMSVILLE WILL BE VERY DETRIMENTAL TO THE ESTABLISHED BUSINESSES CURRENTLY BEING SERVED BY THAT INTERSECTION.

**Please return completed surveys to:**

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TranSystems
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Blue Ash, OH 45242

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Fax to: (513) 621-2901 Attn: SR 32 Study Team

## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name GARY MACK

Address 5377 STATE ROUTE 132 BATAVIA, OHIO 45103

E-mail GARYANDJOELLAN @ NET PENNY . NET

Organization (if any) HOME OWNER

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ☑ Automobile
   - ○ Carpool
   - ○ Other ______
2. What are your destinations within the study area? Choose all that apply.
   - ○ Home
   - ☑ Work
   - ○ School
   - ☑ Shopping
   - ☑ Restaurants
   - ☑ Medical appointments
   - ○ Other ______
3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ☑ Completely unsatisfied
4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ☑ Eastgate Boulevard Interchange
   - ☑ Eastgate Square Drive
   - ☑ Glen Este-Withamsville Road
   - ☑ Elick Lane
   - ☑ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other ______
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ☑ Eastgate Boulevard Interchange
   - ☑ Eastgate Square Drive
   - ☑ Glen Este-Withamsville Road
   - ☑ Elick Lane
   - ☑ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other ______
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
6. How concerned are you about roadway safety within the study area?
   - ☑ Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned
7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - [3] Safety
   - [2] Traffic flow and travel time
   - [4] Environmental impacts
   - [9] Impacts on property and businesses
   - [1] Opportunities for new development
   - [5] Other travel modes (bus, bike, etc.)
   - [10] Impacts on local roads
   - [7] Aesthetics or appearance
   - [8] Construction impacts (noise, traffic, etc.)
   - [6] Cost
   - ☐ Other ______

8. What do you think are the most important transportation problems within this study area?

SR 32 IS AT STANDSTILL DURING MORNING & EVENING RUSH HOUR.

9. What ideas should we consider when developing alternatives?

REMOVE TRAFFIC LIGHTS AT INTERSECTIONS, AND USE OVERPASSES

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

LETTER

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

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The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name JoAnn Montgomery
Address 993 Joyce Drive Batavia O. 45103
E-mail JCMontgomery@webmancraze.com
Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other

2. What are your destinations within the study area? Choose all that apply.
   - ● Home
   - ○ Work
   - ○ School
   - ● Shopping
   - ● Restaurants
   - ○ Medical appointments
   - ○ Other

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ● Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ● Other Fayard
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ● Other Fayard
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ● Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - 1 ■ Safety
   - [2] Traffic flow and travel time
   - ☐ Environmental impacts
   - [3] Impacts on property and businesses
   - ☐ Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - ☐ Impacts on local roads
   - ☐ Aesthetics or appearance
   - [4] Construction impacts (noise, traffic, etc.)
   - ☐ Cost
   - [5] Other Highway Truck Noise For Residents

8. What do you think are the most important transportation problems within this study area?

Safety - Crossing opposite direction traffic entering + leaving 32

Backup during peak hours.
NOISE

9. What ideas should we consider when developing alternatives?

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

Letter - Email

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

The maps were OK. Having someone explaining would be better. With larger groups difficult to get close enough to see details

**Please return completed surveys to:**

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TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

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Name JOE BACHMAN

Address 123 EMMONS PL MT ORAB OH 45154

E-mail JBACHMAN5@gmail.com

Organization (if any) —

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other
2. What are your destinations within the study area? Choose all that apply.
   - ● Home
   - ○ Work
   - ○ School
   - ● Shopping
   - ○ Restaurants
   - ● Medical appointments
   - ● Other KIDS ACTIVITIES
3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ● Somewhat unsatisfied
   - ○ Completely unsatisfied
4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ● Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ● Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
6. How concerned are you about roadway safety within the study area?
   - ● Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned
7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - [2] Safety
   - [1] Traffic flow and travel time
   - [5] Environmental impacts
   - [4] Impacts on property and businesses
   - [6] Opportunities for new development
   - [9] Other travel modes (bus, bike, etc.)
   - [7] Impacts on local roads
   - [10] Aesthetics or appearance
   - [3] Construction impacts (noise, traffic, etc.)
   - [8] Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

over passes would Allevate the traffic problems that stop Lights now cause

9. What ideas should we consider when developing alternatives?

over passes Parrallel ROADS FOR shopping traffic

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

Newspaper email

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

| **Please return completed surveys to:** | **Or contact the team:** |
|---|---|
| SR 32 Study Team<br>TranSystems<br>4555 Lake Forest Drive, Suite 540<br>Blue Ash, OH 45242 | Susan Daniels<br>ssdaniels@transystems.com<br>513-621-1981 – extension 32103<br>Fax to: (513) 621-2901 Attn: SR 32 Study Team |

## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name Beth Hery

Address 4465 Stonelick Olive Branch Rd

E-mail Thehergs @gmail.com

Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other
2. What are your destinations within the study area? Choose all that apply.
   - ○ Home
   - ○ Work
   - ○ School
   - ● Shopping
   - ● Restaurants
   - ○ Medical appointments
   - ● Other
3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ● Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ○ Completely unsatisfied
4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ● Olive Branch-Stonelick Road Interchange
   - ● Other 275
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ● Olive Branch-Stonelick Road Interchange
   - ● Other 275
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
6. How concerned are you about roadway safety within the study area?
   - ○ Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ● Somewhat unconcerned
   - ○ Not at all concerned
7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - 3 Safety
   - 2 Traffic flow and travel time
   - 4 Environmental impacts
   - 5 Impacts on property and businesses
   - 9 Opportunities for new development
   - 8 Other travel modes (bus, bike, etc.)
   - 1 Impacts on local roads
   - 10 Aesthetics or appearance
   - 6 Construction impacts (noise, traffic, etc.)
   - 7 Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

Too many Lights

9. What ideas should we consider when developing alternatives?

I like the idea of collector lanes right next to the main roadway. this eliminates the need to do major work on other Roads. All the constuction is close together. Meets the needs for local and through traffic.

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

email

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

Was concerned that the alternatives looked at in the original study were not even shown again at this meeting.
Too. Seemed to focus on spreading the Construction.

Collectors work well at other cities

**Please return completed surveys to:**

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TranSystems
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Blue Ash, OH 45242

**Or contact the team:**

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513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name CHARLES H HIRSCHAUER
Address 1290 HEITMAN LANE BATAVIA, OHIO 45103
E-mail
Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other

2. What are your destinations within the study area? Choose all that apply.
   - ● Home
   - ● Work
   - ○ School
   - ● Shopping
   - ● Restaurants
   - ○ Medical appointments
   - ○ Other

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ● Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ● Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ● Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ● Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - 1 Safety
   - 2 Traffic flow and travel time
   - ☐ Environmental impacts
   - 4 Impacts on property and businesses
   - ☐ Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - 3 Impacts on local roads
   - ☐ Aesthetics or appearance
   - ☐ Construction impacts (noise, traffic, etc.)
   - ☐ Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

YOU NEED AN OVERPASS AT ROUTE 32 + OLD 74 BY SPEEDWAY + HEITMAN LANE IN WILLOWVILLE. PEOPLE LIVING ON HEITMAN CANNOT TURN LEFT TO GO TO BATAVIA BECAUSE OF THE TRAFFIC BACK UP. WE MUST DRIVE MILES THE WRONG DIRECTION TO TURN TO GO —

9. What ideas should we consider when developing alternatives? → BACK TO BATAVIA. THIS IS UNCALLED FOR.

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

LETTER

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name Richard Huebs Huckel
Address PO BOX 46278 Cinti OH 45244
1080 Clepper
E-mail
Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ☑ Automobile
   - ○ Carpool
   - ○ Other

2. What are your destinations within the study area? Choose all that apply.
   - ○ Home
   - ○ Work
   - ○ School
   - ☑ Shopping
   - ☑ Restaurants
   - ○ Medical appointments
   - ○ Other

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ☑ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ☑ Eastgate Boulevard Interchange
   - ☑ Eastgate Square Drive
   - ☑ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ☑ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ☑ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ○ Very concerned
   - ☑ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - ☑ Safety
   - ☑ Traffic flow and travel time
   - ☐ Environmental impacts
   - ☑ Impacts on property and businesses
   - ☐ Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - ☑ Impacts on local roads
   - ☐ Aesthetics or appearance
   - ☐ Construction impacts (noise, traffic, etc.)
   - ☐ Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

tax payer cost *feasibility* Impact / flow!

9. What ideas should we consider when developing alternatives?

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

Fayard & (Clopper in) need to be part of this redevelopment plan –

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
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Fax to: (513) 621-2901 Attn: SR 32 Study Team

## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name Charles ALight
Address 4666 Rumpke Rd Cincinnati OH 45245
E-mail clight@cinci.rr.com
Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ● Walk
   - ○ Bicycle
   - ● Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other
2. What are your destinations within the study area? Choose all that apply.
   - ○ Home
   - ○ Work
   - ○ School
   - ● Shopping
   - ● Restaurants
   - ○ Medical appointments
   - ○ Other
3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ● Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ○ Completely unsatisfied
4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ● Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange 1
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ● Old SR 74 (Speedway) 2
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32
6. How concerned are you about roadway safety within the study area?
   - ○ Very concerned
   - ● Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned
7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - 1 Safety
   - 2 Traffic flow and travel time
   - 3 Environmental impacts
   - 7 Impacts on property and businesses
   - ☐ Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - 5 Impacts on local roads
   - 6 Aesthetics or appearance
   - ☐ Construction impacts (noise, traffic, etc.)
   - 4 Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

Congestion at rush hour

9. What ideas should we consider when developing alternatives?

Better thru traffic flow

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

| | |
|---|---|
| **Please return completed surveys to:** | **Or contact the team:** |
| SR 32 Study Team<br>TranSystems<br>4555 Lake Forest Drive, Suite 540<br>Blue Ash, OH 45242 | Susan Daniels<br>ssdaniels@transystems.com<br>513-621-1981 – extension 32103<br>Fax to: (513) 621-2901 Attn: SR 32 Study Team |

# SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name LINDA LIGHT
Address 4666 RUMPKE RD. CINTI, OH 45245
E-mail Clight@cinci.rr.com
Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.

- ● Walk
- ○ Bicycle
- ○ Bus
- ● Automobile
- ○ Carpool
- ○ Other

2. What are your destinations within the study area? Choose all that apply.

- ● Home
- ● Work
- ○ School
- ● Shopping
- ● Restaurants
- ○ Medical appointments
- ○ Other

3. How satisfied are you with the time it takes to travel through the study area?

- ○ Very satisfied
- ● Somewhat satisfied
- ○ Neither satisfied or unsatisfied
- ○ Somewhat unsatisfied
- ○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?

- ● Eastgate Boulevard Interchange
- ○ Eastgate Square Drive
- ○ Glen Este-Withamsville Road
- ○ Elick Lane
- ● Old SR 74 (Speedway)
- ○ Olive Branch-Stonelick Road Interchange
- ○ Other
- ○ None – I travel through this area on SR 32
- ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?

- ● Eastgate Boulevard Interchange
- ○ Eastgate Square Drive
- ○ Glen Este-Withamsville Road
- ○ Elick Lane
- ● Old SR 74 (Speedway)
- ○ Olive Branch-Stonelick Road Interchange
- ○ Other
- ○ None – I travel through this area on SR 32
- ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?

- ○ Very concerned
- ● Somewhat concerned
- ○ Neither concerned nor unconcerned
- ○ Somewhat unconcerned
- ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.

- 1 Safety
- 2 Traffic flow and travel time
- 3 Environmental impacts
- ☐ Impacts on property and businesses
- ☐ Opportunities for new development
- 5 Other travel modes (bus, bike, etc.)
- 4 Impacts on local roads
- 6 Aesthetics or appearance
- ☐ Construction impacts (noise, traffic, etc.)
- ☐ Cost
- ☐ Other

8. What do you think are the most important transportation problems within this study area?

Congestion at rush hour -

No safe sidewalks

9. What ideas should we consider when developing alternatives?

SIDEWALKS!

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
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# SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name Mary Stone
Address 4206 N. Gensen Loop, Cinc OH 45245
E-mail mstone@sibcycline.com
Organization (if any) Sibcy Cline Realtors/& homeowner

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ○ Automobile
   - ○ Carpool
   - ○ Other____________________

2. What are your destinations within the study area? Choose all that apply.
   - ● Home
   - ● Work
   - ○ School
   - ● Shopping
   - ● Restaurants
   - ● Medical appointments
   - ○ Other ____________________

3. How satisfied are you with the time it takes to travel through the study area?
   - ● Very satisfied
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ● Eastgate Square Drive
   - ● Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other ____________________
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ● Eastgate Square Drive
   - ● Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other ____________________
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ● Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - ☑ Safety
   - ☐ Traffic flow and travel time
   - ☐ Environmental impacts
   - ☐ Impacts on property and businesses
   - ☐ Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - ☐ Impacts on local roads
   - ☐ Aesthetics or appearance
   - ☐ Construction impacts (noise, traffic, etc.)
   - ☐ Cost
   - ☐ Other ____________________

8. What do you think are the most important transportation problems within this study area?

Area growth inhibited due to congestion on SR32 & Safety Issues

9. What ideas should we consider when developing alternatives?

Impact on local business

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

e-mail

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

mstone@sibcycline.com
4206 N. GenSen Loop
Cinc OH 45245

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
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Fax to: (513) 621-2901 Attn: SR 32 Study Team

# SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name RICHARD WHELEN

Address 1027 CLEPPER LANE

E-mail RICH @ RICHWHELEN.COM

Organization (if any) BLUE SKIES REAL ESTATE COMPANY

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other ____________________

2. What are your destinations within the study area? Choose all that apply.
   - ● Home
   - ● Work
   - ○ School
   - ● Shopping
   - ● Restaurants
   - ○ Medical appointments
   - ○ Other ____________________

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ● Somewhat unsatisfied
   - ○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ● Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other ____________________
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ● Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other ____________________
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ○ Very concerned
   - ● Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - 2 Safety
   - 1 Traffic flow and travel time
   - ~~☐ Environmental impacts~~
   - 3 Impacts on property and businesses
   - 4 Opportunities for new development
   - ~~☐ Other travel modes (bus, bike, etc.)~~
   - 6 Impacts on local roads
   - ~~☐ Aesthetics or appearance~~
   - ~~☐ Construction impacts (noise, traffic, etc.)~~
   - 5 Cost
   - ~~☐ Other ____________________~~

8. What do you think are the most important transportation problems within this study area?

IT IS THE BACKUP OF TRAFFIC DURING MORNING AND AFTERNOON RUSH HOUR ALONG S.R. 32 AT GLENESTE-WITHAMSVILLE ROAD AND ELICK-BACHBUXTON ROAD INTERSECTIONS.

9. What ideas should we consider when developing alternatives?

THE CURRENTLY PROPOSED ELICK-BACHBUXTON EXTENTION INTERCHANGE (TO CROSS S.R. 32 AT THE EASTERN END OF CLEPPER LANE) SEEMS TO BE THE MOST EFFICIENT APPROACH TO MOVING THE MASSES OF PEOPLE ACROSS S.R. 32 WHILE ALLOWING A CONVENIENT ACCESS POINT TO S.R. 32 AS WELL AS A SYSTEM OF SERVICE ROADS PARALLELING S.R. 32.

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

EMAIL ME AT: RICH@RICHWHELEN.COM

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

I THINK THE SERVICE ROADS SHOULD:
A. BE AT LEAST 2 LANES IN EACH DIRECTION
B. BEGIN AT I-275 AND EXTEND BEYOND THE CONGESTED DEMOGRAPHY
C. HAVE A SPEED LIMIT OF 35 MPH
D. PROVIDE OPPORTUNITY FOR PLENTY OF CURB CUTS.

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name Jean Gauthier
Address 1289 Old State 74
E-mail missjcg@fuse.net
Organization (if any) –

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other

2. What are your destinations within the study area? Choose all that apply.
   - ○ Home
   - ● Work
   - ○ School
   - ● Shopping
   - ● Restaurants
   - ● Medical appointments
   - ○ Other

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ○ Somewhat unsatisfied
   - ● Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ● Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ○ Elick Lane
   - ● Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ● Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - ☐ Safety
   - ● Traffic flow and travel time
   - ☐ Environmental impacts
   - ☐ Impacts on property and businesses
   - ☐ Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - ☐ Impacts on local roads
   - ☐ Aesthetics or appearance
   - ☐ Construction impacts (noise, traffic, etc.)
   - ☐ Cost
   - ☐ Other Safety

8. What do you think are the most important transportation problems within this study area?

9. What ideas should we consider when developing alternatives?

Cut of 74 on at least 1 way -
Heavy truck should be using interchange

10. How would you prefer to get updates on this project? (Letter, [✓ e-mail], website, [✓ newspaper], etc.)

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

mail

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

Please consider cut off or one way — for old 74 - Speedway
Some traffic fails to stop even for school bus - Trucks are so many the house rumbles -

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

# SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name Coit & April Frasure

Address 1244 Traction Lane Batavia, OH 45103

E-mail coitf@fuse.net

Organization (if any)

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other

2. What are your destinations within the study area? Choose all that apply.
   - ● Home
   - ○ Work
   - ○ School
   - ● Shopping
   - ● Restaurants
   - ○ Medical appointments
   - ○ Other

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ● Somewhat unsatisfied
   - ○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ● Elick Lane
   - ● Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ○ Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ○ Glen Este-Withamsville Road
   - ● Elick Lane
   - ● Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ● Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - 2 Safety
   - 5 Traffic flow and travel time
   - 8 Environmental impacts
   - 1 Impacts on property and businesses
   - 6 Opportunities for new development
   - 7 Other travel modes (bus, bike, etc.)
   - 4 Impacts on local roads
   - 9 Aesthetics or appearance
   - 3 Construction impacts (noise, traffic, etc.)
   - 10 Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

Traffic lights - the stop and go in this area is more prone to accidents.

9. What ideas should we consider when developing alternatives?

10. How would you prefer to get updates on this project? (Letter, e-mail, website, newspaper, etc.)

e-mail, Letter

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

My concern is how is it going to affect my property. My property backs up to 32 near Old State Route 74 (speedway). How is this going to affect my property value or ReSale value? Also is my property a area being considered for the county to buy for the new exit ramps?

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

## SR 32 Eastgate Area Improvements Questionnaire

The Ohio Department of Transportation is conducting a study of SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by completing this quick survey about transportation issues in the area. Please note that all comments become part of the public record.

Name Don Bowman
Address Box 65 Winchester OH 45697
E-mail kizzdo@yahoo.com
Organization (if any) —

1. What forms of transportation do you use in the study area? Choose all that apply.
   - ○ Walk
   - ○ Bicycle
   - ○ Bus
   - ● Automobile
   - ○ Carpool
   - ○ Other

2. What are your destinations within the study area? Choose all that apply.
   - ● Home
   - ○ Work
   - ○ School
   - ● Shopping
   - ● Restaurants
   - ● Medical appointments
   - ○ Other

3. How satisfied are you with the time it takes to travel through the study area?
   - ○ Very satisfied
   - ○ Somewhat satisfied
   - ○ Neither satisfied or unsatisfied
   - ● Somewhat unsatisfied
   - ○ Completely unsatisfied

4. During **periods of heavy traffic**, what intersections or interchanges do you use to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ● Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

5. When **traffic is lighter**, what intersection or interchange do you use most often to access SR 32 in this area?
   - ● Eastgate Boulevard Interchange
   - ○ Eastgate Square Drive
   - ● Glen Este-Withamsville Road
   - ○ Elick Lane
   - ○ Old SR 74 (Speedway)
   - ○ Olive Branch-Stonelick Road Interchange
   - ○ Other
   - ○ None – I travel through this area on SR 32
   - ○ None – I rarely use SR 32

6. How concerned are you about roadway safety within the study area?
   - ● Very concerned
   - ○ Somewhat concerned
   - ○ Neither concerned nor unconcerned
   - ○ Somewhat unconcerned
   - ○ Not at all concerned

7. When considering alternatives for improving SR 32, what issues should be considered most important? Please rank in order, with **1** being most important.
   - 2 ☑ Safety
   - 1 ☑ Traffic flow and travel time
   - ☐ Environmental impacts
   - ☐ Impacts on property and businesses
   - ☐ Opportunities for new development
   - ☐ Other travel modes (bus, bike, etc.)
   - ☐ Impacts on local roads
   - ☐ Aesthetics or appearance
   - ☐ Construction impacts (noise, traffic, etc.)
   - 3 ☐ Cost
   - ☐ Other

8. What do you think are the most important transportation problems within this study area?

Bumper to Bumper

9. What ideas should we consider when developing alternatives?

Shown on 2 attached papers

10. How would you prefer to get updates on this project? (Letter, [✓ e-mail], website, newspaper, etc.)

11. Are there people in your community who would be interested but are unable to attend public meetings? What is the best way to reach them?

*Thank you for completing the survey questions. Please feel free to provide additional comments.*

Was looking on ODOT site to see how to contact
someone about my Ideas concerning this area.
Sorry for being so late - only saw this on Dec. 12-2010
This for looking — Good luck
Merry Christmas & Happy New Year D.B.

**Please return completed surveys to:**

SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**

Susan Daniels
ssdaniels@transystems.com
513-621-1981 – extension 32103
Fax to: (513) 621-2901 Attn: SR 32 Study Team

## Map of 39.098799,-84.278632

32 EAST

3 LANES

32 EAST

2 Lanes

Slow

Back to 3 LANES

Continue This small section of Road 3 LANES All the way from 275 to Glenn Este-Withamville RD.

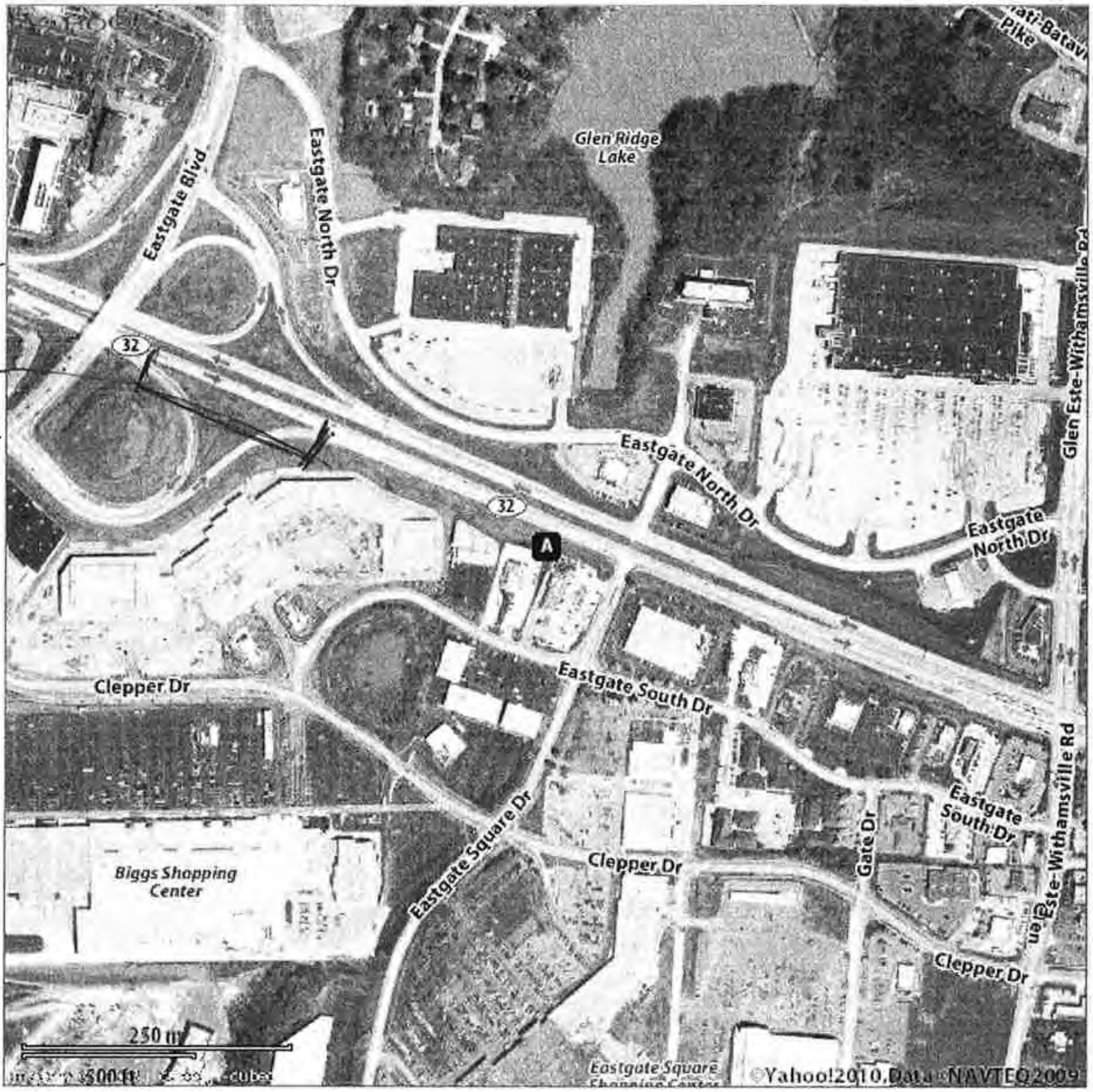
Making 3 Lanes All the way from 275 to Glen Este-Withamville Rd. would greatly increase flow of traffic between 275 & Eastgate Blvd.

## Map of 39.096351,-84.269148

YAHOO!®

32 East

this little Section make 3 Lanes



**Map of 39.098799,-84.278632** 32 West YAHOO!

When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

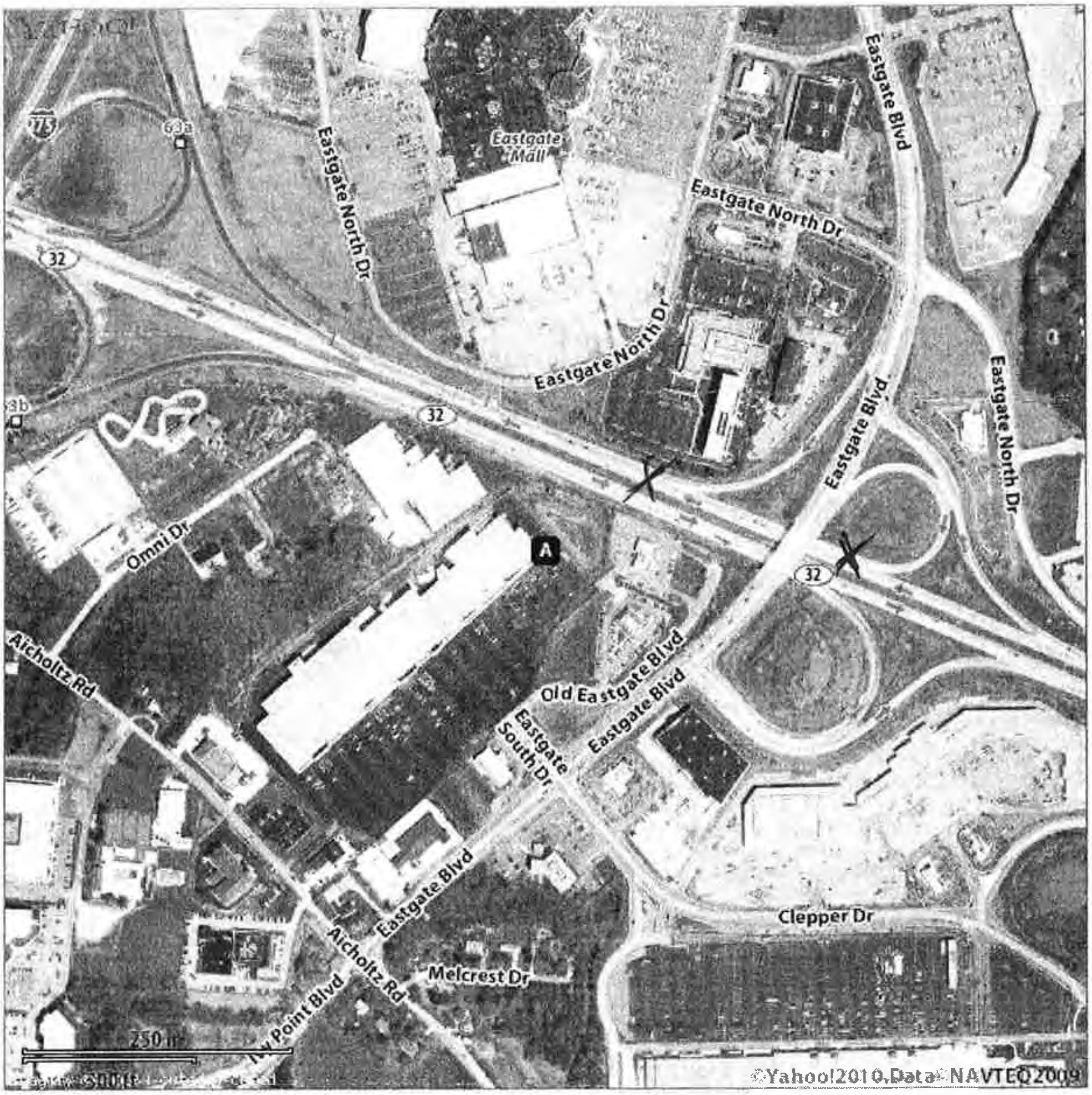
Continue this small section of road so you don't have to merge onto 32 than immediately merge right to Exit onto 275.

Creates a smoother flow and more time to Exit & merg onto Highway

## Map of 39.098449,-84.277237

YAHOO!

275



32 west

## CO-Jen Spinosi

**From:** CO-Susan Daniels
**Sent:** Wednesday, September 29, 2010 2:22 PM
**To:** Jay.Hamilton@dot.state.oh.us
**Cc:** CO-Jen Spinosi; Manger, Pat; CO-Andrew Schneider
**Subject:** IVa Comment - Margaret Moores

When I receive calls about IVa, I will send e-mails to you and Pat for your information. Jen will save these messages to include with the public comments.

I received a phone call today from Margaret Moores, 513-752-4482. She had the following comments:

- She has sold her house and asked that we send an invitation to the new owner: Jason L. Prichard, 4467 Briarwood, 45103 (Jen will do this.)
- She now lives off of Amelia Olive Branch, so she uses the Olive Branch-Stonelick Interchange now to access SR 32.
- She noted the following travel problems in the study area:
    - It is very difficult to turn onto 74 from Briarwood at peak hours. The speed limit is 45 mph, which seems too high considering how many roads and driveways there are. People do not slow down to let you out.
    - At 74/Tealtown intersection, people turning right on red onto 74 regularly pull out in front of traffic on 74. Right turns on red should be prohibited.
    - At 32/74 intersection, turning left is very difficult because there is no turn arrow. Traffic backs up for a long distance. When she used to live off 74, she wouldn't try to turn there, going to the next intersection instead.
    - Turning from White Castle onto Eastgate Boulevard, left turns are prohibited. This should be enforced by the township, because it is regularly violated. Ms. Moores was in a collision at this location when a car illegally turned left from the White Castle in front of her.

She asked if she should still attend the open house, since she doesn't live off 74 anymore. I told her that she is welcome to come. I told her that if she drives SR 32, her opinions would be helpful.

**Susan S. Daniels, PE, AICP, LEED Green Associate**
Senior Professional
Assistant Vice President

**TranSystems**
1105 Schrock Road, Suite 400
Columbus, OH 43229
Main: 614-433-7800
Direct: 614-433-7803
Cell: 614-571-3222
Fax: 614-846-2602
www.transystems.com

**TranSystems**

1105 Schrock Road
Suite 400
Columbus, OH 43229
Tel 614-433-7800
Fax 614-846-2602

www.transystems.com

Friday, October 8, 2010

Mr. Allan Daniel
1001 Joyce Drive
Batavia, OH 45103

Dear Mr. Daniel:

Included, please find copies of the requested materials from the SR 32 Eastgate Area Improvements public meeting from Wednesday, October 6, 2010:

- Study Area display board
- Levels of Service display board and definitions board
- Crash History display board

If you have any questions or comments, please contact Susan Daniels at 513-621-1981 ext. 32-103 or ssdaniels@transystems.com.

Respectfully,

Susan

Susan Daniels

TranSystems

**TranSystems**

1105 Schrock Road
Suite 400
Columbus, OH 43229
Tel 614-433-7800
Fax 614-846-2602

www.transystems.com

January 31, 2011

Ms. Gertrud Whitaker
Office of Congresswoman Jean Schmidt
8044 Montgomery Road, Suite 170
Cincinnati, OH 45236

**Re: Eastern Corridor Segment IV(a) Comments to Date**

Dear Ms. Whitaker:

Thank you for attending the October 6, 2010 stakeholder meeting for Eastern Corridor Segment IV(a): SR 32 Improvements from Eastgate Boulevard to Stonelick-Olive Branch Road. As requested, enclosed are copies of the public comments that we have received regarding the project since the October 6, 2010 public meeting.

If you have any further questions or requests regarding this project, please contact me at 614-433-7803 or ssdaniels@transystems.com.

Respectfully,

Susan S D

Susan S. Daniels, PE, AICP
Project Manager

CC: Jay Hamilton, Ohio Department of Transportation, District 8

# SR 32 Eastgate Area Improvements

## Eastgate Boulevard to Olive Branch-Stonelick Road
## Eastern Corridor, Segment IV(a) – CLE-32-2.25, PID 82370

## Public Open House September 28, 2011

### Purpose of the Meeting

The purpose of this open house is to update you on the State Route 32 Eastgate Area Improvements Study, review the issues in the study area and seek your feedback on various conceptual alternatives that have been developed.

### DID YOU KNOW?

Previous studies for the Eastern Corridor are available at **www.easterncorridor.org**.

Materials from this open house are available on ODOT's website. A link is provided at **www.tid.clermontcountyohio.gov**.

### Project Purpose and Goals

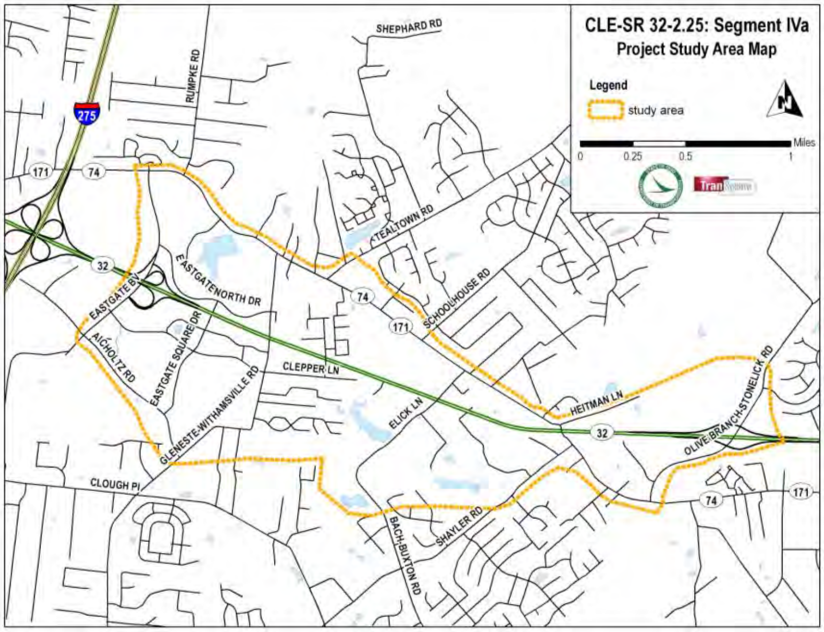
The goals of the SR 32 Eastgate Area Improvements are to serve current and projected travel demand, reduce congestion and delay, and improve roadway safety, in a manner consistent with local transportation and economic development goals.

### Study Area

The current study is focused on SR 32 from the Eastgate Boulevard interchange to the Olive Branch-Stonelick Road interchange. Improvements to local roads or the construction of new local connectors may be included as part of the project. Therefore, the study area also includes areas north and south of SR 32 as shown.

### Background

In November 2004, the Ohio Department of Transportation (ODOT) published *Access Ohio 2004-2030, Statewide Transportation Plan*. The statewide plan recognized SR 32 as an important trade and travel corridor. In 2006, ODOT completed the Eastern Corridor Study, in cooperation with Clermont County, Hamilton County, and the City of Cincinnati. The Eastern Corridor Study was a comprehensive look at the transportation needs between Cincinnati and western Clermont County.



As part of a multi-modal transportation strategy, this study included a recommendation to consolidate and manage access points to establish SR 32 as a limited access arterial roadway, including elimination of access at SR 32/Glen Este-Withamsville Road, with planned local road improvements implemented separately in support of this improvement. The current SR 32 Eastgate Area Improvement Study seeks to build upon the previous study by evaluating solutions for this area in detail.

## Alternatives

Based on technical studies and public comment, five conceptual alternatives have been developed within the study area, including various locations for an interchange, overpasses, and various local network connections. These are as follows:

- **Alternative 1*** – Widen existing SR 32, including five through lanes, and added turn lanes at intersections.
- **Alternative 2** – Includes an interchange on SR 32 between Glen Este-Withamsville Road and the existing Elick Lane/Bach Buxton Road.
- **Alternative 3** – Includes an interchange on SR 32 interchange at the existing Elick Lane/Bach Buxton Road intersection.
- **Alternative 4** – Includes an interchange on SR 32 between the existing Elick Lane/Bach Buxton Road and Old SR 74.
- **Alternative 5** – No Build (do nothing alternative).

* *Alternative 1 is not being recommended for further study.*

## Next Steps

The project team will collect public comments and continue to refine the alternatives. Additional design detail will be completed as well as environmental fieldwork and resource agency coordination. Expect another public involvement meeting sometime in 2012 to share the results of these studies and obtain your feedback on a preferred alternative.

## Your Opinions are Needed

Feel free to view the exhibits and discuss the project with the team members. Please complete a short comment form and drop it in the comment box before you go. What are your thoughts on the conceptual alternatives presented at the public meeting? Do you prefer one alternative over another? Do you have other suggestions for this project?

Written comments may be submitted at the meeting, e-mailed, faxed or mailed to the study team.

Please submit your comments by **October 26, 2011** to:

**SR 32 Study Team**
**TranSystems**
**4555 Lake Forest Drive, Suite 540**
**Blue Ash, OH 45242**

**Phone: 513-621-1981, ask for extension 32-205**
**Fax: 513-621-2901**
**E-mail: amschneider@transystems.com**

Materials are available on the ODOT website, via a link at: **www.tid.clermontcountyohio.gov**.

### PROJECT SCHEDULE

**Spring 2009**

Funding Identified and Programmed thru TRAC

**Spring 2010**

ODOT Assembles Consultant Team and Implementation Committee

**Fall 2010 – Fall 2011**

Technical Studies Conducted and Alternatives Developed

**Fall 2011 – Fall 2012**

Preliminary Design and Environmental Approvals

**2013**

Right-of-Way Acquisition Process

**2014-2015**

Project Construction

# SR 32 Eastgate Area Improvements – Comment Form

The Eastern Corridor

The Ohio Department of Transportation is working to improve conditions along SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by sharing your thoughts on this project. Comments related to this project will be accepted until **October 26, 2011**. Please note that all comments become part of the public record.

Name ____________________

Address ____________________

E-mail ____________________

Organization (if any) ____________________

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

____________________

____________________

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

____________________

____________________

____________________

____________________

____________________

____________________

**Please submit your comments to:**
SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

# SR 32 Eastgate Area Improvements

Public Open House
September 28, 2011

The Eastern Corridor

TranSystems

| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| BARB WIEDENBEIN | Clerk of Courts | b.WIEDENBEIN@ClermontCountyOhio.gov | — |
| RON L MADDEN | | RONMAD8119 at AOL.COM | |
| DUANE FERGUSON | | FERGDEV @ YAHOO.COM | |
| Angelo Santoro | Santoro Engr' Co | santoro@one.net | |
| Joyce Whalen | | lytleleslie@fuse.net | 4305 Minute Man Dr., Cincinnati, OH 45245 |
| Garria Blundell | | ~~gblundell~~ garriae@gmail.com | |
| Diane McWethy | | dianemcw2001@yahoo.com | 1511 W. Meadowbrook Dr Loveland 45140 |
| Mary [illegible] | | | 4563 SUMMERSIDE APT 8 CIN. OH 45244 |
| Marjorie Roberts | | marginnati@zoomtown.com | 459 Dartmouth Cir. |
| Ken Reekers | | | 1264 Secretariat CT. Batavia OH 45103 |
| EUGENE REINHARDT | | | 4390 ELICK Ln |
| Barb & Jim Shinkle | | hairiam33@hotmail.com | 1277 Village Glen BATAVIA |
| John McGraw | | Jmc4604@fuse.net | 4604 Blainfield Ct. 45103 |
| J SCOTT STEWART | | JSSTEWART@fuse.net | 4580 Shepherds Way BATAVIA 45103 |
| DOUGLAS PAVEY | | | |
| ~~JANET CHANEY + TOM CHANEY~~ | | DOUGLASPAVEY@GMAIL.COM | 1263 SHAYLER RD BATAVIA 45103 |
| ~~Ruth Hurt~~ JANET TOM CHANEY | | chaney.jan@gmail.com | 6000 FILAGER RD BATAVIA OH 45103 |
| RUTH HURT | | | 1017 Clipper Ln. Batavia OH 45103 |
| JIM SCHUBERT | | | 1267 SHAYLER RD BATAVIA OHIO 45103 |
| Cheryl Vasar | | loves.reading@yahoo.com | 1251 Misty Lake Ln Batavia OH 45103 |

㉑

# SR 32 Eastgate Area Improvements

Public Open House
September 28, 2011

The Eastern Corridor

TranSystems

| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| Joseph W. Malott | — | JOE.MALOTT@FUSE.NET | 1026 Westchester Way<br>Cincinnati, Ohio 45244 |
| Tim Ross | | | 4807 Stonesbrook Rd<br>Cinti OH 45244 |
| Coit & April Frasure | | coitf@fuse.net | 1244 Traction Lane<br>Batavia, OH 45103 |
| Drena Francis | Kennedys Landing | Francis536@cs.com | 983 Kennedys Landing<br>C. O 45245 |
| Matthew + Elizabeth Meibers | | mmeibers@shp.com | 4967 Beechwood Rd C 45244 |
| Devon Clausing | | drsdale@virtualspectrum.com | 595 Chicory Ln 45244 |
| Charles & Charlotte Brothers | | CHARBROS@GMAIL.COM | 49 Jerrick Lane, Amelia 45102 |
| Chris White | | chriswpcusa@aol.com | 4110 Wood St. Norwood 45212 |
| TERRY BROTHERS | | candyterry.brothers@gmail.com | 29 Terrick Ln, Amelia 45102 |
| Nickie Hampton | | nmhampton@hotmail.com | 4448 Walnut St Batavia Ohio 45103 |
| JEFF + JACKIE MOORE | — | JJMOORE@FUSE.NET | 1154 MUIRWOOD LN BATAVIA OH 45103 |
| Ben Reddick | | | 1007 SAYLER 45245 |
| BOB + JOAN EPEN | | | 4639 LAUREL VIEW DR. 45244 |
| RONALD M. NORRIS | — | RONNORRIS@ZOOMTOWN.COM | 4792 TIMBERKNOLL RD CINTI, OH 45249 |
| Philip Koro | | pkoro@hotmail.com | 6543 Lyceum Ct, Cincy, OH 45230 |
| Beth Lammiesh | | | 5577 Hoffman Rd Milford, OH 45150 |
| Carol Emmel | | | 4612 Stablehand Dr. Batavia 45103 |
| Debbie Myers | | | 4390 Elick Ln Batavia OH 45103 |
| Bob Proud | County Commissioner | bproud@clermontcounty.gov | 101 E. Main St, Batavia 45103 |
| Stuart Kennedy | | | 600 Kennedy Trails, Cincinnati OH 45255 |

# SR 32 Eastgate Area Improvements

Public Open House
September 28, 2011

The Eastern Corridor

TranSystems

| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| Dan Rose | | | |
| Raymond Rose | | | |
| Patrick Manger | Cler. Co. Eng'r off. | | |
| Craig Stephenson | " | | |
| JUDITH A. KELCH | | | 4191 SAGEWOOD CT. BATAVIA 45103 |
| TOM McKEE | WCPO-TV | tmckee@wcpo.com | |
| JOE ESPELAGE | TRANSYSTEMS | jrespelage@transystems.com | |
| Pat Williams | Clermont Cty Library | | |
| STEPHAN TAM | (VVA-649) | | 1871 E Concord Rd Amelia O |
| Valerie Benninger | — | — | 4149 Covetree Batavia |
| ROSE JOHNSON | Cler Cty citizen | REJOHIO@FUSE.NET | 4123 WOODSLY DR BATAVIA 45103 |
| JOHN & SUE A. DISNEY | RETIRED | | 1059 OLD STATE ROUTE 74 45103 |
| Carole Potrafke | retired | | 1771 Clough Pike, Batavia |
| Rod Grubb | individual | grubbr@fuse.net | 668 BOSTWICK CT, 45244 |
| HOWARD HUTCHISON | " | | 5082 MIDFIELD 45244 |
| John Hirsh | individual | jackmhirsh@aol.com | 5060 Midfield Rd 45244 |
| PHILIP DODGE | INDIVIDUAL | PDODGE@CINCI.RR.COM | 4525 ENGLISH CREEK DRIVE, CINCI 45245-1398 |
| Betty Hyden | | BLHYDEN@ZOOMTOWN | 2940 ST. RT. 222 Bethel, Oh 45106 |
| George W. Conner | | | |
| Diana Dallman | | sddal@yahoo.com | 978 Burgoyne DT. Cincinnati OH 45245 |

# SR 32 Eastgate Area Improvements

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TranSystems

| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| | | | |
| Richard Taylor | | rgt3000@fuse.net | 920 Tall Trees Dr.<br>Cincinnati OH 45245 |
| Tim & Kathleen Bizz | | YQX140@aol.com | 4498 Finney Trail 45244 |
| Tracey Woodward | | traceydarine@yahoo.com | 4574 Julepveda<br>Batavia OH 45103 |
| Kevin Post | | | 4485 Forest Trail<br>Cin. OH 45744 |
| Stan Deimling | | | |
| Cary Wright | | | |
| Gina & Charlie Dietrich | | | 8490 Batavia Rd Cinti Oh 45244 |
| Robert & Elaine Kay | | | |
| Carl & Millie Bockman | | | 4602 Pearl Ln. Batavia, Ohio 45103 |
| Scott Janssens | | JANSSENS561@CINCI.RR.COM | 561 CLAIRMONT WOODS DR CINCINNATI OH 45244 |
| Paul Duchemin | | PDUCHEMIN@CINCI.RR.COM | 1500 CEDAR RIDGE LN BATAVIA, OH 45103 |
| Jimmy [illegible] | | | |
| Tim Montel | | tlmontel@yahoo.com | PO 157 Milford 45150 |
| Jennifer Bond | | bondedfour@zoomtown.com | 3950 Randolph Ln 45245 |
| Karen Pointer | | karen-pointer@hotmail.com | 111 St. Andrews Dr, 45245 |
| Jeffry Kohls | | jeffreyKohls@yahoo.com | 1063 Old State Rt 74 Bat. Oh 45103 |
| Pauline M Durkin | | | " " |
| Ken Durkin | | | |
| James Fraley | | JAMESDFRALEY@GMAIL.COM | 1322 Old ST.RT. 74 BATAVIA |

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## SR 32 Eastgate Area Improvements

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| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| Miranda Fash | | | 4414 Eastwood Dr. #6104 Batavia OH 45103 |
| Kellie Geist-May | Community Journal | kmay@communitypress.com | 394 Wards Crn Rd, Loveland, OH |
| Karen Duesing | Everest Real Estate | | |
| Allan Daniel | | | 4466 Forest Tr. Cin Oh 45244 |
| [illegible] | | | |
| Sheri Yonenaka | | simply.yellow@ymail.com | 555 Aspen Glen Dr #704 Cinti 45244 |
| Frank M. Helfen | | SlowBurnin@Fuse.net | 1340 Old SR 74 45103 |
| Ottis L. Bradshaw | | | 465 McIntosh Dr. 45255 |
| Ray Gephart | | | 1129 Wellesley 45103 |
| Cliff Hoagland | Applebees | choagland@tandk.com | 4440 Glenesste Withamsville Rd 45245 |
| Mark Wilken | | mwilken at fuse.net | 141 Cardinal Dr. Cinti Oh. ~~4570~~ 45244 |
| Don Wabler | | DLWabz@ Aol. com | 579 Clairmont Woods Dr Cincinnati 45244 |
| Lloyd Acres | | | |
| Kathleen A. Marshall | | ~~4803 Klatte~~ | 4803 Klatte Rd. Cincinnati, O. 45244 |
| Jerry Thornberry | | 2033 Plumb Ln → | Batavia OH 45103 |
| Jim | | | |
| Sandee Bernard | | ~~2950 Jackson Pike~~ | 2950 Jackson Pike 45103 |
| Jim Bernard | | | 〃 〃 〃 |
| Gary Mack | | | 5377 St. Rte. 132 Batavia, OH. 45103 |
| John Simpson | | John.Simpson@prodigy.net | |

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## SR 32 Eastgate Area Improvements

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| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| Ben Aicholtz | | ben@aicholtz.com | 3748 Waterford Ct Amelia OH 45102 |
| ARNOLD HOMAN JR | | AHOMANJR@YAHOO.COM | 1029 OLD S.R. 74 |
| LYNN BAIRD | | labaird@yahoo.com | 4488 CHESTNUT CREEK DR CINTI 45244 |
| VICTOR BREEHNE | | VBREEHNE@GMAIL.COM | 4313 WUEBOLD LA 45245 |
| TERRY STEWART | | tslvirtuo343@gmail.com | 998 JOYCE DR. 451013 |
| Monica C Faw | | MFAW@ZOOMTOWN.COM | 4649 Locust Grove Ct 45103 |
| Billy Tipton | | | 4563 St. RT. 222 |
| Glen A Wiedenbein | | | 1300 Baldwin Rd Milford, Ohio 4515 |
| Troy & Margaret Hinkle | | buzzhinkle@birdlover.com | 1053 old state Rt. 74 45103 |
| A. Skye Levin | REI | skyelevin@reiteam.com | 602 Lila Avenue, Milford, OH |
| LINDA MORGAN | | | 3309 MT CARMEL Rd CINTI 45244 |
| RANDALL A. WALKER | | RandyWalker@Yahoo.com | 524 MARY LEE La Cincinnati ON 45244 |
| Thomas F Habig | | tfhabig@zoomtown.com | 4476 Glen Willow Dr., Batavia, OH 45103 |
| Dennis M Collier | | | 4495 Glenridge Dr. Cinti, Oh 45245 |
| Nick Grammas | GRP 32 | | 626 old St Rt. 74 Cinti OH 45244 |
| Judith Kocur | clermont county public library | | 6689 Navarra Drive Loveland, Ohio 45140-8708 |
| Faye and Jim Miller | Stonelick Twp Resident | fayejimmiller@Yahoo.com | 5287 Brushy Fork Rd. Batavia Oh 45103 |
| Jeannette Meckstroth | | | 1012 Clipper Lane Batavia Oh 45103 |
| Dennis Skowronski | | HIPDENIS@FUSE.NET | 1007 Glendale Dr. Batavia OH 45103 |
| Lisa Skowronski | | lisajotr@fuse.net | ↓ same |

# SR 32 Eastgate Area Improvements

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| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| Marilyn Baker | | | 1183 Shayler Woods Dr. |
| Anna Stark | | AESTARK47@HOTMAIL.com | 4502 JULEP WAY BATAVIA 45103 |
| Tony Cardinal | CCPL | t.cardinal@efgemail.com | 1205 Woodspoint Lane, Milford 45150 |
| Jeanline Warf | | | 1223 Woodchase Trail Batavia Ohio |
| Tim Dalton | | TSanborn98@fuse.Net | 786 Picket Way Cint, OH 45245 |
| Boyd & Mary Swafford | | | |
| Jeff Roberts | | Jffrob@gmail.com | |
| Carol Kisner | | cjKisNer@yahoo.com | 4810 Summerside Rd<br>Cincinnati 45244 |
| Vicky MEZACK | | | 618 WOODLAND VIEW, CINTI, 45103 |
| Maura Gray | | grayma@oplin.org | 326 Broadway St. Batavia |
| DAVE MEZACK. | LIBRARY. | MEZACKDA@OPLIN.ORG. | |
| RICHARD HEDRICK | | SHORTYHEDRICK@YAHOO.com | |
| Laverne K. Fay – John Fay | | ALARMREP@aol.com | 4503 Glenridge Dr. Cin. |
| Chasity M. Pullins | | chasity.pullins@gmail.com | 6303 Glenneste Withamsville |
| Jane Goedde | Retired | | 4393 Aicholtz Rd. |
| Angela Preece | | preece@fuse.net | 1418 Old SR 74 Batavia 45103 |
| Jeff Preece | | | " |
| MARK BREDEMEIER | KBA, INC. ARCHITECTS | MBREDEMEIER@KBAINC.COM | 4357 FERGUSON DR; 200 45245 |
| Wm WOODWARD | TIPTON INTERESTS | B,W@CINCINNATICM.COM | |
| ERIC FLAIG | JIFFY LUBE | EFLAIG@GMAIL.COM | |

## SR 32 Eastgate Area Improvements

Public Open House
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The Eastern Corridor

| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| Elva Johnston | | | |
| Bill Johnston | Library Board | WJOHNSTON@CINCI.rr.com | 473 WINDFERN FOREST LN CINCINNATI 45244 |
| Margaret Lammrish | | mlammrish@fuse.net | 4262 Matte Rd., Cinti, OH 45244 |
| Glen Wiedenbein | | WiedenbeinFarms@yahoo.com | 4435 STRT222, BAT OH 45103 |
| James M. Jeffries | Resident | — | 4203 Glen Este-Withamsville Rd |
| Dolores E. [illegible] | | gradea@fuse.net | 4187 Heritage Glen cinti 45245 |
| Marion Croswell | Library Board | marion@gocroswell.com | 159 N. Second St Williamsburg 45176 |
| John Becker | | John@BeckerGOP.com | 925 Locust Ln 45245-1313 |
| Rita Walston | Resident | RWALSTON•CINCI.COM | 4433 Fayard Dr Batavia OH 45103 |
| Nancy Gephart | Resident | netgep@aol.com. | 1129 Wellesley 45103 |
| Chuck Lane | Resident | ChuckLane@Zoomtown.com | 886 CASTLE BAY Dr., CINCINNATI, OH 45245 |
| Stephanie Hall | Resident | shall@dag-corp.com | 4607 Fox Trail Circle 45245 |
| Wm Schwartz | " | - | 990 JOYCE DR. BATAVIA. OH 45103 |
| KRIS MARSHALL | | ~~[illegible]~~ MARSHALL4@FUSE.NET | |
| Jason Watson | Resident | JLW56.OH@Netzero.net | 4430 Eastwood Dr. #8104, Batavia, OH 45103 |
| Louise Homan | Res. | weezhoman6@aol.com | 1029 OLD S.R. 74 |
| BETTY SMITH | RES | | ~~443~~ 4437 FAYARD DR. |
| DARRELL SMITH | RES | | 4437 FAYARD DR. |
| LEAH STUMPF | RES | LStumpf@CINCI.RR.COM | 4449 WALNUT ST |
| GEORGE STUMPF | RES | | 4449 WALNUT ST |

# SR 32 Eastgate Area Improvements

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| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| Margaret Bryant | | | 4515 EVA LN BATAVIA Oh 45103 |
| Mike Roth | SANDLER Training | MikeRoth@fuse.net | 4357 Ferguson Dr. #190 45245 |
| Ron Roberts | Roberts Engineering | ronroberts@reiteam.com | 602 Lila Ave Milford |
| Jeffrey A. Hinkle | | | 1065 Batavia Pk 45103 |
| Mike Igney | | MIGNEY@CINCi.RR.COM | 544 Virginia Lane Cin 45244 |
| CARL G. HARTMAN | | chartman@sportszoneusa.com | 3478 HOLLY RIDGE CINTI, OH 45245 |
| ~~CLAUDE CORNELL~~ | | | |
| CLAUDE CORNELL | | CCORNELL@FUSE.NET | 193 HUDSON AVE. WILLIAMSBURG |
| John/Dave Owens | | mojoowens@hotmail.com | 1118 Flick Lane Batavia, OH 45103 |
| GEORGE MILLIGAN | | | 1197 OLD STATE ROUTE 74 BATAVIA OH 45103 |
| John + Martine Adams | | | 620 Sonny Ln Cinti 45244 |
| James Puckett | Mt Carmel Baptist | puckejh@yahoo.com | 4416 FAYARD DR BATAVIA OH 45103 |
| Myrna + Al Langman | | | 4589 CITATION CT BATAVIA 45103 |
| Louise Wilson | | | 4482 Aicholtz Rd |
| David Lammrich | | dlamm@fuse.net | 5577 Hoffman Rd. Milford Oh 45150 |
| Dr Thomas R. Furstenberger | | | |
| Sara Heimbold | | sheimbold@yahoo.com | 4478 Timberknoll Rd Cint. |
| Glene Lentzle | | GLCL43@GMAIL.COM | 996 CLEPPER LN |
| Laura + Dennis Tebus | | dennistebus@yahoo.com | 625 Rust Ln. |
| Greg Malone | Casto | gmalone@castoinfo.com | |

# SR 32 Eastgate Area Improvements

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| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| Sandy Madden | | sandyzmddn@Yahoo.com | 4435 St. Rt 222 Batavia 45103 |
| Rosalie Jeffries | Resident CC | | 4203 Glen Este With. Rd. Cinti 45245 |
| Ellen Croswell Morrison | Resident Lexington Run<br>Twin Spires | EllencMorrison@hotmail.com | 4565 Winners Circle, Batavia 45103 |
| David Forcum | | | 4097 Woodsly Dr, Batavia, OH 45103 |
| Lydia WARD | Resident Union Twp | barneysmom@fuse.net | 496 Paul St. BATAVia, ohio 45103 |
| Mike SAwyers | " | | 1166 Forest RUN DR. BATAVIA |
| Mary Heeney | Resident, Batavia Twp. | meheeney@fuse.net | 2219 Drayyers Knoll 45103 |
| Lisa & Robert Mineer | Resident, Batavia | mommamineer@yahoo.com | 1017 clepper Ln. Batavia OH 45103 |
| Wayne Hart | " " | " | " " |
| Juliana Shanabrook | Sonny Lane | | 624 Sonny La Cinti, 45244 |
| Edwin Foster | Forest Trail | | 4462 Forest Trail Cin-45244 |
| Howard & Ruth Konwinski | Resident Batavia | rkonwinski@fuse.net | 4278 Babson Park Place, Batavia 45103 |
| GARY GOTCHER | | | 503 GENNIE LN CINTI OH 45244 |
| John Aicholtz | 4026 Wilma Court Union Twp | john.aicholtz@ge.com | 4026 Wilma Court Cincinnati OH 45245 |
| JEFF BAUMGARTH | The Myers Y. Cooper Co. | JBaumgarth@Cooper-co.com | 5050 E. Galbraith Rd Ste B Cincinnati OH 45236 |
| RAY SEBASTIAN | | SEBASTIANKR@MSN.Com | #5670 STRT 132 BATAVIA 45103 |
| Ed Waltz | | EJWaltz3@yahoo.Com | |
| Carolyn Kew | | Kewroberts@gmail.com | 4530 Julep Way Batavia 45103 |
| Mossy Greer | | mossyg@cinci.rr.com | 4285 Marette Dr 45245 |
| Carolyn & George Rutherford | Resident/ | Cmrhere@aol.com | 1005 Shepherds Glen Dr BATAVIA 45103 |

# SR 32 Eastgate Area Improvements

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| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| Edwin H. Humphrey | Clermont Board of Commissioners | | 101 E MAIN ST, BATAVIA, OH 45103 |
| RODNEY A. SAYLOR | M-E COMPANIES | RODNEYSAY@AOL.COM | |
| GARY H, MORGAN | | | 3309 MT CARMEL RD CIN, OH 45244 |
| Jane Kammer Habig | Self / Clermont County Public Infrastructure Subcommittee | janekh@zoomtown.com | 4476 Glen Willow Drive, Batavia. 45103-1511 |
| Kristine Durand | | Krisdurand@hotmail.com | 1181 Village Glen Dr. Batavia OH 45103 |
| Jennifer Milligan | | | ~~7197 Old~~ |
| Michelle Hendricks | Animal Wellness Hospital | | 962 Old St. Rt. 74 Batavia Oh 45103 |
| Denise Smith | West Clermont School Bd / Ashley Meadow HOA | smithp@fuse.net | 573 Laurel Grove Ct Cinti OH 45244 |
| PATRICK Smith | — | Smithpat@fuse.net | 573 LAUREL GROVE CT CIN. OH 45244 |
| Alex Lambros | N/A | — | 1069 Clough Pk Cin Ohio 45245 |
| Charles B Rubey | Resident | | 4483 Forest Lawn D 45244 |
| Becky Auchorty | " | | |
| Richard [illegible] | | RICHL39@FUSE.NET | 4762 KLATTE RD |
| Roberta Ross | | | 4807 Stoneybrook Rd. 45244 |
| Lyle Rupp | Snowie | lyle@snowie.com | 4382 Newberry Dr. 45103 |
| Deb Osborne | ENTRAN | dosborne@entran.us | 1848 Summit Rd. Cinc. OH 45237 |
| Patrick Mace | | Pat@Mace1.com | 5091 Eagles Vw, Cinti, OH 45244 |
| PETER + TERRI EDDINGTON | | peter_eddington@ucg.org | 4311 GLEN ESTE WITHAMSVILLE RD. 45245 |
| Jo Brown | Clermont County Library Board | jjbrown@strausstroy.com | 1560 Hunt Club Dr. Milford, OH 45150 |
| Doug Lach | | | 4338 Aicholtz |

# SR 32 Eastgate Area Improvements

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| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| David W. Hawkins | CCPC | hawkinda@oplin.org | |
| Jim/Barb Clarke | | bj60@fuse.net | |
| Ed Dyer | West Clermont Schools | dyere@westcler.org | |
| Clint Hines | Redi-Rock International LLC | clint@redi-rock.com | 4030 Mt. Carmel-Tobasco Rd. Ste. 211<br>Cincinnati, OH 45255 |
| Julie Greger | | jgreger@cinci.rr.com | 1083 Split Rail Dr.<br>Batavia, OH 45103 |
| Bill Flanigan | | | 822 Massachusetts Dr. 45245 |
| Scott Land | Crosspointe Baptist Church | churchadmin@crosspointebc.com | |
| Bob Cusson | | | 819 Massachusetts Dr. Cin, O 45245 |
| Lee Roesch | | | 3749 Redthorne Dr - Amelia OH |
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# SR 32 Eastgate Area Improvements

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| Name | Organization (if any) | Email | Address (to be added to mailing list) |
|---|---|---|---|
| Nancy Miller | | miller-n@juno.com | 4988 Briarwood Ln. Cinti. Oh. 45244 |
| Amanda Miller | | mcncheercoach@gmail.com | 4988 Briarwood Ln Cincinnati 45244 |
| Barbara Apel | | bapel@AOL.com | 607 Sunny Ln Cinti 45244 |
| Julie Kennedy | | | 600 Kennedy Trails Cinti OH 45255 |
| M.E. Dowling | | | 6868 Pineneedle Ln. Cinti, OH. 45243 |
| Brian Lynd | | blynd@fuse.net | 4620 Steeplechase Dr. Batavia, OH 45103 |
| Patricia Ann Mullens | | | |
| | | | |
| Jay Hamilton | ODOT D8 | | |
| Keith Smith | ODOT D8 | | |
| Steve Wharton | CCTID | | |
| Andy Schneider | Transystems | | |
| Cindy Wallace | TranSystems | | |
| (Joe Espelage | TranSystems) | | |
| Jen Spinosi | TranSystems | | |
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# SR 32 Eastgate Area Improvements – Comment Form

The Eastern Corridor

The Ohio Department of Transportation is working to improve conditions along SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by sharing your thoughts on this project. Comments related to this project will be accepted until **October 26, 2011**. Please note that all comments become part of the public record.

Name Thomas Habig
Address 4476 Glen Willow Dr Batavia, Oh 45103
E-mail tfhabig@zoomtown.com
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1*** (widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

**Alternative 3** (interchange at existing Elick/Bach Buxton intersection)

**Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5** (no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

Old 74 will need to be upgraded due to an increase in traffic due to fewer connection points to 32. This should happen sooner rather than later to relive congestion caused by 32 construction.

**Please submit your comments to:**
SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

# SR 32 Eastgate Area Improvements – Comment Form

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Name Beth Lammrish
Address 5577 Hoffman Rd Milford, OH 45150
E-mail
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

No.

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

**Please submit your comments to:**
SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

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Name Drena Francis / Kennedys Landing

Address 983 Kennedys' Landing

E-mail Francis536@cs.com

Organization (if any) Kennedys Landing

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

**Please submit your comments to:**
SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

The Eastern Corridor

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Name Kris Durand
Address 1181 Village Glen Dr Batavia OH 45103
E-mail krisdurand@hotmail.com
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

It was stated tonight that the library would not be impacted. This is something that is important to my family + we definitely want the library to be built!

Thank you!

**Please submit your comments to:**
SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

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The Eastern Corridor

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Name ANNA STARK

Address 4502 JULEP WAY BATAVIA OH 45103

E-mail AESTARK47@HOTMAIL.COM

Organization (if any) ______

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

NO

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

**Please submit your comments to:**
SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

# SR 32 Eastgate Area Improvements – Comment Form

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Name Resident
Address
E-mail
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

RAMP

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

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The Eastern Corridor

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Name GARY MACK
Address 5377 ST. RTE. 132
E-mail
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

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(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

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Name JIM SCHUBERT
Address 1267 SHAYLER RD
E-mail RAPTOROV @ CINCI. RR.com
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1*** (widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

**Alternative 3** (interchange at existing Elick/Bach Buxton intersection)

**Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5** (no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

The FLY-OVERS RT 32 MUST include accomodations for Pedestrian and bicyclists.

I currently see numerous folks biking and walking Rt 32 and crossing whenever they get a chance since there are no cross walks. As such the cross walks and side walks must be ~~considered~~ included for Glen Este Withamsville, OLD 74 and Shayler /Bach Buxton as the main Residential feeder streets

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Name Glen Wiedenbein II

Address 4435 STRT 222 BATAVIA OH 45103

E-mail WiedenbeinFArms@yAhoo.com

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

**Alternative 3**
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**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

Alt 2 Seemes to be the best For EASE OF TrAFFic And getting From A to b.

**Please submit your comments to:**
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Blue Ash, OH 45242

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Name Karen Pointer
Address 111 St. Andrews Drive 45245
E-mail
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

~~**Alternative 1***~~
~~(widen existing SR 32)~~
~~**Alternative 1 is not being recommended for further study.*~~

[✓ **Alternative 2**
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**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

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amschneider@transystems.com
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Name JoEllan Mack
Address 5377 St. Rt. 132 Batavia Ohio 45103
E-mail
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

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Name Jane Kammer Habig
Address 4476 Glen Willow Drive
E-mail janekh@zoomtown.com
Organization (if any) private citizen / public representative on Clermont County Issue 2 Subcommittee

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1*** (widen existing SR 32) **Alternative 1 is not being recommended for further study.*

[✓ **Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)]

**Alternative 3** (interchange at existing Elick/Bach Buxton intersection)

**Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5** (no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

For years county officials have "suggested" Old SR 74 north of SR 32 will be widened PRIOR to any improvements on SR 32. I have NO objection to SR 32 improvements, but it is imperative to improve SR 74 before dumping any more traffic on a road which is only 1 lane each direction & already at maximum capacity 4-6pm. I have attended (except for the last one) all these corridor meetings + am disgruntled at the slow action on the whole plan. It would be helpful to "the citizenry" to know how best to get any portion of this project in motion.

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Name Debbie Myers
Address 4390 ELICK LN BATAVIA, OHIO 45103
E-mail dmyERS16@HOTMAIL.COM
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

[✓ **Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)]

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

No

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

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Name Michelle Hendricks
Address 962 Old St. Rt. 74 Batavia Oh 45103
E-mail
Organization (if any) Animal Wellness Hospital

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

[✓ **Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)]

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

I have a business at the corner of Glen Este Withamsville & old 74. It is essential to keep access to old 74 to maintain a profitable business environment

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

**Please submit your comments to:**
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Name Lydia Ward
Address 996 Paul St. Batavia, Ohio 45103
E-mail barneysmom@fuse.net
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1*** (widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

[✓ **Alternative 3** (interchange at existing Elick/Bach Buxton intersection)]

**Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5** (no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

I hope that if my House is involved that I get A Fair Price (At least what I paid For it 2 yrs ago. I don't think that A person should be Worst off. PLEASE give me A Fair Shake.

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Name Mike Roth
Address 4357 Ferguson Dr. #190
E-mail MikeRoth@Fuse.Net
Organization (if any) Roth + Associates, Inc.

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1*** (widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

[✓ **Alternative 3** (interchange at existing Elick/Bach Buxton intersection)]

**Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5** (no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

① Presented MAPS So only 1 person at a time could see

② Spoty presentation of Alternatives

**Please submit your comments to:**
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Name Sandee Bernard

Address 2950 Jackson Pike 45103

E-mail bernardjt@yahoo.com

Organization (if any) —

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
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[✓ **Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)]

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Yes

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

Like the Clepper Rd extension better than Aicholz Rd

**Please submit your comments to:**
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Name Edwin Foster

Address 4462 Forest Trail 45244

E-mail

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

[✓ **Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)]

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Yes

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

They all look good anything that will help out with traffic on 32. what ever you can do the best for the least money. Thank you.

Edwin Foster

**Please submit your comments to:**
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4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

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Name JIM BERNARD
Address 2950 JACKSON PK
E-mail BERNARD JT@YAHOO.COM
Organization (if any) __________

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

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[✓ **Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)]

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

YES

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

**Please submit your comments to:**
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Name VICTOR A. BREEHNE

Address 4313 WUEBOLD LA

E-mail VBREEHNE@GMAIL.COM

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
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[✓ **Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)]

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Yes

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

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Name Mike Igney
Address 544 Virginia Ln. Cincinnati, Oh 45244
E-mail migney@cinci.rr.com
Organization (if any) __________

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

[✓ **Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)]

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

NO

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

I Do Not want to See The New Library Affected. Maybe I Do Not understand the Proposals But I Do Not see That it would Benefit Traffic That much.

**Please submit your comments to:**
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Name Carol Emmel

Address 4613 Stablehand Dr. Batavia 45103

E-mail N/A

Organization (if any) N/A

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

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**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Yes

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

#2 Alternate – leaves only alternate route which I do not take at night or bad weather i.e. Shayler Rd.

**Please submit your comments to:**
SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

## SR 32 Eastgate Area Improvements – Comment Form

The Ohio Department of Transportation is working to improve conditions along SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by sharing your thoughts on this project. Comments related to this project will be accepted until **October 26, 2011**. Please note that all comments become part of the public record.

Name PETER + TERRI EDDINGTON
Address 4311 GLEN ESTE WITHAMSVILLE RD. 45245
E-mail peter_eddington@wcg.org
Organization (if any) ____

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

YES

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

**Please submit your comments to:**
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Name Diane McWethy

Address 1511 W. Meadowbrook Dr. Loveland OH 45140

E-mail dianemcw2001@yahoo.com

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1*** (widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3** (interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5** (no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

No Ramps that will impact the new library branch

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

I've included a typed statement Name Addy + Phone there
I like the concept of #1, but that's irrelevant
Can improvements be made without taking the
new ~~[illegible]~~ 6 million dollar UT Library Branch?
Please choose an alternative that will save
the library

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Blue Ash, OH 45242

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# SR 32 Eastgate Area Improvements – Comment Form

The Eastern Corridor

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Name CLIFF HOAGLAND
Address 4440 GLENESTE WITHAMSVILLE RD CINTI OH 45245
E-mail CHOAGLAND@TANDK.COM
Organization (if any) APPLEBEES

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

YES - DEFINATELY

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

IT WOULD HAVE BEEN NICE FOR SOMEONE COMING OFF 275 TO BE ABLE TO GET OFF DIRECTLY ONTO GE WITH. ROAD. - IT WOULD (will) BE NICE TO GET OFF AT EASTGATE BLVD -

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Name Tim Ross
Address 4807 Stoneybrook Rd., Cinti. OH 45244
E-mail
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
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**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Yes – ramps are good. Make sure there is plenty of lane-changing room. Need more than exists between Eastgate drive & I-275.

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

- Alt. 2 needs Aicholtz road + old SR74 improvements & connections to be useful as local access. Watch out for increased congestion @ Mt. Carmel intersection.
- Alt. 4 looks to be easier to acquire land & build vs. alt. 3. There is no big traffic need to cross SR32 @ Elick lane. Need to pick up cross traffic that does use old SR74 toward airport.

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Name Jennifer Milligan

Address 1197 old State Route 74 Batavia 45103

E-mail

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1* is not being recommended for further study.*

**Alternative 2**
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**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Yes

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

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Name GEORGE MILLIGAN

Address 1197 OLD STATE ROUTE 74

E-mail gmilligan_5141@fuse.net

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
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**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

YES

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

PLEASE DO SOMETHING ABOUT THE STORM DRAIN WATER ON OLD 74 BECAUSE OF ALL THE BUISINESS THAT HAS ACCUMULATED OVER THE PAST 10 YEARS

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The Eastern Corridor

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Name Carl Bockman
Address 4602 Pearl Ln, Batavia, OHIO 45103
E-mail
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Yes

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

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Name Millie Bockman

Address 4602 Pearl Ln. Batavia, OHIO 45103

E-mail ———

Organization (if any) ———

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

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(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

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**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

yes.

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

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Name ______________________

Address ______________________

E-mail ______________________

Organization (if any) ______________________

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

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(interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

______________________

______________________

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

PLEASE CONTINUE TO MAKE GRAPHICS AVAILABLE AFTER THIS FOR FURTHER STUDY!!

**Please submit your comments to:**
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Blue Ash, OH 45242

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Name PHILIP DODGE
Address 4525 ENGLISH CREEK DR CINCINNATI OH 45245-1308
E-mail PDODGE@CINCI.RR.COM
Organization (if any) NONE

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1*** (widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3** (interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5** (no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

YES

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

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The Eastern Corridor

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Name Chuck LANE

Address 886 CASTLE BAY Dr. Cinti, Oh 45245

E-mail ChuckLANe@ZOOMTOWN.COM

Organization (if any)

Cell 513 312-3989

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1*** (widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3** (interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)] good plan

**Alternative 5** (no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road? Yes

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

Buld this road as a part of I-74 thru CINCINNATI and all across Ohio. Buld I-73 (Old US23) thru Ohio. We need good roads for jobs & growth.

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Name Stuart Kennedy
Address 600 Kennedy Trails Cincinnati OH 45255
E-mail
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

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**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

[✓ **Alternative 5**
(no build)]

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

ARE You CRAZY thinking the tax payers
CAN Afford This?
What about All of the business AND homes that
would be displaced?
Every Politican, State employee AND County employee supporting
this will be voted out office AND/or Fired within
the next few years. The taxpayers will win!

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Name Julie Kennedy

Address 600 Kennedy Trails Cinti Oh 45255

E-mail

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
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**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

[✓ **Alternative 5**
(no build)]

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

Amazing to me that since you must have so much money to spend that you must disrupt so many lives + businesses to spend taxpayer dollars. Really! We'd love to have some of our money back and we will spend it. Our country and so many families are hurting right now because of finances. This is not wise atall. I'd love to fire anyone who is starting/stirring this pot.

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Name Carolyn Rutherford

Address 1005 Shepherds Glen Dr, Batavia, OH 45103

E-mail cmrhere@aol.com

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

~~**Alternative 1*** (widen existing SR 32) **Alternative 1 is not being recommended for further study.*~~

**Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3** (interchange at existing Elick/Bach Buxton intersection)

**Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)

[✓ **Alternative 5** (no build)] UNTIL You Know for Sure what traffic Volume Comes w/ Jungle Jims. (NOT just Guess)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to [✓ Glen Este-Withamsville Road?] → Do Not Close or Eliminate the access.

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

Mr. Hamilton said they do NOT project any added traffic (Local) Coming on SR 32 from EAST to WEST to Jungle Jims that would be backing up in all these new projected interchanges or around Eastgate. That's very shortsighted. There will be increased traffic on all ROADS to Jungle Jim/Eastgate – NOT just on I-275. So #5 would be my choice until you know The new traffic Volume; Before final Plans are done.

**Please submit your comments to:**

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Name Sara Heimbold

Address 4778 Timber Knoll Rd Cint. 45244

E-mail sheimbold@yahoo.com

Organization (if any) ____

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

we need a new idea.

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

Nothing works

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

____

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

Old 74 when construction starts is going to be even more congested. what do you propose to fix the problem?
What about mom & pop places they wont be able to survive all the closes.

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Name Denise Smith

Address 573 Laurel Grove Ct Cincinnati OH 45244

E-mail Smithp(at)fuse.net

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

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**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

I don't feel any of the Options are a good choice.

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

I have concerns about the students accessing the High School. There is no good route for students who live outside immediate HSchool area. I think the Board of Education should be contacted for ideas / input.

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Name PATRICK SMITH

Address 573 LAUREL GROVE COURT CINCINNATI OH 45244

E-mail SMITHPAT@FUSE.NET

Organization (if any) –

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

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(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

YES

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

UPGRADE SECONDARY ROADS (OLD 74) AND THE LIKE TO HANDLE EXTRA TRAFFIC FROM RT 32

**Please submit your comments to:**
SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

# SR 32 Eastgate Area Improvements – Comment Form

The Ohio Department of Transportation is working to improve conditions along SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by sharing your thoughts on this project. Comments related to this project will be accepted until **October 26, 2011**. Please note that all comments become part of the public record.

Name Kenneth F. Durbin

Address 10163 Old State Route 74 Batavia, Ohio 45103

E-mail K8CQO@zoomtown.com

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

yes

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

**Please submit your comments to:**
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Name TOM MANTEL

Address PO 157 MILFORD

E-mail tlmantel @ yahoo.com

Organization (if any) ______

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

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**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

______

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

Please save our new library

**Please submit your comments to:**
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TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**
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amschneider@transystems.com
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# SR 32 Eastgate Area Improvements – Comment Form

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Name Joan Owens

Address 1118 Flick Ln. Batavia, OH 45103

E-mail mojoowens@hotmail.com

Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

With all of the options, it appears much traffic would be diverted to old ST. Rt. 74; therefore ~~at~~ this road would need to be widened + a traffic light would need to be installed at Schoolhouse It already is dangerous making left turns at Schoolhouse + St Rt. 74. Also Glen Este Withamsville should be widened to the high school because of limited busing traffic has increased. Finally – Please do not impact the new library in any way Thank You

**Please submit your comments to:**
SR 32 Study Team
TranSystems
4555 Lake Forest Drive, Suite 540
Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

# SR 32 Eastgate Area Improvements – Comment Form

The Eastern Corridor

The Ohio Department of Transportation is working to improve conditions along SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by sharing your thoughts on this project. Comments related to this project will be accepted until **October 26, 2011**. Please note that all comments become part of the public record.

Name Jeffrey D. Hinkle
Address 1065 Batavia Pk
E-mail
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Not Exceptable

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

All secondary Roads need to be improved 74, Glen Esh
Withamsville MT Carmel Tobasco, Smaller Road like Teal Town
School House, Bridlewood, Kitty Dogwood Heilmann lane
Need new Traffic Intersections, Lights, lanes, +
widening of 74.

**Please submit your comments to:**
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Blue Ash, OH 45242

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amschneider@transystems.com
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## SR 32 Eastgate Area Improvements – Comment Form

The Eastern Corridor

The Ohio Department of Transportation is working to improve conditions along SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by sharing your thoughts on this project. Comments related to this project will be accepted until **October 26, 2011**. Please note that all comments become part of the public record.

Name MARK BREDEMEIER

Address 4357 FERGUSON DR; 200

E-mail MBREDEMEIER@KBAINC.COM

Organization (if any) KBA, INC. ARCHITECTS

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

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(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
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**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

I HAVE CONCERN OVER THE G.E-W RD RAMP OPTIONS. THE CLERMONT COUNTY PUBLIC LIBRARY HAS JUST PURCHASED A SITE AND IS DEVELOPING IT AS THE NEW UNION TOWNSHIP BRANCH. THESE ALTERNATES APPEAR TO WORK AROUND THE SITE; HOWEVER, I AM NOT SURE IT IS POSSIBLE. EVERYTHING WAS VERY WELL PRESENTED.

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Blue Ash, OH 45242

**Or contact the team:**
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Name JUDITH A. KELCH
Address 4191 SAGEWOOD CT. BATAVIA, OH 45103
E-mail
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

NEED TO SEE/REVIEW MORE. BECAUSE OF THE CROWD, DID NOT GET TO STUDY. IT WOULD BE BETTER TO PUT ON SLIDES, + HAVE A PRESENTATION RATHER THAN EMPLOYING 15 PEOPLE (I BELIEVE THIS IS WHAT ONE GENTLEMAN SAID) + PROBABLY PAYING O/T.

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**Or contact the team:**
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amschneider@transystems.com
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# SR 32 Eastgate Area Improvements – Comment Form

The Eastern Corridor

The Ohio Department of Transportation is working to improve conditions along SR 32 from Eastgate Boulevard to Olive Branch-Stonelick Road. Please help us by sharing your thoughts on this project. Comments related to this project will be accepted until **October 26, 2011**. Please note that all comments become part of the public record.

Name James Jeffries
Address 4203 Glen Este-Withamsville Rd Cinti. 45245
E-mail
Organization (if any) Resident

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

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(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
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**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

How many million dollars has been spent on survey's have been done on these different projects The people that are dealing with this is local people + local bussiness + not the people from Ky + Ind. Tax payer money is wasted with Every thing the twsp. is involved with

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Name Dolores E. Smith
Address 4187 Heritage Glen, Cinti oh 45245
E-mail grades@fuse.net
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
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(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

I strongly oppose the tearing down of the library that is being built. We have waited years for this to happen. I can see the need for alleviating congestion on Glen Este-Withamsville road & surely there must be another solution. The cost of tearing down a lot of the businesses is going to be out of sight! Why hasn't this proceeded before all the building

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has been done. We need improvements but not to negate what we have.

I am very concerned about the proposal to reconfigure the intersection of SR 32 and Glen Este-Withamsville Road. The Clermont County Public Library as invested millions of dollars and thousands of hours of planning & discussion. Surely, plans exist that are feasible I do not believe the state can pay the library for the full cost of what is already in place. Is their current building available after the new branch opening date? What about all of the euqipmnet , fixtures, furniture and books, movies and more that have been purchased for the new branch? Where would that be parked and how much would it cost CCPL?

CCPL provides valuable services to a wide variety of Clermont County citizens, from the very young to the very old. The library provides educational, informational and educational resources to all. If the new Union Township is forced to go, it will impact every CCPL branch negatively. This blow, along with recent budget cuts, will impact CCPL in a way that will prevent the branches from providing vital services, the collection will suffer, and staff will be cut. CCPL and the township will lose the public's trust.

Please give all plans consideration, and choose a plan that will not impact the new CCPL Union Township branch

And if you really want public input, how about starting the session later, and end later. Traffic is fierce, schedules are inflexible, and there are many demands on people's time. Why add another barrier?

Sincerely,

Diane McWethy

1511 W. Meadowbrook Dr.

Loveland OH 45140

513-722-0583

## SR 32 Eastgate Area Improvements – Comment Form

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Name BARBARA APEL
Address 607 SONNY LN CINTI OH 45244
E-mail BAPEL@AOL.COM
Organization (if any) RETIRED EDUCATOR

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2**
(interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5**
(no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

Only if you do not curtail parking for the library (Construction underway--old Ryan's Steakhouse)

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

Very pleased to see the efforts made to inform the public and seek input regarding the proposed options for the Eastgate area improvements.
Personnel were most helpful and patient with our questions.
Thank you!

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Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

424 Wards Corner Road
Loveland, OH 45140

TRANSMITTAL NO.:
JOB/PROJECT NO.:
FILE NO.:

# Tipton Interests

## FACSIMILE TRANSMISSION

DATE: 10/13/2011 TIME: 11:09:18 AM NO. OF PAGES: 2 (Including Cover Sheet)

| TO | FROM |
|---|---|
| Andrew Schneider | Bill Woodward |
| | |
| | cc: |
| ATTN: | |
| FAX NO.: 621-2901 | FAX NO.: 513/576-0268 |
| TEL. NO.: | TEL. NO.: 513/248-5648 |

**SUBJECT:** SR 32 Study Team

Andrew:

Attached please find my comment form from the recent meeting in Union Township. Thank you for soliciting feedback from effected businesses!

Bill Woodward
President

**Tipton Interests, Inc.**

# SR 32 Eastgate Area Improvements – Comment Form

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Name William Woodward

Address 424 Wards Corner Rd

E-mail bill@cincinnaticm.com

Organization (if any) Tipton Interests, Inc

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

[✓ **Alternative 1*** (widen existing SR 32) **Alternative 1 is not being recommended for further study.*]

**Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3** (interchange at existing Elick/Bach Buxton intersection)

**Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)

**Alternative 5** (no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

YES!

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

ALTERNATIVE #1 MINIMIZES THE NEGATIVE IMPACT OF LOSING CRITICAL ACCESS POINT (GLEN ESTE-WITHAMSVILLE) TO A MULTITUDE OF EXISTING BUSINESSES

ALSO EXTENSION OF CLEPPER LANE TO ELICK/BACH BUXTON IS CRITICAL

**Please submit your comments to:**

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**Or contact the team:**

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The Eastern Corridor

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Name MARY HEENEY
Address 2219 TRAPPERS KNOLL, BATAVIA, OH 45103
E-mail meheeney@fuse.net
Organization (if any)

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1*** (widen existing SR 32)
**Alternative 1 is not being recommended for further study.*

**Alternative 2** (interchange between Glen Este-Withamsville Road and existing Elick/Bach Buxton)

**Alternative 3** (interchange at existing Elick/Bach Buxton intersection)

[✓ **Alternative 4** (interchange between Elick/Bach Buxton and Old SR74)]

**Alternative 5** (no build)

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

YES

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

CHANGE PROPOSED RAMP/CONNECTIONS TO SPARE THE NEW UNION TWP LIBRARY BLDG

INTERCHANGE CLOSE TO SR 74 NECESSARY FOR CLERMONT COLLEGE TRAFFIC

**Please submit your comments to:**
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Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
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Name ROBERT EISEN
Address 4639 LAUREL VIEW DR, CINTI, OH 45244
E-mail BEISEN@CINCI.RR.COM
Organization (if any) —

Which of the conceptual alternatives do feel would be the best fit for this project? (Please circle one.)

**Alternative 1***
(widen existing SR 32)
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**Alternative 3**
(interchange at existing Elick/Bach Buxton intersection)

**Alternative 4**
(interchange between Elick/Bach Buxton and Old SR74)

[✓ **Alternative 5**
(no build)]

If Alternative 3 or Alternative 4 is selected as the Preferred Alternative, would you prefer to see the ramp connections to Glen Este-Withamsville Road?

?

Do you have any additional comments about any of the alternatives and/or the project in general? (Please write on the back and attach additional pages as necessary.)

SEE ATTACHED.

**Please submit your comments to:**
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TranSystems
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Blue Ash, OH 45242

**Or contact the team:**
Andrew Schneider
amschneider@transystems.com
513-621-1981, ext. 32-205
513-621-2901 – Attn. SR 32 Study Team (fax)

October 8, 2011

My <u>comments</u> on the SR 32 Eastgate Area Improvements:

We are very interested in this project since it will have a direct impact on our subdivision (Ashley Meadows), traveling to work, shopping, visiting friends, and any other traveling we do. Since we live two blocks from Bells Lane, the impact will be immediate.

We have been to three open houses at Union Township Civic Center, plus one presentation held at our Ashley Meadows HOA meeting at the Civic Center. At the earlier HOA meeting with an engineer, he started out being very civil minded and low keyed until the hard questions started, his attitude changed to being combative and finally saying well this is just the early stages of this project. We went away with the opinion that the owner of Gramma's Pizza and the Crosspointe church were happy so our subdivision of 144 houses should also be happy. He was so pleased that they signed off on it that our opinion mattered little in the scheme of things.

Attending the open houses at the Civic Center is chaotic, noisy, overcrowded, and confusing to say the least. There were four display boards, alternative one through four, with an engineer of some type standing in front of or close to each one. You have to get within two feet of the board to try and make any sense of it, so if there are more than five people you are blocked out. You know the board is showing some type of alternate choice, but you're not sure what the choice is. It's very noisy so trying to hear the engineer, unless you are two feet away, is impossible. A few in the crowd are very intent on having their specific concern explained, so they dominate the display board and the subject matter.

If you stay long enough and keep trying to move closer you can make sense of some of the displays and explanations. Toward the end of the two hours the engineer's attitude and demeanor changes, especially with the large crowd on September 28. They end up saying "well nothing is set in stone and all of this is preliminary, we just want your comments until the next open house, then we will be a lot closer to the finished product". So you leave knowing that there were four choices with choice one not being very serious and we may know more in 2012, or 2013.

This is what I got out of it. When the project was years away it made for some good but impractical presentations and far out ideas. Now that we are getting somewhat closer, nothing really seems to work. The SR 32 improvement idea is just too big and isn't feasible, but they aren't willing to scale it down. So we are now at an impasse, with no one willing to admit that a mistake was made and try to rectify it.

If we were permitted to vote on one alternative only I would have to take alternate five (no build), which is a shame and counterproductive!

Bob Eisen

Bob Eisen
4639 Laurel View Dr.
beisen@cinci.rr.com

| | |
|---|---|
| **From:** | Gene R. Smith [grsdes@fuse.net] |
| **Sent:** | Wednesday, September 28, 2011 9:57 PM |
| **To:** | CO-Andrew Schneider |
| **Subject:** | SR 32 Eastgate Area Improvements |
| **Follow Up Flag:** | Follow up |
| **Flag Status:** | Flagged |

Hi Andrew,

It was good to talk to you this evening at the Civic Center, and I thought you did a good gob explaining the proposed Alternative #4. Can you help me get more data?

I looked on the website at www.tid.clermontcountyohio.gov, hoping to print out the maps for #2, #3, and #4 so I could go over them with my wife and neighbors, however the only map was one showing the overall improvement area, not showing the above alternatives with their proposed changes, interchanges, etc.

I would appreciate it if you have maps of those alternatives, and where I can find them, so I can print them out. You can let me know by e-mail, at grsdes@fuse.net.

Thanks for your help.

Gene Smith
4187 Heritage Glen
Cincinnati, Ohio 45245

P.S. One question I forgot to ask you at the meeting, was how much area would be available for parking at the Library if any one of the three alternatives above would be the final senerio.

| | |
|---|---|
| **From:** | smichael7@cinci.rr.com |
| **Sent:** | Wednesday, September 28, 2011 4:19 PM |
| **To:** | CO-Andrew Schneider |
| **Subject:** | Union Township Library |

Please choose an option that does not affect the new library.

Yours truly,

Susan Michael

## CO-Jen Spinosi

| | |
|---|---|
| **From:** | CO-Andrew Schneider |
| **Sent:** | Wednesday, October 12, 2011 9:22 AM |
| **To:** | CO-Jen Spinosi |
| **Subject:** | FW: ST. RT. 32 construction |

FYI

---

**From:** Manger, Pat [mailto:pmanger@clermontcountyohio.gov]
**Sent:** Wednesday, October 12, 2011 9:21 AM
**To:** CO-Andrew Schneider
**Subject:** FW: ST. RT. 32 construction

Andy,

I received this the other day and thought I would forward on to you for follow up.

Sincerely,

Patrick J. Manger

Patrick J. Manger, P.E. - P.S.
Clermont County Engineer
2381 Clermont Center Drive
Batavia, Ohio 45103
(513) 732-8068

---

**From:** Dan & Kerry Braun [mailto:d_kbraun@yahoo.com]
**Sent:** Thursday, September 29, 2011 8:57 PM
**To:** Manger, Pat
**Subject:** ST. RT. 32 construction

Mr. Manger,
I own a home on Fayard Drive right off of St. Rt 32. Will this property at 4423 Fayard be impacted by the planned construction?
Thank you for your response.
Dan Braun

---

**From:** David Bolten [dbolten@cinci.rr.com]
**Sent:** Thursday, September 29, 2011 9:58 AM
**To:** CO-Andrew Schneider
**Subject:** SR 32 Eastgate Area Improvements

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Dear Sir,

My wife and I sincerely ask that other options are considered better than taking the area for the new library. This area library is used heavily and its relocation with enhanced space has been planned for a long time. Demolition of the current project and delay of better services will certainly be felt deeply in this community.

Sincerely,

Dave and Chris Bolten
Eastgate

| | |
|---|---|
| **From:** | djbryson@fuse.net |
| **Sent:** | Thursday, September 29, 2011 12:09 PM |
| **To:** | CO-Andrew Schneider |
| **Subject:** | SR 32 EASTGATE AREA IMPROVEMENTS |

| | |
|---|---|
| **Follow Up Flag:** | Follow up |
| **Flag Status:** | Flagged |

To Whom it May Concern: I am writing in regard to the Eastern Corridor project on SR 32 in Clermont County as it affects our businesses, homes, etc. I strongly urge you to consider where this new road goes and just how many people will be affected by your decisions.

Today I am writing on behalf of the new Union Township Branch Library on Glen Este - Withamsville Road. This library purchased land which had a restaurant on it which had closed. The library system was assured at that time that the new road WOULD NOT affect their plans to completely renovate the building and open a badly needed new library at the end of 2011. Now, as a library patron, I have been told that the new road may now in fact come through the new building. If this is the case, who re-pays the money already spent on renovations???

Does this mean that the public cannot believe what we are told??? Does it mean that nobody KNOWS where the road will be??? I've tried to get a current plan on the computer - no luck.

I'd like some answers, along with a lot of other people who live in Union Township.

**From:** Joan Owens [mojoowens@hotmail.com]
**Sent:** Thursday, September 29, 2011 11:28 AM
**To:** CO-Andrew Schneider; d08.pio@dot.state.oh.us
**Subject:** Eastern Corridor, Segment IV(a) - CLE-32.2.25, PID 82370

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

I live off of School House Road, and I have major concerns that all of the alternatives presented at the Public Open House on September 28, 2011 have the interchange from SR 32 dumping traffic onto St. Rt. 74. I anticipate major traffic congestion on this road from westbound travelers coming into the Eastgate area. Part of this study should include major improvements to St. Rt 74. At a minimum the road should be expanded to at least include a middle turn lane option. Also, it is already very difficult trying to make a left turn from School House onto St. Rt 74 because there is no traffic light at this intersection. I would hope with the additional traffic projections, there would be a plan in place to put a traffic light at this intersection.

Also I did not notice if there were any links to Aicholtz Lane for westbound travelers trying to get to the south side of St. Rt. 32. I am extremely concerned that you are only shifting the traffic problem from Rt 32 to Rt 74; but, Rt. 74 cannot handle the traffic because it is only two lanes.

Finally, please do not move forward on any plans that would jeopardize the new Union Township library (either parking or the beautiful facility). Thank you.

Joan Owens

1118 Flick Lane

Batavia, OH 45103

513-753-9944

## CO-Jen Spinosi

**From:** David Bolten [dbolten@cinci.rr.com]
**Sent:** Thursday, September 29, 2011 12:21 PM
**To:** CO-Andrew Schneider
**Subject:** Re: SR 32 Eastgate Area Improvements

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Thanks for the quick reply.

Dave
On Sep 29, 2011, at 10:02 AM, <amschneider@transystems.com> <amschneider@transystems.com> wrote:

> Thank you for your comment.  Please note that none of the alternatives directly impact the library property.  An optional component of Alt 3 & 4 includes a ramp in one of two locations near the library--one does not impact the property and one could impact some parking spaces. While the ramp does provide some benefit, Alt 3 & 4 can function without it.
>
> Again, thank you for your comment.
> Andy
>
> -----Original Message-----
> From: David Bolten [mailto:dbolten@cinci.rr.com]
> Sent: Thursday, September 29, 2011 9:58 AM
> To: CO-Andrew Schneider
> Subject: SR 32 Eastgate Area Improvements
>
>
> Dear Sir,
>
> My wife and I sincerely ask that other options are considered better than taking the area for the new library. This area library is used heavily and its relocation with enhanced space has been planned for a long time. Demolition of the current project and delay of better services will certainly be felt deeply in this community.
>
> Sincerely,
>
> Dave and Chris Bolten
> Eastgate

## CO-Jen Spinosi

|  |  |
|---|---|
| **From:** | Joan Owens [mojoowens@hotmail.com] |
| **Sent:** | Thursday, September 29, 2011 6:30 PM |
| **To:** | CO-Andrew Schneider |
| **Subject:** | RE: Eastern Corridor, Segment IV(a) - CLE-32.2.25, PID 82370 |
| **Follow Up Flag:** | Follow up |
| **Flag Status:** | Flagged |

I appreciate your reply. After further reviewing the interchange options, I still have strong concerns that St Rt 74 will not be able to handle the additional traffic that would be anticipated unless the road is widened and a traffic light is installed at Schoolhouse. My vote is definitely for Option 2. Thank you again for your consideration.

---

From: amschneider@transystems.com
To: mojoowens@hotmail.com; d08.pio@dot.state.oh.us
Date: Thu, 29 Sep 2011 14:02:23 -0500
Subject: RE: Eastern Corridor, Segment IV(a) - CLE-32.2.25, PID 82370

Hello Ms. Owens. Thank you for your comment. All interchange options will certainly need to consider what improvements might be necessary on the local network to handle the traffic. The maps for the four alternatives are available on ODOTs website at the following link:

http://www.dot.state.oh.us/districts/D08/Pages/CLE32Alt.aspx

Finally, please note that none of the alternatives directly impact the library property. An optional component of Alt 3 & 4 (shown on Alt 4) includes a ramp in one of two locations near the library--one does not impact the property and one could impact some parking spaces. While the ramp does provide some benefit, Alt 3 & 4 can function without it.

Please let me know if I can answer additional questions. And, again thank you for your comment.
Regards,
Andy

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**From:** Joan Owens [mailto:mojoowens@hotmail.com]
**Sent:** Thursday, September 29, 2011 11:28 AM
**To:** CO-Andrew Schneider; d08.pio@dot.state.oh.us
**Subject:** Eastern Corridor, Segment IV(a) - CLE-32.2.25, PID 82370

I live off of School House Road, and I have major concerns that all of the alternatives presented at the Public Open House on September 28, 2011 have the interchange from SR 32 dumping traffic onto St. Rt. 74. I anticipate major traffic congestion on this road from westbound travelers coming into the Eastgate area. Part of this study should include major improvements to St. Rt 74. At a minimum the road should be expanded to at least include a middle turn lane option. Also, it is already very difficult trying to make a left turn from School House onto St. Rt 74 because there is no traffic light at this intersection. I would hope with the additional traffic projections, there would be a plan in place to put a traffic light at this intersection.

Also I did not notice if there were any links to Aicholtz Lane for westbound travelers trying to get to the south side of St. Rt. 32. I am extremely concerned that you are only shifting the traffic problem from Rt 32 to Rt 74; but, Rt. 74 cannot handle the traffic because it is only two lanes.

Finally, please do not move forward on any plans that would jeopardize the new Union Township library (either parking or the beautiful facility). Thank you.

Joan Owens

1118 Flick Lane

Batavia, OH   45103

513-753-9944

| | |
|---|---|
| **From:** | blhyden@zoomtown.com |
| **Sent:** | Monday, October 10, 2011 8:24 PM |
| **To:** | CO-Andrew Schneider |
| **Subject:** | Betty Hyden |
| | |
| **Follow Up Flag:** | Follow up |
| **Flag Status:** | Flagged |

I Am a property owner at 1273 Heitman Ln . Batavia , ohio 45103 the alternate RT. going thru. Heitman i can see will be a real nuisance more traffic in front of my house and RT. 32 behind the house that would be not acceptble for the home owners there . i sure wish there would be a different alternative. i am 3rd house from old 74.

Thanks for attention
Betty Hyden

## CO-Jen Spinosi

**From:** Tonya Spurlock [ktms1990@yahoo.com]
**Sent:** Monday, October 03, 2011 1:32 PM
**To:** CO-Andrew Schneider
**Subject:** Heitman Lane concerns

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Hello,
My family ownes a property on Heitman ln, where the proposed road will be going in. Currrently, as you know there is a MAJOR highway to the back of Heitman, and now it looks like a large through road in the front of the homes.
I've spoken to a few home owners on the street and they have chosen not to come to the meetings or speak out because they feel that the decisions have already been made and there is no value to their opinions.

I realize the deadline for comments is Oct 26, but what kind of feedback are you looking for? I can say that nearly every home owner on the street has been there over 25 years. Typically these are older folks and would hate to move, but are concerned that they could not sell with these changes anyway. Would it be possible for their homes to be bought out? I'm sure you could appriciate not living with a highway in your front and back yards!

I would think that the value of homes will significantly decrease with this new road. This is a concern for many of our neighbors.

Thanks!

**Tonya Spurlock**

**The elevator to sucess is out of order, you will need to take the stairs, one step at a time.**

## CO-Jen Spinosi

| | |
|---|---|
| **From:** | Tonya Spurlock [ktms1990@yahoo.com] |
| **Sent:** | Tuesday, October 04, 2011 7:19 PM |
| **To:** | CO-Andrew Schneider |
| **Subject:** | RE: Heitman Lane concerns |
| | |
| **Follow Up Flag:** | Follow up |
| **Flag Status:** | Flagged |

Andy,
Thanks for responding to my e-mail. It looks to me that no matter which of the three alternative plans are chosen that the road will still go down Heitman ln. Is it being discussed to buy out these homes? I would imagine if anyone on the committee lived on this street they would not want a highway as a front and back yard! My parents own 1273 Heitman, and they rent it to a disabled woman, who wants to live out her life there. They have no desire to be bought out, but I know of someone who does.

Clearly it is undesirable to have such traffic congestion with two major roads up next to your house! I suppose my question is this- is there any other way to avoid the road going down Heitman? Will public imput make a difference on this part of the plan?

Thanks!

**Tonya Spurlock**

**The elevator to sucess is out of order, you will need to take the stairs, one step at a time.**

--- On **Mon, 10/3/11, amschneider@transystems.com** <*amschneider@transystems.com*> wrote:

From: amschneider@transystems.com <amschneider@transystems.com>
Subject: RE: Heitman Lane concerns
To: ktms1990@yahoo.com
Date: Monday, October 3, 2011, 1:47 PM

Hello Ms. Spurlock. At the public meeting we presented four alternatives. These may be viewed on the Eastern Corridor website, as well as ODOT's website:

http://www.dot.state.oh.us/districts/D08/Pages/CLE32Alt.aspx

We also handed out the attached information, and included a comment form on which attendees (and anyone else) could circle which alternative they liked and why. While Alt 1 is not being carried forward, I might mention the other three alternatives do indeed include an additional lane on SR32 in each direction and an overpass/bridge at Old SR 74. There would no longer be direct access from SR 32 and Old SR 74. Access would be via the new interchange (one of three locations) or by Olive Branch-Stonelick (south to Old SR 74). Note that Alt 2 includes a Heitman Lane extension over to Olive Branch-Stonelick. An attempt will be made to avoid as many residential impacts as possible.

I'd be happy to answer any other questions you might have, either by email or phone (513-621-1981 ext 32205). I would ask that you please complete a comment sheet and distribute to your neighbors if they wish to comment as well. It is extremely important to gather input that this early stage. We will of course accept comments throughout the life of the project, but for the purposes of moving forward, there is a 30 day period following the public meeting.

I hope this helps. Again, please let me know if you have additional questions.

Thanks,

Andy

**From:** Tonya Spurlock [mailto:ktms1990@yahoo.com]
**Sent:** Monday, October 03, 2011 1:32 PM
**To:** CO-Andrew Schneider
**Subject:** Heitman Lane concerns

Hello,

My family ownes a property on Heitman ln, where the proposed road will be going in. Currrently, as you know there is a MAJOR highway to the back of Heitman, and now it looks like a large through road in the front of the homes.

I've spoken to a few home owners on the street and they have chosen not to come to the meetings or speak out because they feel that the decisions have already been made and there is no value to their opinions.

I realize the deadline for comments is Oct 26, but what kind of feedback are you looking for? I can say that nearly every home owner on the street has been there over 25 years. Typically these are older folks and would hate to move, but are concerned that they could not sell with these changes anyway. Would it be possible for their homes to be bought out? I'm sure you could appriciate not living with a highway in your front and back yards!

I would think that the value of homes will significantly decrease with this new road. This is a concern for many of our neighbors.

Thanks!

Tonya Spurlock

The elevator to sucess is out of order, you will need to take the stairs, one step at a time.

# CO-Jen Spinosi

**From:** Keys Font [keys130@gmail.com]
**Sent:** Friday, October 07, 2011 3:38 PM
**To:** CO-Andrew Schneider
**Subject:** Eastgate Area Improvements

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

These improvements should not take place 1. You'll be destroying peoples yards and homes to build this extension. 2. Misuse of funds- this area was just remodeled. take the money and focus on upgrading the existing roads. If we are in a recession why would be focus on building new roads when we cant even maintain the ones we have.

Who is the person who said we needed to build new roads in the Eastgate Area?

MISUSE of funds!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

**From:** Osborne, Deborah [DOsborne@entran.us]
**Sent:** Monday, October 10, 2011 4:14 PM
**To:** CO-Andrew Schneider
**Subject:** FW: Eastern Corridor: StRt32

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Andy - I'm not sure you got this one - that's what sparked the previous email about giving you access.

Deb

-----Original Message-----
From: Alex Lambros [mailto:theophanes677@aol.com]
Sent: Sunday, October 09, 2011 8:53 AM
To: ECSegment4a
Subject: Eastern Corridor: StRt32

This is an enquiry e-mail via http://www.easterncorridor.org/ from:
Alex Lambros <theophanes677@aol.com>

On September 28, 2011, at the Public Open House, the Ohio Department of Transportation (ODOT) and the SR32 Study Team introduced several proposals for public review and comment regarding redevelopment of the State Route 32 corridor that will change the existing access on State Route 32 within Union Township.

These alternatives provided several options that addressed the needs of ODOT in order to ensure the provision of safe traffic flow and to reduce congestion along St Rt. 32 corridor. However, these proposals did not show any improvements to Old State Route 74 or Aicholtz Road or other local roadways which will be forced to accommodate the redirection of all local traffic and would likely shift safety and congestion issues onto the local and county roads in this area.

Without considering the inclusion of the redevelopment of ALL secondary roadways within Union Township in order to improve safety and congestion on the St Rt. 32 corridor, ODOT will inadvertently pass the financial burden to the Clermont County taxpayers to make improvements to our local roadways and jeopardize the safety of our citizens in emergency situations.

As taxpayers of Union Township and the entire County, we must express our concerns regarding ODOT’s lack of consideration in the implications of resulting improvements necessary on the local road infrastructure and the financial burden to the citizens of Clermont County.

We as taxpayer must MAKE the time to express our concerns regarding the safety implications for our secondary roadways within Union Township and the financial burden to the local taxpayers regarding ODOT proposals during the open comment period which will expire on October 26, 2011.

The bottom line is that our secondary roadways, in their current state, will never be able to accommodate the increased traffic volume and jeopardize the safety of our citizens, places an unreasonable financial burden on local taxpayers and substantially reduces our ability in economic development. We can not sit in the sidelines and expect the Government always to do the right thing. SPEAK OUT this is our only chance.

Alex Lambros
1069 Clough Pike

**From:** Mollie Labeda [mj.labeda@gmail.com]
**Sent:** Monday, October 10, 2011 12:03 PM
**To:** CO-Andrew Schneider
**Subject:** 32 Projects a Win!

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Hello,

I wanted to give some positive feedback to the effort put forth to improve the corridor. I work at Xavier (have worked at UC before) and it is a pain to get to work from my home in Pierce Township to Norwood. Many of the routes are congested (471, Columbia Parkway, if there is a concert or flooding- Kellogg and 275 is horrible) or slow (32 through Newtown is a nightmare). It takes me a good 45 minutes to get back and forth, mostly just sitting in traffic. I have many times wished that there was a highway that continues across the city to the east side.

This option will be a fantastic way to reduce that congestion and offer an alternative to the already overwhelmed 32 and the alternates. I am very excited! I am also intrigued by the rail option, although it does not (yet) offer a stop at Xavier, what a wonderful addition to the options.

Mollie Labeda
Pierce Township resident

**From:** Dan & Kerry Braun [d_kbraun@yahoo.com]
**Sent:** Thursday, October 13, 2011 7:33 PM
**To:** CO-Andrew Schneider
**Subject:** Re: ST. RT. 32 construction

Andy,
Thank you for the information that you have provided. I have a rental property on Fayard Dr. but live in Dayton, Ohio and was interested whether or not our properties were part of the ground needed to complete the project. This would impact decisions for future rental plans.
Thank you for your help,
Dan Braun

**From:** "amschneider@transystems.com" <amschneider@transystems.com>
**To:** d_kbraun@yahoo.com
**Sent:** Wednesday, October 12, 2011 9:33 AM
**Subject:** FW: ST. RT. 32 construction

Mr. Braun, Im returning your email on behalf of Pat Manger. I am the project manager at the consultant firm working for ODOT on the SR 32 project. First, a preferred alternative has not yet been selected. We are actively soliciting feedback from the community on three alternatives. These alternatives are available to view at the following links:

http://www.dot.state.oh.us/districts/D08/Pages/CLE32Alt.aspx
http://tid.clermontcountyohio.gov/Segment+IVA.aspx
http://www.easterncorridor.org/eastgate-area-corridor/segment-iva-sr-32-eastgate-public-involvement/september-2011-open-house

Your home should not be directly impacted by the alternatives under consideration. However, access to SR 32 from Fayard will be closed off, as it will at all access points between Eastgate and Olive Branch-Stonelick. A new interchange is proposed at one of three locations between Eastgate and Olive Branch-Stonelick (Alternatives 2-4). Alternative 1 is not being carried forward in the study.

Please feel free to email me or call (513-621-1981 ext 32205) if you have other comments or questions.
Thanks,
Andy Schneider

---

**From:** Dan & Kerry Braun [mailto:d_kbraun@yahoo.com]
**Sent:** Thursday, September 29, 2011 8:57 PM
**To:** Manger, Pat
**Subject:** ST. RT. 32 construction

Mr. Manger,
I own a home on Fayard Drive right off of St. Rt 32. Will this property at 4423 Fayard be impacted by the planned construction?
Thank you for your response.
Dan Braun

## CO-Jen Spinosi

**From:** samichel@earthlink.net
**Sent:** Sunday, October 16, 2011 2:06 PM
**To:** CO-Andrew Schneider
**Subject:** SR32 Study Team Proposal Comments

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Hi,

I revisited the project site after seeing in the Community Journal that a open house had been presented with updated info.
Up to now, the information had been somewhat sketchy, but the latest proposals were much better, though lacked any information on current and projected traffic loads for each proposal. (I understand this is difficult to obtain and speculative) Nevertheless, after reviewing the 4 proposals I would like to submit my observations and suggestions for review.
Perhaps taking portions of #2 and #3 would be best.

Ranked:

Proposal 2
- much cleaner integration between SR74, SR32, and Bach-Buxton
- I would suggest NOT completing the Heitman Ln extension. While this may artificially offload traffic from the 2 lane SR32 onto the new 1 lane extension, it would ultimately create a CHOKE POINT where it would dump into the 1 lane SR74 and much of the traffic would again attempt to enter SR32 to obtain access to the businesses farther west.
* consider use of curved Glen-Este/Alcholtz extension idea from #3 to avoid clash with residentials,
  and provide smoother integration with Bach Buxton,
  and also consider a new entrance into high school at the mid-point of the back of the main lot
  connecting to the Glen Este/Alcholtz curved extension to Bach Buxton.

Proposal 3
- Old SR 74 tie-in too far down to be of real benefit. Also, disruption/displacement of existing residencs and busnesses to justify
* Consider a new entrance into high school at the mid-point of the back of the main lot
  connecting to the Glen Este/Alcholtz curved extension to Bach Buxton.

Proposal 4
- CLepper Ln. extension overly disruption/displacement of existing residencs and busnesses to justify
- Old SR 74 tie-in too far down to be of real benefit. disruption/displacement of existing residencs and busnesses to justify

Proposal 1
- Blocking of Eastgate Square Blvd is a bad idea.
- Does nothing to address interconnections between SR74, SR32, Bach-Buxton, and Glen Este Withamsville.

Applies to all proposals: Blocking of inbound Eastgate Square Blvd traffic is a bad idea...blocking of outbound to SR32 would be good.

** Consider an over pass extesion of Eastgate Square Blvd to cross SR32. No ramps, just a cross over.

This would provide a direct connection between the 2 large business areas, which are expected to have drastically increased traffic once Jungle Jim's comes online, and other prospective businesses.

* One concern I have, and perhaps that is due to ODOT project funding vs. Clermont County funds, is the lack of a 'through' access at Glen Este High School.  It does have a back entrance via Wuebold Ln., but this dumps directly into the middle of a residential area. With the introduction of the Glen-Este/Alcholtz extension to connect to Bach-Buxton, it would make great sense to include a new entrance for Glen-Este High School off of the mid-point of the back of the main lot that would connect to the new Glen Este/Alcholtz extension to Bach Buxton.

Thanks for your consideration of the above items and continued work towards improving the traffic and connectivity issues.

Sincerely,
Steve Michel

**From:** Chris Coldiron [ccoldiron@guardiansavingsbank.com]
**Sent:** Monday, October 17, 2011 5:51 PM
**To:** CO-Andrew Schneider
**Subject:** RE: eastern corridor project (can you please give me a call ?)

Hi Andy,

Thanks for your quick reply.

I am not sure if you handle the responsibilities for where my lot is.
Do you know where St.Rt. 32 & Hickory Creek Drive intersect?
It is just west of Eight Mile Road (before you get to Burger Farm) on the south side of St.Rt. 32.

Can you answer any questions relating to that portion of the project?

The section of St.Rt. 32 where my Vacant Lot is would have nothing to do with the potential alternatives which you sent to me for review.

Sincerely,

Chris Coldiron
cell # : (513) 313-1593

-----Original Message-----
From: amschneider@transystems.com [mailto:amschneider@transystems.com]
Sent: Monday, October 17, 2011 5:08 PM
To: ccoldiron@guardiansavingsbank.com
Subject: RE: eastern corridor project (can you please give me a call ?)

Hi Chris, thanks for the email. I can certainly give you a call and answer what questions I can (though Im not in the office for most of the week). If you had not attended the public meeting Sept 28, the potential alternatives are available on ODOTs website at the following link:
http://www.dot.state.oh.us/districts/D08/Pages/CLE32Alt.aspx

If you had not seen the alternatives, plesae take a look and we can discuss.
If you have seen them and have questions, I can try to answer those as well.

Thanks again and I look forward to talking with you.
Andy

---

From: Chris Coldiron [ccoldiron@guardiansavingsbank.com]
Sent: Monday, October 17, 2011 2:59 PM
To: CO-Andrew Schneider

Subject: eastern corridor project (can you please give me a call ?)

Hi Mr. Schneider.

I was hoping to ask you a couple of questions regarding this project.

I own a vacant lot along St.Rt. 32 and Hickory Creek Drive.
This is a corner lot at that intersection.

My cell phone is listed below.

Sincerely,

Chris Coldiron
cell # :  (513) 313-1593

**From:** hzehetmaier [hzehetmaier@cinci.rr.com]
**Sent:** Tuesday, October 18, 2011 12:38 PM
**To:** CO-Andrew Schneider
**Subject:** Re: Sr 32

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Thank you very much.
As a resident in this area and as a now retired highway design project manager with KZF, Alternative 2 is my preferred option.
Heinrich

----- Original Message -----
From: <amschneider@transystems.com>
To: <hzehetmaier@cinci.rr.com>
Sent: Monday, October 17, 2011 4:58 PM
Subject: RE: Sr 32

Yes, the options may be viewed at the following link:
http://www.dot.state.oh.us/districts/D08/Pages/CLE32Alt.aspx

Please let me know if you have questions or comments.
Thanks,
Andy

---

From: hzehetmaier [hzehetmaier@cinci.rr.com]
Sent: Monday, October 17, 2011 9:12 AM
To: CO-Andrew Schneider
Subject: Sr 32

Mr. Schneider,
Is there a website the various SR 32 plan options can be viewed?
I would greatly appreciate your help.
Thanks,
Heinrich

## CO-Jen Spinosi

| | |
|---|---|
| **From:** | Sarah Schneider [sschneider@saybrookmarketing.com] |
| **Sent:** | Tuesday, October 25, 2011 12:00 PM |
| **To:** | CO-Andrew Schneider |
| **Cc:** | Vogel, Joe; Hamilton, Jay; Laura Whitman |
| **Subject:** | Fwd: Eastern Corridor: Union Township library |

Andy,
The comment in the email below was submitted through the Eastern Corridor website. We can respond to this email with a message that says, "Thank you for sharing your comment. The Implementation Partners and project team appreciate your feedback and will add your comment to the official meeting record."

We can send this email from the responses@easterncorridor.org account. Please let me know if this is okay or if you prefer a different response. I look forward to hearing from you soon.

Thank you!

Sarah

---------- Forwarded message ----------
From: **Kelley Paul** <kelleyp13@yahoo.com>
Date: Mon, Oct 24, 2011 at 2:34 PM
Subject: Eastern Corridor: Union Township library
To: ECSegment4a@entran.us

This is an enquiry e-mail via http://www.easterncorridor.org/ from:
Kelley Paul <kelleyp13@yahoo.com>

Please keep in mind that young children will be using the library. We go frequently, and I worry about the road being so close to my children. We would also be disappointed if the ramp took away the outdoor children's area.

--

**Sarah Schneider** | Account Associate
3665 Erie Avenue | Cincinnati, OH 45208
Saybrook Marketing Communications, LLC.
Facebook | Twitter | LinkedIn | Blog |
Email: Sarah Schneider | Phone: 859.391.1590

October 24, 2011

To Whom It May Concern

This letter is with regards to the SR 32 Eastgate Area Improvements: Eastgate Boulevard to Olive Branch-Stonelick Road; Eastern Corrider, Segment IV(a) – CLE-32-2.25, PID 82370.

I am in favor of Alternative 2 – interchange on SR 32 between Glen Este-Withamsville Road and the existing Elick Lane/Bach Buxton Road. I think that location for this interchange is best suited for several reasons. First, most of the land needed is undeveloped and would be more cost effective as to the number of homeowners and businesses that would need to be purchased for the Right of Way for this development.

Secondly, it appears that this interchange would balance out the traffic accessing Old SR 74 to the north of SR 32 and traffic flowing onto Buch Buxton Road to the south rather than off/on ramps at Glen Este-Withamsville Road.

And third, it involves me directly. I live at 996 Paul Street Batavia, Ohio in the Thomas and Mame Clepper Subdivison Lot 31, Parcel 414109B031 which borders the new Clermont County Public Library on Glen Este-Withamsville Road near SR 32. If and when, more likely when, current access to my subdivision is closed (Fayard Drive and SR 32), another access is needed. As it stands right now, it is very likely my property will be acquistioned by the state in order to extend Paul Street to Glen Este-Withamsville Road.

There is another way out of the subdivision that I think should be considered. At the other end of Paul Street there is a 40' wide by approximately 900' long wooded strip that comes out onto Old SR 74. Parcel 413104B306. I've been told that this strip of land was originally used as a road sometime in the past. I believe that this possible access to and from the subdivision is well worth considering. From what I can see, no one would have to lose their home. Please see attachments.

Why couldn't Paul Street be extended into Jamestown Crossing whereby using their exit system? Also, if the interchange as discussed in Alternative 2 materializes, why can't Paul Street extend through Jamestown Crossing to the interchange and exit/enter?

I purchased my home at 996 Paul Street in late May 2009. I moved to this area to be near my friend, Rita Walston who lives down the street from me at 4433 Fayard Drive. I have a degenerative eye disease which will prevent me froming driving at some point and possibly affecting other aspects of my life. She was kind enough to suggest I move here, when this property came up for sale, so that she could help me when I needed her. This house is near everything and is convenient for me to get around. Alternatives 2, 3 and 4 show Paul Street being extended through my property.

The thought of losing my home is very stressful. I'm retired and on a fixed income. I used my life savings as a down payment on this house. I have a good interest rate. I was planning on staying here indefinitely. Now the housing values have dropped significantly. I may not be able to recoup what I have monetarily in the house. I cannot afford to lose in this situation. Why should I be worst off for something that I have no control over?

Thank you for your consideration.
Lydia Ward Ph: 513-753-0919

513-753-0919

---

**From:** David Belshaw [belshaw_dave@yahoo.com]
**Sent:** Tuesday, October 25, 2011 8:15 AM
**To:** CO-Andrew Schneider
**Subject:** US 32 corridor project.

Greetings sir.

I have lived on the east side since the '60s and basically grew up here. I have lived in the East Gate area for 16 years in both Batavia township and Union township. I have seen the area grow as have all the other residents. The 32 corridor as it is called has been overloaded since I can recall. Most of this is due to how the local governments have ignored common sense when it comes to anything but revenue. They allowed business and residential development to run rampant but never gave any thought to SR 32 or any of the side roads that feed it. Much the same thing has been done to SR 125. There have been no ramps added to SR 125.

I for one see nothing good regarding any modifications to SR 32 by adding off or on ramps to dump traffic on already crowded and dangerous side routes such as SR 74 or clough pike for example. What is done is done and folks need to recognize that and live with it. We have seen one business close down already with just the mention of this activity and that was Cheese Burger in Paradise. That caused the loss of 40 jobs from just the one business closure. Our economy could benefit from whatever money is earmarked for this by being used for other good causes, but not at the cost of people's jobs.

Recall the physician's oath, first do no harm.

Please do not add any ramps to SR 32 in the East Gate area as all it will do is distribute the madness to other roadways that are supported and paid for by smaller governments.

Thank you for your time Andrew.
Respectfully,
Dave Belshaw.

EASTGATESPRING
OF CINCINNATI
Transitional Care Center
4400 Glen Este-Withamsville Road, Cincinnati, OH 45245, Phone: (513)752-3710, Fax: (513)752-7603, Website: www.carespring.com

## Eastern Corridor Segment IV(a)
## SR 32 Eastgate Area Improvements

**To:** Andrew Schneider, TranSystems
amschneider@transystems.com

**From:** Gina Bell, LNHA Regional Administrator
**Company:** Carespring Health Care Management
**Address:** 4400 Glen Este-Withamsville Road, Cincinnati, Ohio 45245
**Email:** ginab@carespring.com

The following comments are in response to the public hearing on September, 28, 2011.

The Eastern Corridor Website lists the following four important issues:

- Impacts and benefits to existing businesses;
- Maintaining access;
- Community disruption; and
- Impacts during construction.

In addition, the Purpose and Need Statement for the Eastgate Area Improvements contains the following: all sure

- Serve current and projected travel demand;
- Reduce congestion and delay;
- Improve roadway safety; and
- Be consistent with local transportation and economic development goals.

The information, exhibits and documentation available at the September public hearing failed to address very important aspects of the proposed improvements related to the business community. To my knowledge, there was no information provided for each of the considered Alternatives related to:

- Impacts and benefits to existing businesses:

- Maintaining access;
- Community disruption:
- Impacts during construction: and
- Consistency with local transportation and economic development goals.

Without information related to the above, it is difficult to make an intelligent and informed decision about a preferred Alternative(s) for future study. Of particular concern is the lack of

Information related to impacts and benefits to existing businesses, maintaining access, and economic development goals.

Considering the state of our national, regional, and local economy, it seems to me that issues related to "jobs" and the economy should be an important part of the alternative analysis process.

**Request for Additional Information**

*I request that you provide additional information and background support for each Alternative (2, 3, 4, and No Build) related to the above five issues, as it specifically applies to Eastgatespring of Cincinnati and also to the business community in general.*

**Priorities for Carespring Health Management**

A high level of access is extremely important for our facility. We presently have a convenient and highly visible access to SR 32 for our visitors, ambulances and medical assistance vehicles, and our staff. All of the considered Alternatives eliminate our direct access to SR 32.

**Alternative #4** has the most negative impact on our ingress/egress since our driveway would apparently be restricted to Right In/Right Out only. This situation is unacceptable and certainly drastically diminishes our ability to provide high-quality service for visitors and residents.

**Alternative #2,** while providing full movement access for our driveway, fails to replace the devastating loss of access at the Glen Este -- Withamsville interchange with appropriate local road improvements. This Alternative also fails to provide connectivity to the surrounding area and, especially the proposed SR 32 interchange with Bach-Buxton/Elick.

**Alternative #3** provides full movement access for our driveway and also improves Clepper Lane. It provides some benefit by extending Clepper lane to the proposed SR 32 interchange at Bach-Buston/Elick.

**Glen Este- Withamsville Ramp Options** appear to be compatible with either Alternative #3 or Alternative #4. These additional ramps would help to increase accessibility and circulation for both residential and business land uses in the area. These ramps would undoubtedly increase the total cost of the project. However, I believe the benefits to the commercial and residential community, when calculated, would exceed the additional cost.

**Overall Impression of Alternatives**

- The construction of the Glen Este-Withamsville overpass at SR 32 will have an overwhelming negative impact on our business;
- Alternative #4 is unacceptable due to the loss of full movement at our driveway and Alternative #2 is unacceptable due to the loss of local road circulation and connectivity.
- Alternative #3 incorporates elements which, to some extent, partially address the negative impact of the Glen Este Withamsville overpass; and
- The Glen Este-Withamsville Ramp Options are beneficial and should be constructed.

**Conclusion**

*Alternative #3, with the addition of Glen Este-Withamsville Ramps, should be the Preferred Alternative for further study.*

# Phone Log

Phone Call Received: 9/28/2011, 9:50 AM

From: Maureen Dikeman (513-688-0136)

Message: “I wish to express my opinion that I don't want anything to change where the Union Branch library is. Use an option that doesn't disturb it. Thank you.”

// JNS

Date: 9/29/2011, 10:20 AM

Subject: Eastern Corridor Segment IV(a) Public Comment

James Elliot, 1276 Old 74 (middle house across from Speedway) near Shayler.

Concern is whether he will be relocated; he wants to stay.

Explained that at this time, we didn’t have design detail to sufficiently know where the Old 74 would be touching back down at grade. His driveway is on Old 74.

// Andrew Schneider

Phone Call Received: 10/7/2011, 10:50 AM

From: James Elliot (513-752-3552)

Message: Question about whether he could get a copy of the alternatives.

// JNS

September 30, 2011

Mr. Allan Daniel
1001 Joyce Drive
Batavia, OH  45103

Dear Mr. Daniel:

Included, please find copies of the four (4) Alternatives Maps that you requested at the SR 32 Eastgate Area Improvements public meeting on Wednesday, September 28, 2011. Please note that these are still preliminary designs; final designs won't be done until next year.

Additionally, you may find the full-size versions of these materials and items from past meetings on the following websites:

- Eastern Corridor – www.easterncorridor.org
- ODOT, District 8 – www.dot.state.oh.us/districts/D08/Pages/PublicInvolvementMeetingSchedule.aspx
- Clermont County TID – tid.clermontcountyohio.gov/Segment+IVA.aspx

If you have any questions or comments, please contact me at 513-621-1981 ext. 32-205 or amschneider@transystems.com.

Respectfully,

Andrew Schneider

October 14, 2011

Ms. Clairee Smith
453 Ivy Trails Drive
Cincinnati, OH 45244

Dear Ms. Smith:

Included, please find copies of the four (4) Alternatives Maps and a map of the Glen Este-Withamsville Road ramp options that you requested regarding the SR 32 Eastgate Area Improvements project. Please note that these are still preliminary designs; final designs won't be done until next year.

If you have any questions or comments, please contact Andrew Schneider at 513-621-1981 ext. 32-205 or amschneider@transystems.com.

Respectfully,

Jennifer Spinosi

October 12, 2011

Mr. Norman Wright
136 Judd Road
Amelia, OH 45102

Dear Mr. Wright:

Included, please find copies of the four (4) Alternatives Maps and a map of the Glen Este-Withamsville Road ramp options that you requested regarding the SR 32 Eastgate Area Improvements project. Please note that these are still preliminary designs; final designs won't be done until next year.

Additionally, you may find the full-size versions of these materials and items from past meetings on the following websites:

- Eastern Corridor – www.easterncorridor.org
- ODOT, District 8 – www.dot.state.oh.us/districts/D08/Pages/PublicInvolvementMeetingSchedule.aspx
- Clermont County TID – tid.clermontcountyohio.gov/Segment+IVA.aspx

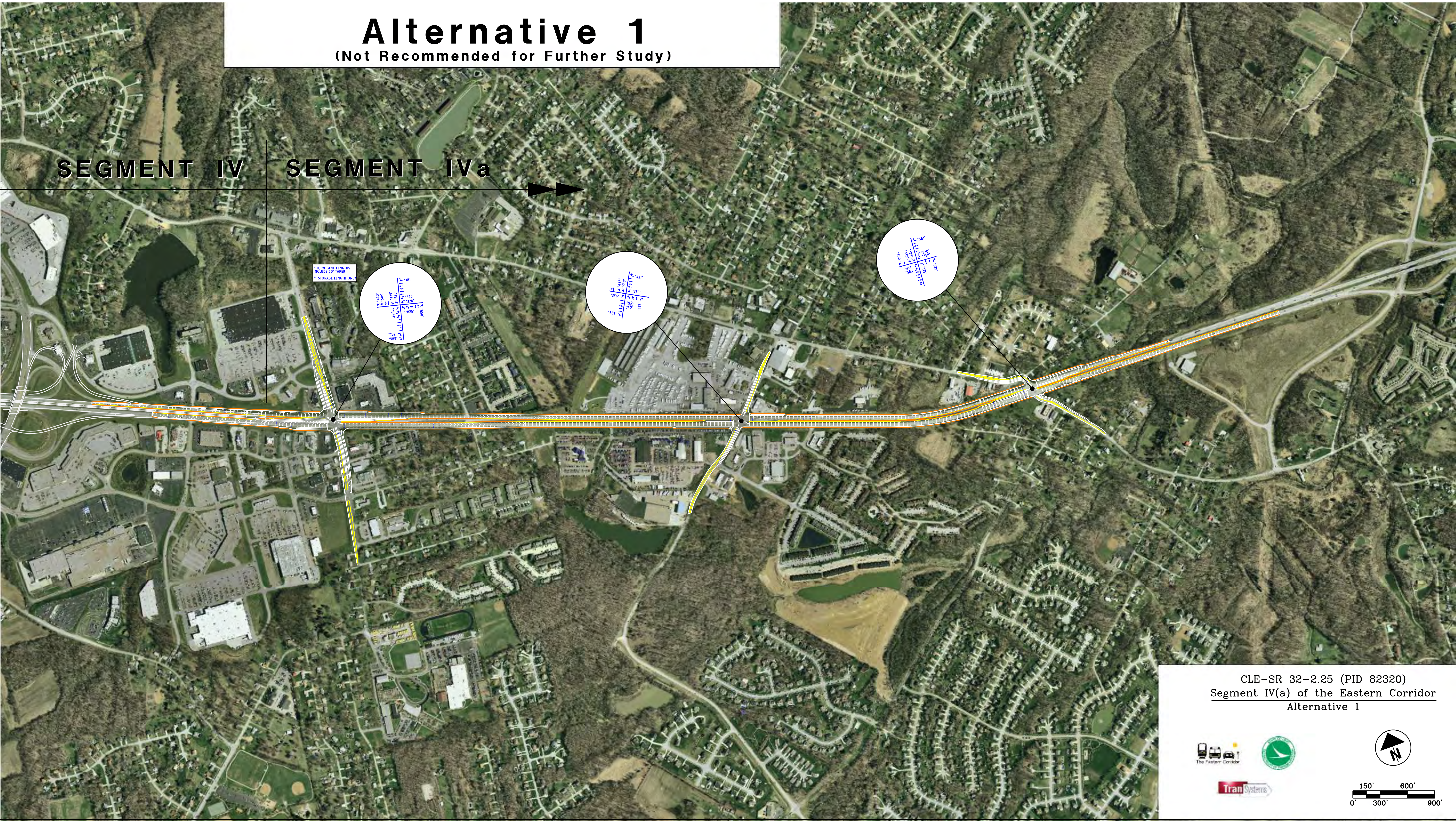
If you have any questions or comments, please contact me at 513-621-1981 ext. 32-205 or amschneider@transystems.com.

Respectfully,

Andrew Schneider

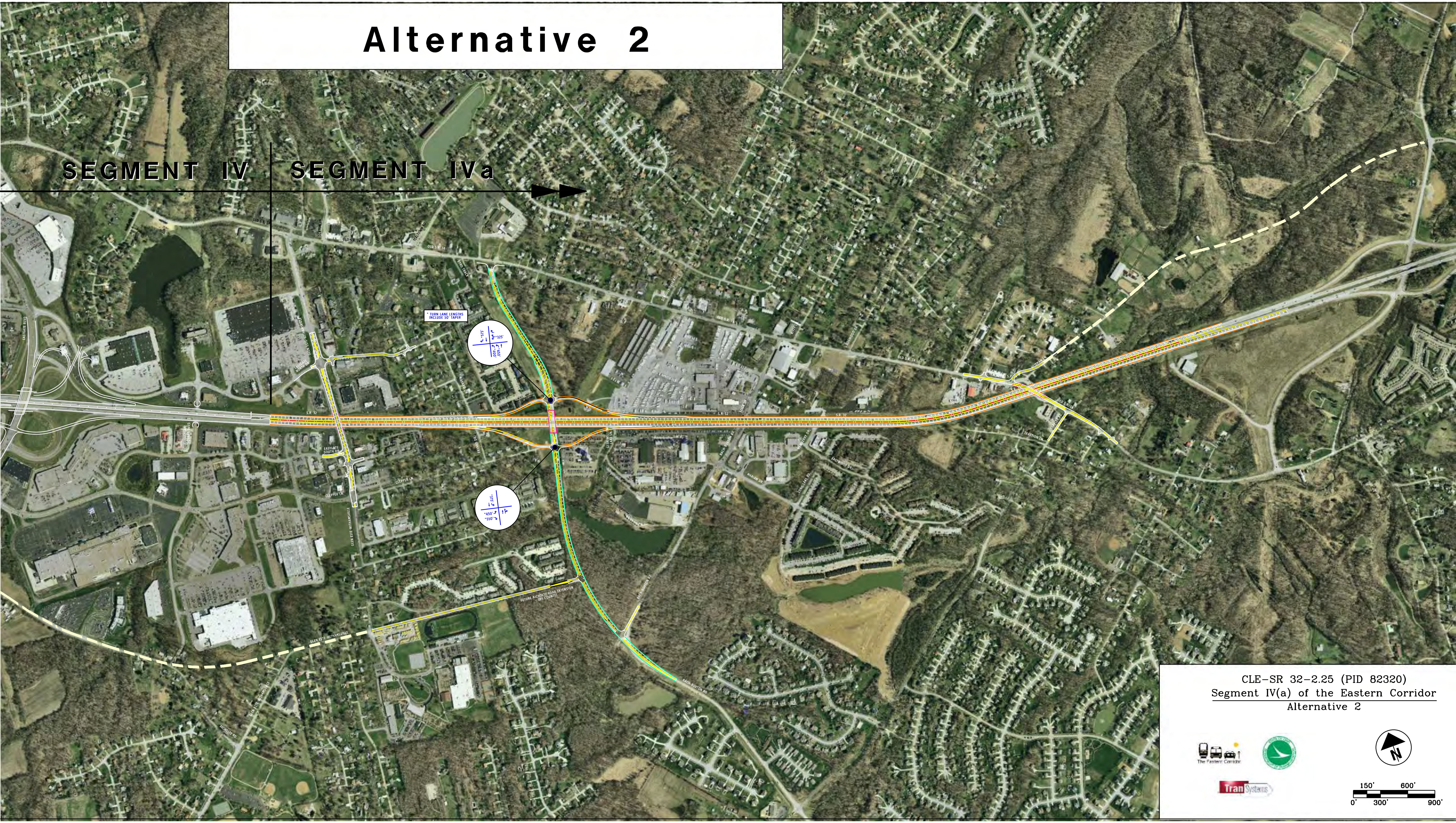
# Alternative 1

(Not Recommended for Further Study)



CLE-SR 32-2.25 (PID 82320)
Segment IV(a) of the Eastern Corridor
Alternative 1

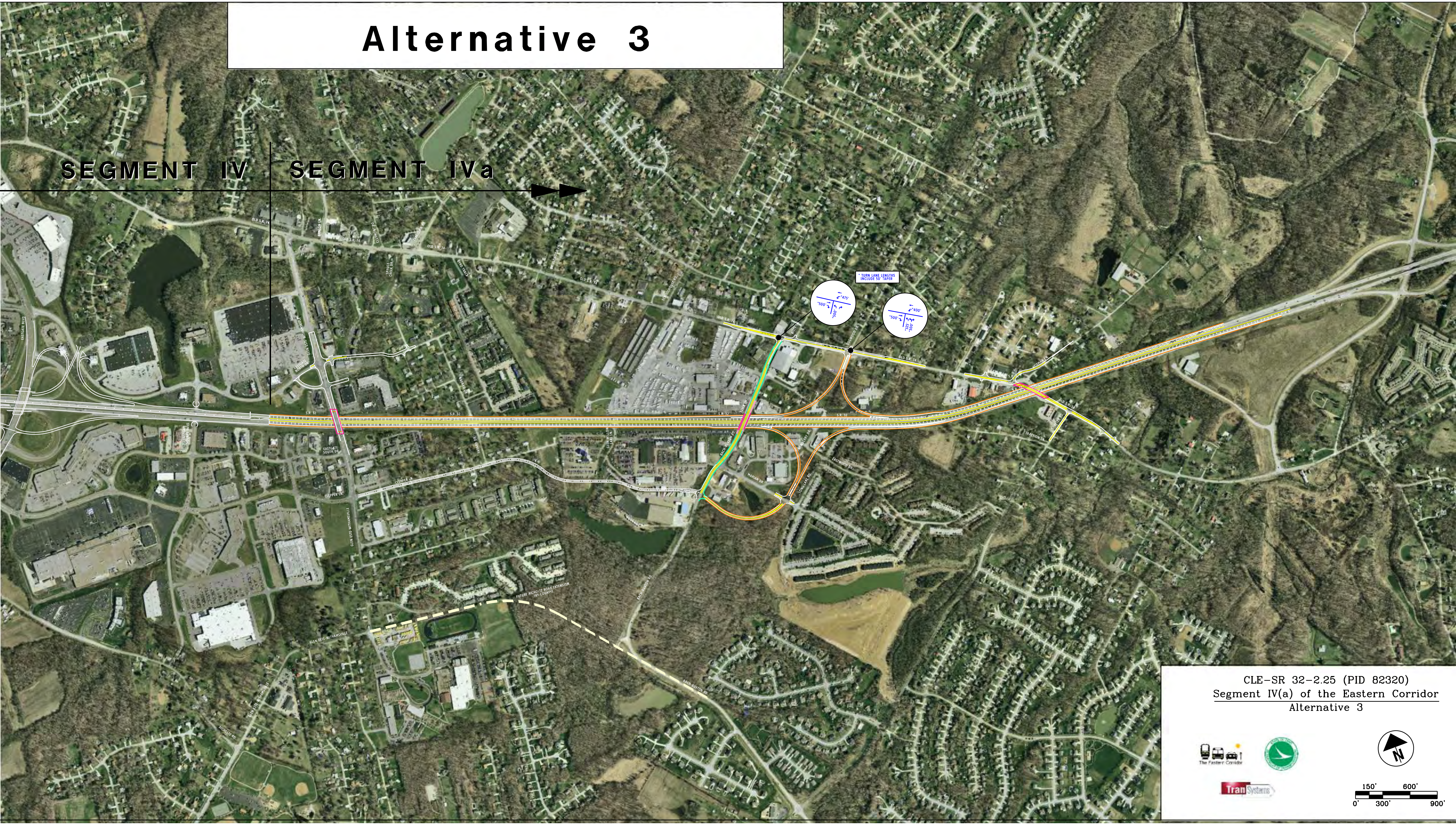
# Alternative 2



CLE-SR 32-2.25 (PID 82320)
Segment IV(a) of the Eastern Corridor
Alternative 2

The Eastern Corridor

# Alternative 3



CLE-SR 32-2.25 (PID 82320)
Segment IV(a) of the Eastern Corridor
Alternative 3

# Alternative 4

CLE–SR 32–2.25 (PID 82320)
Segment IV(a) of the Eastern Corridor
Alternative 4

# Glen Este-Withamsville Ramp Options

**CLE-SR 32-2.25 (PID 82320)**

**Segment IV(a) of the Eastern Corridor**

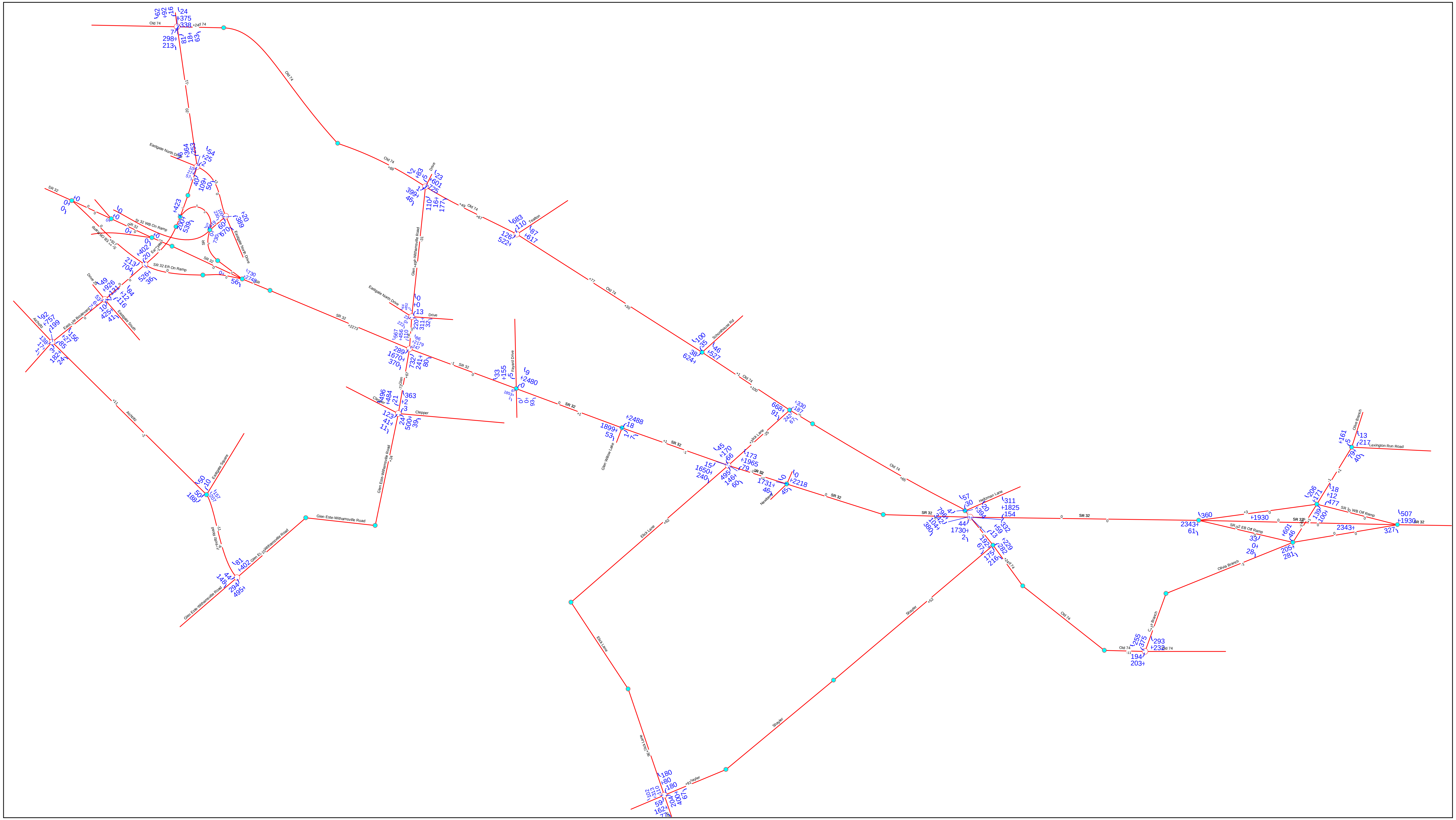
**Glen Este-Withamsville Options**

# APPENDIX C: TRAFFIC PLATES (ON CD)

- Alternatives 1 & 5 – AM and PM
- Alternative 2 – AM and PM
- Alternative 3 – AM and PM + updates
- Alternative 4 with Glen Este-Withamsville Road ramps – AM and PM + updates
- Alternative 4 without Glen Este-Withamsville Road ramps – AM and PM updates

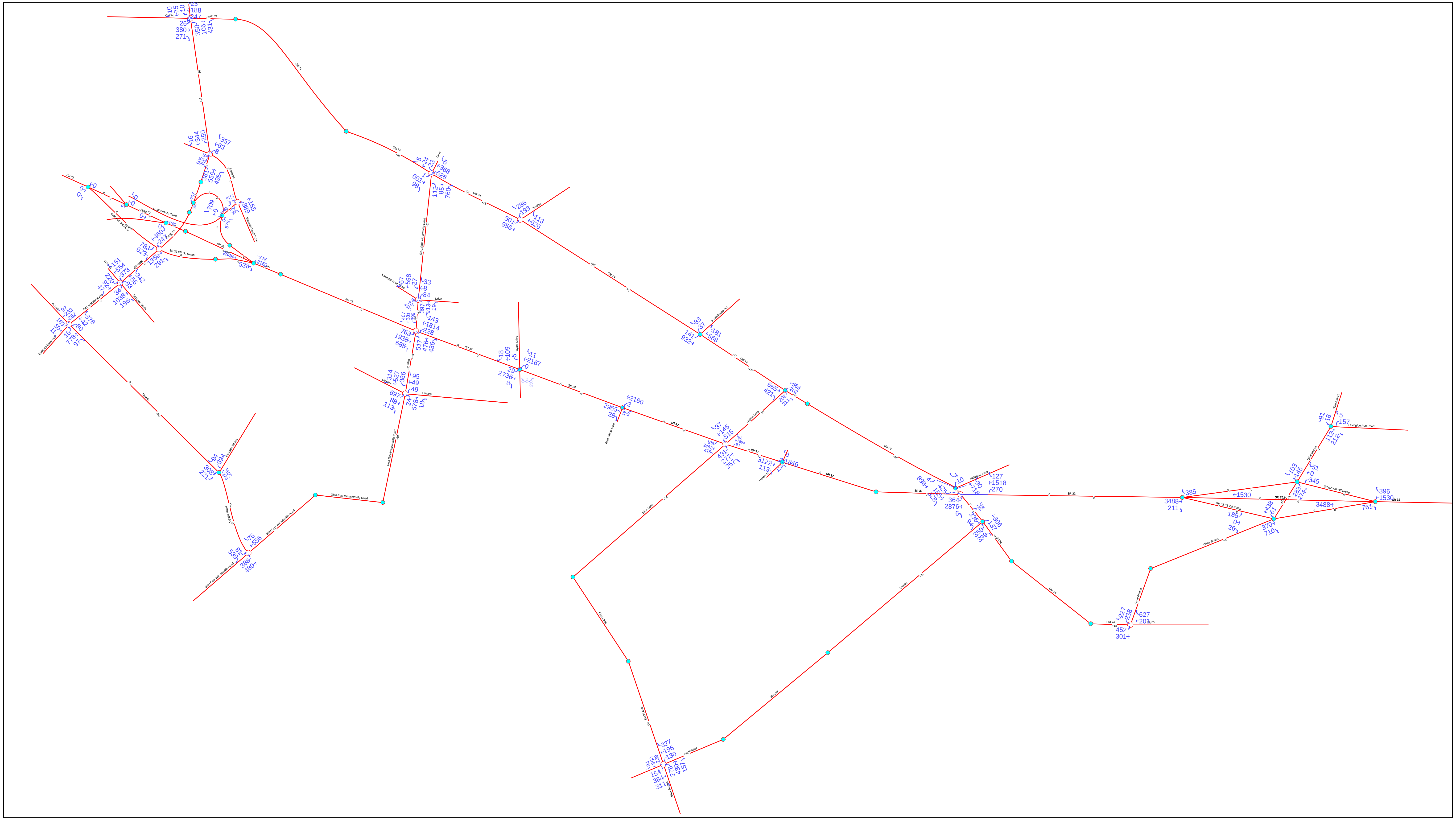
**G:\CO10\0004\Traffic\Data_In\HNTB Synchro\No-Build 06-17-11\SR-32 Corridor (Existing_am) 06-17-11 sny 6.sy7** **ALT 1&5 AM**

**Volume Balance Between Intersections**



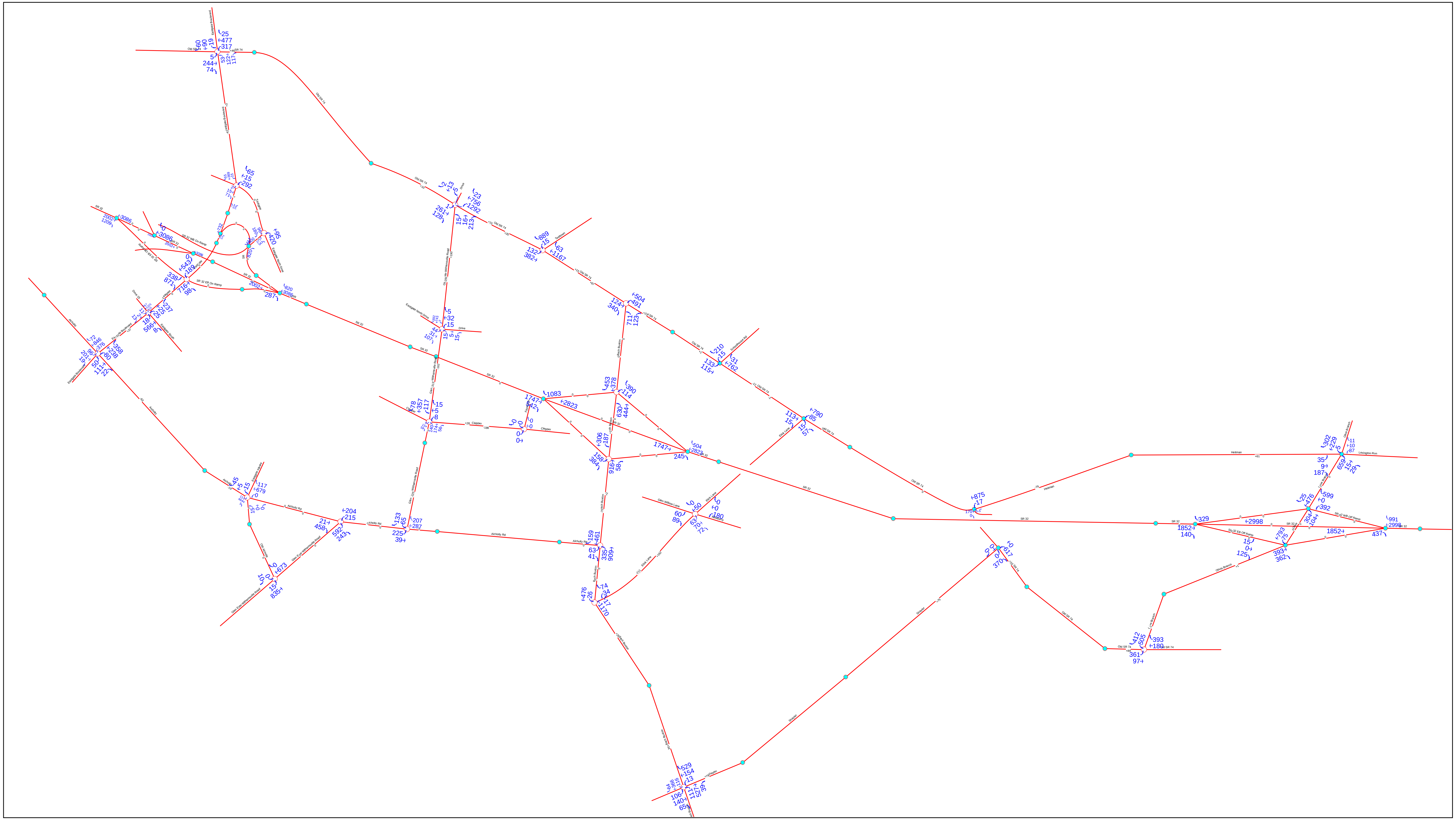
**G:\CO10\0004\Traffic\Data_In\HNTB Synchro\No-Build 06-17-11\SR-32 Corridor (Existing_pm) 06-17-11 syn 6.sy7** **ALT 1&5 PM**

**Volume Balance Between Intersections**



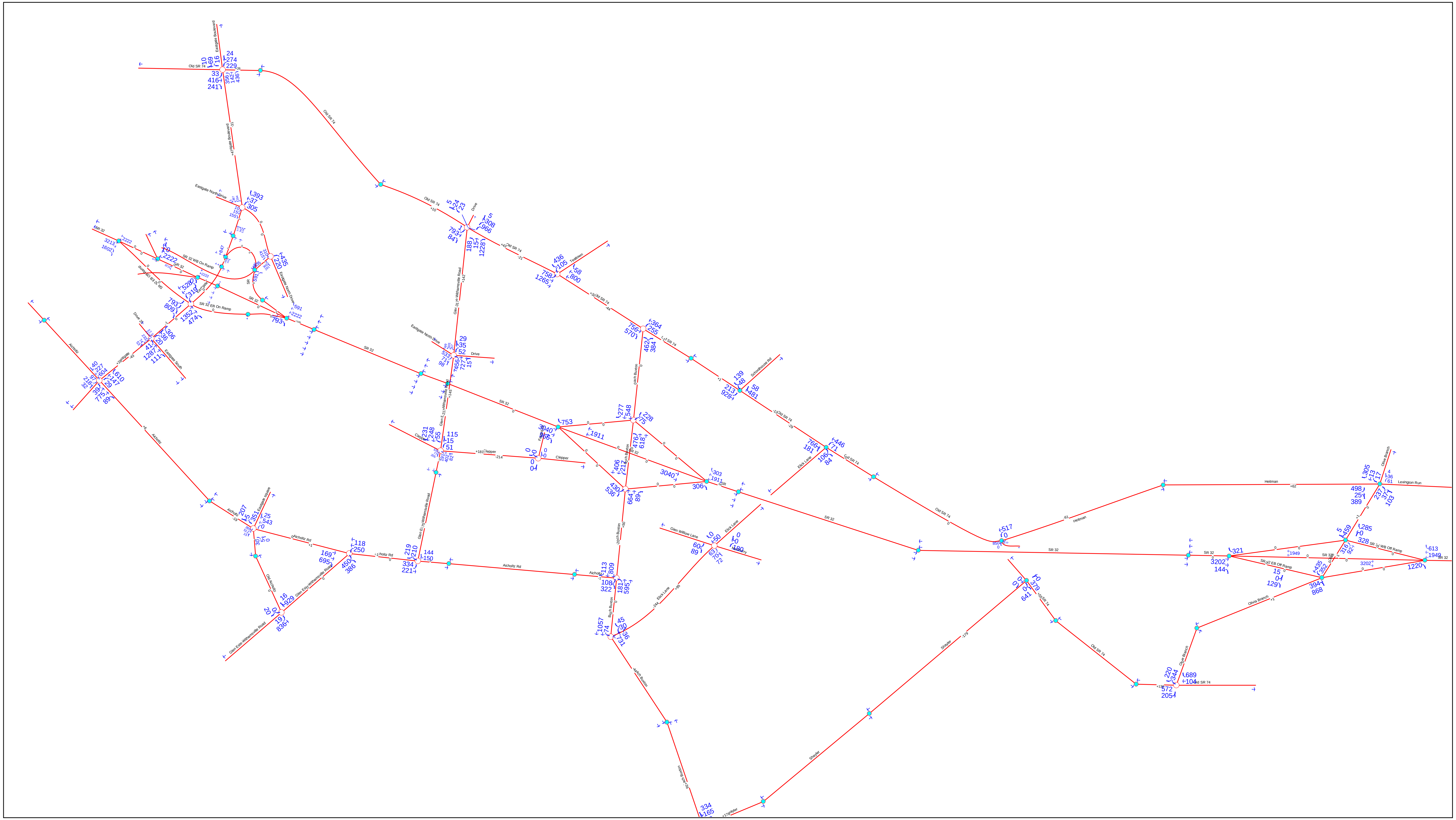
**G:\CO10\0004\Traffic\Data_In\HNTB Synchro\Segment IVa - July 2011\Alt 7\SR-32 Corridor (Alt 7_am) 06-30-2011 syn 6.sy7** **ALT 2 AM**

**Volume Balance Between Intersections**



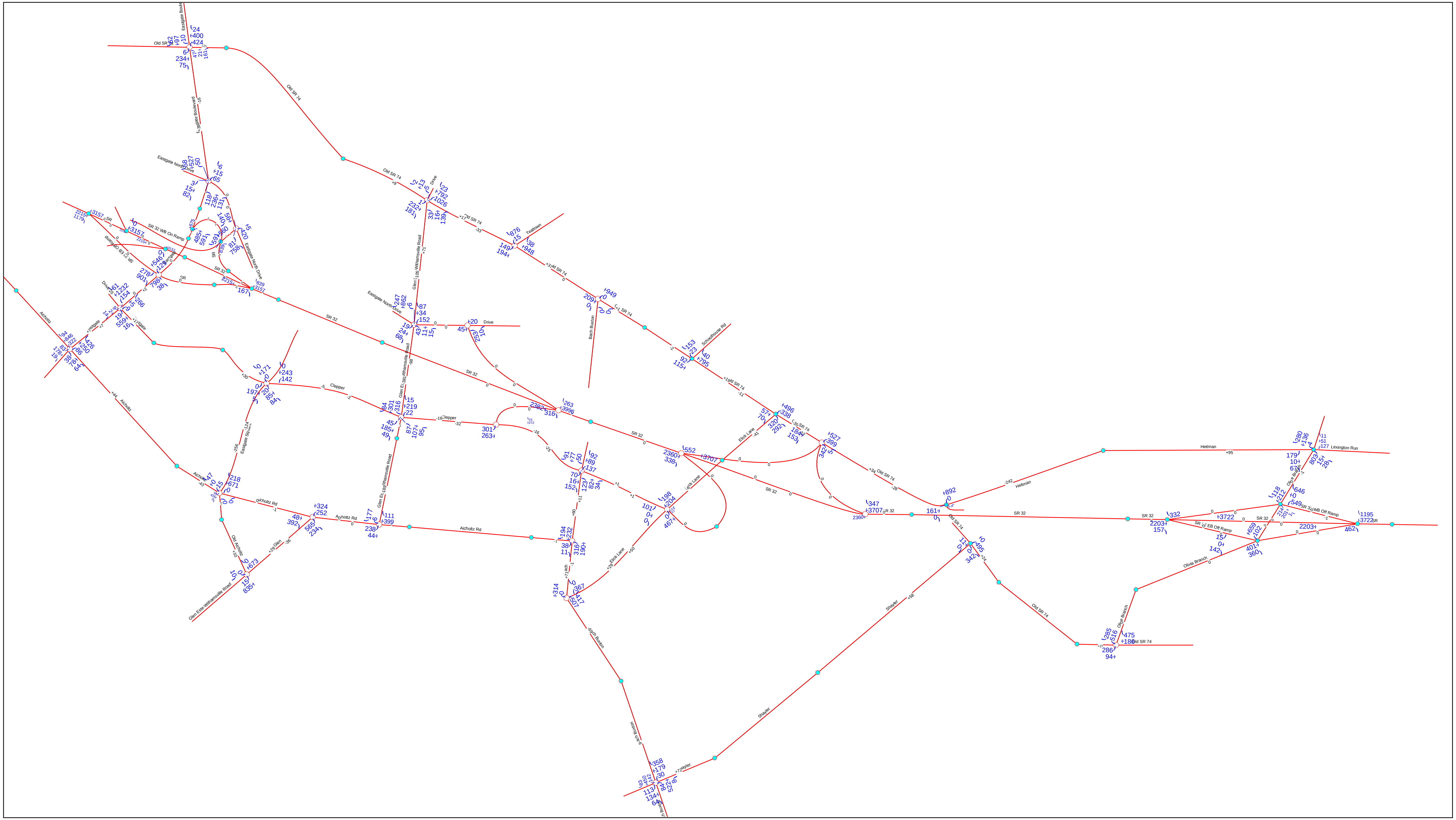
**G:\CO10\0004\Traffic\Data_In\HNTB Synchro\Segment IVa - July 2011\Alt 7\SR-32 Corridor (Alt 7_pm) 06-30-2011 syn 6.sy7** **ALT 2 PM**

**Volume Balance Between Intersections**



**Map - G:\CO10\0004\Traffic\Data_In\HNTB Synchro\Alt 8A1 A2 L2 - July 2011\SR-32 Corridor (Alt 8L1_am) 07-15-2011 syn 61.sy7** **ALT 3 AM**

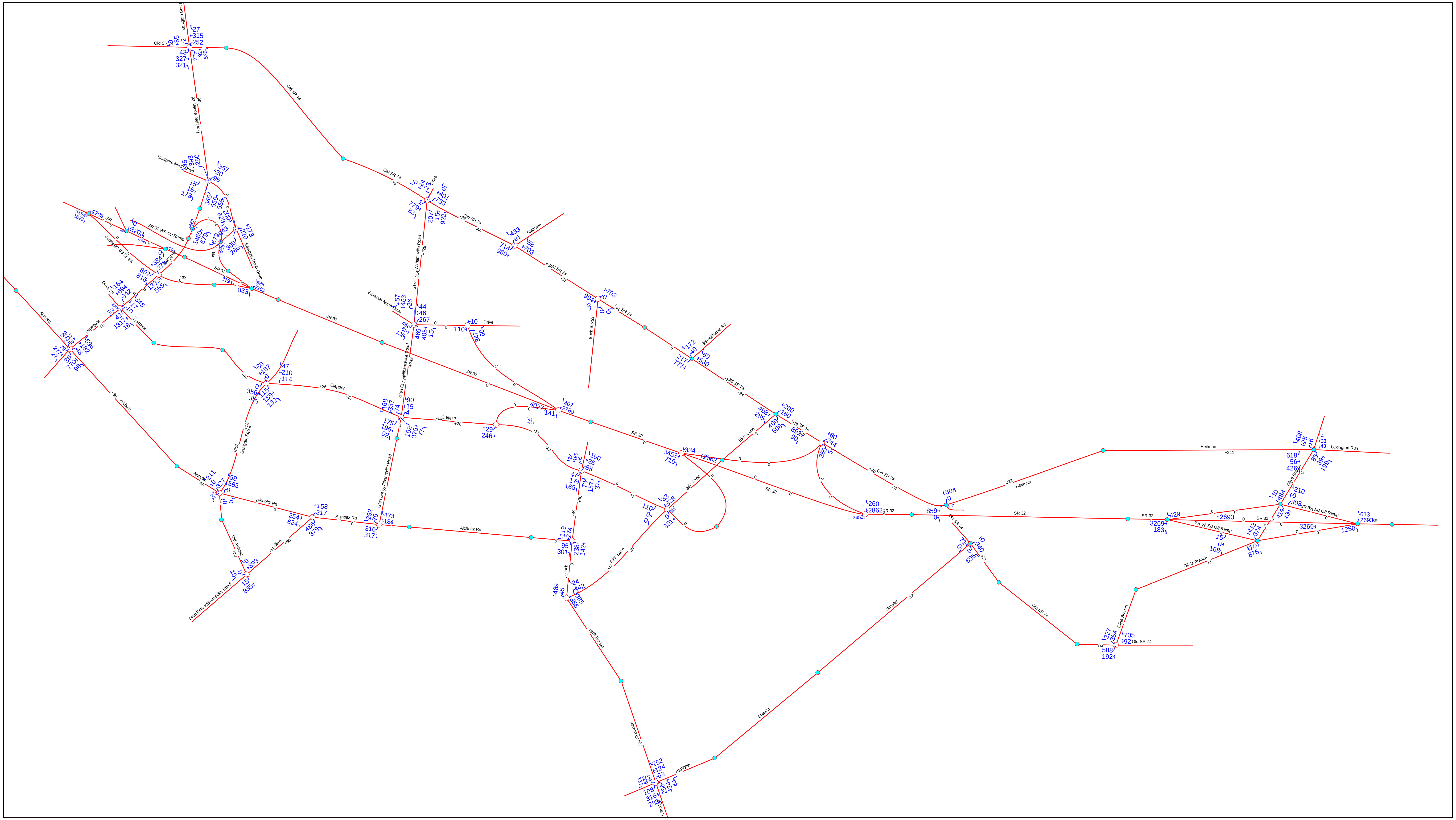
**Volume Balance Between Intersections**



Segment IV(a) - Alternative 3
Planning Level Traffic Volumes
2030 AM Peak Hour

**Map - G:\CO10\0004\Traffic\Data_In\HNTB Synchro\Alt 8A1 A2 L2 - July 2011\SR-32 Corridor (Alt 8L1_pm) 07-15-2011 syn 61.sy7** **ALT 3 PM**

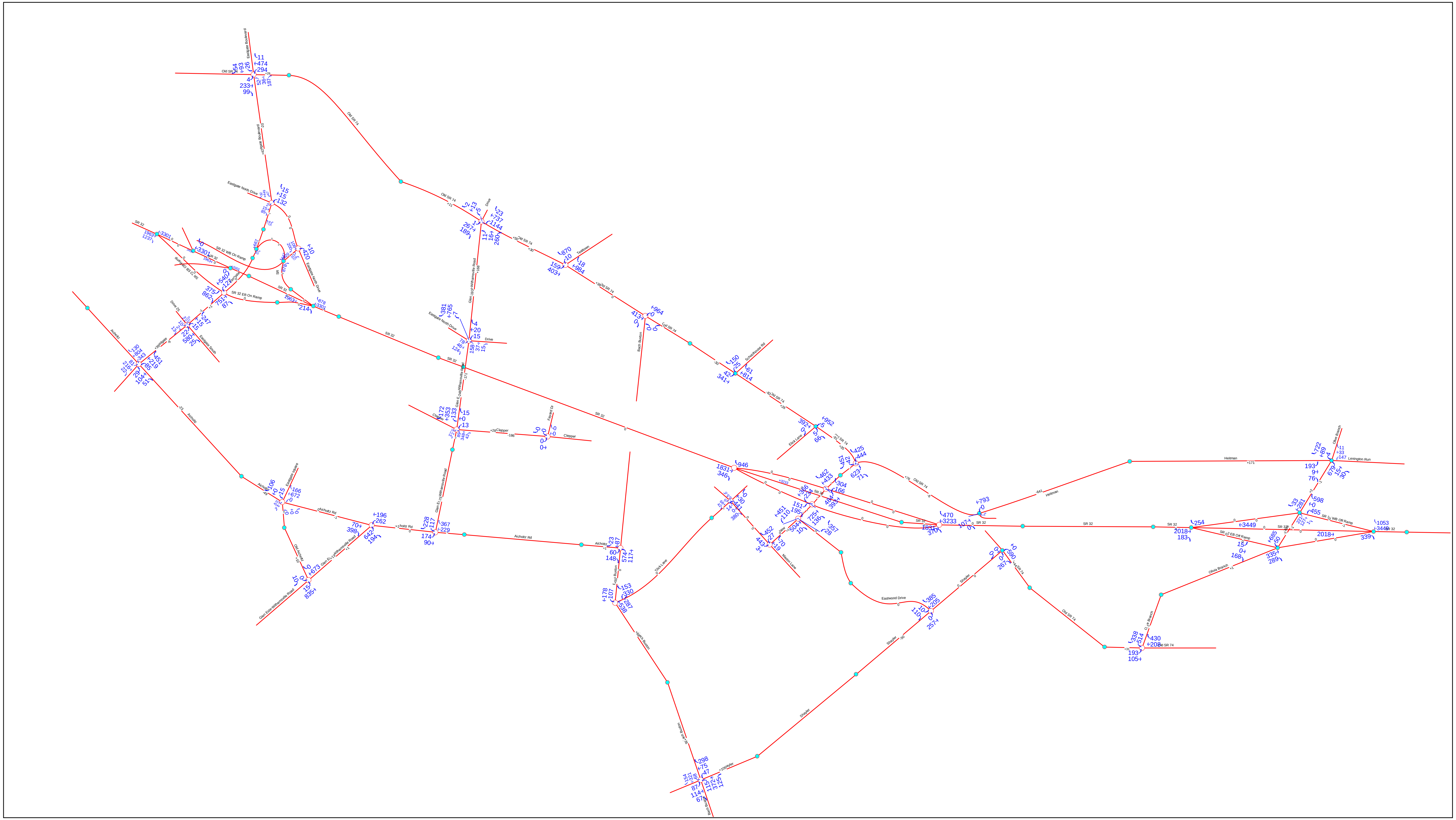
**Volume Balance Between Intersections**



# Segment IV(a) - Alternative 3
# Planning Level Traffic Volumes
# 2030 PM Peak Hour

**Map - G:\CO10\0004\Traffic\Data_In\HNTB Synchro\Alt 8A1 A2 L2 - July 2011\SR-32 Corridor (Alt 8a1_am) 07-14-2011 syn 6.sy7** **ALT 4 AM**

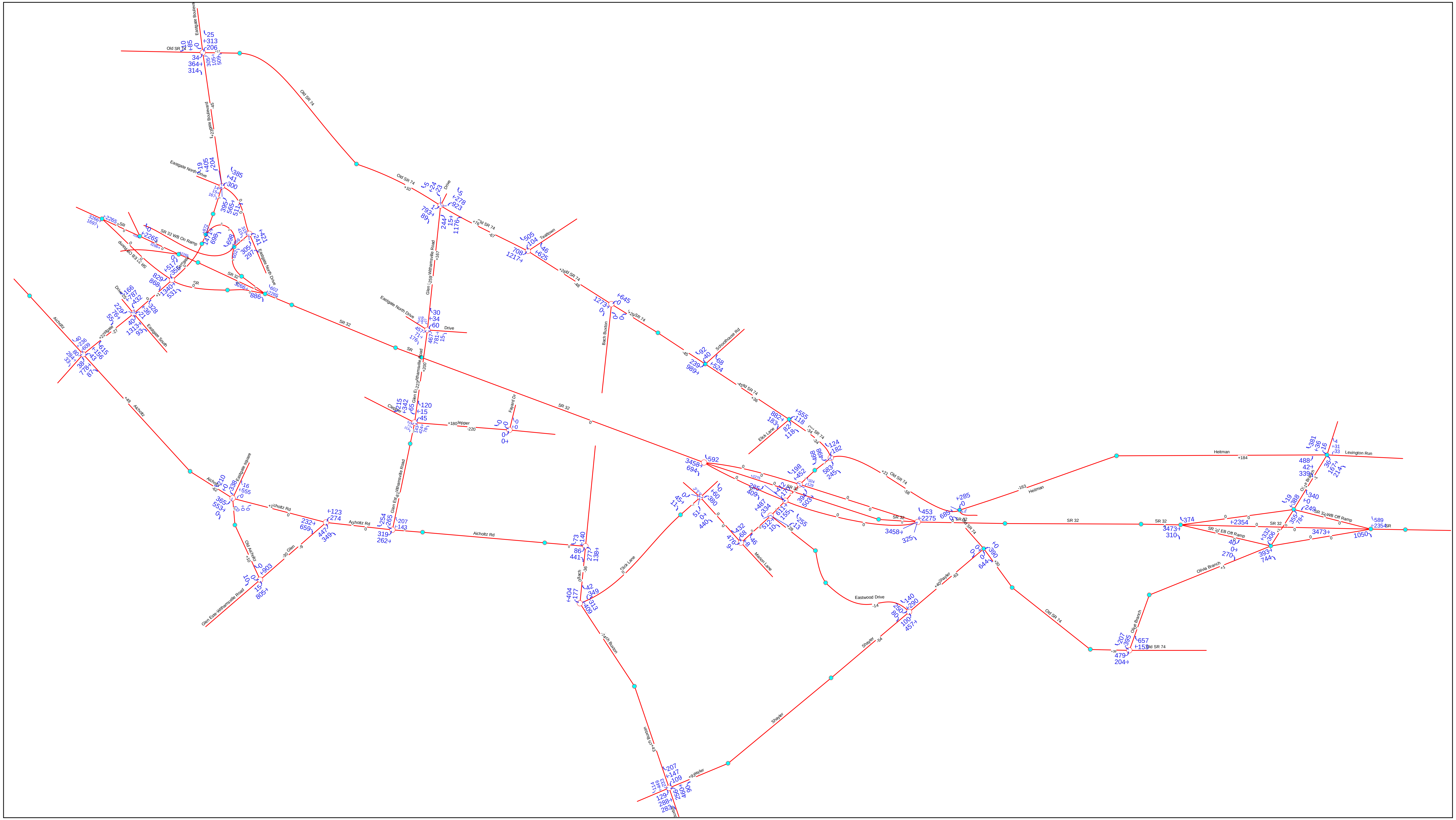
**Volume Balance Between Intersections**



**Segment IV(a) - Alternative 4**
**Planning Level Traffic Volumes**
**2030 AM Peak Hour**

**Map - G:\CO10\0004\Traffic\Data_In\HNTB Synchro\Alt 8A1 A2 L2 - July 2011\SR-32 Corridor (Alt 8a1_pm) 07-14-2011 Syn 6.sy7** **ALT 4 PM**

**Volume Balance Between Intersections**



## Segment IV(a) - Alternative 4
## Planning Level Traffic Volumes
## 2030 PM Peak Hour

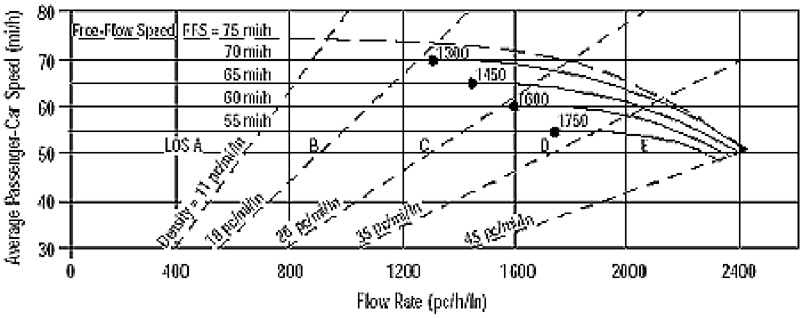
## Segment IV(a) - Alternative 4 without Glen Este ramps Planning Level Traffic Volumes 2030 AM Peak Hour

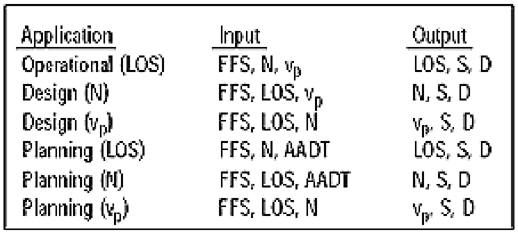
**Segment IV(a) - Alternative 4**
**without Glen Este ramps**
**Planning Level Traffic Volumes**
**2030 PM Peak Hour**

# APPENDIX D: HIGHWAY CAPACITY SOFTWARE (HCS) OUTPUT (ON CD)

- Alternative 1
    - Freeway Segments
    - Key Intersections
- Alternative 2
    - Freeway Segments
    - Key Intersections
    - Ramp Junctions
- Alternative 3 (with Glen Este-Withamsville Road ramps)
    - Freeway Segments
    - Key Intersections
    - Ramp Junctions
- Alternative 4 (with Glen Este-Withamsville Road ramps)
    - Freeway Segments
    - Key Intersections
    - Ramp Junctions
- Alternative 4 (without Glen Este-Withamsville Road ramps)
    - Freeway Segments
    - Key Intersections
    - Ramp Junctions
- Alternative 5
    - Freeway Segments
    - Key Intersections

# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Eastgate entrance to Glen Este* |
| Date Performed | *7/06/11* | Jurisdiction | *HNTB No-Build Volumes* |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 1* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2329* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs / Calc Speed Adj and FFS

| | | | | | |
|---|---|---|---|---|---|
| Lane Width | *12.0* | ft | $f_{LW}$ | | mi/h |
| Rt-Shoulder Lat. Clearance | *6.0* | ft | $f_{LC}$ | | mi/h |
| Interchange Density | *0.50* | I/mi | $f_{ID}$ | | mi/h |
| Number of Lanes, N | *3* | | $f_N$ | | mi/h |
| FFS (measured) | *60.0* | mi/h | FFS | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h | | | |

## LOS and Performance Measures / Design (N)

| | | | | |
|---|---|---|---|---|
| Operational (LOS) | | | Design (N) | |
| | | | Design LOS | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *876* | pc/h/ln | $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | pc/h |
| S | *60.0* | mi/h | S | mi/h |
| D = $v_p$ / S | *14.6* | pc/mi/ln | D = $v_p$ / S | pc/mi/ln |
| LOS | *B* | | Required Number of Lanes, N | |

## Glossary

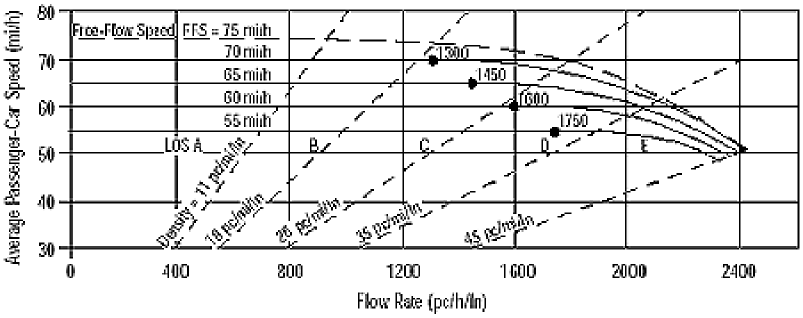
| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

## Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

HCS+$^{TM}$ Version 5.5 Generated: 12/5/2011 11:16 AM

## BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Eastgate entrance to Glen Este* |
| Date Performed | *7/06/11* | Jurisdiction | *No-Build Volumes* |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Alt 1* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3386* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs / Calc Speed Adj and FFS

| | | | | | |
|---|---|---|---|---|---|
| Lane Width | *12.0* | ft | $f_{LW}$ | | mi/h |
| Rt-Shoulder Lat. Clearance | *6.0* | ft | $f_{LC}$ | | mi/h |
| Interchange Density | *0.50* | I/mi | $f_{ID}$ | | mi/h |
| Number of Lanes, N | *3* | | $f_N$ | | mi/h |
| FFS (measured) | *60.0* | mi/h | FFS | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h | | | |

### LOS and Performance Measures / Design (N)

| | | | | | |
|---|---|---|---|---|---|
| Operational (LOS) | | | Design (N) | | |
| | | | Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1273* | pc/h/ln | $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | *60.0* | mi/h | S | | mi/h |
| D = $v_p$ / S | *21.2* | pc/mi/ln | D = $v_p$ / S | | pc/mi/ln |
| LOS | *C* | | Required Number of Lanes, N | | |

### Glossary / Factor Location

| | | | |
|---|---|---|---|
| N - Number of lanes | S - Speed | $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| V - Hourly volume | D - Density | $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $v_p$ - Flow rate | FFS - Free-flow speed | $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS - Level of service | BFFS - Base free-flow speed | LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |
| DDHV - Directional design hour volume | | | |

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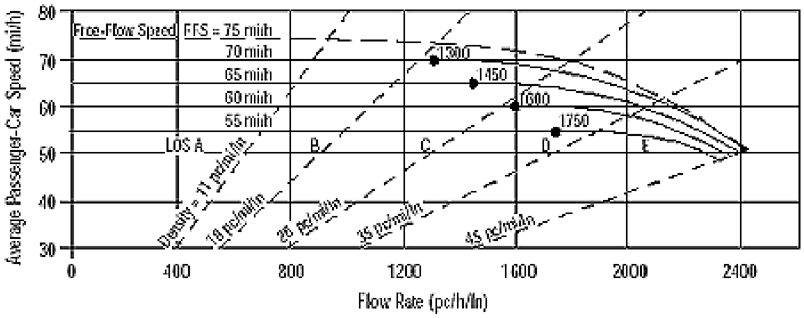
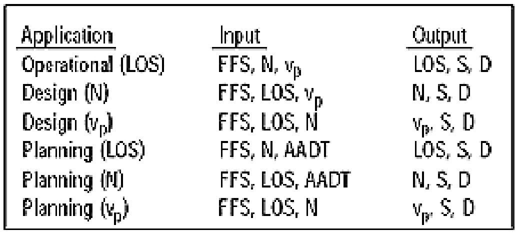
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## *General Information*

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Old SR 74 to Olive Branch exit* |
| Date Performed | *7/06/11* | Jurisdiction | *No-Build Volumes* |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 ALT 1* |

## *Site Information*

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## *Flow Inputs*

| | | | | |
|---|---|---|---|---|
| Volume, V | *2404* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *904* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *15.1* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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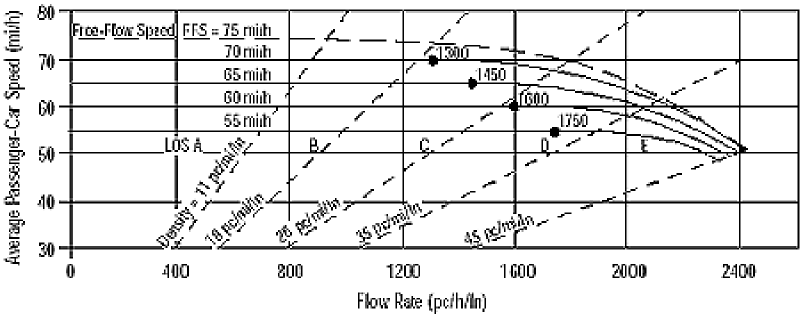
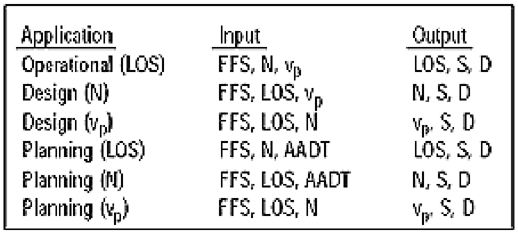
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *scf* |
| Agency or Company | *TranSystems* |
| Date Performed | *7/06/11* |
| Analysis Time Period | *PM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Eastbound* |
| From/To | *Old SR 74 to Olive Branch exit* |
| Jurisdiction | *No-Build Volumes* |
| Analysis Year | *2030 ALT 1* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3699* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1391* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *23.2* | pc/mi/ln |
| LOS | *C* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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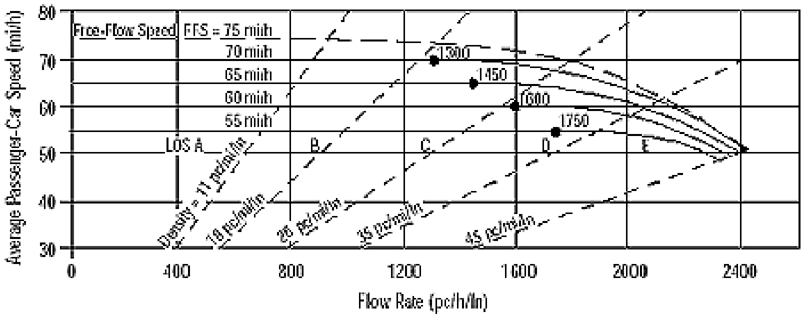
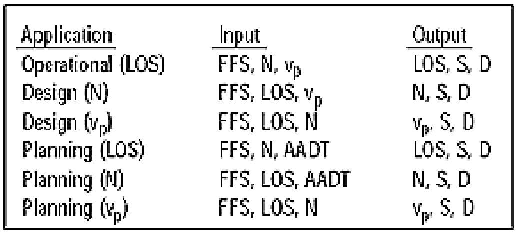
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Glen Este to Eastgate exit* |
| Date Performed | *7/06/11* | Jurisdiction | *HNTB No-Build Volumes* |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 1* |

## Site Information

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3478* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *2* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1961* | pc/h/ln |
| S | *58.4* | mi/h |
| D = $v_p$ / S | *33.6* | pc/mi/ln |
| LOS | *D* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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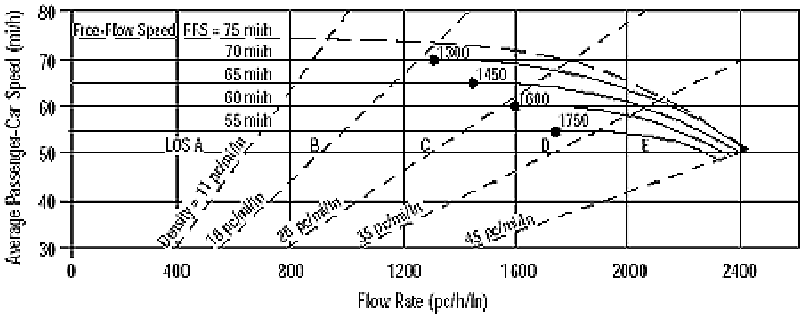
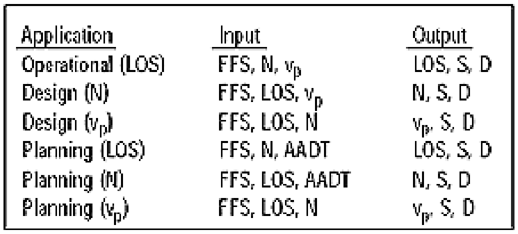
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *scf* |
| Agency or Company | *TranSystems* |
| Date Performed | *7/06/11* |
| Analysis Time Period | *PM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *Glen Este to Eastgate exit* |
| Jurisdiction | *No-Build Volumes* |
| Analysis Year | *2030 ALT 1* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2738* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1029* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *17.1* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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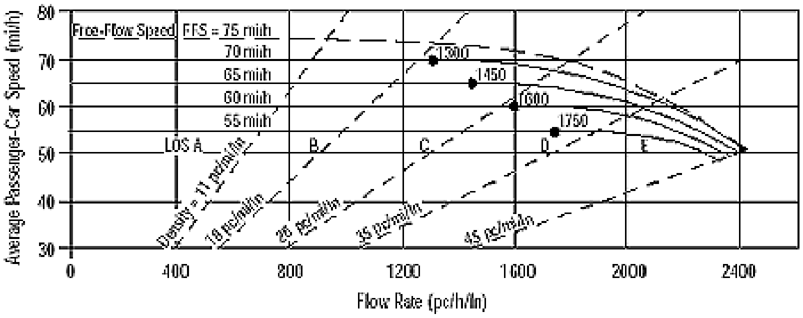
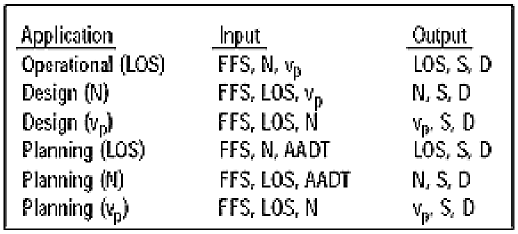
## BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### General Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Olive Branch ent to Old SR 74* |
| Date Performed | *7/06/11* | Jurisdiction | *No-Build Volumes* |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 1* |

### Site Information

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2290* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *2* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1291* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *21.5* | pc/mi/ln |
| LOS | *C* | |

### Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

### Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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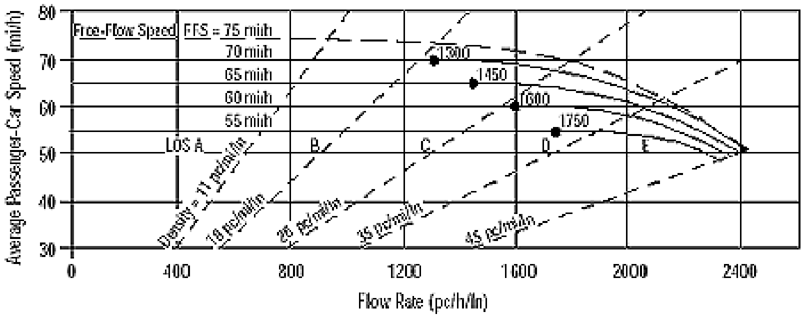
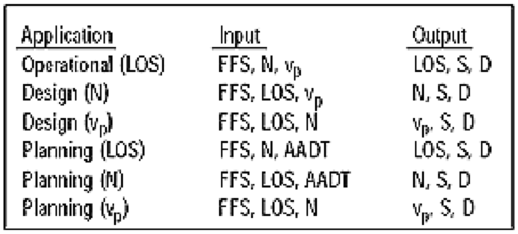
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *scf* |
| Agency or Company | *TranSystems* |
| Date Performed | *7/06/11* |
| Analysis Time Period | *PM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *Olive Branch ent to Old SR 74* |
| Jurisdiction | *No-Build Volumes* |
| Analysis Year | *2030 ALT 1* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *1915* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *2* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1080* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *18.0* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

HCS+™ Version 5.5 Generated: 12/5/2011 11:42 AM

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                  HCS+: Signalized Intersections Release 5.5

Analyst: scf                            Inter.: SR 32 & Glen Este
Agency: TranSystems                     Area Type: All other areas
Date:   2/3/2011                        Jurisd:
Period: AM Peak                         Year  : 2030 No Build improved
Project ID: Segment IVa
E/W St: SR 32                           N/S St: Glen Este

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   3   5   2   |   2   5   1   |   3   2   1   |   2   2   2   |
LGConfig   | L     T    R  | L     T    R  | L     T    R  | L     T    R  |
Volume     |289  1670 370  |247  2179 86   |732  241  80   |110  456  567  |
Lane Width |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0 12.0 |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A
    Thru                A             |     Thru         A
    Right               A             |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A
    Thru                A             |     Thru         A
    Right               A             |     Right        A
    Peds                              |     Peds
NB  Right         P                   | EB  Right  P
SB  Right         P                   | WB  Right  P
Green            13.5  38.0                      28.0  20.5
Yellow           3.5   3.5                       3.5   3.5
All Red          1.5   1.5                       1.5   1.5
                                                   Cycle Length: 120.0   secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate   __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C      Delay LOS   Delay LOS
_______________________________________________________________________________

Eastbound
L        537       4774       0.60   0.11     52.5   D
T        2652      8375       0.70   0.32     36.8   D    34.8   C
R        1642      2775       0.25   0.59     11.8   B
Westbound
L        383       3403       0.72   0.11     57.7   E
T        2652      8375       0.91   0.32     44.8   D    44.9   D
R        928       1568       0.10   0.59     10.7   B
Northbound
L        1125      4820       0.72   0.23     44.7   D
T        606       3547       0.44   0.17     45.1   D    43.6   D
R        514       1583       0.17   0.32     29.1   C
Southbound
L        802       3437       0.15   0.23     36.7   D
T        606       3547       0.84   0.17     58.1   E    45.7   D
R        911       2803       0.69   0.32     37.5   D
         Intersection Delay = 41.5  (sec/veh)   Intersection LOS = D

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                  HCS+: Signalized Intersections Release 5.5

Analyst: scf                            Inter.: SR 32 & Glen Este
Agency: TranSystems                     Area Type: All other areas
Date:   2/3/2011                        Jurisd: No Build improved
Period: PM Peak                         Year  : 2030 ALT 1
Project ID: Segment IVa
E/W St: SR 32                           N/S St: Glen Este

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound      |  Westbound      |  Northbound     |  Southbound     |
           | L    T    R     | L    T    R     | L    T    R     | L    T    R     |
           |________________|________________|________________|________________|
No. Lanes  |   3   5   2     |   2   5   1     |   3   2   1     |   2   2   2     |
LGConfig   | L     T    R    | L     T    R    | L     T    R    | L     T    R    |
Volume     |763  1938 685    |228  1814 143    |517  476  436    |399  381  407    |
Lane Width |12.0 12.0 12.0   |12.0 12.0 12.0   |12.0 12.0 12.0   |12.0 12.0 12.0   |
RTOR Vol   |          0      |          0      |          0      |          0      |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A
    Thru                A             |     Thru         A
    Right               A             |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A
    Thru                A             |     Thru         A
    Right               A             |     Right        A
    Peds                              |     Peds
NB  Right         P                   | EB  Right  P
SB  Right         P                   | WB  Right  P
Green            23.5  33.5                       21.5  21.5
Yellow           3.5   3.5                        3.5   3.5
All Red          1.5   1.5                        1.5   1.5
                                                   Cycle Length: 120.0   secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        935       4774      0.91   0.20    59.6   E
T        2338      8375      0.92   0.28    48.6   D    45.5   D
R        1388      2775      0.55   0.50    21.1   C
Westbound
L        666       3403      0.38   0.20    42.3   D
T        2338      8375      0.86   0.28    44.6   D    42.6   D
R        784       1568      0.20   0.50    16.8   B
Northbound
L        864       4820      0.66   0.18    47.8   D
T        636       3547      0.83   0.18    56.7   E    46.5   D
R        660       1583      0.73   0.42    33.6   C
Southbound
L        616       3437      0.72   0.18    50.5   D
T        636       3547      0.67   0.18    48.5   D    41.0   D
R        1168      2803      0.39   0.42    24.6   C
         Intersection Delay = 44.2  (sec/veh)   Intersection LOS = D

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                  HCS+: Signalized Intersections Release 5.5

Analyst: scf                            Inter.: SR 32 & Elick Lane
Agency: TranSystems                     Area Type: All other areas
Date:   2/4/2011                        Jurisd: No Build improved
Period: AM                              Year  : 2030 Alt 1
Project ID: Segment IVa; P403100004
E/W St: SR 32                           N/S St: Elick Lane

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   5   1   |   1   4   1   |   2   1   1   |   2   1   0   |
LGConfig   | L     T    R  | L     T    R  | L     T    R  | L     TR      |
Volume     |15   1650 240  |79   1965 173  |495  146  60   |66   170  45   |
Lane Width |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0      |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A     A
    Thru                A             |     Thru         P     A
    Right               A             |     Right        P     A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A
    Thru                A             |     Thru               P
    Right               A             |     Right              A
    Peds                              |     Peds
NB  Right         P                   | EB  Right  P     P
SB  Right                             | WB  Right  P
Green            8.5   42.0                       10.5  8.5   25.5
Yellow           3.5   3.5                        3.5   3.5   3.5
All Red          1.5   1.5                        1.5   1.5   1.5
                                                   Cycle Length: 120.0   secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group      Flow Rate   ___________    __________  ___________
Grp     Capacity     (s)      v/c    g/C      Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        124       1752      0.14   0.07    52.8   D
T        2931      8375      0.63   0.35    32.9   C    30.4   C
R        928       1568      0.29   0.59    12.2   B
Westbound
L        124       1752      0.71   0.07    71.7   E
T        2345      6700      0.93   0.35    45.0   D    43.9   D
R        751       1568      0.26   0.48    18.7   B
Northbound
L        694       3471      0.79   0.20    51.9   D
T        611       1881      0.27   0.32    30.1   C    44.6   D
R        700       1599      0.10   0.44    19.9   B
Southbound
L        304       3471      0.24   0.09    51.4   D
TR       387       1822      0.62   0.21    50.0   D    50.4   D

         Intersection Delay = 39.3  (sec/veh)   Intersection LOS = D

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                  HCS+: Signalized Intersections Release 5.5

Analyst: scf                            Inter.: SR 32 & Elick Lane
Agency: TranSystems                     Area Type: All other areas
Date:   2/4/2011                        Jurisd: No Build improved
Period: PM                              Year  : 2030 ALT 1
Project ID: Segment IVa; P403100004
E/W St: SR 32                           N/S St: Elick Lane

_________________________SIGNALIZED INTERSECTION SUMMARY________________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   5   1   |   1   4   1   |   2   1   1   |   2   1   0   |
LGConfig   | L     T    R  | L     T    R  | L     T    R  | L     TR      |
Volume     |103  2462 415  |93   1694 62   |431  277  257  |515  145  37   |
Lane Width |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0      |
RTOR Vol   |          0    |          0    |          0    |          0    |
________________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A     A             | NB  Left   A
    Thru                A     A       |     Thru         A
    Right               A     A       |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A
    Thru                      A       |     Thru         A
    Right                     A       |     Right        A
    Peds                              |     Peds
NB  Right         P                   | EB  Right  P
SB  Right               P             | WB  Right  P
Green            9.5   1.0   36.5                 24.5  23.5
Yellow           3.5   3.5   3.5                  3.5   3.5
All Red          1.5   1.5   1.5                  1.5   1.5
                                                   Cycle Length: 120.0   secs
____________________Intersection Performance Summary____________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  ___________    __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
________________________________________________________________________________

Eastbound
L        226       1752      0.50   0.13    50.5   D
T        2966      8375      0.92   0.35    42.7   D    38.9   D
R        941       1568      0.49   0.60    14.0   B
Westbound
L        139       1752      0.74   0.08    73.0   E
T        2038      6700      0.92   0.30    48.1   D    48.1   D
R        862       1568      0.08   0.55    12.7   B
Northbound
L        709       3471      0.68   0.20    46.6   D
T        368       1881      0.84   0.20    61.9   E    48.1   D
R        506       1599      0.57   0.32    35.6   D
Southbound
L        709       3471      0.81   0.20    52.4   D
TR       357       1824      0.57   0.20    45.7   D    50.6   D

         Intersection Delay = 44.2  (sec/veh)   Intersection LOS = D

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                  HCS+: Signalized Intersections Release 5.5

Analyst: scf                            Inter.: SR 32 & Old 74
Agency: TranSystems                     Area Type: All other areas
Date:   2/4/2011                        Jurisd: No Build improved
Period: AM                              Year  : 2030 ALT 1
Project ID: Segment IVa; P403100004
E/W St: SR 32                           N/S St: Old 74

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   2  5    0   |   2   4   1   |   1   2   1   |   2   1   1   |
LGConfig   | L     TR      | L     T    R  | L     T    R  | L     T    R  |
Volume     |44   1730 2    |154  1825 311  |13   59   332  |342  104  380  |
Lane Width |12.0 12.0      |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0 12.0 |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A     P
    Thru                A             |     Thru         A
    Right               A             |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A
    Thru                A             |     Thru         A
    Right               A             |     Right        A
    Peds                              |     Peds
NB  Right         P                   | EB  Right  P
SB  Right         P                   | WB  Right  P
Green            9.5   36.0                       17.5  25.0
Yellow           3.5   3.5                        3.5   3.5
All Red          1.5   1.5                        1.5   1.5
                                                   Cycle Length: 108.0   secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        299       3403      0.16   0.09    45.8   D
TR       2791      8373      0.69   0.33    31.9   C    32.2   C

Westbound
L        296       3370      0.58   0.09    50.1   D
T        2212      6635      0.92   0.33    41.2   D    38.2   D
R        841       1553      0.41   0.54    14.9   B
Northbound
L        567       1752      0.02   0.44    17.3   B
T        813       3512      0.08   0.23    32.5   C    30.7   C
R        573       1568      0.64   0.37    30.9   C
Southbound
L        557       3437      0.68   0.16    46.0   D
T        431       1863      0.27   0.23    34.4   C    39.2   D
R        579       1583      0.73   0.37    34.3   C
         Intersection Delay = 35.8  (sec/veh)   Intersection LOS = D

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                  HCS+: Signalized Intersections Release 5.5

Analyst: scf                            Inter.: SR 32 & Old 74
Agency: TranSystems                     Area Type: All other areas
Date:   2/4/2011                        Jurisd: No Build improved
Period: PM                              Year  : 2030 ALT 1
Project ID: Segment IVa; P403100004
E/W St: SR 32                           N/S St: Old 74

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   2  5    0   |   2   4   1   |   1   2   1   |   2   1   1   |
LGConfig   | L     TR       | L     T    R  | L     T    R  | L     T    R  |
Volume     |364  2876 6    |270  1518 127  |10   257  398  |425  155  328  |
Lane Width |12.0 12.0      |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0 12.0 |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left          A     A             | NB  Left   A     P
    Thru                A     A       |     Thru         A
    Right               A     A       |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A
    Thru                      A       |     Thru         A
    Right                     A       |     Right        A
    Peds                              |     Peds
NB  Right         P                   | EB  Right  P
SB  Right         P                   | WB  Right  P
Green            12.0  10.0  33.0                 19.5  20.5
Yellow           3.5   3.5   3.5                  3.5   3.5
All Red          1.5   1.5   1.5                  1.5   1.5
                                                   Cycle Length: 120.0   secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate   __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        766       3403      0.53   0.22     41.6   D
TR       3349      8372      0.96   0.40     42.8   D    42.7   D

Westbound
L        337       3370      0.89   0.10     77.5   E
T        1825      6635      0.92   0.28     50.8   D    52.4   D
R        744       1553      0.19   0.48     18.0   B
Northbound
L        434       1752      0.03   0.38     24.1   C
T        600       3512      0.48   0.17     45.5   D    53.4   D
R        490       1568      0.90   0.31     59.3   E
Southbound
L        559       3437      0.84   0.16     60.2   E
T        318       1863      0.54   0.17     47.3   D    51.6   D
R        495       1583      0.74   0.31     42.5   D
         Intersection Delay = 47.7  (sec/veh)   Intersection LOS = D

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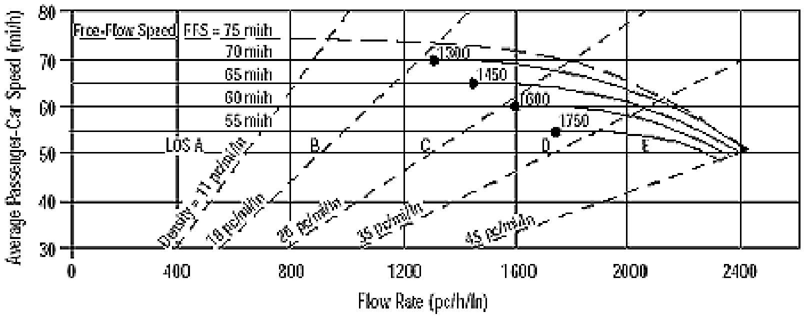
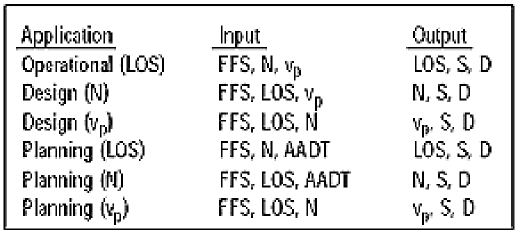
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Bach Buxton Ent to Olive Exit* |
| Date Performed | *2/7/2011* | Jurisdiction | *HNTB Scenario 7* |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 2* |

## Site Information

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *1992* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *2* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1123* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *18.7* | pc/mi/ln |
| LOS | *C* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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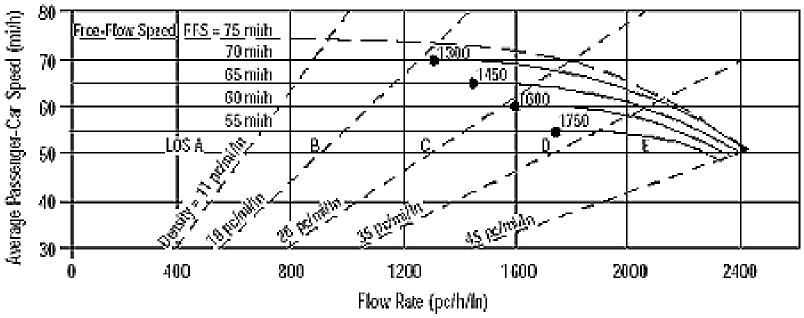
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *scf* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *PM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Eastbound* |
| From/To | *Bach Buxton Ent to Olive Exit* |
| Jurisdiction | *HNTB Scenario 7* |
| Analysis Year | *2030 Alt 2* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3346* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *2* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1887* | pc/h/ln |
| S | *59.1* | mi/h |
| D = $v_p$ / S | *31.9* | pc/mi/ln |
| LOS | *D* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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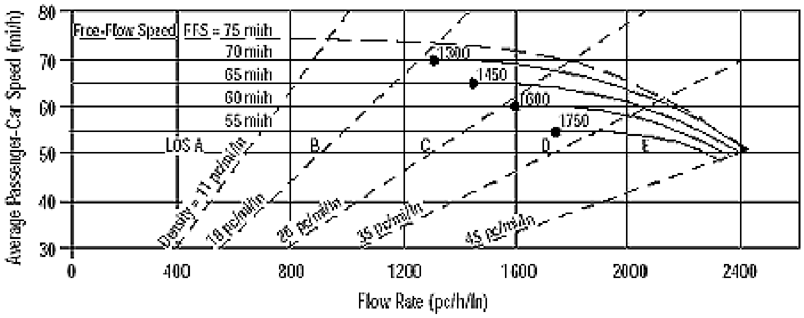
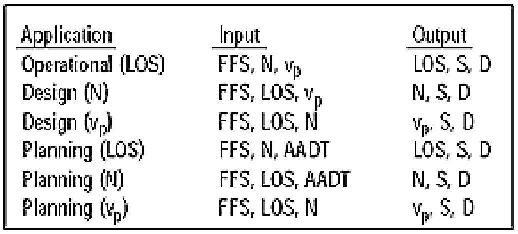
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Eastgate Ent to Bach Buxton Ex* |
| Date Performed | *2/7/2011* | Jurisdiction | *HNTB Scenario 7* |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 ALT 2* |

Project Description Segment IVa- P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2289* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV}$ = 1/[1+$P_T$($E_T$ - 1) + $P_R$($E_R$ - 1)] | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *860* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *14.3* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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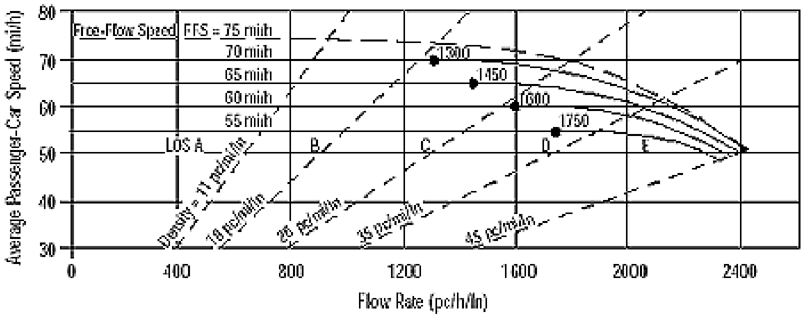
## BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### General Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Eastgate Ent to Bach Buxton Ex* |
| Date Performed | *2/7/2011* | Jurisdiction | *HNTB Scenario 7* |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Alt 2* |

### Site Information

Project Description Segment IVa- P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4006* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1506* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *25.1* | pc/mi/ln |
| LOS | *C* | |

### Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

### Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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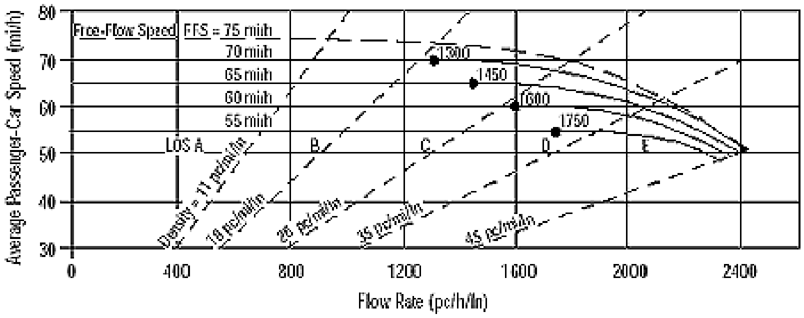
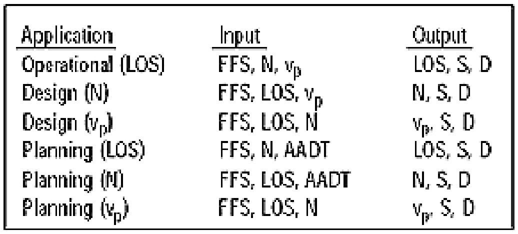
## BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### General Information

| | |
|---|---|
| Analyst | *scf* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *AM Peak* |

### Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *Bach Buxton ent to Eastgate Ex* |
| Jurisdiction | *HNTB Scenario 7* |
| Analysis Year | *2030 Alt 2* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3906* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1468* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *24.5* | pc/mi/ln |
| LOS | *C* | |

### Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

### Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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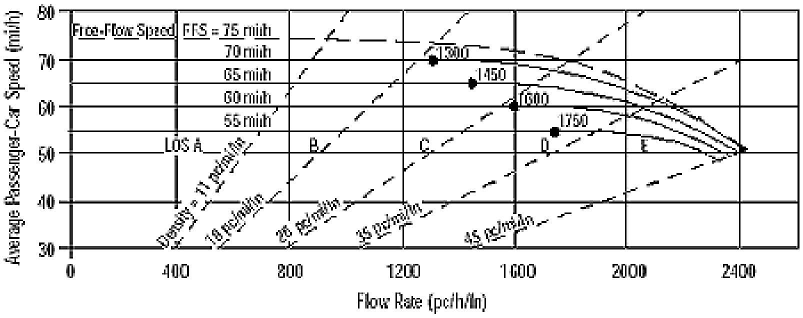
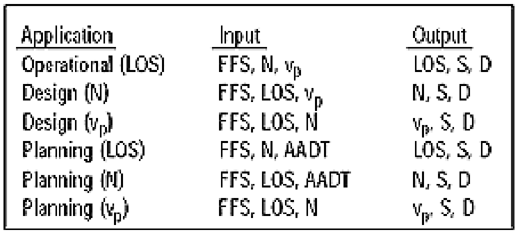
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Bach Buxton ent to Eastgate Ex* |
| Date Performed | *2/7/2011* | Jurisdiction | *HNTB Scenario 7* |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Alt 2* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2664* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1001* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *16.7* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

## Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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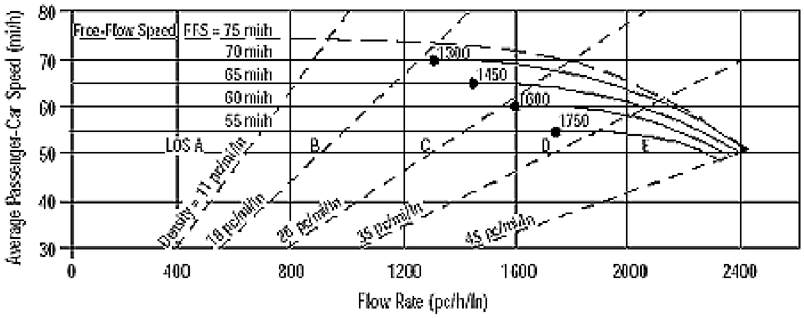
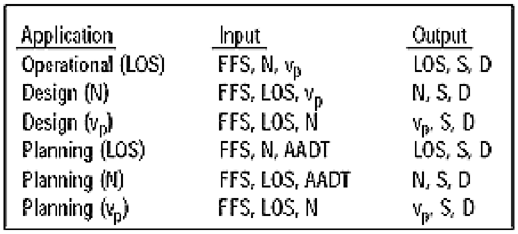
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Olive Branch Exit to Bach Ent* |
| Date Performed | *2/7/2011* | Jurisdiction | *HNTB Scenario 7* |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 2* |

## Site Information

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3327* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1251* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *20.9* | pc/mi/ln |
| LOS | *C* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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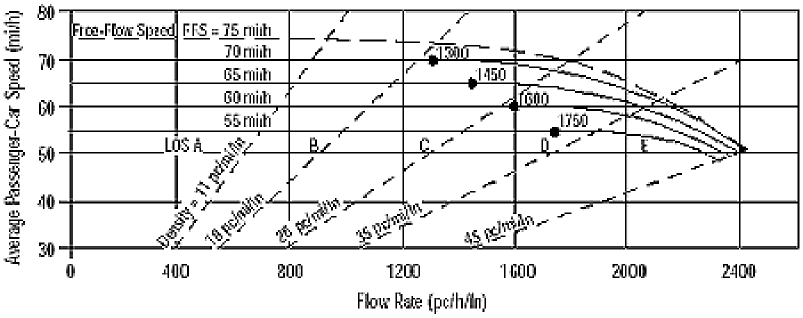
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *scf* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *PM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *Olive Branch Exit to Bach Ent* |
| Jurisdiction | *HNTB Scenario 7* |
| Analysis Year | *2030 Alt 2* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2270* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *853* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *14.2* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Old 74 @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: AM Peak                         Year  : Alt 2 (HNTB Alt 7)
Project ID: Segment IVa Alt 8A1
E/W St: Old 74 WB                       N/S St: Bach Buxton NB and Old 74 SB

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound      |  Westbound      |  Northbound     |  Southbound     |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   1   1   |   2   1   0   |   2   0   1   |   0   0   0   |
LGConfig   |       T    R  | L     T       | L         R  |               |
Volume     |     124  340  |491  504       |711       123  |               |
Lane Width |     12.0 12.0 |12.0 12.0      |12.0      12.0 |               |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left   A
    Thru            A                 |     Thru
    Right           A                 |     Right  A
    Peds                              |     Peds
WB  Left          A                   | SB  Left
    Thru          P     A             |     Thru
    Right                             |     Right
    Peds                              |     Peds
NB  Right         A                   | EB  Right  A
SB  Right                             | WB  Right
Green            27.0  15.0                      33.0
Yellow           3.5   3.5                       3.5
All Red          1.5   1.5                       1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane        Adj Sat     Ratios       Lane Group   Approach
Lane    Group      Flow Rate  __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound

T        311       1863      0.44   0.17     34.8   C    16.8   B
R        932       1583      0.41   0.59     10.3   B
Westbound
L        1031      3437      0.53   0.30     26.7   C
T        973       1863      0.58   0.52     15.5   B    21.1   C

Northbound
L        1260      3437      0.63   0.37     24.4   C
                                                        21.4   C
R        1143      1583      0.12   0.72     3.8    A
Southbound



         Intersection Delay = 20.3  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Old 74 @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: PM Peak                         Year  : Alt 2 (HNTB Alt 7)
Project ID: Segment IVa Alt 8A1
E/W St: Old 74 WB                       N/S St: Bach Buxton NB and Old 74 SB

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   1   1   |   2   1   0   |   2   0   1   |   0   0   0   |
LGConfig   |       T    R  | L     T       | L          R  |               |
Volume     |     756  570  |255  364       |462       384  |               |
Lane Width |     12.0 12.0 |12.0 12.0      |12.0      12.0 |               |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left   A
    Thru            A                 |     Thru
    Right           A                 |     Right  A
    Peds                              |     Peds
WB  Left      A                       | SB  Left
    Thru      P     A                 |     Thru
    Right                             |     Right
    Peds                              |     Peds
NB  Right     A                       | EB  Right  A
SB  Right                             | WB  Right
Green          9.0   43.0                          23.0
Yellow         3.5   3.5                           3.5
All Red        1.5   1.5                           1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound

T        890       1863      0.94   0.48    40.4   D    24.6   C
R        1249      1583      0.51   0.79    3.7    A
Westbound
L        344       3437      0.82   0.10    54.5   D
T        1180      1863      0.34   0.63    7.9    A    27.1   C

Northbound
L        878       3437      0.58   0.26    30.3   C
                                                        27.3   C
R        651       1583      0.66   0.41    23.8   C
Southbound



         Intersection Delay = 26.0  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: scf                            Inter.: SR 32 EB Ramps & BB
Agency: TranSystems                     Area Type: All other areas
Date:   12/22/2010                      Jurisd:
Period: AM DHV                          Year  : 2030 Alt 2
Project ID: Segment IVA Alt 7
E/W St: SR 32 EB Ramps                  N/S St: Bach Buxton Road

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   0   1   |   0   0   0   |   0   2   0   |   1   1   0   |
LGConfig   | L          R  |               |       TR      | L     T       |
Volume     |158       384  |               |     916  58   |187  306       |
Lane Width |12.0      12.0 |               |     12.0      |12.0 12.0      |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
WB  Left                              | SB  Left   A     P
    Thru                              |     Thru   P     A
    Right                             |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            32.0                             8.5   34.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        629       1770      0.28   0.36    21.0   C
                                                        28.4   C
R        563       1583      0.76   0.36    31.5   C
Westbound



Northbound

TR       1347      3515      0.80   0.38    28.4   C    28.4   C

Southbound
L        250       1770      0.83   0.53    39.6   D
T        994       1863      0.34   0.53    12.2   B    22.6   C

         Intersection Delay = 27.0  (sec/veh)   Intersection LOS = C

_______________________________________________________________________________
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                  HCS+: Signalized Intersections Release 5.5

Analyst: scf                            Inter.: SR 32 EB Ramps & BB
Agency: TranSystems                     Area Type: All other areas
Date:   12/22/2010                      Jurisd: ODOT
Period: PM DHV                          Year  : 2030 Alt 2
Project ID: Segment IVA Alt 7
E/W St: SR 32 EB Ramps                  N/S St: Bach Buxton Road

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   0   1   |   0   0   0   |   0   2   0   |   1   1   0   |
LGConfig   | L          R  |               |       TR      | L     T       |
Volume     |430       536  |               |     664  89   |217  406       |
Lane Width |12.0      12.0 |               |     12.0      |12.0 12.0      |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
WB  Left                              | SB  Left   A     P
    Thru                              |     Thru   P     A
    Right                             |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            37.5                             10.0  27.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane        Adj Sat     Ratios       Lane Group   Approach
Lane    Group       Flow Rate   __________   __________   ___________
Grp     Capacity      (s)       v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        737       1770      0.65   0.42    23.0   C
                                                        32.6   C
R        660       1583      0.90   0.42    40.4   D
Westbound



Northbound

TR       1065      3484      0.79   0.31    32.5   C    32.5   C

Southbound
L        283       1770      0.85   0.47    39.7   D
T        880       1863      0.51   0.47    17.1   B    24.9   C

         Intersection Delay = 30.6  (sec/veh)   Intersection LOS = C

_______________________________________________________________________________
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                  HCS+: Signalized Intersections Release 5.5

Analyst: scf                            Inter.: SR 32 WB Ramps & BB
Agency: TranSystems                     Area Type: All other areas
Date:   12/22/2010                      Jurisd: ODOT
Period: AM DHV                          Year  : 2030 Alt 2
Project ID: Segment IVA Alt 7
E/W St: SR 32 WB Ramps                  N/S St:

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound    |  Southbound    |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   0   0   |   0   0   2   |   2   1   0   |   0   1   1   |
LGConfig   |               |       LR   R  | L     T       |       T    R  |
Volume     |               |114       390  |630  444       |     378  453  |
Lane Width |               |     12.0 12.0 |12.0 12.0      |     12.0 12.0 |
RTOR Vol   |               |          0    |               |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left   A
    Thru                              |     Thru   P     A
    Right                             |     Right
    Peds                              |     Peds
WB  Left          A                   | SB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            20.5                             22.0  32.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound



Westbound

LR       381       1673      0.73   0.23    39.3   D    34.8   C
R        638       2803      0.44   0.23    30.3   C
Northbound
L        840       3437      0.83   0.24    39.5   D
T        1232      1863      0.40   0.66    7.2    A    26.2   C

Southbound

T        673       1863      0.62   0.36    25.5   C    34.3   C
R        572       1583      0.88   0.36    41.6   D
         Intersection Delay = 30.8  (sec/veh)   Intersection LOS = C

_______________________________________________________________________________
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                  HCS+: Signalized Intersections Release 5.5

Analyst: scf                            Inter.: SR 32 WB Ramps & BB
Agency: TranSystems                     Area Type: All other areas
Date:   12/22/2010                      Jurisd: ODOT
Period: PM DHV                          Year  : 2030 Alt 2
Project ID: Segment IVA Alt 7
E/W St: SR 32 WB Ramps                  N/S St:

_________________________SIGNALIZED INTERSECTION SUMMARY________________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   0   0   |   0   0   2   |   2   1   0   |   0   1   1   |
LGConfig   |               |       LR   R  | L     T       |       T    R  |
Volume     |               |75        228  |476  618       |     548  277  |
Lane Width |               |     12.0 12.0 |12.0 12.0      |     12.0 12.0 |
RTOR Vol   |               |          0    |               |          0    |
________________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4 |           5     6     7     8
EB  Left                              | NB  Left   A
    Thru                              |     Thru   P     A
    Right                             |     Right
    Peds                              |     Peds
WB  Left          A                   | SB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            18.5                             22.0  34.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary____________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group      Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
________________________________________________________________________________
Eastbound



Westbound

LR       345       1680      0.48   0.21    32.6   C    31.5   C
R        576       2803      0.30   0.21    30.5   C
Northbound
L        840       3437      0.63   0.24    31.9   C
T        1273      1863      0.54   0.68    7.6    A    18.2   B

Southbound

T        714       1863      0.85   0.38    35.2   D    30.8   C
R        607       1583      0.51   0.38    21.9   C
         Intersection Delay = 24.7  (sec/veh)   Intersection LOS = C

________________________________________________________________________________
```

# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | HNTB Scenario 7 |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 2 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 1747 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 1970 |
| Ramp | 245 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 276 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1165 pc/h

$V_3$ or $V_{av34}$ 805 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 2246 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 1441 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

$D_R$ = 13.5 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.292 (Exibit 25-19)

$S_R$= 54.7 mph (Exhibit 25-19)

$S_0$= 58.9 mph (Exhibit 25-19)

S = 56.2 mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## *General Information* / *Site Information*

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | HNTB Scenario 7 |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 2 |

Project Description Segment IVa - P403100004

## *Inputs*

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## *Conversion to pc/h Under Base Conditions*

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3040 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3428 |
| Ramp | 306 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 345 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## *Estimation of $v_{12}$*

$V_{12} = V_F$ ( $P_{FM}$ )

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 2028 pc/h

$V_3$ or $V_{av34}$ 1400 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## *Capacity Checks*

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 3773 | Exhibit 25-7 | | No |

## *Flow Entering Merge Influence Area*

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 2373 | Exhibit 25-7 | 4600:All | No |

## *Level of Service Determination (if not F)*

$D_R$ = 5.475 + 0.00734 v $_R$ + 0.0078 $V_{12}$ - 0.00627 $L_A$

$D_R$ = 20.7 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## *Speed Determination*

$M_S$ = 0.318 (Exibit 25-19)

$S_R$= 54.3 mph (Exhibit 25-19)

$S_0$= 56.8 mph (Exhibit 25-19)

S = 55.2 mph (Exhibit 25-14)

### Diverge Areas

## *Estimation of $v_{12}$*

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## *Capacity Checks*

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## *Flow Entering Diverge Influence Area*

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## *Level of Service Determination (if not F)*

$D_R$ = 4.252 + 0.0086 $V_{12}$ - 0.009 $L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## *Speed Determination*

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | HNTB Scenario 7 |
| Analysis Time Period | AM Peak | Analysis Year | |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2289 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2581 |
| Ramp | 542 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 611 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.667 using Equation (Exhibit 25-12)

$V_{12}$ = 1926 pc/h

$V_3$ or $V_{av34}$ 655 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 2581 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 1970 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 611 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 1926 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 16.3 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.353 (Exhibit 25-19)

$S_R$= 53.6 mph (Exhibit 25-19)

$S_0$= 65.8 mph (Exhibit 25-19)

S = 56.3 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | HNTB Scenario 7 |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 2 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 4006 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4518 |
| Ramp | 966 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 1089 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.597 using Equation (Exhibit 25-12)

$V_{12}$ = 3136 pc/h

$V_3$ or $V_{av34}$ 1382 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 4518 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 3429 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 1089 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 3136 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 26.7 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.396 (Exhibit 25-19)

$S_R$= 52.9 mph (Exhibit 25-19)

$S_0$= 64.3 mph (Exhibit 25-19)

S = 55.9 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## *General Information* / *Site Information*

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | HNTB Scenario 7 |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 2 |

Project Description Segment IVa - P403100004

## *Inputs*

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## *Conversion to pc/h Under Base Conditions*

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2823 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3184 |
| Ramp | 1083 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 1221 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## *Estimation of $v_{12}$*

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1883 pc/h

$V_3$ or $V_{av34}$ 1301 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## *Capacity Checks*

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 4405 | Exhibit 25-7 | | No |

## *Flow Entering Merge Influence Area*

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 3104 | Exhibit 25-7 | 4600:All | No |

## *Level of Service Determination (if not F)*

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 26.0 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## *Speed Determination*

$M_S$ = 0.363 (Exibit 25-19)

$S_R$= 53.5 mph (Exhibit 25-19)

$S_0$= 57.1 mph (Exhibit 25-19)

S = 54.5 mph (Exhibit 25-14)

**Diverge Areas**

## *Estimation of $v_{12}$*

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## *Capacity Checks*

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## *Flow Entering Diverge Influence Area*

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## *Level of Service Determination (if not F)*

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## *Speed Determination*

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | HNTB Scenario 7 |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 2 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 1911 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2155 |
| Ramp | 753 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 849 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1275 pc/h

$V_3$ or $V_{av34}$ 880 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 3004 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 2124 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 18.5 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.309 (Exibit 25-19)

$S_R$= 54.4 mph (Exhibit 25-19)

$S_0$= 58.6 mph (Exhibit 25-19)

S = 55.6 mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | HNTB Scenario 7 |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 2 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3327 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3752 |
| Ramp | 504 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 568 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.640 using Equation (Exhibit 25-12)

$V_{12}$ = 2606 pc/h

$V_3$ or $V_{av34}$ 1146 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 3752 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 3184 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 568 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 2606 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 22.2 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.349 (Exhibit 25-19)

$S_R$= 53.7 mph (Exhibit 25-19)

$S_0$= 65.3 mph (Exhibit 25-19)

S = 56.8 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | HNTB Scenario 7 |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 2 |

Project Description Segment IVa - P403100004

## Inputs

| Upstream Adj Ramp | Terrain: Level | Downstream Adj Ramp |
|---|---|---|
| ☐ Yes ☐ On<br>☑ No ☐ Off | | ☐ Yes ☐ On<br>☑ No ☐ Off |
| $L_{up}$ = ft | $S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph | $L_{down}$ = ft |
| $V_u$ = veh/h | Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$) | $V_D$ = veh/h |

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2214 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2497 |
| Ramp | 303 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 342 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.682 using Equation (Exhibit 25-12)

$V_{12}$ = 1811 pc/h

$V_3$ or $V_{av34}$ 686 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 2497 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 2155 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 342 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 1811 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 15.3 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.329 (Exhibit 25-19)

$S_R$= 54.1 mph (Exhibit 25-19)

$S_0$= 65.8 mph (Exhibit 25-19)

S = 56.9 mph (Exhibit 25-15)

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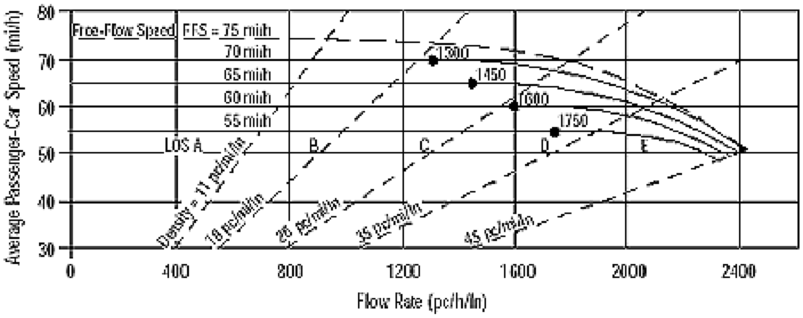
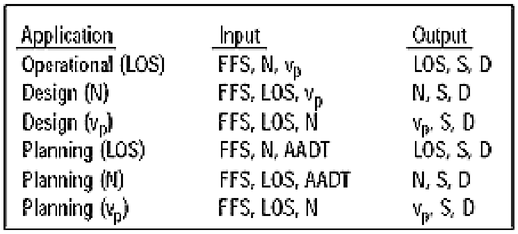
## BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### General Information

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *AM Peak* |

### Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Eastbound* |
| From/To | *Eastgate Ent to Glen Este Ent* |
| Jurisdiction | *Scenario 8 L1* |
| Analysis Year | *2030 Alt 3* |

Project Description Segment IVa- P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2380* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *895* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *14.9* | pc/mi/ln |
| LOS | *B* | |

### Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

### Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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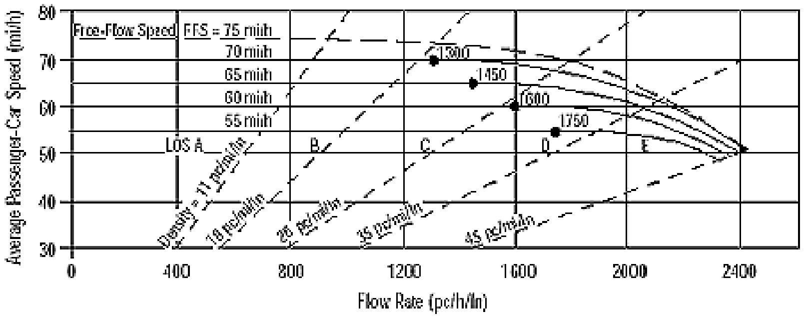
## BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### General Information

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *PM Peak* |

### Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Eastbound* |
| From/To | *Eastgate Ent to Glen Este Ent* |
| Jurisdiction | |
| Analysis Year | *2030 Alt 3* |

Project Description Segment IVa- P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4025* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1513* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *25.2* | pc/mi/ln |
| LOS | *C* | |

### Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

### Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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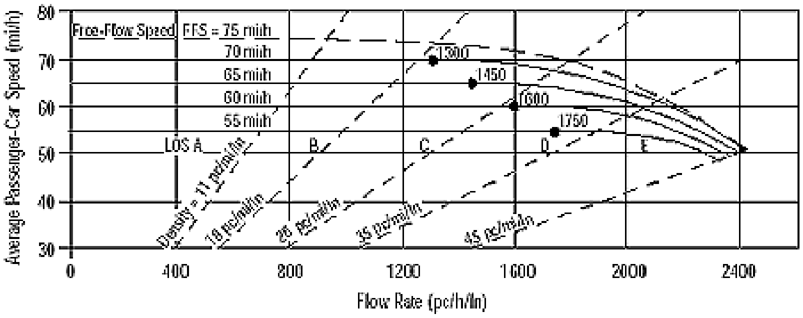
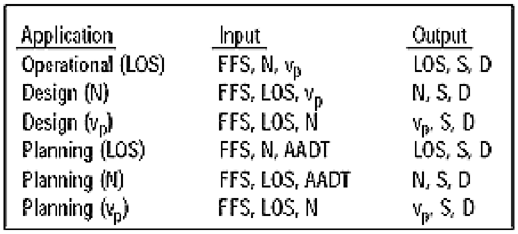
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Bach Buxton Ent to Olive Ext* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 3* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2450* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *921* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *15.4* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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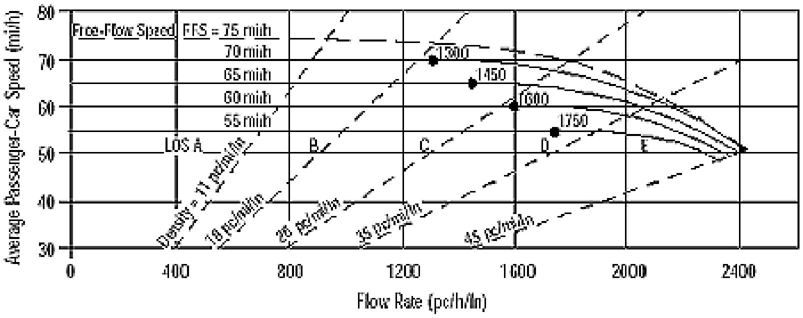
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | | |
| Agency or Company | *TranSystems* | | |
| Date Performed | *2/7/2011* | | |
| Analysis Time Period | *PM Peak* | | |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Eastbound* |
| From/To | *Bach Buxton Ent to Olive Ext* |
| Jurisdiction | |
| Analysis Year | *2030 Alt 3* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4045* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1521* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *25.4* | pc/mi/ln |
| LOS | *C* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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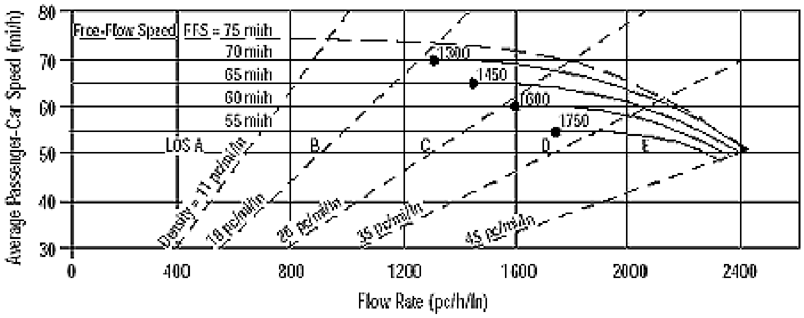
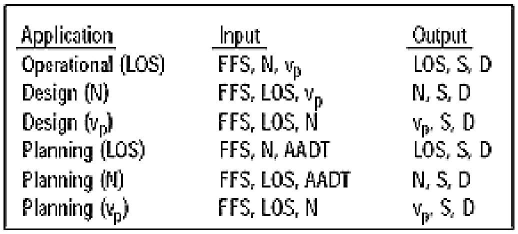
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Glen Este Ent to Elick Ext* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 3* |

Project Description Segment IVa- P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2580* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *970* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *16.2* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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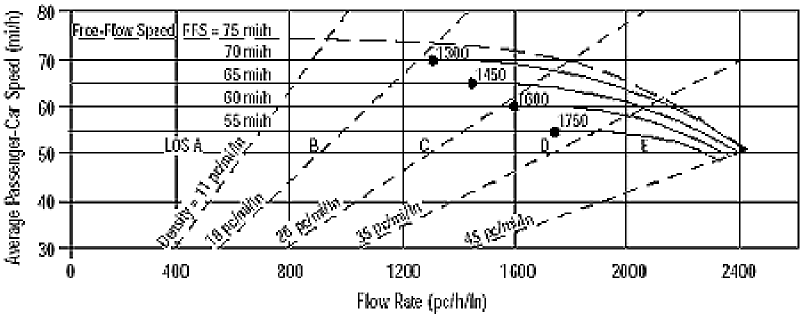
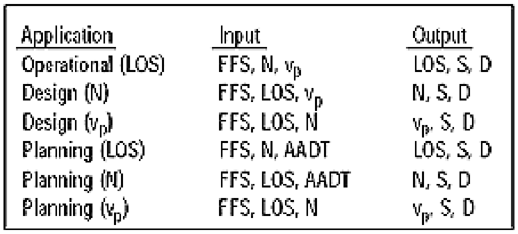
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Glen Este Ent to Elick Ext* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Alt 3* |

Project Description Segment IVa- P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4365* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs / Calc Speed Adj and FFS

| | | | | | |
|---|---|---|---|---|---|
| Lane Width | *12.0* | ft | $f_{LW}$ | | mi/h |
| Rt-Shoulder Lat. Clearance | *6.0* | ft | $f_{LC}$ | | mi/h |
| Interchange Density | *0.50* | I/mi | $f_{ID}$ | | mi/h |
| Number of Lanes, N | *3* | | $f_N$ | | mi/h |
| FFS (measured) | *60.0* | mi/h | FFS | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h | | | |

## LOS and Performance Measures / Design (N)

| | | | | | |
|---|---|---|---|---|---|
| Operational (LOS) | | | Design (N) | | |
| | | | Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1641* | pc/h/ln | $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | *60.0* | mi/h | S | | mi/h |
| D = $v_p$ / S | *27.4* | pc/mi/ln | D = $v_p$ / S | | pc/mi/ln |
| LOS | *D* | | Required Number of Lanes, N | | |

## Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

## Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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# FREEWAY WEAVING WORKSHEET

## General Information

| | |
|---|---|
| Analyst | STA |
| Agency/Company | TRANSYSTEMS |
| Date Performed | 8/3/2011 |
| Analysis Time Period | AM PEAK |

## Site Information

| | |
|---|---|
| Freeway/Dir of Travel | SR 32 EASTBOUND |
| Weaving Seg Location | GLEN ESTE ON TO ELICK OFF |
| Jurisdiction | |
| Analysis Year | 2030 alt 3 (L 1) |

## Inputs

| | |
|---|---|
| Freeway free-flow speed, $S_{FF}$ (mi/h) | 60 |
| Weaving number of lanes, N | 4 |
| Weaving seg length, L (ft) | 2000 |
| Terrain | Level |

| | |
|---|---|
| Weaving type | A |
| Volume ratio, VR | 0.19 |
| Weaving ratio, R | 0.36 |

## Conversions to pc/h Under Base Conditions

| (pc/h) | V | PHF | Truck % | RV % | $E_T$ | $E_R$ | $f_{HV}$ | $f_p$ | v |
|---|---|---|---|---|---|---|---|---|---|
| $V_{o1}$ | 2060 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 2323 |
| $V_{o2}$ | 20 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 22 |
| $V_{w1}$ | 320 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 360 |
| $V_{w2}$ | 180 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 203 |
| $V_w$ | | | | 563 | $V_{nw}$ | | | | 2345 |
| V | | | | | | | | | 2908 |

## Weaving and Non-Weaving Speeds

| | Unconstrained | | Constrained | |
|---|---|---|---|---|
| | Weaving (i = w) | Non-Weaving (i = nw) | Weaving (i = w) | Non-Weaving ( = nw) |
| a (Exhibit 24-6) | 0.15 | 0.0035 | | |
| b (Exhibit 24-6) | 2.20 | 4.00 | | |
| c (Exhibit 24-6) | 0.97 | 1.30 | | |
| d (Exhibit 24-6) | 0.80 | 0.75 | | |
| Weaving intensity factor, Wi | 0.30 | 0.12 | | |
| Weaving and non-weaving speeds, Si (mi/h) | 53.40 | 59.46 | | |

Number of lanes required for unconstrained operation, Nw 1.20
Maximum number of lanes, Nw (max) 1.40

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

## Weaving Segment Speed, Density, Level of Service, and Capacity

| | |
|---|---|
| Weaving segment speed, S (mi/h) | 58.18 |
| Weaving segment density, D (pc/mi/ln) | 12.50 |
| Level of service, LOS | B |
| Capacity of base condition, $c_b$ (pc/h) | 8175 |
| Capacity as a 15-minute flow rate, c (veh/h) | 8054 |
| Capacity as a full-hour volume, $c_h$ (veh/h) | 7249 |

## Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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# FREEWAY WEAVING WORKSHEET

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | STA | Freeway/Dir of Travel | SR 32 EASTBOUND |
| Agency/Company | TRANSYSTEMS | Weaving Seg Location | GLEN ESTE ON TO ELICK OFF |
| Date Performed | 8/3/2011 | Jurisdiction | |
| Analysis Time Period | AM PEAK | Analysis Year | 2030 alt 3 (L 1) |

## Inputs

| | | | |
|---|---|---|---|
| Freeway free-flow speed, $S_{FF}$ (mi/h) | 60 | Weaving type | A |
| Weaving number of lanes, N | 4 | Volume ratio, VR | 0.20 |
| Weaving seg length, L (ft) | 2000 | Weaving ratio, R | 0.34 |
| Terrain | Level | | |

## Conversions to pc/h Under Base Conditions

| (pc/h) | V | PHF | Truck % | RV % | $E_T$ | $E_R$ | $f_{HV}$ | $f_p$ | v |
|---|---|---|---|---|---|---|---|---|---|
| $V_{o1}$ | 3455 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 3896 |
| $V_{o2}$ | 50 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 56 |
| $V_{w1}$ | 570 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 642 |
| $V_{w2}$ | 290 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 327 |
| $V_w$ | | | | 969 | $V_{nw}$ | | | | 3952 |
| V | | | | | | | | | 4921 |

## Weaving and Non-Weaving Speeds

| | Unconstrained | | Constrained | |
|---|---|---|---|---|
| | Weaving (i = w) | Non-Weaving (i = nw) | Weaving (i = w) | Non-Weaving ( = nw) |
| a (Exhibit 24-6) | 0.15 | 0.0035 | | |
| b (Exhibit 24-6) | 2.20 | 4.00 | | |
| c (Exhibit 24-6) | 0.97 | 1.30 | | |
| d (Exhibit 24-6) | 0.80 | 0.75 | | |
| Weaving intensity factor, Wi | 0.51 | 0.25 | | |
| Weaving and non-weaving speeds, Si (mi/h) | 48.20 | 55.01 | | |

| | |
|---|---|
| Number of lanes required for unconstrained operation, Nw | 1.27 |
| Maximum number of lanes, Nw (max) | 1.40 |

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

## Weaving Segment Speed, Density, Level of Service, and Capacity

| | |
|---|---|
| Weaving segment speed, S (mi/h) | 53.52 |
| Weaving segment density, D (pc/mi/ln) | 22.99 |
| Level of service, LOS | C |
| Capacity of base condition, $c_b$ (pc/h) | 8157 |
| Capacity as a 15-minute flow rate, c (veh/h) | 8036 |
| Capacity as a full-hour volume, $c_h$ (veh/h) | 7232 |

## Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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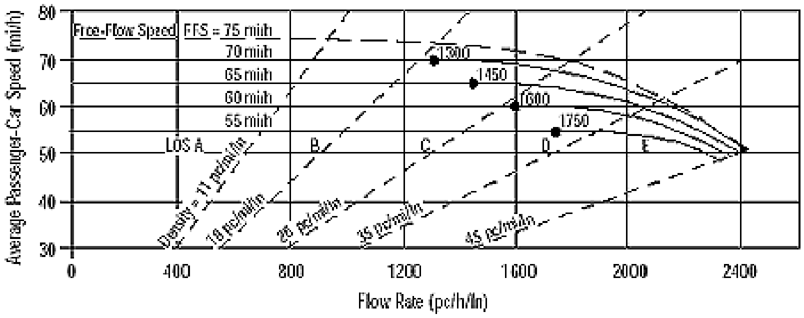
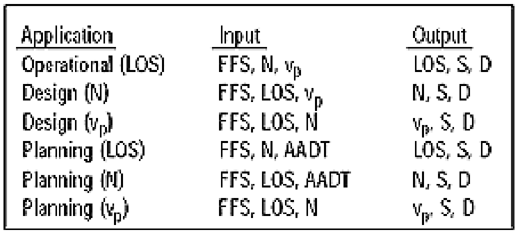
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Bach Buxton ent toGlenEste Ext* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 3* |

(Site Information: right columns above)

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4205* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1581* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *26.4* | pc/mi/ln |
| LOS | *D* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

## Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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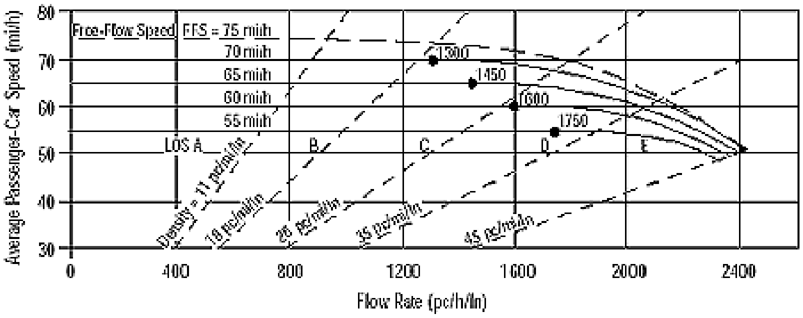
## BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### *General Information* / *Site Information*

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Bach Buxton ent toGlenEste Ext* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Alt 3* |

Project Description pSegment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### *Flow Inputs*

| | | | | |
|---|---|---|---|---|
| Volume, V | *3200* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1203* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *20.0* | pc/mi/ln |
| LOS | *C* | |

### Design (N)

Design (N)

| | |
|---|---|
| Design LOS | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | pc/h |
| S | mi/h |
| D = $v_p$ / S | pc/mi/ln |
| Required Number of Lanes, N | |

### Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

### Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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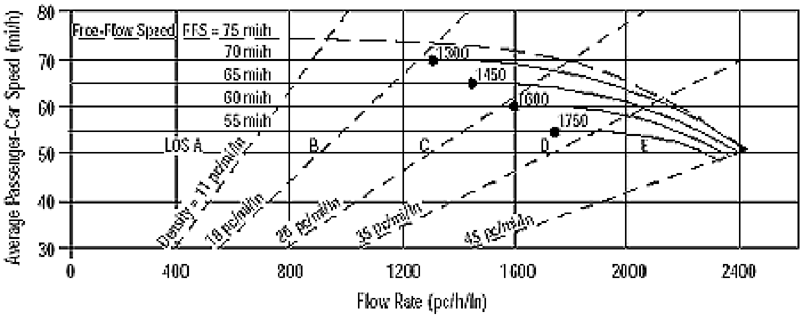
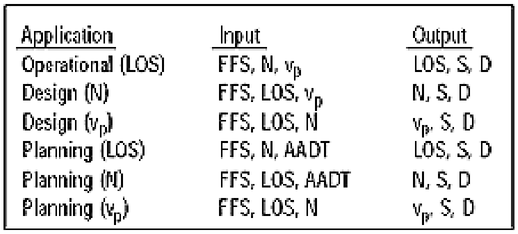
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *AM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *GlenEste Ext to Eastgate Exit* |
| Jurisdiction | |
| Analysis Year | *2030 Alt 3* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3940* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1481* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *24.7* | pc/mi/ln |
| LOS | *C* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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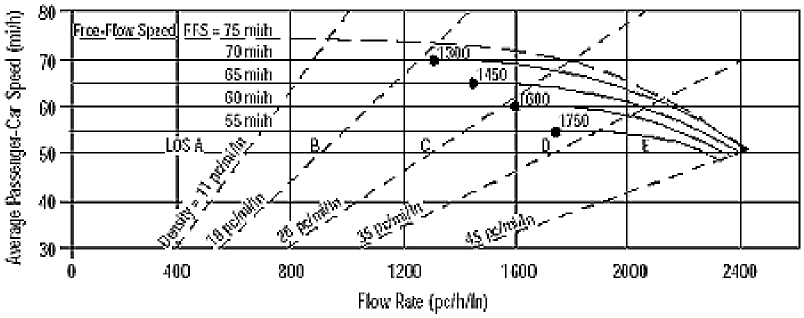
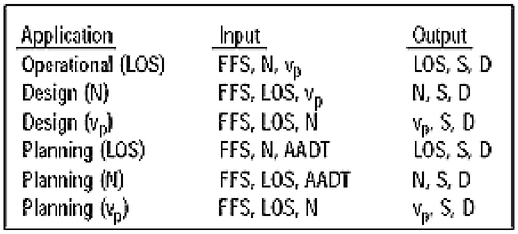
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *PM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *GlenEste Ext to Eastgate Exit* |
| Jurisdiction | |
| Analysis Year | *2030 Alt 3* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2795* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1051* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *17.5* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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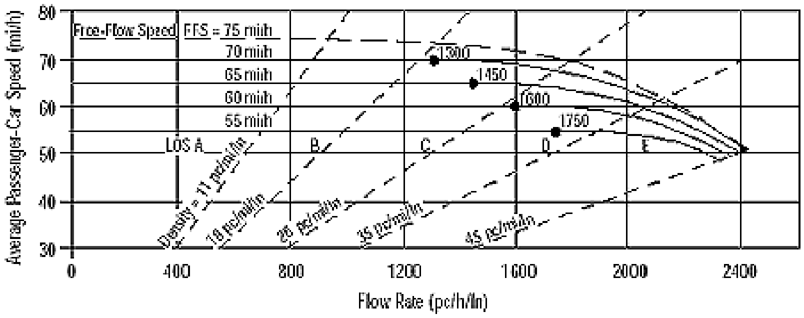
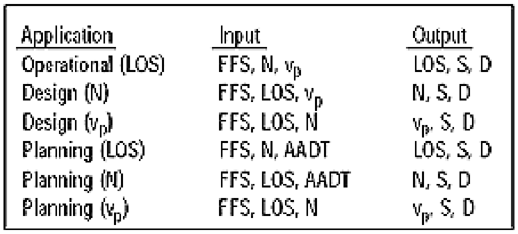
## BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### General Information

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *AM Peak* |

### Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *Olive Branch Ent to Bach Ext* |
| Jurisdiction | |
| Analysis Year | *2030 Alt 3* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4155* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1562* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *26.0* | pc/mi/ln |
| LOS | *D* | |

### Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

### Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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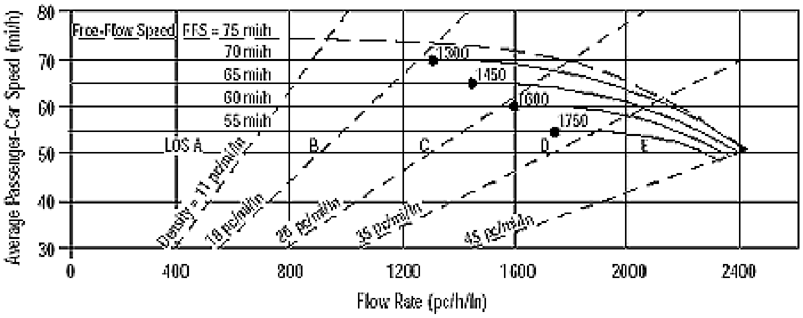
## BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### *General Information*

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *PM Peak* |

### *Site Information*

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *Olive Branch Ent to Bach Ext* |
| Jurisdiction | |
| Analysis Year | *2030 Alt 3* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### *Flow Inputs*

| | | | | |
|---|---|---|---|---|
| Volume, V | *3125* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

<u>Operational (LOS)</u>

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1175* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *19.6* | pc/mi/ln |
| LOS | *C* | |

### Design (N)

<u>Design (N)</u>

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

### Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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# FREEWAY WEAVING WORKSHEET

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | STA | Freeway/Dir of Travel | SR 32 WESTBOUND |
| Agency/Company | TRANSYSTEMS | Weaving Seg Location | ELICK ON TO GLEN ESTE OFF |
| Date Performed | 8/3/2011 | Jurisdiction | |
| Analysis Time Period | AM PEAK | Analysis Year | 2030 alt 3 (L 1) |

## Inputs

| | | | |
|---|---|---|---|
| Freeway free-flow speed, $S_{FF}$ (mi/h) | 60 | Weaving type | A |
| Weaving number of lanes, N | 4 | Volume ratio, VR | 0.19 |
| Weaving seg length, L (ft) | 2000 | Weaving ratio, R | 0.29 |
| Terrain | Level | | |

## Conversions to pc/h Under Base Conditions

| (pc/h) | V | PHF | Truck % | RV % | $E_T$ | $E_R$ | $f_{HV}$ | $f_p$ | v |
|---|---|---|---|---|---|---|---|---|---|
| $V_{o1}$ | 3370 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 3800 |
| $V_{o2}$ | 30 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 33 |
| $V_{w1}$ | 570 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 642 |
| $V_{w2}$ | 235 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 265 |
| $V_w$ | | | | 907 | $V_{nw}$ | | | | 3833 |
| V | | | | | | | | | 4740 |

## Weaving and Non-Weaving Speeds

| | Unconstrained | | Constrained | |
|---|---|---|---|---|
| | Weaving (i = w) | Non-Weaving (i = nw) | Weaving (i = w) | Non-Weaving ( = nw) |
| a (Exhibit 24-6) | 0.15 | 0.0035 | | |
| b (Exhibit 24-6) | 2.20 | 4.00 | | |
| c (Exhibit 24-6) | 0.97 | 1.30 | | |
| d (Exhibit 24-6) | 0.80 | 0.75 | | |
| Weaving intensity factor, Wi | 0.48 | 0.23 | | |
| Weaving and non-weaving speeds, Si (mi/h) | 48.71 | 55.54 | | |

Number of lanes required for unconstrained operation, Nw 1.24

Maximum number of lanes, Nw (max) 1.40

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

## Weaving Segment Speed, Density, Level of Service, and Capacity

| | |
|---|---|
| Weaving segment speed, S (mi/h) | 54.09 |
| Weaving segment density, D (pc/mi/ln) | 21.91 |
| Level of service, LOS | C |
| Capacity of base condition, $c_b$ (pc/h) | 8188 |
| Capacity as a 15-minute flow rate, c (veh/h) | 8067 |
| Capacity as a full-hour volume, $c_h$ (veh/h) | 7260 |

## Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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# FREEWAY WEAVING WORKSHEET

## General Information

Analyst STA
Agency/Company TRANSYSTEMS
Date Performed 8/3/2011
Analysis Time Period AM PEAK

## Site Information

Freeway/Dir of Travel SR 32 WESTBOUND
Weaving Seg Location ELICK ON TO GLEN ESTE OFF
Jurisdiction
Analysis Year 2030 alt 3 (L 1)

## Inputs

| | |
|---|---|
| Freeway free-flow speed, $S_{FF}$ (mi/h) | 60 |
| Weaving number of lanes, N | 4 |
| Weaving seg length, L (ft) | 2000 |
| Terrain | Level |

| | |
|---|---|
| Weaving type | A |
| Volume ratio, VR | 0.25 |
| Weaving ratio, R | 0.48 |

## Conversions to pc/h Under Base Conditions

| (pc/h) | V | PHF | Truck % | RV % | $E_T$ | $E_R$ | $f_{HV}$ | $f_p$ | v |
|---|---|---|---|---|---|---|---|---|---|
| $V_{o1}$ | 2380 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 2684 |
| $V_{o2}$ | 20 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 22 |
| $V_{w1}$ | 415 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 468 |
| $V_{w2}$ | 385 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 434 |
| $V_w$ | | | | 902 | $V_{nw}$ | | | | 2706 |
| V | | | | | | | | | 3608 |

## Weaving and Non-Weaving Speeds

| | Unconstrained | | Constrained | |
|---|---|---|---|---|
| | Weaving (i = w) | Non-Weaving (i = nw) | Weaving (i = w) | Non-Weaving ( = nw) |
| a (Exhibit 24-6) | | | 0.35 | 0.0020 |
| b (Exhibit 24-6) | | | 2.20 | 4.00 |
| c (Exhibit 24-6) | | | 0.97 | 1.30 |
| d (Exhibit 24-6) | | | 0.80 | 0.75 |
| Weaving intensity factor, Wi | | | 0.96 | 0.11 |
| Weaving and non-weaving speeds, Si (mi/h) | | | 40.49 | 59.91 |

Number of lanes required for unconstrained operation, Nw 1.43
Maximum number of lanes, Nw (max) 1.40

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

## Weaving Segment Speed, Density, Level of Service, and Capacity

| | |
|---|---|
| Weaving segment speed, S (mi/h) | 53.49 |
| Weaving segment density, D (pc/mi/ln) | 16.86 |
| Level of service, LOS | B |
| Capacity of base condition, $c_b$ (pc/h) | 7805 |
| Capacity as a 15-minute flow rate, c (veh/h) | 7690 |
| Capacity as a full-hour volume, $c_h$ (veh/h) | 6921 |

## Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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                  HCS+: Signalized Intersections Release 5.5

Analyst:                                Inter.: Elick @ Old 74
Agency: TranSystems                     Area Type: All other areas
Date:   7/20/2011                       Jurisd:
Period: AM Peak Hour                    Year  : 2030 Alt 3
Project ID: Segment IVa Alt 8 L1
E/W St: Old SR 74                       N/S St: Elick

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   1   1   |   1   1   0   |   1   0   1   |   0   0   0   |
LGConfig   |       T    R  | L     T       | L          R  |               |
Volume     |     200  220  |340  530       |320       330  |               |
Lane Width |     12.0 12.0 |12.0 12.0      |12.0      12.0 |               |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left                              | NB  Left   A
    Thru          A                   |     Thru
    Right         A                   |     Right  A
    Peds                              |     Peds
WB  Left          A     A             | SB  Left
    Thru          A     A             |     Thru
    Right                             |     Right
    Peds                              |     Peds
NB  Right         P                   | EB  Right  A
SB  Right                             | WB  Right
Green            7.0   18.0                       20.0
Yellow           3.5   3.5                        3.5
All Red          1.5   1.5                        1.5
                                                   Cycle Length: 60.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane      Adj Sat      Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound

T        559       1863      0.40   0.30    17.2   B    9.7    A
R        1134      1583      0.22   0.72    2.9    A
Westbound
L        536       1770      0.71   0.50    16.9   B
T        932       1863      0.63   0.50    12.4   B    14.1   B

Northbound
L        590       1770      0.60   0.33    18.4   B
                                                        13.6   B
R        844       1583      0.43   0.53    8.9    A
Southbound



         Intersection Delay = 13.0  (sec/veh)   Intersection LOS = B

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                  HCS+: Signalized Intersections Release 5.5

Analyst:                                Inter.: Elick @ Old 74
Agency: TranSystems                     Area Type: All other areas
Date:   7/20/2011                       Jurisd:
Period: PM Peak Hour                    Year  : 2030 Alt 3
Project ID: Segment IVa Alt 8 L1
E/W St: Old SR 74                       N/S St: Elick

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   1   1   |   1   1   0   |   1   0   1   |   0   0   0   |
LGConfig   |       T    R  | L     T       | L          R  |               |
Volume     |     350  435  |200  295       |400       360  |               |
Lane Width |     12.0 12.0 |12.0 12.0      |12.0      12.0 |               |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left   A
    Thru                A             |     Thru
    Right               A             |     Right  A
    Peds                              |     Peds
WB  Left          A     A             | SB  Left
    Thru          A     A             |     Thru
    Right                             |     Right
    Peds                              |     Peds
NB  Right         P                   | EB  Right  A
SB  Right                             | WB  Right
Green            7.0   16.5                       21.5
Yellow           3.5   3.5                        3.5
All Red          1.5   1.5                        1.5
                                                   Cycle Length: 60.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group      Flow Rate   __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C      Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound

T        512       1863      0.76   0.28     26.5    C    13.9   B
R        1134      1583      0.43   0.72     3.7     A
Westbound
L        364       1770      0.61   0.47     14.0    B
T        885       1863      0.37   0.47     10.3    B    11.8   B

Northbound
L        634       1770      0.70   0.36     19.9    B
                                                        14.4   B
R        884       1583      0.45   0.56     8.2     A
Southbound



         Intersection Delay = 13.6  (sec/veh)   Intersection LOS = B

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                  HCS+: Signalized Intersections Release 5.5

Analyst:                                Inter.: Elick @ SR 32 EB Off Ramp
Agency: TranSystems                     Area Type: All other areas
Date:   7/20/2011                       Jurisd:
Period: AM Peak Hour                    Year  : 2030 Alt 3
Project ID: Segment IVa Alt 8 L1
E/W St: SR 32 EB Off ramp               N/S St: Elick

_________________________SIGNALIZED INTERSECTION SUMMARY________________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   1   0   |   0   1   1   |   1   1   0   |   1   1   0   |
LGConfig   |       LTR     |       LT  R   | L     TR      | L     TR      |
Volume     |100  25   10   |135  120  75   |10   465  40   |150  210  200  |
Lane Width |     12.0      |     12.0 12.0 |12.0 12.0      |12.0 12.0      |
RTOR Vol   |          0    |          0    |          0    |          0    |
________________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A
    Thru          A                   |     Thru   A
    Right         A                   |     Right  A
    Peds          X                   |     Peds   X
WB  Left          A                   | SB  Left   A
    Thru          A                   |     Thru   A
    Right         A                   |     Right  A
    Peds          X                   |     Peds   X
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green           22.5                             27.5
Yellow          3.5                              3.5
All Red         1.5                              1.5
                                                   Cycle Length: 60.0    secs
____________________Intersection Performance Summary____________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group      Flow Rate  __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C      Delay LOS   Delay LOS
________________________________________________________________________________
Eastbound

LTR      356       950       0.42   0.38    14.7   B    14.7   B

Westbound

LT       535       1427      0.53   0.38    15.6   B    14.9   B
R        594       1583      0.14   0.38    12.5   B
Northbound
L        334       729       0.03   0.46    9.0    B
TR       844       1841      0.66   0.46    14.6   B    14.5   B

Southbound
L        251       547       0.67   0.46    19.2   B
TR       791       1726      0.58   0.46    13.0   B    14.7   B

         Intersection Delay = 14.7  (sec/veh)   Intersection LOS = B

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                  HCS+: Signalized Intersections Release 5.5

Analyst:                                Inter.: Elick @ SR 32 EB Off Ramp
Agency: TranSystems                     Area Type: All other areas
Date:   7/20/2011                       Jurisd:
Period: PM Peak Hour                    Year  : 2030 Alt 3
Project ID: Segment IVa Alt 8 L1
E/W St: SR 32 EB Off ramp               N/S St: Elick

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   1   0   |   0   1   1   |   1   1   0   |   1   1   0   |
LGConfig   |       LTR     |       LT   R  | L     TR      | L     TR      |
Volume     |110  60   10   |180  130  260  |10   340  50   |200  330  105  |
Lane Width |     12.0      |     12.0 12.0 |12.0 12.0      |12.0 12.0      |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left          A                   | NB  Left   A
    Thru          A                   |     Thru   A
    Right         A                   |     Right  A
    Peds          X                   |     Peds   X
WB  Left          A                   | SB  Left   A
    Thru          A                   |     Thru   A
    Right         A                   |     Right  A
    Peds          X                   |     Peds   X
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            23.5                               26.5
Yellow           3.5                                3.5
All Red          1.5                                1.5
                                                     Cycle Length: 60.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate   __________    __________  ___________
Grp     Capacity     (s)      v/c    g/C    Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound

LTR      351       897        0.57   0.39    16.5   B    16.5   B

Westbound

LT       536       1369       0.64   0.39    17.4   B    15.9   B
R        620       1583       0.47   0.39    14.1   B
Northbound
L        290       657        0.04   0.44    9.6    A
TR       807       1827       0.54   0.44    13.0   B    12.9   B

Southbound
L        330       748        0.67   0.44    18.6   B
TR       793       1795       0.61   0.44    14.2   B    15.6   B

         Intersection Delay = 15.2  (sec/veh)   Intersection LOS = B

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Glen Este @ Clepper
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: AM Peak                         Year  : 2030 Alt 3
Project ID: Segment IVa Alt 8L1
E/W St: Clepper                         N/S St: Glen Este

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   1   0   |   1   1   0   |   1   1   0   |   1   1   1   |
LGConfig   | L     TR      | L     TR      | L     TR      | L     T    R  |
Volume     |45   185  50   |25   220  15   |90   100  100  |220  350  170  |
Lane Width |12.0 12.0      |12.0 12.0      |12.0 12.0      |12.0 12.0 12.0 |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A     A
    Thru          A                   |     Thru         A
    Right         A                   |     Right        A
    Peds          X                   |     Peds
WB  Left          A                   | SB  Left   A     A
    Thru          A                   |     Thru         A
    Right         A                   |     Right        A
    Peds          X                   |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green           34.0                             7.0   34.0
Yellow          3.5                              3.5   3.5
All Red         1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate   __________   __________  ___________
Grp     Capacity     (s)       v/c    g/C      Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L         365       967        0.14   0.38     18.5   B
TR        681       1803       0.38   0.38     20.7   C    20.4   C

Westbound
L         364       964        0.08   0.38     18.0   B
TR        697       1845       0.37   0.38     20.6   C    20.4   C

Northbound
L         397       1770       0.25   0.51     13.2   B
TR        651       1723       0.34   0.38     20.3   C    18.1   B

Southbound
L         537       1770       0.45   0.51     15.2   B
T         704       1863       0.55   0.38     23.0   C    20.0+  C
R         598       1583       0.32   0.38     20.1   C
         Intersection Delay = 19.8  (sec/veh)   Intersection LOS = B

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Glen Este @ Clepper
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: PM Peak                         Year  : 2030 Alt 3
Project ID: Segment IVa
E/W St: Clepper                         N/S St: Glen Este

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
           |________________|________________|________________|________________|
No. Lanes  |   1   1   0    |   1   1   0    |   1   1   0    |   1   1   1    |
LGConfig   | L     TR       | L     TR       | L     TR       | L     T    R   |
Volume     |250  200  100   |10   50   150   |165  425  80    |200  350  240   |
Lane Width |12.0 12.0       |12.0 12.0       |12.0 12.0       |12.0 12.0 12.0 |
RTOR Vol   |          0     |          0     |          0     |          0     |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |           5     6     7     8
EB  Left          A                   | NB  Left   A     A
    Thru          A                   |     Thru         A
    Right         A                   |     Right        A
    Peds          X                   |     Peds
WB  Left          A                   | SB  Left   A     A
    Thru          A                   |     Thru         A
    Right         A                   |     Right        A
    Peds          X                   |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            33.0                              7.5   34.5
Yellow           3.5                               3.5   3.5
All Red          1.5                               1.5   1.5
                                                    Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group      Flow Rate  __________    __________  ___________
Grp     Capacity     (s)      v/c    g/C    Delay LOS   Delay LOS

_______________________________________________________________________________
Eastbound
L        384       1046       0.72   0.37   31.2   C
TR       649       1770       0.51   0.37   22.9   C    26.7   C

Westbound
L        290       792        0.04   0.37   18.4   B
TR       606       1653       0.37   0.37   21.2   C    21.1   C

Northbound
L        414       1770       0.44   0.52   13.8   B
TR       697       1818       0.80   0.38   31.6   C    27.2   C

Southbound
L        283       1770       0.78   0.52   30.0   C
T        714       1863       0.54   0.38   22.5   C    24.0   C
R        607       1583       0.44   0.38   21.1   C
         Intersection Delay = 25.4  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Eastgate North & Glen Este
Agency: TranSystems                     Area Type: All other areas
Date:   07/01/2011                      Jurisd:
Period: AM                              Year  : Alt 3
Project ID: Segment IVa; P403 10 0004
E/W St: Eastgate North Drive            N/S St: Glen Este-Withamsville Road

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   2   0   1   |   0   0   0   |   1   1   0   |   0   2   0   |
LGConfig   | L          R  |               | L     T       |       TR      |
Volume     |100       220  |               |50   80        |     760  225  |
Lane Width |12.0      12.0 |               |12.0 12.0      |     12.0      |
RTOR Vol   |          0    |               |               |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A     A
    Thru                              |     Thru   A     A
    Right         A                   |     Right
    Peds          X                   |     Peds   X     X
WB  Left                              | SB  Left
    Thru                              |     Thru         A
    Right                             |     Right        A
    Peds                              |     Peds         X
NB  Right                             | EB  Right  A
SB  Right                             | WB  Right
Green            16.0                             18.0  41.0
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)       v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L         611       3437      0.18   0.18    31.6   C
                                                        21.8   C
R         686       1583      0.36   0.43    17.4   B
Westbound



Northbound
L         479       1770      0.12   0.71    7.3    A
T         1325      1863      0.07   0.71    4.0    A    5.3    A

Southbound

TR        1560      3425      0.70   0.46    21.0   C    21.0   C

         Intersection Delay = 19.8  (sec/veh)   Intersection LOS = B

_______________________________________________________________________________
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                  HCS+: Signalized Intersections Release 5.5

Analyst: lpk                            Inter.: Eastgate North & Glen Este
Agency: TranSystems                     Area Type: All other areas
Date:   07/01/2011                      Jurisd:
Period: PM                              Year  : Alt 3
Project ID: Segment IVa; P403 10 0004
E/W St: Eastgate North Drive            N/S St: Glen Este-Withamsville Road

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
           |________________|________________|________________|________________|
No. Lanes  |   2   0   1    |   0   0   0    |   1   1   0    |   0   2   0    |
LGConfig   | L          R   |                | L     T        |       TR       |
Volume     |490       395   |                |470  405        |     565  180   |
Lane Width |12.0      12.0  |                |12.0 12.0       |     12.0       |
RTOR Vol   |          0     |                |                |          0     |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |             5     6     7     8
EB  Left          A                   | NB  Left    A     P
    Thru                              |     Thru    A     A
    Right         A                   |     Right
    Peds          X                   |     Peds    X     X
WB  Left                              | SB  Left
    Thru                              |     Thru          A
    Right                             |     Right         A
    Peds                              |     Peds          X
NB  Right                             | EB  Right   A
SB  Right                             | WB  Right
Green            20.5                              22.5  32.0
Yellow           3.5                               3.5   3.5
All Red          1.5                               1.5   1.5
                                                    Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane      Adj Sat     Ratios        Lane Group   Approach
Lane    Group     Flow Rate  __________     __________   ___________
Grp     Capacity    (s)      v/c    g/C     Delay LOS    Delay LOS
_______________________________________________________________________________
Eastbound
L        783       3437      0.69   0.23    34.6   C
                                                         25.4   C
R        844       1583      0.52   0.53    14.1   B
Westbound




Northbound
L        573       1770      0.91   0.66    38.9   D
T        1232      1863      0.37   0.66    7.0    A    24.1   C

Southbound

TR       1215      3418      0.68   0.36    26.2   C    26.2   C

         Intersection Delay = 25.2  (sec/veh)   Intersection LOS = C

_______________________________________________________________________________
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# TWO-WAY STOP CONTROL SUMMARY

| **General Information** | | **Site Information** | |
|---|---|---|---|
| Analyst | | Intersection | *Marian/ Sr 32 EB Ramps* |
| Agency/Co. | | Jurisdiction | |
| Date Performed | *12/1/2011* | Analysis Year | *2030 Alt 3* |
| Analysis Time Period | *AM* | | |

Project Description *Segment IV A*

| | |
|---|---|
| East/West Street: *Marian* | North/South Street: *SR 32 Ramps* |
| Intersection Orientation: *North-South* | Study Period (hrs): *0.25* |

## Vehicle Volumes and Adjustments

| **Major Street** | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume (veh/h) | *10* | *180* | *15* | *10* | *290* | *40* |
| Peak-Hour Factor, PHF | *0.90* | *0.90* | *0.90* | *0.90* | *0.90* | *0.90* |
| Hourly Flow Rate, HFR (veh/h) | *11* | *200* | *16* | *11* | *322* | *44* |
| Percent Heavy Vehicles | *2* | -- | -- | *2* | -- | -- |
| Median Type | *Undivided* | | | | | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *0* | *1* | *0* | *0* | *1* | *0* |
| Configuration | *LTR* | | | *LTR* | | |
| Upstream Signal | | *0* | | | *0* | |

| **Minor Street** | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume (veh/h) | *10* | *15* | *10* | *30* | *20* | *20* |
| Peak-Hour Factor, PHF | *0.90* | *0.90* | *0.90* | *0.90* | *0.90* | *0.90* |
| Hourly Flow Rate, HFR (veh/h) | *11* | *16* | *11* | *33* | *22* | *22* |
| Percent Heavy Vehicles | *2* | *2* | *2* | *2* | *2* | *2* |
| Percent Grade (%) | *0* | | | *0* | | |
| Flared Approach | | *N* | | | *N* | |
| Storage | | *0* | | | *0* | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *0* | *1* | *0* | *0* | *1* | *0* |
| Configuration | | *LTR* | | | *LTR* | |

**Delay, Queue Length, and Level of Service**

| Approach | Northbound | Southbound | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | *LTR* | *LTR* | | *LTR* | | | *LTR* | |
| v (veh/h) | *11* | *11* | | *77* | | | *38* | |
| C (m) (veh/h) | *1193* | *1354* | | *458* | | | *446* | |
| v/c | *0.01* | *0.01* | | *0.17* | | | *0.09* | |
| 95% queue length | *0.03* | *0.02* | | *0.60* | | | *0.28* | |
| Control Delay (s/veh) | *8.0* | *7.7* | | *14.4* | | | *13.8* | |
| LOS | *A* | *A* | | *B* | | | *B* | |
| Approach Delay (s/veh) | -- | -- | *14.4* | | | *13.8* | | |
| Approach LOS | -- | -- | *B* | | | *B* | | |

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# TWO-WAY STOP CONTROL SUMMARY

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | | Intersection | *Marian/ Sr 32 EB Ramps* |
| Agency/Co. | | Jurisdiction | |
| Date Performed | *12/1/2011* | Analysis Year | *2030 Alt 3* |
| Analysis Time Period | | | |

Project Description *Segment IVa*

East/West Street: *Marian*

North/South Street: *SR 32 Ramps*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

## Vehicle Volumes and Adjustments

| **Major Street** | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume (veh/h) | *10* | *280* | *20* | *30* | *540* | *50* |
| Peak-Hour Factor, PHF | *0.90* | *0.90* | *0.90* | *0.90* | *0.90* | *0.90* |
| Hourly Flow Rate, HFR (veh/h) | *11* | *311* | *22* | *33* | *600* | *55* |
| Percent Heavy Vehicles | *2* | -- | -- | *2* | -- | -- |
| Median Type | *Undivided* | | | | | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *0* | *1* | *0* | *0* | *1* | *0* |
| Configuration | *LTR* | | | *LTR* | | |
| Upstream Signal | | *0* | | | *0* | |

| **Minor Street** | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume (veh/h) | *10* | *15* | *10* | *20* | *10* | *20* |
| Peak-Hour Factor, PHF | *0.90* | *0.90* | *0.90* | *0.90* | *0.90* | *0.90* |
| Hourly Flow Rate, HFR (veh/h) | *11* | *16* | *11* | *22* | *11* | *22* |
| Percent Heavy Vehicles | *2* | *2* | *2* | *2* | *2* | *2* |
| Percent Grade (%) | *0* | | | *0* | | |
| Flared Approach | | *N* | | | *N* | |
| Storage | | *0* | | | *0* | |
| RT Channelized | | | *0* | | | *0* |
| Lanes | *0* | *1* | *0* | *0* | *1* | *0* |
| Configuration | | *LTR* | | | *LTR* | |

## Delay, Queue Length, and Level of Service

| Approach | Northbound | Southbound | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Configuration | *LTR* | *LTR* | | *LTR* | | | *LTR* | |
| v (veh/h) | *11* | *33* | | *55* | | | *38* | |
| C (m) (veh/h) | *932* | *1226* | | *269* | | | *241* | |
| v/c | *0.01* | *0.03* | | *0.20* | | | *0.16* | |
| 95% queue length | *0.04* | *0.08* | | *0.75* | | | *0.55* | |
| Control Delay (s/veh) | *8.9* | *8.0* | | *21.8* | | | *22.7* | |
| LOS | *A* | *A* | | *C* | | | *C* | |
| Approach Delay (s/veh) | -- | -- | *21.8* | | | *22.7* | | |
| Approach LOS | -- | -- | *C* | | | *C* | | |

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                  HCS+: Signalized Intersections Release 5.5

Analyst:                                Inter.: Old SR 74 @ SR 32 WB Off Ramp
Agency: TranSystems                     Area Type: All other areas
Date:   7/20/2011                       Jurisd:
Period: AM Peak Hour                    Year  : 2030 Alt 3
Project ID: Segment IVa Alt 8 L1
E/W St: Old SR 74                       N/S St: SR 32 WB Ramps

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   1   1   |   1   1   0   |   1   0   0   |   0   0   0   |
LGConfig   |       T    R  | L     T       | L     LR      |               |
Volume     |     135  400  |200  325       |545       5    |               |
Lane Width |     12.0 12.0 |12.0 12.0      |12.0 12.0      |               |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left   A
    Thru                A             |     Thru
    Right               A             |     Right  A
    Peds                              |     Peds
WB  Left          A     A             | SB  Left
    Thru          A     A             |     Thru
    Right                             |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right  A
SB  Right                             | WB  Right
Green            7.0   9.5                        28.5
Yellow           3.5   3.5                        3.5
All Red          1.5   1.5                        1.5
                                                   Cycle Length: 60.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity    (s)      v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound

T        295       1863      0.51   0.16    24.6   C    8.9    A
R        1134      1583      0.39   0.72    3.6    A
Westbound
L        410       1770      0.54   0.36    15.8   B
T        668       1863      0.54   0.36    16.2   B    16.1   B

Northbound
L        841       1770      0.72   0.47    15.6   B
LR       752       1583      0.01   0.47    8.3    A    15.5   B

Southbound



         Intersection Delay = 13.5  (sec/veh)   Intersection LOS = B

_______________________________________________________________________________
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                  HCS+: Signalized Intersections Release 5.5

Analyst:                                Inter.: Old SR 74 @ SR 32 WB Off Ramp
Agency: TranSystems                     Area Type: All other areas
Date:   7/20/2011                       Jurisd:
Period: PM Peak Hour                    Year  : 2030 Alt 3
Project ID: Segment IVa Alt 8 L1
E/W St: Old SR 74                       N/S St: SR 32 WB Ramps

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   1   1   |   1   1   0   |   1   0   0   |   0   0   0   |
LGConfig   |       T    R  | L     T       | L     LR      |               |
Volume     |     520  190  |245  140       |355       5    |               |
Lane Width |     12.0 12.0 |12.0 12.0      |12.0 12.0      |               |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left                              | NB  Left   A
    Thru            A                 |     Thru
    Right           A                 |     Right  A
    Peds                              |     Peds
WB  Left      A     A                 | SB  Left
    Thru      A     A                 |     Thru
    Right                             |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right  A
SB  Right                             | WB  Right
Green            9.5   35.0                         30.5
Yellow           3.5   3.5                          3.5
All Red          1.5   1.5                          1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane        Adj Sat     Ratios       Lane Group   Approach
Lane    Group      Flow Rate   __________    __________  ___________
Grp     Capacity     (s)      v/c    g/C      Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound

T        725       1863      0.80   0.39    30.6   C    23.1   C
R        1240      1583      0.17   0.78    2.5    A
Westbound
L        316       1770      0.86   0.55    37.1   D
T        1025      1863      0.15   0.55    10.0+  B    27.2   C

Northbound
L        600       1770      0.66   0.34    27.9   C
LR       536       1583      0.01   0.34    19.8   B    27.8   C

Southbound



         Intersection Delay = 25.3  (sec/veh)   Intersection LOS = C

_______________________________________________________________________________
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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$, $V_R$, $V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | $v = V/PHF \times f_{HV} \times f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2240 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2526 |
| Ramp | 210 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 237 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$$V_{12} = V_F ( P_{FM} )$$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1494 pc/h

$V_3$ or $V_{av34}$ 1032 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 2763 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 1731 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$$

$D_R$ = 15.7 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.298 (Exibit 25-19)

$S_R$= 54.6 mph (Exhibit 25-19)

$S_0$= 58.1 mph (Exhibit 25-19)

S = 55.9 mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3745 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4224 |
| Ramp | 300 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 338 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 2498 pc/h

$V_3$ or $V_{av34}$ 1726 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 4562 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 2836 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 24.3 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.342 (Exibit 25-19)

$S_R$= 53.8 mph (Exhibit 25-19)

$S_0$= 55.6 mph (Exhibit 25-19)

S = 54.5 mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information | Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

S $_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2580 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2910 |
| Ramp | 340 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 383 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R$ = 5.475 + 0.00734 v $_R$ + 0.0078 $V_{12}$ - 0.00627 $L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.670 using Equation (Exhibit 25-12)

$V_{12}$ = 2075 pc/h

$V_3$ or $V_{av34}$ 835 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 2910 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 2527 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 383 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 2075 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R$ = 4.252 + 0.0086 $V_{12}$ - 0.009 $L_D$

$D_R$ = 17.6 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.332 (Exhibit 25-19)

$S_R$= 54.0 mph (Exhibit 25-19)

$S_0$= 65.8 mph (Exhibit 25-19)

S = 56.9 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$, $V_R$, $V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | $v = V/PHF \times f_{HV} \times f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 4365 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4923 |
| Ramp | 620 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 699 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

## Merge Areas

### Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

### Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

### Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

### Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

### Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

## Diverge Areas

### Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.605 using Equation (Exhibit 25-12)

$V_{12}$ = 3254 pc/h

$V_3$ or $V_{av34}$ 1669 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

### Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 4923 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 4224 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 699 | Exhibit 25-3 | 2100 | No |

### Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 3254 | Exhibit 25-14 | 4400:All | No |

### Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 27.7 (pc/mi/ln)

LOS = C (Exhibit 25-4)

### Speed Determination

$D_s$ = 0.361 (Exhibit 25-19)

$S_R$= 53.5 mph (Exhibit 25-19)

$S_0$= 63.2 mph (Exhibit 25-19)

S = 56.4 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Glen Este Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

| Upstream Adj Ramp | Terrain: Level | Downstream Adj Ramp |
|---|---|---|
| ☐ Yes ☐ On | | ☐ Yes ☐ On |
| ☑ No ☐ Off | | ☑ No ☐ Off |
| $L_{up}$ = ft | $S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph | $L_{down}$ = ft |
| $V_u$ = veh/h | Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$) | $V_D$ = veh/h |

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2380 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2684 |
| Ramp | 200 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 226 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1588 pc/h

$V_3$ or $V_{av34}$ 1096 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 2910 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 1814 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 16.4 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.300 (Exibit 25-19)

$S_R$= 54.6 mph (Exhibit 25-19)

$S_0$= 57.9 mph (Exhibit 25-19)

S = 55.8 mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Glen Este Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 4025 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4539 |
| Ramp | 340 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 383 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 2685 pc/h

$V_3$ or $V_{av34}$ 1854 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 4922 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 3068 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 26.1 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.360 (Exibit 25-19)

$S_R$= 53.5 mph (Exhibit 25-19)

$S_0$= 55.1 mph (Exhibit 25-19)

S = 54.1 mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$, $V_R$, $V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3605 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4066 |
| Ramp | 600 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 677 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$$V_{12} = V_F ( P_{FM} )$$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 2405 pc/h

$V_3$ or $V_{av34}$ 1661 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 4743 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 3082 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$$

$D_R$ = 26.1 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.361 (Exibit 25-19)

$S_R$= 53.5 mph (Exhibit 25-19)

$S_0$= 55.8 mph (Exhibit 25-19)

S = 54.3 mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | $v = V/PHF \times f_{HV} \times f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2765 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3118 |
| Ramp | 435 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 491 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$$V_{12} = V_F ( P_{FM} )$$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1844 pc/h

$V_3$ or $V_{av34}$ 1274 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 3609 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 2335 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$$

$D_R$ = 20.3 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.316 (Exibit 25-19)

$S_R$= 54.3 mph (Exhibit 25-19)

$S_0$= 57.2 mph (Exhibit 25-19)

S = 55.3 mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

### Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$, $V_R$, $V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

### Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 4155 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4686 |
| Ramp | 550 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 620 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

### Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

### Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

### Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

### Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

### Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

### Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.614 using Equation (Exhibit 25-12)

$V_{12}$ = 3118 pc/h

$V_3$ or $V_{av34}$ 1568 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

### Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 4686 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 4066 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 620 | Exhibit 25-3 | 2100 | No |

### Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 3118 | Exhibit 25-14 | 4400:All | No |

### Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 26.6 (pc/mi/ln)

LOS = C (Exhibit 25-4)

### Speed Determination

$D_s$ = 0.354 (Exhibit 25-19)

$S_R$= 53.6 mph (Exhibit 25-19)

$S_0$= 63.6 mph (Exhibit 25-19)

S = 56.6 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$, $V_R$, $V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | $v = V/PHF \times f_{HV} \times f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3125 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3524 |
| Ramp | 360 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 406 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes, $V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.653 using Equation (Exhibit 25-12)

$V_{12}$ = 2443 pc/h

$V_3$ or $V_{av34}$ 1081 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes, $V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 3524 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 3118 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 406 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 2443 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 20.8 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.335 (Exhibit 25-19)

$S_R$= 54.0 mph (Exhibit 25-19)

$S_0$= 65.5 mph (Exhibit 25-19)

S = 57.1 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Glen Este Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 4205 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4742 |
| Ramp | 265 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 299 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R$ = 5.475 + 0.00734 v $_R$ + 0.0078 $V_{12}$ - 0.00627 $L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.628 using Equation (Exhibit 25-12)

$V_{12}$ = 3088 pc/h

$V_3$ or $V_{av34}$ 1654 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 4742 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 4443 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 299 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 3088 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R$ = 4.252 + 0.0086 $V_{12}$ - 0.009 $L_D$

$D_R$ = 26.3 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.325 (Exhibit 25-19)

$S_R$= 54.2 mph (Exhibit 25-19)

$S_0$= 63.3 mph (Exhibit 25-19)

S = 57.0 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Glen Este Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 3 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3200 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3609 |
| Ramp | 405 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 457 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F\ (P_{FM})$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.649 using Equation (Exhibit 25-12)

$V_{12}$ = 2502 pc/h

$V_3$ or $V_{av34}$ 1107 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 3609 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 3152 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 457 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 2502 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 21.3 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.339 (Exhibit 25-19)

$S_R$= 53.9 mph (Exhibit 25-19)

$S_0$= 65.4 mph (Exhibit 25-19)

S = 57.0 mph (Exhibit 25-15)

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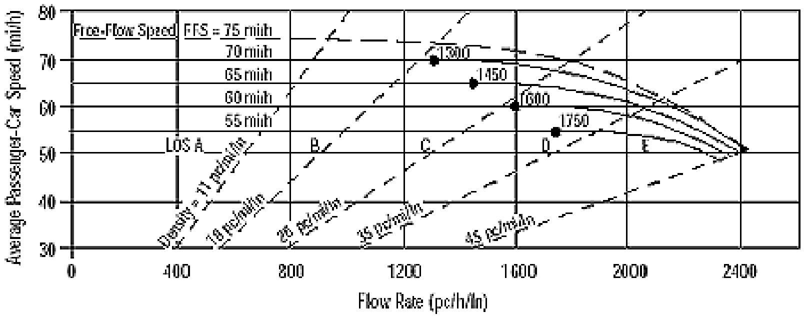
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | | |
| Agency or Company | *TranSystems* | | |
| Date Performed | *2/7/2011* | | |
| Analysis Time Period | *AM Peak* | | |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Eastbound* |
| From/To | *Eastgate Ent to Glen Este Ent* |
| Jurisdiction | |
| Analysis Year | *2030 Alt 4* |

Project Description Segment IVa- P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2380* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *895* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *14.9* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | |
|---|---|
| Design LOS | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | pc/h |
| S | mi/h |
| D = $v_p$ / S | pc/mi/ln |
| Required Number of Lanes, N | |

## Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

## Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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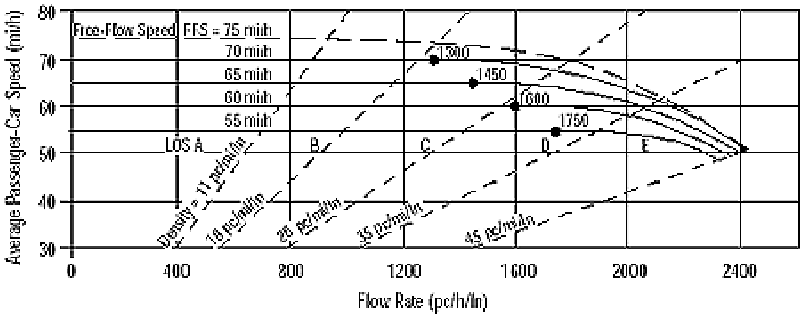
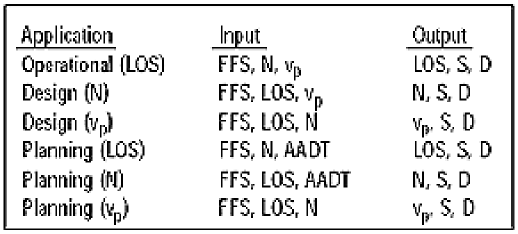
## BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

| ***General Information*** | | ***Site Information*** | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Eastgate Ent to Glen Este Ent* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Alt 4* |

Project Description Segment IVa- P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### *Flow Inputs*

| | | | | |
|---|---|---|---|---|
| Volume, V | *4030* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

<u>Operational (LOS)</u>

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1515* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *25.3* | pc/mi/ln |
| LOS | *C* | |

### Design (N)

<u>Design (N)</u>

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

### Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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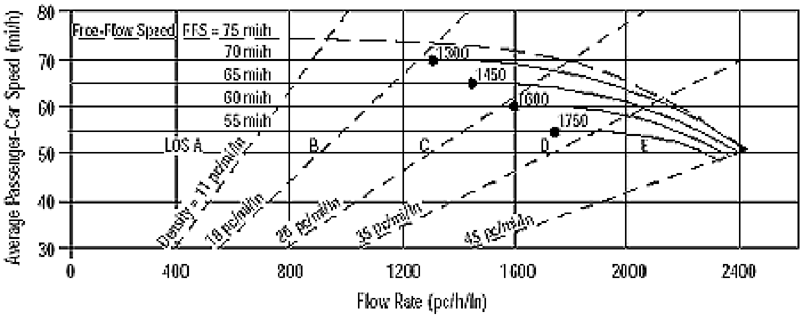
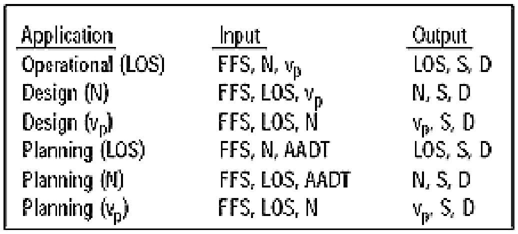
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *AM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Eastbound* |
| From/To | *Bach Buxton Ent to Olive Exit* |
| Jurisdiction | |
| Analysis Year | *2030 ALT 4* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2400* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *902* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *15.0* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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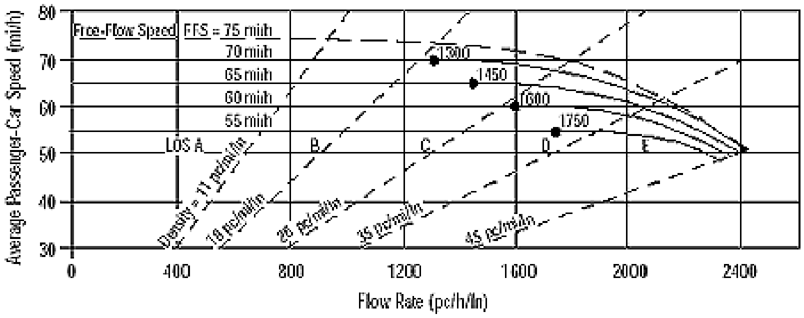
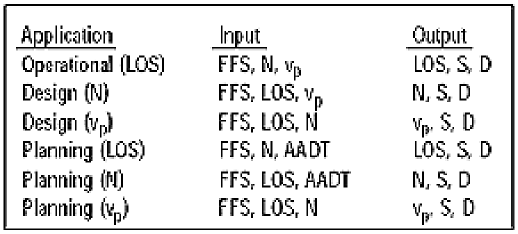
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Highway/Direction of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | From/To | Bach Buxton Ent to Olive Exit |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 4 |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | 4145 | veh/h | Peak-Hour Factor, PHF | 0.90 |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | 3 |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | 0 |
| Peak-Hr Direction Prop, D | | | General Terrain: | Level |
| DDHV = AADT x K x D | | veh/h | Grade % Length | mi |
| Driver type adjustment | 1.00 | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | 1.00 | $E_R$ | 1.2 |
| $E_T$ | 1.5 | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | 0.985 |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | 12.0 | ft |
| Rt-Shoulder Lat. Clearance | 6.0 | ft |
| Interchange Density | 0.50 | I/mi |
| Number of Lanes, N | 3 | |
| FFS (measured) | 60.0 | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | 60.0 | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | 1558 | pc/h/ln |
| S | 60.0 | mi/h |
| D = $v_p$ / S | 26.0 | pc/mi/ln |
| LOS | C | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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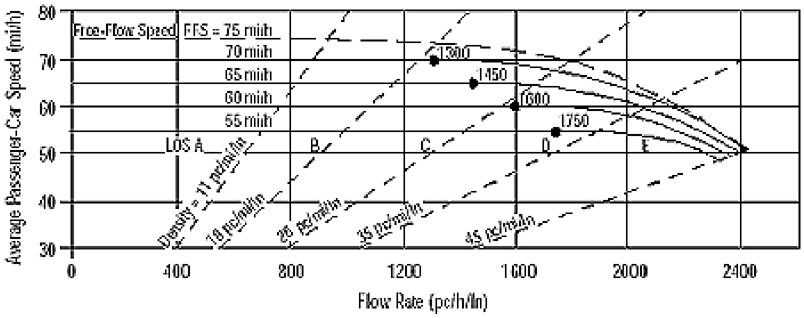
## BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

| ***General Information*** | | ***Site Information*** | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *GlenEst ENT to BACH Exit* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 4* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### *Flow Inputs*

| | | | | |
|---|---|---|---|---|
| Volume, V | *2580* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

| **Speed Inputs** | | | **Calc Speed Adj and FFS** | | |
|---|---|---|---|---|---|
| Lane Width | *12.0* | ft | $f_{LW}$ | | mi/h |
| Rt-Shoulder Lat. Clearance | *6.0* | ft | $f_{LC}$ | | mi/h |
| Interchange Density | *0.50* | I/mi | $f_{ID}$ | | mi/h |
| Number of Lanes, N | *3* | | $f_N$ | | mi/h |
| FFS (measured) | *60.0* | mi/h | FFS | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h | | | |

| **LOS and Performance Measures** | | | **Design (N)** | |
|---|---|---|---|---|
| | | | Design (N) | |
| Operational (LOS) | | | Design LOS | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *970* | pc/h/ln | $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | pc/h |
| S | *60.0* | mi/h | S | mi/h |
| D = $v_p$ / S | *16.2* | pc/mi/ln | D = $v_p$ / S | pc/mi/ln |
| LOS | *B* | | Required Number of Lanes, N | |

| **Glossary** | | **Factor Location** | |
|---|---|---|---|
| N - Number of lanes | S - Speed | $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| V - Hourly volume | D - Density | $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $v_p$ - Flow rate | FFS - Free-flow speed | $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS - Level of service | BFFS - Base free-flow speed | LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |
| DDHV - Directional design hour volume | | | |

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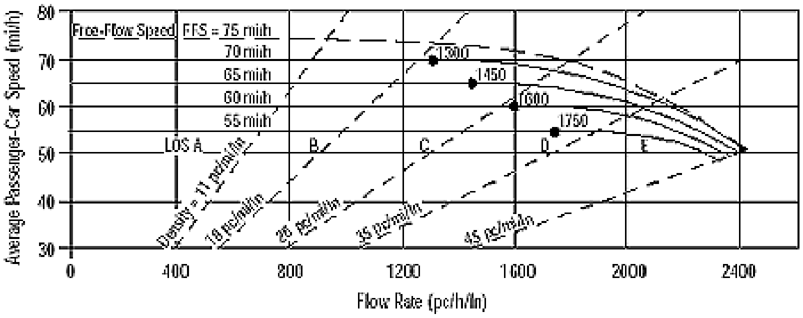
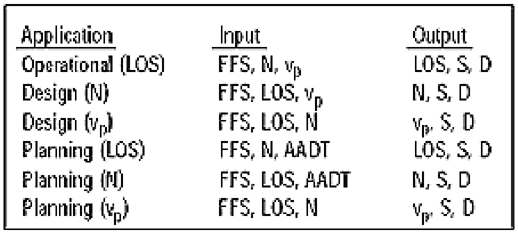
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *GlenEst ENT to BACH Exit* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Alt 4* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4370* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1643* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *27.4* | pc/mi/ln |
| LOS | *D* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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# FREEWAY WEAVING WORKSHEET

## General Information

Analyst STA
Agency/Company TRANSYSTEMS
Date Performed 8/3/2011
Analysis Time Period AM PEAK

## Site Information

Freeway/Dir of Travel SR 32 EASTBOUND
Weaving Seg Location GLEN ESTE ON TO VBACH EXIT
Jurisdiction
Analysis Year 2030 alt 4

## Inputs

| | |
|---|---|
| Freeway free-flow speed, $S_{FF}$ (mi/h) | 60 |
| Weaving number of lanes, N | 4 |
| Weaving seg length, L (ft) | 2200 |
| Terrain | Level |
| Weaving type | A |
| Volume ratio, VR | 0.22 |
| Weaving ratio, R | 0.28 |

## Conversions to pc/h Under Base Conditions

| (pc/h) | V | PHF | Truck % | RV % | $E_T$ | $E_R$ | $f_{HV}$ | $f_p$ | v |
|---|---|---|---|---|---|---|---|---|---|
| $V_{o1}$ | 1965 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 2216 |
| $V_{o2}$ | 35 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 39 |
| $V_{w1}$ | 415 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 468 |
| $V_{w2}$ | 165 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 186 |
| $V_w$ | | | | 654 | $V_{nw}$ | | | | 2255 |
| V | | | | | | | | | 2909 |

## Weaving and Non-Weaving Speeds

| | Unconstrained | | Constrained | |
|---|---|---|---|---|
| | Weaving (i = w) | Non-Weaving (i = nw) | Weaving (i = w) | Non-Weaving ( = nw) |
| a (Exhibit 24-6) | 0.15 | 0.0035 | | |
| b (Exhibit 24-6) | 2.20 | 4.00 | | |
| c (Exhibit 24-6) | 0.97 | 1.30 | | |
| d (Exhibit 24-6) | 0.80 | 0.75 | | |
| Weaving intensity factor, Wi | 0.30 | 0.13 | | |
| Weaving and non-weaving speeds, Si (mi/h) | 53.57 | 59.30 | | |

Number of lanes required for unconstrained operation, Nw 1.34
Maximum number of lanes, Nw (max) 1.40

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

## Weaving Segment Speed, Density, Level of Service, and Capacity

| | |
|---|---|
| Weaving segment speed, S (mi/h) | 57.91 |
| Weaving segment density, D (pc/mi/ln) | 12.56 |
| Level of service, LOS | B |
| Capacity of base condition, $c_b$ (pc/h) | 8082 |
| Capacity as a 15-minute flow rate, c (veh/h) | 7963 |
| Capacity as a full-hour volume, $c_h$ (veh/h) | 7167 |

## Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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# FREEWAY WEAVING WORKSHEET

## General Information

| | |
|---|---|
| Analyst | |
| Agency/Company | TRANSYSTEMS |
| Date Performed | 8/3/2011 |
| Analysis Time Period | AM PEAK |

## Site Information

| | |
|---|---|
| Freeway/Dir of Travel | SR 32 EASTBOUND |
| Weaving Seg Location | GLEN ESTE ON TO VBACH EXIT |
| Jurisdiction | |
| Analysis Year | 2030 alt 4 |

## Inputs

| | |
|---|---|
| Freeway free-flow speed, $S_{FF}$ (mi/h) | 60 |
| Weaving number of lanes, N | 4 |
| Weaving seg length, L (ft) | 2200 |
| Terrain | Level |

| | |
|---|---|
| Weaving type | A |
| Volume ratio, VR | 0.22 |
| Weaving ratio, R | 0.28 |

## Conversions to pc/h Under Base Conditions

| (pc/h) | V | PHF | Truck % | RV % | $E_T$ | $E_R$ | $f_{HV}$ | $f_p$ | v |
|---|---|---|---|---|---|---|---|---|---|
| $V_{o1}$ | 1965 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 2216 |
| $V_{o2}$ | 35 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 39 |
| $V_{w1}$ | 415 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 468 |
| $V_{w2}$ | 165 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 186 |
| $V_w$ | | | | 654 | $V_{nw}$ | | | | 2255 |
| V | | | | | | | | | 2909 |

## Weaving and Non-Weaving Speeds

| | Unconstrained | | Constrained | |
|---|---|---|---|---|
| | Weaving (i = w) | Non-Weaving (i = nw) | Weaving (i = w) | Non-Weaving ( = nw) |
| a (Exhibit 24-6) | 0.15 | 0.0035 | | |
| b (Exhibit 24-6) | 2.20 | 4.00 | | |
| c (Exhibit 24-6) | 0.97 | 1.30 | | |
| d (Exhibit 24-6) | 0.80 | 0.75 | | |
| Weaving intensity factor, Wi | 0.30 | 0.13 | | |
| Weaving and non-weaving speeds, Si (mi/h) | 53.57 | 59.30 | | |

| | |
|---|---|
| Number of lanes required for unconstrained operation, Nw | 1.34 |
| Maximum number of lanes, Nw (max) | 1.40 |

☑ If Nw < Nw(max) unconstrained operation ☐ if Nw > Nw (max) constrained operation

## Weaving Segment Speed, Density, Level of Service, and Capacity

| | |
|---|---|
| Weaving segment speed, S (mi/h) | 57.91 |
| Weaving segment density, D (pc/mi/ln) | 12.56 |
| Level of service, LOS | B |
| Capacity of base condition, $c_b$ (pc/h) | 8082 |
| Capacity as a 15-minute flow rate, c (veh/h) | 7963 |
| Capacity as a full-hour volume, $c_h$ (veh/h) | 7167 |

## Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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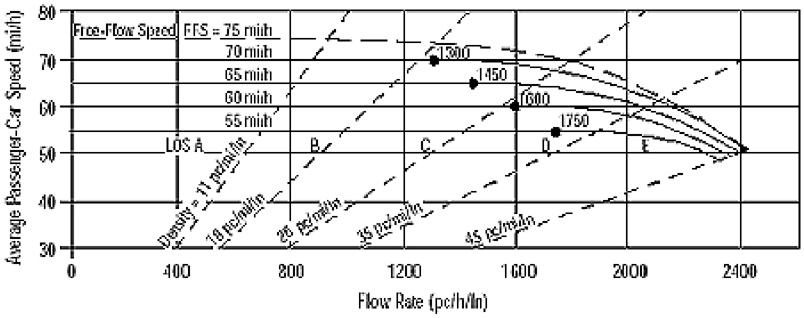
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *AM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *Bach Buxton ent to GlenEst Ext* |
| Jurisdiction | |
| Analysis Year | *2030 Alt 4* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4200* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1579* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *26.3* | pc/mi/ln |
| LOS | *D* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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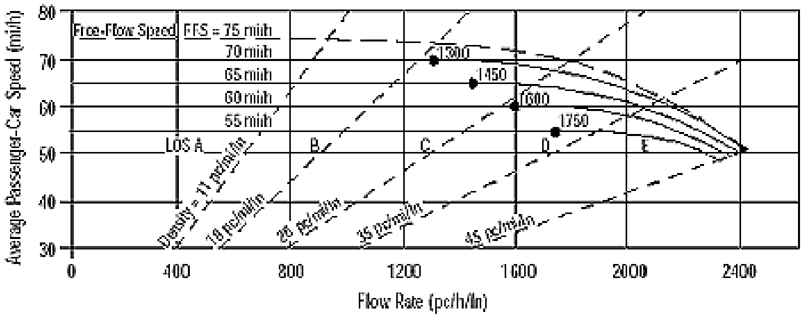
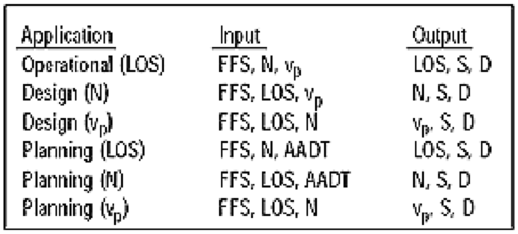
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Bach Buxton ent to GlenEst Ext* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Alt 4* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3200* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs / Calc Speed Adj and FFS

| | | | | | |
|---|---|---|---|---|---|
| Lane Width | *12.0* | ft | $f_{LW}$ | | mi/h |
| Rt-Shoulder Lat. Clearance | *6.0* | ft | $f_{LC}$ | | mi/h |
| Interchange Density | *0.50* | I/mi | $f_{ID}$ | | mi/h |
| Number of Lanes, N | *3* | | $f_N$ | | mi/h |
| FFS (measured) | *60.0* | mi/h | FFS | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h | | | |

## LOS and Performance Measures / Design (N)

| | | | | | |
|---|---|---|---|---|---|
| Operational (LOS) | | | Design (N) | | |
| | | | Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1203* | pc/h/ln | $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | *60.0* | mi/h | S | | mi/h |
| D = $v_p$ / S | *20.0* | pc/mi/ln | D = $v_p$ / S | | pc/mi/ln |
| LOS | *C* | | Required Number of Lanes, N | | |

## Glossary / Factor Location

| | | | |
|---|---|---|---|
| N - Number of lanes | S - Speed | $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| V - Hourly volume | D - Density | $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $v_p$ - Flow rate | FFS - Free-flow speed | $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS - Level of service | BFFS - Base free-flow speed | LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |
| DDHV - Directional design hour volume | | | |

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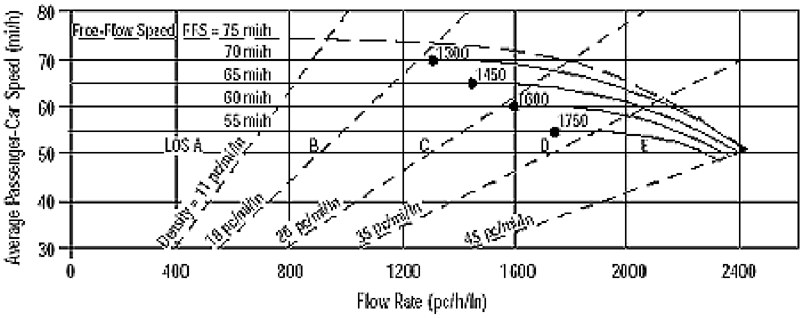
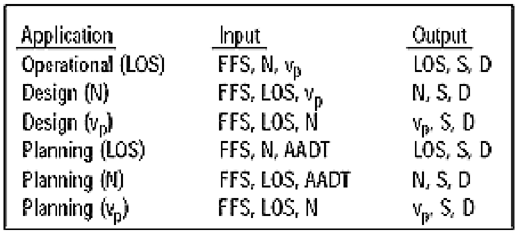
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | | |
| Agency or Company | *TranSystems* | | |
| Date Performed | *2/7/2011* | | |
| Analysis Time Period | *AM Peak* | | |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *GlenEst Ext to Eastgate Exit* |
| Jurisdiction | |
| Analysis Year | *2030 Alt 4* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3935* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1479* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *24.6* | pc/mi/ln |
| LOS | *C* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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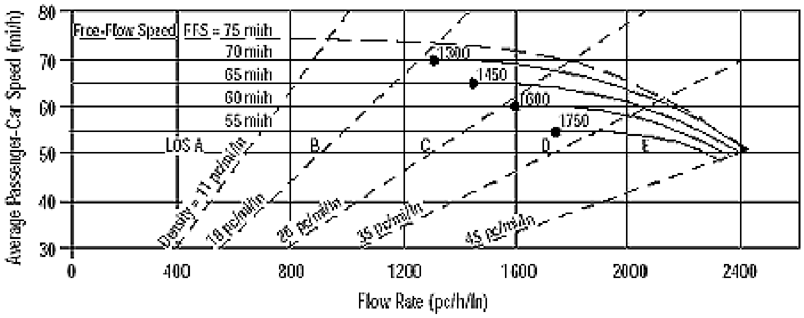
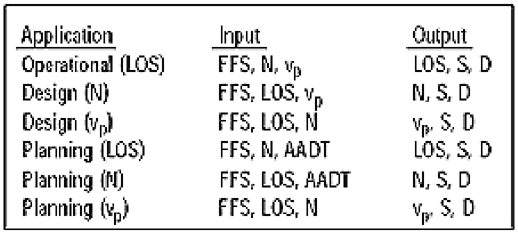
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *GlenEst Ext to Eastgate Exit* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Alt 4* |

## Site Information

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2790* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1049* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *17.5* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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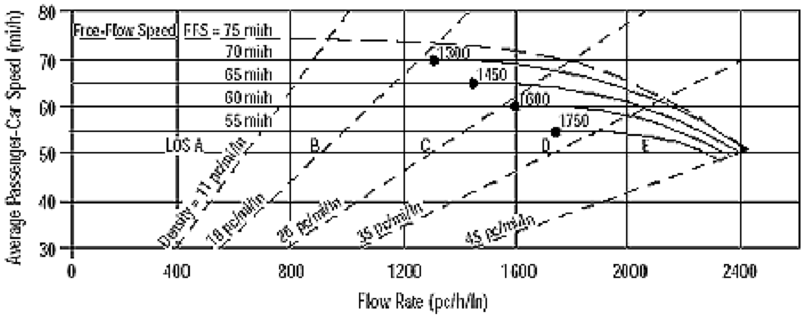
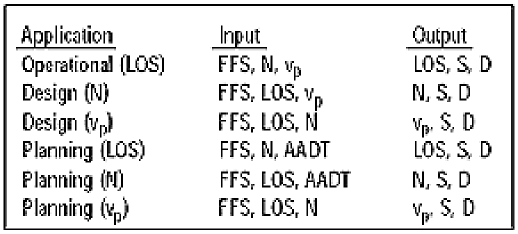
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Olive Branch Ent to Bach Exit* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Scenario 8 Alt A1(ALT 4)* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3905* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs / Calc Speed Adj and FFS

| Speed Inputs | | | Calc Speed Adj and FFS | | |
|---|---|---|---|---|---|
| Lane Width | *12.0* | ft | $f_{LW}$ | | mi/h |
| Rt-Shoulder Lat. Clearance | *6.0* | ft | $f_{LC}$ | | mi/h |
| Interchange Density | *0.50* | I/mi | $f_{ID}$ | | mi/h |
| Number of Lanes, N | *3* | | $f_N$ | | mi/h |
| FFS (measured) | *60.0* | mi/h | FFS | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h | | | |

## LOS and Performance Measures / Design (N)

| LOS and Performance Measures | | | Design (N) | |
|---|---|---|---|---|
| Operational (LOS) | | | Design (N) | |
| | | | Design LOS | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1468* | pc/h/ln | $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | pc/h |
| S | *60.0* | mi/h | S | mi/h |
| D = $v_p$ / S | *24.5* | pc/mi/ln | D = $v_p$ / S | pc/mi/ln |
| LOS | *C* | | Required Number of Lanes, N | |

## Glossary / Factor Location

| Glossary | | Factor Location | |
|---|---|---|---|
| N - Number of lanes | S - Speed | $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| V - Hourly volume | D - Density | $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $v_p$ - Flow rate | FFS - Free-flow speed | $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS - Level of service | BFFS - Base free-flow speed | LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |
| DDHV - Directional design hour volume | | | |

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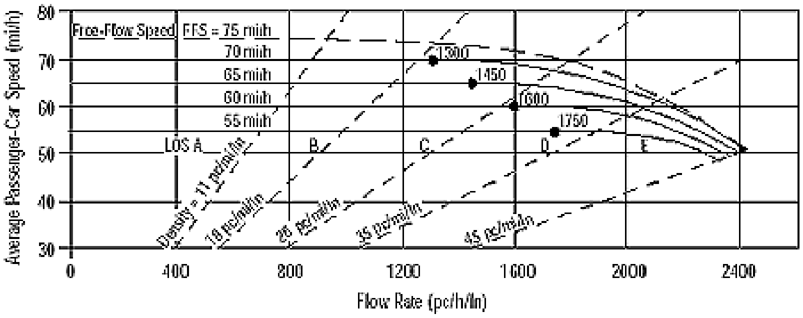
## BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### General Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Olive Branch Exit to Bach Ent* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 ALT 4* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3100* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1165* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *19.4* | pc/mi/ln |
| LOS | *C* | |

### Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

### Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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# FREEWAY WEAVING WORKSHEET

## General Information

| | |
|---|---|
| Analyst | |
| Agency/Company | TRANSYSTEMS |
| Date Performed | 8/3/2011 |
| Analysis Time Period | AM PEAK |

## Site Information

| | |
|---|---|
| Freeway/Dir of Travel | SR 32 WESTBOUND |
| Weaving Seg Location | ELICK ON TO GLEN ESTE OFF |
| Jurisdiction | |
| Analysis Year | 2030 alt 4 |

## Inputs

| | |
|---|---|
| Freeway free-flow speed, $S_{FF}$ (mi/h) | 60 |
| Weaving number of lanes, N | 4 |
| Weaving seg length, L (ft) | 2300 |
| Terrain | Level |

| | |
|---|---|
| Weaving type | A |
| Volume ratio, VR | 0.26 |
| Weaving ratio, R | 0.19 |

## Conversions to pc/h Under Base Conditions

| (pc/h) | V | PHF | Truck % | RV % | $E_T$ | $E_R$ | $f_{HV}$ | $f_p$ | v |
|---|---|---|---|---|---|---|---|---|---|
| $V_{o1}$ | 3050 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 3439 |
| $V_{o2}$ | 60 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 67 |
| $V_{w1}$ | 885 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 998 |
| $V_{w2}$ | 205 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 231 |
| $V_w$ | | | | 1229 | $V_{nw}$ | | | | 3506 |
| V | | | | | | | | | 4735 |

## Weaving and Non-Weaving Speeds

| | Unconstrained | | Constrained | |
|---|---|---|---|---|
| | Weaving (i = w) | Non-Weaving (i = nw) | Weaving (i = w) | Non-Weaving ( = nw) |
| a (Exhibit 24-6) | | | 0.35 | 0.0020 |
| b (Exhibit 24-6) | | | 2.20 | 4.00 |
| c (Exhibit 24-6) | | | 0.97 | 1.30 |
| d (Exhibit 24-6) | | | 0.80 | 0.75 |
| Weaving intensity factor, Wi | | | 1.14 | 0.15 |
| Weaving and non-weaving speeds, Si (mi/h) | | | 38.38 | 58.48 |

Number of lanes required for unconstrained operation, Nw 1.53

Maximum number of lanes, Nw (max) 1.40

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

## Weaving Segment Speed, Density, Level of Service, and Capacity

| | |
|---|---|
| Weaving segment speed, S (mi/h) | 51.48 |
| Weaving segment density, D (pc/mi/ln) | 22.99 |
| Level of service, LOS | C |
| Capacity of base condition, $c_b$ (pc/h) | 7895 |
| Capacity as a 15-minute flow rate, c (veh/h) | 7778 |
| Capacity as a full-hour volume, $c_h$ (veh/h) | 7000 |

## Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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# FREEWAY WEAVING WORKSHEET

## General Information

| | |
|---|---|
| Analyst | |
| Agency/Company | TRANSYSTEMS |
| Date Performed | 8/3/2011 |
| Analysis Time Period | PM PEAK |

## Site Information

| | |
|---|---|
| Freeway/Dir of Travel | SR 32 WESTBOUND |
| Weaving Seg Location | ELICK ON TO GLEN ESTE OFF |
| Jurisdiction | |
| Analysis Year | 2030 alt 4 |

## Inputs

| | |
|---|---|
| Freeway free-flow speed, $S_{FF}$ (mi/h) | 60 |
| Weaving number of lanes, N | 4 |
| Weaving seg length, L (ft) | 2300 |
| Terrain | Level |
| Weaving type | A |
| Volume ratio, VR | 0.27 |
| Weaving ratio, R | 0.39 |

## Conversions to pc/h Under Base Conditions

| (pc/h) | V | PHF | Truck % | RV % | $E_T$ | $E_R$ | $f_{HV}$ | $f_p$ | v |
|---|---|---|---|---|---|---|---|---|---|
| $V_{o1}$ | 2265 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 2554 |
| $V_{o2}$ | 75 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 84 |
| $V_{w1}$ | 525 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 592 |
| $V_{w2}$ | 335 | 0.90 | 3 | 0 | 1.5 | 1.2 | 0.985 | 1.00 | 377 |
| $V_w$ | | | | 969 | $V_{nw}$ | | | | 2638 |
| V | | | | | | | | | 3607 |

## Weaving and Non-Weaving Speeds

| | Unconstrained | | Constrained | |
|---|---|---|---|---|
| | Weaving (i = w) | Non-Weaving (i = nw) | Weaving (i = w) | Non-Weaving ( = nw) |
| a (Exhibit 24-6) | | | 0.35 | 0.0020 |
| b (Exhibit 24-6) | | | 2.20 | 4.00 |
| c (Exhibit 24-6) | | | 0.97 | 1.30 |
| d (Exhibit 24-6) | | | 0.80 | 0.75 |
| Weaving intensity factor, Wi | | | 0.89 | 0.11 |
| Weaving and non-weaving speeds, Si (mi/h) | | | 41.48 | 60.11 |

Number of lanes required for unconstrained operation, Nw 1.53

Maximum number of lanes, Nw (max) 1.40

☐ If Nw < Nw(max) unconstrained operation ☑ if Nw > Nw (max) constrained operation

## Weaving Segment Speed, Density, Level of Service, and Capacity

| | |
|---|---|
| Weaving segment speed, S (mi/h) | 53.64 |
| Weaving segment density, D (pc/mi/ln) | 16.81 |
| Level of service, LOS | B |
| Capacity of base condition, $c_b$ (pc/h) | 7832 |
| Capacity as a 15-minute flow rate, c (veh/h) | 7716 |
| Capacity as a full-hour volume, $c_h$ (veh/h) | 6944 |

## Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: EB Ramps @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: Am Peak Hour                    Year  : Alt 8 A1
Project ID: Segment IVa
E/W St: EB Off Ramp                     N/S St:

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   0   1   |   0   0   0   |   0   3   0   |   2   1   0   |
LGConfig   | L          R  |               |       TR      | L     T       |
Volume     |250       200  |               |     530  70   |200  325       |
Lane Width |12.0      12.0 |               |     12.0      |12.0 12.0      |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
WB  Left                              | SB  Left   A
    Thru                              |     Thru   A     A
    Right                             |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            31.5                             12.0  31.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate   __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C      Delay LOS   Delay LOS

_______________________________________________________________________________
Eastbound
L        619       1770       0.45   0.35    23.1   C
                                                        22.9   C
R        554       1583       0.40   0.35    22.6   C
Westbound




Northbound

TR       1749      4996       0.38   0.35    22.1   C    22.1   C

Southbound
L        458       3437       0.48   0.13    36.9   D
T        1004      1863       0.36   0.54    12.1   B    21.6   C

         Intersection Delay = 22.1  (sec/veh)   Intersection LOS = C

_______________________________________________________________________________
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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: EB Ramps @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: PM Peak Hour                    Year  : 2030 Alt 4
Project ID: Segment IVa
E/W St: EB Off Ramp                     N/S St:

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   0   1   |   0   0   0   |   0   3   0   |   2   1   0   |
LGConfig   | L          R  |               |       TR      | L     T       |
Volume     |290       410  |               |     510  155  |320  410       |
Lane Width |12.0      12.0 |               |     12.0      |12.0 12.0      |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
WB  Left                              | SB  Left   A
    Thru                              |     Thru   A     A
    Right                             |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            33.0                             15.5  27.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 91.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate   ___________    ___________ ____________
Grp     Capacity     (s)      v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        642       1770      0.50   0.36    23.2   C
                                                        29.3   C
R        574       1583      0.79   0.36    33.6   C
Westbound



Northbound

TR       1124      3721      0.66   0.30    29.1   C    29.1   C

Southbound
L        585       3437      0.61   0.17    36.8   D
T        983       1863      0.46   0.53    13.8   B    23.9   C

         Intersection Delay = 27.3  (sec/veh)   Intersection LOS = C

_______________________________________________________________________________
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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: WB Ramp @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: AM peak Hour                    Year  : 2030 Alt 4
Project ID: Segment IVa Alt 8A1
E/W St: WB Ramps                        N/S St: New Bach Buxton

_________________________SIGNALIZED INTERSECTION SUMMARY________________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   0   0   |   1   0   2   |   2   1   0   |   0   3   0   |
LGConfig   |               | L          R  | L     T       |       TR      |
Volume     |               |225       425  |485  295       |     300  460  |
Lane Width |               |12.0      12.0 |12.0 12.0      |     12.0      |
RTOR Vol   |               |          0    |               |          0    |
________________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left   A
    Thru                              |     Thru   A     A
    Right                             |     Right  A
    Peds                              |     Peds
WB  Left          A                   | SB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            22.0                             16.5  36.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary____________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  ___________     ___________ ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
________________________________________________________________________________
Eastbound



Westbound
L        433       1770      0.58   0.24    31.8   C
                                                        33.1   C
R        685       2803      0.69   0.24    33.8   C
Northbound
L        630       3437      0.86   0.18    46.8   D
T        1201      1863      0.27   0.64    7.0    A    31.7   C

Southbound

TR       968       2388      0.87   0.41    33.4   C    33.4   C

         Intersection Delay = 32.7  (sec/veh)   Intersection LOS = C

________________________________________________________________________________
```

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: WB Ramp @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: AM peak Hour                    Year  : Alt 4
Project ID: Segment IVa Alt 8A1
E/W St: WB Ramps                        N/S St: New Bach Buxton

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   0   0   |   1   0   2   |   2   1   0   |   0   3   0   |
LGConfig   |               | L          R  | L     T       |       TR      |
Volume     |               |130       370  |400  400       |     600  200  |
Lane Width |               |12.0      12.0 |12.0 12.0      |     12.0      |
RTOR Vol   |               |          0    |               |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left   A
    Thru                              |     Thru   A     A
    Right                             |     Right  A
    Peds                              |     Peds
WB  Left          A                   | SB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            26.0                             15.0  34.0
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane      Adj Sat      Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound



Westbound
L        511       1770      0.28   0.29    25.1   C
                                                        26.6   C
R        810       2803      0.51   0.29    27.2   C
Northbound
L        573       3437      0.77   0.17    42.5   D
T        1118      1863      0.40   0.60    9.7    A    26.1   C

Southbound

TR       1239      3281      0.72   0.38    25.9   C    25.9   C

         Intersection Delay = 26.2  (sec/veh)   Intersection LOS = C

_______________________________________________________________________________
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```
                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Glen Este @ Clepper
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: AM Peak                         Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa Alt 8A1
E/W St: Clepper                         N/S St: Glen Este

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
           |________________|________________|________________|________________|
No. Lanes  |   1   1   0    |   1   1   0    |   1   1   0    |   1   1   1    |
LGConfig   | L     TR       | L     TR       | L     TR       | L     T    R   |
Volume     |45   185  50    |25   220  15    |90   200  100   |220  350  170   |
Lane Width |12.0 12.0       |12.0 12.0       |12.0 12.0       |12.0 12.0 12.0  |
RTOR Vol   |          0     |          0     |          0     |          0     |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left          A                   | NB  Left   A     A
    Thru          A                   |     Thru         A
    Right         A                   |     Right        A
    Peds          X                   |     Peds
WB  Left          A                   | SB  Left   A     A
    Thru          A                   |     Thru         A
    Right         A                   |     Right        A
    Peds          X                   |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            34.0                                 7.0   34.0
Yellow           3.5                                  3.5   3.5
All Red          1.5                                  1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane      Adj Sat     Ratios        Lane Group   Approach
Lane    Group     Flow Rate  ___________    ___________  ___________
Grp     Capacity    (s)      v/c    g/C     Delay LOS    Delay LOS
_______________________________________________________________________________
Eastbound
L        365       967       0.14   0.38    18.5    B
TR       681       1803      0.38   0.38    20.7    C    20.4    C

Westbound
L        364       964       0.08   0.38    18.0    B
TR       697       1845      0.37   0.38    20.6    C    20.4    C

Northbound
L        397       1770      0.25   0.51    13.2    B
TR       669       1770      0.50   0.38    22.0    C    20.0+   C

Southbound
L        443       1770      0.55   0.51    18.3    B
T        704       1863      0.55   0.38    23.0    C    20.9    C
R        598       1583      0.32   0.38    20.1    C
         Intersection Delay = 20.5  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Glen Este @ Clepper
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: PM Peak                         Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa Alt 8A1
E/W St: Clepper                         N/S St: Glen Este

_________________________SIGNALIZED INTERSECTION SUMMARY________________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   1   0   |   1   1   0   |   1   1   0   |   1   1   1   |
LGConfig   | L     TR      | L     TR      | L     TR      | L     T    R  |
Volume     |250  200  100  |10   50   150  |165  425  75   |225  340  260  |
Lane Width |12.0 12.0      |12.0 12.0      |12.0 12.0      |12.0 12.0 12.0 |
RTOR Vol   |          0    |          0    |          0    |          0    |
________________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A     A
    Thru          A                   |     Thru         A
    Right         A                   |     Right        A
    Peds          X                   |     Peds
WB  Left          A                   | SB  Left   A     A
    Thru          A                   |     Thru         A
    Right         A                   |     Right        A
    Peds          X                   |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            33.0                             7.5   34.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary____________________________
Appr/   Lane       Adj Sat     Ratios      Lane Group   Approach
Lane    Group     Flow Rate   __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C      Delay LOS   Delay LOS
________________________________________________________________________________
Eastbound
L        384       1046      0.72   0.37    31.2   C
TR       649       1770      0.51   0.37    22.9   C    26.7   C

Westbound
L        290       792       0.04   0.37    18.4   B
TR       606       1653      0.37   0.37    21.2   C    21.1   C

Northbound
L        423       1770      0.43   0.52    13.6   B
TR       698       1821      0.80   0.38    31.0   C    26.7   C

Southbound
L        288       1770      0.87   0.52    40.2   D
T        714       1863      0.53   0.38    22.2   C    26.9   C
R        607       1583      0.48   0.38    21.5   C
         Intersection Delay = 26.2  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Eastgate North & Glen Este
Agency: TranSystems                     Area Type: All other areas
Date:   07/01/2011                      Jurisd:
Period: AM                              Year  : Alt 4
Project ID: Segment IVa; P403 10 0004
E/W St: Eastgate North Drive            N/S St: Glen Este-Withamsville Road

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   2   0   1   |   0   0   0   |   1   1   0   |   0   2   0   |
LGConfig   | L          R  |               | L     T       |       TR      |
Volume     |100       220  |               |160  100       |     780  225  |
Lane Width |12.0      12.0 |               |12.0 12.0      |     12.0      |
RTOR Vol   |          0    |               |               |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A     A
    Thru                              |     Thru   A     A
    Right         A                   |     Right
    Peds          X                   |     Peds   X     X
WB  Left                              | SB  Left
    Thru                              |     Thru         A
    Right                             |     Right        A
    Peds                              |     Peds         X
NB  Right                             | EB  Right  A
SB  Right                             | WB  Right
Green            16.0                              18.0  41.0
Yellow           3.5                               3.5   3.5
All Red          1.5                               1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        611       3437      0.18   0.18    31.6   C
                                                        21.8   C
R        686       1583      0.36   0.43    17.4   B
Westbound



Northbound
L        472       1770      0.38   0.71    9.7    A
T        1325      1863      0.08   0.71    4.0    A    7.5    A

Southbound

TR       1562      3428      0.72   0.46    21.4   C    21.4   C

         Intersection Delay = 19.2  (sec/veh)   Intersection LOS = B

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                  HCS+: Signalized Intersections Release 5.5

Analyst: lpk                            Inter.: Eastgate North & Glen Este
Agency: TranSystems                     Area Type: All other areas
Date:   07/01/2011                      Jurisd:
Period: PM                              Year  : Alt 4
Project ID: Segment IVa; P403 10 0004
E/W St: Eastgate North Drive            N/S St: Glen Este-Withamsville Road

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound      |  Westbound      |  Northbound     |  Southbound     |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   2   0   1   |   0   0   0   |   1   1   0   |   0   2   0   |
LGConfig   | L          R   |               | L     T        |       TR      |
Volume     |495       440  |               |470  400       |      565  180  |
Lane Width |12.0      12.0 |               |12.0 12.0      |      12.0       |
RTOR Vol   |          0    |               |               |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A     P
    Thru                              |     Thru   A     A
    Right         A                   |     Right
    Peds          X                   |     Peds   X     X
WB  Left                              | SB  Left
    Thru                              |     Thru         A
    Right                             |     Right        A
    Peds                              |     Peds         X
NB  Right                             | EB  Right  A
SB  Right                             | WB  Right
Green            20.5                             22.5  32.0
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        783       3437      0.70   0.23    34.8   C
                                                        25.6   C
R        844       1583      0.58   0.53    15.2   B
Westbound



Northbound
L        573       1770      0.91   0.66    38.9   D
T        1232      1863      0.36   0.66    7.0    A    24.2   C

Southbound

TR       1215      3418      0.68   0.36    26.2   C    26.2   C

         Intersection Delay = 25.3  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Marian Dr @ Bach-Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: AM Peak                         Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa Alt 8A1
E/W St: Old 74 WB                       N/S St: Bach Buxton NB and Old 74 SB

_________________________SIGNALIZED INTERSECTION SUMMARY________________________
           |  Eastbound      |  Westbound      |  Northbound     |  Southbound     |
           | L    T    R     | L    T    R     | L    T    R     | L    T    R     |
           |_________________|_________________|_________________|_________________|
No. Lanes  |   0   1   0     |   0   1   0     |   1   1   0     |   1   1   0     |
LGConfig   |      LTR        |      LTR        | L     TR        | L     TR        |
Volume     |20   15   10     |30   20   225    |10   355  15     |30   455  40     |
Lane Width |     12.0        |     12.0        |12.0 12.0        |12.0 12.0        |
RTOR Vol   |          0      |          0      |          0      |          0      |
________________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations__________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left         A
    Thru          A                   |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A     A
    Thru          A                   |     Thru   A     A
    Right         A                   |     Right  A     A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            33.0                             7.0   34.0
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 89.0    secs
____________________Intersection Performance Summary____________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group      Flow Rate   __________   __________   ___________
Grp     Capacity     (s)       v/c    g/C   Delay LOS    Delay LOS
________________________________________________________________________________
Eastbound

LTR      558       1504       0.09   0.37   18.3   B     18.3   B

Westbound

LTR      595       1604       0.51   0.37   22.5   C     22.5   C

Northbound
L        308       806        0.04   0.38   17.3   B
TR       707       1851       0.58   0.38   23.1   C     22.9   C

Southbound
L        387       1770       0.09   0.52   12.2   B
TR       951       1840       0.58   0.52   15.7   B     15.5   B

         Intersection Delay = 19.5  (sec/veh)   Intersection LOS = B

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Marian Dr @ Bach-Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: PM Peak                         Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa Alt 8A1
E/W St: Old 74 WB                       N/S St: Bach Buxton NB and Old 74 SB

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   1   0   |   0   1   0   |   1   1   0   |   1   1   0   |
LGConfig   |       LTR     |       LTR     | L     TR      | L     TR      |
Volume     |55   10   10   |15   30   225  |10   510  20   |225  515  80   |
Lane Width |     12.0      |     12.0      |12.0 12.0      |12.0 12.0      |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left          A
    Thru          A                   |     Thru          A
    Right         A                   |     Right         A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A     A
    Thru          A                   |     Thru   A     A
    Right         A                   |     Right  A     A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            30.0                             7.0   38.0
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane      Adj Sat      Ratios      Lane Group   Approach
Lane    Group     Flow Rate  ___________    ___________ ____________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound

LTR      395       1185      0.21   0.33    21.8   C    21.8   C

Westbound

LTR      542       1627      0.55   0.33    25.8   C    25.8   C

Northbound
L        272       645       0.04   0.42    15.3   B
TR       782       1852      0.75   0.42    26.2   C    26.0   C

Southbound
L        300       1770      0.83   0.56    33.4   C
TR       1014      1825      0.65   0.56    15.4   B    20.4   C

         Intersection Delay = 23.1  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Old 74 @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd: old 74 east leg T's in
Period: AM Peak                         Year  : 2030 Alt 4
Project ID: Segment IVa Alt 8A1
E/W St: Old 74 WB                       N/S St: Bach Buxton NB and Old 74 SB

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound      |  Westbound      |  Northbound     |  Southbound     |
           | L    T    R     | L    T    R     | L    T    R     | L    T    R     |
           |_________________|_________________|_________________|_________________|
No. Lanes  |   0    0    0   |   1    0    1   |  0    1    1    |   1    1    0   |
LGConfig   |                 | L           R   |       T    R    | L     T         |
Volume     |                 |245       325    |     550  170    |45   515         |
Lane Width |                 |12.0      12.0   |     12.0 12.0   |12.0 12.0        |
RTOR Vol   |                 |          0      |          0      |                 |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |           5     6     7     8
EB  Left                              | NB  Left
    Thru                              |     Thru        A
    Right                             |     Right       A
    Peds                              |     Peds
WB  Left          A                   | SB  Left  A     P
    Thru                              |     Thru  A     A
    Right         A                   |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            31.0                             7.0   37.0
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate   __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound



Westbound
L        610       1770       0.45   0.34    23.4   C
                                                         26.0   C
R        545       1583       0.66   0.34    28.1   C
Northbound

T        766       1863       0.80   0.41    29.2   C    26.5   C
R        651       1583       0.29   0.41    18.0   B
Southbound
L        271       1770       0.18   0.54    14.3   B
T        1014      1863       0.56   0.54    14.2   B    14.2   B

         Intersection Delay = 22.7  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst:                                Inter.: Old 74 @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd: old 74 east leg T's in
Period: PM Peak                         Year  : 2030 Alt 4
Project ID: Segment IVa Alt 8A1
E/W St: Old 74 WB                       N/S St: Bach Buxton NB and Old 74 SB

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   0   0   |   1   0   1   |   0   1   1   |   1   1   0   |
LGConfig   |               | L          R  |       T    R  | L     T       |
Volume     |               |185       125  |     525  245  |240  615       |
Lane Width |               |12.0      12.0 |     12.0 12.0 |12.0 12.0      |
RTOR Vol   |               |          0    |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left
    Thru                              |     Thru         A
    Right                             |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A     P
    Thru                              |     Thru   A     A
    Right         A                   |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            29.5                             7.0   38.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound



Westbound
L        580       1770      0.36   0.33    23.4   C
                                                        23.1   C
R        519       1583      0.27   0.33    22.6   C
Northbound

T        797       1863      0.73   0.43    24.9   C    22.8   C
R        677       1583      0.40   0.43    18.2   B
Southbound
L        312       1770      0.86   0.56    43.7   D
T        1045      1863      0.65   0.56    15.2   B    23.2   C

         Intersection Delay = 23.0  (sec/veh)   Intersection LOS = C

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 alt 4 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2130 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2402 |
| Ramp | 270 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 305 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

## Merge Areas

### Estimation of $v_{12}$

$$V_{12} = V_F ( P_{FM} )$$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1421 pc/h

$V_3$ or $V_{av34}$ 981 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

### Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 2707 | Exhibit 25-7 | | No |

### Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 1726 | Exhibit 25-7 | 4600:All | No |

### Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$$

$D_R$ = 15.7 (pc/mi/ln)

LOS = B (Exhibit 25-4)

### Speed Determination

$M_S$ = 0.298 (Exibit 25-19)

$S_R$= 54.6 mph (Exhibit 25-19)

$S_0$= 58.3 mph (Exhibit 25-19)

S = 55.9 mph (Exhibit 25-14)

## Diverge Areas

### Estimation of $v_{12}$

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

### Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

### Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

### Level of Service Determination (if not F)

$$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

### Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 4 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3670 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4139 |
| Ramp | 475 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 536 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F\ (P_{FM})$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 2448 pc/h

$V_3$ or $V_{av34}$ 1691 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 4675 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 2984 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 25.4 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.353 (Exibit 25-19)

$S_R$= 53.6 mph (Exhibit 25-19)

$S_0$= 55.7 mph (Exhibit 25-19)

S = 54.4 mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information

Analyst sta
Agency or Company TranSystems
Date Performed 2/7/2011
Analysis Time Period AM Peak

## Site Information

Freeway/Dir of Travel SR 32 Eastbound
Junction Bach Buxton Exit Ramp
Jurisdiction
Analysis Year 2030 ALT 4

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On
☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On
☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2580 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2910 |
| Ramp | 450 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 508 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F\ (P_{FM})$

$L_{EQ}$ = (Equation 25-2 or 25-3)
$P_{FM}$ = using Equation (Exhibit 25-5)
$V_{12}$ = pc/h
$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)
Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No
Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No
If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)
LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)
$S_R$= mph (Exhibit 25-19)
$S_0$= mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)
$P_{FD}$ = 0.664 using Equation (Exhibit 25-12)
$V_{12}$ = 2103 pc/h
$V_3$ or $V_{av34}$ 807 pc/h (Equation 25-15 or 25-16)
Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No
Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No
If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 2910 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 2402 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 508 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 2103 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 17.8 (pc/mi/ln)
LOS = B (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.344 (Exhibit 25-19)
$S_R$= 53.8 mph (Exhibit 25-19)
$S_0$= 65.8 mph (Exhibit 25-19)
S = 56.7 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information

Analyst sta
Agency or Company TranSystems
Date Performed 2/7/2011
Analysis Time Period PM Peak

## Site Information

Freeway/Dir of Travel SR 32 Eastbound
Junction Bach Buxton Exit Ramp
Jurisdiction
Analysis Year 2030 Scenario 8a1

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
$L_{up}$ = ft
$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph
Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
$L_{down}$ = ft
$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 4370 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4928 |
| Ramp | 700 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 789 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)
$P_{FM}$ = using Equation (Exhibit 25-5)
$V_{12}$ = pc/h
$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)
Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No
Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No
If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)
LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)
$S_R$= mph (Exhibit 25-19)
$S_0$= mph (Exhibit 25-19)
S = mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)
$P_{FD}$ = 0.601 using Equation (Exhibit 25-12)
$V_{12}$ = 3274 pc/h
$V_3$ or $V_{av34}$ 1654 pc/h (Equation 25-15 or 25-16)
Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No
Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No
If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 4928 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 4139 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 789 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 3274 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 27.9 (pc/mi/ln)
LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.369 (Exhibit 25-19)
$S_R$= 53.4 mph (Exhibit 25-19)
$S_0$= 63.3 mph (Exhibit 25-19)
S = 56.3 mph (Exhibit 25-15)

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## RAMPS AND RAMP JUNCTIONS WORKSHEET

### General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Glen Este Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 4 |

Project Description Segment IVa - P403100004

### Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

### Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2380 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2684 |
| Ramp | 200 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 226 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

### Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1588 pc/h

$V_3$ or $V_{av34}$ 1096 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

### Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 2910 | Exhibit 25-7 | | No |

### Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 1814 | Exhibit 25-7 | 4600:All | No |

### Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 16.4 (pc/mi/ln)

LOS = B (Exhibit 25-4)

### Speed Determination

$M_S$ = 0.300 (Exibit 25-19)

$S_R$= 54.6 mph (Exhibit 25-19)

$S_0$= 57.9 mph (Exhibit 25-19)

S = 55.8 mph (Exhibit 25-14)

**Diverge Areas**

### Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

### Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

### Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

### Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

### Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

| General Information | | Site Information | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Glen Este Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 4 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$, $V_R$, $V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | $v = V/PHF \times f_{HV} \times f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 4030 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4545 |
| Ramp | 340 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 383 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 2688 pc/h

$V_3$ or $V_{av34}$ 1857 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 4928 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 3071 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 26.1 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.360 (Exibit 25-19)

$S_R$= 53.5 mph (Exhibit 25-19)

$S_0$= 55.1 mph (Exhibit 25-19)

S = 54.1 mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Scenario 8 a1(Alt 4) |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

S $_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3255 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3671 |
| Ramp | 945 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 1066 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 2171 pc/h

$V_3$ or $V_{av34}$ 1500 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 4737 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 3237 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 27.1 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.375 (Exibit 25-19)

$S_R$= 53.2 mph (Exhibit 25-19)

$S_0$= 56.4 mph (Exhibit 25-19)

S = 54.2 mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## *General Information* / *Site Information*

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Scenario 8 a1(Alt 4) |

Project Description Segment IVa - P403100004

## *Inputs*

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## *Conversion to pc/h Under Base Conditions*

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2600 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2932 |
| Ramp | 600 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 677 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## *Estimation of $v_{12}$*

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1734 pc/h

$V_3$ or $V_{av34}$ 1198 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## *Capacity Checks*

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 3609 | Exhibit 25-7 | | No |

## *Flow Entering Merge Influence Area*

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 2411 | Exhibit 25-7 | 4600:All | No |

## *Level of Service Determination (if not F)*

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 20.8 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## *Speed Determination*

$M_S$ = 0.319 (Exibit 25-19)

$S_R$= 54.2 mph (Exhibit 25-19)

$S_0$= 57.5 mph (Exhibit 25-19)

S = 55.3 mph (Exhibit 25-14)

### Diverge Areas

## *Estimation of $v_{12}$*

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## *Capacity Checks*

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## *Flow Entering Diverge Influence Area*

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## *Level of Service Determination (if not F)*

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## *Speed Determination*

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information

| | |
|---|---|
| Analyst | sta |
| Agency or Company | TranSystems |
| Date Performed | 2/7/2011 |
| Analysis Time Period | AM Peak |

## Site Information

| | |
|---|---|
| Freeway/Dir of Travel | SR 32 Westbound |
| Junction | Bach Buxton Exit Ramp |
| Jurisdiction | |
| Analysis Year | 2030 Alt 4 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3905 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4404 |
| Ramp | 650 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 733 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$$V_{12} = V_F ( P_{FM} )$$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.616 using Equation (Exhibit 25-12)

$V_{12}$ = 2995 pc/h

$V_3$ or $V_{av34}$ 1409 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 4404 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 3671 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 733 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 2995 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$$

$D_R$ = 25.5 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.364 (Exhibit 25-19)

$S_R$= 53.4 mph (Exhibit 25-19)

$S_0$= 64.2 mph (Exhibit 25-19)

S = 56.5 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 ALT 4 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$, $V_R$, $V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3100 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3496 |
| Ramp | 500 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 564 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes, $V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.647 using Equation (Exhibit 25-12)

$V_{12}$ = 2460 pc/h

$V_3$ or $V_{av34}$ 1036 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes, $V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 3496 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 2932 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 564 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 2460 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 20.9 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.349 (Exhibit 25-19)

$S_R$= 53.7 mph (Exhibit 25-19)

$S_0$= 65.7 mph (Exhibit 25-19)

S = 56.8 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Glen Este Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Alt 4 |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$, $V_R$, $V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 4200 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4737 |
| Ramp | 265 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 299 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.628 using Equation (Exhibit 25-12)

$V_{12}$ = 3085 pc/h

$V_3$ or $V_{av34}$ 1652 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 4737 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 4438 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 299 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 3085 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 26.3 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.325 (Exhibit 25-19)

$S_R$= 54.2 mph (Exhibit 25-19)

$S_0$= 63.3 mph (Exhibit 25-19)

S = 57.0 mph (Exhibit 25-15)

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## RAMPS AND RAMP JUNCTIONS WORKSHEET

| ***General Information*** | | ***Site Information*** | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Glen Este Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Alt 4 |

Project Description Segment IVa - P403100004

### *Inputs*

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

S $_{FF}$ = 60.0 mph S$_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

### *Conversion to pc/h Under Base Conditions*

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3200 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3609 |
| Ramp | 410 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 462 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

### *Estimation of $v_{12}$*

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

### *Capacity Checks*

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

### *Flow Entering Merge Influence Area*

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

### *Level of Service Determination (if not F)*

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

### *Speed Determination*

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

### *Estimation of $v_{12}$*

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.649 using Equation (Exhibit 25-12)

$V_{12}$ = 2503 pc/h

$V_3$ or $V_{av34}$ 1106 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

### *Capacity Checks*

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 3609 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 3147 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 462 | Exhibit 25-3 | 2100 | No |

### *Flow Entering Diverge Influence Area*

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 2503 | Exhibit 25-14 | 4400:All | No |

### *Level of Service Determination (if not F)*

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 21.3 (pc/mi/ln)

LOS = C (Exhibit 25-4)

### *Speed Determination*

$D_s$ = 0.340 (Exhibit 25-19)

$S_R$= 53.9 mph (Exhibit 25-19)

$S_0$= 65.4 mph (Exhibit 25-19)

S = 57.0 mph (Exhibit 25-15)

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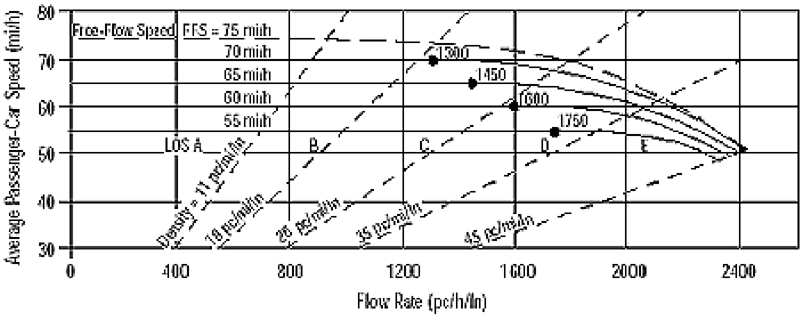
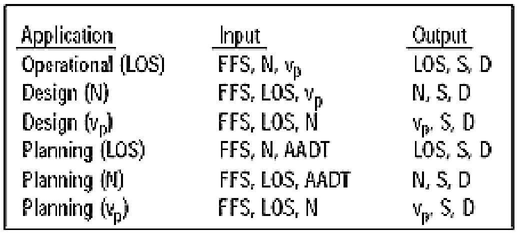
## BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### General Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Bach Buxton Ent to Olive Exit* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Scenario 8 a1 (Alt 4)* |

(Site Information)

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2100* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *789* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *13.1* | pc/mi/ln |
| LOS | *B* | |

### Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

### Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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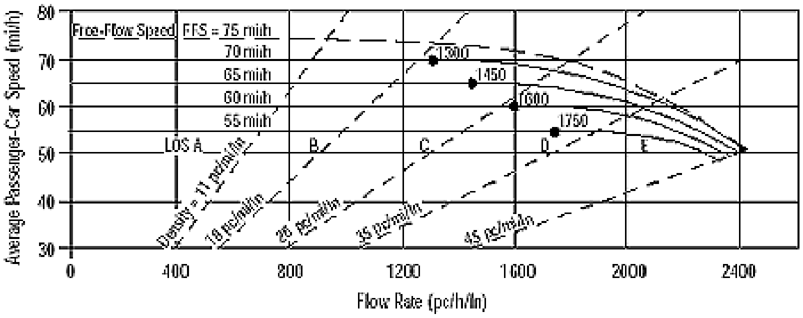
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *PM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Eastbound* |
| From/To | *Bach Buxton Ent to Olive Exit* |
| Jurisdiction | |
| Analysis Year | *2030 Scenario 8 a1 (Alt 4)* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4135* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1554* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *25.9* | pc/mi/ln |
| LOS | *C* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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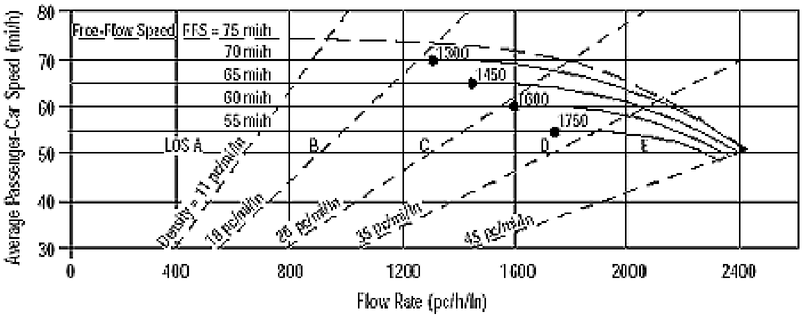
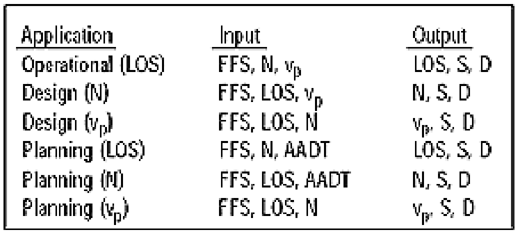
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Eastgate Ent to Bach Buxton Ex* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Scenario 8 A1 (Alt 4)* |

Project Description Segment IVa- P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2180* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *820* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *13.7* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes

V - Hourly volume

$v_p$ - Flow rate

LOS - Level of service

DDHV - Directional design hour volume

S - Speed

D - Density

FFS - Free-flow speed

BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10

$E_T$ - Exhibits 23-8, 23-10, 23-11

$f_p$ - Page 23-12

LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3

$f_{LW}$ - Exhibit 23-4

$f_{LC}$ - Exhibit 23-5

$f_N$ - Exhibit 23-6

$f_{ID}$ - Exhibit 23-7

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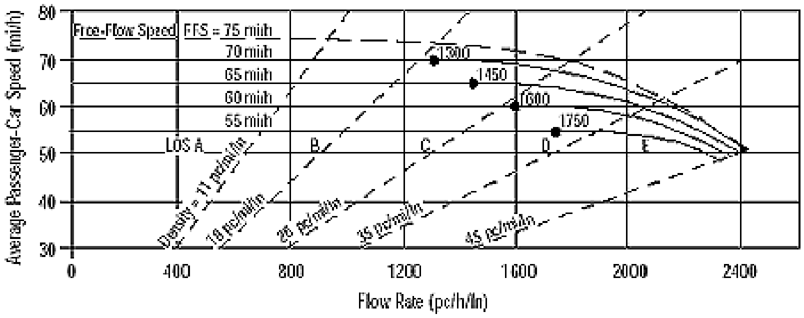
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *PM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Eastbound* |
| From/To | *Eastgate Ent to Bach Buxton Ex* |
| Jurisdiction | |
| Analysis Year | *2030 Scenario 8 A1 (Alt 4)* |

Project Description Segment IVa- P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4160* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV}$ = 1/[1+$P_T$($E_T$ - 1) + $P_R$($E_R$ - 1)] | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1564* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *26.1* | pc/mi/ln |
| LOS | *D* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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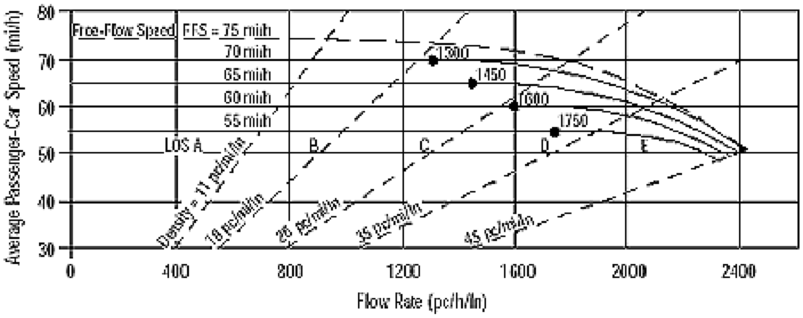
## BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### General Information

### Site Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Bach Buxton ent to Eastgate Ex* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Scenario 8 A2 (Alt 4)* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *4010* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1507* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *25.1* | pc/mi/ln |
| LOS | *C* | |

### Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

### Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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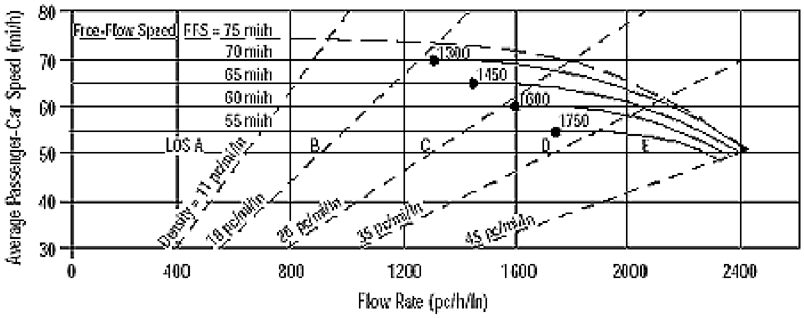
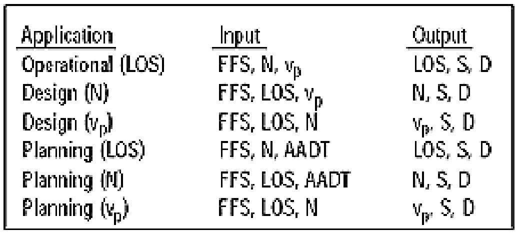
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Bach Buxton ent to Eastgate Ex* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Scenario 8 A2 (Alt 4)* |

## Site Information

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2120* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *797* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *13.3* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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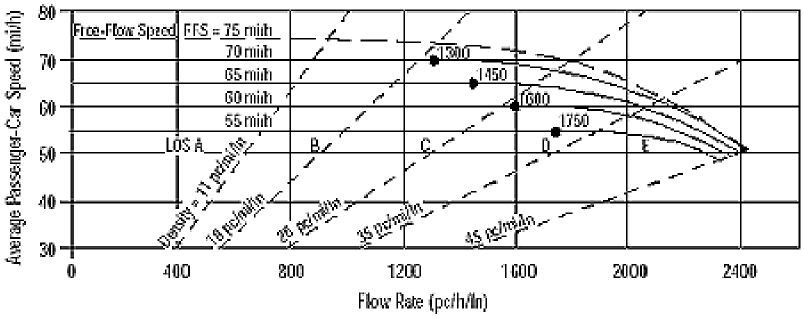
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *sta* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Olive Branch Ent to Bach Exit* |
| Date Performed | *2/7/2011* | Jurisdiction | |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Scenario 8 Alt A1 (Alt 4)* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3835* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1442* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *24.0* | pc/mi/ln |
| LOS | *C* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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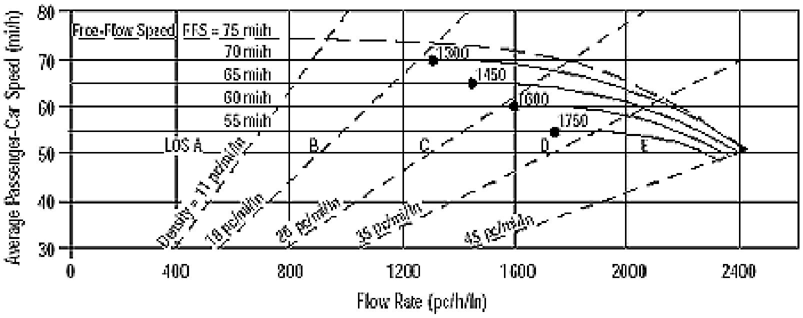
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *sta* |
| Agency or Company | *TranSystems* |
| Date Performed | *2/7/2011* |
| Analysis Time Period | *PM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *Olive Branch Exit to Bach Ent* |
| Jurisdiction | |
| Analysis Year | *2030 Scenario 8 Alt A1 (Alt 4)* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2670* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1004* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *16.7* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

## Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: EB Ramps @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: Am Peak Hour                    Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa
E/W St: EB Off Ramp                     N/S St:

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   0   1   |   0   0   0   |   0   3   0   |   2   1   0   |
LGConfig   | L          R  |               |       TR      | L     T       |
Volume     |250       200  |               |     525  135  |235  365       |
Lane Width |12.0      12.0 |               |     12.0      |12.0 12.0      |
RTOR Vol   |          0    |               |          0    |               |
________________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4  |            5     6     7     8
EB  Left          A                    | NB  Left
    Thru                               |     Thru         A
    Right         A                    |     Right        A
    Peds                               |     Peds
WB  Left                               | SB  Left   A
    Thru                               |     Thru   A     A
    Right                              |     Right
    Peds                               |     Peds
NB  Right                              | EB  Right
SB  Right                              | WB  Right
Green            31.5                              12.0  31.5
Yellow           3.5                               3.5   3.5
All Red          1.5                               1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group      Flow Rate  __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C     Delay LOS   Delay LOS
________________________________________________________________________________
Eastbound
L        619      1770      0.45   0.35    23.1   C
                                                        22.9   C
R        554      1583      0.40   0.35    22.6   C
Westbound



Northbound

TR       1725     4929      0.42   0.35    22.5   C    22.5   C

Southbound
L        458      3437      0.57   0.13    38.3   D
T        1004     1863      0.40   0.54    12.5   B    22.6   C

         Intersection Delay = 22.6  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: EB Ramps @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: PM Peak Hour                    Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa
E/W St: EB Off Ramp                     N/S St: Bach Buxton

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   0   1   |   0   0   0   |   0   3   0   |   2   1   0   |
LGConfig   | L          R  |               |       TR      | L     T       |
Volume     |290       410  |               |     510  255  |420  410       |
Lane Width |12.0      12.0 |               |     12.0      |12.0 12.0      |
RTOR Vol   |          0    |               |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
WB  Left                              | SB  Left   A
    Thru                              |     Thru   A     A
    Right                             |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            31.5                            16.5  27.0
Yellow           3.5                             3.5   3.5
All Red          1.5                             1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane        Adj Sat     Ratios        Lane Group   Approach
Lane    Group       Flow Rate   __________     __________  ___________
Grp     Capacity      (s)       v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        619       1770      0.52   0.35    24.0   C
                                                        31.3   C
R        554       1583      0.82   0.35    36.5   D
Westbound



Northbound

TR       1099      3663      0.77   0.30    32.2   C    32.2   C

Southbound
L        630       3437      0.74   0.18    39.4   D
T        1004      1863      0.45   0.54    13.0   B    26.4   C

         Intersection Delay = 29.8  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: WB Ramp @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: AM peak Hour                    Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa Alt 8A1
E/W St: WB Ramps                        N/S St: New Bach Buxton

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   0   0   |   1   0   2   |   2   1   0   |   0   3   0   |
LGConfig   |               | L          R  | L     T       |       TR      |
Volume     |               |265       505  |485  295       |     335  460  |
Lane Width |               |12.0      12.0 |12.0 12.0      |     12.0      |
RTOR Vol   |               |          0    |               |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left   A
    Thru                              |     Thru   A     A
    Right                             |     Right  A
    Peds                              |     Peds
WB  Left          A                   | SB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            22.5                             16.0  36.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound



Westbound
L        443       1770      0.66   0.25    34.1   C
                                                        36.8   D
R        701       2803      0.80   0.25    38.2   D
Northbound
L        611       3437      0.88   0.18    50.3   D
T        1190      1863      0.28   0.64    7.2    A    34.0   C

Southbound

TR       973       2398      0.91   0.41    37.2   D    37.2   D

         Intersection Delay = 36.0  (sec/veh)   Intersection LOS = D

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: WB Ramp @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: PM peak Hour                    Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa Alt 8A1
E/W St: WB Ramps                        N/S St: New Bach Buxton

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   0   0   |   1   0   2   |   2   1   0   |   0   3   0   |
LGConfig   |               | L          R  | L     T       |       TR      |
Volume     |               |130       420  |395  405       |     700  200  |
Lane Width |               |12.0      12.0 |12.0 12.0      |     12.0      |
RTOR Vol   |               |          0    |               |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left   A
    Thru                              |     Thru   A     A
    Right                             |     Right  A
    Peds                              |     Peds
WB  Left          A                   | SB  Left
    Thru                              |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            25.5                             15.5  34.0
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound



Westbound
L        501       1770      0.29   0.28    25.5   C
                                                        28.1   C
R        794       2803      0.59   0.28    28.9   C
Northbound
L        592       3437      0.74   0.17    40.3   D
T        1128      1863      0.40   0.61    9.5    A    24.7   C

Southbound

TR       1245      3295      0.80   0.38    28.9   C    28.9   C

         Intersection Delay = 27.2  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Marian Dr @ Bach-Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd:
Period: AM Peak                         Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa Alt 8A1
E/W St: Old 74 WB                       N/S St: Bach Buxton NB and Old 74 SB

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound      |  Westbound      |  Northbound     |  Southbound     |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   1   0   |   0   1   0   |   1   1   0   |   1   1   0   |
LGConfig   |       LTR     |       LTR     | L     TR      | L     TR      |
Volume     |20   15   10   |30   20   225  |10   415  15   |30   495  40   |
Lane Width |     12.0      |     12.0      |12.0 12.0      |12.0 12.0      |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left          A
    Thru          A                   |     Thru          A
    Right         A                   |     Right         A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A     A
    Thru          A                   |     Thru   A     A
    Right         A                   |     Right  A     A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            32.5                                     7.0   35.5
Yellow           3.5                                      3.5   3.5
All Red          1.5                                      1.5   1.5
                                                           Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group      Flow Rate   __________      __________   ___________
Grp     Capacity     (s)      v/c    g/C      Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound

LTR      542       1502      0.09   0.36     19.1   B    19.1   B

Westbound

LTR      579       1604      0.53   0.36     23.6   C    23.6   C

Northbound
L        288       729       0.04   0.39     16.8   B
TR       731       1853      0.65   0.39     24.3   C    24.2   C

Southbound
L        349       1770      0.09   0.53     12.6   B
TR       972       1842      0.61   0.53     15.9   B    15.8   B

         Intersection Delay = 20.3  (sec/veh)   Intersection LOS = C

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                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                             Inter.: Marian Dr @ Bach-Buxton
Agency: TranSystems                      Area Type: All other areas
Date:   7/18/2011                        Jurisd:
Period: PM Peak                          Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa Alt 8A1
E/W St: Old 74 WB                        N/S St: Bach Buxton NB and Old 74 SB

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound      |  Westbound      |  Northbound     |  Southbound     |
           | L    T    R     | L    T    R     | L    T    R     | L    T    R     |
           |_________________|_________________|_________________|_________________|
No. Lanes  |   0   1   0     |   0   1   0     |   1   1   0     |   1   1   0     |
LGConfig   |      LTR        |      LTR        | L     TR        | L     TR        |
Volume     |55   10   10     |15   30   100    |10   610  20     |225  515  80     |
Lane Width |     12.0        |     12.0        |12.0 12.0        |12.0 12.0        |
RTOR Vol   |          0      |          0      |          0      |          0      |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left         A
    Thru          A                   |     Thru         A
    Right         A                   |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A     A
    Thru          A                   |     Thru   A     A
    Right         A                   |     Right  A     A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            25.5                              7.0   42.5
Yellow           3.5                               3.5   3.5
All Red          1.5                               1.5   1.5
                                                    Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios          Lane Group   Approach
Lane    Group      Flow Rate   __________      __________   ___________
Grp     Capacity     (s)       v/c    g/C      Delay LOS    Delay LOS
_______________________________________________________________________________
Eastbound

LTR      386        1364       0.22   0.28     24.9   C     24.9   C

Westbound

LTR      464        1639       0.35   0.28     26.1   C     26.1   C

Northbound
L        333        705        0.03   0.47     12.8   B
TR       875        1854       0.80   0.47     25.5   C     25.3   C

Southbound
L        281        1770       0.89   0.61     43.3   D
TR       1105       1825       0.60   0.61     11.9   B     20.5   C

         Intersection Delay = 23.0  (sec/veh)   Intersection LOS = C

_______________________________________________________________________________
```

```
                  HCS+: Signalized Intersections Release 5.5

Analyst: sta                            Inter.: Old 74 @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd: old 74 east leg T's in
Period: AM Peak                         Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa Alt 8A1
E/W St: Old 74 WB                       N/S St: Bach Buxton NB and Old 74 SB

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   0   0   |   1   0   1   |   0   1   1   |   1   1   0   |
LGConfig   |               | L          R  |       T    R  | L     T       |
Volume     |               |245       325  |     625  175  |45   550       |
Lane Width |               |12.0      12.0 |     12.0 12.0 |12.0 12.0      |
RTOR Vol   |               |          0    |          0    |               |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left
    Thru                              |     Thru         A
    Right                             |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A     P
    Thru                              |     Thru   A     A
    Right         A                   |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            29.0                             7.0   39.0
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C      Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound



Westbound
L        570       1770      0.48   0.32    25.1   C
                                                        28.6   C
R        510       1583      0.71   0.32    31.3   C
Northbound

T        807       1863      0.86   0.43    32.4   C    28.9   C
R        686       1583      0.28   0.43    16.7   B
Southbound
L        238       1770      0.21   0.57    15.2   B
T        1056      1863      0.58   0.57    13.4   B    13.5   B

         Intersection Delay = 24.2  (sec/veh)    Intersection LOS = C

_______________________________________________________________________________
```

```
                  HCS+: Signalized Intersections Release 5.5

Analyst:                                Inter.: Old 74 @ New Bach Buxton
Agency: TranSystems                     Area Type: All other areas
Date:   7/18/2011                       Jurisd: old 74 east leg T's in
Period: PM Peak                         Year  : Alt 8 A1 (Alt 4)
Project ID: Segment IVa Alt 8A1
E/W St: Old 74 WB                       N/S St: Bach Buxton NB and Old 74 SB

_________________________SIGNALIZED INTERSECTION SUMMARY________________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   0   0   0   |   1   0   1   |   0   1   1   |   1   1   0   |
LGConfig   |               | L          R  |       T    R  | L     T       |
Volume     |               |185       125  |     580  245  |240  715       |
Lane Width |               |12.0      12.0 |     12.0 12.0 |12.0 12.0      |
RTOR Vol   |               |          0    |          0    |               |
________________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left                              | NB  Left
    Thru                              |     Thru         A
    Right                             |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A     P
    Thru                              |     Thru   A     A
    Right         A                   |     Right
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            27.5                             9.0   38.5
Yellow           3.5                              3.5   3.5
All Red          1.5                              1.5   1.5
                                                   Cycle Length: 90.0    secs
____________________Intersection Performance Summary____________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
________________________________________________________________________________
Eastbound



Westbound
L        541       1770      0.38   0.31    25.0   C
                                                        24.6   C
R        484       1583      0.29   0.31    24.1   C
Northbound

T        797       1863      0.81   0.43    28.7   C    25.6   C
R        677       1583      0.40   0.43    18.2   B
Southbound
L        306       1770      0.87   0.58    39.2   D
T        1087      1863      0.73   0.58    16.2   B    21.9   C

         Intersection Delay = 23.8  (sec/veh)   Intersection LOS = C

________________________________________________________________________________
```

# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Scenario 8A1 (Alt 4) |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 1730 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 1951 |
| Ramp | 370 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 417 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1154 pc/h

$V_3$ or $V_{av34}$ 797 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 2368 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 1571 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 14.4 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.295 (Exibit 25-19)

$S_R$= 54.7 mph (Exhibit 25-19)

$S_0$= 58.9 mph (Exhibit 25-19)

S = 56.1 mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | scf | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Scenario 8A1 (Alt 4) |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3460 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3902 |
| Ramp | 675 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 761 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$$V_{12} = V_F ( P_{FM} )$$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 2308 pc/h

$V_3$ or $V_{av34}$ 1594 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 4663 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 3069 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$$

$D_R$ = 25.9 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.360 (Exibit 25-19)

$S_R$= 53.5 mph (Exhibit 25-19)

$S_0$= 56.1 mph (Exhibit 25-19)

S = 54.4 mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Scenario 8a1 (Alt 4) |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2180 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2459 |
| Ramp | 450 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 508 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F$ ( $P_{FM}$ )

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.675 using Equation (Exhibit 25-12)

$V_{12}$ = 1825 pc/h

$V_3$ or $V_{av34}$ 634 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 2459 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 1951 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 508 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 1825 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 15.4 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.344 (Exhibit 25-19)

$S_R$= 53.8 mph (Exhibit 25-19)

$S_0$= 65.8 mph (Exhibit 25-19)

S = 56.5 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

|  |  |  |  |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Eastbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction |  |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Scenario 8a1 (Alt 4) |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$, $V_R$, $V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | $v = V/PHF \times f_{HV} \times f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 4160 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4692 |
| Ramp | 700 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 789 |
| UpStream |  |  |  |  |  |  |  |  |
| DownStream |  |  |  |  |  |  |  |  |

### Merge Areas

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes, $V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

|  | Actual | Capacity |  | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ |  | Exhibit 25-7 |  |  |

## Flow Entering Merge Influence Area

|  | Actual | Max Desirable |  | Violation? |
|---|---|---|---|---|
| $V_{R12}$ |  | Exhibit 25-7 |  |  |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

### Diverge Areas

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.606 using Equation (Exhibit 25-12)

$V_{12}$ = 3156 pc/h

$V_3$ or $V_{av34}$ 1536 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes, $V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

|  | Actual | Capacity |  | LOS F? |
|---|---|---|---|---|
| $V_F$ | 4692 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 3903 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 789 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

|  | Actual | Max Desirable |  | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 3156 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 26.9 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.369 (Exhibit 25-19)

$S_R$= 53.4 mph (Exhibit 25-19)

$S_0$= 63.7 mph (Exhibit 25-19)

S = 56.4 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Scenario 8 a1 (ALT 4) |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 55.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3065 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3457 |
| Ramp | 945 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 1066 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F\ (P_{FM})$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 2045 pc/h

$V_3$ or $V_{av34}$ 1412 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 4523 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 3111 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 26.1 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.364 (Exibit 25-19)

$S_R$= 50.3 mph (Exhibit 25-19)

$S_0$= 51.7 mph (Exhibit 25-19)

S = 50.7 mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Entrance Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Scenario 8 a1 (ALT 4) |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

S $_{FF}$ = 55.0 mph S$_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2120 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 2391 |
| Ramp | 600 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 677 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F ( P_{FM} )$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = 0.591 using Equation (Exhibit 25-5)

$V_{12}$ = 1414 pc/h

$V_3$ or $V_{av34}$ 977 pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | 3068 | Exhibit 25-7 | | No |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | 2091 | Exhibit 25-7 | 4600:All | No |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = 18.3 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$M_S$ = 0.308 (Exibit 25-19)

$S_R$= 51.0 mph (Exhibit 25-19)

$S_0$= 53.3 mph (Exhibit 25-19)

S = 51.7 mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = using Equation (Exhibit 25-12)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | | Exhibit 25-14 | | |
| $V_{FO} = V_F - V_R$ | | Exhibit 25-14 | | |
| $V_R$ | | Exhibit 25-3 | | |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | | Exhibit 25-14 | | |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$D_s$ = (Exhibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | AM Peak | Analysis Year | 2030 Scenario 8 a1 (Alt 4) |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$,$V_R$,$V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 3835 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 4325 |
| Ramp | 770 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 868 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$$V_{12} = V_F ( P_{FM} )$$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$$V_{12} = V_R + (V_F - V_R)P_{FD}$$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.612 using Equation (Exhibit 25-12)

$V_{12}$ = 2984 pc/h

$V_3$ or $V_{av34}$ 1341 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 4325 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 3457 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 868 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 2984 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$$

$D_R$ = 25.4 (pc/mi/ln)

LOS = C (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.376 (Exhibit 25-19)

$S_R$= 53.2 mph (Exhibit 25-19)

$S_0$= 64.5 mph (Exhibit 25-19)

S = 56.3 mph (Exhibit 25-15)

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# RAMPS AND RAMP JUNCTIONS WORKSHEET

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | sta | Freeway/Dir of Travel | SR 32 Westbound |
| Agency or Company | TranSystems | Junction | Bach Buxton Exit Ramp |
| Date Performed | 2/7/2011 | Jurisdiction | |
| Analysis Time Period | PM Peak | Analysis Year | 2030 Scenario 8 a1 (Alt 4) |

Project Description Segment IVa - P403100004

## Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{up}$ = ft

$V_u$ = veh/h

Terrain: Level

$S_{FF}$ = 60.0 mph $S_{FR}$ = 45.0 mph

Sketch ( show lanes, $L_A$, $L_D$, $V_R$, $V_f$)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

$L_{down}$ = ft

$V_D$ = veh/h

## Conversion to pc/h Under Base Conditions

| (pc/h) | V (Veh/hr) | PHF | Terrain | %Truck | %Rv | $f_{HV}$ | $f_p$ | v = V/PHF x $f_{HV}$ x $f_p$ |
|---|---|---|---|---|---|---|---|---|
| Freeway | 2670 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 3011 |
| Ramp | 550 | 0.90 | Level | 3 | 0 | 0.985 | 1.00 | 620 |
| UpStream | | | | | | | | |
| DownStream | | | | | | | | |

**Merge Areas**

## Estimation of $v_{12}$

$V_{12} = V_F\ (P_{FM})$

$L_{EQ}$ = (Equation 25-2 or 25-3)

$P_{FM}$ = using Equation (Exhibit 25-5)

$V_{12}$ = pc/h

$V_3$ or $V_{av34}$ pc/h (Equation 25-4 or 25-5)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☐ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☐ No

If Yes,$V_{12a}$ = pc/h (Equation 25-8)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_{FO}$ | | Exhibit 25-7 | | |

## Flow Entering Merge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{R12}$ | | Exhibit 25-7 | | |

## Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

$D_R$ = (pc/mi/ln)

LOS = (Exhibit 25-4)

## Speed Determination

$M_S$ = (Exibit 25-19)

$S_R$= mph (Exhibit 25-19)

$S_0$= mph (Exhibit 25-19)

S = mph (Exhibit 25-14)

**Diverge Areas**

## Estimation of $v_{12}$

$V_{12} = V_R + (V_F - V_R)P_{FD}$

$L_{EQ}$ = (Equation 25-8 or 25-9)

$P_{FD}$ = 0.656 using Equation (Exhibit 25-12)

$V_{12}$ = 2189 pc/h

$V_3$ or $V_{av34}$ 822 pc/h (Equation 25-15 or 25-16)

Is $V_3$ or $V_{av34}$ > 2,700 pc/h? ☐ Yes ☑ No

Is $V_3$ or $V_{av34}$ > 1.5 * $V_{12}$/2 ☐ Yes ☑ No

If Yes,$V_{12a}$ = pc/h (Equation 25-18)

## Capacity Checks

| | Actual | Capacity | | LOS F? |
|---|---|---|---|---|
| $V_F$ | 3011 | Exhibit 25-14 | 6900 | No |
| $V_{FO} = V_F - V_R$ | 2391 | Exhibit 25-14 | 6900 | No |
| $V_R$ | 620 | Exhibit 25-3 | 2100 | No |

## Flow Entering Diverge Influence Area

| | Actual | Max Desirable | | Violation? |
|---|---|---|---|---|
| $V_{12}$ | 2189 | Exhibit 25-14 | 4400:All | No |

## Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

$D_R$ = 18.6 (pc/mi/ln)

LOS = B (Exhibit 25-4)

## Speed Determination

$D_s$ = 0.354 (Exhibit 25-19)

$S_R$= 53.6 mph (Exhibit 25-19)

$S_0$= 65.8 mph (Exhibit 25-19)

S = 56.5 mph (Exhibit 25-15)

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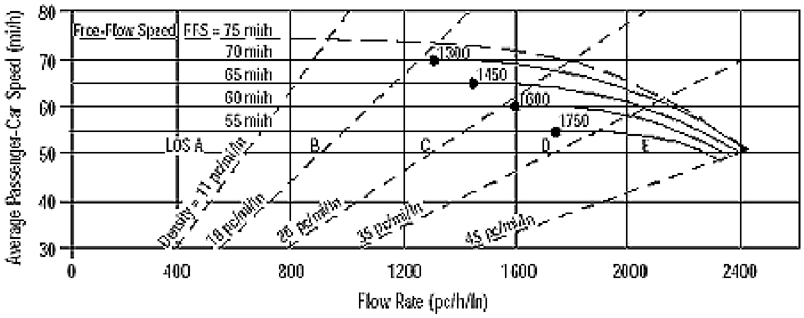
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Eastgate entrance to Glen Este* |
| Date Performed | *7/06/11* | Jurisdiction | *HNTB No-Build Volumes* |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 1* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2329* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *876* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *14.6* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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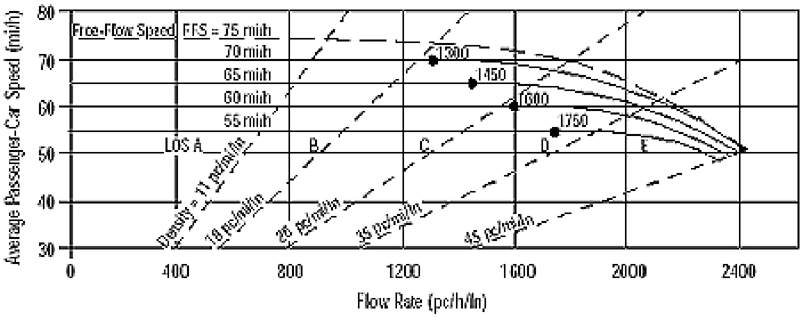
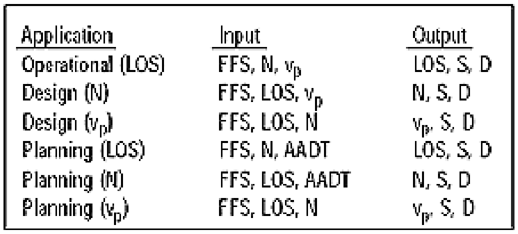
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## *General Information* / *Site Information*

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Eastgate entrance to Glen Este* |
| Date Performed | *7/06/11* | Jurisdiction | *No-Build Volumes* |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 Alt 1* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## *Flow Inputs*

| | | | | |
|---|---|---|---|---|
| Volume, V | *3386* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *3* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1273* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *21.2* | pc/mi/ln |
| LOS | *C* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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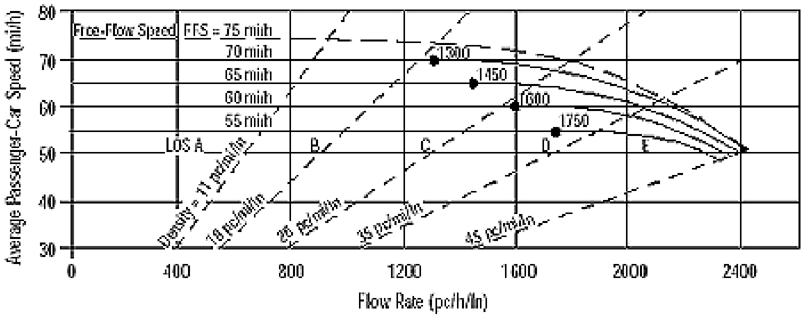
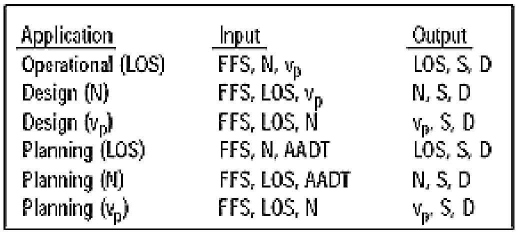
## BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

### *General Information*

| | |
|---|---|
| Analyst | *scf* |
| Agency or Company | *TranSystems* |
| Date Performed | *7/06/11* |
| Analysis Time Period | *AM Peak* |

### *Site Information*

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Eastbound* |
| From/To | *Old SR 74 to Olive Branch exit* |
| Jurisdiction | *No-Build Volumes* |
| Analysis Year | *2030 Alt 5* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

### *Flow Inputs*

| | | | | |
|---|---|---|---|---|
| Volume, V | *2404* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

### Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

### Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *2* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

### Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

### LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1356* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *22.6* | pc/mi/ln |
| LOS | *C* | |

### Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

### Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

### Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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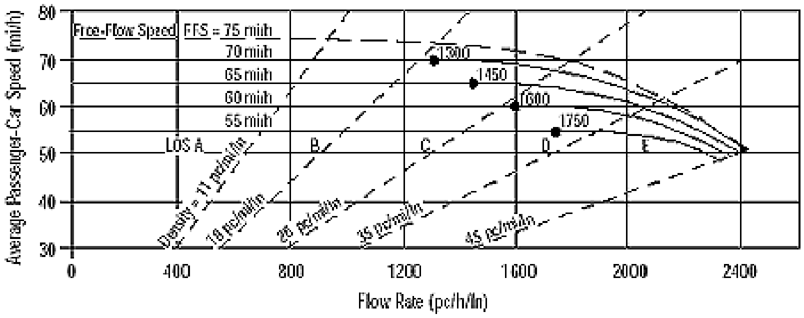
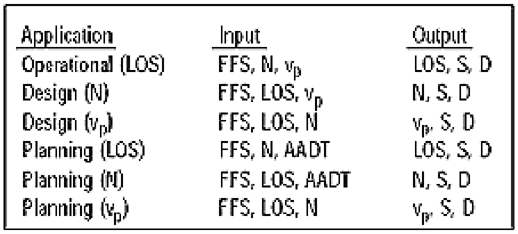
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Eastbound* |
| Agency or Company | *TranSystems* | From/To | *Old SR 74 to Olive Branch exit* |
| Date Performed | *7/06/11* | Jurisdiction | *No-Build Volumes* |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 ALT 5* |

## Site Information

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3699* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *2* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *2086* | pc/h/ln |
| S | *56.6* | mi/h |
| D = $v_p$ / S | *36.9* | pc/mi/ln |
| LOS | *E* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

## Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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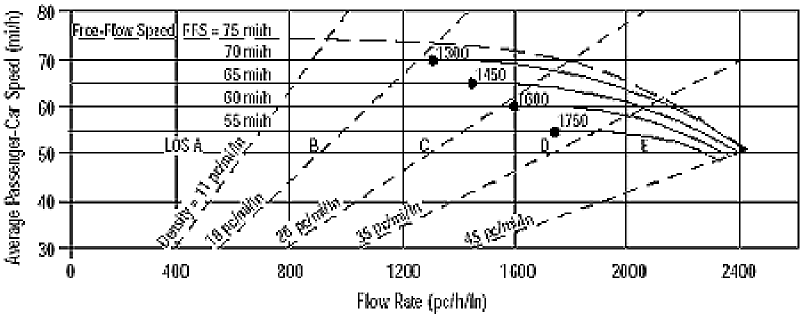
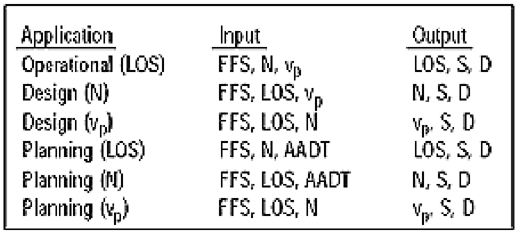
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Glen Este to Eastgate exit* |
| Date Performed | *7/06/11* | Jurisdiction | *HNTB No-Build Volumes* |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 5* |

## Site Information

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *3478* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *2* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1961* | pc/h/ln |
| S | *58.4* | mi/h |
| D = $v_p$ / S | *33.6* | pc/mi/ln |
| LOS | *D* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

| | |
|---|---|
| N - Number of lanes | S - Speed |
| V - Hourly volume | D - Density |
| $v_p$ - Flow rate | FFS - Free-flow speed |
| LOS - Level of service | BFFS - Base free-flow speed |
| DDHV - Directional design hour volume | |

## Factor Location

| | |
|---|---|
| $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |

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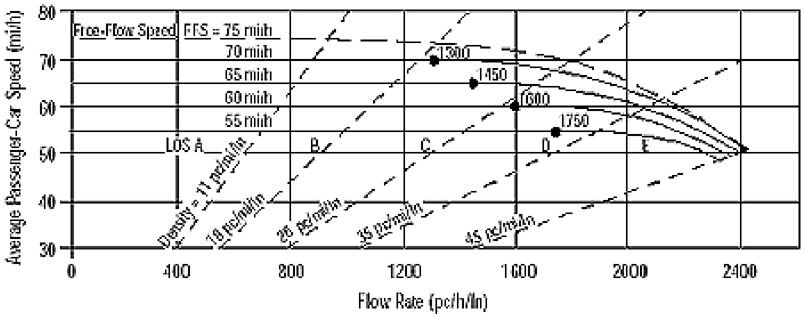
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

| ***General Information*** | | ***Site Information*** | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Glen Este to Eastgate exit* |
| Date Performed | *7/06/11* | Jurisdiction | *No-Build Volumes* |
| Analysis Time Period | *PM Peak* | Analysis Year | *2030 ALT 5* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## *Flow Inputs*

| | | | | |
|---|---|---|---|---|
| Volume, V | *2738* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

| **Speed Inputs** | | | **Calc Speed Adj and FFS** | | |
|---|---|---|---|---|---|
| Lane Width | *12.0* | ft | $f_{LW}$ | | mi/h |
| Rt-Shoulder Lat. Clearance | *6.0* | ft | $f_{LC}$ | | mi/h |
| Interchange Density | *0.50* | I/mi | $f_{ID}$ | | mi/h |
| Number of Lanes, N | *2* | | $f_N$ | | mi/h |
| FFS (measured) | *60.0* | mi/h | FFS | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h | | | |

| **LOS and Performance Measures** | | | **Design (N)** | |
|---|---|---|---|---|
| <u>Operational (LOS)</u> | | | <u>Design (N)</u> | |
| | | | Design LOS | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1544* | pc/h/ln | $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | pc/h |
| S | *60.0* | mi/h | S | mi/h |
| D = $v_p$ / S | *25.7* | pc/mi/ln | D = $v_p$ / S | pc/mi/ln |
| LOS | *C* | | Required Number of Lanes, N | |

| **Glossary** | | **Factor Location** | |
|---|---|---|---|
| N - Number of lanes | S - Speed | $E_R$ - Exhibits23-8, 23-10 | $f_{LW}$ - Exhibit 23-4 |
| V - Hourly volume | D - Density | $E_T$ - Exhibits 23-8, 23-10, 23-11 | $f_{LC}$ - Exhibit 23-5 |
| $v_p$ - Flow rate | FFS - Free-flow speed | $f_p$ - Page 23-12 | $f_N$ - Exhibit 23-6 |
| LOS - Level of service | BFFS - Base free-flow speed | LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3 | $f_{ID}$ - Exhibit 23-7 |
| DDHV - Directional design hour volume | | | |

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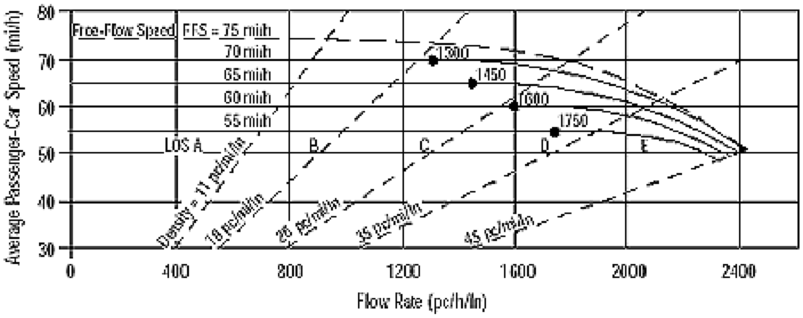
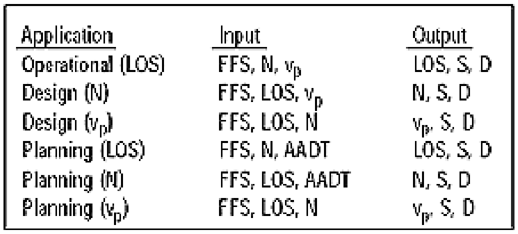
# BASIC FREEWAY SEGMENTS WORKSHEET





| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information / Site Information

| | | | |
|---|---|---|---|
| Analyst | *scf* | Highway/Direction of Travel | *SR 32 Westbound* |
| Agency or Company | *TranSystems* | From/To | *Olive Branch ent to Old SR 74* |
| Date Performed | *7/06/11* | Jurisdiction | *No-Build Volumes* |
| Analysis Time Period | *AM Peak* | Analysis Year | *2030 Alt 1* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *2290* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *2* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1291* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *21.5* | pc/mi/ln |
| LOS | *C* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

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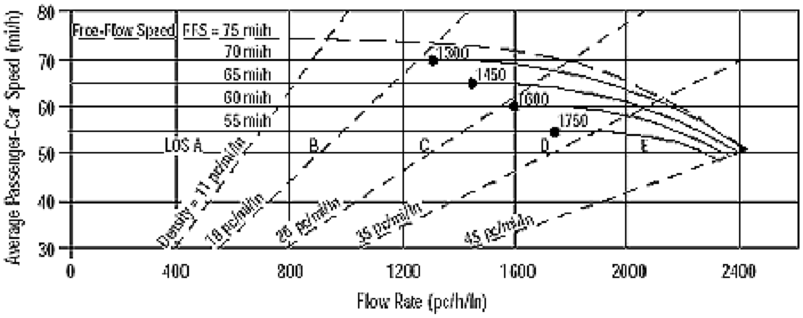
# BASIC FREEWAY SEGMENTS WORKSHEET



| Application | Input | Output |
|---|---|---|
| Operational (LOS) | FFS, N, $v_p$ | LOS, S, D |
| Design (N) | FFS, LOS, $v_p$ | N, S, D |
| Design ($v_p$) | FFS, LOS, N | $v_p$, S, D |
| Planning (LOS) | FFS, N, AADT | LOS, S, D |
| Planning (N) | FFS, LOS, AADT | N, S, D |
| Planning ($v_p$) | FFS, LOS, N | $v_p$, S, D |

## General Information

| | |
|---|---|
| Analyst | *scf* |
| Agency or Company | *TranSystems* |
| Date Performed | *7/06/11* |
| Analysis Time Period | *PM Peak* |

## Site Information

| | |
|---|---|
| Highway/Direction of Travel | *SR 32 Westbound* |
| From/To | *Olive Branch ent to Old SR 74* |
| Jurisdiction | *No-Build Volumes* |
| Analysis Year | *2030 ALT 1* |

Project Description Segment IVa - P403100004

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

## Flow Inputs

| | | | | |
|---|---|---|---|---|
| Volume, V | *1915* | veh/h | Peak-Hour Factor, PHF | *0.90* |
| AADT | | veh/day | %Trucks and Buses, $P_T$ | *3* |
| Peak-Hr Prop. of AADT, K | | | %RVs, $P_R$ | *0* |
| Peak-Hr Direction Prop, D | | | General Terrain: | *Level* |
| DDHV = AADT x K x D | | veh/h | Grade % Length | *mi* |
| Driver type adjustment | *1.00* | | Up/Down % | |

## Calculate Flow Adjustments

| | | | |
|---|---|---|---|
| $f_p$ | *1.00* | $E_R$ | *1.2* |
| $E_T$ | *1.5* | $f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$ | *0.985* |

## Speed Inputs

| | | |
|---|---|---|
| Lane Width | *12.0* | ft |
| Rt-Shoulder Lat. Clearance | *6.0* | ft |
| Interchange Density | *0.50* | I/mi |
| Number of Lanes, N | *2* | |
| FFS (measured) | *60.0* | mi/h |
| Base free-flow Speed, BFFS | | mi/h |

## Calc Speed Adj and FFS

| | | |
|---|---|---|
| $f_{LW}$ | | mi/h |
| $f_{LC}$ | | mi/h |
| $f_{ID}$ | | mi/h |
| $f_N$ | | mi/h |
| FFS | *60.0* | mi/h |

## LOS and Performance Measures

Operational (LOS)

| | | |
|---|---|---|
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | *1080* | pc/h/ln |
| S | *60.0* | mi/h |
| D = $v_p$ / S | *18.0* | pc/mi/ln |
| LOS | *B* | |

## Design (N)

Design (N)

| | | |
|---|---|---|
| Design LOS | | |
| $v_p$ = (V or DDHV) / (PHF x N x $f_{HV}$ x $f_p$) | | pc/h |
| S | | mi/h |
| D = $v_p$ / S | | pc/mi/ln |
| Required Number of Lanes, N | | |

## Glossary

N - Number of lanes
V - Hourly volume
$v_p$ - Flow rate
LOS - Level of service
DDHV - Directional design hour volume
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed

## Factor Location

$E_R$ - Exhibits23-8, 23-10
$E_T$ - Exhibits 23-8, 23-10, 23-11
$f_p$ - Page 23-12
LOS, S, FFS, $v_p$ - Exhibits 23-2, 23-3
$f_{LW}$ - Exhibit 23-4
$f_{LC}$ - Exhibit 23-5
$f_N$ - Exhibit 23-6
$f_{ID}$ - Exhibit 23-7

HCS+™ Version 5.5 Generated: 12/5/2011 11:42 AM

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                  HCS+: Signalized Intersections Release 5.5

Analyst: lpk                            Inter.: SR 32 & Glen Este-Withamsville 20Agency: TranSystems                     Area Type: All other areas
Date:   06/08/2010                      Jurisd:
Period: AM                              Year  : 2030 No-Build
Project ID: Segment IVa; P403 10 0004
E/W St: SR 32                           N/S St: Glen Este-Withamsville Road

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   2   2   1   |   2   2   1   |   2   2   1   |   2   2   1   |
LGConfig   | L     T    R  | L     T    R  | L     T    R  | L     T    R  |
Volume     |289  1670 370  |247  2179 86   |732  241  80   |110  456  567  |
Lane Width |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0 12.0 |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A
    Thru                A             |     Thru         A
    Right               A             |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A
    Thru                A             |     Thru         A
    Right               A             |     Right        A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            12.5  48.5                       15.5  23.5
Yellow           3.5   3.5                        3.5   3.5
All Red          1.5   1.5                        1.5   1.5
                                                   Cycle Length: 120.0   secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        354       3403      0.91   0.10    79.2   E
T        1419      3512      1.31   0.40    179.5  F    143.5  F
R        634       1568      0.65   0.40    31.2   C
Westbound
L        354       3403      0.77   0.10    62.6   E
T        1419      3512      1.71   0.40    356.5  F    316.3  F
R        568       1568      0.17   0.36    26.1   C
Northbound
L        444       3437      1.83   0.13    435.0  F
T        695       3547      0.39   0.20    42.3   D    315.1  F
R        310       1583      0.29   0.20    41.6   D
Southbound
L        444       3437      0.27   0.13    47.5   D
T        695       3547      0.73   0.20    49.2   D    286.6  F
R        310       1583      2.03   0.20    523.9  F
         Intersection Delay = 254.1 (sec/veh)   Intersection LOS = F

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                  HCS+: Signalized Intersections Release 5.5
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                  HCS+: Signalized Intersections Release 5.5

Analyst: lpk                            Inter.: 22 - Glen Este & SR 32
Agency: TranSystems                     Area Type: All other areas
Date:   06/08/2011                      Jurisd:
Period: PM                              Year  : 2030 No-Build
Project ID: Segment IVa; P403 10 0004
E/W St: SR 32                           N/S St: Glen Este-Withamsville Road

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   2   2   1   |   2   2   1   |   2   2   1   |   2   2   1   |
LGConfig   | L     T    R  | L     T    R  | L     T    R  | L     T    R  |
Volume     |763  1938 685  |228  1814 143  |517  476  436  |399  381  407  |
Lane Width |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0 12.0 |12.0 12.0 12.0 |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A
    Thru                A             |     Thru        A
    Right               A             |     Right       A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A
    Thru                A             |     Thru        A
    Right               A             |     Right       A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            16.0  50.5                       12.5  21.0
Yellow           3.5   3.5                        3.5   3.5
All Red          1.5   1.5                        1.5   1.5
                                                   Cycle Length: 120.0   secs
____________________Intersection Performance Summary___________________________
Appr/   Lane      Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate   __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C      Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        454       3403      1.87   0.13     450.9  F
T        1478      3512      1.46   0.42     244.1  F    265.6  F
R        660       1568      1.15   0.42     120.2  F
Westbound
L        454       3403      0.56   0.13     50.2   D
T        1478      3512      1.36   0.42     203.0  F    175.5  F
R        595       1568      0.27   0.38     26.0   C
Northbound
L        358       3437      1.60   0.10     338.0  F
T        621       3547      0.85   0.17     59.0   E    264.0  F
R        277       1583      1.75   0.17     400.3  F
Southbound
L        358       3437      1.24   0.10     182.4  F
T        621       3547      0.68   0.17     49.4   D    197.1  F
R        277       1583      1.63   0.17     349.7  F
         Intersection Delay = 231.3 (sec/veh)   Intersection LOS = F

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                  HCS+: Signalized Intersections Release 5.5

Analyst: lpk                            Inter.: SR 32 & Elick Lane
Agency: TranSystems                     Area Type: All other areas
Date:   06/08/2010                      Jurisd:
Period: AM                              Year  : 2030 No-Build
Project ID: Segment IVa; P403 10 0004
E/W St: SR 32                           N/S St: Elick Lane

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   2   1   |   1   2   0   |   2   1   1   |   2   1   1   |
LGConfig   | L     T    R  | L     TR      | L     T    R  | L     T    R  |
Volume     |15   1650 240  |79   1965 173  |495  146  60   |66   170  45   |
Lane Width |12.0 12.0 12.0 |12.0 12.0      |12.0 12.0 12.0 |12.0 12.0 12.0 |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations_________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A     A
    Thru                A             |     Thru         A     A
    Right               A             |     Right        A     A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A
    Thru                A             |     Thru               A
    Right               A             |     Right              A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            8.5   66.0                       7.0   3.5   10.0
Yellow           3.5   3.5                        3.5   3.5   3.5
All Red          1.5   1.5                        1.5   1.5   1.5
                                                   Cycle Length: 120.0   secs
____________________Intersection Performance Summary___________________________
Appr/   Lane      Adj Sat      Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        124       1752      0.14   0.07    52.8   D
T        1932      3512      0.95   0.55    36.2   D    33.7   C
R        862       1568      0.31   0.55    14.9   B
Westbound
L        124       1752      0.71   0.07    71.7   E
TR       1909      3470      1.24   0.55    141.5  F    139.0  F

Northbound
L        448       3471      1.23   0.13    173.1  F
T        290       1881      0.56   0.15    49.4   D    136.4  F
R        247       1599      0.27   0.15    45.4   D
Southbound
L        202       3471      0.36   0.06    55.5   E
T        157       1881      1.20   0.08    192.0  F    137.9  F
R        133       1599      0.38   0.08    53.8   D
         Intersection Delay = 99.2  (sec/veh)   Intersection LOS = F

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                    HCS+: Signalized Intersections Release 5.5

Analyst: lpk                                Inter.: SR 32 & Elick Lane
Agency: TranSystems                         Area Type: All other areas
Date:   06/08/2010                          Jurisd:
Period: PM                                  Year  : 2030 No-Build
Project ID: Segment IVa; P403 10 0004
E/W St: SR 32                               N/S St: Elick Lane

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
           |________________|________________|________________|________________|
No. Lanes  |   1   2   1    |   1   2   0    |   2   1   1    |   2   1   1    |
LGConfig   | L     T    R   | L     TR       | L     T    R   | L     T    R   |
Volume     |103  2462 415   |93   1694 62    |431  277  257   |515  145  37    |
Lane Width |12.0 12.0 12.0  |12.0 12.0       |12.0 12.0 12.0  |12.0 12.0 12.0  |
RTOR Vol   |          0     |          0     |          0     |          0     |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A
    Thru                A             |     Thru         A
    Right               A             |     Right        A
    Peds                              |     Peds
WB  Left          A                   | SB  Left   A
    Thru                A             |     Thru         A
    Right               A             |     Right        A
    Peds                              |     Peds
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            8.0   52.0                       11.0  19.0
Yellow           3.5   3.5                        3.5   3.5
All Red          1.5   1.5                        1.5   1.5
                                                   Cycle Length: 110.0   secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios        Lane Group   Approach
Lane    Group      Flow Rate  __________     __________  ___________
Grp     Capacity     (s)      v/c    g/C     Delay LOS   Delay LOS

_______________________________________________________________________________
Eastbound
L        127       1752       0.90   0.07    100.6  F
T        1660      3512       1.65   0.47    323.4  F    274.0  F
R        741       1568       0.62   0.47    23.3   C
Westbound
L        127       1752       0.81   0.07    81.6   F
TR       1652      3494       1.18   0.47    117.0  F    115.2  F

Northbound
L        347       3471       1.38   0.10    237.8  F
T        325       1881       0.95   0.17    81.3   F    158.6  F
R        276       1599       1.04   0.17    109.4  F
Southbound
L        347       3471       1.65   0.10    353.9  F
T        325       1881       0.50   0.17    42.4   D    272.4  F
R        276       1599       0.15   0.17    38.9   D
         Intersection Delay = 211.4 (sec/veh)   Intersection LOS = F

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                  HCS+: Signalized Intersections Release 5.5

Analyst: lpk                            Inter.: SR 32 & Old 74
Agency: TranSystems                     Area Type: All other areas
Date:   06/30/11                        Jurisd:
Period: AM                              Year  : 2030 No-Build
Project ID: Segment IVa; P403 10 0004
E/W St: SR 32                           N/S St: Old 74

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   2   0   |   1   2   0   |   1   1   0   |   1   1   0   |
LGConfig   | L     TR      | L     TR      | L     TR      | L     TR      |
Volume     |44   1730 2    |154  1825 311  |13   59   332  |342  104  380  |
Lane Width |12.0 12.0      |12.0 12.0      |12.0 12.0      |12.0 12.0      |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A
    Thru                      A       |     Thru   A
    Right                     A       |     Right  A
    Peds                      X       |     Peds   X
WB  Left          A     A             | SB  Left   A
    Thru                P     A       |     Thru   A
    Right               P     A       |     Right  A
    Peds                      X       |     Peds   X
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            8.5   5.5   43.6                 42.4
Yellow           3.5   3.5   3.5                  3.5
All Red          1.5   1.5   1.5                  1.5
                                                   Cycle Length: 120.0   secs
____________________Intersection Performance Summary___________________________
Appr/   Lane       Adj Sat     Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________

Eastbound
L        124       1752      0.40   0.07    55.4   E
TR       1276      3512      1.51   0.36    270.8  F    265.5  F

Westbound
L        275       1736      0.62   0.16    51.4   D
TR       1534      3402      1.55   0.45    282.6  F    267.1  F

Northbound
L        104       293       0.13   0.35    26.9   C
TR       569       1610      0.76   0.35    40.5   D    40.1   D

Southbound
L        179       508       2.12   0.35    562.5  F
TR       581       1643      0.92   0.35    57.7   E    267.1  F

         Intersection Delay = 249.2 (sec/veh)   Intersection LOS = F

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                  HCS+: Signalized Intersections Release 5.5

Analyst: lpk                            Inter.: SR 32 & Old 74
Agency: TranSystems                     Area Type: All other areas
Date:   06/30/11                        Jurisd:
Period: PM                              Year  : 2030 No-Build
Project ID: Segment IVa; P403 10 0004
E/W St: SR 32                           N/S St: Old 74

_________________________SIGNALIZED INTERSECTION SUMMARY_______________________
           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
No. Lanes  |   1   2   0   |   1   2   0   |   1   1   0   |   1   1   0   |
LGConfig   | L     TR      | L     TR      | L     TR      | L     TR      |
Volume     |364  2876 6    |270  1518 127  |1    257  398  |425  155  328  |
Lane Width |12.0 12.0      |12.0 12.0      |12.0 12.0      |12.0 12.0      |
RTOR Vol   |          0    |          0    |          0    |          0    |
_______________________________________________________________________________
Duration    0.25      Area Type: All other areas
______________________________Signal Operations________________________________
Phase Combination 1     2     3     4 |            5     6     7     8
EB  Left          A                   | NB  Left   A
    Thru                A             |     Thru   A
    Right               A             |     Right  A
    Peds                X             |     Peds   X
WB  Left          A                   | SB  Left   A
    Thru                A             |     Thru   A
    Right               A             |     Right  A
    Peds                X             |     Peds   X
NB  Right                             | EB  Right
SB  Right                             | WB  Right
Green            7.0   42.6                       55.4
Yellow           3.5   3.5                        3.5
All Red          1.5   1.5                        1.5
                                                   Cycle Length: 120.0   secs
____________________Intersection Performance Summary____________________________
Appr/   Lane      Adj Sat      Ratios       Lane Group   Approach
Lane    Group     Flow Rate  __________     __________  ___________
Grp     Capacity     (s)     v/c    g/C     Delay LOS   Delay LOS
_______________________________________________________________________________
Eastbound
L        102       1752      3.96   0.06    1412   F
TR       1246      3511      2.57   0.35    747.8  F    822.2  F

Westbound
L        101       1736      2.97   0.06    969.2  F
TR       1220      3438      1.50   0.35    267.3  F    366.3  F

Northbound
L        235       510       0.00   0.46    17.4   B
TR       774       1677      0.94   0.46    50.1   D    50.1   D

Southbound
L        100       216       4.72   0.46    1729   F
TR       772       1673      0.69   0.46    28.3   C    824.6  F

         Intersection Delay = 617.4 (sec/veh)   Intersection LOS = F

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                  HCS+: Signalized Intersections Release 5.5

STA
TranSystems
2030 No-Build


Phone:                                        Fax:
E-Mail:
______________________________OPERATIONAL ANALYSIS_____________________________

Analyst:                  lpk
Agency/Co.:               TranSystems
Date Performed:           06/30/11
Analysis Time Period:     PM
Intersection:             SR 32 & Old 74
Area Type:                All other areas
Jurisdiction:
Analysis Year:            2030 No-Build
Project ID:  Segment IVa; P403 10 0004
E/W St: SR 32                           N/S St: Old 74

________________________________VOLUME DATA____________________________________

           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
Volume     |364  2876 6    |270  1518 127  |1    257  398  |425  155  328  |
% Heavy Veh|3    3    3    |4    4    4    |3    3    3    |2    2    2    |
PHF        |0.90 0.90 0.90 |0.90 0.90 0.90 |0.90 0.90 0.90 |0.90 0.90 0.90 |
PK 15 Vol  |101  799  2    |75   422  35   |1    71   111  |118  43   91   |
Hi Ln Vol  |               |               |               |               |
% Grade    |     0         |     0         |     0         |     0         |
Ideal Sat  |1900 1900      |1900 1900      |1900 1900      |1900 1900      |
ParkExist  |               |               |               |               |
NumPark    |               |               |               |               |
No. Lanes  |   1   2   0   |   1   2   0   |   1   1   0   |   1   1   0   |
LGConfig   | L     TR      | L     TR      | L     TR      | L     TR      |
Lane Width |12.0 12.0      |12.0 12.0      |12.0 12.0      |12.0 12.0      |
RTOR Vol   |          0    |          0    |          0    |          0    |
Adj Flow   |404  3203      |300  1828      |1    728       |472  536       |
%InSharedLn|               |               |               |               |
Prop LTs   |      0.000    |      0.000    |1.000 0.000    |1.000 0.000    |
Prop RTs   |   0.002       |   0.077       |   0.607       |   0.679       |
Peds  Bikes|   0     0     |   0     0     |   0     0     |   0     0     |
Buses      |0    0         |0    0         |0    0         |0    0         |
%InProtPhase               |               |               |               |
Duration    0.25      Area Type: All other areas

_____________________________OPERATING PARAMETERS______________________________

           |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
           | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
           |_______________|_______________|_______________|_______________|
Init Unmet |0.0  0.0       |0.0  0.0       |0.0  0.0       |0.0  0.0       |
Arriv. Type|3    3         |3    3         |3    3         |3    3         |
Unit Ext.  |3.0  3.0       |3.0  3.0       |3.0  3.0       |3.0  3.0       |
I Factor   |     1.000     |     1.000     |     1.000     |     1.000     |
Lost Time  |2.0  2.0       |2.0  2.0       |2.0  2.0       |2.0  2.0       |
Ext of g   |2.0  2.0       |2.0  2.0       |2.0  2.0       |2.0  2.0       |
Ped Min g  |     3.2       |     3.2       |     3.2       |     3.2       |
```

```
_________________________________PHASE DATA____________________________________

Phase Combination 1     2     3     4 |            5     6     7     8

EB  Left          A                   | NB  Left   A
    Thru              A               |     Thru   A
    Right             A               |     Right  A
    Peds              X               |     Peds   X

WB  Left          A                   | SB  Left   A
    Thru              A               |     Thru   A
    Right             A               |     Right  A
    Peds              X               |     Peds   X

NB  Right                             | EB  Right
                                      |
SB  Right                             | WB  Right
                                      |
                                      |
Green            7.0   42.6                       55.4
Yellow           3.5   3.5                        3.5
All Red          1.5   1.5                        1.5

                                                    Cycle Length: 120.0   secs

_________________VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET_______________
Volume Adjustment
           |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
           | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
           |_______________|_______________|_______________|_______________|
Volume, V  |364  2876 6     |270  1518 127  |1    257  398  |425  155  328  |
PHF        |0.90 0.90 0.90 |0.90 0.90 0.90 |0.90 0.90 0.90 |0.90 0.90 0.90 |
Adj flow   |404  3196 7     |300  1687 141  |1    286  442  |472  172  364  |
No. Lanes  |   1   2   0    |   1   2   0    |   1   1   0    |   1   1   0    |
Lane group | L     TR       | L     TR       | L     TR       | L     TR       |
Adj flow   |404  3203       |300  1828       |1    728        |472  536        |
Prop LTs   |      0.000     |      0.000     |1.000 0.000     |1.000 0.000     |
Prop RTs   |   0.002        |   0.077        |   0.607        |   0.679        |

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____
         Eastbound         Westbound        Northbound        Southbound
LG      L     TR          L     TR          L     TR          L     TR
So    1900  1900        1900  1900        1900  1900        1900  1900
Lanes 1     2     0     1     2     0     1     1     0     1     1     0
fW    1.000 1.000       1.000 1.000       1.000 1.000       1.000 1.000
fHV   0.971 0.971       0.962 0.962       0.971 0.971       0.980 0.980
fG    1.000 1.000       1.000 1.000       1.000 1.000       1.000 1.000
fP    1.000 1.000       1.000 1.000       1.000 1.000       1.000 1.000
fBB   1.000 1.000       1.000 1.000       1.000 1.000       1.000 1.000
fA    1.000 1.000       1.000 1.000       1.000 1.000       1.000 1.000
fLU   1.000 0.952       1.000 0.952       1.000 1.000       1.000 1.000
fRT         1.000             0.988             0.909             0.898
fLT   0.950 1.000       0.950 1.000       0.277 1.000       0.116 1.000
Sec.
fLpb  1.000 1.000       1.000 1.000       1.000 1.000       1.000 1.000
fRpb        1.000             1.000             1.000             1.000
S     1752  3511        1736  3438        510   1677        216   1673
Sec.
_________________________CAPACITY AND LOS WORKSHEET____________________________
Capacity Analysis and Lane Group Capacity
```

```
                      Adj      Adj Sat   Flow     Green  --Lane Group--
   Appr/  Lane     Flow Rate  Flow Rate  Ratio    Ratio  Capacity   v/c
   Mvmt   Group       (v)        (s)     (v/s)    (g/C)     (c)    Ratio
_______________________________________________________________________________
Eastbound
   Prot
   Perm
   Left   L          404        1752    # 0.23     0.06    102      3.96
   Prot
   Perm
   Thru   TR         3203       3511    # 0.91     0.35    1246     2.57
   Right
Westbound
   Prot
   Perm
   Left   L          300        1736      0.17     0.06    101      2.97
   Prot
   Perm
   Thru   TR         1828       3438      0.53     0.35    1220     1.50
   Right
Northbound
   Prot
   Perm
   Left   L          1          510       0.00     0.46    235      0.00
   Prot
   Perm
   Thru   TR         728        1677      0.43     0.46    774      0.94
   Right
Southbound
   Prot
   Perm
   Left   L          472        216     # 2.19     0.46    100      4.72
   Prot
   Perm
   Thru   TR         536        1673      0.32     0.46    772      0.69
   Right
_______________________________________________________________________________
Sum of flow ratios for critical lane groups, Yc =   Sum (v/s)   = 3.33
Total lost time per cycle,  L = 15.00 sec
Critical flow rate to capacity ratio,        Xc = (Yc)(C)/(C-L) = 3.80

Control Delay and LOS Determination____________________________________________
Appr/   Ratios   Unf   Prog  Lane  Incremental  Res   Lane Group   Approach
Lane  _________  Del   Adj   Grp   Factor Del   Del   __________  ___________
Grp   v/c   g/C  d1    Fact  Cap   k      d2    d3     Delay LOS   Delay LOS

_______________________________________________________________________________
Eastbound
L    3.96  0.06  56.5  1.000 102   0.50   1356  0.0   1412   F
TR   2.57  0.35  38.7  1.000 1246  0.50   709.1 0.0   747.8  F    822.2  F

Westbound
L    2.97  0.06  56.5  1.000 101   0.50   912.7 0.0   969.2  F
TR   1.50  0.35  38.7  1.000 1220  0.50   228.6 0.0   267.3  F    366.3  F

Northbound
L    0.00  0.46  17.4  1.000 235   0.11   0.0   0.0   17.4   B
TR   0.94  0.46  30.7  1.000 774   0.45   19.4  0.0   50.1   D    50.1   D

Southbound
L    4.72  0.46  32.3  1.000 100   0.50   1697  0.0   1729   F
TR   0.69  0.46  25.6  1.000 772   0.26   2.7   0.0   28.3   C    824.6  F
```

```
_______________________________________________________________________________
         Intersection delay = 617.4 (sec/veh)   Intersection LOS = F



______________________SUPPLEMENTAL PERMITTED LT WORKSHEET______________________
                              for exclusive lefts
Input
                                                       EB    WB    NB    SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C                           120.0   sec
Total actual green time for LT lane group, G (s)                   55.4  55.4
Effective permitted green time for LT lane group, g(s)             55.4  55.4
Opposing effective green time, go (s)                              55.4  55.4
Number of lanes in LT lane group, N                                1     1
Number of lanes in opposing approach, No                           1     1
Adjusted LT flow rate, VLT (veh/h)                                 1     472
Proportion of LT in LT lane group, PLT                             1.000 1.000
Proportion of LT in opposing flow, PLTo                            0.00  0.00
Adjusted opposing flow rate, Vo (veh/h)                            536   728
Lost time for LT lane group, tL                                    5.00  5.00
Computation
LT volume per cycle, LTC=VLTC/3600                                 0.03  15.73
Opposing lane util. factor, fLUo                       0.952 0.952 1.000 1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)                17.87 24.27
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g                              0.0   0.0
Opposing platoon ratio, Rpo (refer Exhibit 16-11)                  1.00  1.00
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]                       0.54  0.54
gq, (see Exhibit C16-4,5,6,7,8)                                    22.39 38.87
gu=g-gq if gq>=gf, or = g-gf if gq<gf                              33.01 16.53
n=Max(gq-gf)/2,0)                                                  11.20 19.44
PTHo=1-PLTo                                                        1.00  1.00
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]                                 1.00  1.00
EL1 (refer to Exhibit C16-3)                                       2.15  2.57
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g  or  fmin=2(1+Pl)/g                                 0.07  0.07
gdiff=max(gq-gf,0)                                                 0.00  0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)                0.28  0.12
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT                                          0.277 0.116

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

______________________SUPPLEMENTAL PERMITTED LT WORKSHEET______________________
                                for shared lefts
Input
                                                       EB    WB    NB    SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C                           120.0   sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
```

```
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT                 0.000 0.000 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo                       0.952 0.952 1.000 1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g  or  fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_______________SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_______________
Permitted Left Turns
                                                       EB    WB    NB    SB
Effective pedestrian green time, gp (s)                           55.4  55.4
Conflicting pedestrian volume, Vped (p/h)                         0     0
Pedestrian flow rate, Vpedg (p/h)                                 0     0
OCCpedg                                                           0.000 0.000
Opposing queue clearing green, gq (s)                             22.39 38.87
Eff. ped. green consumed by opp. veh. queue, gq/gp                0.404 0.702
OCCpedu                                                           0.000 0.000
Opposing flow rate, Vo (veh/h)                                    536   728
OCCr                                                              0.000 0.000
Number of cross-street receiving lanes, Nrec                      2     2
Number of turning lanes, Nturn                                    1     1
ApbT                                                              1.000 1.000
Proportion of left turns, PLT                                     1.000 1.000
Proportion of left turns using protected phase, PLTA              0.000 0.000
Left-turn adjustment, fLpb                                        1.000 1.000
Permitted Right Turns
Effective pedestrian green time, gp (s)               42.6  42.6  55.4  55.4
Conflicting pedestrian volume, Vped (p/h)             0     0     0     0
Conflicting bicycle volume, Vbic (bicycles/h)         0     0     0     0
Vpedg                                                 0     0     0     0
OCCpedg                                               0.000 0.000 0.000 0.000
Effective green, g (s)                                42.6  42.6  55.4  55.4
Vbicg                                                 0     0     0     0
```

```
OCCbicg                                               0.020 0.020 0.020 0.020
OCCr                                                  0.000 0.000 0.000 0.000
Number of cross-street receiving lanes, Nrec          1     1     2     2
Number of turning lanes, Nturn                        1     1     1     1
ApbT                                                  1.000 1.000 1.000 1.000
Proportion right-turns, PRT                           0.002 0.077 0.607 0.679
Proportion right-turns using protected phase, PRTA    0.000 0.000 0.000 0.000
Right turn adjustment, fRpb                           1.000 1.000 1.000 1.000

_____________________SUPPLEMENTAL UNIFORM DELAY WORKSHEET_______________________

                                                      EBLT  WBLT  NBLT  SBLT
Cycle length, C                           120.0  sec
Adj. LT vol from Vol Adjustment Worksheet, v
v/c ratio from Capacity Worksheet, X
Protected phase effective green interval, g (s)
Opposing queue effective green interval, gq
Unopposed green interval, gu
Red time r=(C-g-gq-gu)
Arrival rate, qa=v/(3600(max[X,1.0]))
Protected ph. departure rate, Sp=s/3600
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)
XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

_________________DELAY/LOS WORKSHEET WITH INITIAL QUEUE________________________

        Initial Dur.    Uniform Delay   Initial Final   Initial Lane
Appr/   Unmet   Unmet   _______________ Queue   Unmet   Queue   Group
Lane    Demand  Demand  Unadj.  Adj.    Param.  Demand  Delay   Delay
Group   Q veh   t hrs.  ds      d1 sec    u     Q veh   d3 sec  d sec
_______________________________________________________________________________
Eastbound
L       0.0     0.00    56.5    56.5    0.00    75.5    0.0     1412
TR      0.0     0.00    38.7    38.7    0.00    489.3   0.0     747.8
        0.0                                             0.0

Westbound
L       0.0     0.00    56.5    56.5    0.00    49.8    0.0     969.2
TR      0.0     0.00    38.7    38.7    0.00    152.0   0.0     267.3
        0.0                                             0.0

Northbound
L       0.0     0.00    32.3    17.4    0.00    0.0     0.0     17.4
TR      0.0     0.00    32.3    30.7    0.00    0.0     0.0     50.1
        0.0                                             0.0

Southbound
L       0.0     0.00    32.3    32.3    0.00    93.0    0.0     1729
TR      0.0     0.00    32.3    25.6    0.00    0.0     0.0     28.3
        0.0                                             0.0
_______________________________________________________________________________
       Intersection Delay  617.4  sec/veh     Intersection LOS  F


___________________________BACK OF QUEUE WORKSHEET_____________________________
```

```
               Eastbound       Westbound      Northbound      Southbound
LaneGroup  |L    TR         |L    TR         |L    TR         |L    TR         |
Init Queue |0.0  0.0        |0.0  0.0        |0.0  0.0        |0.0  0.0        |
Flow Rate  |404  1682       |300  960        |1    728        |472  536        |
So         |1900 1900       |1900 1900       |1900 1900       |1900 1900       |
No.Lanes   |1    2    0     |1    2    0     |1    1    0     |1    1    0     |
SL         |1752 1844       |1736 1805       |510  1677       |216  1673       |
LnCapacity |102  654        |101  640        |235  774        |100  772        |
Flow Ratio |0.2  0.9        |0.2  0.5        |0.0  0.4        |2.2  0.3        |
v/c Ratio  |3.96 2.57       |2.97 1.50       |0.00 0.94       |4.72 0.69       |
Grn Ratio  |0.06 0.35       |0.06 0.35       |0.46 0.46       |0.46 0.46       |
I Factor   |     1.000      |     1.000      |     1.000      |     1.000      |
AT or PVG  |3    3          |3    3          |3    3          |3    3          |
Pltn Ratio |1.00 1.00       |1.00 1.00       |1.00 1.00       |1.00 1.00       |
PF2        |1.00 1.00       |1.00 1.00       |1.00 1.00       |1.00 1.00       |
Q1         |13.5 56.1       |10.0 32.0       |0.0  23.1       |15.7 14.2       |
kB         |0.2  0.6        |0.2  0.6        |0.3  0.7        |0.2  0.7        |
Q2         |38.0 129.5      |     25.2 41.8  |     0.0  5.6   |     46.8 1.5   |
Q Average  |51.5 185.6      |     35.2 73.8  |     0.0  28.7  |     62.5 15.7  |
Q Spacing  |25.0 25.0       |25.0 25.0       |25.0 25.0       |25.0 25.0       |
Q Storage  |0    0          |0    0          |0    0          |0    0          |
Q S Ratio  |                |                |                |                |
70th Percentile Output:
fB%        |1.1  1.1        |1.1  1.1        |1.2  1.1        |1.1  1.2        |
BOQ        |58.1 204        |40.2 82.3       |0.0  33.0       |70.1 18.3       |
QSRatio    |                |                |                |                |
85th Percentile Output:
fB%        |1.4  1.3        |1.4  1.3        |1.6  1.4        |1.3  1.5        |
BOQ        |69.7 241        |49.0 97.8       |0.0  40.6       |83.6 23.2       |
QSRatio    |                |                |                |                |
90th Percentile Output:
fB%        |1.4  1.4        |1.5  1.4        |1.8  1.5        |1.4  1.6        |
BOQ        |73.7 260        |51.7 104        |0.0  42.9       |88.6 24.8       |
QSRatio    |                |                |                |                |
95th Percentile Output:
fB%        |1.5  1.5        |1.6  1.5        |2.1  1.6        |1.5  1.8        |
BOQ        |79.0 278        |55.8 111        |0.0  46.6       |94.9 27.4       |
QSRatio    |                |                |                |                |
98th Percentile Output:
fB%        |1.7  1.7        |1.8  1.7        |2.7  1.8        |1.7  2.0        |
BOQ        |88.5 316        |62.2 126        |0.1  52.0       |107  31.3       |
QSRatio    |                |                |                |                |
_______________________________________________________________________________

________________________________ERROR MESSAGES_________________________________

       No errors to report.
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# APPENDIX E: PREVIOUS REPORTS (ON CD)

- Segment IV(a) Public Involvement Plan
- Segment IV(a) Purpose & Need (updated September 14, 2011)
- Segment IV(a) Red Flag Report

# Eastern Corridor Segment IV(a) – Public Involvement Plan
# CLE-32-2.25 (PID 82370)
# July 2010

## Introduction

The Segment IV(a) project is located in Clermont County as part of the Eastern Corridor family of projects. Segment IV(a) work is intended to complete Steps 1 through 4 of the Ohio Department of Transportation (ODOT) Project Development Process by supplementing the previous Tier 1 EIS. Capacity and safety improvements on SR 32 are the focus in this area, which may involve the addition of an interchange and elimination of several at-grade intersections. The project will evaluate local roads to determine additional changes necessary in coordination with the SR 32 improvements.

Clermont County Transportation Improvement District (CCTID) and ODOT are partners on this project. The anticipated study limits will be Eastgate Blvd, Stonelick Olive Branch Rd, Aicholtz Rd, and Old SR 74/Heitman Lane in the vicinity of I-275 and SR 32 in Clermont County.

This study will involve various project stakeholders, affected residents, business owners, community leaders, and the general public. Political entities and funding agencies will ultimately implement the proposed improvements. Therefore, the public involvement, detailed in this plan, is a critical component to the success of this project.

## Purpose

In ODOT's Project Development Process (PDP), involving the public early and often is critical to helping the surrounding community understand transportation studies so it can, in turn, provide meaningful input to help shape the study. Two basic objectives include disseminating information and soliciting input. The Public Involvement Plan must address both. The Public Involvement Plan for the Segment IV(a) project will:

- Solicit public input to identify problems and solutions to project objectives
- Provide the public with information on the decision-making process
- Provide information on the potential impacts and benefits of each transportation solution under consideration
- Solicit input on the conclusions and recommendations of the alternatives analysis

In order to achieve these goals, the Project Team proposes to use several methods during the planning phase of the project. These methods are detailed within this Public Involvement Plan.

Title VI of the Civil Rights Act of 1964 and Executive Order 12898 on Environmental Justice (EJ) requires federal agencies to consider whether a project will have disproportionately high and adverse impacts to low-income, minority or elderly populations. Our Public Involvement efforts will identify and engage such populations existing within the project area and insure that their interests, concerns and needs are effectively addressed throughout the PDP. If potential EJ populations are identified within the study area, specific techniques (individual phone conversation, an e-mail response, meeting with individuals, etc.) may be necessary to address any specific issues or concerns related to the project.

## Methods

***Mailing List and Notifications*** – TranSystems will develop a public contact list that will serve as the basis for notifications and mailings. The public contact list will continue to be updated throughout the process with the names and contact information from meeting attendance sheets and submitted comments. At a minimum, property owners within the project study area will be included along with the Implementation Partners and Stakeholder Committees discussed below.

***Implementation Partners*** – For the overall Eastern Corridor plan, the Implementation Partners group consists of ODOT, Clermont County, Hamilton County, City of Cincinnati, and Federal Highway Administration (FHWA). For specific details of the Segment IV(a) project, the Implementation Partners are a subset of that group, including FHWA, ODOT, and Clermont County. These decision-makers will use stakeholder and public input to make decisions about project recommendations. This group will meet approximately monthly to review project progress and issues. They will also review all stakeholder committee and open house public involvement materials prior to use.

***Stakeholder Committee*** – The Stakeholder Committee will be formed at the beginning of the project to ensure that the interests of each community or organization near the study area are represented. It will include the Implementation Partners members as well as public sector and private sector community leaders and representatives. This committee will play a vital role in collecting public input and keeping the public informed throughout the duration of the project. Suggested stakeholders include:

- Ohio Department of Transportation, District 8, Jay Hamilton
- Clermont County Transportation Improvement District, Steve Wharton and Dave Spinney
- Clermont County Engineer, Pat Manger
- Miami Township Administrator, Larry Fronk
- Union Township Administrator, Ken Geis
- Clermont County Chamber of Commerce
- Neighborhood associations
- Local elected officials:
    - Clermont County Commissioners
    - Miami Township Trustees
    - Union Township Trustees
- Federal elected officials:
    - U.S. House of Representatives, Ohio 2nd, Jean Schmidt
    - U.S. Senate, George Voinovich and Sherrod Brown
- State elected officials:
    - Ohio House of Representatives, District 66, Joe Uecker
    - Ohio Senate, District 14, Tom Niehaus

***Meeting #1***– The first meeting task will include a combination of public involvement meetings: one with stakeholders only, followed by an open house-style public meeting later the same day. These meetings will build off previous Eastern Corridor public involvement and will seek initial feedback on the Segment IV(a) project. TranSystems will present information on the project purpose and need, specifically related to congestion and safety issues on SR 32. Background information will be provided on the state routes, local highway network, and current land-use plans. The team will solicit input on the range of alternatives that should be considered to address the underlying transportation needs, as well as short-term countermeasures.

Stakeholders and property owners in the study area will be mailed notification at least two weeks prior to the meeting date, and will include respective times and locations of the meetings. For the open house, a press release will be produced for the media to provide notice to other members of the public. Written comments will be accepted at the meetings and two weeks after the meetings. Comments made after the meeting date will then be collected and summarized. A summary of comments will be provided to the Implementation Partners and Stakeholders, as well as posted on the website.

***Meeting #2*** – A second stakeholder meeting will be held in order to discuss how the project team will address comments and concerns raised during Meeting #1. Stakeholders will also be briefed on status of traffic analyses, alternatives development, and other technical issues. Following this meeting, the attendees will be provided with a summary of the discussion. This summary, along with the presentation and handouts will be published to the website.

***Meeting #3*** – Similar to the first meeting task, Meeting #3 will include a combination of public involvement meetings: one with stakeholders followed by an open house-style public meeting later the same day. TranSystems will present the alternatives, simulations, and draft comparison matrix for discussion. The intent will be to discuss the alternatives and solicit feedback from the stakeholders and the public. Stakeholders and property owners in the study area will be mailed notification at least two weeks prior to the meeting date, and will include respective times and locations of the meetings. For the open house, a press release will be produced for the media to provide notice to other members of the public. Written comments will be accepted at the meetings and two weeks after the meetings. Comments made after the meeting date will then be collected and summarized. A summary of comments will be provided to the Implementation Partners and Stakeholders, as well as posted on the website.

***Project Newsletter*** – An electronic newsletter will be sent out to the project contact list between Meeting #1 and Meeting #3. It will update the stakeholders and the general public regarding ongoing project activities and schedule. The newsletter will be provided to property owners within the study area, stakeholders, additional people who have expressed interest in the project, local officials, and various news outlets.

***Website*** – A project website has been created for the overall Eastern Corridor plan. Materials for Segment IV(a) will be provided to Entran for inclusion on this website, including mapping, status updates and ODOT-approved documents/deliverables. The website will allow for project-related information to be easily accessible at all times to the public. Contact information for the project team will be included.

## Schedule

An approximate timeline of public involvement activities is summarized below. The exact dates, times and locations will be determined as the project progresses.

| Activity | Timeframe |
|---|---|
| Develop project website and update | May 2010, continuous throughout project |
| Identify stakeholders/property owners and prepare contact database | July/August 2010 |
| Develop and send introductory email/letter to mailing list | September 2010 |
| Meeting #1 – Stakeholder and Public Open House to introduce project, discuss Purpose & Need, and seek input regarding evaluation criteria | September 2010 |
| Newsletter creation and distribution to mailing list within study area | October 2010 |
| Meeting #2 – Stakeholder update meeting to discuss progress | November 2010 |
| Meeting 3# -- Stakeholder and Public Open House to discuss, compare and seek comments on alternatives | December 2010 |

## Modifications to the Plan

A Public Involvement Plan is never final until the project is complete. The approaches being used for this project will continue to be examined during the progress of the work and adjusted as necessary. For instance, if appropriate representation from certain neighborhoods or communities is not being received, such as Environmental Justice populations, extra efforts will be made to reach out to those areas or specific populations.

# Purpose and Need Statement—August 2011
# SR 32 Eastgate Area Improvements

Eastern Corridor, Segment IV(a)
CLE-32-2.25 (PID 82370)

## 1.0 PROJECT HISTORY

The State Route 32 Eastgate Area Improvements, also known as Eastern Corridor Segment IV(a), traces its roots to the Eastern Corridor Major Investment Study (MIS) completed in April 2000 by Ohio Kentucky Indiana Regional Council of Governments (OKI), the regional planning organization in southwestern Ohio. The purpose of the MIS was to identify alternatives to meet the regional transportation needs while balancing cost, social and economic benefits, and environmental impacts. The MIS studied a 200-square-mile area and ultimately recommended a multi-modal plan for the Eastern Corridor area, including Transportation Management System improvements, new and expanded bus transit service, new rail service, and highway capacity improvements.

Building upon the recommendations of the MIS for the overall study area, a Tier 1 Environmental Impact Statement (EIS) was prepared to identify strategies for improving long-term travel mobility specifically between the City of Cincinnati and its eastern suburbs. With this refined geographic focus, the Tier 1 EIS was a detailed examination of the range of alternatives that would meet the four general recommendations of the MIS. Therefore, within a 14-square-mile study area roughly centered on SR 32, several feasible alternatives were presented by mode and geographic area, to be further developed in Tier 2 environmental analyses. Of the modes, highway capacity alternatives were divided into four segments within the study area (Segments I through IV). Specifically, alternatives in Segment IV focused on the consolidation and management of access points in order to establish an improved SR 32 as a limited access arterial roadway east of I-275 to Olive Branch-Stonelick Road. Later, the interchange at SR 32 and I-275 was broken out as a separate project, and Segment IV(a) was defined by Eastgate Boulevard to the west and Olive Branch-Stonelick Road to the east.

The SR 32 corridor, including Segment IV(a), plays an important role in the Appalachian Development Highway System, serving the movement of raw materials, finished goods, and services to and from Interstates 71 and 75 via I-275. In addition to movement of goods and services, SR 32 serves as a direct route for employees from the eastern rural communities employed at Clermont County companies. Numerous businesses and residential developments are situated along the corridor and accessed directly or indirectly from SR 32.

## 2.0 PROJECT PURPOSE

The purpose of the Segment IV(a) project is to serve current and projected travel demand, reduce congestion and delay, and improve roadway safety, consistent with local transportation and economic development goals. The identified needs forming the basis of this purpose are each described in detail below.

## 3.0 IDENTIFIED NEEDS

### 3.1 TRAVEL DEMAND

SR 32 is an urban principal arterial throughout the Segment IV(a) study corridor. The SR 32 corridor provides two lanes in each direction, divided by a grassy median, and turn lanes at each intersection. The ADT for 2010 varies between 50,520 and 56,820, increasing with proximity to the I-275 interchange at the west end of the study corridor. There are three signalized intersections on SR 32 within the project limits: Glen Este-Withamsville Road, Elick Lane/Bach Buxton Road, and Old SR 74. (See Figure 1, Study Area Map.)

Certified traffic for these intersections and the SR 32 corridor was provided by ODOT Office of Technical Services in 2007 under PID 76289. The data presented 2010 and 2030 AM and PM design hour volumes, noting that the 2010 volumes were interpolated from the existing (2007) counts and the projected 2030 volumes. These ADT numbers are presented in Table 1 below.

**Table 1: Average Daily Traffic (ADT)**

| Road Segment | 2010 ADT | 2030 ADT | % Increase |
|---|---|---|---|
| SR 32 (west of Glen Este) | 61,800* | 83,800* | 36% |
| SR 32 (btw Glen Este and Elick) | 56,820 | 80,540 | 42% |
| SR 32 (btw Elick and Old SR 74) | 52,090 | 71,410 | 37% |
| SR 32 (east of SR 74) | 50,520 | 67,900 | 34% |
| Glen Este (north of SR 32) | 7,700* | 9,800* | 27% |
| Glen Este (south of SR 32) | 10,200* | 13,700* | 34% |
| Elick Lane (north of SR 32) | 6,380 | 6,690 | 5% |
| Bach Buxton (south of SR 32) | 13,110 | 14,390 | 10% |
| Old SR 74 (north of SR 32) | 9,540 | 10,340 | 8% |
| Old SR 74 (south of SR 32) | 16,390 | 18,030 | 10% |

* ADT estimated from ODOT-certified design hourly volumes.

With a mix of heavy commercial, industrial and residential development within the Eastern Corridor, combined with extensive commuter traffic along SR 32, a 1995 origin-destination survey reported in the Eastern Corridor MIS found that 50% of trips during peak periods were local and 50% were external. The result is a crossing configuration in traffic patterns in which through traffic is in conflict with heavy local traffic within the corridor.

### 3.2 CONGESTION AND DELAY

The standard criterion used to define quality of traffic flow is "level of service" (LOS). This is a qualitative assessment of factors such as speed, volume, geometry, delays, and ease of maneuvering. There are six level of service grades that represent all of the possible operating conditions; these levels range from LOS A, representing the best operating condition, to LOS F, representing the worst. Typically in urbanized areas, a roadway component is seen as acceptable if the corresponding level of service is LOS D or better.

Intersection capacity analyses for the AM and PM peak hours were performed at intersections within the study area using existing (year 2010) and 2030 no-build traffic volumes, assuming existing roadway configurations and traffic control. The resulting levels of services are shown in Table 2 and Table 3. Analyses resulting in LOS E and F are shown in red.

Based upon analyses of existing counts (shown in Table 2), most of the intersections along the SR 32 corridor are operating at a poor LOS during either the AM, PM or both peak hours. These include the signalized intersections of SR 32 with Glen Este-Withamsville Road, Elick Lane/Bach Buxton Road, and Old SR 74, where the overall intersection is at LOS E or F with several or all approaches at LOS E or F. The outbound movement from the unsignalized side streets (Fayard Drive and Glen Willow Lake Lane) experience considerable delays and operate at LOS F during either or both peak hours.

## Table 2 No Build Capacity Analyses of Existing Counts

| Intersection # | Intersection | Intersection Control | Assumed Street Orientation | | Approach | 2010 AM | | 2010 PM | |
|---|---|---|---|---|---|---|---|---|---|
| | | | East-West | North-South | | Delay | LOS | Delay | LOS |
| 1 | Olive Branch Stonelick Road & Lexington Run Drive | STOP-sign | Lexington (stop controlled) | Olive Branch | Westbound | 9.3 | A | 9.6 | A |
| | | | | | Southbound | 7.3 | A [L] | 7.5 | A [L] |
| 2 | Olive Branch Stonelick Road & SR 32 WB Ramps | STOP-sign | SR 32 WB Ramps (stop controlled) | Olive Branch | Westbound | 11.5 | B | 12.2 | B |
| | | | | | Northbound | 7.5 | A [L] | 7.6 | A [L] |
| 3 | Olive Branch Stonelick Road & SR 32 EB Ramps | STOP-sign | SR 32 EB Ramps (stop controlled) | Olive Branch | Eastbound | 11.3 | B | 13.0 | B |
| | | | | | Southbound | 7.7 | A [L] | 8.4 | A [L] |
| 4 | Olive Branch Stonelick Road & Old SR 74 | Traffic Signal | Old SR 74 | Olive Branch | Eastbound | 13.1 | B | 15.6 | B |
| | | | | | Westbound | 7.4 | A | 3.9 | A |
| | | | | | Southbound | 13.1 | B | 15.5 | B |
| | | | | | **Intersection** | **10.9** | **B** | **10.9** | **B** |
| 5 | Old SR 74 & Shayler Road | STOP-sign | Old SR 74 | Shayler (stop controlled) | Westbound | 8.0 | A [L] | 8.5 | A [L] |
| | | | | | Northbound | 15.3 | C | 20.2 | C |
| 6 | SR 32 @ Old SR 74 | Traffic Signal | SR 32 | Old SR 74 | Eastbound | 46.4 | D | 157.7 | F |
| | | | | | Westbound | 45.7 | D | 242.9 | F |
| | | | | | Northbound | 21.5 | C | 54.7 | D |
| | | | | | Southbound | 46.4 | D | 244.0 | F |
| | | | | | **Intersection** | **42.5** | **D** | **193.0** | **F** |
| 7 | Old SR 74 & Heitman Lane | STOP-sign | Heitman (stop controlled) | Old SR 74 | Westbound | 11.2 | B | 10.7 | B |
| | | | | | Southbound | 8.1 | A [L] | 8.3 | A [L] |
| 8 | Old SR 74 & Elick Lane | STOP-sign | Old SR 74 | Elick (stop controlled) | Westbound | 7.8 | A [L] | 9.4 | A [L] |
| | | | | | Northbound | 15.2 | C | 36.9 | E |
| 9 | Old SR 74 & Schoolhouse Road | STOP-sign | Old SR 74 | Schoolhouse (stop controlled) | Eastbound | 8.5 | A [L] | 8.5 | A [L] |
| | | | | | Southbound | 14.6 | B | 20.4 | C |
| 10 | Old SR 74 & Tealtown Road | Traffic Signal | Old SR 74 | Tealtown | Eastbound | 15.1 | B | 20.2 | C |
| | | | | | Westbound | 27.2 | C | 25.2 | C |
| | | | | | Southbound | 27.5 | C | 25.2 | C |
| | | | | | **Intersection** | **25.2** | **C** | **22.5** | **C** |
| 11 | Old SR 74 & Glen Este Withamsville | Traffic Signal | Old SR 74 | Glen Este | Eastbound | 27.0 | C | 51.7 | D |
| | | | | | Westbound | 28.7 | C | 42.2 | D |
| | | | | | Northbound | 22.4 | C | 51.2 | D |
| | | | | | Southbound | 28.6 | C | 44.0 | D |
| | | | | | **Intersection** | **27.7** | **C** | **48.4** | **D** |
| 12 | Old SR 74 & Eastgate Blvd. | Traffic Signal | Old SR 74 | Eastgate Blvd. | Eastbound | 17.1 | B | 18.7 | B |
| | | | | | Westbound | 14.7 | B | 11.7 | B |
| | | | | | Northbound | 16.3 | B | 18.0 | B |
| | | | | | Southbound | 17.2 | B | 18.5 | B |
| | | | | | **Intersection** | **15.4** | **B** | **16.3** | **B** |
| 13 | Eastgate Blvd. & Eastgate North Drive | Traffic Signal | Eastgate North | Eastgate Blvd. | Eastbound | 14.4 | B | 16.4 | B |
| | | | | | Westbound | 14.6 | B | 16.6 | B |
| | | | | | Northbound | 14.4 | B | 15.0 | B |
| | | | | | Southbound | 13.3 | B | 16.2 | B |
| | | | | | **Intersection** | **13.8** | **B** | **15.8** | **B** |
| 14 | SR 32 WB Ramps & Eastgate Blvd. | Traffic Signal | SR 32 WB Ramps | Eastgate Blvd. | Westbound | 13.2 | B | 15.5 | B |
| | | | | | Northbound | 12.9 | B | 15.4 | B |
| | | | | | Southbound | 13.1 | B | 13.7 | B |
| | | | | | **Intersection** | **13.0** | **B** | **14.8** | **B** |
| 16 | SR 32 EB Ramps & Eastgate Blvd. | Traffic Signal | SR 32 EB Ramps | Eastgate Blvd. | Westbound | 18.5 | B | 23.3 | C |
| | | | | | Northbound | 18.8 | B | 23.8 | C |
| | | | | | Southbound | 10.3 | B | 11.6 | B |
| | | | | | **Intersection** | **17.2** | **B** | **21.1** | **C** |
| 17 | Eastgate Blvd. & Eastgate South Drive | Traffic Signal | Eastgate South | Eastgate Blvd. | Eastbound | 26.1 | C | 29.3 | C |
| | | | | | Westbound | 25.9 | C | 28.3 | C |
| | | | | | Northbound | 23.2 | C | 29.6 | C |
| | | | | | Southbound | 26.2 | C | 29.7 | C |
| | | | | | **Intersection** | **25.3** | **C** | **29.3** | **C** |
| 18 | Eastgate Blvd. & Aicholtz Road | Traffic Signal | Aicholtz | Eastgate Blvd. | Eastbound | 18.1 | B | 20.0 | C |
| | | | | | Westbound | 13.5 | B | 14.4 | B |
| | | | | | Northbound | 17.9 | B | 20.4 | C |
| | | | | | Southbound | 12.6 | B | 18.1 | B |
| | | | | | **Intersection** | **13.8** | **B** | **18.3** | **B** |
| 19 | Eastgate Square & Aicholtz | STOP-sign | Aicholtz | Eastgate Square (stop controlled) | Eastbound | | | | |
| | | | | | Southbound | | | | |
| 20 | Glen Este Withamsville Road & Aicholtz Road | Traffic Signal | Aicholtz | Glen Este | Eastbound | 11.3 | B | 17.1 | B |
| | | | | | Northbound | 5.7 | A | 11.7 | B |
| | | | | | Southbound | 11.5 | B | 16.5 | B |
| | | | | | **Intersection** | **7.9** | **A** | **15.1** | **B** |
| 21 | Glen Este Withamsville Road & Clepper Drive | Traffic Signal | Clepper | Glen Este | Eastbound | 15.0 | B | 22.1 | C |
| | | | | | Westbound | 14.3 | B | 10.7 | B |
| | | | | | Northbound | 15.3 | B | 21.9 | C |
| | | | | | Southbound | 15.1 | B | 22.3 | C |
| | | | | | **Intersection** | **15.2** | **B** | **21.8** | **C** |
| 22 | SR 32 & Glen Este Withamsville Road | Traffic Signal | SR 32 | Glen Este | Eastbound | 44.4 | D | 70.7 | E |
| | | | | | Westbound | 87.0 | F | 48.2 | D |
| | | | | | Northbound | 84.7 | F | 70.2 | E |
| | | | | | Southbound | 88.2 | F | 53.3 | D |
| | | | | | **Intersection** | **72.7** | **E** | **61.7** | **E** |
| 23 | Glen Este Withamsville Road & Eastgate North Drive | Traffic Signal | Eastgate North | Glen Este | Eastbound | 17.5 | B | 22.8 | C |
| | | | | | Westbound | 16.0 | B | 11.8 | B |
| | | | | | Northbound | 9.4 | A | 18.4 | B |
| | | | | | Southbound | 17.3 | B | 23.1 | C |
| | | | | | **Intersection** | **15.0** | **B** | **20.4** | **C** |
| 24 | SR 32 & Fayard Drive | STOP-sign | SR 32 | Fayard (stop controlled) | Eastbound | 18.3 | C [L] | 15.1 | C [L] |
| | | | | | Northbound | 10.0 | A | 13.7 | B |
| | | | | | Southbound | 212.1 | F | 15.2 | C |
| 25 | SR 32 & Glen Willow Lake Lane | STOP-sign | SR 32 | Glen Willow Lake (stop controlled) | Westbound | 14.1 | B [L] | 28.7 | D [L] |
| | | | | | Northbound | 69.2 | F | 7383.0 | F |
| 26 | SR 32 & Elick Lane | Traffic Signal | SR 32 | Elick | Eastbound | 41.5 | D | 71.1 | E |
| | | | | | Westbound | 51.7 | D | 43.9 | D |
| | | | | | Northbound | 49.8 | D | 69.0 | E |
| | | | | | Southbound | 50.3 | D | 69.9 | E |
| | | | | | **Intersection** | **47.6** | **D** | **63.4** | **E** |
| 27 | SR 32 & Eastwood Drive (Newberry Drive) | STOP-sign | SR 32 | Eastwood/Newberry (stop controlled) | Northbound | 10.0 (-) | A | 14.6 | B |
| | | | | | Southbound | 17.7 | C | 14.8 | B |
| 28 | Bach-Buxton Road & Shayler Road | Traffic Signal | Shayler | Bach-Buxton | Eastbound | 13.4 | B | 20.5 | C |
| | | | | | Westbound | 16.3 | B | 16.9 | B |
| | | | | | Northbound | 14.9 | B | 20.1 | C |
| | | | | | Southbound | 16.4 | B | 18.6 | B |
| | | | | | **Intersection** | **15.6** | **B** | **19.3** | **B** |

Note: Delay in seconds. Intersection #15 (Eastgate Blvd NB @ SR 32 WB on Ramp) is not included as it is a free flow movement (no traffic control). Intersection #19 (Eastgate Square & Aicholtz Road) did not have existing traffic volumes for analysis.

# Table 3 No-Build Capacity Analyses for 2030 Traffic Projections

| Intersection # | Intersection | Intersection Control | Assumed Street Orientation | | Approach | 2030 AM | | 2030 PM | |
|---|---|---|---|---|---|---|---|---|---|
| | | | East-West | North-South | | Delay | LOS | Delay | LOS |
| 1 | Olive Branch Stonelick Road & Lexington Run Drive | STOP-sign | Lexington (stop controlled) | Olive Branch | Westbound | 15.5 | C | 13.0 | B |
| | | | | | Southbound | 7.5 | A [L] | 8.1 | A [L] |
| 2 | Olive Branch Stonelick Road & SR 32 WB Ramps | STOP-sign | SR 32 WB Ramps (stop controlled) | Olive Branch | Westbound | 370.9 | F | 244.8 | F |
| | | | | | Northbound | 9.3 | A [L] | 8.4 | A [L] |
| 3 | Olive Branch Stonelick Road & SR 32 EB Ramps | STOP-sign | SR 32 EB Ramps (stop controlled) | Olive Branch | Eastbound | 29.0 | D | 171.2 | F |
| | | | | | Southbound | 8.8 | A [L] | 11.0 | B [L] |
| 4 | Olive Branch Stonelick Road & Old SR 74 | Traffic Signal | Old SR 74 | Olive Branch | Eastbound | 27.9 | C | 103.2 | F |
| | | | | | Westbound | 4.6 | A | 2.4 | A |
| | | | | | Southbound | 28.0 | C | 68.8 | E |
| | | | | | **Intersection** | **19.5** | **B** | **53.0** | **D** |
| 5 | Old SR 74 & Shayler Road | STOP-sign | Old SR 74 | Shayler (stop controlled) | Westbound | 11.0 | B [L] | 10.6 | B [L] |
| | | | | | Northbound | 237.1 | F | 1258.0 | F |
| 6 | SR 32 @ Old SR 74 | Traffic Signal | SR 32 | Old SR 74 | Eastbound | 366.8 | F | 363.5 | F |
| | | | | | Westbound | 216.3 | F | 337.9 | F |
| | | | | | Northbound | 367.7 | F | 51.6 | D |
| | | | | | Southbound | 45.8 | D | 364.2 | F |
| | | | | | **Intersection** | **253.6** | **F** | **313.0** | **F** |
| 7 | Old SR 74 & Heitman Lane | STOP-sign | Heitman (stop controlled) | Old SR 74 | Westbound | 20.9 | C | 29.5 | C |
| | | | | | Southbound | 8.8 | A [L] | 10.7 | B [L] |
| 8 | Old SR 74 & Elick Lane | STOP-sign | Old SR 74 | Elick (stop controlled) | Westbound | 11.8 | B [L] | 15.3 | C [L] |
| | | | | | Northbound | 3094.0 | F | 1582.0 | F |
| 9 | Old SR 74 & Schoolhouse Road | STOP-sign | Old SR 74 | Schoolhouse (stop controlled) | Eastbound | 9.9 | A [L] | 9.7 | A [L] |
| | | | | | Southbound | 36.0 | E | 149.0 | F |
| 10 | Old SR 74 & Tealtown Road | Traffic Signal | Old SR 74 | Tealtown | Eastbound | 29.2 | C | 23.8 | C |
| | | | | | Westbound | 53.3 | D | 39.8 | D |
| | | | | | Northbound | 24.4 | C | 39.3 | D |
| | | | | | Southbound | 52.0 | D | 26.9 | C |
| | | | | | **Intersection** | **44.2** | **D** | **28.9** | **C** |
| 11 | Old SR 74 & Glen Este Withamsville | Traffic Signal | Old SR 74 | Glen Este | Eastbound | 125.8 | F | 52.0 | D |
| | | | | | Westbound | 121.9 | F | 39.7 | D |
| | | | | | Northbound | 13.7 | B | 53.6 | D |
| | | | | | Southbound | 51.1 | D | 34.5 | C |
| | | | | | **Intersection** | **102.6** | **F** | **48.6** | **D** |
| 12 | Old SR 74 & Eastgate Blvd. | Traffic Signal | Old SR 74 | Eastgate Blvd. | Eastbound | 23.8 | C | 22.9 | C |
| | | | | | Westbound | 17.5 | B | 13.8 | B |
| | | | | | Northbound | 24.5 | C | 22.9 | C |
| | | | | | Southbound | 23.2 | C | 14.1 | B |
| | | | | | **Intersection** | **22.2** | **C** | **20.9** | **C** |
| 13 | Eastgate Blvd. & Eastgate North Drive | Traffic Signal | Eastgate North | Eastgate Blvd. | Eastbound | 15.2 | B | 15.9 | B |
| | | | | | Westbound | 14.3 | B | 17.7 | B |
| | | | | | Northbound | 15.1 | B | 18.2 | B |
| | | | | | Southbound | 14.6 | B | 14.5 | B |
| | | | | | **Intersection** | **14.8** | **B** | **17.2** | **B** |
| 14 | SR 32 WB Ramps & Eastgate Blvd. | Traffic Signal | SR 32 WB Ramps | Eastgate Blvd. | Westbound | 14.6 | B | 15.9 | B |
| | | | | | Northbound | 13.6 | B | 16.0 | B |
| | | | | | Southbound | 15.2 | B | 14.5 | B |
| | | | | | **Intersection** | **14.6** | **B** | **15.6** | **B** |
| 16 | SR 32 EB Ramps & Eastgate Blvd. | Traffic Signal | SR 32 EB Ramps | Eastgate Blvd. | Westbound | 18.9 | B | 23.6 | C |
| | | | | | Northbound | 19.5 | B | 23.2 | C |
| | | | | | Southbound | 13.4 | B | 9.8 | A |
| | | | | | **Intersection** | **16.4** | **B** | **19.7** | **B** |
| 17 | Eastgate Blvd. & Eastgate South Drive | Traffic Signal | Eastgate South | Eastgate Blvd. | Eastbound | 28.9 | C | 31.9 | C |
| | | | | | Westbound | 29.1 | C | 31.9 | C |
| | | | | | Northbound | 21.3 | C | 31.7 | C |
| | | | | | Southbound | 28.8 | C | 26.0 | C |
| | | | | | **Intersection** | **27.2** | **C** | **30.2** | **C** |
| 18 | Eastgate Blvd. & Aicholtz Road | Traffic Signal | Aicholtz | Eastgate Blvd. | Eastbound | 18.7 | B | 21.8 | C |
| | | | | | Westbound | 15.5 | B | 16.2 | B |
| | | | | | Northbound | 18.9 | B | 22.1 | C |
| | | | | | Southbound | 14.8 | B | 19.7 | B |
| | | | | | **Intersection** | **15.8** | **B** | **20.0** | **C** |
| 19 | Eastgate Square & Aicholtz | STOP-sign | Aicholtz | Eastgate Square (stop controlled) | Eastbound | 8.0 | A [L] | 9.5 | A [L] |
| | | | | | Southbound | 10.6 | B | 253.9 | F |
| 20 | Glen Este Withamsville Road & Aicholtz Road | Traffic Signal | Aicholtz | Glen Este | Eastbound | 14.4 | B | 17.8 | B |
| | | | | | Northbound | 6.3 | A | 12.5 | B |
| | | | | | Southbound | 15.0 | B | 18.7 | B |
| | | | | | **Intersection** | **10.4** | **B** | **15.7** | **B** |
| 21 | Glen Este Withamsville Road & Clepper Drive | Traffic Signal | Clepper | Glen Este | Eastbound | 19.8 | B | 118.3 | F |
| | | | | | Westbound | 19.0 | B | 14.6 | B |
| | | | | | Northbound | 17.9 | B | 17.8 | B |
| | | | | | Southbound | 20.0 (-) | B | 116.9 | F |
| | | | | | **Intersection** | **19.1** | **B** | **90.3** | **F** |
| 22 | SR 32 & Glen Este Withamsville Road | Traffic Signal | SR 32 | Glen Este | Eastbound | 127.9 | F | 109.3 | F |
| | | | | | Westbound | 165.4 | F | 174.4 | F |
| | | | | | Northbound | 160.2 | F | 152.9 | F |
| | | | | | Southbound | 164.0 | F | 173.0 | F |
| | | | | | **Intersection** | **150.5** | **F** | **144.2** | **F** |
| 23 | Glen Este Withamsville Road & Eastgate North Drive | Traffic Signal | Eastgate North | Glen Este | Eastbound | 23.1 | C | 26.6 | C |
| | | | | | Westbound | 18.0 | B | 20.1 | C |
| | | | | | Northbound | 15.2 | B | 19.8 | B |
| | | | | | Southbound | 23.5 | C | 27.1 | C |
| | | | | | **Intersection** | **20.5** | **C** | **23.1** | **C** |
| 24 | SR 32 & Fayard Drive | STOP-sign | SR 32 | Fayard (stop controlled) | Eastbound | 17.9 | C [L] | 20.4 | C [L] |
| | | | | | Northbound | 11.4 | B | 15.9 | C |
| | | | | | Southbound | >10,000 | F | >10,000 | F |
| 25 | SR 32 & Glen Willow Lake Lane | STOP-sign | SR 32 | Glen Willow Lake (stop controlled) | Westbound | 18.0 | C [L] | 17.9 | C [L] |
| | | | | | Northbound | 94.4 | F | 1823.0 | F |
| 26 | SR 32 & Elick Lane | Traffic Signal | SR 32 | Elick | Eastbound | 47.2 | D | 51.9 | D |
| | | | | | Westbound | 110.7 | F | 120.3 | F |
| | | | | | Northbound | 101.4 | F | 122.0 | F |
| | | | | | Southbound | 108.6 | F | 119.5 | F |
| | | | | | **Intersection** | **85.3** | **F** | **96.5** | **F** |
| 27 | SR 32 & Eastwood Drive (Newberry Drive) | STOP-sign | SR 32 | Eastwood/Newberry (stop controlled) | Northbound | 10.8 | B | 12.4 | B |
| | | | | | Southbound | 17.5 | C | 17.5 | C |
| 28 | Bach-Buxton Road & Shayler Road | Traffic Signal | Shayler | Bach-Buxton | Eastbound | 14.3 | B | 208.5 | F |
| | | | | | Westbound | 96.9 | F | 212.5 | F |
| | | | | | Northbound | 32.6 | C | 132.3 | F |
| | | | | | Southbound | 90.7 | F | 211.7 | F |
| | | | | | **Intersection** | **66.3** | **E** | **188.2** | **F** |

Note: Delay in Seconds

Intersection #15 (Eastgate Blvd NB @ SR 32 WB On Ramp) is not included as it a free flow movement (no traffic control).

*[L] = Delay shown is for left turn movement only.

For 2030 (shown in Table 3) many of the intersections will operate at LOS E or F during the peak hours. The outbound movements from the unsignalized side streets along Old SR 74 and SR 32 will experience long delays and will operate at LOS E or F. The SR 32 ramps at Olive Branch Stonelick Road (unsignalized) will also operate at LOS E or F. All the at-grade signalized intersections along SR 32 will operate at an overall LOS F with all or several approaches operating at LOS E or F.

The desired condition is for the failing SR 32 intersections to function at LOS D or better, and for the local network within the Segment IV(a) study corridor to continue operating at acceptable levels of service. Reducing congestion to acceptable levels, and thereby improving regional travel times, is particularly important because of the role of SR 32 in goods movement within the region.

## 3.3 IMPROVE SAFETY

This corridor has regularly appeared on the ODOT high crash location list, known as the Highway Safety Program (HSP). ODOT's CLE-32 2.00-4.79 Corridor Safety Study, based on the 2007 HSP, states that CLE-32 2.00-4.00 is a Hot Spot location, ranked #22, while CLE-32 2.90-4.79, ranked #76, shows up as a congestion location. For purposes of this document, crash data for SR 32 was supplied by ODOT for the years 2007-2009. After review and mapping of the crash locations, 480 crashes were determined to be located within the study area. Following a review of the OH-1 reports, 13 of the 480 crashes could not be specifically logged on SR 32 or defined as intersection-related. Therefore, while the summary below captures all 480 crashes, the calculations have been based on only the 467 crashes that were verified as intersection or non-intersection related. The resulting crashes have been categorized as intersection or non-intersection crashes and were further broken down by type, location and year. The summary below indicates a trend of rear end crashes driven largely by congestion resulting from the high traffic volume and existing at-grade intersections, signalized and unsignalized, within this stretch of highway. The number of crashes by year shows a slightly higher frequency in 2007, but a generally similar trend in terms of number in each of the three years evaluated.

### Crash Type

- 77.29% Rear End (371)
- 9.79% Side Swipe (47)
- 4.58% Angle (22)
- 3.33% Collision w/ Fixed Object (16)
- 5.00% Other (24)

### Crash Location

- 58.75% Non-intersection (282)
- 40.21% Intersection (193)
- 0.63% Driveway Access Related (3)
- 0.42% Not Stated (2)

### Number of Crashes by Year

- 36% in 2007 (174)
- 32% in 2008 (152)
- 32% in 2009 (154)

### Crash Rates – Section Crash Rate

As part of the crash analysis, the study corridor was divided into five sections between Eastgate Square and Olive Branch-Stonelick Road, and a crash rate per million vehicles was calculated for each section. Table 4 shows the crash rates and severity index for five segments along the study corridor. The severity index is intended to highlight the proportion of severe crashes, that is, those involving injury or fatality. Severity index is computed by dividing the sum of the injury and fatality crashes by the total number of crashes on the segment. Average crash rates were obtained from ODOT's 2009 report, covering the years 2007-2009. These statewide rates exclude intersection and intersection-related crashes. The segment crash rates calculated in Table 4 below adhered to this same methodology. Four of the five segments ranked above the statewide average, while the remaining one had a severity index higher than the mean + standard deviation for the sections in this study. These entries have been highlighted in Table 4. Because the segment crash rates can be compared against the statewide averages, these results suggest that the SR 32 corridor is experiencing a substantially higher rate of crashes compared to other similar roadways in Ohio. In essence, this points to a safety problem. The severity index shows that on average 30% of the SR 32 segment crashes resulted in injury or fatality, with the easternmost segment experiencing this outcome in nearly half of the recorded crashes.

**Table 4: Crash Rates and Severity Index for SR 32 Segments**

| Road Segment (west to east) | Total Crashes | Severity Index | Crash Rate | State-wide Average* |
|---|---|---|---|---|
| Eastgate Square to Glen Este-Withamsville | 39 | 0.31 | 3.00 acc/mvm | 1.11 crash/mvm |
| Glen Este-Withamsville to Fayard | 72 | 0.32 | 5.35 acc/mvm | 1.11 crash/mvm |
| Fayard to Bach Buxton/Elick | 100 | 0.26 | 3.98 acc/mvm | 1.11 crash/mvm |
| Bach Buxton/Elick to Old SR 74 | 52 | 0.13 | 1.90 acc/mvm | 1.11 crash/mvm |
| Old SR 74 to Olive Branch-Stonelick | 13 | 0.46 | 0.36 acc/mvm | 1.11 crash/mvm |
| **Segment Total** | **276** | | | |
| **Mean** | | **0.30** | | |
| **Standard Deviation** | | **0.12** | | |
| **Mean + Standard Deviation** | | **0.41** | | |

* The statewide average crash rates can be found on ODOT's web page under *Transportation System Development* > *Systems Planning & Program Management* > *Capital Programs* > *Crash Rate Information.*

### Crash Rates – Intersection Crash Rate

The SR 32 study corridor has seven intersections that were determined to be evaluated for intersection crash rates. Table 5 shows the crash rates for the six intersections, as well as the mean + standard deviation for the sample set. It should be noted that ODOT does not have statewide intersection crash rates available for comparison on an accidents per million entering vehicles basis. Two intersections (Glen Este-Withamsville Road and Elick Lane/Bach Buxton Road) have crash rates higher than the mean + standard deviation value of 1.09 and are thus highlighted in the table as critical crash locations. This indicates that these two intersections have experienced an unusually high rate of crashes as it relates to the SR 32 study corridor.

**Table 5: Crash Rates for SR 32 Intersections**

| Intersection (west to east) | Total Crashes | Calculated Crash Rate |
|---|---|---|
| Eastgate Square—North | 5 | 0.20 acc/mev |
| Eastgate Square—South | 1 | 0.04 acc/mev |
| Glen Este-Withamsville | 96 | 1.53 acc/mev |
| Fayard | 10 | 0.22 acc/mev |
| Bach Buxton/Elick | 63 | 1.15 acc/mev |
| Newberry | 2 | 0.09 acc/mev |
| Old SR 74 (Batavia Pike) | 14 | 0.24 acc/mev |
| **Intersection Total** | **191** | |
| **Mean** | | **0.49** |
| **Standard Deviation** | | **0.59** |
| **Mean + Standard Deviation** | | **1.09** |

ODOT has undertaken various safety studies and implemented improvements to address known safety problems on the SR 32 corridor. Specifically, signal timing adjustments were implemented as part of a 2007 signal timing and phasing study. The *Pilot for Systematic Signal Timing and Phasing Program, Final Traffic Signal Timing Report for SR-32* recommended and evaluated optimized and coordinated signal timing plans on SR 32 from Glen Este Withamsville Road to Cincinnati-Batavia Pike. Separate from the operational improvements, geometric modifications have also been considered including the recent construction of an eastbound right turn lane on SR 32 at the Elick Lane intersection.

## 3.4 CONSISTENCY WITH LOCAL TRANSPORTATION AND ECONOMIC DEVELOPMENT GOALS

### State Transportation Planning

The State of Ohio's Long Range Multi-Modal Transportation Plan is titled *Access Ohio 2004-2030*. It includes a comprehensive analysis of existing transportation conditions, a 26-year projection of the needs and recommendations for Ohio's multi-modal transportation system, including roads, bridges, bicycle and pedestrian trails, rail systems, and air and water ports. Its vision and the projects and recommendations identified are distilled from long-range plans researched and compiled by regional Metropolitan Planning Organizations (MPO), ODOT's Safety and Congestion analysis, ODOT's Interstate Reconstruction Program, local public transit officials, the Ohio Rail Development Commission and many others, including hundreds of projects identified by state and local officials.

Macro-Highway Corridor 21 is a 200 mile east/west route that serves southern Ohio from Cincinnati to Marietta following routes SR 32, US 50 and SR 7. The corridor has been designated by the federal government as part of the Appalachian Development Highway System (ADHS). Due to the high cost of building roadways through the Appalachian's rocky terrain, most of the region had been bypassed by the Interstate Highway System and subsequently suffered economic implications. Prior to this important four-lane, limited access highway corridor being constructed, most counties within southern Ohio were serviced with only two-lane winding roads that were slow to drive and unsafe. Today thanks to the ADHS, southern Ohio residents and businesses have access to Interstates 70, 71, 75, and 77 from Corridor 21.

***Access Ohio* Objectives for Corridor 21:**

- Improve mobility for freight and through traffic

- Complete US 50/Corridor D linkage into West Virginia via a new Ohio River crossing

- Support development of industrial and commercial areas

- Address safety and congestion deficiencies throughout the corridor

- Implement recommendation for the Eastern Corridor Study

### Local Transportation Planning

At the local level, the various project segments and actions outlined in the Eastern Corridor Tier I EIS are being coordinated with land use, development, preservation and transportation plans within the individual jurisdictions within the Eastern Corridor in Clermont and Hamilton counties. Specifically, the Eastern Corridor transportation recommendations are consistent with and are incorporated in the SR 32 Corridor Thoroughfare Plan and Access Clermont, which is Clermont County's Long Range Plan. Improvements to the local network will affect how traffic accesses SR 32. Likewise, changes in access to the local network from SR 32 will affect how traffic utilizes the local network.

Direct local public investment in water, sewer and road infrastructure projects within the SR 32 corridor totals $89 million in completed and planned improvements. A total of $9.5 million in local road projects have recently been completed in the study area, and at least $4.8 million in planned roadway projects adjacent to the SR 32 corridor will affect SR 32.

Other local studies that are relevant to SR 32 include: *Green Infrastructure Concept Master Plan, February 2005;* Eastgate *Market Study, December 2007*; and studies provided in support of the funding application to the Transportation Review Advisory Council (TRAC) for the adjacent project CLE-275-8.90.

### Preserve and Support Local Economic Development

In addition to addressing critical safety, travel demand and congestion issues, transportation solutions for Segment IV(a) should also strive to preserve the economic vitality of the area. While SR 32 serves as a travel corridor for east-west commuters, it also provides local access to important commercial and retail development. The goods and services provided to local residents are as vital as the economic contributions are to the County as a whole. While the interface between the through-traffic and local traffic is the heart of the transportation problem, the challenge is to solve the problem in such a way as to minimize impact to the business community along SR 32.

## 4.0 SUMMARY

CLE-SR32-2.25 Segment IV(a) is part of the larger Eastern Corridor, a multi-modal family of projects in Hamilton and Clermont Counties, Ohio. As stated in the Tier I EIS, the purpose of the Eastern Corridor overall projects is to implement a multi-modal transportation program consistent with the adopted long-range plan for the region, addressing priority needs and furthering project goals established in the major investment study phase. Transportation recommendations were divided by mode, and recommendations for the highway mode were divided into four segments along SR 32. Segment IV in Clermont County represents the area between I-275 and Olive Branch-Stonelick Road.

The I-275 interchange was broken out as a separate project, and the west end of Segment IV(a) was defined as Eastgate Blvd.

The purpose of the Segment IV(a) project is to:

- Serve current and projected travel demand
- Reduce congestion and delay
- Improve roadway safety
- Be consistent with local transportation and economic development goals

## 5.0 LOGICAL TERMINI

Based upon the identified congestion and safety problems, the termini for the proposed improvements along SR 32 are Eastgate Boulevard to the west and Olive Branch-Stonelick Road to the east. These limits are specified as part of the Tier 1 Record of Decision for the Eastern Corridor.

Because changes to SR 32 have the potential to affect the local network and vice versa, it will be important to consider local road improvements necessary as a result of changes to the operation of SR 32. Therefore, the initial study area will incorporate the area from Old SR 74 on the north and Aicholtz Road—Clough Pike—Shayler Road—Old SR 74 on the south. (See Figure 1, Study Area Map.) Traffic studies also extend to the nearby intersection of Bach-Buxton Road and Shayler Road just south of the study area.

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

| | | | |
|---|---|---|---|
| **Project Name (County, Route, Section):** | CLE-SR32-2.25 | **PID:** | 82370 |
| **Date Red Flag Summary Completed:** | October 2010 | **Prepared By:** | Andrew Schneider |
| **City, Township or Village Name(s):** | Union Twp. | **ODOT Project Manager:** | Jay Hamilton |

## GENERAL PROJECT PLANNING INFORMATION:

**Project Description:**
The Segment IV(a) project is located in Clermont County as part of the Eastern Corridor family of projects. Segment IV(a) work is intended to complete Steps 1 through 4 of ODOT's Project Development Process by supplementing the previous Tier 1 EIS. Capacity and safety improvements on SR 32 are the focus in this area, which may involve the addition of an interchange and elimination of several at-grade intersections. The project will evaluate local roads to determine additional changes necessary in coordination with the SR 32 improvements.

**Project Limits/General Location:**
The anticipated east and west study limits are Eastgate Blvd. and Stonelick Olive Branch Road. The anticipated northern and southern limits are Aicholtz Road and Old SR74 / Heitman Lane.

**ODOT DISCIPLINE INVOLVEMENT:**

***List name and phone number of individual(s) representing each discipline during the site visit and preparation of the Red Flag Summary. One individual may represent multiple disciplines.***

| DISCIPLINE | NAME | PHONE NUMBER |
|---|---|---|
| ODOT County Manager** | Josh Wallace | 513-933-6660 |
| District Production Administrator** | Doug Miller | 513-933-6603 |
| District Planning and Programming Administrator** | Andrew Fluegemann | 513-933-6597 |
| ODOT Project Manager | Jay Hamilton | 513-933-6584 |
| CCEO Project Contact | Pat Manger | 513-732-8068 |
| CCTID Contact | Steve Wharton | 513-289-9051 |
| | | |
| | | |
| | | |
| | | |
| | | |

**** The County Manager, Production Administrator and Planning/Programming Administrator (or qualified representative) must attend the site visit.**

**EXTERNAL AGENCY INVOLVEMENT:**

***Indicate external agency involvement during identification of red flags. List the name and phone number of individual(s) representing each agency during the site visit.***

| AGENCY | NAME | PHONE NUMBER |
|---|---|---|
| FHWA Engineer*** | Mark Vonder Embse | 614-280-6854 x6876 |
| | | |
| | | |

**EXTERNAL AGENCY INVOLVEMENT:**

| | | |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

***** The FHWA Engineer should be invited on projects expected to require approval from Federal Highway Administration.**

**General Project Planning Information**

Structures:
Bridge Number _________ Structure File Number ________
Bridge Number _________ Structure File Number ________
Bridge Number _________ Structure File Number ________

Project Sponsor: ODOT District 8
Is local legislation required? X Yes No
Is FHWA oversight required? X Yes No
Is project location on congestion/safety list? X Yes No

Estimated Cost: $65,850,000

Funding Source(s):
- X Federal
- X State
- X Local ___________
- ☐ Private __________

Are funding splits required? ☐ Yes ☐ No
Specify: Possibly

Anticipated quarter and Fiscal Year of project award:
_______________

Problem identified by *(indicate document date)*:
- ☐ District Work Plan __________
- ☐ Congestion Study __________
- X Safety Study ODOT 2006
- ☐ Major New __________
- ☐ MPO TIP __________
- ☐ MPO LRP __________
- ☐ Access Ohio __________
- X Hot Spot Location ODOT 2006
- X HSP Location ODOT 2007
- X Other Eastern Corridor Project Tier 1 FEIS

- Are there any other projects in the area (ODOT, local or utility) that might conflict with the project (e.g., a local project on the proposed detour route for the ODOT project, a resurfacing project a year after a pavement marking project)?
  X Yes ☐ No *Specify.* Coordination with CCTID and CCEO
- Are there growth or land use changes in the area surrounding the project that could have an impact on project scope?
  X Yes ☐ No *Specify.*_____

Are there any known public involvement issues? ☐ Yes X No *Specify.* _____

**Briefly describe the Purpose and Need** (Must be a separate document for Major Projects):

The purpose of the project is to improve capacity and safety; and reduce traffic congestion on a portion of SR 32 while accounting for local improvements to Aicholtz Rd., Old SR 74 and Heitman Lane. The safety and congestion issues stem from the fact that SR 32 functions both as a busy arterial for thru-traffic as well as a local collector/distributor for dense business and residential developments along the route. The mix of the thru-traffic from the local traffic is a critical issue of the project.

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

**GENERAL EXISTING INFORMATION:**

Legal Speed 55 MPH
Design Speed 60 MPH
Traffic Data:
Opening Year ADT: (2006 ODOT TSR, East of Eastgate Blvd) 38,850 ADT
Design Year ADT: N/A
Design Hourly Volume: N/A
Directional Distribution: N/A
Trucks (24 Hour B&C): (2006 ODOT TSR, East of Eastgate Blvd) 3,240 ADT
*(Traffic data does not need to be certified for the Red Flag Summary.)*
SR 32 Functional Classification:
☐ Interstate, freeway
X Arterial
X Collector
X Local

Locale:
☐ Rural
X Urban
National Highway System (NHS):
NHS Routes: SR 32
Non-NHS Routes: Aicholtz Road, Bach Buxton Road, Heitman Lane, Olive-Branch Stonelick Road, Glen Este-Withamsville Road
Resurfacing, Restoration and Rehabilitation (3R) Project? ☐Yes X No

**SITE VISIT:**

***A site visit is required for ALL projects. The site visit shall consist of visual inspection of the entire project area including the ditch lines, cut slopes, stream banks, bridge foundations, pavement, embankment slopes, etc.***

Date(s) of site visit:

**ODOT COUNTY MANAGER CONCERNS:**

***List any comments/requests from the ODOT County Manager.***

ODOT County Manager indicated no concerns at this time.

**ACCIDENT DATA:**

***Briefly summarize accident history. Indicate any design features that should be revised to increase safety.***

From ODOT's CLE-32 from Eastgate to Old 74 (CLE-32 2.00-4.79) study
2007 Hot Spot #22/Congestion #76
712 crashes from 2005-2007
70% rear end collisions mostly related to congestion at Glen Este-Withamsville, Elick and Old 74 intersections.
Countermeasures being considered are changes to signing, signal modifications and consideration of turn lane restrictions as well as grade separations along SR 32.

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

**ENVIRONMENTAL ISSUES:**

***Make a preliminary determination on whether the following resources will be affected by the proposed project. Comments must identify the location of the issue. Comments are required for any Yes or Possible responses.***

| **Involvement** | **Resource/Feature** | Location/**Comments** |
|---|---|---|
| ☐Yes ☐ No<br>X Possible | Parkland, nature preserves and wildlife areas *(Name)* | Veterans Park is a recreational park with ball fields and other sports facilities at Clough Pike & Glen Este-Withamsville. Ivy Point Park is located at Ferguson Dr near Clough Pike. Both parks are owned by Union Township. Recreational fishing occurs at three reservoirs: Glen Willow Lake and Wuerdeman Lakes are located off of Bach Buxton Rd, and Jackson Lake is located at Old State Route 74 near Eastgate Mall. Ball fields (Maquier Field) exist near Old S. R. 74 and Heitman Ln. |
| ☐Yes ☐ No<br>X Possible | Cemetery *(Name)* | The Olive Branch Cemetery, Old Cemetery, and the Old-Apple-German-Olive Branch Cemetery were identified within the study area near Olive Branch Road. |
| ☐Yes X No<br>☐ Possible | Scenic River *(Name)* | There are no designated Wild or Scenic Rivers located within one mile of study area. Little Miami River a state and national scenic river is > 3 mi from the project study area. |
| ☐Yes ☐ No<br>X Possible | Public Facilities *(Name)* | Willowville Elementary School is at Schoolhouse Rd and Eva Ln. Glen Este Middle School and Glen Este High School are located at 4342 Glen Este-Withamsville Rd. Clough Pike Elementary is located at 808 Clough Pike. Union Township Civic Center is at 4350 Aicholtz Rd and houses Union Township Administration, West Clermont Local School District administrative offices, a post office, Clermont Senior Services, public meeting rooms, a gymnasium, and an amphitheatre. Union Township Fire Station headquarters (Station 51) is located at 860 Clough Pike. Union Township Fire Station 50 is located at 1141 Old SR 74. Union Township Police Department and Service Department are located at 4312 Glen Este-Withamsville Rd. |
| ☐Yes ☐ No<br>☒ Possible | Threatened and Endangered Species and/or habitat (e.g., Indiana bat trees, etc.) | Seven (7) federally listed species for Clermont County. Potential Indiana bat habitat may be present throughout portions of the study area. |
| ☐Yes ☐ No<br>X Possible | Existing cat tails *(Location)* | Cattail is present in areas of disturbance, i.e. roadside ditches, as well as potential wetland areas and retention pond fringes. |
| ☐Yes ☐ No<br>X Possible | Existing wet areas *(Location)* | NWI and soil survey maps indicate a presence of wet areas throughout the study area. Previous field investigations indicate the presence of wet areas throughout the study area. |
| ☐Yes ☐ No<br>X Possible | Streams, rivers and watercourses (*Use Designation*) | The project area is within the East Fork Little Miami River watershed. Salt Run and Shayler Run are also within the study area and are designated WWH-aquatic life use, AWS & IWS-water supply use, PCR-recreation use. Numerous unnamed streams exist within the area as well. |
| ☐Yes ☐ No<br>X Possible | Historic Building(s) *(Location)* | Previously identified historic buildings are located within the study area. None are known to be eligible for the NRHP. |
| ☐Yes X No<br>☐ Possible | Historic Bridge(s) *(Location)* | No bridges listed on the NRHP. |
| ☐Yes ☐ No<br>X Possible | Farmland *(Location)* | Farmland was identified along Eastgate Boulevard and Aicholtz Road as well as west of Traction Lane. |
| ☒Yes ☐ No<br>☐ Possible | Air Quality non-attainment area or concerns (ozone particulate or air toxics) | Clermont County is a basic non-attainment county. |
| ☐Yes ☐ No<br>☒ Possible | Landfill(s), Superfund Site(s) and/or evidence of hazardous materials *(Location)* | No mapped landfills or superfund sites. Numerous haz mat and LUST/UST sites of concern are located throughout project area. |

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

**ENVIRONMENTAL ISSUES:**

***Make a preliminary determination on whether the following resources will be affected by the proposed project. Comments must identify the location of the issue. Comments are required for any Yes or Possible responses.***

| | | |
|---|---|---|
| ☐Yes ☐ No<br>X Possible | Known Archaeological Sites | Previously identified archaeological sites are located in the study area. None are known to be eligible for the NRHP. |
| ☐Yes ☐ No<br>X Possible | Total Maximum Daily Load (TMDL) Streams | Salt Run is a Section 303(d) impaired water. |
| ☒Yes ☐ No<br>☐ Possible | ODOT MS4 Phase 2 Regulated Areas | The entire project study area falls within an ODOT MS4 Regulated Area. |
| ☐Yes ☐ No<br>X Possible | Sensitive environmental justice areas | Locations to be determined as project planning continues. |
| ☐Yes ☒ No<br>☐ Possible | Federal Emergency Management Agency (FEMA) floodplains | No special flood hazard areas were identified as occurring within the project study area. |
| ☐Yes ☒ No<br>☐ Possible | Lake Erie Coastal Management Area | Project area is not located within the Lake Erie Coastal Management Area. |
| ☐Yes ☒ No<br>☐ Possible | Sole Source Aquifers (Location) | No sole source aquifers are located within the project study area. |
| ☐Yes ☒ No<br>☐ Possible | Wellhead Protection Areas (Specify) | No wellhead protection areas are located within the project study area. |
| ☐Yes ☐ No<br>☒ Possible | Does it appear that noise abatement will be an issue for the project? | There are several single-family and multi-family residential developments as well as a school, cemetery, and park within the project study area. Abatement may be feasible. |
| ☐Yes ☐ No<br>X Possible | Other environmental issues | Need to consider Veteran's Park, and several cemeteries near Olive Branch. |
| | | |

**GEOMETRIC ISSUES:**

***Use the design speed, design functional classification and available traffic data to make a preliminary determination as to the geometric standards for the project. Compare these requirements to accident data and impacts if deviations are being considered.***

| **Design Exception Required?** | **Design Feature** | **Preliminary Comments Regarding Justification** |
|---|---|---|
| ☐Yes X No<br>☐Possible<br>☐Not Applicable | Lane Width (including curve widening) | |
| ☐Yes X No<br>☐Possible<br>☐Not Applicable | Graded Shoulder Width | |
| ☐Yes X No<br>☐Possible<br>☐Not Applicable | Bridge Width | |
| ☐Yes X No<br>☐Possible<br>☐Not Applicable | Structural Capacity | |
| ☐ Yes ☐ No<br>X Possible<br>☐ Not Applicable | Horizontal Alignment (including Excessive Deflections, Degree of Curve, Lack of Spirals, Transition/Taper Rates and Intersection Angles) | Reconnection of side roads near potential overpass location. |

**GEOMETRIC ISSUES:**

***Use the design speed, design functional classification and available traffic data to make a preliminary determination as to the geometric standards for the project. Compare these requirements to accident data and impacts if deviations are being considered.***

| | | |
|---|---|---|
| ☐ Yes ☐ No<br>X Possible<br>☐ Not Applicable | Vertical Alignment (including grade breaks) | Reconnection of side roads near potential overpass location. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Grades | Reconnection of side roads near potential overpass location. |
| ☐Yes ☐No<br>X Possible<br>☐ Not Applicable | Stopping Sight Distance | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Pavement Cross Slopes | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Super elevation (Maximum rate, transition, position) | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Horizontal Clearance | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Vertical Clearance | |

**GEOMETRIC ISSUES:**

***Indicate if the following geometric issues are present or should be considered during project development. Consider work on the mainline as well as any side roads or service roads. Provide additional comments as needed.***

| | **Design Issue** | **Comments** |
|---|---|---|
| X Yes ☐ No<br>☐ Possible<br>☐ Not Applicable | Does the existing horizontal alignment need to be modified? | The intersection of SR 32 is severely skewed with side roads entering near the main intersection. These side roads may see increased traffic due to mainline changes. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does the existing vertical alignment need to be modified? | Various side roads have vertical alignments that should be analyzed for design speed conformance. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Does stopping sight distance need to be increased? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Does intersection sight distance need to be increased? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there geometric issues that may affect traffic safety (including Full or Half-Clover Leaf Interchange, Slip Ramps, Weave Areas, and short acceleration/deceleration lanes). *Describe.* | There is an existing half clover interchange at SR 32 and Eastgate that will be reconstructed as part of another project. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there any hazards in the clear zone? *Specify treatment.* | There is a narrow median along SR 32 that should be considered; possible barrier required. |

**GEOMETRIC ISSUES:**

***Indicate if the following geometric issues are present or should be considered during project development. Consider work on the mainline as well as any side roads or service roads. Provide additional comments as needed.***

| | | |
|---|---|---|
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does existing guardrail need to be replaced (e.g., too low, poor condition)? | |
| ☐Yes X No<br>X Possible<br>☐ Not Applicable | Is the area for guardrail anchor assemblies insufficient? (E-98 or B-98)? *Consider proper grading around the anchor assembly.* | To be determined based on field visit. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does the number of turn lanes or through lanes need to be increased? | Will be analyzed with traffic study. |
| X Yes ☐ No<br>☐ Possible<br>☐ Not Applicable | Are changes to access control required? | Will be analyzed with traffic study. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there any drive locations that will require special attention during design (e.g., very steep grades, high volume commercial drives, drives close to bridges or intersections)? | There are drives near the potential overpass alternatives that may require realignment or closure. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are new mailbox turnouts required? | Along side roads. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there any evidence of accidents due to substandard vertical clearance on overpass structures? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Will an interchange be added or modified? | Possible proposed interchange toward the middle of the study area along SR 32. Possible signalized access eliminated at Glen Este, Elick and old SR 74 (East). |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Do the existing intersection radius returns need to be modified to accommodate larger truck turning movements? | Truck movements will be analyzed with the traffic study. |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Does grading need to be upgraded? To what criteria (e.g., clear zone, safety, standard)? | Various side roads should have shoulder and grading upgraded to current standards if there is an increase in traffic volumes. Existing conditions have little to no shoulder width and steep ditch slopes. |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Are there any other geometric issues? *Describe* | With a potential increase in traffic along old SR 74 and Aicholtz, upgraded pavement and shoulders should be considered. |

**GEOTECHNICAL ISSUES**

***Based on the information compiled during this study indicate whether or not the following geotechnical issues are present or should be further considered during project development. Provide additional comments as needed.***

| | **Design Issues** | **Comments** |
|---|---|---|
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there evidence of soil drainage problems (e.g., wet or pumping subgrade, standing water, the presence of seeps, wetlands, swamps, bogs)? | None observed during B&N (geotech subconsultant) site visit. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is the groundwater table anticipated to be affected by construction? | Does not appear that deep cuts will be needed for construction based on site topography. |

**GEOTECHNICAL ISSUES**

***Based on the information compiled during this study indicate whether or not the following geotechnical issues are present or should be further considered during project development. Provide additional comments as needed.***

| | | |
|---|---|---|
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there evidence of any embankment or foundation problems (e.g., differential settlement, sag, foundation failures, slope failures, scours, evidence of channel migrations)? | None observed during B&N (geotech subconsultant) site visit. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there evidence of any slope instability (soil or rock)? | None observed during B&N (geotech subconsultant) site visit.Embankments and cuts are nominal in height. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Is there evidence of unsuitable materials (e.g., presence of debris or man-made fills or waste pits containing these materials, indications from old soil borings)? | Area is highly developed and fill soils are anticipated to be encountered. |
| X Yes ☐ No<br>☐ Possible<br>☐ Not Applicable | Is there evidence of rock strata (e.g., presence of exposed bedrock, rock on the old borings)? | Bedrock is relatively shallow at the site based on existing geologic and subsurface information. Rock is exposed in the streambeds. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there evidence of active, reclaimed or abandoned surface mines? | No mining is known to exist at the location. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there information pertaining to the existence of underground mines? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there Acid Mine Drainage present within the study area? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does subgrade stabilization or an undercut appear to be needed? | Possible based on review of existing subsurface explorations. The near surface native soils were typically wetter at the time the borings were drilled. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Should the Office of Geotechnical Engineering be contacted to evaluate the project site? | Based on our review, any proposed improvements would appear to be routine from an ODOT perspective. Geotechnical coordination and consultation at the District level would appear to be sufficient. |
| ☐Yes ☐ No<br>☐ Possible<br>☐ Not Applicable | Were there any significant items found during plan and specification review? *Specify.* | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there any other geotechnical issues? *Specify.* | Nothing significant to report at this stage. |

**PAVEMENT ISSUES:**

***Indicate if the following pavement issues are present or should be considered during project development. Side road and service road work should be considered in this assessment. Provide additional comments as needed.***

| | **Design Issue** | **Comments** |
|---|---|---|
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Are pavement cores needed to determine the existing pavement buildup and/or condition? | The side roads will need evaluation of existing pavement with the potential of increased volumes. |

| | | |
|---|---|---|
| **PAVEMENT ISSUES:** | | |
| ***Indicate if the following pavement issues are present or should be considered during project development. Side road and service road work should be considered in this assessment. Provide additional comments as needed.*** | | |
| X Yes ☐ No<br>☐ Possible<br>☐ Not Applicable | Is the proposed pavement buildup unknown? (For pavement preservation projects, pavement treatment, including pavement type & thickness should be specified in the design scope of services) | Pavement design will be completed once geotechnical and traffic work is complete. |
| ☐Yes ☐ No<br>☐ Possible<br>X Not Applicable | Do dynaflect tests indicate the existing pavement is in poor condition? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does the proposed pavement buildup need to be approved by the Pavement Selection Committee? | |
| ☐Yes ☐ No<br>☐ Possible<br>X Not Applicable | Are joint repairs needed? | |
| ☐Yes ☐ No<br>☐ Possible<br>X Not Applicable | Are pressure relief joints needed? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are pavement repairs needed? | Clepper between Glen Este and the east end of the roadway is deteriorated. Heitman Lane is deteriorated; spot full-depth failures are apparent. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does the maintenance of traffic scheme require additional permanent or temporary pavement? | Assumed part-width construction will be used along the side roads. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does curb need to be replaced due to deteriorated condition or lack of curb reveal? | Most of the study area is a shoulder section. There are small sections of curbed sections that will be analyzed to determine adequacy of existing curb reveal. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does sidewalk need to be replaced or installed? | To be determined. Existing walk around mall and side roads. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are new curb ramps needed? | To be determined. Existing walk around mall and side roads. Ramps will be ADA compliant. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Do truncated domes need to be installed? | To be determined. Existing walk around mall and side roads. |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Is there any work on side roads, service roads, or ramps? | A new interchange and overpasses will affect various side roads. |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Are there any special drive treatments or preferences (e.g., concrete for all drive aprons, curved aprons, etc.)? | There are many commercial drives that should include a concrete option. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Has the site received repeated resurfacings in recent years? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Does pavement deterioration appear to be caused by drainage or geotechnical problems? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there any other pavement issues? *Specify.* | The majority of the pavement is in satisfactory conditions except for Clepper east of Glen Este and Heitman lane. Any increase in volumes will require pavement work. |

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

| **STRUCTURAL ISSUES:** | | |
|---|---|---|
| ***Indicate if the following structure issues are present or should be considered during project development. Provide additional comments as needed. Provide a separate table for each structure.*** | | |
| **Structure:** | **Design Issue** | **Comments** |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Is it impossible for the structure to be replaced with a prefabricated box culvert or 3-sided box? | For potential crossing for the Heitman extension if included within the project. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does the bridge (including foundation) violate current design live loading? | Unknown at this time. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Was the existing structure not built according to plan? | Unknown at this time. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is deck coring needed? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is the deck delaminated? *Specify.* | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is non-destructive testing needed to determine the amount of delamination? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is the bridge deck in poor condition? *Specify location and level of deterioration.* | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Does a deck condition survey (see Bridge Design Manual) need to be performed? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there areas to be patched or repaired on the deck? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is the bridge a poor candidate for an overlay? *Specify type of overlay if know.* | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Does the bridge rail violate current standards? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is fatigue analysis required? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Should all fatigue prone details be retrofitted or replaced? *Specify.* | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is the abutment (including backwall, beam seats, breastwall, wingwall, etc.) in poor condition? *Specify location and level of deterioration.* | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there any evidence of substructure movement (e.g., settlement, rotation)? | |

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

**STRUCTURAL ISSUES:**

***Indicate if the following structure issues are present or should be considered during project development. Provide additional comments as needed. Provide a separate table for each structure.***

| | | |
|---|---|---|
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are the piers in poor condition? *Specify location and level of deterioration.* | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Is there any evidence of existing beam deterioration/section loss, strands exposed, shear joints leaking or longitudinal cracks? | SR 32 bridge over Olive Branch has exposed steel along the north edge. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are the bearings in poor condition? | |
| ☐Yes ☐ No<br>☐ Possible<br>X Not Applicable | Is elimination of the deck joint impossible? What modifications are necessary? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are new approach slabs needed? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Is it impossible for the hinges to be removed to make the members continuous? | Unknown at this time. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is the bridge on a curve, skew or superelevation transition? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there any evidence that the bridge does not meet hydraulic capacity? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there existing sidewalks on or adjacent to the bridge? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Will the structure work require any special maintenance of traffic (e.g., closing of roadway for erection of beams, maintenance of waterway traffic, location of cut line, etc.)? *Specify*. | Construction of proposed bridges over SR 32 will require closures of the mainline for beam erection. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there any erosion in the existing channel? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is the foundation exposed due to scour? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Will there be more than 25' of channel relocation? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Do no opportunities exist to construct the bridge faster (e.g., precast walls, segmental construction)? | If Heitman is extended, there is a potential for the use of a Conspan or box beam structure. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Does the bridge need to accommodate future roadway lanes or railroad tracks? | |

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

**STRUCTURAL ISSUES:**

***Indicate if the following structure issues are present or should be considered during project development. Provide additional comments as needed. Provide a separate table for each structure.***

| | | |
|---|---|---|
| ☐Yes ☐ No<br>☐ Possible<br>X Not Applicable | Will temporary shoring be required next to the railroad? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there any problems with the existing retaining walls? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there any other structures issues? *Specify.* | The existing major brides (Eastgate over SR 32, and Olive Branch over stream near Lexington Run) are all in satisfactory condition with no work being anticipated. |

**HYDRAULIC ISSUES:**

**Indicate if the following drainage issues are present or should be considered during project development. Side road and service road work should be considered in this assessment. Provide additional comments as needed.**

| | **Design Issue** | **Comments** |
|---|---|---|
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Based on visual evidence (height of debris, erosion or other markings left from high water) and approximate drainage areas, does the existing drainage system (culverts, storm sewers and/or ditches) appear to be inappropriately sized and not functioning properly? *Describe deficiencies.* | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there evidence of alignment or flow velocity problems (e.g., scour, bank erosions, silting) at culvert entrances or exits? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there sinkholes or other deterioration in the pavement that would indicate separations in the existing pipes? | |
| ☐Yes ☐ No<br>X Possible | Is ditch clean-out required? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Should guardrail over culverts be eliminated with clear zone grading? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Should the existing culverts be replaced? | Formal inspection should be completed. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Should the existing culverts be extended? | Depending on proposed pavement widening. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will a new alignment concentrate flow (in culverts) that is currently overland flow? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Will the maximum height of cover (100') be exceeded for any culvert? | |

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

**HYDRAULIC ISSUES:**

**Indicate if the following drainage issues are present or should be considered during project development. Side road and service road work should be considered in this assessment. Provide additional comments as needed.**

| | | |
|---|---|---|
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Will bankfull design be used for any culverts? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Does the existing drainage system have an odor that might indicate that it includes septic connections? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Is the exposed curb height in existing gutters inadequate to contain flow (include height of proposed resurfacing)? | Most of the study area is a shoulder section. There are small sections of curbed sections that will be analyzed to determine adequacy of existing curb reveal. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Do the existing inlets or catch basins need to be raised to meet proposed grade? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Does the project affect a wetland or waterway (e.g., stream, river, jurisdictional ditch)? | Salt Run and Shayler Run. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is the existing and/or proposed channel alignment incompatible with the existing/proposed structure? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will channel relocation be required? | A proposed Heitman Lane extension will include stream crossings. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will Municipal Separate Storm Sewer System (MS4) requirements apply? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Will post construction flow requirements be required? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is there evidence of existing field tiles? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are underdrain outlets not functioning properly? | Along SR 32. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will a new storm sewer outfall be required? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Does the drainage work warrant any special maintenance of traffic considerations? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there any other hydraulic issues? *Describe.* | |

**TRAFFIC CONTROL ISSUES:**

***Indicate if the following traffic control (signals, signing, pavement markings, etc.) issues are present or should be considered during project development. Provide additional comments as needed.***

| | **Design Issue** | **Comments** |
|---|---|---|
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Do the existing signs need to be replaced due to poor condition? | The existing signs appear to be in satisfactory condition. Recommend the existing signing along routes with major construction work be replaced. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there any obvious deviations from requirements of the Ohio Manual of Uniform Traffic Control Devices (OMUTCD)? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Is a particular type of pavement marking desired (e.g., paint, epoxy, thermoplastic)? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Will pavement planing affect loop detectors? | Most of the signalized intersections have loop detection and will be affected by milling. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will pavement widening affect pole locations? | Along County and Township roads. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Will resurfacing affect signal height? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does it appear that any traffic control items will fall outside the existing right of way limits (e.g., large signs, strain poles)? | It appears that most/all of the signal poles and signing is within the existing right-of-way. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there any accidents that can be related to existing signal deficiencies (e.g., timing, lack of turn lanes)? | Most of the accidents are caused by back-ups and large volumes. Rear end due to excessive stacking and sideswipes due to high turning volumes. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Do turn lane lengths appear to have insufficient storage capacity? | Primarily thru-lane backup. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does the controller need to be upgraded? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Do proprietary materials need to be specified? | |
| ☐Yes ☐ No<br>XPossible<br>☐ Not Applicable | Should signs or signal installations be supplemented with lighting? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Are any TODS signs present? | Along exit ramps from I-275. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | If traffic control at an intersection is being changed from stop control to signalization, does the stop condition road need to be upgraded to accommodate faster traffic? | Will depend on traffic study results. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there any other traffic control issues? *Specify.* | |

**MAINTENANCE OF TRAFFIC ISSUES:**

***Briefly describe the maintenance of traffic and any constraints. A list of considerations has been provided below.***

**Maintenance of Traffic Considerations**

- Limits on traffic detour (including local alternate detours) due to load limits, bridge width restrictions, shoulder condition, emergency vehicle impact
- Temporary pavement requirements
- Speed limit during construction
- Pedestrian Traffic
- Additional width at culverts
- Drive Access
- Stopping Sight Distance
- Construction Access
- Right of Way acquisition
- Permitted lane closures
- Cross-overs
- Short duration road closures
- Temporary structure requirements
- Additional signal heads (drives and/or side roads)
- Construction timeframe issues
- Innovative contracting
- Maintaining railroad traffic
- Turn movement restrictions

**Maintenance of Traffic Description**

There doesn't appear to be major MOT issues. SR 32 will remain open to traffic. One area to consider will be the Glen Este high school traffic. If a connector road between Aicholtz and the proposed interchange can be completed prior to the closure of SR 32 access from Glen Este, the transition will be smoother. In general, most of the roadways within the study area are heavily traveled and any disruption will cause delays. The key will be phasing the construction to get the proposed facilities open to traffic as efficiently as possible and minimize the delays and backups. The inability to close multiple intersections at a time may increase construction efficiency and therefore cost.

**RIGHT OF WAY/SURVEY ISSUES:**

***Indicate if right of way or survey issues are present or should be considered during project development. Provide additional comments as needed.***

| | Design Issue | Comments |
|---|---|---|
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Will there be any work beyond the existing right of way limits? | At a minimum, a potential interchange and overpasses are being considered with grade separations. Side road work may require proposed right-of-way. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will major real estate relocation acquisition be involved? | There are numerous commercial properties that could require relocation. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will relocation of residences be involved? | A proposed interchange and new roadway alignment may require residential relocations. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will relocation of businesses be involved? | There are numerous commercial properties that could require relocation. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will the project cause relocation of parties that might be eligible for relocation assistance? If so, list the estimated number of residential and non-residential relocations? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Will the project require modifying the access control to any properties? If so, list the estimated number and type of properties affected. | Properties near the proposed grade separations may require modified access, as well as some drives with direct access to SR 32. |

**RIGHT OF WAY/SURVEY ISSUES:**

***Indicate if right of way or survey issues are present or should be considered during project development. Provide additional comments as needed.***

| | | |
|---|---|---|
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there any objects within the existing right of way limits that may be considered an encroachment? | Possible along side roads. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will it be difficult or impossible to determine the number of involved property owners? If not how many are involved? | A rough estimate can be taken based on conceptual construction limits and GIS property information. |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Will temporary parcels be needed (e.g., for drive work)? | Various temporary parcels will be required for grading and drive work. |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Will right of way need to be acquired for an agency other than ODOT (e.g., county, city)? *Specify.* | Various County and Township roads within the study area. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will additional right of way be needed for utility relocations? | The extent of the proposed work will require utility relocations, which may include existing easements. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will right of way need to be acquired for storm sewer outfalls? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Do property owners need to be contacted for the locations of underground items such as leach fields, septic systems, or field tiles that might be affected by the proposed take? | Some of the residential properties may be utilizing septic systems. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there any mineral rights considerations? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there any specific property owner concerns? If so, list property owners and concerns. | The possibility of substantial impacts to the Jeff Wyler auto dealer along with various other commercial properties. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are work agreements prohibited for any reason? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are the centerline of right of way and centerline of construction different? | Where feasible, the centerline of right-of-way will be used on the centerline of construction. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will right of way be acquired for wetland or stream mitigation? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Are there any other right of way or survey issues? *Specify.* | Proposed grade separations will likely displace numerous commercial and residential properties. |

**UTILITY ISSUES:**

***Indicate if the following utility issues are present or should be considered during project development. Provide additional comments as needed.***

| | **Design Issue** | **Comments** |
|---|---|---|
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Do existing utilities need to be relocated? *If so, please identify*. | No specific utilities have been identified at this time. It has been assumed that pole lines, sewers, and water lines that run along the anticipated work (specifically the overpasses) will be relocated. |

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

**UTILITY ISSUES:**

***Indicate if the following utility issues are present or should be considered during project development. Provide additional comments as needed.***

| | | |
|---|---|---|
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Is it impossible to minimize utility conflicts? (e.g., by careful placement of storm sewer and underdrains)? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Would the project benefit from subsurface utility engineering (SUE)? | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there existing utilities on an existing structure that need to be relocated? | The existing structures are to remain. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there any specific utility requirements or concerns? *Specify*. | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Is additional right of way needed to accommodate utility relocations? | Any utilities within existing easements will require new easements or payment. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there water or sanitary lines that will be relocated as part of the ODOT contract? | There are existing lines near the intersections of the proposed work. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Are there any other utility issues? *Specify*. | |

**MISCELLANEOUS ISSUES:**

***Indicate if the following issues are present or should be considered during project development. Provide additional comments as needed.***

| | **Design Issue** | **Comments** |
|---|---|---|
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Will any of the construction activity take place over, under, or near railroad property? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Could material with long lead times for delivery have an impact on the construction schedule (e.g., strain poles, large box culverts, steel beams, etc.)? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Will a value engineering study be required due to project cost (total cost greater than $20 million) or project complexity? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will warranties be used? | To be determined. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there aesthetic concerns? *Specify*. | Overpasses, noise walls and interchange. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there any concerns relating to noise walls? | To be determined. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there no areas available within the existing right of way for portable plants or waste and borrow sites? | To be determined. |

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

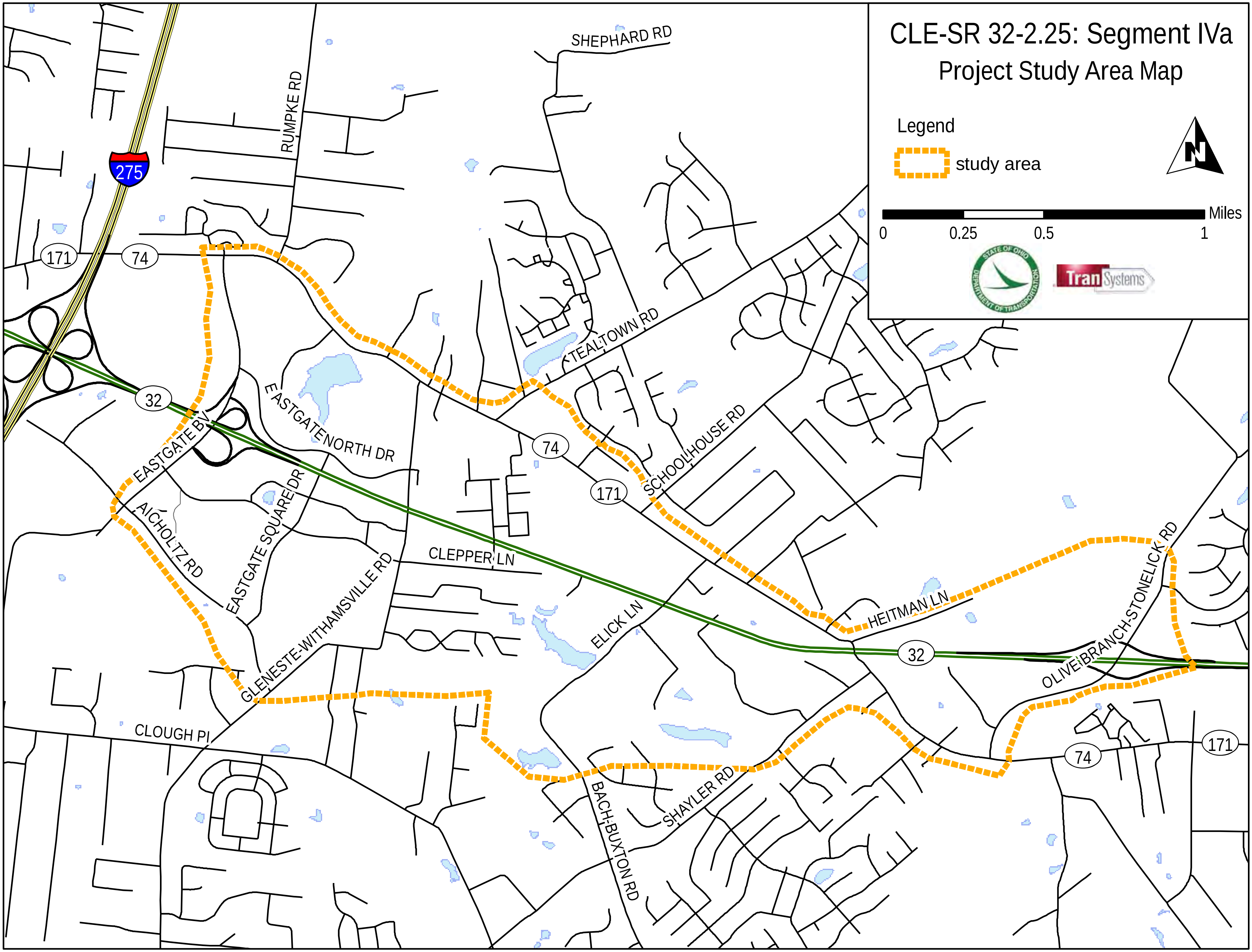
| **MISCELLANEOUS ISSUES:** | | |
|---|---|---|
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there any specific concerns related to pedestrian or bicycle access? | Project will need to consider pedestrian and bicycle access as well as ADA accessibility. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Are there any concerns related to landscaping? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Are there any concerns related to existing or proposed lighting (e.g., light trespass, river navigation, airway clearance)? | Lighting at new interchange. |
| ☐Yes ☐ No<br>☐ Possible<br>☐ Not Applicable | Are there any other project concerns? *Specify* | |

| **PERMIT ISSUES:** | | |
|---|---|---|
| ***Indicate if the following permit issues are present or should be considered during project development. Provide additional comments as needed.*** | | |
| | **Issue** | **Comments** |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Will an individual Corps of Engineers/ Environmental Protection Agency 404/401 permit be required? | Will depend upon preferred alternative and calculation of impacts. |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Does it appear that the project can be constructed under a nationwide 404/401 permit? If so, which permit and what specific requirements apply? | To be determined upon calculation of impacts. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Will a Coast Guard permit be required? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Is review by a local public agency or project sponsor required? *Specify*. | Clermont County TID. |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Is Airway/Highway clearance analysis required? | |
| ☐Yes ☐ No<br>X Possible<br>☐ Not Applicable | Is State Historic Preservation Office (SHPO) coordination for work involving historic bridges or historic properties required? | Reconnaissance-level survey is required for archaeology and history/architecture, to be coordinated with SHPO. Historic properties to be determined. |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Is coordination with ODNR for work involving State Scenic Rivers, State Wildlife Areas or State Recreational Areas required? | |
| XYes ☐ No<br>☐ Possible<br>☐ Not Applicable | Is coordination with any other agency required (see Location and Design Manual Volume 3)? | US Fish and Wildlife and Ohio Department of Natural Resources. |

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

| **SCOPE, SCHEDULE AND BUDGET CONSIDERATIONS:** | | |
|---|---|---|
| ***Based on the responses to the red flag questions, do any of the following need to be modified?*** | | |
| | **Issue** | **Comments** |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Conceptual scope | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Work limits | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Probable environmental document type | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Major/Minor/Minimal classification | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Schedule | |
| ☐Yes X No<br>☐ Possible<br>☐ Not Applicable | Budget | |

# FIGURES



# CLE-SR 32-2.25: Segment IVa

## Project Study Area Map

Legend

🟧 study area

# APPENDIX A

## Ecological Resources Literature Review

## ECOLOGICAL RESOURCES LITERATURE SURVEY

### Secondary Source Information

Secondary source information was examined to determine potential ecological concerns associated with the proposed project. Secondary sources included: U.S. Geological Survey (USGS) topographic maps, soil survey maps and soil data (National Resources Conservation Service (NRCS), National Wetlands Inventory (NWI) maps, Ohio Wetlands Inventory (OWI) maps (U.S. Fish and Wildlife Service (USFWS), study area aerial photographs.

### Soils

The majority of soils occurring within the project study area are listed as hydric or non-hydric with hydric inclusions for Clermont County (see Hydric Soil Map Unit map).

### Aquatic Ecology

Water Quality

The study area lies within East Fork Little Miami River watershed (HUC: 05090202130) (see Hydrologic Unit Code map). Aerial and topographic mapping indicate that the area is drained by several unnamed tributaries, as well as Salt Run and Shayler Run, which have warmwater habitat (WWH) life us designations, agriculture and industry water supply use designations, and primary contact recreation uses. Salt Run-East Fork Little Miami River is listed on the 303(d) List of Prioritized Impaired Waters (Ohio EPA, 2010) (see 303(d) attachment). No state or federal scenic rivers are located within the project study area.

Ponds/Lakes

Available mapping identifies several open water/ponds as occurring within the project study area limits (See USGS Topographic map, Hydric Soils Map Units map, NWI and OWI maps).

FEMA

No special flood hazard areas were identified as occurring within the project study area (see FIRMette).

### Wetland Resources

National Wetlands Inventory maps

NWI and OWI maps identify numerous wetland and open water habitat systems within the project study area (see NWI and OWI maps). The NWI and OWI maps are developed using high altitude aerial imagery and are not ground truthed, therefore they can sometimes map wetlands that no longer exist due to development, farming, etc. as well as wetlands that never existed (errors).

### Endangered Species Resources

The USFWS lists seven (7) federally threatened, endangered, proposed, and/or candidate species for Clermont County (USFWS, 2010) (see attachment). The seven species include the endangered Indiana bat (*Myotis sodalis*), running buffalo clover (*Trifolium stoloniferum*), pink mucket pearly mussel (*Lampsilis orbiculata*), and fanshell (*Cyprogenia stegaria*) and the candidate rayed bean (*Villosa fabalis*) and sheepnose (*Plethobasus cyphyus*) mussels and the snuffbox (*Epioblama triquetra*) mussel a species of concern (see USFWS attachment).

The Ohio Department of Natural Resources (ODNR) Division of Natural Areas and Preserves (DNAP) was contacted for records of occurrences of endangered, threatened, or potentially threatened species and geological features within the study area as well as a one mile radius of the proposed project. In addition, all known Indiana bat hibernacula locations within a 10-mile radius and Indiana bat capture locations within a 5-mile radius of the proposed study area were requested. Coordination with ODNR-DNAP did not reveal the presence of any threatened, endangered, or potentially threatened species within the project study area, including a one mile radius (see DNAP attachment letter).

Ohio Department of Natural Resources

TED STRICKLAND, GOVERNOR
SEAN D. LOGAN, DIRECTOR

**Division of Natural Areas and Preserves**
*Anthony J. Celebreeze, III, Acting Chief*
2045 Morse Rd., Bldg. F-1
Columbus, OH 43229-6693
*Phone: (614) 265-6453; Fax: (614) 267-3096*

May 5, 2010

Jennifer Arp
TranSystems
55 Public Square, Suite 1900
Cleveland, OH 44113

Dear Ms. Arp:

After reviewing our Natural Heritage maps and files, I find the Division of Natural Areas and Preserves has no records of rare or endangered species in the CLE-SR32-2.25 (PID 82330) Segment IVa project area, including a one mile radius, in Union Township, Clermont County, and on the Withamsville Quad (P403100004). We also have no records for Indiana Bat (*Myotis sodalis*, state endangered, federal endangered) capture sites within a five mile radius or hibernacula within a ten mile radius of the project site.

There are no dedicated state nature preserves or scenic rivers at the project site. We are also unaware of any unique ecological sites, geologic features, animal assemblages, state parks, state forests or state wildlife areas within a one mile radius of the project area.

Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. Although we inventory all types of plant communities, we only maintain records on the highest quality areas.

Please contact me at 614-265-6818 if I can be of further assistance.

Sincerely,

Debbie Woischke, Ecological Analyst
Natural Heritage Program

RECEIVED
MAY 10 2010
TranSystems

**United States Department of the Interior**

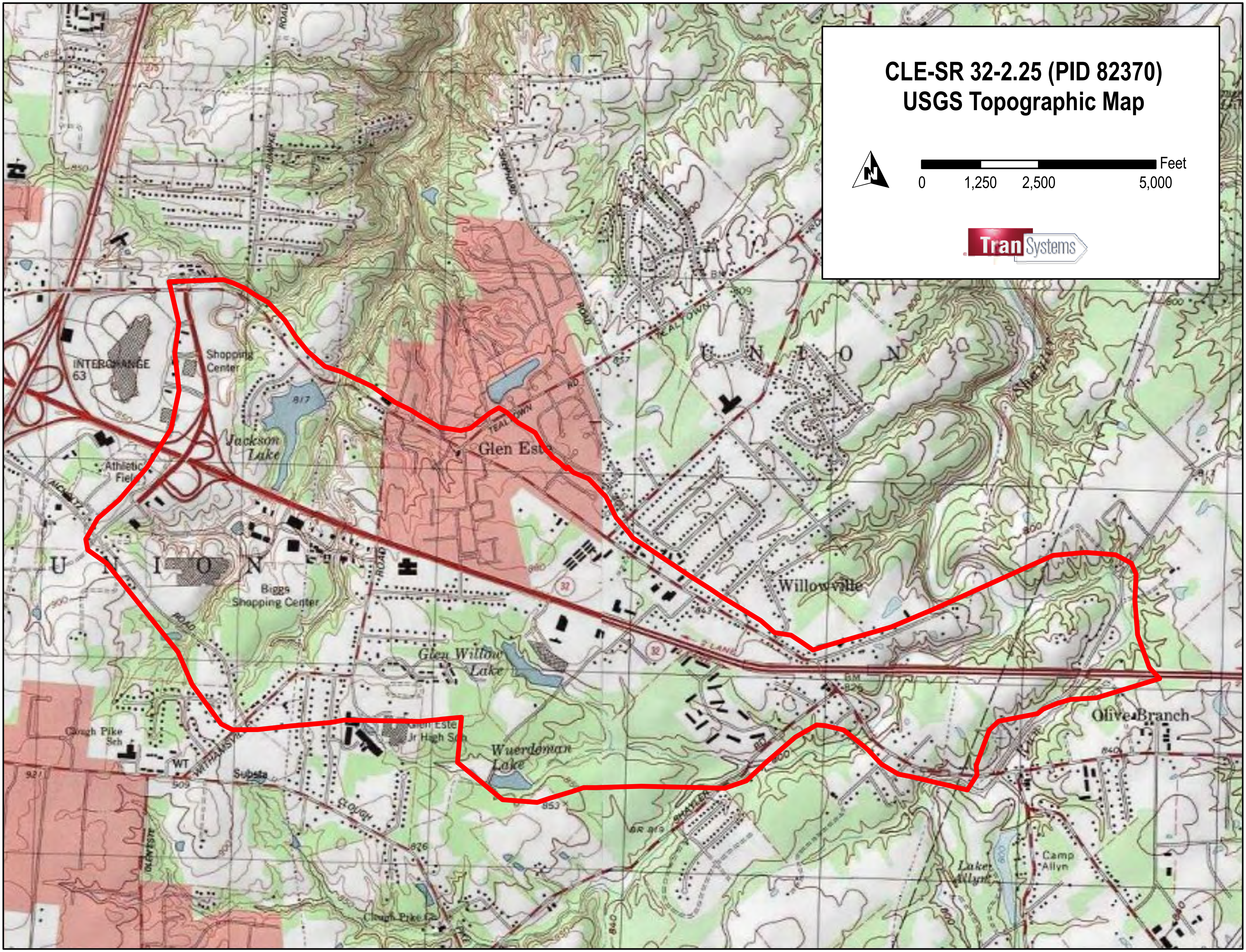
FISH AND WILDLIFE SERVICE

Ecological Services
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / FAX (614) 416-8994

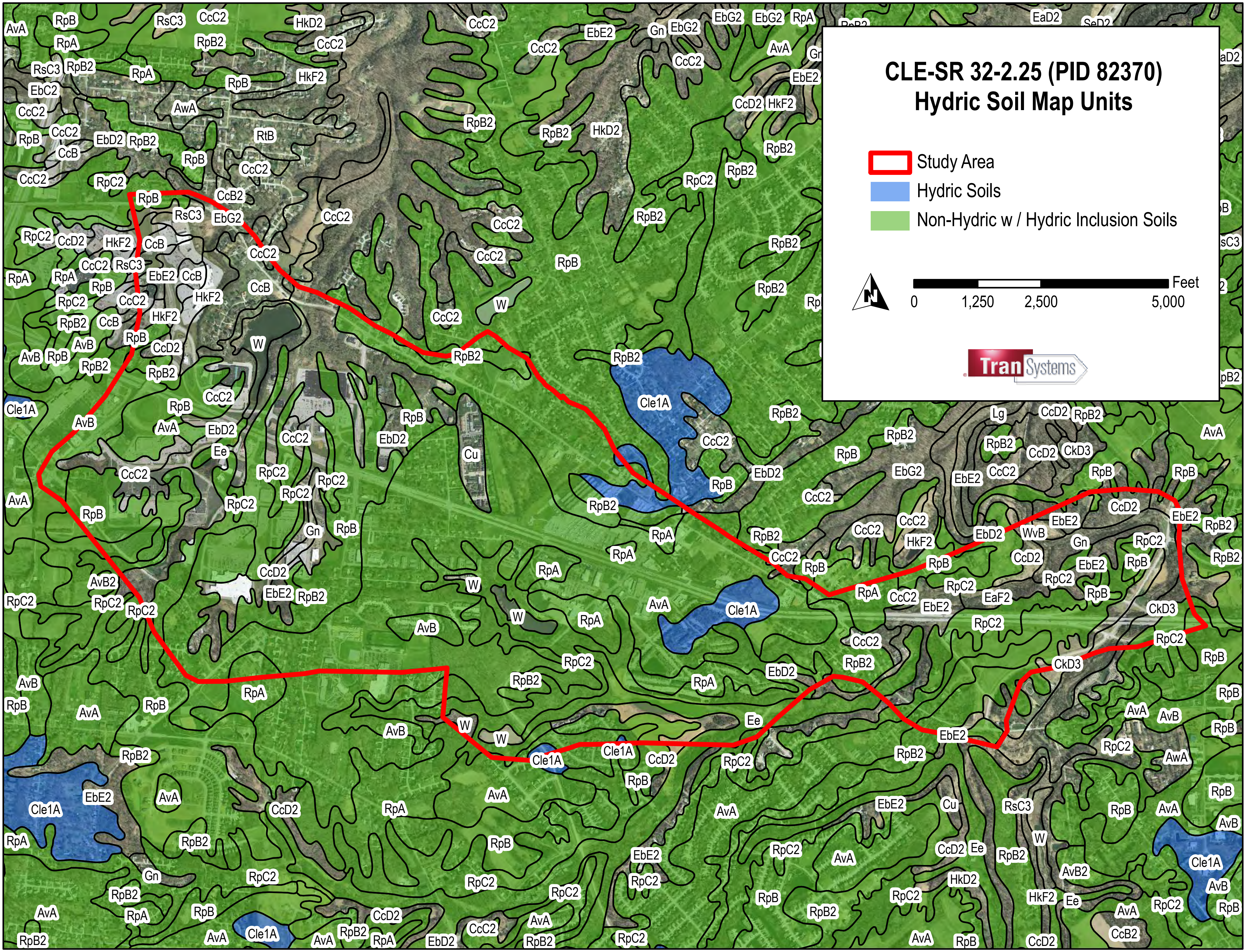
## Federally-Listed Species by Ohio Counties
## May 2010

| **COUNTY** | **SPECIES**<br>E = Endangered CH = Critical Habitat<br>T = Threatened SC = Species of Concern<br>C = Candidate |
|---|---|
| ADAMS | Indiana bat (E), running buffalo clover (E), pink mucket pearly mussel (E), fanshell (E), sheepnose (C), snuffbox (SC), timber rattlesnake (SC) |
| ALLEN | Indiana bat (E), bald eagle (SC) |
| ASHLAND | Indiana bat (E), bald eagle (SC), eastern hellbender (SC) |
| ASHTABULA | Indiana bat (E), clubshell (E), piping plover (E), eastern massasauga (C), bald eagle (SC), snuffbox (SC) |
| ATHENS | Indiana bat (E), American burying beetle (E), pink mucket pearly mussel (E), fanshell (E), sheepnose (C), snuffbox (SC), timber rattlesnake (SC) |
| AUGLAIZE | Indiana bat (E) |
| BELMONT | Indiana bat (E), sheepnose (C), snuffbox (SC), bald eagle (SC), eastern hellbender (SC) |
| BROWN | Indiana bat (E), running buffalo clover (E), pink mucket pearly mussel (E), fanshell (E), rayed bean (C), sheepnose (C), bald eagle (SC), snuffbox (SC) |
| BUTLER | Indiana bat (E), bald eagle (SC) |
| CARROLL | Indiana bat (E) |
| CHAMPAIGN | Indiana bat (E), clubshell (E), eastern massasauga (C), rayed bean (C), rabbitsfoot (C), snuffbox (SC) |
| CLARK | Indiana bat (E), eastern prairie fringed orchid (T), eastern massasauga (C) |
| CLERMONT | Indiana bat (E), running buffalo clover (E), pink mucket pearly mussel (E), fanshell (E), rayed bean (C), sheepnose (C), snuffbox (SC) |
| CLINTON | Indiana bat (E), eastern massasauga (C) |
| COLUMBIANA | Indiana bat (E), eastern massasauga (C), sheepnose (C), snuffbox (SC), bald eagle (SC), eastern hellbender (SC) |
| COSHOCTON | Indiana bat (E), clubshell (E), fanshell (E), purple cat's paw pearly mussel(E), rayed bean(C), sheepnose (C), rabbitsfoot (C), bald eagle (SC), snuffbox (SC), eastern hellbender (SC) |

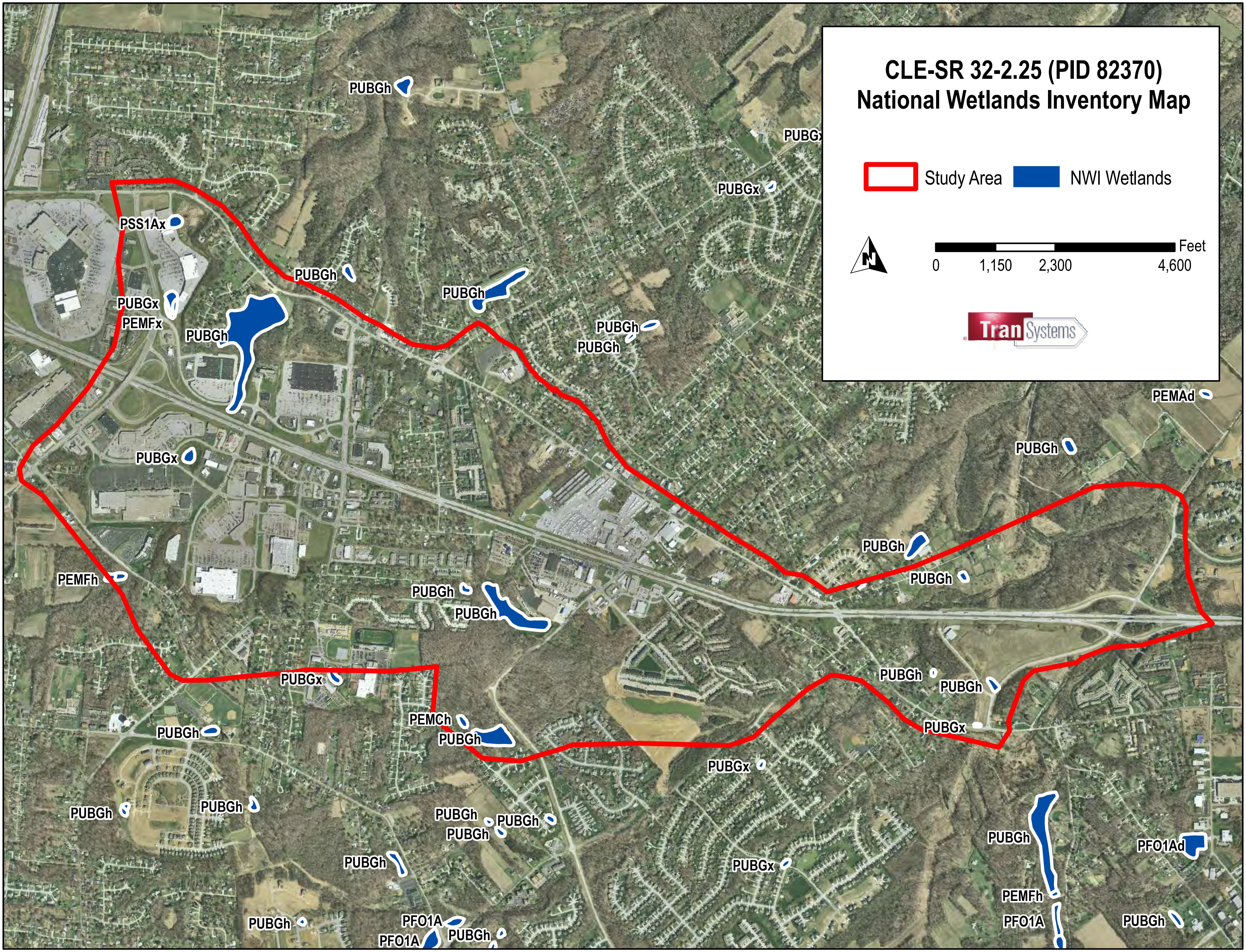
# CLE-SR 32-2.25 (PID 82370)
# USGS Topographic Map

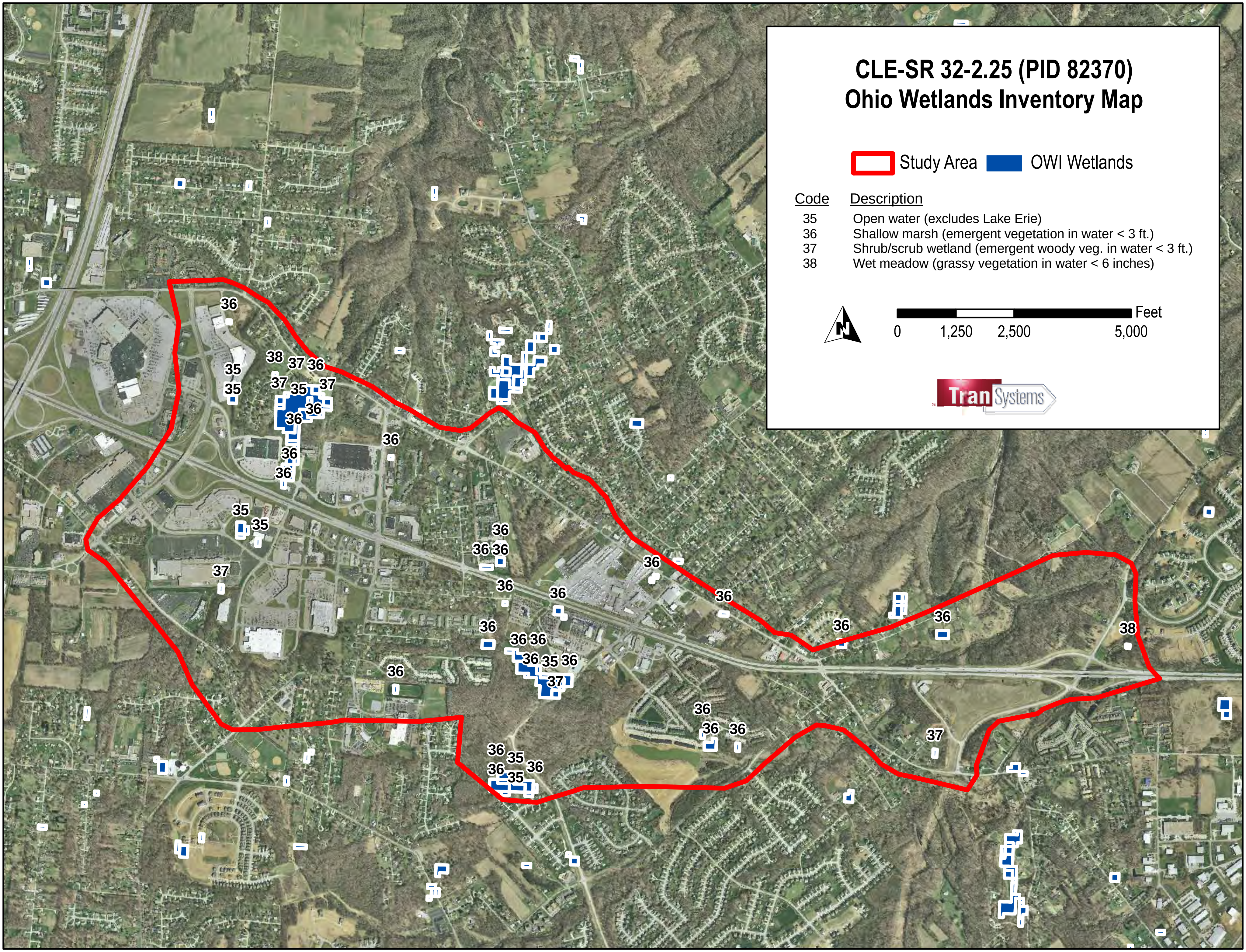


# CLE-SR 32-2.25 (PID 82370)
# Hydric Soil Map Units



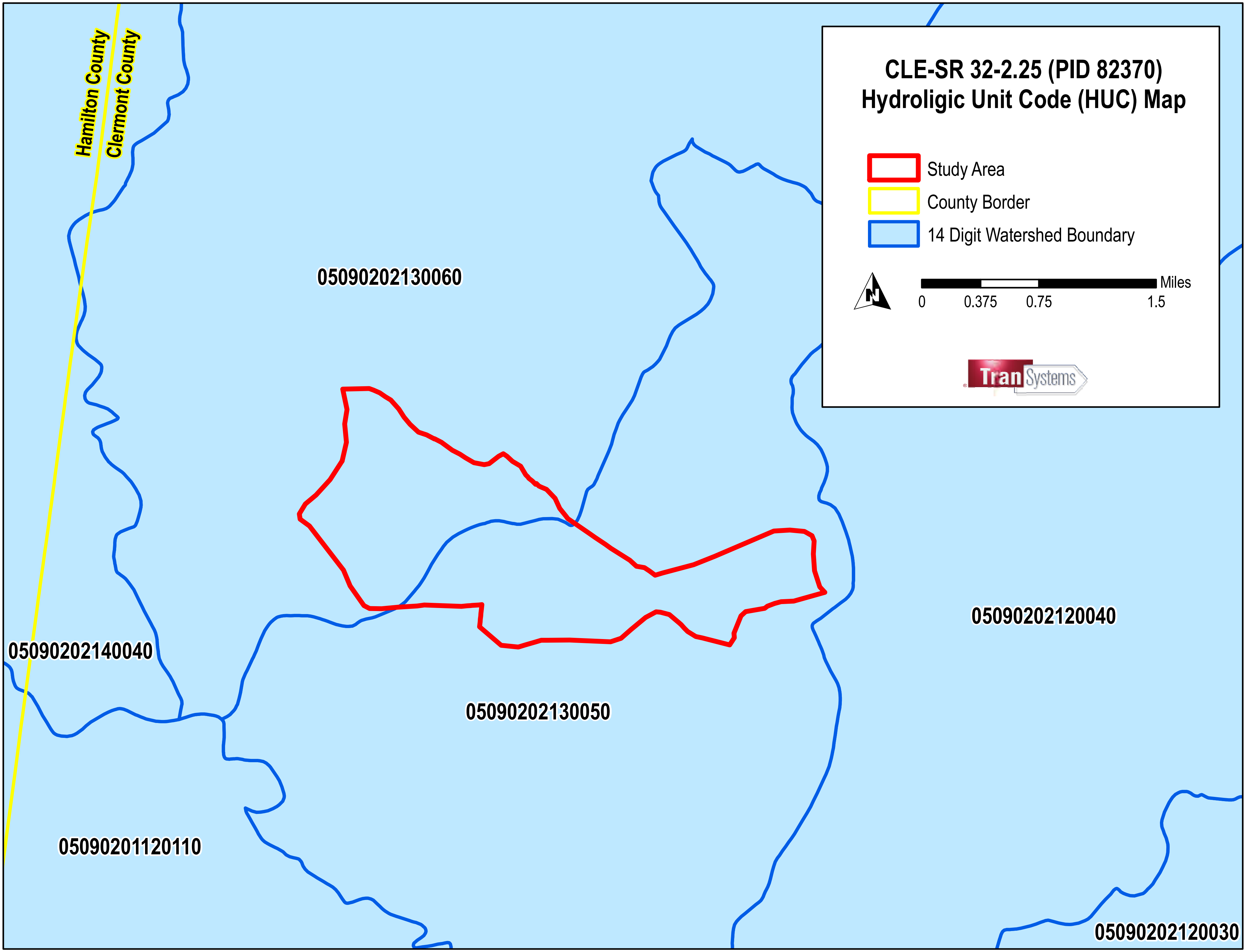
# CLE-SR 32-2.25 (PID 82370)
# National Wetlands Inventory Map





# CLE-SR 32-2.25 (PID 82370)
# Ohio Wetlands Inventory Map

| Code | Description |
|---|---|
| 35 | Open water (excludes Lake Erie) |
| 36 | Shallow marsh (emergent vegetation in water < 3 ft.) |
| 37 | Shrub/scrub wetland (emergent woody veg. in water < 3 ft.) |
| 38 | Wet meadow (grassy vegetation in water < 6 inches) |



# CLE-SR 32-2.25 (PID 82370)
# Hydroligic Unit Code (HUC) Map

# APPENDIX B

## Cultural Resources Literature Review

# Red Flag Summary CLE-SR32-2.25 (PID 82370)

**Historic Structures within Study Area**

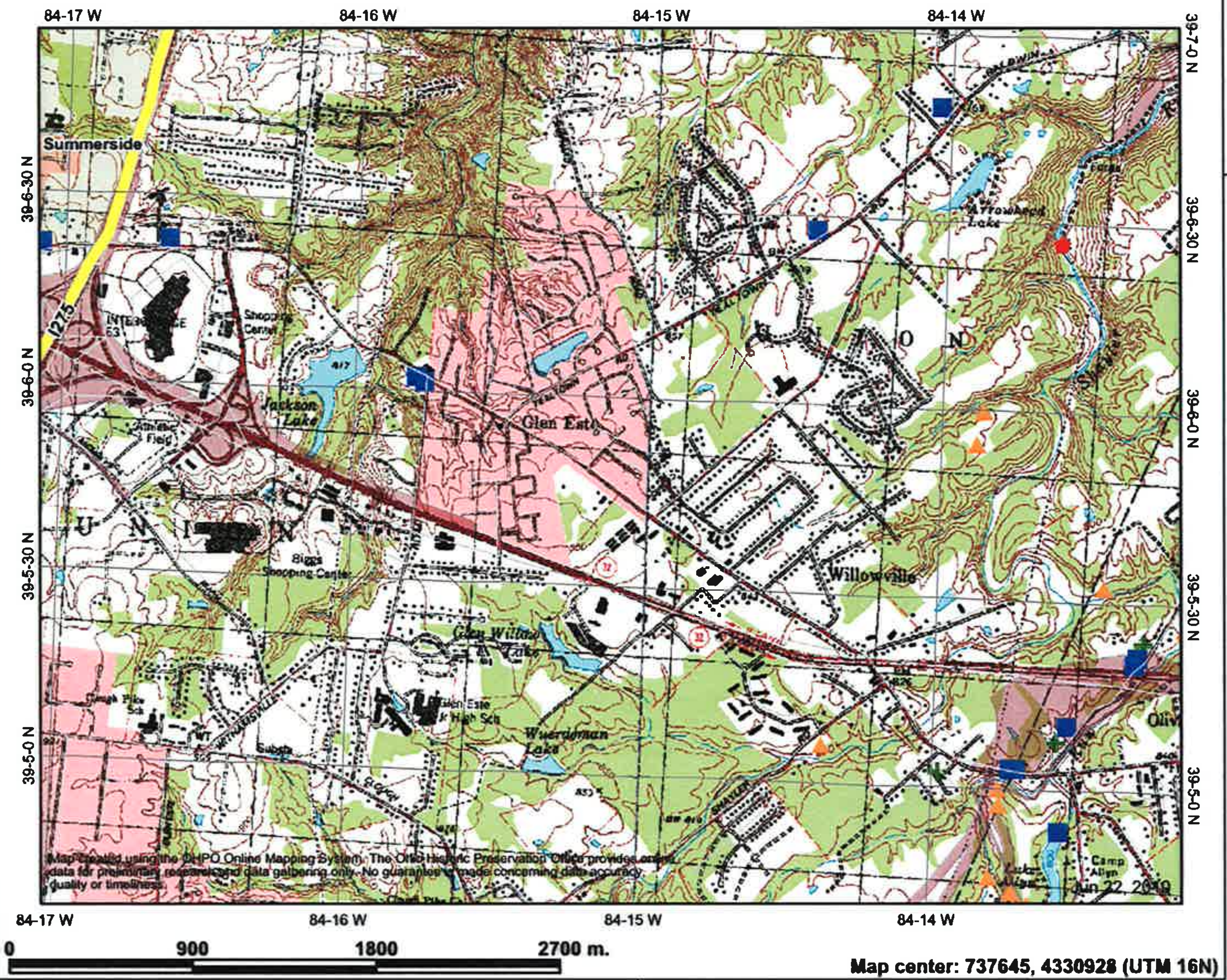
| OHI | Present Name | Former Name | Address | City/Township | Style | Use | Date | UTM | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CLE0053006 | Rose House | A Conklin House | 947 Old SR 74 | Glen Este | Vernacular | Single Dwelling | 1865 | 16 | 736670 | 4331300 |
| CLE0052906 | William Jones Bldg | null | 951 Old SR 74 | Glen Este | Vernacular | Unknown Use | 1860 | 16 | 736710 | 4331280 |
| CLE0067606 | null | West Property | 1378 Old SR 174 | Union (Township of) | Vernacular | Single Dwelling | 1945 | 16 | 739690 | 4329575 |
| CLE0067807 | Hunt Property | Darby Property | Stonelick-Olive Branch Rd | Batavia (Township of) | Vernacular | Barn | 1840 | 16 | 739960 | 4329800 |
| CLE0067907 | Potrafke Property | Hunt Property | 4409 Stonelick-Olive Branch Rd | Batavia (Township of) | Vernacular | Single Dwelling | 1865 | 16 | 740275 | 4330120 |
| CLE0068007 | Hunt Property | Darby Property | Stonelick-Olive Branch Rd | Batavia (Township of) | Vernacular | Single Dwelling | 1945 | 16 | 740285 | 4330155 |
| CLE0057907 | Lake Allyn of Camp Allyn | Lake for CG & P Power Plant | Amelia-Olive Branch Rd | Batavia (Township of) | null | Other Use | 1902 | 16 | 739950 | 4329275 |

**Archaeological Sites within Study Area**

| OAI No. | Name | Township | Time Period | Type | UTM | | |
|---|---|---|---|---|---|---|---|
| CT0596 | | Batavia | Prehistoric | Open Site | 16 | 740510 | 4330290 |
| CT0597 | | Batavia | Prehistoric | Open Site | 16 | 740100 | 4330470 |
| CT0547 | | Batavia | Prehistoric | Open Site | 16 | 739650 | 4329380 |
| CT0548 | | Batavia | Historic | Open Site | 16 | 739640 | 4329460 |
| CT0581 | | Batavia | Prehistoric | Open Site | 16 | 738760 | 4329620 |
| CT0170 | Wiederhold Mound / Pfarr Site | Batavia | Prehistoric | Open Site | 16 | 739460 | 4331300 |
| CT0172 | Wiederhold Site | Batavia | Prehistoric | Open Site | 16 | 739435 | 4331138 |

Ohio Historic Preservation Office

# Segment IVa Cultural Literature Review Map



Map created using the OHPO Online Mapping System. The Ohio Historic Preservation Office provides online data for preliminary research and data gathering only. No guarantee is made concerning data accuracy, quality or timeliness.

**Map center: 737645, 4330928 (UTM 16N)**

## Legend

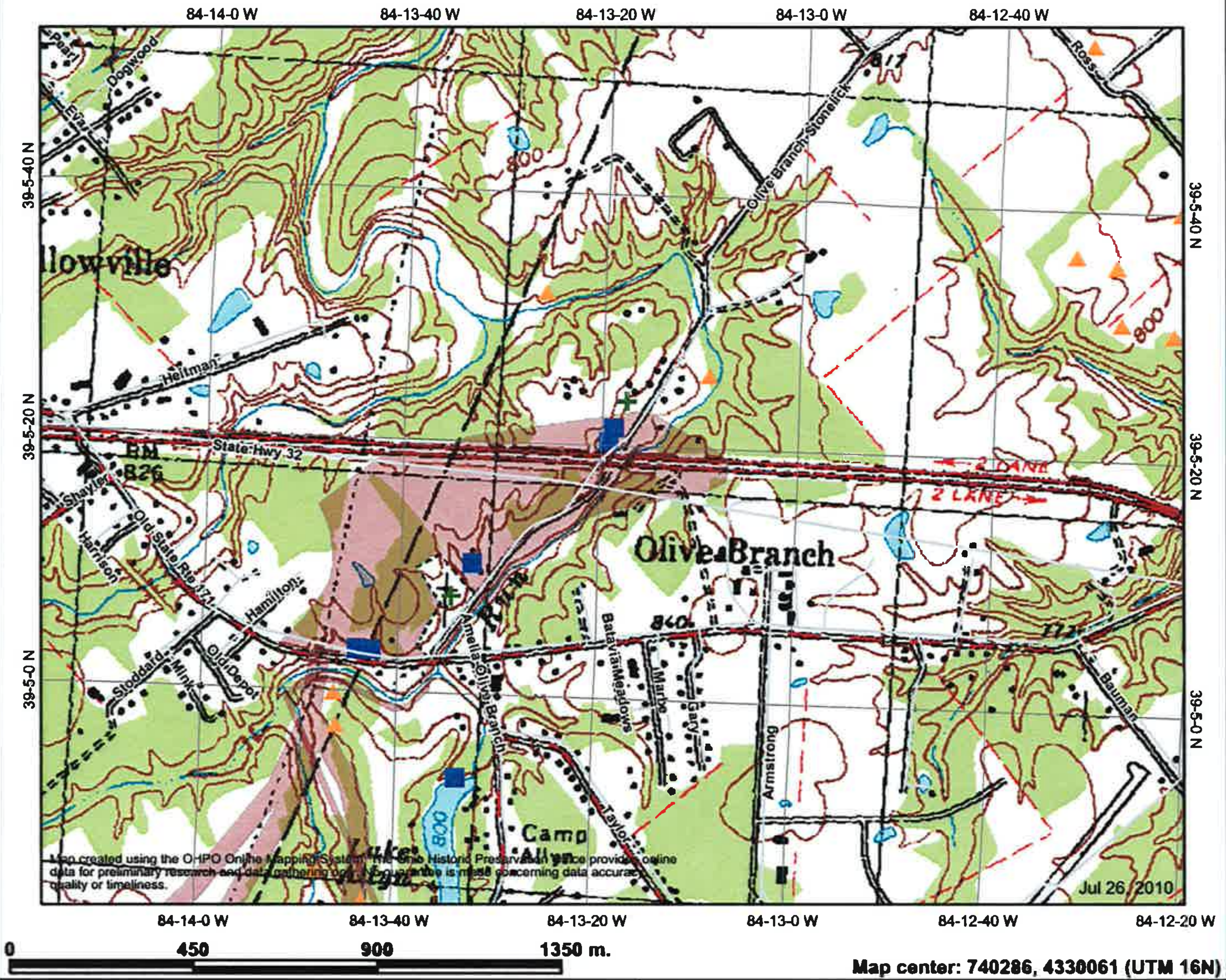
- NR Determinations of Eligibility
- National Road
- Highways
- Roads
- ⬟ National Register Listings
- ▲ Archaeological Sites
- ■ Historic Structures
- ✚ OGS Cemeteries
- ▨ Phase 1
- ▨ Phase 2
- ▨ Phase 3
- ☐ National Register Boundaries
- ☐ Cities
- ■ Wayne National Forest
- Counties

**Scale: 1:38,173**

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Ohio History
Ohio Historic Preservation Office

# Detail Map--SR 32 and Olive Branch Road



Map created using the OHPO Online Mapping System. The Ohio Historic Preservation Office provides online data for preliminary research and data gathering only. No guarantee is made concerning data accuracy, quality or timeliness.

Map center: 740286, 4330061 (UTM 16N)

## Legend

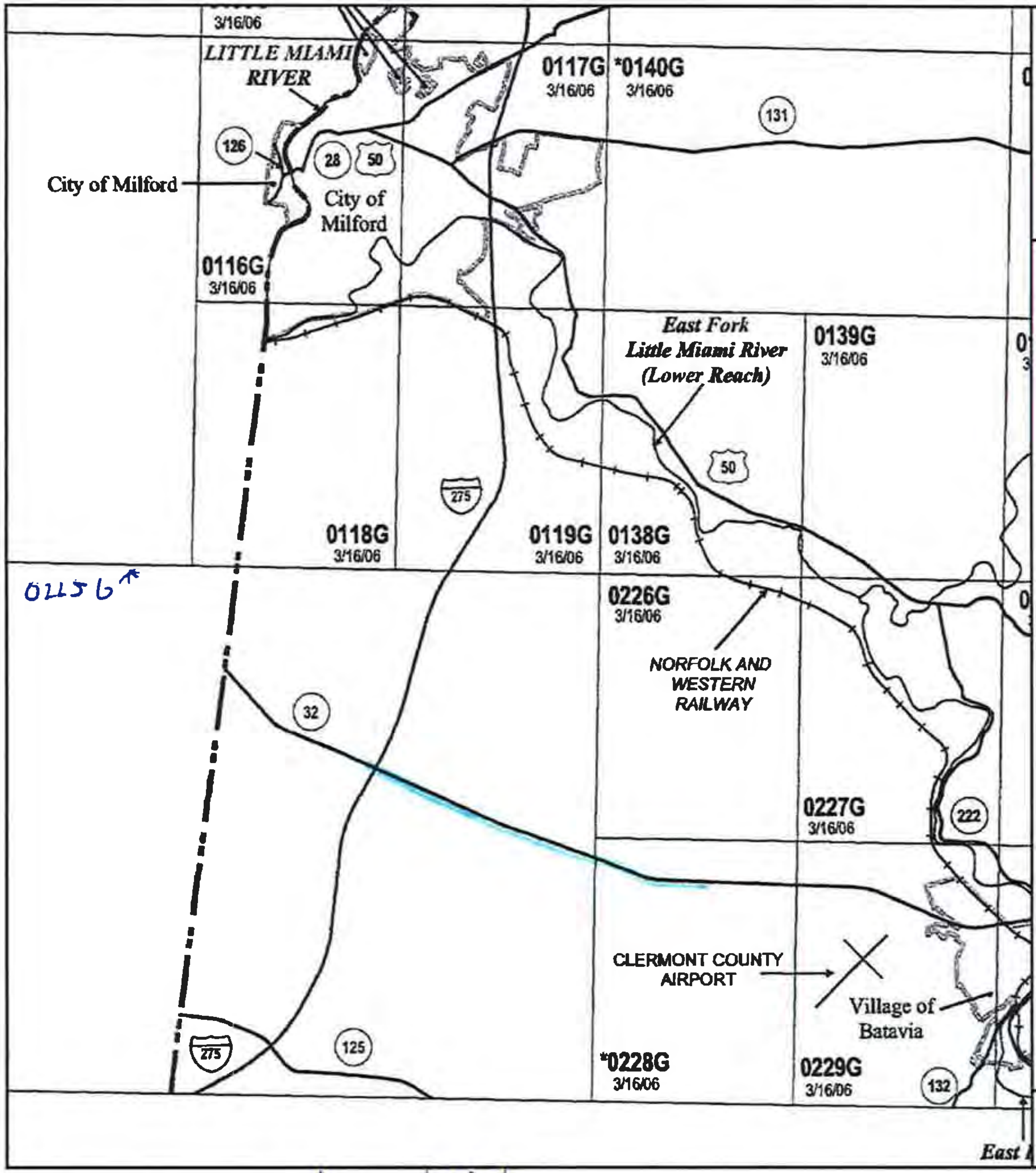
- ● NR Determinations of Eligibility
- ▬ National Road
- ▬ Highways
- ─ Roads
- ⬟ National Register Listings
- ▲ Archaeological Sites
- ■ Historic Structures
- ✚ OGS Cemeteries
- ▨ Phase 1
- ▨ Phase 2
- ▨ Phase 3
- ☐ National Register Boundaries
- ☐ Cities
- ■ Wayne National Forest
- ☐ Counties

Scale: 1:15,087

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

# APPENDIX C

**Floodplain Insurance Map**
**Non-Attainment Area Map**
**ODOT MS4 Regulated Map**
**Sole Source Acquifer Map**
**Total Maximum Daily Load Rating**



0225G*

# FIRM

## FLOOD INSURANCE RATE MAP

## CLERMONT COUNTY, OHIO

AND INCORPORATED AREAS

# MAP INDEX

**SHEET 1 OF 2**

**PANELS PRINTED:** 18, 19, 38, 39, 102, 104, 106, 108, 109, 116, 117, 118, 119, 127, 131, 132, 135, 138, 139, 143, 144, 145, 155, 160, 165, 170, 226, 227, 229, 233, 235, 260

**(SEE SHEET 2 FOR ADDITIONAL PANELS PRINTED)**

**MAP NUMBER**
**39025CIND1A**

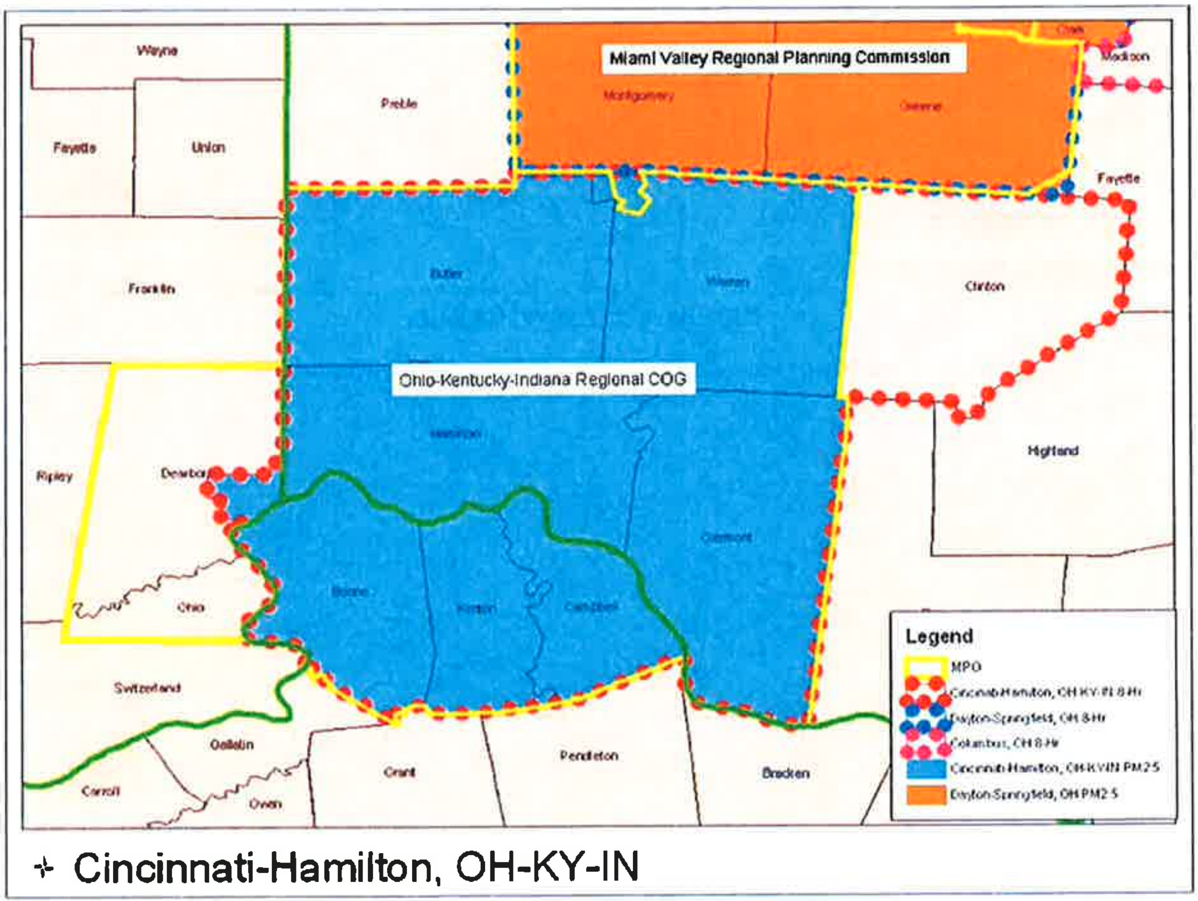
**EFFECTIVE DATE**
**MARCH 16, 2006**

**Federal Emergency Management Agency**

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

* No special flood hazard areas identified

# Cincinnati-Hamilton, OH-KY-IN PM2.5 Nonattainment Area Map



Prepared by FHWA-HEPN-40

April 2005

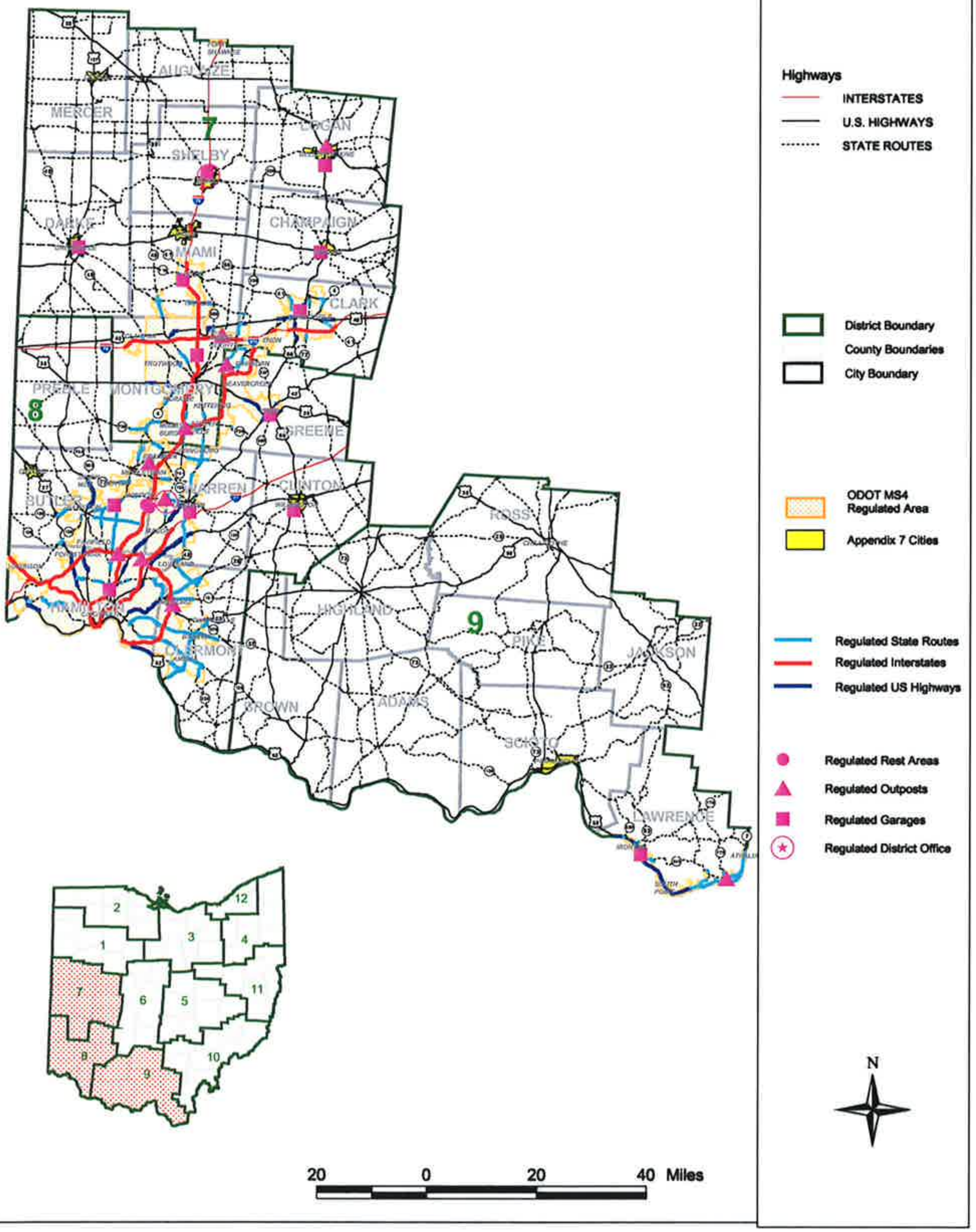
"This map shows the boundaries of the designated Cincinnati-Hamilton, OH-KY-IN PM2.5 nonattainment area. It includes the boundaries of associated 8-hour ozone nonattainment areas, as well as any associated MPOs. The map is intended to depict the extent of PM2.5 nonattainment in this area, and how the boundaries of the PM2.5 area, 8-hour area, and the MPO planning area relate to each other."

- Cincinnati-Hamilton, OH-KY-IN PM2.5 Nonattainment Area
  - INDIANA
    - Dearborn Co (P)
  - KENTUCKY
    - Boone Co
    - Campbell Co
    - Kenton Co
  - OHIO
    - Butler Co
    - Clermont Co
    - Hamilton Co
    - Warren Co
- Cincinnati-Hamilton, OH-KY-IN 8-hour Ozone Nonattainment Area
  - INDIANA
    - Dearborn Co (P)
  - KENTUCKY
    - Boone Co

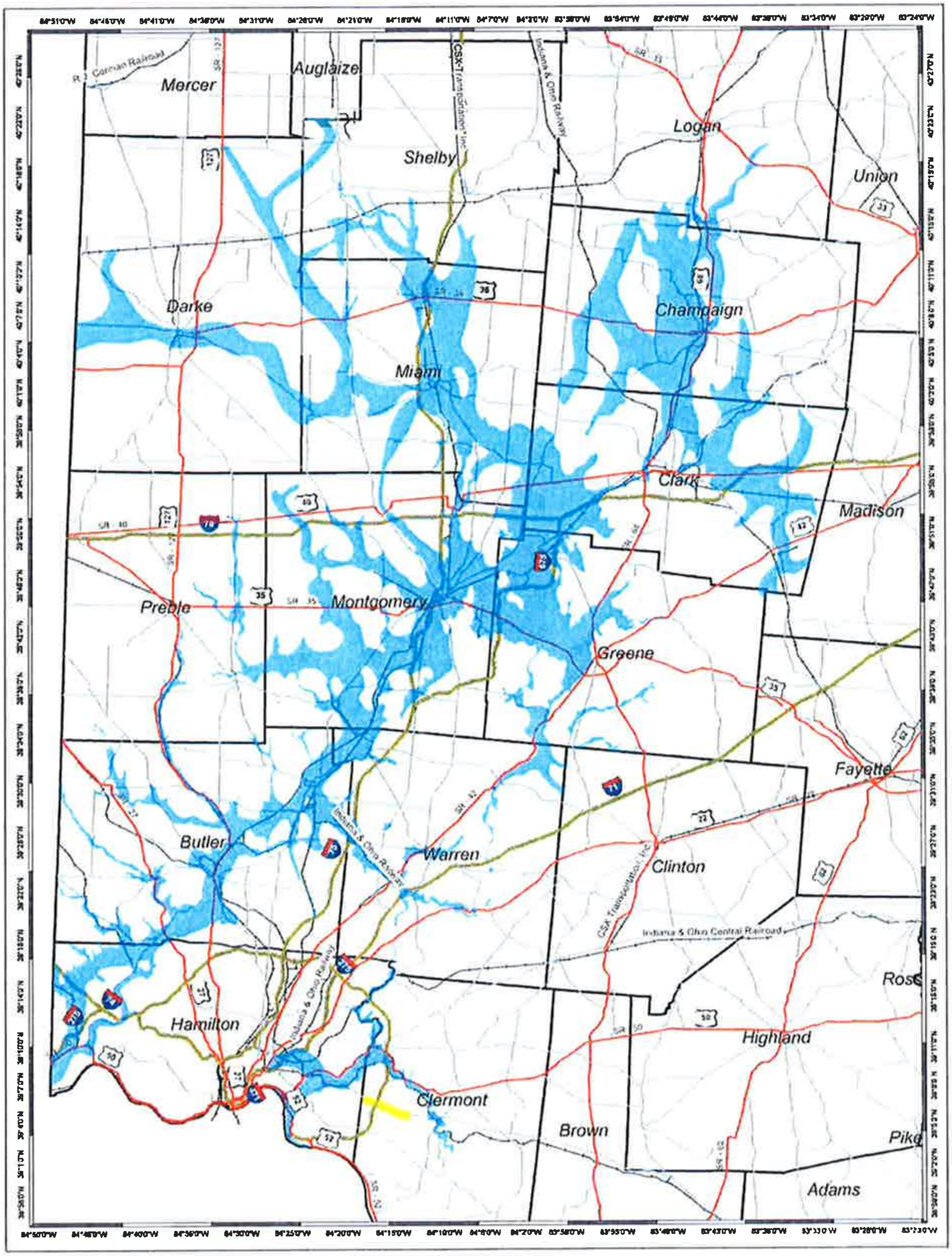
        - Campbell Co
        - Kenton Co
    - OHIO
        - Butler Co
        - Clermont Co
        - Clinton Co
        - Hamilton Co
        - Warren Co
- Ohio-Kentucky-Indiana Regional COG
    - INDIANA
        - Dearborn Co
        - Ohio Co
    - KENTUCKY
        - Boone Co
        - Campbell Co
        - Kenton Co
    - OHIO
        - Butler Co
        - Clermont Co
        - Hamilton Co
        - Warren Co

This page last modified on September 30, 2005

# ODOT MS4 Outfall Inventory Regulated Area District 7, 8 & 9



# Greater Miami Sole Source Aquifer



🟦 Ohio Sole Source Aquifers

☐ County Boundaries

0 5 10 20 Miles

**OhioEPA**

Division of Drinking and Ground Waters

*November 24, 2006*

## Section L4. Section 303(d) List of Prioritized Impaired Waters

| Assessment Unit | Assessment Unit Name | Sq. Mi. in Ohio | Human Health | Recre- ation | Aquatic Life | PDW Supply | Priority Points | Next Field Monitoring | Projected TMDL |
|---|---|---|---|---|---|---|---|---|---|
| 05090202 13 05 | Salt Run-East Fork Little Miami River | 42.5 | 1h | 5 | 5hx | 0 | 5 | 2012 | 2015 |
| 04100001 03 04 | Headwaters Tenmile Creek | 39.9 | 5h | 3 | 5x | 3i | 4 | 2014 | 2017 |
| 04100003 04 02 | Headwaters Fish Creek | 7.8 | 3 | 3 | 5x | 0 | 4 | 2012 | 2015 |
| 04100003 04 05 | Town of Alvarado-Fish Creek | 2.7 | 3 | 3 | 5x | 0 | 4 | 2012 | 2015 |
| 04100003 04 06 | Cornell Ditch-Fish Creek | 6.2 | 3 | 3 | 5x | 0 | 4 | 2012 | 2015 |
| 04100005 02 01 | Zuber Cutoff | 29.9 | 3 | 3 | 5hx | 0 | 4 | 2016 | 2019 |
| 04100005 02 02 | North Chaney Ditch-Maumee River | 14.4 | 3i | 3 | 5hx | 0 | 4 | 2016 | 2019 |
| 04100005 02 03 | Marie DeLarme Creek | 23.1 | 3 | 3 | 5hx | 0 | 4 | 2016 | 2019 |
| 04100005 02 04 | Gordon Creek | 42.9 | 3 | 3 | 5hx | 0 | 4 | 2016 | 2019 |
| 04100005 02 05 | Sixmile Cutoff-Maumee River | 15.7 | 3 | 3 | 5hx | 0 | 4 | 2016 | 2019 |
| 04100005 02 06 | Platter Creek | 21.7 | 3 | 3 | 5hx | 0 | 4 | 2016 | 2019 |
| 04100005 02 07 | Sulphur Creek-Maumee River | 18.2 | 3 | 3 | 5hx | 0 | 4 | 2016 | 2019 |
| 04100005 02 08 | Snooks Run-Maumee River | 24.9 | 3i | 3 | 5hx | 0 | 4 | 2016 | 2019 |
| 04100006 03 01 | Bates Creek-Tiffin River | 29.3 | 5h | 3 | 5hx | 3i | 4 | 2011 | 2014 |
| 04100006 03 03 | Flat Run-Tiffin River | 33.2 | 5h | 3 | 5hx | 3i | 4 | 2011 | 2014 |
| 04100006 05 02 | Brush Creek | 66.0 | 5h | 3 | 5hx | 3i | 4 | 2011 | 2014 |
| 04100007 04 03 | Honey Run | 13.3 | 5h | 3 | 5hx | 3i | 4 | 2010 | 2013 |
| 04100009 02 02 | Benien Creek | 24.0 | 3 | 3 | 5x | 0 | 4 | 2016 | 2019 |
| 04100009 02 04 | Garret Creek | 28.6 | 3 | 3 | 5x | 0 | 4 | 2016 | 2019 |
| 04100009 02 05 | Oberhaus Creek | 24.0 | 3 | 3 | 5x | 0 | 4 | 2016 | 2019 |
| 04100009 02 06 | Village of Napoleon-Maumee River | 21.3 | 3i | 3 | 5x | 0 | 4 | 2016 | 2019 |
| 04100009 04 03 | Dry Creek-Maumee River | 27.4 | 3 | 3 | 5hx | 0 | 4 | 2016 | 2019 |
| 04100009 09 01 | Grassy Creek Diversion | 24.8 | 3 | 5 | 3i | 0 | 4 | 2023 | 2011 |
| 04100010 01 02 | Needles Creek | 31.4 | 3 | 5 | 5 | 0 | 4 | 2023 | 2011 |
| 04100010 02 05 | Cessna Ditch-Middle Branch Portage River | 25.4 | 3i | 5 | 1 | 0 | 4 | 2023 | 2011 |
| 04100010 07 03 | Cedar Creek-Frontal Lake Erie | 58.0 | 3 | 5 | 5 | 0 | 4 | 2023 | 2011 |
| 04100010 07 04 | Wolf Creek-Frontal Lake Erie | 15.2 | 3 | 5 | 3i | 0 | 4 | 2023 | 2011 |
| 04100010 07 06 | Otter Creek-Frontal Lake Erie | 18.1 | 3i | 5 | 5 | 0 | 4 | 2023 | 2011 |
| 04100011 01 03 | Mills Creek | 42.2 | 3 | 3 | 5hx | 3i | 4 | 2009 | 2012 |
| 04100011 06 05 | Mouth Tymochtee Creek | 26.1 | 1 | 5 | 4Ax | 0 | 4 | 2019 | 2022 |
| 04100011 08 06 | Lower Honey Creek | 35.6 | 3 | 5 | 4Ax | 0 | 4 | 2019 | 2022 |
| 04100012 03 04 | Old Woman Creek | 26.5 | 3 | 5 | 4Ax | 0 | 4 | 2021 | 2024 |
| 04110001 01 06 | Cossett Creek-West Branch Rocky River | 41.4 | 1 | 3 | 5x | 0 | 4 | 2021 | 2024 |

# APPENDIX D

## ESA Hazardous Materials Literature Review

Segment IV A contains (but is not limited to) the following hazardous wastes sites of concern:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CIVACON A DOVER RESOURCES CO FRS ECHO<br>4595 E TECH DR CINCINNATI, OH 45245 | - | - | - | - | - | View Report | - |
| CUSTOM COLORS AUTO SERVICE FRS ECHO<br>1124A OLD ROUTE 74 BATAVIA, OH 45103 | - | - | - | - | - | View Report | - |
| DYNAMICS CORP OF AMERICA ELLIS & WATTS DIV FRS ECHO<br>4400 GLEN WILLOW LAKE LANE BATAVIA, OH 451030000 | View Report | - | - | - | - | View Report | - |
| EASTGATE MOTORS INC FRS ECHO<br>4468 EASTGATE BLVD CINCINNATI, OH 45245 | - | - | - | - | - | View Report | - |
| ENVIRONMENTAL CHEMICAL CORP FRS ECHO<br>3235 OMNI DRIVE CINCINNATI, OH 452451515 | - | - | - | - | - | View Report | - |
| FIRESTONE FRS ECHO<br>4625 EASTGATE BLVD CINCINNATI, OH 45245 | - | - | - | - | - | View Report | - |
| HEMPLEMAN S AUTO BODY FRS ECHO<br>4413 KITTY LN BATAVIA, OH 45103 | - | - | - | - | - | View Report | - |
| HOLMAN MOTORS INC FRS ECHO<br>4387 ELICK LN BATAVIA, OH 45103 | - | - | - | - | - | View Report | - |
| JEFF WYLER BUICK PONTIAC FRS ECHO<br>1117 STATE ROUTE 32 BATAVIA, OH 45103 | - | - | - | - | - | View Report | - |
| JERRY S AUTOBODY CARSTAR INC FRS ECHO<br>4425 AICHOLTZ RD CINCINNATI, OH 45201 | - | - | - | - | - | View Report | - |
| KROGER #902 FRS ECHO<br>4530 EASTGATE BLVD CINCINNATI, OH 45245 | - | - | - | - | - | View Report | - |
| LUCAS AUTOMOTIVE FRS ECHO<br>3241 OMNI DR. CINCINNATI, OH 45245 | View Report | - | - | - | - | View Report | View Report |
| MEIJER #148 GAS STATION FRS ECHO<br>887 EASTGATE NORTH ROAD CINCINNATI, OH 45245 | - | - | - | - | - | View Report | - |
| MEIJER STORE NO 148 FRS ECHO<br>4445 GLEN-ESTE WITHAMSVILLE RD CINCINNATI, OH 45245 | - | - | - | - | - | View Report | - |
| MIDWEST AUTO EXCHANGE FRS ECHO<br>4584 SUMMERSIDE RD CINCINNATI, OH 45244 | - | - | - | - | - | View Report | - |
| PEP BOYS THE NO 260 FRS ECHO<br>4436 GLENESTE-WITHAMSVILLE CINCINNATI, OH 45245 | - | - | - | - | - | View Report | - |

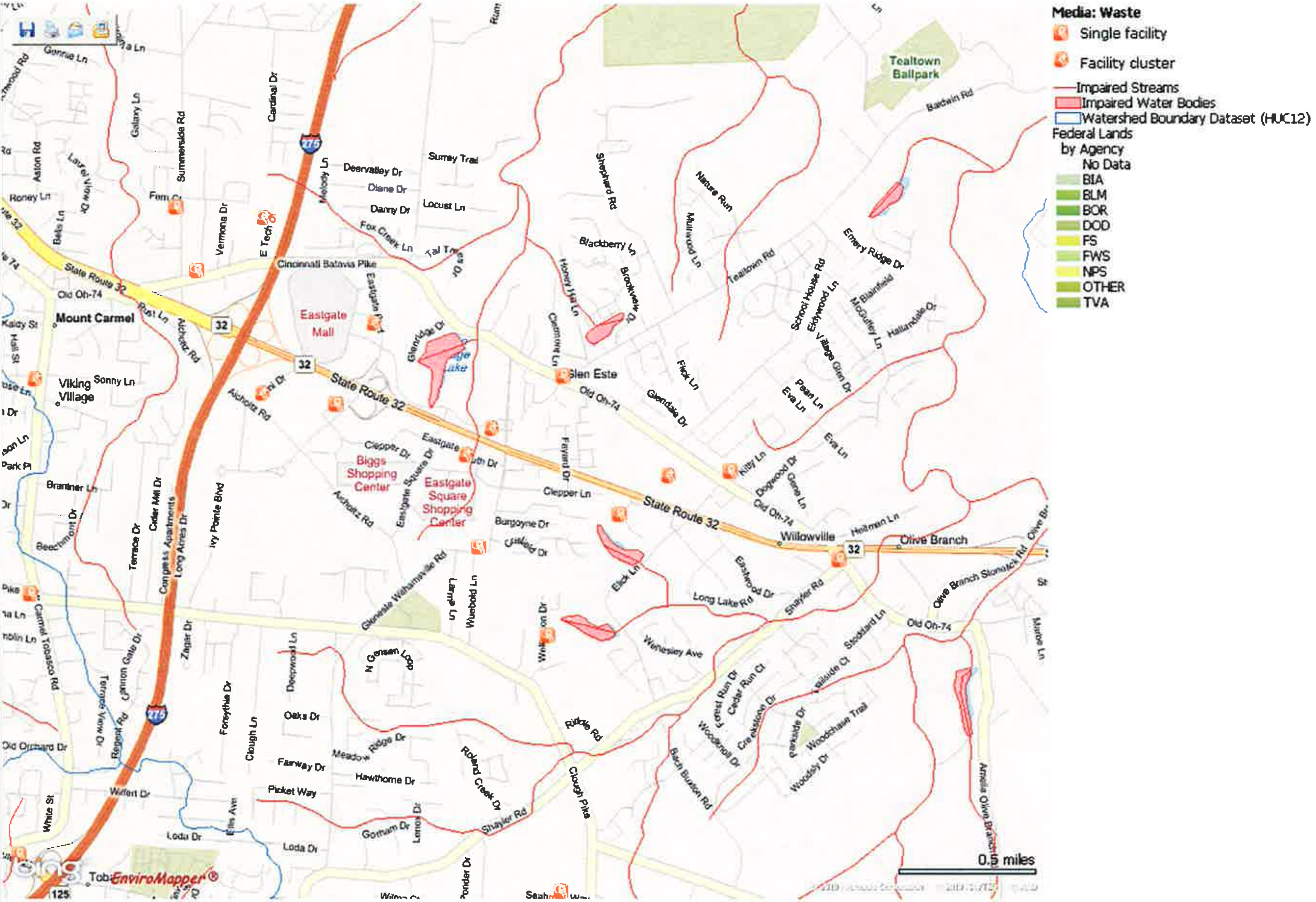
| | | | | | |
|---|---|---|---|---|---|
| SAMS CLUB NO 6528 FRS ECHO<br>815 CLEPPER LANE CINCINNATI, OH 45245 | - | ---- | View<br>Report | | - |
| SEARS # 1810 FRS ECHO<br>4595 EASTGATE BLVD CINCINNATI, OH 45245 | - | ---- | View<br>Report | | - |
| SUMMERS BODY AND PAINT FRS ECHO<br>1107 OLD ST RTE 74 BATAVIA, OH 45103 | - | ---- | View<br>Report | | - |
| TEALTOWN EXXON FRS ECHO<br>1006 CINCINNATI BATAVIA PIKE BATAVIA, OH 45103 | - | ---- | View<br>Report | | - |
| TERMINIX BRANCH 2020 FRS ECHO<br>4440 GLEN ESTE-WITHAMSVILLE RD CINCINNATI, OH 45245 | - | ---- | View<br>Report | | - |
| TRENTEC INC FRS ECHO<br>4600 E TECH DR CINCINNATI, OH 45245 | - | ---- | View<br>Report | | - |
| VIVI-COLOR INC * FRS ECHO<br>665 CINCINNATI-BATAVIA PIKE CINCINNATI, OH 45245 | - | ---- | View<br>Report | View<br>Report | |
| WAL-MART NO 1443 FRS ECHO<br>4370 EASTGATE SQUARE DR CINCINNATI, OH 45201 | - | ---- | View<br>Report | | - |
| WEST CLERMONT FRS ECHO<br>4342 GLEN ESTE WITHAMSVILLE RD CINCINNATI, OH 45245 | - | ---- | View<br>Report | | - |
| WYLER JEFF NISSAN INC FRS ECHO<br>861 WYLER PARK DR CINCINNATI, OH 45245 | - | ---- | View<br>Report | | - |

Segment IV A also contains (but is not limited to) the following UST/LUST sites of concern:

| **Facility Id** | **Facility Name** | **Address** | **City** |
|---|---|---|---|
| 13000126 | SUNOCO #0043-8820 | 1006 CINCINNATI-BATAVIA PIKE | BATAVIA |
| 13010072 | TEALTOWN EXXON | 1006 OLD STATE RTE 74 | BATAVIA |
| 13004027 | SAULS CONSTRUCTION CO., INC. | 1077 CINCINNATI-BATAVIA PIKE | BATAVIA |
| 13000113 | GLENESTE MARATHON | 1098 CINCINNATI-BATAVIA PIKE | BATAVIA |

|  |  |  |  |
|---|---|---|---|
| 13000010 | JEFF WYLER AUTO CENTER | 1117 ST RT 32 | BATAVIA |
| 13010103 | BIG MIKES GAS-N-GO | 1147 MARIAN DR | BATAVIA |
| 13000026 | CLERMONT DISTRIBUTING CO | 1155 Old State Route 74 | BATAVIA |
| 13002579 | SPEEDWAY #9674 | 1269 OLD ST RT 74 | BATAVIA |
| 13002615 | UNITED DAIRY FARMERS #139 | 957-961 CINCINNATI-BATAVIA PIKE | BATAVIA |

# CLE-SR 32-2.25 Segment IVA ESA Red Flag Map



## APPENDIX E

## Geotechnical Red Flag Report

# RED FLAG SUMMARY

# GEOTECHNICAL INFORMATION, SITE VISIT & ISSUES
# STATE ROUTE 32 & BACH BUXTON ROAD
# CLERMONT COUNTY, OHIO

*Prepared For:*

**TranSystems**
**1105 Schrock Road, Suite 400**
**Columbus Ohio 43229**

*Prepared By:*

**Burgess & Niple, Inc.**
**312 Plum Street**
**12th Floor**
**Cincinnati, Ohio 45202-2678**

**May 24, 2010**

**BURGESS & NIPLE**

# RED FLAG SUMMARY

(Form Revised April 2005)

The purpose of this Red Flag Summary is to identify concerns that could cause revisions to the anticipated design and construction scope of work, the proposed project development schedule, the estimated project budget, or the potential impacts of the project on the surrounding area.

Date Red Flag Summary Completed: June 4, 2010
District: District 8
Project Name (County, Route and Section): CLE-32-2.25
City, Township or Village Names(s): Batavia, Union Township
PID: 82370
Prepared by: Burgess & Niple, Inc.
ODOT Project Manager: Jay Hamilton

**EXISTING GEOTECHNICAL INFORMATION:**

Review of information from ODOT:

- [x]Original construction plans including plan views, profiles, and cross-sections
- [ ] Construction diaries and inspection reports for original construction
- [ ] Compile information on changes to the plans during construction activities (e.g., slope, spring drains)
- [ ] Interview people knowledgeable with the previous projects
- [ ] Maintenance records
- [x] Boring log on file with the Office of Geotechnical Engineering
- [ ] History and occurrence of landslides
- [ ] History and occurrence of rockfalls
- [ ] Other________________________________

Review of information from ODNR:

From the Division of Geological Survey

- [ ] Boring logs on file
- [ ] Measured geologic sections
- [x] Bedrock Geologic Maps
- [x] Bedrock Topography Maps
- [x] Bedrock Structure Maps
- [x] Geologic Map of Ohio
- [x] Quaternary Geology of Ohio
- [x] Known and Probable Karst in Ohio
- [ ] Bulletins
- [ ] Information Circulars
- [ ] Report of Investigations
- [x] Location and information on underground mines
- [ ] Location and characteristics of karst features
- [ ] Landslide maps
- [ ] Other________________________________

From the Division of Mineral Resource Management
[ ] Applications and permits files for surface mines (coal & industrial mineral)
[ ] Active, reclaimed or abandoned surface mines
[ ] Abandoned Mine Land (AML) sites
[ ] Emergency Projects
[ ] Other______________________________

From the Division of Soil & Water
[x] Water well logs
[x] Soil Surveys
[x] Ohio Wetland Inventory Maps
[x] National Wetland Inventory Maps
[ ] Presence of lake bed sediments, organic soils or peat deposits
[ ] Other______________________________

Other Sources:
[ ] Aerial photographs
[ ] Satellite imagery
[x] USGS quadrangles
[ ] USGS publications and files
[ ] City and County Engineers
[ ] Academia with engineering or geology programs
[ ] USGS Open File Map Series #78-1057 "Landslides and Related Features"
[ ] Other______________________________

## SITE VISIT:

Date(s) of site visit: May 24, 2010

## GEOTECHNICAL ISSUES:

### GEOLOGY

#### *Glacial Geology*

Clermont County is located in the Illinoian Till Plain of the Interior Till Plains. The glaciated and non-glaciated regions of Ohio comprise five physiographic sections, based on distinct geological profile and plant and animal communities. The study area is within the Illinoian Till Plain of the Central Lowland Till Plains. This area is characterized by broad, level to rolling uplands dissected by steep-sided stream valleys. The topography in the upland areas primarily reflects the bedrock surface due to the thin glacial cover in these areas.

Both the Illinoian and Wisconsinian glaciers advanced over two-thirds of the State of Ohio, leaving behind glacial till, kame deposits, lacustrine deposits, and outwash terraces. The Illinoian glaciers covered all of Clermont County with each glacial advance depositing variable thicknesses of glacial till across the county. The rolling ground moraine of older till within the Illinoian Till Plain section generally lacks glacial features such as moraines, kames, and eskers. Till across Clermont County is highly weathered, particularly where the till thinly covers the underlying bedrock. The majority of upland areas in Clermont County are covered by variable thicknesses of loess which is fine, silt-sized particles picked up from floodplains and deposited by wind.

According to the Ohio Department of Natural Resources (ODNR) Surficial Geology of the Ohio Portion of the Cincinnati and Falmouth 30 X 60 Minute Quadrangle Map (Map) the majority of the study area consists of Illinoian-age loam-till generally overlain by up to 3.5 feet of loess, but loess may be 10 feet thick along bluffs bordering major rivers. Additionally, landsliding may occur in oversteepend, wet areas. The Map identifies areas of Holocene-age alluvium near the eastern portion of the study area along an unnamed tributary and Shayler Run. The Map categorizes alluvium to be found within modern streams consisting of a wide variety of textural classes from silt to boulders which are generally not compact and rarely greater than 20 feet thick. According to the Map, alluvium deposits along Shayler Run within the study area are up to 20 feet thick. Additionally, the Map shows the area east of Jackson Lake along unnamed tributaries to consist of Ordivician-age shale-dominant bedrock and clay-rich bedrock-derived colluvium which is prone to landsliding.

#### *Bedrock Geology*

Based on the ODNR Bedrock Geology Map of Ohio (ODNR, 2006), bedrock within the study area, west of the eastern edge of Jackson Lake, consists of the undivided Grant Lake Formation, Miamitown Shale, and the Fairview Formation which consist of undivided Upper Ordivician limestone and shale which are interbedded. The Grant Lake Formation consists of shale (50 to 80 percent) and limestone (30 to 50 percent) that is gray to bluish gray and contains thin to medium, wavy, planar, and nodular bedding. The Fairview Formation in this area consists of limestone (50 percent) and shale (50 percent) that is gray to bluish gray, and contains thin to thick, planar to irregular bedding. This unit also contains sparse to abundant fossils. It is noted that the Miamitown Shale has been associated with bedrock slope failures (landslides in the form of rotational slopes and earthflows) in areas where thick colluvium has developed and excessive hydrostatic pressure builds up (ODNR, Geofacts No. 8).

The bedrock east of Jackson Lake within the study area consists of undivided Grant Lake Limestone and Fairview Formation which are comprised of Upper Ordivician limestone and shale. The Grant Lake Limestone is gray to bluish gray, contains thin to thick, wavy to irregular to nodular bedding and is interbedded with shale (20 to 50 percent). The Fairview Formation in this area consists of limestone

(50 percent) and shale (50 percent) that is gray to bluish gray, contains thin to thick, planar to irregular bedding, with sparse to abundant fossils.

The ODNR bedrock topography 7.5 minute Quadrangle maps for Withamsville, Ohio-Kentucky and Batavia, Ohio show bedrock topography is generally higher in the western portion of the study area and lower in the eastern portion of the study area. Near the western edge of the study area along State Route (SR) 32 a bedrock elevation of 850 feet above mean sea level (amsl) was recorded with 10 feet of overburden. Observed bedrock elevations near the eastern edge of the study area range between 755 and 768 feet amsl along SR 32 with 8 to 20 feet of overburden. Appendix 5 contains the ODNR bedrock maps discussed.

### *Soil Conservation Service Soil Description*

Twenty-two different soil types are identified within the study area according to the Clermont County Soil Survey. The majority of these soils consist of nearly level to gently sloping silt loams. Based on the Soil Survey of Clermont County, the soil types within the study area are described below in Table 1. Appendix 4 contains the USDA soil map of the study area.

### *Groundwater*

Based on the ODNR map for *Ground-Water Resources of Clermont County, Ohio* (Walker, 1986) located in Appendix 6 and the *Ground Water Pollution Potential of Clermont County* (ODNR, 1993) report, the study area is a poor source for groundwater. Bedrock consists of interbedded shale and thin limestone layers and if water is present in the rock it usually occurs in the upper few feet where the bedrock may be weathered and fractured. Wells installed in the bedrock seldom produce more than 3 gallons per minute (gpm). According to ODNR, reports of dry holes are not uncommon. The overlying glacial overburden is thin and mostly consists of fine-grained tills. Rare lenses of sand and gravel found within the till may supply limited yields.

An ODNR groundwater well log search for the study area generated four monitoring wells and three groundwater well logs. Copies of the well logs and the locations of these wells are shown on a map located in Appendix 6. Each of the four monitoring wells is located at the same address, near the center of the study area with bottom depths ranging between 13 and 14 feet below ground surface (bgs). The monitoring wells are screened in unconsolidated clay and gravel and have shallow static water levels. All three water wells are screened in shale or shale/limestone bedrock and range in total depth from 40 to 90 feet bgs. Bedrock was observed at 32 feet bgs, 21 feet bgs, and 21 feet bgs for ODNR well logs 100474, 100504, and 107858, respectively.

The *Ground Water Pollution Potential of Clermont County* (ODNR, 1993) map indicates the study area has a low vulnerability to contamination. The pollution potential is low due to several factors including the lack of groundwater within the interbedded shale and limestone bedrock which is covered by varying amounts of glacial till.

### *Wetlands and Streams*

A review of the Soil Survey of Clermont County, Ohio (1975) and the U. S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) web soil survey indicated that multiple map units identified within the project corridor are considered hydric soils within Clermont County. A review of National Wetlands Inventory (NWI) mapping for the site was also reviewed. Multiple features, most of which appear to be open water areas/ponds, are depicted within the limits of the project corridor. NWI mapping also depicted Shayler Run and its tributaries, along with other stream channels in the project area.

The following NWI wetland designations occur within the project corridor or along the edge of the corridor:

- PFO1C, Palustrine forested wetland with a seasonally flooded water regime
- R3UBH, Upper perennial riverine system with a permanently flooded water regime
- PUBGh, Palustrine system that is intermittently exposed and diked/impounded
- PUBGx, Palustrine system that is intermittently exposed and has been excavated
- PEMFx, Palustrine emergent wetland with a semipermanently flooded water regime, excavated.

**TABLE 1. SOILS WITHIN THE RED FLAG STUDY AREA**

| Soil Type | Soil Occurrence and Area | | Soil Description | Potential Red Flag Soil | Probable USCS Classification |
|---|---|---|---|---|---|
| | Acres | Percent | | | |
| Avonburg silt loam (AvA) | 230 0 | 23 1% | Slopes are 0-2 percent Consists of loess over till on till plains and is poorly drained Found on uplands and sloping areas | | ML/CL |
| Avonburg silt loam (AvB) | 2 0 | 0.2% | Slopes are 2-6 percent Consists of loess over till on till plains and is poorly drained Found on uplands, along and commonly at the heads of small drainageways | | ML/CL |
| Cincinnati silt loam (CcB) | 11 4 | 1.1% | Slopes are 2 to 6 percent Consists of loess over till on till plains and is well drained Found on relatively high ridgetops on uplands between deeply entrenched tributaries of major drainage systems | | ML/CL |
| Cincinnati silt loam (CcC2) | 32 5 | 3 3% | Slopes are 6 to 12 percent Consists of loess over till on till plains and is well drained Found on sides of smaller waterways and next to the steeper upland soils on valley walls | | ML/CL |
| Cincinnati silt loam (CcD2) | 21 4 | 2 1% | Slopes are 12 to 18 percent and are moderately eroded Consists of loess over till on till plains and is well drained. Found on side slopes of smaller waterways and adjacent to steeper soils on valley walls in upland areas | | ML/CL |
| Cincinnati and Hickory soils (CkD3) | 25 3 | 2 5% | Slopes are 12 to 25 percent and severely eroded. Consists of loess over till on till plains and are well drained Mostly found on valley walls of entrenched steam | | ML/CL |
| Clermont silt loam (Cle1A) | 35 4 | 3 6% | Slopes are 0 to 1 percent. Consists of loess and underlying Illinoian till Soils are poorly drained, not flooded, but frequently ponded This soil meets hydric criteria Found on uplands between drainageways and at the heads of low-gradient waterways where runoff water tends to pool. | X | ML/CL |
| Cut and fill land (Cu) | 13 4 | 1 3% | The cut and fill land is generally small and associated with excavated or cut soil material for fill or grading associated with urban land complexes | | N/A |
| Eden flaggy silty clay loam (EaF2) | 8 2 | 0 8% | Slopes are 25 to 50 percent and are found on moderately eroded hills Consists of 20 to 40 inches of well drained silty clay loam over bedrock (lithic) | X | CL/CH/MH |
| Edenton loam (EbD2) | 53 2 | 5 3% | Slopes are 12 to 18 percent and are moderately eroded Consists of well drained till over limestone and shale on till plains. | | CL/ML |
| Edenton loam (EbE2) | 28 6 | 2 9% | Slopes are 18 to 25 percent and are moderately eroded Consists of till over limestone and shale on till plains Erosion scars are readily visible and bedrock may be exposed in ravines and gullies | | CL/ML |
| Edenton loam (EbG2) | 39 9 | 4 0% | Slopes are 25 to 50 percent and are moderately eroded. Consists of well drained till over limestone and shale on till plains Bedrock is commonly exposed in ravines or gullies | | CL/ML |
| Eel silt loam (Ee) | 10 9 | 1 1% | Slopes are 0 to 2 percent Consists of moderately well drained alluvium on flood plains This soil is occasionally flooded and not ponded This soil does not meed hydric criteria | | CL/ML |
| Fairmont very flaggy silty clay loam (FaG2) | 1 9 | 0 2% | Slopes are 25 to 50 percent and are moderately eroded Consists of well drained residuum weathered from limestone and shale on hills Bedrock (lithic) is approximately 10 to 20 inches below grade Found on uplands along the rims of the sides fo hills that border streams | X | CL/CH/MH |
| Genesee silt loam (Gn) | 33 8 | 3 4% | Slopes are 0 to 2 percent Consists of deep loamy alluvium on flood plains that is well drained This soil is occasionally flooded, not ponded, and does not meet hydric criteria | | ML/SM |
| Hickory loam (HkF2) | 9 8 | 1 0% | Slopes are 18 to 35 percent and are moderately eroded Consists of well drained loess over till on till plains Found on uplands in irregular shaped wooded areas | | CL/ML |
| Lanier sandy loam (Lg) | 1 8 | 0 2% | Slopes are 0 to 2 percent Consists of loamy alluvium over outwash on floodplains It is well drained, occaisionally flooded, but not ponded This soil does not meed hydric criteria | | CL/ML |
| Rossmoyne silt loam (RpA) | 56 6 | 5 7% | Slopes are 0 to 2 percent Consists of moderately well drained loess over till on till plains | | ML/CL |
| Rossmoyne silt loam (RpB) | 190 2 | 19 1% | Slopes are 2 to 6 percent Consists of loess over till on till plains and is moderately well drained Found on ridges of the uplands | | ML/CL |
| Rossmoyne silt loam (RpB2) | 81 7 | 8 2% | Slopes are 2 to 6 percent and are moderately eroded Consists of loess over till on till plains and is moderately well drained | | ML/CL |
| Rossmoyne silt loam (RpC2) | 96 1 | 9 6% | Slopes are 6 to 12 percent and are moderately eroded Consists of moderately well drained loess over till on till plains Found in areas near the heads of drainageways and alongside the steeper soils on uplands | | ML/CL |
| Water (W) | 10 6 | 1 1% | Water | | N/A |
| Williamsburg and Martinsville silt loams (WvB) | 2 5 | 0 2% | Slopes are 2 to 6 percent The Williamsburg component makes up 55 percent of the map unit and consists of loess over alluvium over glacial outwash and is well drained The Martinsville component makes ups 45 percent of the map unit and consists of well drained loess over glacial outwash This map unit is locatated on stream terraces | | ML/CL/SM/SC |

## EXISTING SOIL PROFILE REVIEW

There are three Soil Profile plans sets available which provide subsurface information for the Red Flag Study Area. These are CLE-74-(4.39-7.64) which was developed in 1957 for a portion of SR-32 from a point near Heitman Lane to Stonelick-Olive Branch Road. CLE-74-0.01 developed in 1958 which investigated the portion of SR-32 from the Eastgate Boulevard Interchange to Heitman Lane and CLE-CR3-0.00 (circa 1981) which was the Eastgate interchange project. The subsurface results indicate a relatively thin layer of cohesive overburden soils exist above bedrock. The overburden soils are comprised primarily of A-6 and A-7-6 soils with lesser amounts of A-4 soils. A-4b soils were evidenced in a small percentage of the soils tested. The plans indicate a few locations where fill depths were approximately 30 feet high and cut depths were on the order of 15 feet deep. Based on a review of the soil test data the water contents of the soils at the time of testing were generally slightly higher than the plastic limit of the soil except for the near surface soils where the moisture content was noticeably higher. An approximate 100-foot section of the southern portion of Jackson Lake was filled in the late 1950's to construct roadway embankment for SR 32. There were no test borings located within the lake to investigate the potential for soft soil conditions.

**GEOTECHNICAL ISSUES:**

**Based on the information compiled during this study indicate whether or not the following geotechnical issues are present or should be further considered during project development. Provide additional comments as needed.**

| | Design Issue | Comments |
|---|---|---|
| ☐ Yes ☒ No<br>☐ Possible ☐ N/A | Is there evidence of soil drainage problems (e.g., wet or pumping subgrade, standing water, the presence of seeps, wetlands, swamps, bogs)? | None observed during site visit |
| ☐ Yes ☒ No<br>☐ Possible ☐ N/A | Is the groundwater table anticipated to be affected by construction? | Does not appear that deep cuts will be needed for construction based on site topography |
| ☐ Yes ☒ No<br>☐ Possible ☐ N/A | Is there evidence of any embankment or foundation problems (e.g., differential settlement, sag, foundation failures, slope failures, scours, evidence of channel migrations)? | None observed during site visit |
| ☐ Yes ☒ No<br>☐ Possible ☐ N/A | Is there evidence of any slope instability (soil or rock)? | None observed during site visit. Embankments and cuts are nominal in height |
| ☐ Yes ☐ No<br>☒ Possible ☐ N/A | Is there evidence of unsuitable materials (e.g., presence of debris or man-made fills or waste pits containing these materials, indications from old soil borings)? | Area is highly developed and fill soils are anticipated to be encountered |
| ☒ Yes ☐ No<br>☐ Possible ☐ N/A | Is there evidence of rock strata (e.g., presence of exposed bedrock, rock on the old borings)? | Bedrock is relatively shallow at the site based on exisitng geologic and subsurface information<br>Rock is exposed in the streambeds |
| ☐ Yes ☒ No<br>☐ Possible ☐ N/A | Is there evidence of active, reclaimed or abandoned surface mines? | No mining is known to exist at the location of the site |
| ☐ Yes ☒ No<br>☐ Possible ☐ N/A | Is there information pertaining to the existence of underground mines? | |
| ☐ Yes ☒ No<br>☐ Possible ☐ N/A | Is there Acid Mine Drainage present within the study area? | |
| ☐ Yes ☐ No<br>☒ Possible ☐ N/A | Does an undercut or subgrade stabilization appear to be needed? | Possible based on review of existing subsurface explorations. The near surface native soils were typically wetter at the time the borings were drilled |
| ☐ Yes ☒ No<br>☐ Possible ☐ N/A | Should the Office of Geotechnical Engineering be contacted to evaluate the project site? | Based on our review any proposed improvements would appear to be routine from an ODOT perspective. Geotechnical coordination and consultation at the District level would appear to be sufficient. |
| ☐ Yes ☐ No<br>☐ Possible ☐ N/A | Were there any significant items found during plan and specification review? Specify. | |
| ☐ Yes ☒ No<br>☐ Possible ☐ N/A | Are There any other geotechnical issues? Specify. | Nothing significant to report at this stage |

## FIELD REVIEW

B&N performed a site visit on 5/24/10 to make site observations within the Red Flag Study Area relative to geotechnical implications for the project. Because of the size of the study area the observations were made by travelling the roadways in a vehicle. From the Eastgate Boulevard Interchange extending east along SR 32 to Old SR 74 the area is heavily developed with commercial and residential properties. Beyond Old SR-74 along SR 32 and extending east to Olive-Branch Stonelick Road the corridor becomes less developed and contains more heavily wooded areas and pastureland. In general the travelled roads were in fair to good condition with no obvious large areas distress. There are many creeks, streams and ditches in the area and in general surface drainage appeared reasonable good. Due to the large number of structures located in the area no specific observations were made relative to their condition. The bridges at the Eastgate Boulevard Interchange and Olive-Branch Stonelick Road which are located near the beginning and end of the corridor appeared in good condition. No areas of significant geotechnical concern were observed during the site visit.

## REFERENCES

Brockman, Scott. *Physiographic Regions of Ohio*. Ohio Department of Natural Resources. April 1998.

Hansen, Michael C. *Geofacts Number 8.* Ohio Department of Natural Resources, Division of Geological Survey. September 1995.

Ohio Department of Natural Resource, Division of Geological Survey. *Surficial Geology of the Ohio Portions of the Cincinnati and Falmouth 30 X 60 Minute Quadrangle*. 2004.

Ohio Department of Natural Resources, Division of Geological Survey. *Bedrock Topography of the Batavia, Ohio 7 $^{1}/_{2}$ Minute Quadrangle.* Revised July 1998.

Ohio Department of Natural Resources, Division of Geological Survey. *Bedrock Topography of the Withamsville, Ohio-Kentucky 7 $^{1}/_{2}$ Minute Quadrangle (Ohio Portion).* Revised July 1998.

Ohio Department of Natural Resources, Division of Water. *Ground Water Pollution Potential of Clermont County.* 1993.

United States Department of Agriculture Soil Conservation Service In Cooperation With Ohio Ohio Department of Natural Resources, Division of Lands and Soil and Ohio Agricultural Research and Development Center. *Soil Survey of Clermont County, Ohio.* September 1975.

Walker, A.C. *Ground-Water Resources of Clermont County.* Ohio Department of Natural Resources, Division of Water. 1985.

# APPENDICES

| | |
|---|---|
| Appendix 1 | Geotechnical Red Flag Study Area |
| Appendix 2 | Site Photos |
| Appendix 3 | List of References |
| Appendix 4 | USDA Soil Maps |
| Appendix 5 | Bedrock Topography Maps |
| Appendix 6 | ODNR Groundwater Resources Map and Water Well Logs |
| Appendix 7 | ODNR Geologic Maps |
| Appendix 8 | FEMA Flood Insurance Map |
| Appendix 9 | Ohio Mineral Industries |

# Appendix 1
# Geotechnical Red Flag Study Area

## Segment IVa Alternatives

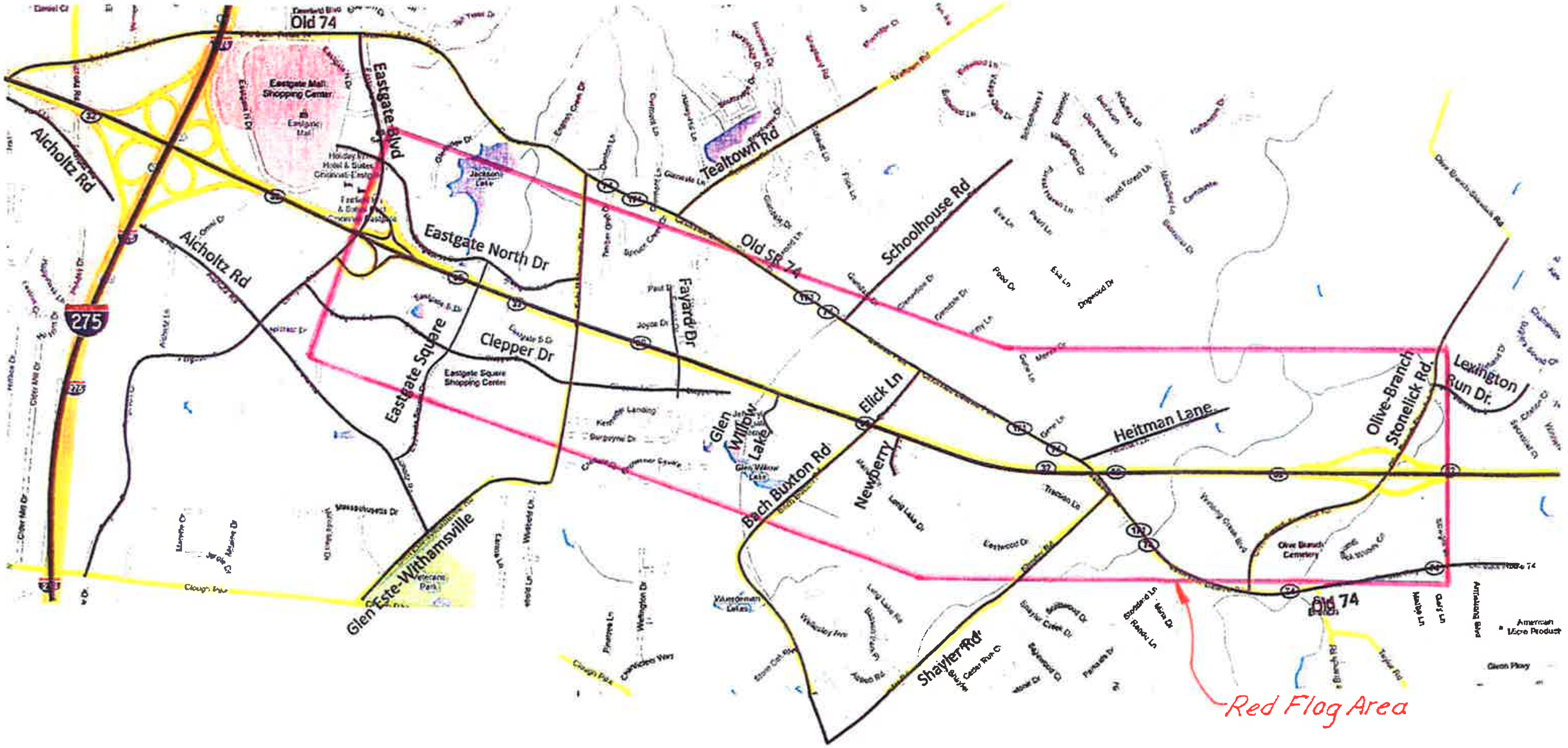


Figure 3. Location of Clermont County in Ohio.

## GENERAL INFORMATION ABOUT CLERMONT COUNTY

Clermont County is located in the southwestern part of Ohio and occupies a total land area of 459 square miles (Lerch, et al., 1975). It is bordered to the north by Warren and Clinton Counties, to the South by the Ohio River, to the East by Brown County, and to the West by Hamilton County (Figure 3).

### Climate

The climate of Clermont County is moderate and humid. The county's annual mean temperature over a 30 year period (1961 - 1990) at the Milford station in the north was 51.7 degrees Fahrenheit and at the Chilo station in the south was 53.3 degrees Fahrenheit (U.S. Department of Commerce, 1992). Annual average precipitation for the same time period at the same stations were 43.21 inches at Milford and 42.57 inches at Chilo (U.S. Department of Commerce, 1992).

### Physiography

Clermont County is located in the Till Plains Section of the Central lowlands province (Fenneman, 1938). This area is characterized by broad, level to rolling uplands dissected by steep-sided stream valleys (Hunt, 1974). The topography in the upland areas primarily reflects the bedrock surface (i.e. "bedrock-controlled") due to the thin glacial cover in these areas.

### Modern Drainage

Clermont County lies within the Ohio River Drainage Basin. Indian Creek, located in southern Clermont County, drains directly into. the Ohio River. Most of the central and southern portion of the county drains into the East Fork Little Miami River. Stonelick Creek is the largest tributary and drains north central Clermont County. The East Fork Little Miami River empties into the Little Miami River in Hamilton County. O'Bannon Creek, which drains the far northern portion of the county, empties into the Little Miami River near the Warren County boundary.

# *Appendix 2*
# *Site Photos*

Looking west along SR 32 from Gleneste-Withamsville Road

Looking east along SR 32 from Gleneste-withamsville Road

Looking west along north side of SR 32 from Elick Lane

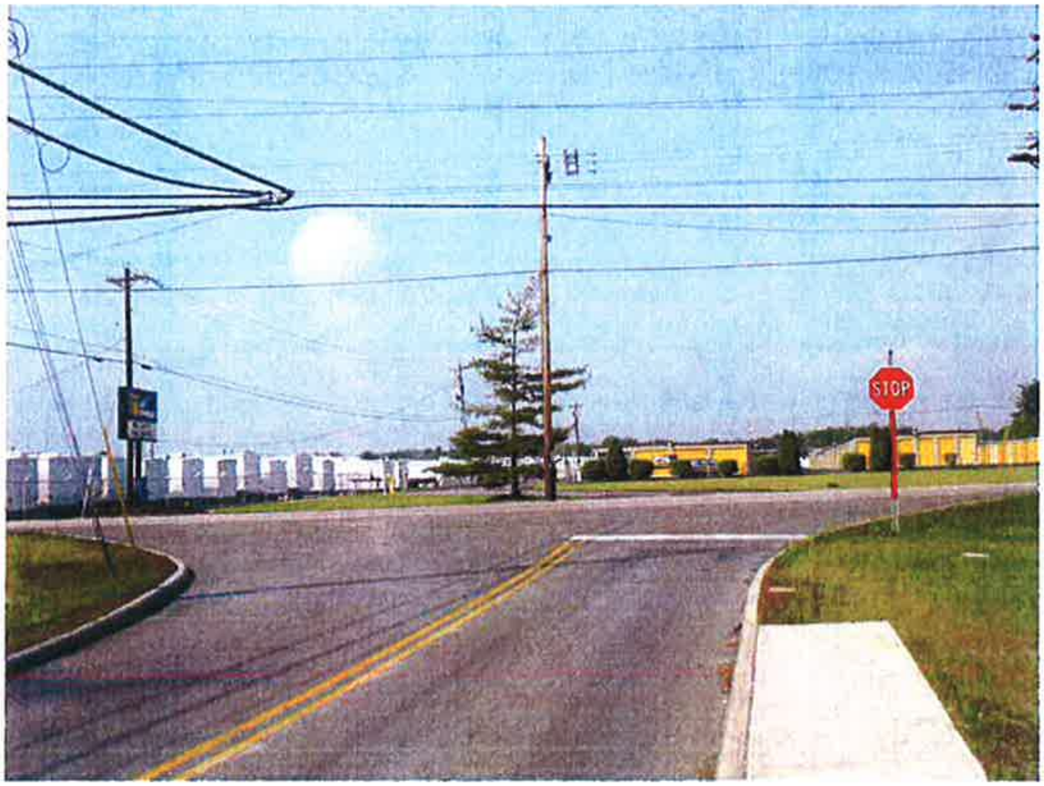
Looking west along SR 32 from Elick Lane

Looking southwest along SR 32 from Bach Buxton Road

Looking west along south side of SR 32 from Bach Buxton Road

Looking east along SR 32 from Bach Buxton Road

Looking east along north side of Old SR 74 east of Schoolhouse Road



Looking south along Schoolhouse Road toward Old SR 74

Looking west along Old SR 74 from Schoolhouse Road

Looking north along Bach Buxton Road toward Marian Drive

Looking south along Bach Buxton Road

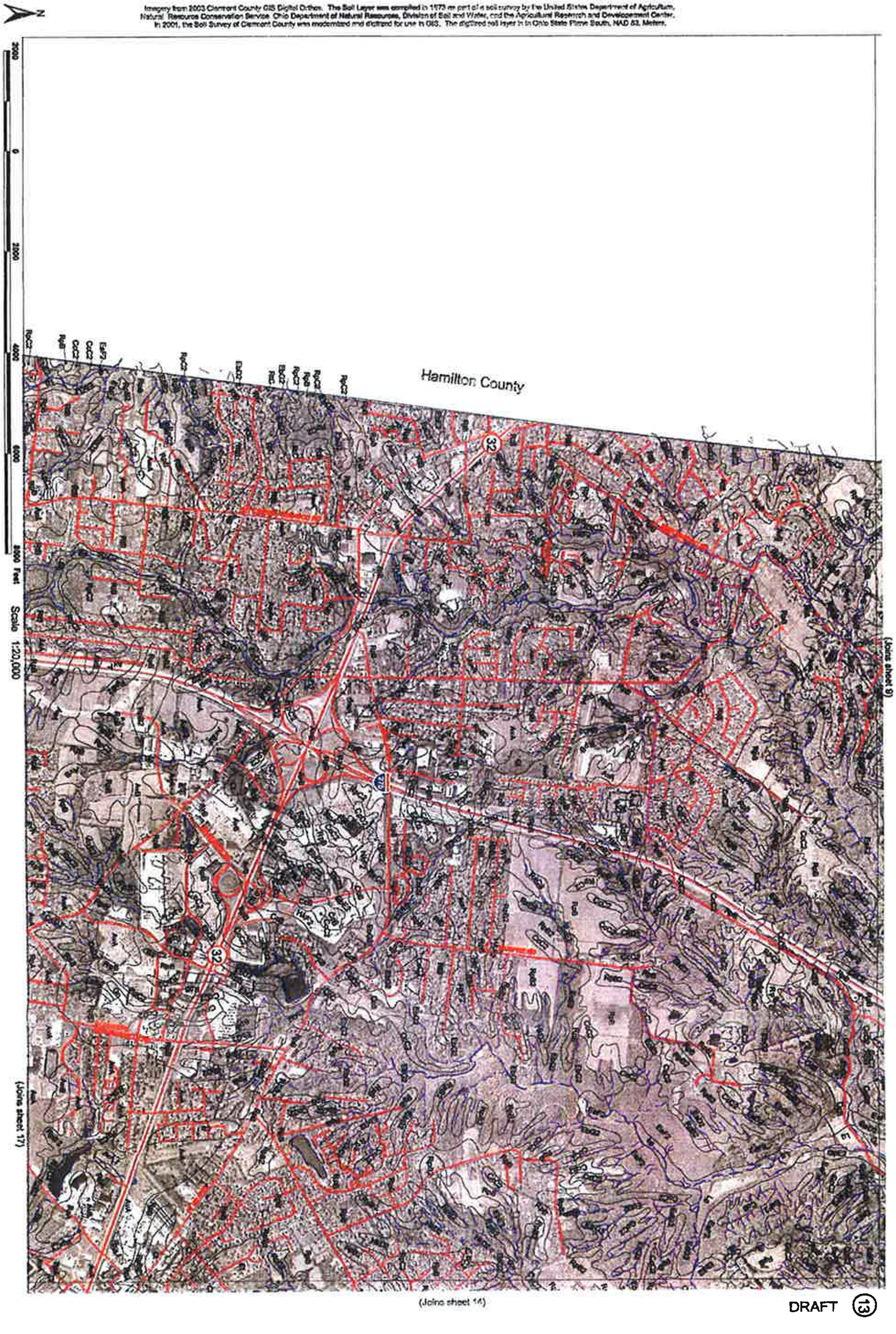
# Appendix 3
# List of References

| Source | ID | Description | Reference |
|---|---|---|---|
| Department of Transportation | | Original construction plans including plan views, profiles and cross sections | Previous projects sent to B&N on CD by ODOT |
| Department of Transportation | | Construction diaries and inspection reports for original construction | Not Available |
| Department of Transportation | | Compile information on changes to plans during construction activities | Not Available |
| Department of Transportation | | Interview people knowledgeable with previous projects | |
| Department of Transportation | | Maintenance records | |
| Department of Transportation | | Boring log on file with the Office of Geotechnical Engineering | Boring logs part of previous project plans |
| Department of Transportation | | History and occurrences of landsides | None |
| Department of Transportation | | History and occurrences of Rock falls | None |
| Division of Geological survey | | Boring Logs on file | |
| Division of Geological survey | | Measured geological sections | |
| Division of Geological survey | | Bedrock Geological Maps | Bedrock Geological Map of Ohio |
| Division of Geological survey | | Bedrock Topography Maps | Shaded Bedrock -Topography Map of Ohio |
| Division of Geological survey | | Bedrock Structure Maps | |
| Division of Geological survey | | | |
| Division of Geological survey | | | |
| Division of Geological survey | | | |
| Division of Geological survey | | | |
| Division of Geological survey | | Geological Maps | Cross Section Map of Ohio's Geologic Systems |
| Division of Geological survey | | Quaternary Geology of Ohio | |
| Division of Geological survey | | Known and Probable Karst in Oho | Known and Probable Karst in Oho Map-ODNR-Department of Natural Recourses |
| Division of Geological survey | | Bulletins | Geology of Cincinnati and Vicinity (Bulletin #19) |
| Division of Geological survey | | | Minerals of Ohio by Ernest Carlson |
| Division of Geological survey | | Information Circulars | |
| Division of Geological survey | | Report of Investigations | Reviewed Sand & Gravel Reports for Clermont County, Ohio |
| Division of Geological survey | | Location and information of underground mines | |
| Division of Geological survey | | | |
| Division of Geological survey | | Location and characteristics of Karst features | |
| Division of Geological survey | | Landslide Maps | |
| Division of Geological survey | | Other | Physiographic Regions of Ohio |
| Division of Geological survey | | | Glacial Map of Ohio |
| Division of Geological survey | | | Geological Map and Cross Section of Ohio |
| Division of Geological survey | | | Shaded Elevation Map of Ohio |
| Division of Geological survey | | | Oil and Gas Pipelines in Ohio 1989 |
| Division of Geological survey | | | Shaded Drift Thickness Map of Ohio |
| Division of Geological survey | | | Ground Water Resources Map of Clermont Co. |
| Division of Geological survey | | | |
| Division of Mineral Resource Management | | Applications and permits files for surface mines (coal & industrial mineral) | No mining permits issued by ODNR on record for Union Township |
| | | Active, reclaimed or abandoned surface mines | Reviewed Mines, Quarries and Prep Plants ODNR Map-No Mines |
| | | Abandoned Mine Land (AML) sites | Reviewed Abandoned Underground Mines ODNR Map-No Mines |
| | | Emergency Projects | Not available |
| | | Other | 2007 Report on Ohio mineral industries |
| Division of Soil & Water | | Water Well Logs | ODNR Well Logs |
| | | Soil Survey Book | Clermont County Soil Survey |
| | | Ohio Wetland Inventory Maps | Reviewed online |
| | | Nation Wetland Inventory Maps (NWI) | Reviewed online |

| | | | |
|---|---|---|---|
| | | Presence of lake bed sediments, organic soils or peat deposits | |
| | | Other | |
| Other Sources | | Aerial Photographs | Reviewed Aerial photography online at Google.com |
| | | Satellite imagery | Reviewed Satellite imagery online at Google.com |
| | | USGS quadrangles | Withamsville Quadrangle-Ohio-Ky 1983 USGS |
| | | USGS quadrangles | Batavia Quadrangle-Ohio-Clermont Co. 1982 USGS |
| | | USGS publications and files | Maps and other printed material |
| | | County Engineers | |
| | | Academia with engineering or geology programs | Not found |
| | | USGS Open File Map Series | |
| | | Other | Cincinnati Fossils |

# *Appendix 4*
# *USDA Soil Maps*

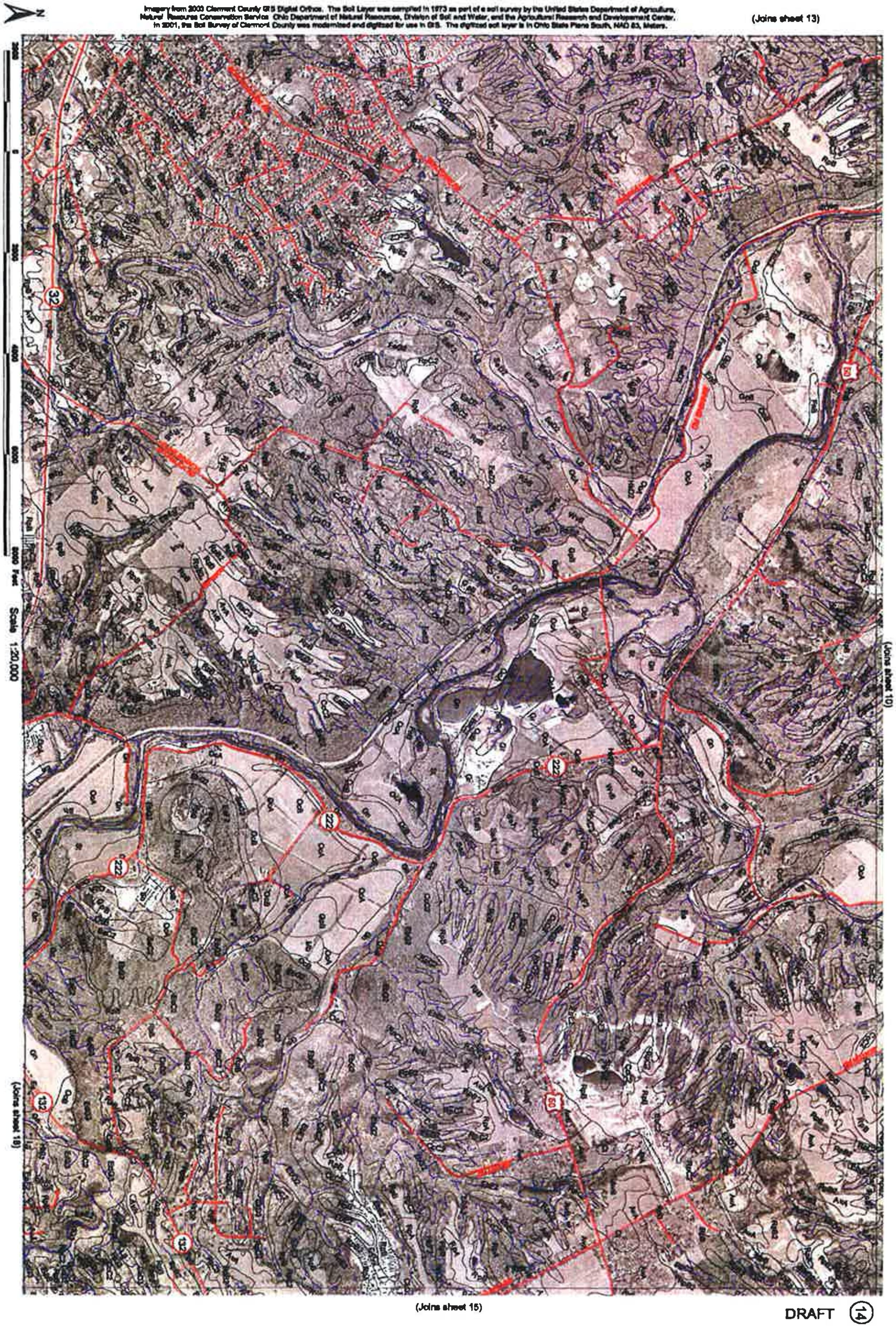
Imagery from 2003 Clermont County GIS Digital Orthos. The Soil Layer was compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Natural Resource Conservation Service, Ohio Department of Natural Resources, Division of Soil and Water, and the Agricultural Research and Development Center. In 2001, the Soil Survey of Clermont County was modernized and digitized for use in GIS. The digitized soil layer is in Ohio State Plane South, NAD 83, Meters.



DRAFT ⑬

Imagery from 2003 Clermont County GIS Digital Orthos. The Soil Layer was compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Natural Resources Conservation Service, Ohio Department of Natural Resources, Division of Soil and Water, and the Agricultural Research and Development Center. In 2001, the Soil Survey of Clermont County was modernized and digitized for use in GIS. The digitized soil layer is in Ohio State Plane South, NAD 83, Meters.

(Joins sheet 13)

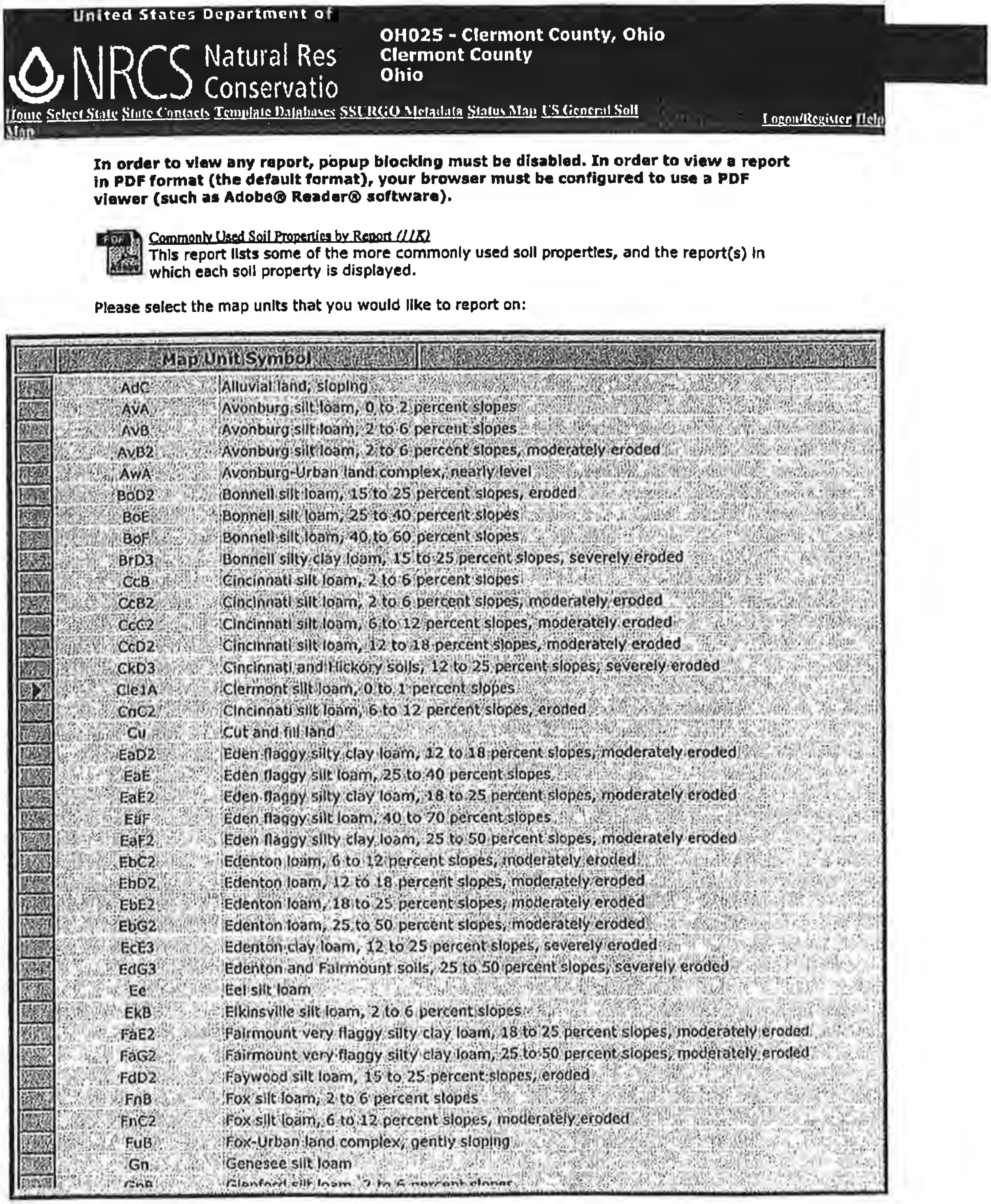


(Joins sheet 15)

DRAFT ⑭

Imagery from 2003 Clermont County GIS Digital Orthos. The Soil Layer was compiled in 1973 as part of a soil survey by the United States Department of Agriculture, Natural Resource Conservation Service Ohio Department of Natural Resources, Division of Soil and Water, and the Agricultural Research and Development Center. In 2001, the Soil Survey of Clermont County was modernized and digitized for use in GIS. The digitized soil layer is in Ohio State Plane South, NAD 83, Meters.

DRAFT



United States Department of

NRCS Natural Res
Conservatio

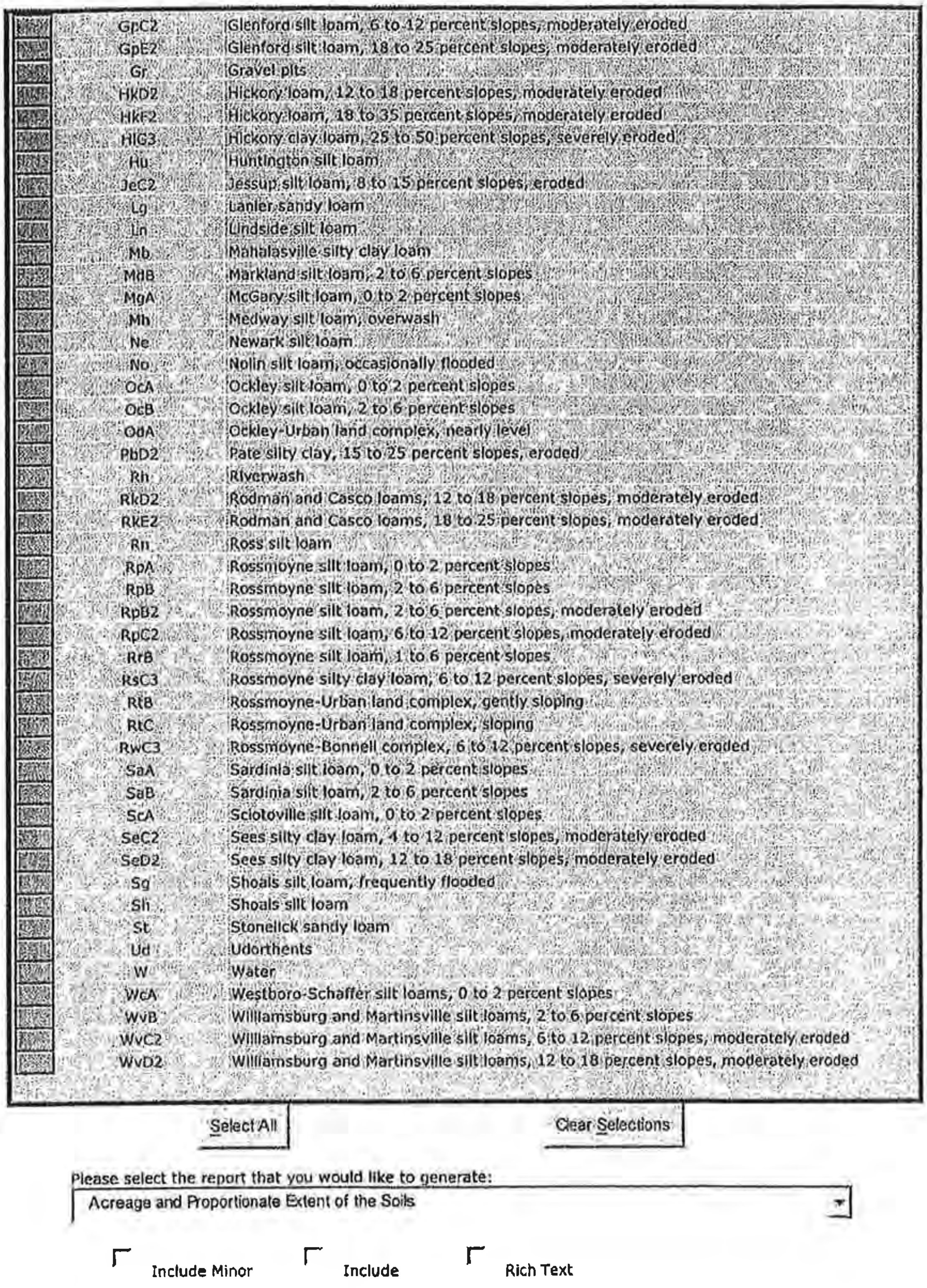
**OH025 - Clermont County, Ohio**
**Clermont County**
**Ohio**

**In order to view any report, popup blocking must be disabled. In order to view a report in PDF format (the default format), your browser must be configured to use a PDF viewer (such as Adobe® Reader® software).**

Commonly Used Soil Properties by Report (11K)
This report lists some of the more commonly used soil properties, and the report(s) in which each soil property is displayed.

Please select the map units that you would like to report on:

| | Map Unit Symbol | |
|---|---|---|
| | AdC | Alluvial land, sloping |
| | AvA | Avonburg silt loam, 0 to 2 percent slopes |
| | AvB | Avonburg silt loam, 2 to 6 percent slopes |
| | AvB2 | Avonburg silt loam, 2 to 6 percent slopes, moderately eroded |
| | AwA | Avonburg-Urban land complex, nearly level |
| | BoD2 | Bonnell silt loam, 15 to 25 percent slopes, eroded |
| | BoE | Bonnell silt loam, 25 to 40 percent slopes |
| | BoF | Bonnell silt loam, 40 to 60 percent slopes |
| | BrD3 | Bonnell silty clay loam, 15 to 25 percent slopes, severely eroded |
| | CcB | Cincinnati silt loam, 2 to 6 percent slopes |
| | CcB2 | Cincinnati silt loam, 2 to 6 percent slopes, moderately eroded |
| | CcC2 | Cincinnati silt loam, 6 to 12 percent slopes, moderately eroded |
| | CcD2 | Cincinnati silt loam, 12 to 18 percent slopes, moderately eroded |
| | CkD3 | Cincinnati and Hickory soils, 12 to 25 percent slopes, severely eroded |
| ▶ | Cle1A | Clermont silt loam, 0 to 1 percent slopes |
| | CnC2 | Cincinnati silt loam, 6 to 12 percent slopes, eroded |
| | Cu | Cut and fill land |
| | EaD2 | Eden flaggy silty clay loam, 12 to 18 percent slopes, moderately eroded |
| | EaE | Eden flaggy silt loam, 25 to 40 percent slopes |
| | EaE2 | Eden flaggy silty clay loam, 18 to 25 percent slopes, moderately eroded |
| | EaF | Eden flaggy silt loam, 40 to 70 percent slopes |
| | EaF2 | Eden flaggy silty clay loam, 25 to 50 percent slopes, moderately eroded |
| | EbC2 | Edenton loam, 6 to 12 percent slopes, moderately eroded |
| | EbD2 | Edenton loam, 12 to 18 percent slopes, moderately eroded |
| | EbE2 | Edenton loam, 18 to 25 percent slopes, moderately eroded |
| | EbG2 | Edenton loam, 25 to 50 percent slopes, moderately eroded |
| | EcE3 | Edenton clay loam, 12 to 25 percent slopes, severely eroded |
| | EdG3 | Edenton and Fairmount soils, 25 to 50 percent slopes, severely eroded |
| | Ee | Eel silt loam |
| | EkB | Elkinsville silt loam, 2 to 6 percent slopes |
| | FaE2 | Fairmount very flaggy silty clay loam, 18 to 25 percent slopes, moderately eroded |
| | FaG2 | Fairmount very flaggy silty clay loam, 25 to 50 percent slopes, moderately eroded |
| | FdD2 | Faywood silt loam, 15 to 25 percent slopes, eroded |
| | FnB | Fox silt loam, 2 to 6 percent slopes |
| | FnC2 | Fox silt loam, 6 to 12 percent slopes, moderately eroded |
| | FuB | Fox-Urban land complex, gently sloping |
| | Gn | Genesee silt loam |
| | GnB | Glenford silt loam, 2 to 6 percent slopes |



| | | |
|---|---|---|
| ☐ | GpC2 | Glenford silt loam, 6 to 12 percent slopes, moderately eroded |
| ☐ | GpE2 | Glenford silt loam, 18 to 25 percent slopes, moderately eroded |
| ☐ | Gr | Gravel pits |
| ☐ | HkD2 | Hickory loam, 12 to 18 percent slopes, moderately eroded |
| ☐ | HkF2 | Hickory loam, 18 to 35 percent slopes, moderately eroded |
| ☐ | HlG3 | Hickory clay loam, 25 to 50 percent slopes, severely eroded |
| ☐ | Hu | Huntington silt loam |
| ☐ | JeC2 | Jessup silt loam, 8 to 15 percent slopes, eroded |
| ☐ | Lg | Lanier sandy loam |
| ☐ | Ln | Lindside silt loam |
| ☐ | Mb | Mahalasville silty clay loam |
| ☐ | MdB | Markland silt loam, 2 to 6 percent slopes |
| ☐ | MgA | McGary silt loam, 0 to 2 percent slopes |
| ☐ | Mh | Medway silt loam, overwash |
| ☐ | Ne | Newark silt loam |
| ☐ | No | Nolin silt loam, occasionally flooded |
| ☐ | OcA | Ockley silt loam, 0 to 2 percent slopes |
| ☐ | OcB | Ockley silt loam, 2 to 6 percent slopes |
| ☐ | OdA | Ockley-Urban land complex, nearly level |
| ☐ | PbD2 | Pate silty clay, 15 to 25 percent slopes, eroded |
| ☐ | Rh | Riverwash |
| ☐ | RkD2 | Rodman and Casco loams, 12 to 18 percent slopes, moderately eroded |
| ☐ | RkE2 | Rodman and Casco loams, 18 to 25 percent slopes, moderately eroded |
| ☐ | Rn | Ross silt loam |
| ☐ | RpA | Rossmoyne silt loam, 0 to 2 percent slopes |
| ☐ | RpB | Rossmoyne silt loam, 2 to 6 percent slopes |
| ☐ | RpB2 | Rossmoyne silt loam, 2 to 6 percent slopes, moderately eroded |
| ☐ | RpC2 | Rossmoyne silt loam, 6 to 12 percent slopes, moderately eroded |
| ☐ | RrB | Rossmoyne silt loam, 1 to 6 percent slopes |
| ☐ | RsC3 | Rossmoyne silty clay loam, 6 to 12 percent slopes, severely eroded |
| ☐ | RtB | Rossmoyne-Urban land complex, gently sloping |
| ☐ | RtC | Rossmoyne-Urban land complex, sloping |
| ☐ | RwC3 | Rossmoyne-Bonnell complex, 6 to 12 percent slopes, severely eroded |
| ☐ | SaA | Sardinia silt loam, 0 to 2 percent slopes |
| ☐ | SaB | Sardinia silt loam, 2 to 6 percent slopes |
| ☐ | ScA | Sciotoville silt loam, 0 to 2 percent slopes |
| ☐ | SeC2 | Sees silty clay loam, 4 to 12 percent slopes, moderately eroded |
| ☐ | SeD2 | Sees silty clay loam, 12 to 18 percent slopes, moderately eroded |
| ☐ | Sg | Shoals silt loam, frequently flooded |
| ☐ | Sh | Shoals silt loam |
| ☐ | St | Stonelick sandy loam |
| ☐ | Ud | Udorthents |
| ☐ | W | Water |
| ☐ | WcA | Westboro-Schaffer silt loams, 0 to 2 percent slopes |
| ☐ | WvB | Williamsburg and Martinsville silt loams, 2 to 6 percent slopes |
| ☐ | WvC2 | Williamsburg and Martinsville silt loams, 6 to 12 percent slopes, moderately eroded |
| ☐ | WvD2 | Williamsburg and Martinsville silt loams, 12 to 18 percent slopes, moderately eroded |

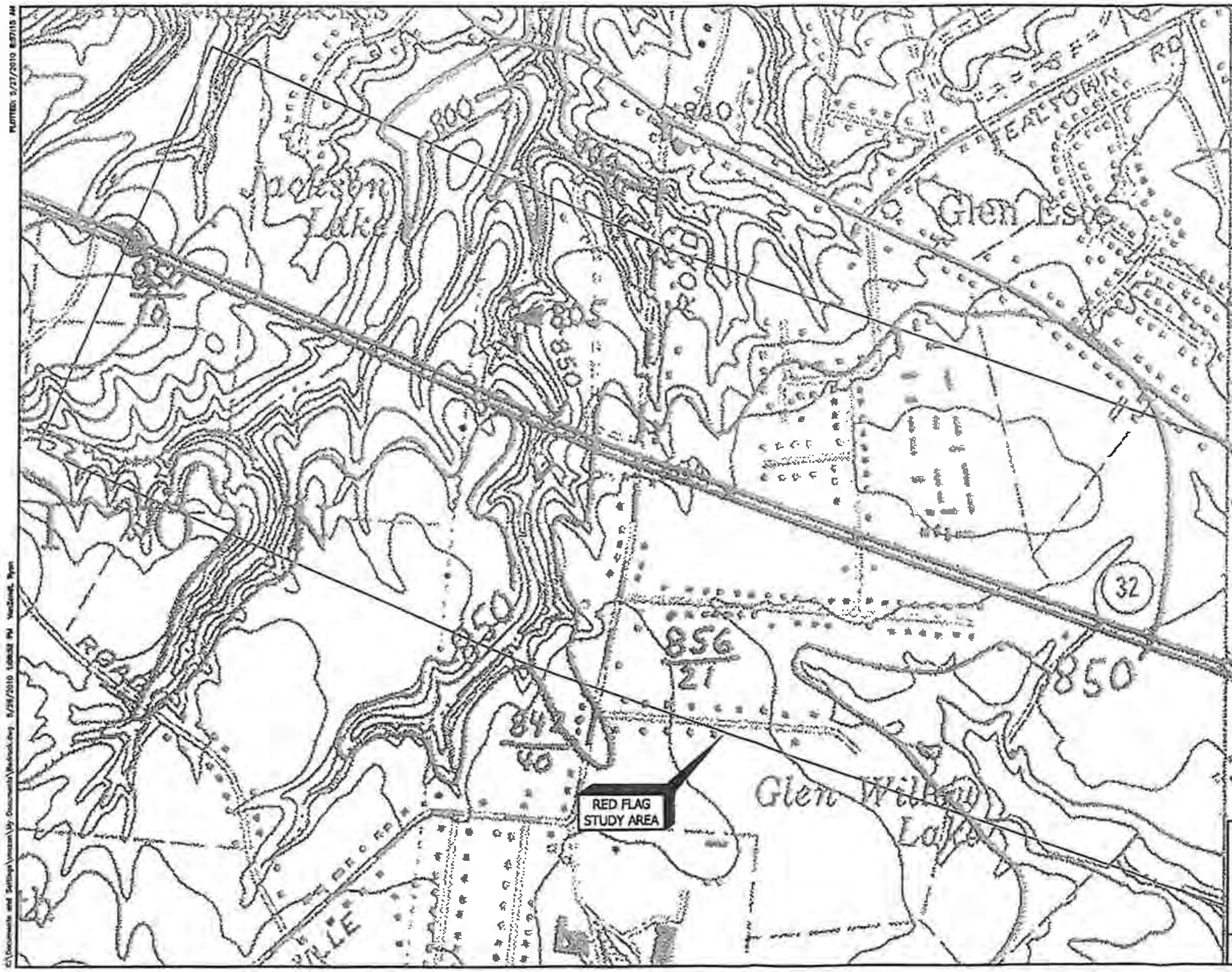
Please select the report that you would like to generate:

Acreage and Proportionate Extent of the Soils

☐ Include Minor ☐ Include ☐ Rich Text

# Appendix 5
# Bedrock Topography Maps

## Soil Map—Clermont County, Ohio
(48934)



GEOTECHNICAL RED FLAG STUDY
CLE-32-2.25

BEDROCK TOPOGRAPHY MAP
SHEET 2

MAY 2010

**BURGESS & NIPLE**

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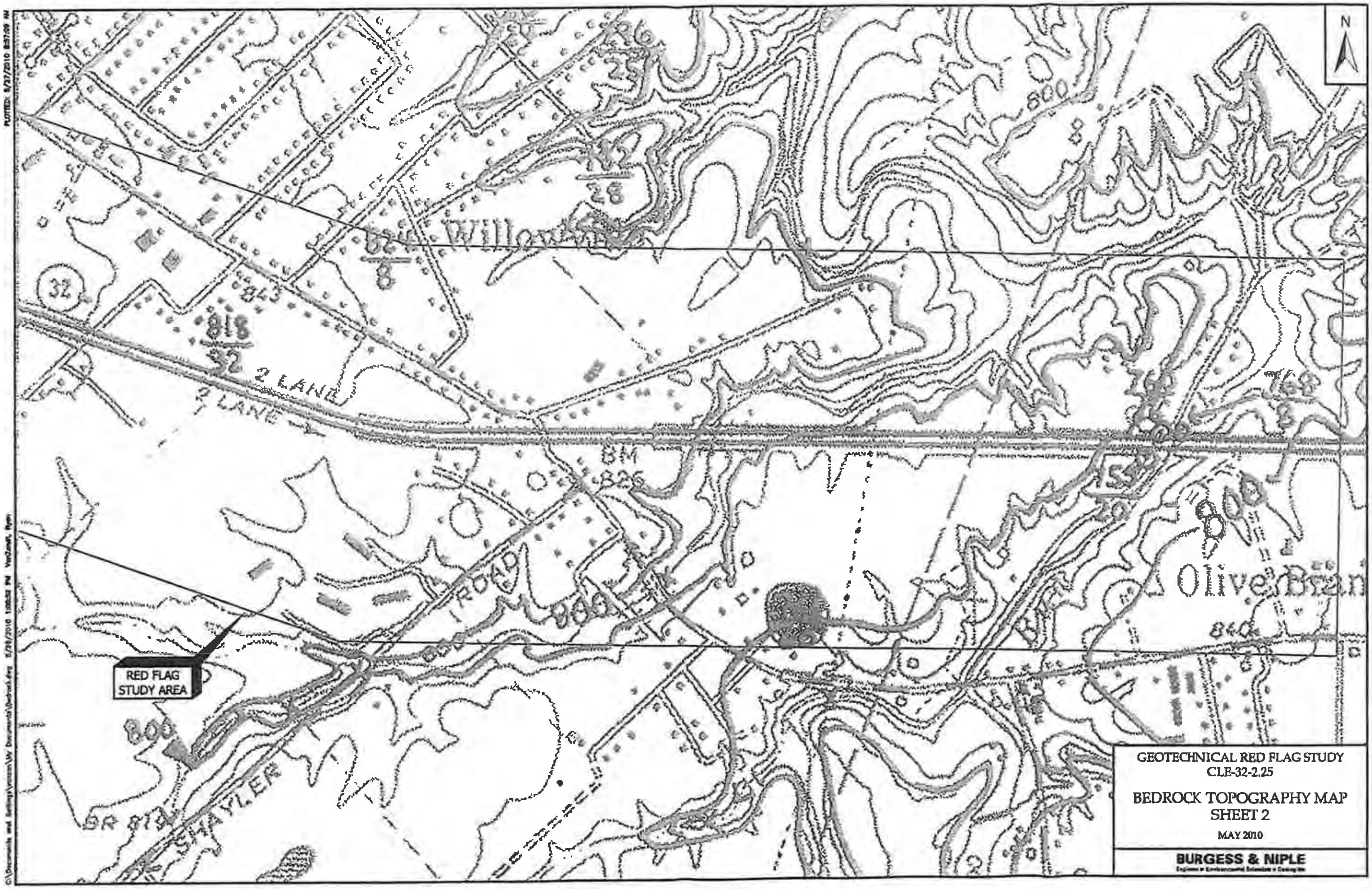
PLOTTED: 5/27/2010 8:57:15 AM



RED FLAG STUDY AREA

GEOTECHNICAL RED FLAG STUDY
CLE-32-2.25

BEDROCK TOPOGRAPHY MAP
SHEET 2

MAY 2010

**BURGESS & NIPLE**

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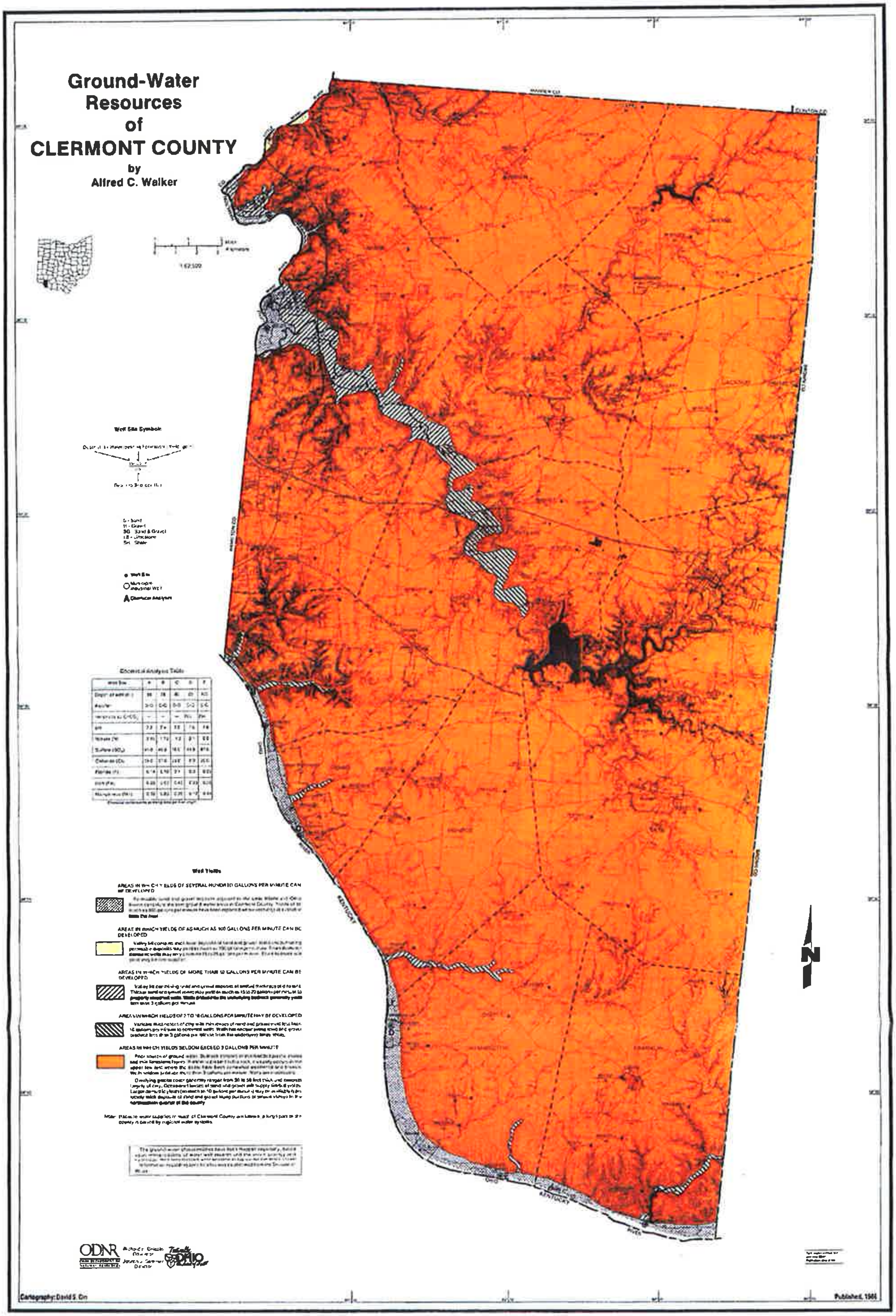
PLOTTED: 5/27/2010 8:57:09 AM

# Appendix 6
# ODNR Groundwater Resources Map and Water Well Logs

# Ground-Water Resources of CLERMONT COUNTY

by

Alfred C. Walker



Well Yields

AREAS IN WHICH YIELDS OF SEVERAL HUNDRED GALLONS PER MINUTE CAN BE DEVELOPED

AREAS IN WHICH YIELDS OF AS MUCH AS 100 GALLONS PER MINUTE CAN BE DEVELOPED

AREAS IN WHICH YIELDS OF MORE THAN 10 GALLONS PER MINUTE CAN BE DEVELOPED

AREAS IN WHICH YIELDS OF 3 TO 10 GALLONS PER MINUTE MAY BE DEVELOPED

AREAS IN WHICH YIELDS SELDOM EXCEED 3 GALLONS PER MINUTE

Cartography: David S. Orr

Published, 1986

# Ground Water Pollution Potential of CLERMONT COUNTY

by

Ohio Department of Natural Resources, Division of Water

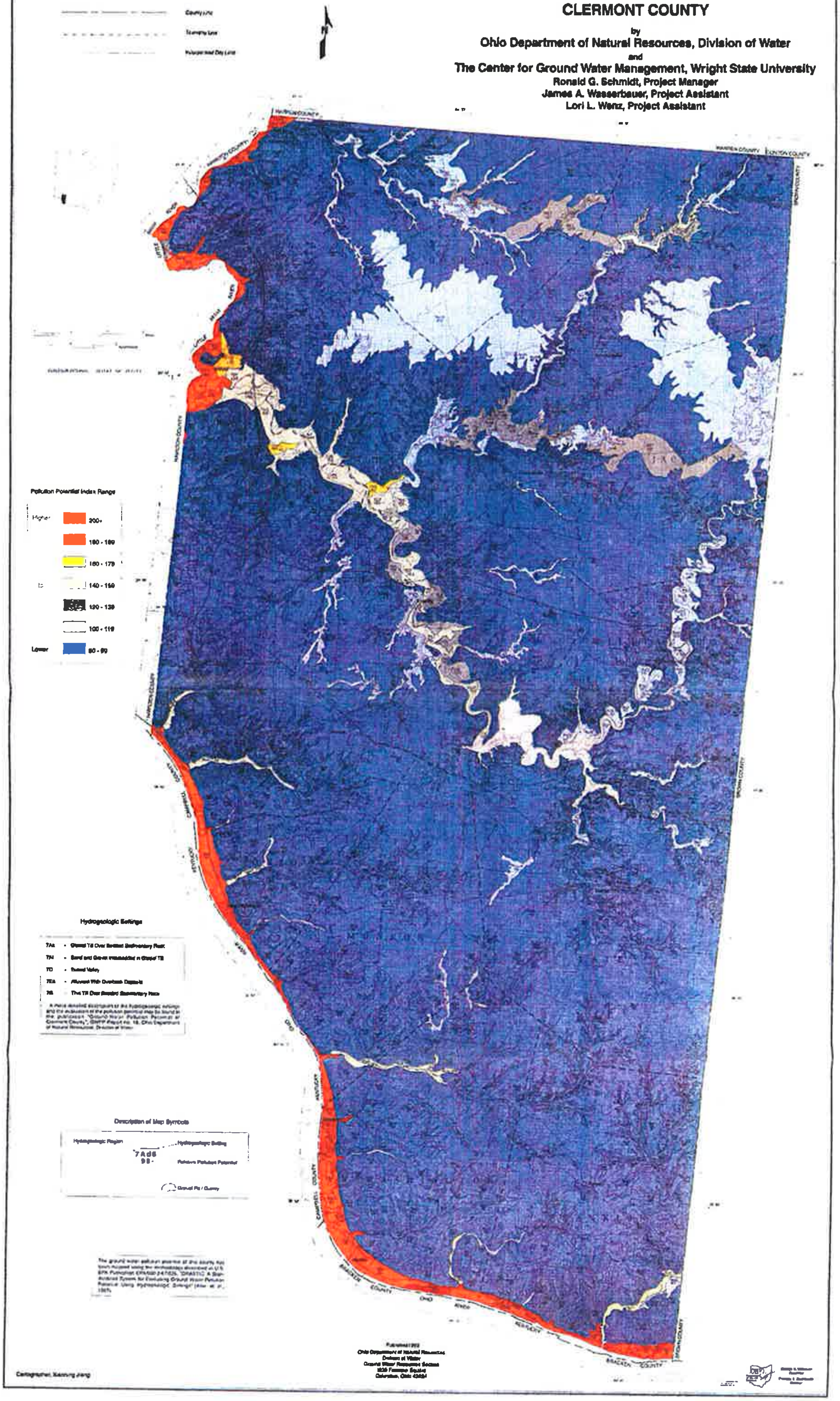
and

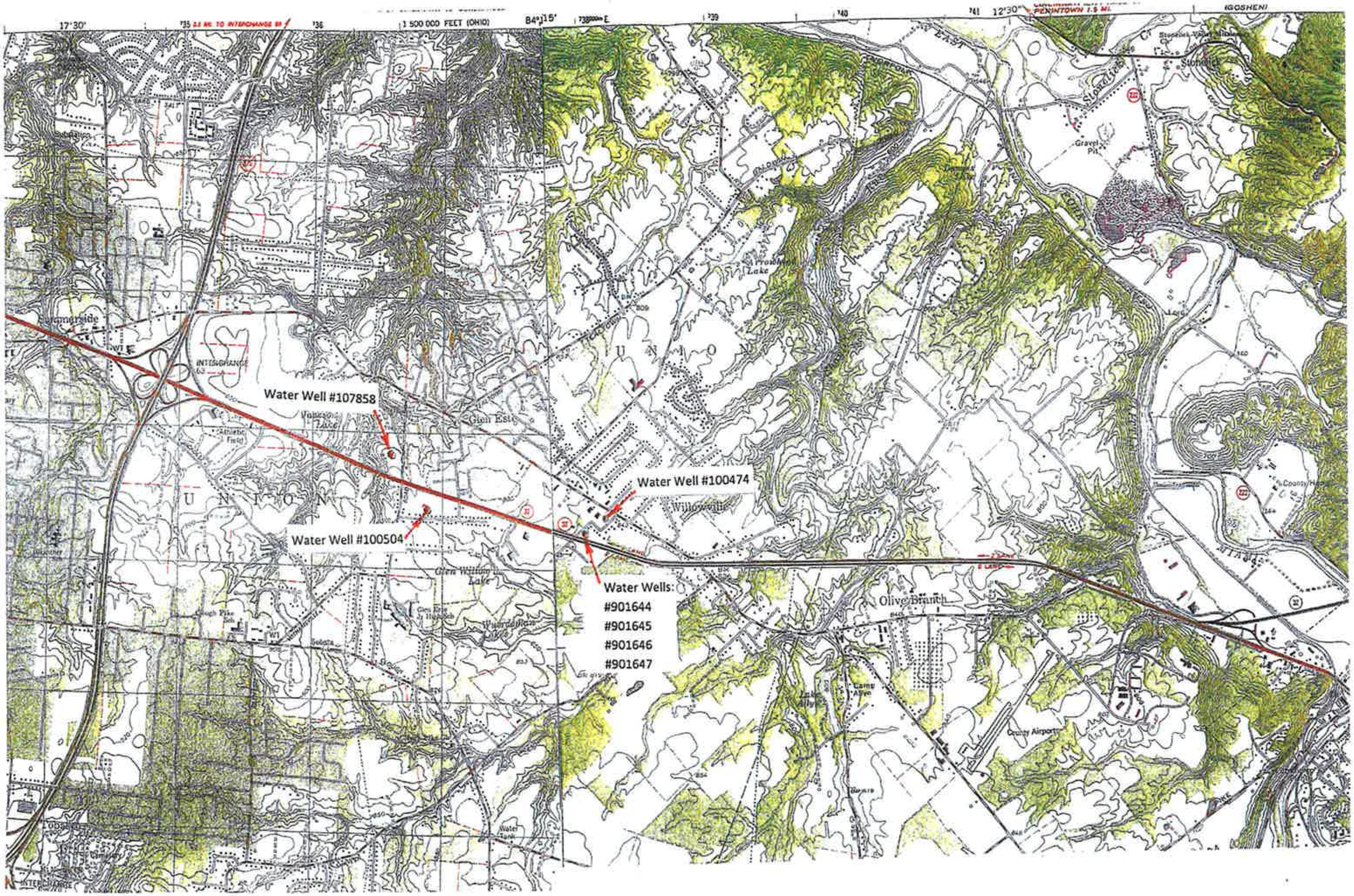
The Center for Ground Water Management, Wright State University

Ronald G. Schmidt, Project Manager

James A. Wasserbauer, Project Assistant

Lori L. Wenz, Project Assistant




17'30"
35 2.2 MI. TO INTERCHANGE 59
36
1 500 000 FEET (OHIO)
84°15'
738000m E
739
740
741
12'30"
PENINTOWN 1.5 MI.
(GOSHEN)
Water Well #107858
Water Well #100504
Water Well #100474
Water Wells:
#901644
#901645
#901646
#901647
U N I O N
INTERCHANGE
Glen Este
Willowville
Olive Branch
County Airport
Gravel Pit
Glen Willow Lake
Athletic Field
Summerside

# *Water Well Log*
# *Glen Este-Withamsville Road*

View Image of Original Well Log

**Select a Well Log from the list below.**

Address, Original Owners Name, Well Log Number

GLEN ESTE-WITHAMSVILLE, HARRIS, 102931 ← outside project limits
GLEN ESTE-WITHAMSVILLE, WALTER CLIPPER, 107858

**Well Log Number: 102931**

## ORIGINAL OWNER AND LOCATION

**Original Owner Name:** *HARRIS*
**County:** *CLERMONT* **Township:** *UNION* **Section Number:**
**Address:** *GLEN ESTE-WITHAMSVILLE RD* **Lot Number:**
**City:** **State:** *OH* **Zip Code:**
**Location Number:** *81* **Location Map Year:** *1984* **Location Area:**
**Latitude:** **Longitude:**

## CONSTRUCTION DETAILS

**Borehole Diameter: 1:** **Borehole Depth: 1:** *50 ft.* **Depth to Bedrock:**
**2:** **2:**
**Casing Diameter: 1:** *6 in.* **Casing Length: 1:** *12 ft.* **Casing Thickness: 1:**
**2:** **2:** **2:**
**Casing Height Above Ground:** **Aquifer Type:** *LIMESTONE AND SHALE*
**Date of Completion:** *4/8/1953* **Total Depth:** *50 ft.* **Well Use:**
**Driller's Name:**

**Screen Diameter:** **Slot Size:** **Screen Length:**
**Type:** **Material:**
**Set Between:**

**Gravel Pack Material/Size:** **Vol/Wt Used:**
**Method of Installation:** **Placed:**

**Grout Material/Size:** **Vol/Wt Used:**
**Method of Installation:** **Placed**

## WELL TEST DETAILS

**Static Water Level:** *12 ft.* **Test Rate:** **Associated Reports**
**Drawdown:** **Test Duration:** *NONE*

**COMMENTS:** *NONE*

## WELL LOG

| **Formations** | **From** | **To** |
|---|---|---|
| YELLOW CLAY | 0 | 12 |
| TOP SOIL | 12 | 12 |
| LIMESTONE & SHALE | 12 | 50 |

View Image of Original Well Log

**Well Log Number: 107858**

## ORIGINAL OWNER AND LOCATION

**Original Owner Name:** *WALTER CLIPPER* x = 1,499,200

y = 401,800 S

ORIGINAL

16

# WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Columbus, Ohio

№ 107858

County Clermont 13 Township Union 10 Section of Township or Lot Number 1

Owner Walter Clepper Address R.R. 5 Batavia Ohio

Location of property Glen Este - Withamsville Rd

## CONSTRUCTION DETAILS

Casing diameter 5 8" Length of casing 20'

Type of screen none Length of screen

Type of pump

Capacity of pump

Depth of pump setting

## PUMPING TEST

Pumping rate / G.P.M. Duration of test hrs.

Drawdown ft. Date

Developed capacity

Static level—depth to water ft.

Pump installed by

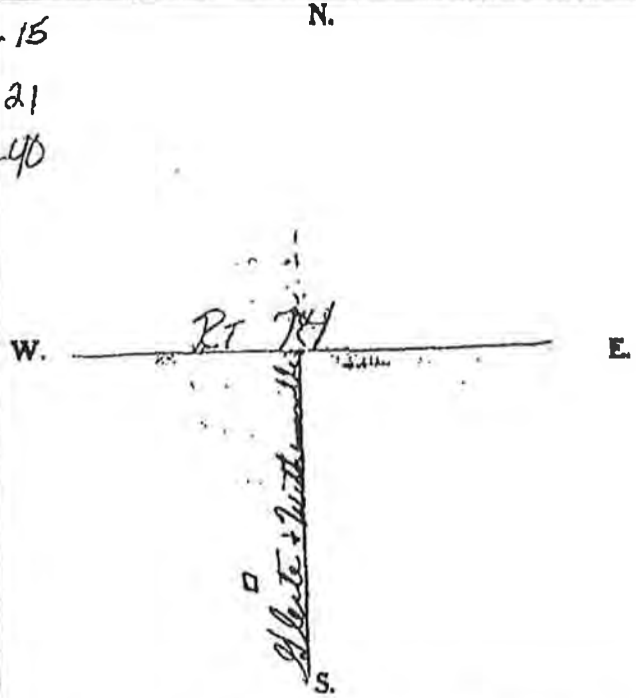
## WELL LOG

| Formations Sandstone, shale, limestone, gravel and clay | From | To |
|---|---|---|
| | 0 Feet | Ft. |
| Clay 15' | 15' | 0-15 |
| Sand + Gravel 6' | 6' | 15-21 |
| Shale + Lime Stone 40' | 40' | 21-40 |

Water at 20'

## SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm Glen Este Well Drilling Date March 25th 1954

Address Batavia Ohio Signed Thomas Clepper Jr.

(56)

# *Water Well Log*
# *Elick Lane*

---

**Select a Well Log from the list below.**

Address, Original Owners Name, Well Log Number

4382 ELICK, SHELL , 901644
4382 ELICK, SHELL , 901645
4382 ELICK, SHELL , 901646
4382 ELICK, SHELL , 901647
ELICK, A THOMPSON, 100474

**Well Log Number:** 901644

View Image of Original Well Log

## ORIGINAL OWNER AND LOCATION

**Original Owner Name:** *SHELL*
**County:** *CLERMONT* **Township:** *BATAVIA* **Section Number:**
**Lot Number:**
**Address:** *4382 ELICK LN*
**City:** *BATAVIA* **State:** *OH* **Zip Code:** *451031504*
**Location Number:** **Location Map Year:** **Location Area:**
**Latitude:** **Longitude:**

## CONSTRUCTION DETAILS

**Borehole Diameter:** **1:** *8 in.* **2:** **Borehole Depth:** **1:** *16 ft.* **2:** **Depth to Bedrock:**
**Casing Diameter:** **1:** *2 in.* **2:** **Casing Length:** **1:** *6 ft.* **2:** **Casing Thickness:** **1:** *0.4 in.* **2:**
**Casing Height Above Ground:** **Aquifer Type:** *CLAY AND GRAVEL*
**Date of Completion:** *3/22/2000* **Total Depth:** *14 ft.* **Well Use:** *MONITOR*
**Driller's Name:** *ATC ASSOCIATES*

**Screen Diameter:** **Slot Size:** **Screen Length:**
**Type:** **Material:**
**Set Between:**

**Gravel Pack Material/Size:** **Vol/Wt Used:**
**Method of Installation:** **Placed:**

**Grout Material/Size:** **Vol/Wt Used:**
**Method of Installation:** **Placed**

## WELL TEST DETAILS

**Static Water Level:** *11.5 ft.* **Test Rate:** **Associated Reports**
**Drawdown:** **Test Duration:** *NONE*

**COMMENTS:** NONE

## WELL LOG

| Formations | From | To |
|---|---|---|

| | | |
|---|---|---|
| GRAY SILTY CLAY | 5 | 2 |
| CONCRETE | 0 | 5 |
| GRAY SILTY CLAY | 2 | 14 |
| OLIVE SILTY CLAY & GRAVEL | 14 | 16 |

View Image of Original Well Log

**Well Log Number:** 901645

## ORIGINAL OWNER AND LOCATION

**Original Owner Name:** *SHELL*
**County:** *CLERMONT*
**Township:** *BATAVIA*
**Section Number:**
**Lot Number:**
**Address:** *4382 ELICK LN*
**City:** *BATAVIA*
**State:** *OH*
**Zip Code:** *451031504*
**Location Number:**
**Location Map Year:**
**Location Area:**
**Latitude:**
**Longitude:**

## CONSTRUCTION DETAILS

**Borehole Diameter: 1:** *8 in.*
**2:**
**Borehole Depth: 1:** *14 ft.*
**2:**
**Depth to Bedrock:**
**Casing Diameter: 1:** *2 in.*
**2:**
**Casing Length: 1:** *4 ft.*
**2:**
**Casing Thickness: 1:** *0.4 in.*
**2:**
**Casing Height Above Ground:**
**Aquifer Type:** *CLAY AND GRAVEL*
**Well Use:** *MONITOR*
**Date of Completion:** *3/22/2000*
**Total Depth:** *14 ft.*
**Driller's Name:** *ATC ASSOCIATES*

**Screen Diameter:**
**Slot Size:**
**Screen Length:**
**Type:**
**Material:**
**Set Between:**

**Gravel Pack Material/Size:**
**Vol/Wt Used:**
**Method of Installation:**
**Placed:**

**Grout Material/Size:**
**Vol/Wt Used:**
**Method of Installation:**
**Placed**

## WELL TEST DETAILS

**Static Water Level:** *1 ft.*
**Test Rate:**
**Drawdown:**
**Test Duration:**

Associated Reports
*NONE*

**COMMENTS:** *NONE*

## WELL LOG

| **Formations** | **From** | **To** |
|---|---|---|
| CONCRETE | 0 | 5 |
| GRAY SILTY CLAY | 5 | 8 |
| BROWN SILTY CLAY & GRAVEL | 8 | 10 |
| BROWN SILTY CLAY | 10 | 14 |

View Image of Original Well Log

**Well Log Number:** 901646

## ORIGINAL OWNER AND LOCATION

**Original Owner Name:** *SHELL*
**County:** *CLERMONT*
**Township:** *BATAVIA*
**Section Number:**
**Lot Number:**
**Address:** *4382 ELICK LN*
**City:** *BATAVIA*
**State:** *OH*
**Zip Code:** *451031504*
**Location Number:**
**Location Map Year:**
**Location Area:**
**Latitude:**
**Longitude:**

## CONSTRUCTION DETAILS

**Borehole Diameter: 1:** *8 in.* **Borehole Depth: 1:** *23 ft.* **Depth to Bedrock:**
**2:** **2:**
**Casing Diameter: 1:** *2 in.* **Casing Length: 1:** *3 ft.* **Casing Thickness: 1:** *0.4 in.*
**2:** **2:** **2:**
**Casing Height Above Ground:** **Aquifer Type:** *CLAY AND GRAVEL*
**Date of Completion:** *3/23/2000* **Total Depth:** *13 ft.* **Well Use:** *MONITOR*
**Driller's Name:** *ATC ASSOCIATES*

**Screen Diameter:** **Slot Size:** **Screen Length:**
**Type:** **Material:**
**Set Between:**

**Gravel Pack Material/Size:** **Vol/Wt Used:**
**Method of Installation:** **Placed:**

**Grout Material/Size:** **Vol/Wt Used:**
**Method of Installation:** **Placed**

## WELL TEST DETAILS

**Static Water Level:** *2 ft.* **Test Rate:** **Associated Reports**
**Drawdown:** **Test Duration:** *NONE*

**COMMENTS:** *NONE*

## WELL LOG

| Formations | From | To |
|---|---|---|
| CONCRETE | 0 | 5 |
| GRAY SILTY CLAY | 5 | 12 |
| BROWN SILTY CLAY & GRAVEL | 12 | 16 |
| BROWN SILTY CLAY & GRAVEL | 16 | 21 |

View Image of Original Well Log

**Well Log Number: 901647**

## ORIGINAL OWNER AND LOCATION

**Original Owner Name:** *SHELL*
**County:** *CLERMONT* **Township:** *BATAVIA* **Section Number:**
**Address:** *4382 ELICK LN* **Lot Number:**
**City:** *BATAVIA* **State:** *OH* **Zip Code:** *451031504*
**Location Number:** **Location Map Year:** **Location Area:**
**Latitude:** **Longitude:**

## CONSTRUCTION DETAILS

**Borehole Diameter: 1:** *8 in.* **Borehole Depth: 1:** *14 ft.* **Depth to Bedrock:**
**2:** **2:**
**Casing Diameter: 1:** *2 in.* **Casing Length: 1:** *3 ft.* **Casing Thickness: 1:** *0.4 in.*
**2:** **2:** **2:**
**Casing Height Above Ground:** *0* **Aquifer Type:** *CLAY AND GRAVEL*
**Date of Completion:** *3/23/2000* **Total Depth:** *13 ft.* **Well Use:** *MONITOR*
**Driller's Name:** *ATC ASSOCIATES*

**Screen Diameter:** **Slot Size:** **Screen Length:**
**Type:** **Material:**
**Set Between:**

**Gravel Pack Material/Size:** **Vol/Wt Used:**
**Method of Installation:** **Placed:**

**Grout Material/Size:** **Vol/Wt Used:**

=1,503,100

y=403,2005

# WELL LOG AND DRILLING REPORT

ORIGINAL

34

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Columbus, Ohio

**Nº 100474**

10

County Clermont 13 Township Union Section of Township or Lot Number

Owner A G Thompson Address Pisgah O.

Location of property Ecklick Rd Elick Ln

## CONSTRUCTION DETAILS

Casing diameter 6 Length of casing 32

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

## PUMPING TEST

Pumping rate 3 G.P.M. Duration of test hrs.

Drawdown ft. Date

Developed capacity

Static level—depth to water ft.

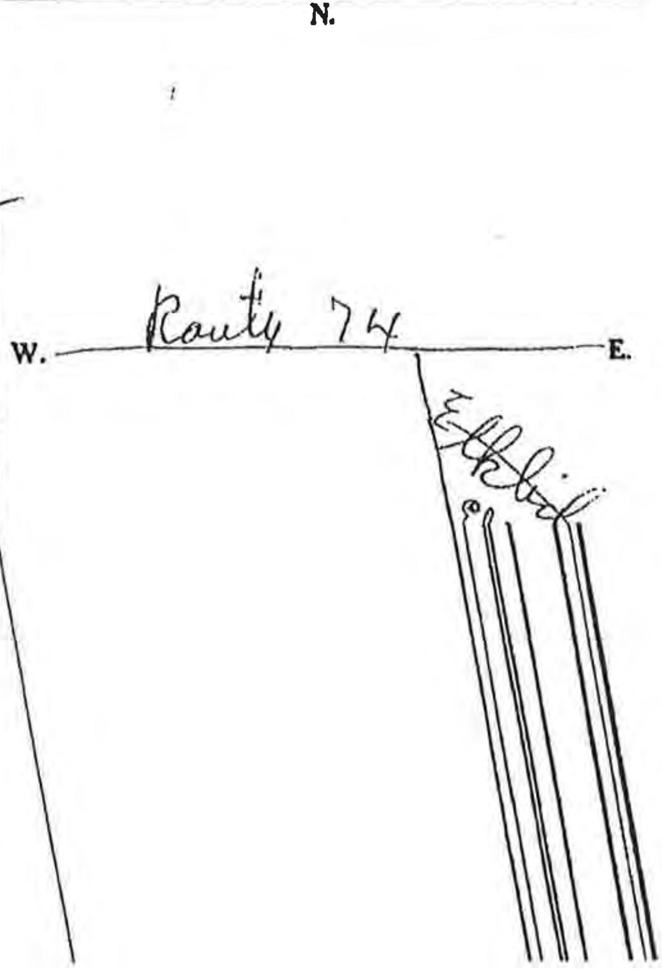
Pump installed by

## WELL LOG

| Formations Sandstone, shale, limestone, gravel and clay | From | To |
|---|---|---|
| | 0 Feet | Ft. |
| [illegible] & soil & clay | | 32 |
| Lime & shale | 32 | 90 |

## SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



**Method of Installation:** Placed

## WELL TEST DETAILS

**Static Water Level:** *3 ft.*
**Test Rate:**
**Associated Reports**
**Drawdown:**
**Test Duration:**
*NONE*

**COMMENTS:** *NONE*

## WELL LOG

| Formations | From | To |
|---|---|---|
| CONCRETE | 0 | 5 |
| GRAY SILTY CLAY | 5 | 8 |
| BROWN SILTY CLAY & GRAVEL | 8 | 13 |

**Well Log Number:** 100474

View Image of Original Well Log

## ORIGINAL OWNER AND LOCATION

**Original Owner Name:** *A THOMPSON*
**County:** *CLERMONT*
**Township:** *UNION*
**Section Number:**
**Address:** *ELICK LN*
**Lot Number:**
**City:**
**State:** *OH*
**Zip Code:**
**Location Number:** *58*
**Location Map Year:** *1984*
**Location Area:**
**Latitude:**
**Longitude:**

## CONSTRUCTION DETAILS

**Borehole Diameter: 1:**
**2:**
**Borehole Depth: 1:** *90 ft.*
**2:**
**Depth to Bedrock:**
**Casing Diameter: 1:** *6 in.*
**2:**
**Casing Length: 1:** *32 ft.*
**2:**
**Casing Thickness: 1:**
**2:**
**Casing Height Above Ground:**
**Aquifer Type:** *SHALE*
**Date of Completion:** *6/26/1952*
**Total Depth:** *90 ft.*
**Well Use:**
**Driller's Name:**

**Screen Diameter:**
**Slot Size:**
**Screen Length:**
**Type:**
**Material:**
**Set Between:**

**Gravel Pack Material/Size:**
**Vol/Wt Used:**
**Method of Installation:**
**Placed:**

**Grout Material/Size:**
**Vol/Wt Used:**
**Method of Installation:**
**Placed**

## WELL TEST DETAILS

**Static Water Level:**
**Test Rate:** *2 gpm*
**Associated Reports**
**Drawdown:**
**Test Duration:**
*NONE*

**COMMENTS:** *NONE*

## WELL LOG

| Formations | From | To |
|---|---|---|
| CLAY & BOULDERS | 0 | 32 |
| SOIL | 32 | 32 |
| SHALE | 32 | 90 |
| LIMESTONE | 90 | 90 |

X=1,500,900
(2000×2000)
y = 403,800 S

# WELL LOG AND DRILLING REPORT

ORIGINAL
35

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Columbus, Ohio

№ 100504

County Clermont 13 Township Union Section of Township or Lot Number

Owner Thomas Clepper Address R. R. 5 Batavia O.

Location of property Clepper Lane Clepper Lane

## CONSTRUCTION DETAILS

Casing diameter 5 Length of casing 21

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

## PUMPING TEST

Pumping rate G.P.M. Duration of test hrs.

Drawdown ft. Date

Developed capacity 25 gph

Static level—depth to water ft.

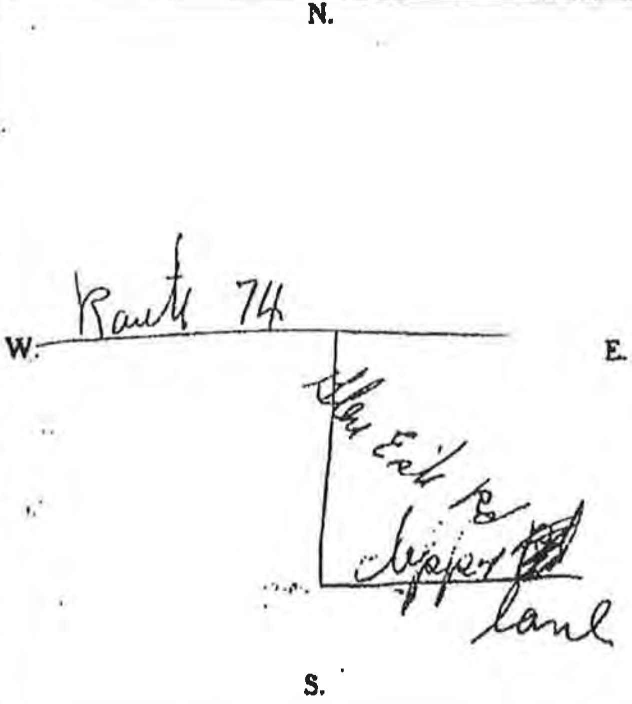
Pump installed by

## WELL LOG

| Formations Sandstone, shale, limestone, gravel and clay | From | To |
|---|---|---|
| | 0 Feet | Ft. |
| sand clay | | 21 |
| lime & shale | 21 | 50 |

## SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm Hubert Farris Date June 4 - 52

Address 3357 Madison Rd Cin 9, Signed H Farris

(57)

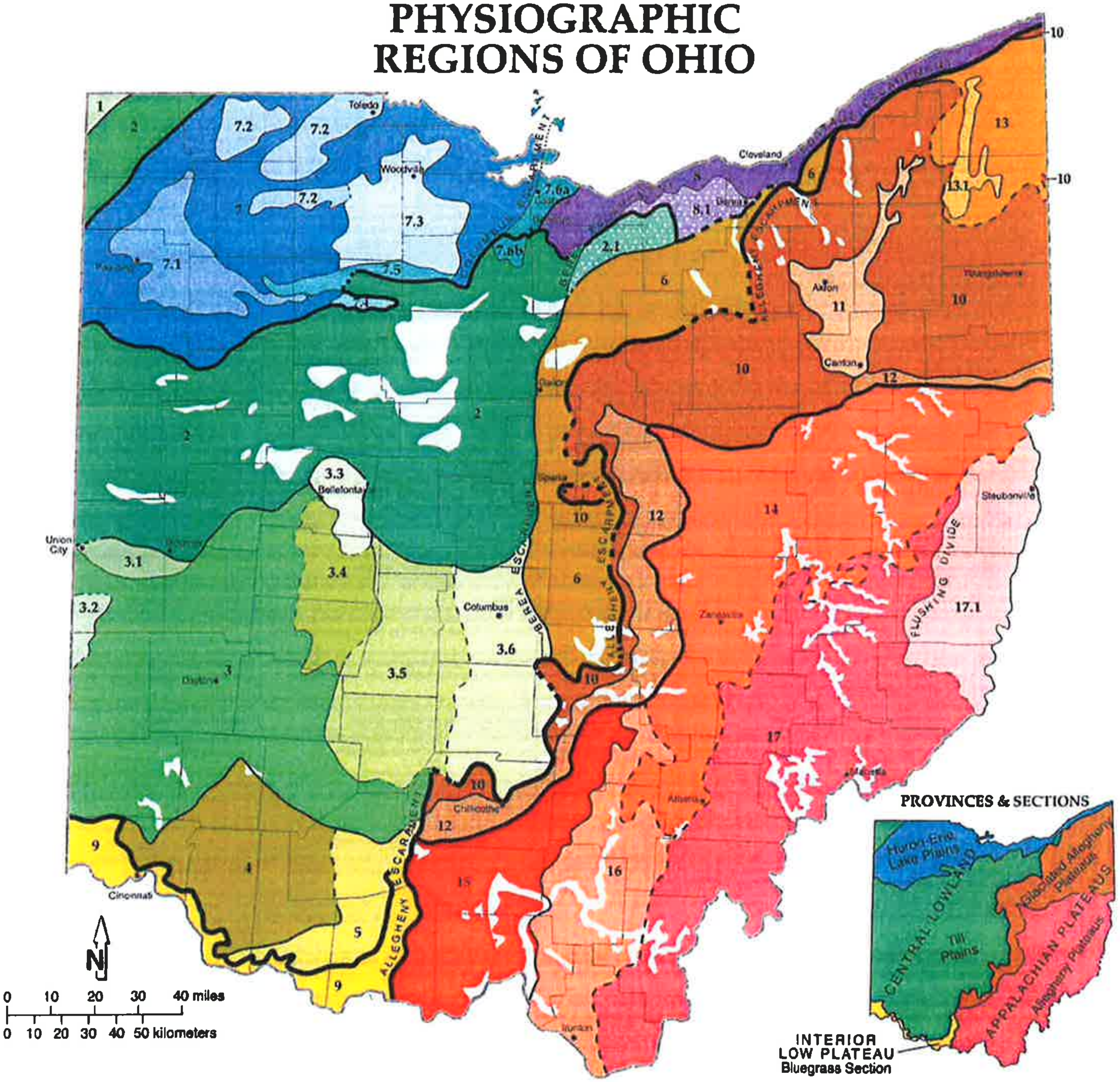
# Appendix 7
# ODNR Geologic Maps

STATE OF OHIO
Ted Strickland, Governor

DEPARTMENT OF NATURAL RESOURCES
Sean D. Logan, Director

DIVISION OF GEOLOGICAL SURVEY
Lawrence H. Wickstrom, Chief

# PHYSIOGRAPHIC REGIONS OF OHIO



**Till Plains**

- ⬜ 1. Steuben Till Plain
- 🟩 2. Central Ohio Clayey Till Plain
  - ▨ 2.1. Berea Headlands of the Till Plain
- 🟩 3. Southern Ohio Loamy Till Plain
  - 🟩 3.1. Union City-Bloomer Transitional Terrain
  - 🟨 3.2. Whitewater Interlobate Plain
  - ⬜ 3.3. Bellefontaine Upland
  - 🟩 3.4. Mad River Interlobate Plain
  - 🟨 3.5. Darby Plain
  - 🟨 3.6. Columbus Lowland
- 🟫 4. Illinoian Till Plain
- 🟨 5. Dissected Illinoian Till Plain
- 🟧 6. Galion Glaciated Low Plateau

- - - Transitional boundary

Lake basin/deposits outside Huron-Erie Lake Plains

**Huron-Erie Lake Plains**

- 🟦 7. Maumee Lake Plains
  - 🟦 7.1. Paulding Clay Basin
  - 🟦 7.2. Maumee Sand Plains
  - ⬜ 7.3. Woodville Lake-Plain Reefs
  - 🟦 7.4. Findlay Embayment
  - 🟦 7.5. Fostoria Lake-Plain Shoals
  - 🟦 7.6a and 7.6b. Bellevue-Castalia Karst Plain
- 🟪 8. Erie Lake Plain
  - ▨ 8.1. Berea Headlands of the Erie Lake Plain

**Bluegrass Section**

- 🟨 9. Outer Bluegrass Region

**Glaciated Allegheny Plateaus**

- 🟧 10. Killbuck-Glaciated Pittsburgh Plateau
- 🟧 11. Akron-Canton Interlobate Plateau
- 🟧 12. Illinoian Glaciated Allegheny Plateau
- 🟧 13. Grand River Low Plateau
  - 🟨 13.1 Grand River Finger-Lake Plain

**Allegheny Plateaus**

- 🟧 14. Muskingum-Pittsburgh Plateau
- 🟥 15. Shawnee-Mississippian Plateau
- ▨ 16. Ironton Plateau
- 🟥 17. Marietta Plateau
  - ⬜ 17.1. Little Switzerland Plateau

4/98

**Recommended citation:** Ohio Division of Geological Survey, 1998, Physiographic regions of Ohio: Ohio Department of Natural Resources, Division of Geological Survey, page-size map with text, 2 p., scale 1:2,100,00.

# PHYSIOGRAPHIC REGIONS OF OHIO

| Major Divisions | Provinces | Sections * | DISTINGUISHING CHARACTERISTICS OF REGIONS & DISTRICTS | GEOLOGY | BOUNDARIES |
|---|---|---|---|---|---|
| INTERIOR PLAINS | CENTRAL LOWLAND | Till Plains | **1. Steuben Till Plain.** Hummocky terrain with rolling hills, interspersed flats and closed depressions, wetlands, few streams, deranged drainage, only a small part of the region is in Ohio, elevation 950'-1100', moderately low relief (60') | Wisconsinan-age (latest Ice Age) loamy till from a northern source (Saginaw glacial lobe) over Mississippian-age Coldwater Shale | Southeast: edge of Wabash Moraine |
| | | | **2. Central Ohio Clayey Till Plain.** Surface of clayey till; well-defined moraines with intervening flat-lying ground moraine and intermorainal lake basins, no boulder belts, about a dozen silt-, clay-, and till-filled lake basins range in area from a few to 200 square miles; few large streams, limited sand & gravel outwash, elevation 700'-1150', moderate relief (100') | Clayey, high-lime Wisconsinan-age till from a northeastern source (Erie glacial lobe) and lacustrine materials over Lower Paleozoic-age carbonate rocks and, in the east, shales, loess thin to absent | North: Lake Plain, northeast: limit of Berea Sandstone, east: Berea Escarpment, south: Powell and Union City/Bloomer Moraines, northern segment boundaries: Wabash Moraine and lake plain |
| | | | **2.1. Berea Headlands of the Till Plain.** Gently rolling to flat terrain of thin drift descending to Lake Erie; punctuated by more than 20 streamlined "whalebacks" of Berea Sandstone 0.5 to 2.5 miles long, 30'-60' high, somewhat poorly drained, elevation 800'-1000', low relief (40') | Thin, clayey, medium-lime Wisconsinan-age till over resistant Mississippian-age Berea Sandstone | South: limit of Berea Sandstone, elsewhere: Berea Escarpment and/or margin of highest Pleistocene lake |
| | | | **3. Southern Ohio Loamy Till Plain.** Surface of loamy till, end and recessional moraines, commonly associated with boulder belts, between relatively flat-lying ground moraine, cut by steep-walled large streams, stream valleys filled with outwash and alternate between broad floodplains and narrows, buried valleys common, elevation 530'-1150', moderate relief (200') | Loamy, high-lime Wisconsinan-age till, outwash, and loess over Lower Paleozoic-age carbonate rocks and, in the east, shales | East: Berea and Allegheny Escarpments; north: Powell and Union City/Bloomer Moraines, south: limit of Wisconsinan-age till |
| | | | **3.1. Union City-Bloomer Transitional Terrain.** Well-defined moraines with low relief, hummocky ground moraine like the Central Ohio Clayey Till Plain to the north, loamy till with loess cap like Southern Ohio Loamy Till Plain to the south, elevation 920'-1075', moderately low relief (30') | Loamy, high-lime Wisconsinan-age till with thin loess cap over Silurian-age dolomites | North: Bloomer Moraine and limit of loamy till, south: Union City Moraine |
| | | | **3.2. Whitewater Interlobate Plain.** An upland between two converging glacial lobes with hummocky moraines, moraine complexes, kames, boulder belts, and broad outwash trains/plains, contains highest elevations in Indiana (1257') and in adjacent Ohio counties (1240'); elevation in Ohio 980'-1240', moderate relief (150') | Loamy, high-lime Wisconsinan-age till and sand and gravel outwash over resistant Silurian-age carbonate rocks (north) and less resistant Ordovician-age shales and limestones (south) | North: limit of Knightstown/Farmersville Moraines and kame fields, east: high, dissected hills draining to Whitewater River |
| | | | **3.3. Bellefontaine Upland.** Moderately high relief (250') dissected topography with moraine complexes, boulder belts, high-gradient major streams, caves and sinkholes, few glacial depressions/kettles compared to surrounding areas, elevation 1100'-1549', includes highest elevation in Ohio (Campbell Hill, 1549') | Loamy, high-lime Wisconsinan-age till over generally deeply buried Silurian- to Devonian-age carbonate rocks and Ohio Shale | North: areas with hilltops above 1200', elsewhere: hilltops above about 1300' |
| | | | **3.4. Mad River Interlobate Plain.** Area between two major converging glacial lobes with extensive outwash, outwash terraces, and bordering moraines, springs and cool, ground-water-fed surface waters; elevation 800'-1350', moderate relief (200') | Loamy, high-lime Wisconsinan-age till and sand and gravel outwash over Silurian- to Devonian-age carbonate rocks and Ohio Shale | East and north: rear edge of Cable Moraine Complex, south: outwash to Clifton Gorge, west: western edge of Mad River Outwash |
| | | | **3.5. Darby Plain.** Moderately low relief (25'), broadly hummocky ground moraine with several broad, indistinct recessional moraines, between hummocks are broad, poorly drained swales which held wet prairies/meadows in pioneer days, few large streams, elevation 750'-1100' | Loamy, high-lime Wisconsinan-age till and sparse outwash over Silurian- and Devonian-age carbonate rocks and Ohio Shale in the southeast | South and west: front of Reesville and rear of Cable Moraines, north: Powell Moraine; east: increasing eastward slope (see 3.6) |
| | | | **3.6. Columbus Lowland.** Lowland surrounded in all directions by relative uplands, having a broad regional slope toward the Scioto Valley, many larger streams, elevation 600'-850' (950' near Powell Moraine), moderately low relief (25') | Loamy, high-lime (west) to medium-lime (east) Wisconsinan-age till and extensive outwash in Scioto Valley over deep Devonian- to Mississippian-age carbonate rocks, shales, and siltstones | North: Powell Moraine, east and south: Berea and/or Allegheny Escarpments, west: flatter and higher Darby Plain |
| | | | **4. Illinoian Till Plain.** Rolling ground moraine of older till generally lacking constructional features such as moraines, kames, and eskers; many buried valleys, modern valleys alternating between broad floodplains and bedrock gorges, elevation 600'-1100', moderately low relief (50') | Silt-loam, high-lime, Illinoian-age till with loess cap; soils leached several feet; underlain by Ordovician- and Silurian-age carbonate rocks and calcareous shales | North: Wisconsinan glacial margin (Cuba and Hartwell Moraines), elsewhere: limit of common till-covered hillslopes |
| | | | **5. Dissected Illinoian Till Plain.** Hilly former till plain in which glacial deposits have been eroded from many valley sides; relatively high stream density, elevation 600'-1340', moderate relief (200') | Hilltops of high-lime Illinoian-age till with loess cap; slopes of bedrock- and till-derived colluvium and Ordovician- and Silurian-age carbonate rocks and calcareous shales | East: maximum glacial margin, elsewhere: limit of general absence of till on hillslopes |
| | | | **6. Galion Glaciated Low Plateau.** Rolling upland transitional between the gently rolling Till Plain and the hilly Glaciated Allegheny Plateau, mantled with thin to thick drift; elevation 800'-1400', moderate relief (100') | Medium- to low-lime Wisconsinan-age till over Mississippian-age shales and sandstones | North: limit of Berea Sandstone, west: Berea Escarpment, south and east: Allegheny Escarpment |
| | | Huron-Erie Lake Plains | **7. Maumee Lake Plains.** Flat-lying Ice-Age lake basin with beach ridges, bars, dunes, deltas, and clay flats, contained the former Black Swamp, slightly dissected by modern streams, elevation 570'-800', very low relief (5') | Pleistocene-age silt, clay, and wave-planed clayey till over Silurian- and Devonian-age carbonate rocks and shales | Northeast: Lake Erie; elsewhere: margin of highest Pleistocene lake |
| | | | **7.1. Paulding Clay Basin.** Nearly flat lacustrine plain, most clayey of all Lake Plain subregions; low-gradient, highly meandering streams; easily ponded soils; elevation 700'-725', extremely low relief (less than 5') | Pleistocene-age lacustrine clay over clay till and Silurian-age dolomites | Northeast: subdued ("drowned") remnant of Defiance Moraine, elsewhere: limit of lacustrine clay |
| | | | **7.2. Maumee Sand Plains.** Lacustrine plain mantled by sand, includes low dunes, interdunal pans, beach ridges, and sand sheets of glacial lakeshores, well to poorly drained; elevation 600'-800', very low relief (10') | Late Wisconsinan-age sand over clay till and lacustrine deposits, Silurian- and Devonian-age carbonate rocks and shales buried deeply | Limit of sandy deposits and/or low dunes |
| | | | **7.3. Woodville Lake-Plain Reefs.** Very low relief (10') lacustrine plain with low dunes and lake margin features, punctuated by more than 75 ancient bedrock reefs rising 10' to 40' above the level of the plain and ranging in area from 0.1 to 3.0 square miles, the oblong reefs are thinly draped with drift; elevation 600'-775' | Thin to absent Wisconsinan-age wave-planed clay till, lacustrine deposits, and sand over Silurian-age reefal Lockport Dolomite | Limit of thinly mantled Lockport Dolomite (Bowling Green Fault to the west and the Defiance Moraine to the south) |
| | | | **7.4. Findlay Embayment.** Very low relief (10'), broadly rolling lacustrine plain; embayment of ancestral Lake Erie in which relatively coarse lacustrine sediments collected; elevation 775'-800' | Silty to gravelly Wisconsinan-age lacustrine deposits and wave-planed clayey till over Silurian-age Lockport Dolomite | West: 775' beach ridge; north: Defiance Moraine, south: margin of highest Pleistocene lake level |
| | | | **7.5. Fostoria Lake-Plain Shoals.** Portion of the Defiance Moraine highly eroded by shallow Lake Maumee with low north-south trending hillocks and shallow, closed depressions, many sandy areas, elevation 750'-825', low relief, decreasing westward (10'-15') | Silty to gravelly Wisconsinan-age lacustrine deposits and wave-planed clay till over deeply covered Silurian-age dolomite | South and east: unmodified Defiance Moraine, elsewhere: very low relief lake plain |
| | | | **7.6a and 7.6b. Bellevue-Castalia Karst Plain.** Hummocky plain of rock knobs and numerous sinkholes, large solution features, and caves; large springs; thinly mantled by drift, region straddles both Lake Plain (7.6a) and Till Plain (7.6b), 7.6a has greatest relief of any Lake Plain region (25'); elevation 570'-825' | Columbus and Delaware Limestones overlain by thin clay till in 7.6b, and thin silty and sandy Wisconsinan-age lacustrine deposits and wave-planed clay till in 7.6a | Limit of thinly mantled Columbus and Delaware Limestones, which is marked in the west by the Columbus Escarpment |
| | | | **8. Erie Lake Plain.** Edge of very low-relief (10') Ice-Age lake basin separated from modern Lake Erie by shoreline cliffs, major streams in deep gorges; elevation 570'-800' | Pleistocene-age lacustrine sand, silt, clay, and wave-planed till over Devonian- and Mississippian-age shales and sandstones | North: Lake Erie; south: margin of highest Pleistocene lake |
| | | | **8.1 Berea Headlands of the Erie Lake Plain.** Portion of the Erie Lake Plain underlain by resistant Berea Sandstone, several large sandstone headlands jut into the Ice-Age lake basin, contains several streamlined "whalebacks" of Berea Sandstone 0.5 to 2.0 miles long, 20'-35' high; poorly drained; elevation 670'-800', very low relief (10') | Thin lacustrine deposits over thin, wave-planed, clayey, medium-lime Wisconsinan-age till; underlain by resistant Berea Sandstone | North: portion of Lake Plain underlain by soft shales, south: margin of highest Pleistocene lake |
| | INT. LOW PLATEAUS | Bluegrass Section | **9. Outer Bluegrass Region.** Moderately high relief (300') dissected plateau of carbonate rocks, in east, caves and other karst features relatively common; in west, thin, early drift caps narrow ridges; elevation 455'-1120' | Ordovician- and Silurian-age dolomites, limestones, and calcareous shales; thin pre-Wisconsinan drift on ridges in west, silt-loam colluvium | Eastern segment: maximum glacial margin and high eastern ridges capped by noncarbonate rocks, connected by Ohio River bluffs to western segment which is bounded by nondissected till plain |
| APPALACHIAN HIGHLANDS | APPALACHIAN PLATEAUS | Glaciated Allegheny (Southern New York) Plateaus | **10. Killbuck-Glaciated Pittsburgh Plateau.** Ridges and flat uplands generally above 1200', covered with thin drift and dissected by steep valleys; valley segments alternate between broad drift-filled and narrow rock-walled reaches; elevation 600'-1505', moderate relief (200') | Thin to thick Wisconsinan-age clay to loam till over Mississippian- and Pennsylvanian-age shales, sandstones, conglomerates and coals | West and north: resistant sandstones of the Allegheny and Portage Escarpments, south and east: Wisconsinan glacial margin |
| | | | **11. Akron-Canton Interlobate Plateau.** Hummocky area between two converging glacial lobes dominated by kames, kame terraces, eskers, kettles, kettle lakes, and bogs/fens, deranged drainage with many natural lakes; elevation 900'-1200', moderate relief (200') | Sandy Wisconsinan-age and older drift over Devonian- to Pennsylvanian-age sandstones, conglomerates and shales | Limit of common sandy ice-contact features and deposits |
| | | | **12. Illinoian Glaciated Allegheny Plateau.** Dissected, rugged hills, loess and older drift on ridgetops, but absent on bedrock slopes, dissection similar to unglaciated regions of the Allegheny Plateau, elevation 600'-1400', moderate relief (200') | Colluvium and Illinoian-age till over Devonian- to Pennsylvanian-age shales, siltstones and sandstones | North and west: Wisconsinan glacial margin; south and east: Illinoian (maximum) glacial margin |
| | | | **13. Grand River Low Plateau.** Gentle rolling ground and end moraine having thin to thick drift, poorly drained areas and wetlands relatively common; elevation 760'-1200', low relief (20') except near Grand River Valley (200') | Clayey, low-lime Wisconsinan-age till over deeply buried, soft Devonian-age shales and near-surface Mississippian-age sandstones and shales | North: Portage Escarpment; south and west: Defiance Moraine, southeast: increasing relief from proximity of buried Pennsylvanian-age sandstones |
| | | | **13.1. Grand River Finger-Lake Plain.** Very low relief (10') lake deposits in steep-sided troughs (200' relief) within the Grand River Low Plateau; cut by glacial and stream erosion, extensive wetlands, elevation 800'-900' | Surficial lacustrine clay and drift over deeply buried, soft Devonian-age shales | Margins of steeply sloping troughs containing the Grand River and parts of Rock and Mosquito Creeks |
| | | Allegheny (Kanawha) Plateaus | **14. Muskingum-Pittsburgh Plateau.** Moderately high to high relief (300'-600') dissected plateau having broad major valleys that contain outwash terraces, and tributaries with lacustrine terraces, medium-grained bedrock sequences coarser than those in Marietta Plateau (17) but finer than those in Ironton Plateau (16), remnants of ancient Teays-age drainage system uncommon, elevation 650'-1400' | Mississippian and Pennsylvanian-age siltstones, shales, sandstones and economically important coals and claystones; Wisconsinan-age sand, gravel, and lacustrine silt; silt-loam colluvium | North and west: maximum glacial margin; southeast: transition to finer grained bedrock; southwest: transition to coarser grained bedrock |
| | | | **15. Shawnee-Mississippian Plateau.** High relief (400'-800'), highly dissected plateau of coarse and fine grained rock sequences; most rugged area in Ohio; remnants of ancient lacustrine clay-filled Teays drainage system are extensive in lowlands, absent in uplands, elevation 490'-1340' | Devonian- and Mississippian-age shales, siltstones, and locally thick sandstones, Pleistocene-age sandy outwash in Scioto River; Teays-age Minford Clay, silt-loam and channery colluvium | North: Maximum glacial margin; west: carbonate bedrock, east: limit of Mississippian-age bedrock |
| | | | **16. Ironton Plateau.** Moderately high relief (300') dissected plateau, coarser grained coal-bearing rock sequences more common than in other regions of the Allegheny Plateau; common lacustrine clay-filled Teays Valley remnants; elevation 515'-1060' | Pennsylvanian-age (Pottsville, Allegheny and Conemaugh Groups) cycles of sandstones, siltstones, shales and economically important coals; Pleistocene (Teays)-age Minford Clay, silt-loam and channery colluvium | West: limit of common Pennsylvanian-age bedrock; north and east: gradation to finer rock sequences |
| | | | **17. Marietta Plateau.** Dissected, high relief (generally 350', to 600' near Ohio River) plateau; mostly fine-grained rocks, red shales and red soils relatively common, landslides common, remnants of ancient lacustrine clay-filled Teays drainage system common, elevation 515'-1400' | Pennsylvanian-age Upper Conemaugh Group through Permian-age Dunkard Group cyclic sequences of red and gray shales, and siltstones, sandstones, limestones and coals, Pleistocene (Teays)-age Minford Clay, red and brown silty clay loam colluvium, landslide deposits | North and west: transition to medium-grained Lower Conemaugh rocks; east: Flushing Divide |
| | | | **17.1. Little Switzerland Plateau.** Highly dissected, high relief (generally 350' to 750' along Ohio River) plateau; mostly fine-grained rocks; red shales and red soils relatively common, landslides common; high-gradient shale-bottomed streams subject to flash flooding; no remnants of ancient Teays drainage system; elevation 580'-1400' | Similar to Marietta Plateau but lacking Pleistocene (Teays)-age Minford Clay | North: transition to medium-grained rocks; west and south: Flushing Divide, east: Ohio River |

* Section names modified from Fenneman (1938, 1946)

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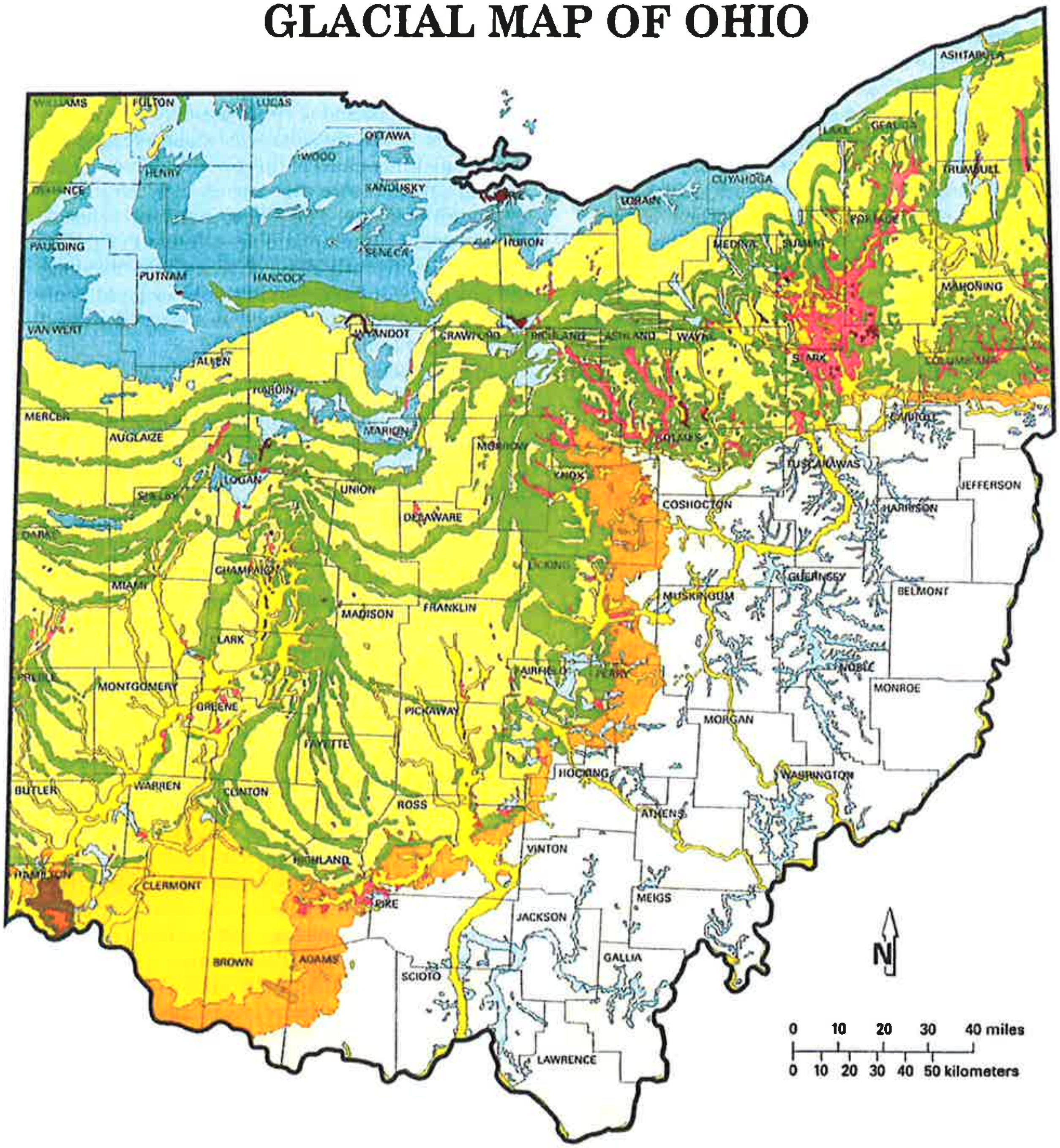
# GLACIAL MAP OF OHIO



**WISCONSINAN**
(14,000 to 24,000 years old)

- 🟨 Ground moraine
- 🟦 Wave-planed ground moraine
- 🟩 Ridge moraine

**ILLINOIAN**
(130,000 to 300,000 years old)

- 🟨 Ground moraine
- 🟧 Dissected ground moraine
- 🟧 Hummocky moraine

**PRE-ILLINOIAN**
(older than 300,000 years)

- 🟧 Ground moraine
- 🟫 Dissected ground moraine

- 🟥 Kames and eskers
- 🟨 Outwash
- ⬜ Lake deposits
- 🟫 Peat
- ⬜ Colluvium

**Recommended citation:** Ohio Division of Geological Survey, 2005, Glacial map of Ohio: Ohio Department of Natural Resources, Division of Geological Survey, page-size map with text, 2 p., scale 1:2,000,000.

# GLACIAL DEPOSITS OF OHIO

Although difficult to imagine, Ohio has at various times in the recent geologic past (within the last 1.6 million years) had three-quarters of its surface covered by vast sheets of ice perhaps as much as 1 mile thick. This period of geologic history is referred to as the Pleistocene Epoch or, more commonly, the Ice Age, although there is abundant evidence that Earth has experienced numerous other "ice ages" throughout its 4.6 billion years of existence.

Ice Age glaciers invading Ohio formed in central Canada in response to climatic conditions that allowed massive buildups of ice. Because of their great thickness, these ice masses flowed under their own weight and ultimately moved south as far as northern Kentucky. Oxygen-isotope analysis of deep-sea sediments indicates that more than a dozen glaciations occurred during the Pleistocene. Portions of Ohio were covered by the last two glaciations, known as the Wisconsinan (the most recent) and the Illinoian (older), and by an undetermined number of pre-Illinoian glaciations.

Because each major advance covered deposits left by the previous ice sheets, pre-Illinoian deposits are exposed only in extreme southwestern Ohio in the vicinity of Cincinnati. Although the Illinoian ice sheet covered the largest area of Ohio, its deposits are at the surface only in a narrow band from Cincinnati northeast to the Ohio-Pennsylvania border. Most features shown on the map of glacial deposits of Ohio are the result of the most recent or Wisconsinan-age glaciers.

The material left by the ice sheets consists of mixtures of clay, sand, gravel, and boulders in various types of deposits of different modes of origin. Rock debris carried along by the glacier was deposited in two principal fashions, either directly by the ice or by meltwater from the glacier. Some material reaching the ice front was carried away by streams of meltwater to form outwash deposits. Material deposited by water on and under the surface of the glacier itself formed features called kames and eskers, which are recognized by characteristic shapes and composition. A distinctive characteristic of glacial sediments that have been deposited by water is that the material was sorted by the water that carried it. Thus, outwash, kame, and esker deposits normally consist of sand and gravel. The large boulder-size particles were left behind and the smaller clay-size particles were carried far away, leaving the intermediate gravel- and sand-size material along the stream courses.

Material deposited directly from the ice was not sorted and ranges from clay to boulders. Some of the debris was deposited as ridges parallel to the edge of the glacier, forming terminal or end moraines, which mark the position of the ice when it paused for a period of time, possibly a few hundred years. When the entire ice sheet receded because of melting, much of the ground-up rock material still held in the ice was deposited on the surface as ground moraine. The oldest morainic deposits in Ohio are of Illinoian and pre-Illinoian age. Erosion has significantly reduced these deposits along the glacial boundary, leaving only isolated remnants that have been mapped as dissected ground moraine and hummocky moraine.

Many glacial lakes were formed in Ohio during the Ice Age. Lake deposits are primarily fine-grained clay- and silt-size sediments. The most extensive area of lake deposits is in northern Ohio bordering Lake Erie. These deposits, and adjacent areas of wave-planed ground moraine, are the result of sedimentation and erosion by large lakes that occupied the Erie basin as Wisconsinan-age ice retreated into Canada. Other lake deposits accumulated in stream valleys whose outlets were temporarily dammed by ice or outwash. Many outwash-dammed lake deposits are present in southeastern Ohio far beyond the glacial boundary. Peat deposits are associated with many lake deposits and formed through the accumulation of partially decayed aquatic vegetation in oxygen-depleted, stagnant water.

The term glacial drift commonly is used to refer to any material deposited directly (*e.g.*, ground moraine) or indirectly (*e.g.*, outwash) by a glacier. Because the ice that invaded Ohio came from Canada, it carried in many rock types not found in Ohio. Pebbles, cobbles, and boulders of these foreign rock types are called erratics. Rock collecting in areas of glacial drift may yield granite, gneiss, trace quantities of gold, and very rarely, diamonds. Most rocks found in glacial deposits, however, are types native to Ohio.

Certain deposits left behind by the ice are of economic importance, particularly sand and gravel, clay, and peat. Sand and gravel that have been sorted by meltwater generally occur as kames or eskers or as outwash along major drainageways. Sand and gravel are vital to Ohio's construction industry. Futhermore, outwash deposits are among the state's most productive sources of ground water.

Glacial clay is used in cement and for common clay products (particularly brick). The minor quantities of peat produced in the state are used mainly for mulch and soil conditioning.

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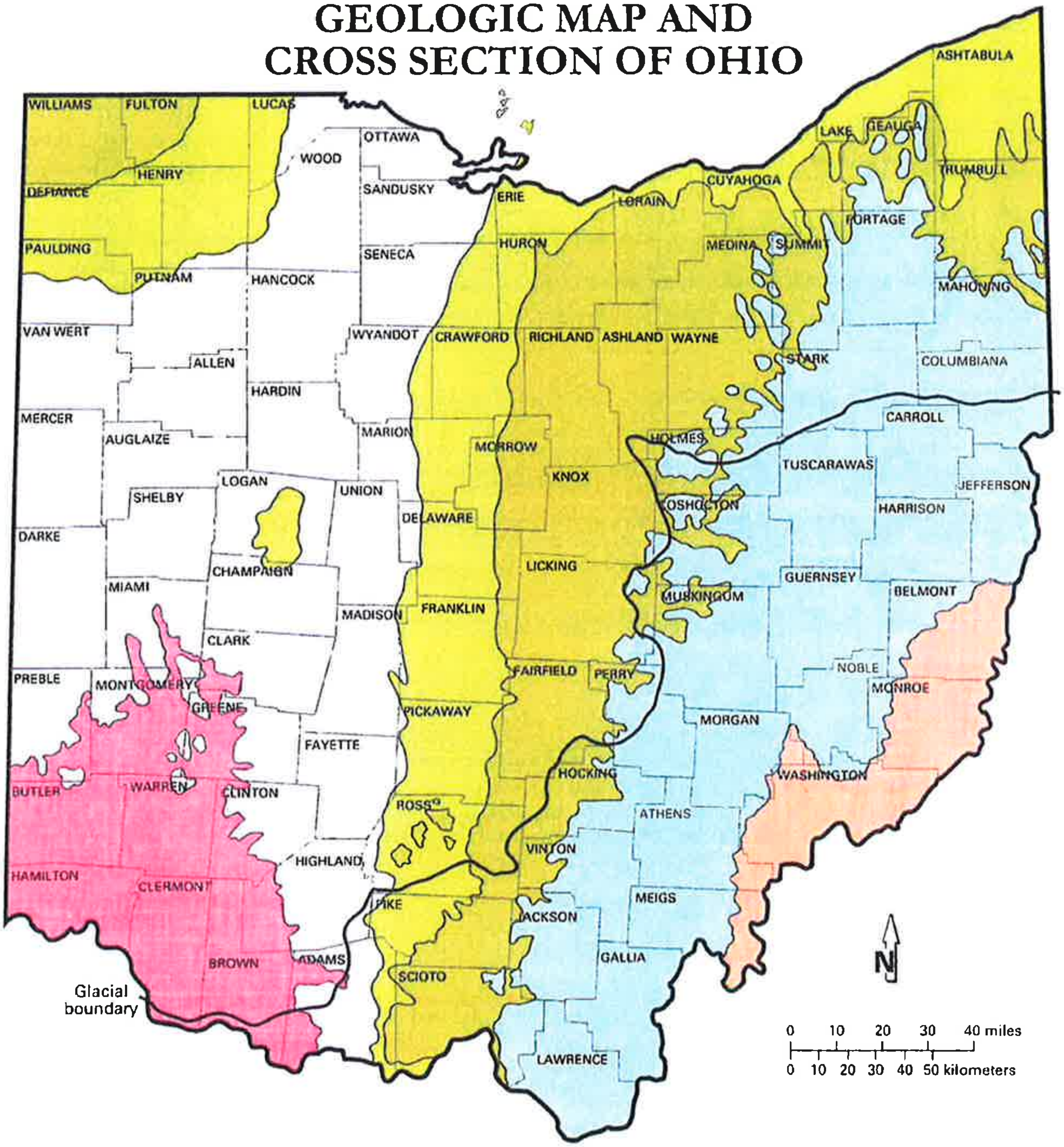
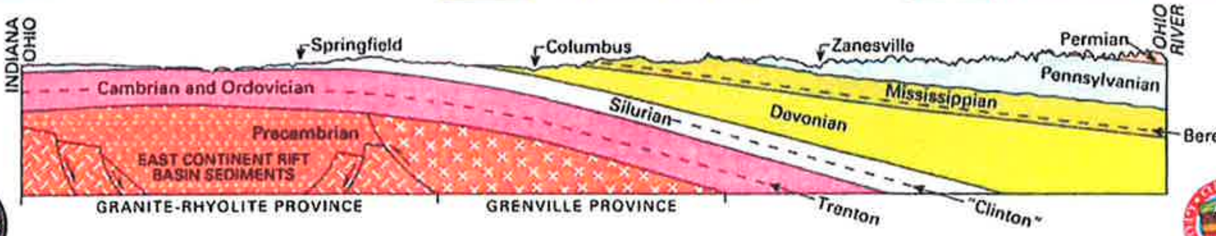
# GEOLOGIC MAP AND CROSS SECTION OF OHIO



GEOLOGIC SYSTEM (million years before present)

- 🟧 Permian (286-245)
- 🟦 Pennsylvanian (320-286)
- 🟩 Mississippian (360-320)
- 🟨 Devonian (408-360)
- ⬜ Silurian (438-408)
- 🟪 Ordovician (505-438)



**Recommended citation:** Ohio Division of Geological Survey, 2006, Geologic map and cross section of Ohio: Ohio Department of Natural Resources, Division of Geological Survey, page-size map, 1 p., scale 1:2,000,000.

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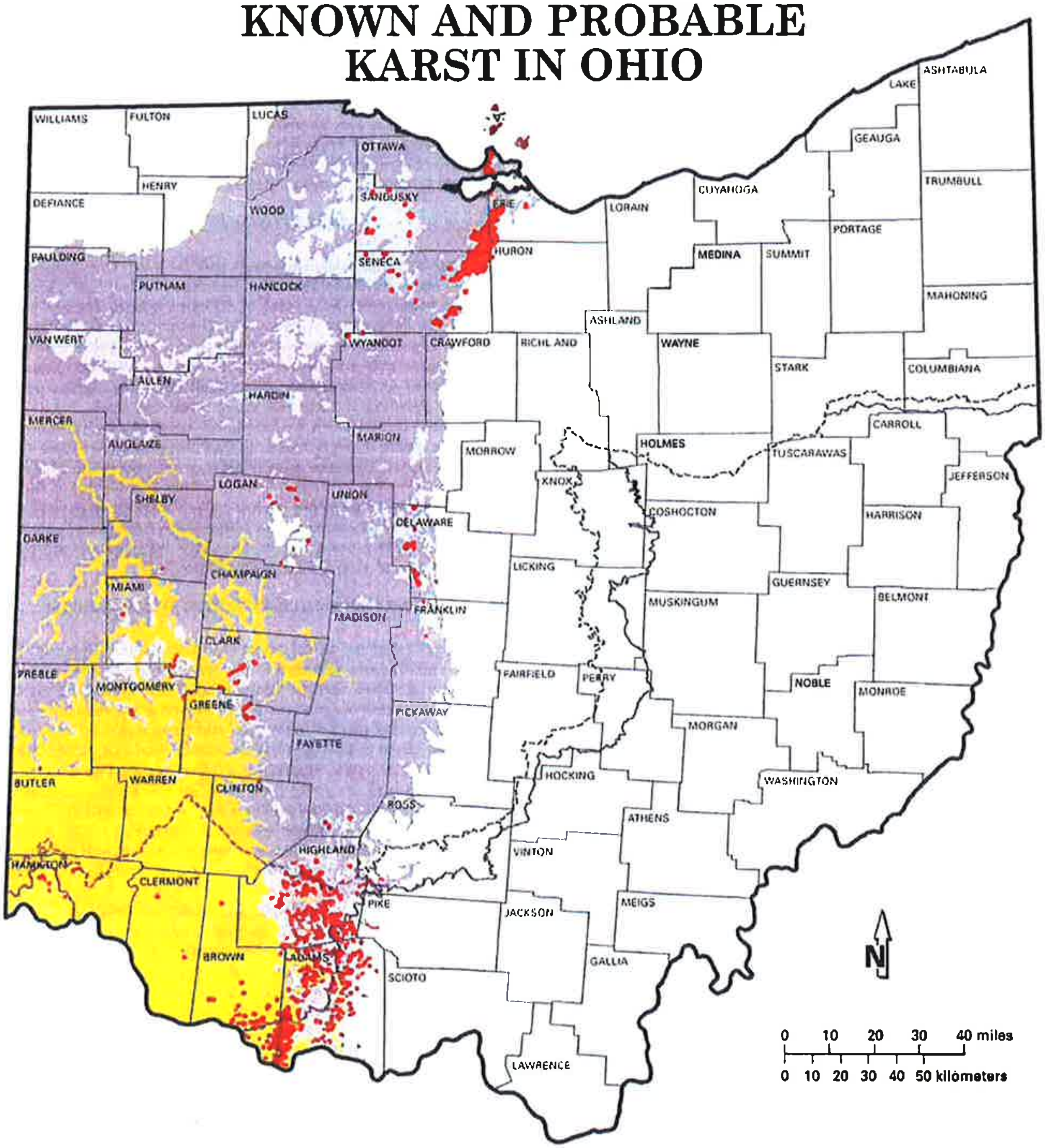
Larry Wickstrom, Chief

# KNOWN AND PROBABLE KARST IN OHIO



## EXPLANATION

☐ Silurian- and Devonian-age carbonate bedrock overlain by less than 20 feet of glacial drift and/or alluvium

▨ Silurian- and Devonian-age carbonate bedrock overlain by more than 20 feet of glacial drift and/or alluvium

🟨 Interbedded Ordovician-age limestone and shale overlain by less than 20 feet of glacial drift and/or alluvium

🟨 Interbedded Ordovician-age limestone and shale overlain by more than 20 feet of glacial drift and/or alluvium

🟥 Probable karst areas

☐ Area not known to contain karst features

Wisconsinan Glacial Margin

Illinoian Glacial Margin

**Recommended citation:** Ohio Division of Geological Survey, 1999 (rev. 2002, 2006), Known and probable karst in Ohio: Ohio Department of Natural Resources, Division of Geological Survey Map EG-1, generalized page-size version with text, 2 p., scale 1:2,000,000.

# OHIO KARST AREAS

Karst is a landform that develops on or in limestone, dolomite, or gypsum by dissolution and that is characterized by the presence of characteristic features such as sinkholes, underground (or internal) drainage through solution-enlarged fractures (joints), and caves. While karst landforms and features are commonly striking in appearance and host to some of Ohio's rarest fauna, they also can be a significant geologic hazard. Sudden collapse of an underground cavern or opening of a sinkhole can cause surface subsidence that can severely damage or destroy any overlying structure such as a building, bridge, or highway. Improperly backfilled sinkholes are prone to both gradual and sudden subsidence, and similarly threaten overlying structures. Sewage, animal wastes, and agricultural, industrial, and ice-control chemicals entering sinkholes as surface drainage are conducted directly and quickly into the ground-water system, thereby posing a severe threat to potable water supplies. Because of such risks, many of the nation's state geological surveys, and the U.S. Geological Survey, are actively mapping and characterizing the nation's karst regions.

The five most significant Ohio karst regions are described below.

## BELLEVUE-CASTALIA KARST PLAIN

The Bellevue-Castalia Karst Plain occupies portions of northeastern Seneca County, northwestern Huron County, southeastern Sandusky County, and western Erie County. Adjacent karst terrain in portions of Ottawa County, including the Marblehead Peninsula, Catawba Island, and the Bass Islands, is related in geologic origin to the Bellevue-Castalia Karst Plain. The area is underlain by up to 175 feet of Devonian carbonates (Delaware Limestone, Columbus Limestone, Lucas Dolomite, and Amherstburg Dolomite) overlying Silurian dolomite, anhydrite, and gypsum of the Bass Islands Dolomite and Salina Group.

The Bellevue-Castalia Karst Plain is believed to contain more sinkholes than any of Ohio's other karst regions. Huge, irregularly shaped, closed depressions up to 270 acres in size and commonly enclosing smaller, circular-closed depressions 5 to 80 feet in diameter pockmark the land between the village of Flat Rock in northeastern Seneca County and Castalia in western Erie County. Surface drainage on the plain is very limited, and many of the streams which are present disappear into sinkholes called swallow holes.

Karst in the Bellevue-Castalia and Lake Erie islands region is due to collapse of overlying carbonate rocks into voids created by the dissolution and removal of underlying gypsum beds. According to Verber and Stansbery (1953, Ohio Journal of Science), ground water is introduced into Salina Group anhydrite ($CaSO_4$) through pores and fractures in the overlying carbonates. The anhydrite chemically reacts with the water to form gypsum ($CaSO_4 \cdot 2H_2O$), undergoing a 33 to 62 percent increase in volume in the process. This swelling lifts overlying strata, thereby opening fractures and creating massive passageways for conduction of greater volumes of ground water through the Silurian Bass Islands Dolomite and into underlying Salina Group strata. Gypsum, being readily soluble in water, is dissolved, creating huge voids. Overlying carbonates then collapse or break down, leaving surface depressions similar to those resulting from roof failure of an underground mine.

## DISSECTED NIAGARA ESCARPMENT

The dissected Niagara Escarpment of southwestern Ohio includes the largest single area of karst terrain in the state and the greatest number of surveyed caves. It also is estimated to include the second-largest number of sinkholes in the state. The area is underlain by Silurian rocks of the Peebles Dolomite, Lilley Formation, Bisher Formation, Estill Shale, and Noland Formation in Adams, Highland, and Clinton Counties and the Cedarville Dolomite, Springfield Dolomite, Euphemia Dolomite, Massie Shale, Laurel Dolomite, Osgood Shale, and Dayton Formation in Greene, Clark, Miami, Montgomery, and Preble Counties. The Peebles-Lilley-Bisher sequence and the Cedarville-Springfield-Euphemia sequence constitute the Lockport Group.

Most karst features along the Niagara Escarpment in southwestern Ohio are developed in Lockport Group strata. More than 100 sinkholes and caves developed in the Lockport have been documented in the field, and more than 1,000 probable sinkholes in the Lockport have been identified on aerial photographs, soils maps, and topographic maps. As with most karst terrain, sinkholes developed on the Niagara Escarpment commonly show linear orientations aligned with prevailing joint trends in the area. The greatest concentration of sinkholes on the escarpment is south of the Wisconsinan glacial border in southern Highland and Adams Counties, where highly dissected ridges capped by Silurian carbonate rocks rise 150 to 200 feet above surrounding drainage. Illinoian till in these areas is thin to absent, and soils are completely leached with respect to calcium and calcium-magnesium carbonate. Such geologic settings are ideal for active karst processes, as downward-percolating, naturally acidic rain water is not buffered until it has dissolved some of the underlying carbonate bedrock. Other significant karst features of the Niagara Escarpment include small caves in escarpment re-entrants created by the valleys of the Great Miami and Stillwater Rivers in Miami County.

## BELLEFONTAINE OUTLIER

The Bellefontaine Outlier in Logan and northern Champaign Counties is an erosionally resistant "island" of Devonian carbonates capped by Ohio Shale and surrounded by a "sea" of Silurian strata. Though completely glaciated, the outlier was such an impediment to Ice Age glaciers that it repeatedly separated advancing ice sheets into two glacial lobes—the Miami Lobe on the west and the Scioto Lobe on the east. Most Ohioans recognize the outlier as the location of Campbell Hill—the highest point in the state at an elevation of 1,549 feet above mean sea level.

Although it is not known for having an especially well-developed karst terrain, the outlier is the location of Ohio's largest known cave, Ohio Caverns. The greatest sinkhole concentrations are present in McArthur and Rushcreek Townships of Logan County, where the density of sinkholes in some areas approaches 30 per square mile. Sinkholes here typically occur in upland areas of Devonian Lucas Dolomite or Columbus Limestone that are 30 to 50 feet or more above surrounding drainage and are covered by less than 20 feet of glacial drift and/or Ohio Shale.

## SCIOTO AND OLENTANGY RIVER GORGES

The uplands adjacent to the gorges of the Scioto and Olentangy Rivers in northern Franklin and southern Delaware Counties include areas of well-developed, active karst terrain. These uplands also are among the most rapidly developing areas of the state, which means karst should be a consideration in site assessments for commercial and residential construction projects.

The Scioto River in this area has been incised to a depth of 50 to 100 feet into underlying bedrock, creating a shallow gorge. The floor, walls, and adjacent uplands of the gorge consist of Devonian Delaware and Columbus Limestones mantled by up to 20 feet of Wisconsinan till. Sinkhole concentrations up to 1 sinkhole per acre are not uncommon in Concord, Scioto, and Radnor Townships of Delaware County. The sinkholes range in diameter from about 10 to 100 feet and commonly are aligned linearly along major joint systems.

The Olentangy River is approximately 5 miles east of the Scioto River in southern Delaware County and occupies a gorge that is narrower and up to 50 feet deeper than the Scioto River gorge. The floor and the lower half of the walls along the Olentangy gorge are composed of Delaware and Columbus Limestones, the upper half of the walls is composed of Devonian Ohio and Olentangy Shales mantled by a thin veneer of glacial drift. Karst terrain has developed along portions of the gorge in a manner similar to karst terrain along the Scioto River.

## ORDOVICIAN UPLANDS

The Ordovician uplands of southwestern Ohio are the location of surprisingly well-developed karst terrain despite the large component of shale in local bedrock. Numerous sinkholes are present in Ordovician rocks of Adams, Brown, Clermont, and Hamilton Counties.

The carbonate-rich members of the Grant Lake Formation (Bellevue and Mount Auburn), Grant Lake Limestone (Bellevue and Straight Creek), and the upper portion of the Arnheim formation are the Ordovician units most prone to karstification; however, the shale-rich (70 percent shale, 30 percent limestone) Waynesville Formation also has been subjected to a surprising amount of karst development in southeastern Brown and southwestern Adams Counties, just north of the Ohio River.

## ACKNOWLEDGMENT

The Division of Geological Survey gratefully acknowledges the Ohio Low-Level Radioactive-Waste Facility Development Authority for its financial support for mapping Ohio karst terrain.

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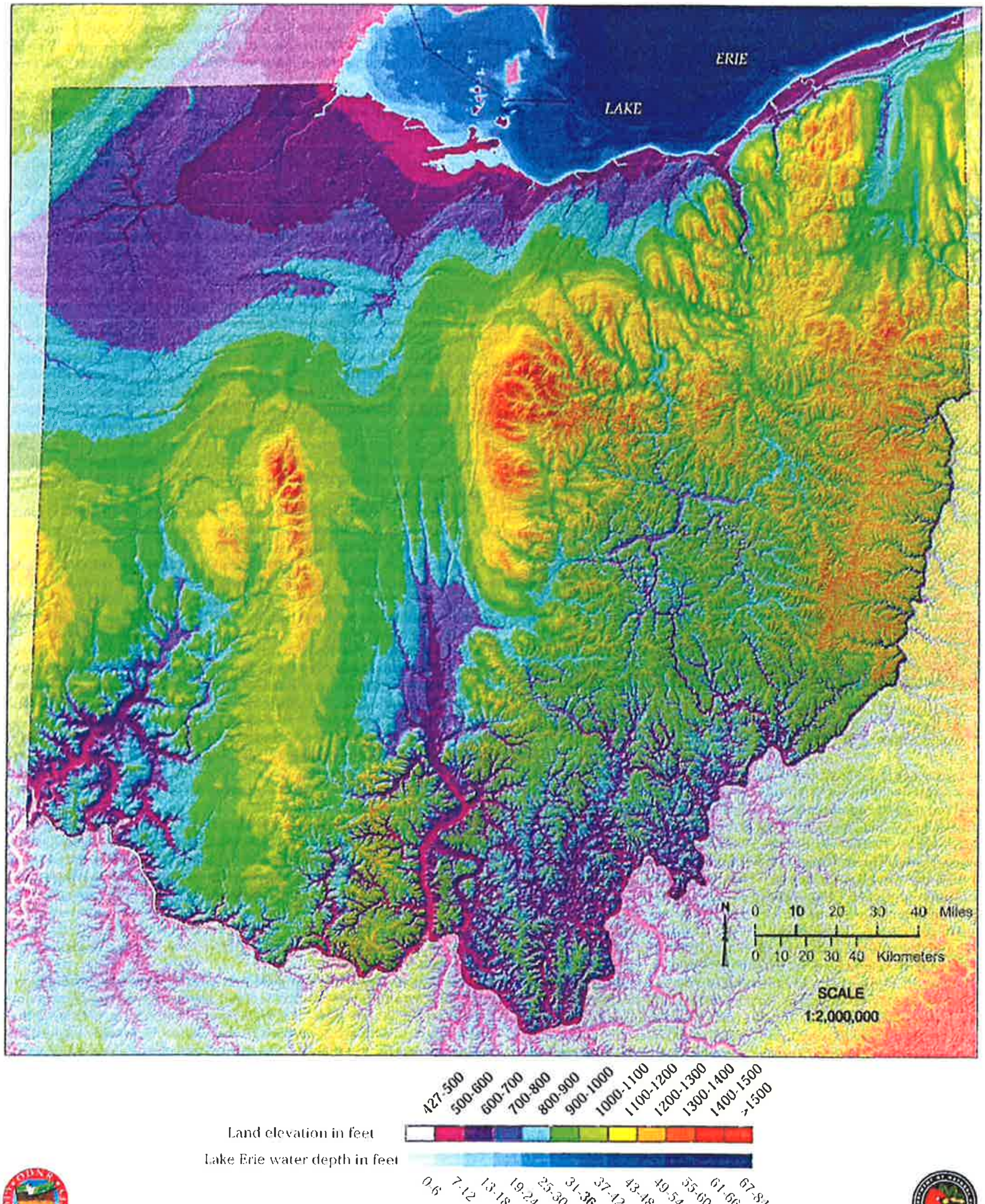
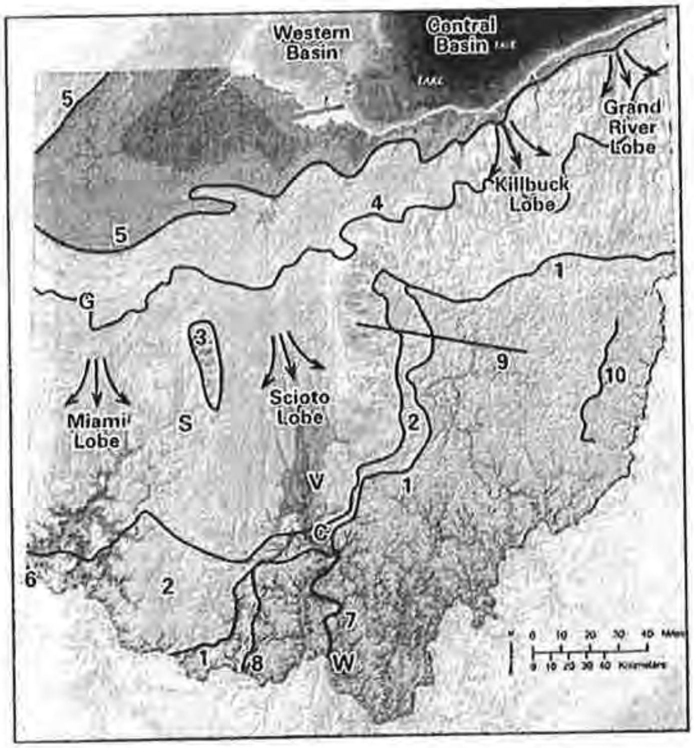
# SHADED ELEVATION MAP OF OHIO



Recommended citation: Ohio Division of Geological Survey, 2002 (2003), Shaded elevation map of Ohio—spectral version: Ohio Department of Natural Resources, Division of Geological Survey Map MG-1, generalized page-size version with text, 2 p., scale 1:2,000,000.

# SHADED ELEVATION MAP

This map depicts the topographic relief of Ohio's landscape using color to represent elevation intervals. The colorized topography has been digitally shaded from the northwest slightly above the horizon to give the appearance of a three-dimensional surface. The map is based on elevation data from the U.S. Geological Survey's National Elevation Dataset; the grid spacing for the data is 30 meters. Lake Erie water depths are derived from National Oceanic and Atmospheric Administration data. This digitally derived map shows details of Ohio's topography unlike any map of the past. Some of Ohio's more striking topographic features are outlined on the inset map below and described in the following paragraphs.



Direction of ice flow in glacial lobes

C = Chillicothe
G = Grand Lake St. Marys
S = Springfield
V = Circleville
W = Wheelersburg

**1** *Glacial boundary*—Continental ice sheets several thousand feet thick sculpted about two-thirds of Ohio's landscape and, upon melting, deposited material formerly incorporated in or beneath the ice. This boundary marks the southernmost known extent of glacial ice in Ohio. Topography in the glaciated portion of Ohio is smooth compared to the highly dissected, unglaciated part of Ohio. The glacial boundary in eastern Ohio is farther north than the boundary in western Ohio because the erosion-resistant bedrock hills in eastern Ohio impeded southward glacial advances. The glacial boundary in central and southwestern Ohio typically represents the maximum advance of Illinoian-age (130,000-300,000 years ago) glaciers. The east-west-oriented boundary in northeastern Ohio represents the maximum advance of Wisconsinan-age (14,000-24,000 years ago) glaciers.

**2** *Illinoian till areas*—Thin till (an unsorted mixture of glacially deposited clay, silt, sand, and cobbles) of Illinoian age is at the surface in a 10- to 40-mile-wide belt between the Illinoian and Wisconsinan maximum advances. Terrain in this belt is typically transitional between the generally flat Wisconsinan till plains to the north and west and the dissected, unglaciated bedrock to the southeast. The surface deposits in this belt are characterized by loess (wind-blown silt) over thin till on ridge tops and thick colluvium (weathered bedrock) on slopes.

**3** *Ohio's highest elevation*—An upland area known as the Bellefontaine Outlier covers portions of Champaign, Logan, and Union Counties in west-central Ohio. The outlier is an erosional remnant of Devonian-age limestone, dolomite, and shale that lies 25 miles west of the main outcrop belt of Devonian-age rock in Franklin and Delaware Counties in central Ohio. The outlier is mantled by up to 160 feet of till, which adds to the outlier's height. Campbell Hill, the highest elevation in Ohio at 1,549 feet above sea level, is on the outlier. The higher, more resistant bedrock of the outlier impeded the southward-advancing glaciers, causing them to split into two lobes, the Miami Lobe on the west and the Scioto Lobe on the east. Ridges of thick accumulations of glacial material, called moraines, drape around the outlier and are distinct features on the map. Some moraines in Ohio are more than 200 miles long. Two other glacial lobes, the Killbuck and the Grand River Lobes, are present in the northern and northeastern portions of the state.

**4** *Eastern Continental Divide*—A continental drainage divide extends east-west across northern Ohio. Surface water north of this divide flows northward to Lake Erie, eventually over Niagara Falls into Lake Ontario, and into the Atlantic Ocean. Surface water south of the divide flows south to the Ohio River, the Mississippi River, and eventually into the Gulf of Mexico. The divide follows the crests of glacial moraines in western Ohio. In north-central and northeastern Ohio, the divide follows bedrock-controlled hills and glacial valleys containing thick glacial-lake deposits.

**5** *Ancient Lake Maumee shoreline*—About 14,000 years ago, the last continental ice sheet retreated northward across Ohio. The St. Lawrence Seaway was blocked by glacial ice, and glacial meltwater created lakes in front of the ice. A large lake, called Lake Maumee, formed in the general position of Lake Erie but extended over a much larger portion of northwestern Ohio. Ancient Lake Maumee water levels were about 230 feet higher than modern Lake Erie, and drained westward into the Wabash River system. The shoreline of ancient Lake Maumee had a series of sandy beaches and beach scarps, much like portions of Lake Erie today. The ancient sandy beaches are visible on the map as long, thin ridges on the surrounding flat lake terrain. Other beach ridges formed as the water level receded in stages before rising to its current level of approximately 572 feet above sea level. Lake Erie is the shallowest of the Great Lakes and has three basins: the western (averages 30 feet in depth), central (averages 60 feet in depth), and eastern (not shown on map; averages 80 feet in depth; maximum depth is about 212 feet).

**6** *Ohio's lowest elevation*—The lowest surface elevation in Ohio is about 455 feet above sea level and is located where the Ohio River exits the state at the extreme southwestern corner of Ohio.

**7** *Teays River valley*—The ancient Teays River flowed across Ohio before and during the earliest Ice Age. A north-south-trending remnant of the Teays River valley in south-central Ohio is distinctly visible on this map. From its headwaters in North Carolina, the Teays River flowed northwest across Virginia and West Virginia and entered Ohio in the area of present-day Wheelersburg. The Teays River cut a wide, curving valley as it flowed northward through southern Ohio. This valley, partially filled with clay, silt and sand, contains only a small stream today and remains clearly visible on the map as far as Chillicothe. North of Chillicothe, the valley is buried beneath hundreds of feet of glacial sediment but can be traced using well data to Circleville; the buried valley then turns northwestward, passing beneath Springfield and Grand Lake St. Marys and into eastern Indiana. In parts of western Ohio, the valley lies beneath 700 feet of glacially derived material. The valley commonly is about 200 to 300 feet deep and has steep to near-vertical walls.

**8** *Allegheny Escarpment*—Beyond the glacial boundary, the Allegheny Escarpment of southern Ohio marks a distinct change in topography. The land surface changes abruptly from the flatter, lower terrain in the west, which is underlain by soft carbonate rocks, to the higher, steeper terrain in the east, which is underlain by shale and sandstone. To the north, the escarpment was affected by glaciation, making it a less distinct topographic feature. The Allegheny Escarpment corresponds to a slight increase in the dip (tilt) of the rock layers as they descend eastward into the Appalachian Basin.

**9** *Surface lineament*—A west-northwest-trending lineament (a linear topographic feature on the Earth's surface) across east-central Ohio is distinctly visible on the map. The Walhonding River and a portion of the Muskingum River flow in portions of this linear topographic depression. Although poorly understood, this feature, which is referred to as the Coshocton Fracture Zone, has been attributed to fractures in the surface bedrock that are possibly related to faults present deeper in the subsurface.

**10** *Flushing Divide*—A sharp, north-northeast-trending, ridgelike feature in eastern Ohio is the Flushing Drainage Divide, named after the Belmont County village of Flushing, where it is well developed. Surface water west of the divide flows westward into a series of low-gradient creeks, such as the Sandy, Conotton, and Stillwater, and then to the Tuscarawas River. Surface water east of the divide flows eastward into a series of high-gradient, rapidly down-cutting creeks that flow into the Ohio River. The ridge is at an elevation of about 1,260 to 1,280 feet above sea level and separates two old Teays-era drainage basins.

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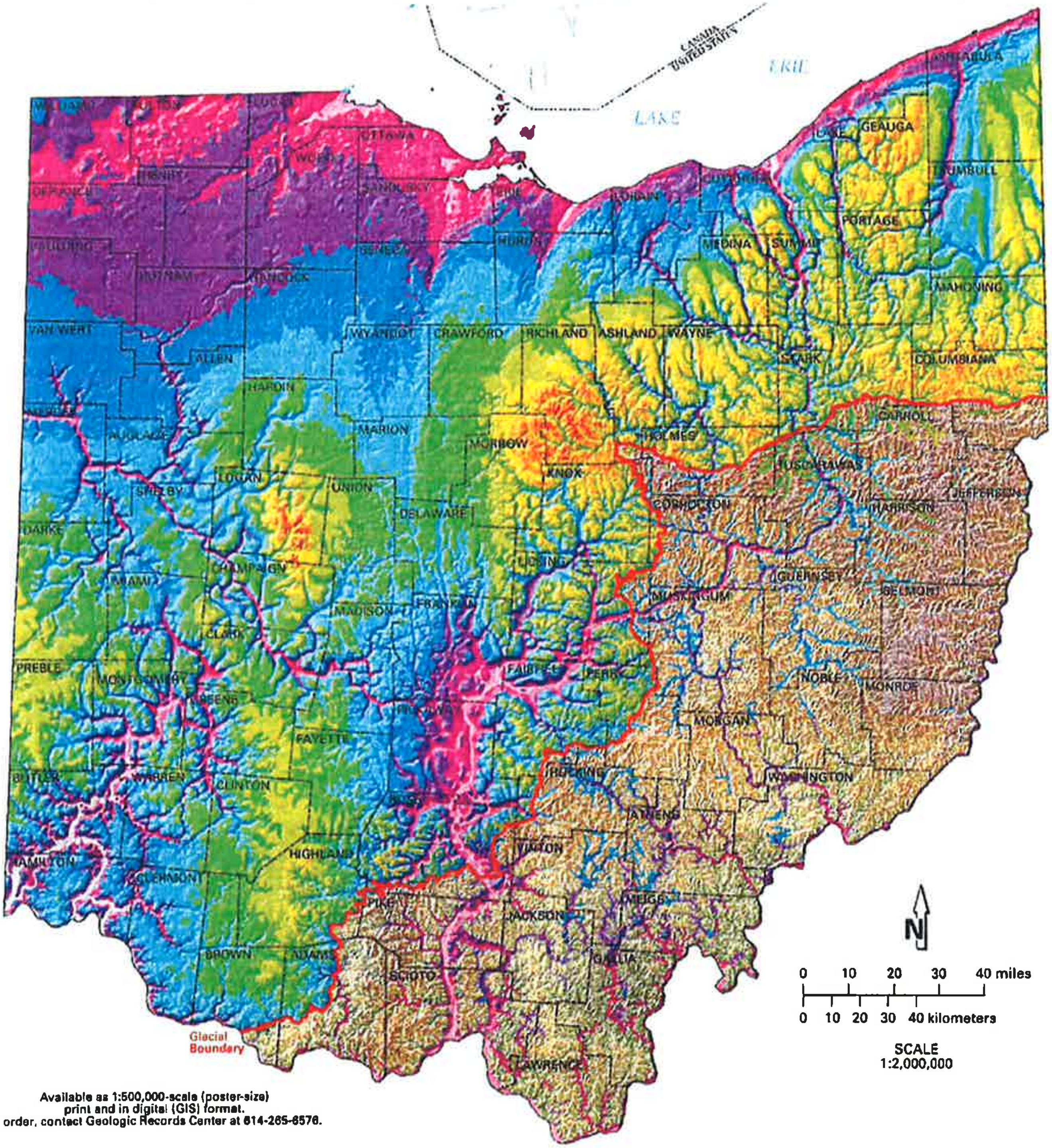
# SHADED BEDROCK-TOPOGRAPHY MAP OF OHIO



Available as 1:500,000-scale (poster-size) print and in digital (GIS) format.
To order, contact Geologic Records Center at 614-265-6576.

| Bedrock-topography | Elevation | Land surface |
|---|---|---|
| 🟥 | 1401-1500 | |
| 🟧 | 1301-1400 | ▨ |
| 🟧 | 1201-1300 | ▨ |
| 🟨 | 1101-1200 | ▨ |

| Bedrock-topography | Elevation | Land surface |
|---|---|---|
| 🟩 | 1001-1100 | ▨ |
| 🟩 | 901-1000 | ▨ |
| 🟦 | 801-900 | ▨ |
| 🟦 | 701-800 | ▨ |

| Bedrock-topography | Elevation | Land surface |
|---|---|---|
| 🟪 | 601-700 | ▨ |
| 🟪 | 501-600 | ▨ |
| ▨ | 401-500 | ▨ |
| ▨ | 301-400 | |

Elevation in feet above sea level

**Recommended citation:** Ohio Division of Geological Survey, 2003, Shaded bedrock-topography map of Ohio: Ohio Department of Natural Resources, Division of Geological Survey Map BG-3, generalized page-size version with text, 2 p., scale 1:2,000,000.

# SHADED BEDROCK-TOPOGRAPHY MAP OF OHIO

The shaded bedrock-topography map of Ohio depicts the configuration and elevation of the bedrock surface. In southeastern Ohio, the bedrock surface coincides with present-day land-surface topography and is depicted by earth-tone hues to represent elevation intervals. In glaciated western and northern Ohio, the bedrock surface is buried under mainly glacial sediments that can be several-hundred-feet thick. The land surface in this region was smoothed by glaciation (figure 1) and masks a complexly dissected, underlying bedrock surface. This dissected bedrock surface is the result of erosion before, during, and after glaciation. Spectral hues depict elevation intervals on the buried-bedrock surface and show the bedrock surface as if the overlying glacial sediment were removed.

Prior to and during glaciation, the north-flowing Teays River system dominated surface-water drainage patterns in western and southern Ohio (figure 2). Water flow direction in the main Teays valley was north from Wheelersburg (Scioto County) to Circleville (Pickaway County) and then northwest to Mercer County where the Teays Valley exited the state. Remnants of the Teays Valley are distinct on the present land surface in southern Ohio and form a continuous valley on the buried-bedrock surface across western Ohio. Modern rivers and streams still occupy portions of this valley system. Water flow in the Teays River system was disrupted by early glaciations as southward-advancing glaciers blocked outlets of the north-flowing river system. Drainageways, both large and small, were abandoned or filled with sediment as ice advanced and retreated.

In northwestern Ohio, the generally smooth buried-bedrock surface is the result of repeated scouring by glacial ice advancing westward out of the Lake Erie basin. Another distinctly scoured bedrock surface is in the Grand River Lobe (figure 2) in northeastern Ohio where smooth north-south trending valleys mirror ice-flow direction. South of the scour-dominated surface of northern Ohio, the bedrock surface has been sculpted by water to create a distinct drainage pattern (figure 2). Large volumes of glacial meltwater eroded the bedrock surface, widening and deepening existing valleys of the Teays system and creating new valleys. Some modern rivers and creeks flow in unusually wide valleys; evidence that far greater volumes of water generated from melting glaciers once flowed in these valleys. Flow direction in other valleys has been reversed as glacial ice or glacial sediments blocked formerly northward and westward flowing streams.

Southeastern Ohio is unglaciated and devoid of ice-deposited sediment (glacial till). However, many river valleys in southeast Ohio did carry glacial meltwater away from the ice front and toward the Ohio River. In the process, many of these valleys were at times made deeper by the erosive force of fast-flowing meltwater streams, and at other times partially filled with sediment. Some valleys in unglaciated Ohio contain thick deposits of clay and silt that accumulated on the bottoms of lakes that formed when glacial ice blocked the flow of rivers or when rapidly accumulating meltwater sediments blocked the mouths of rivers.

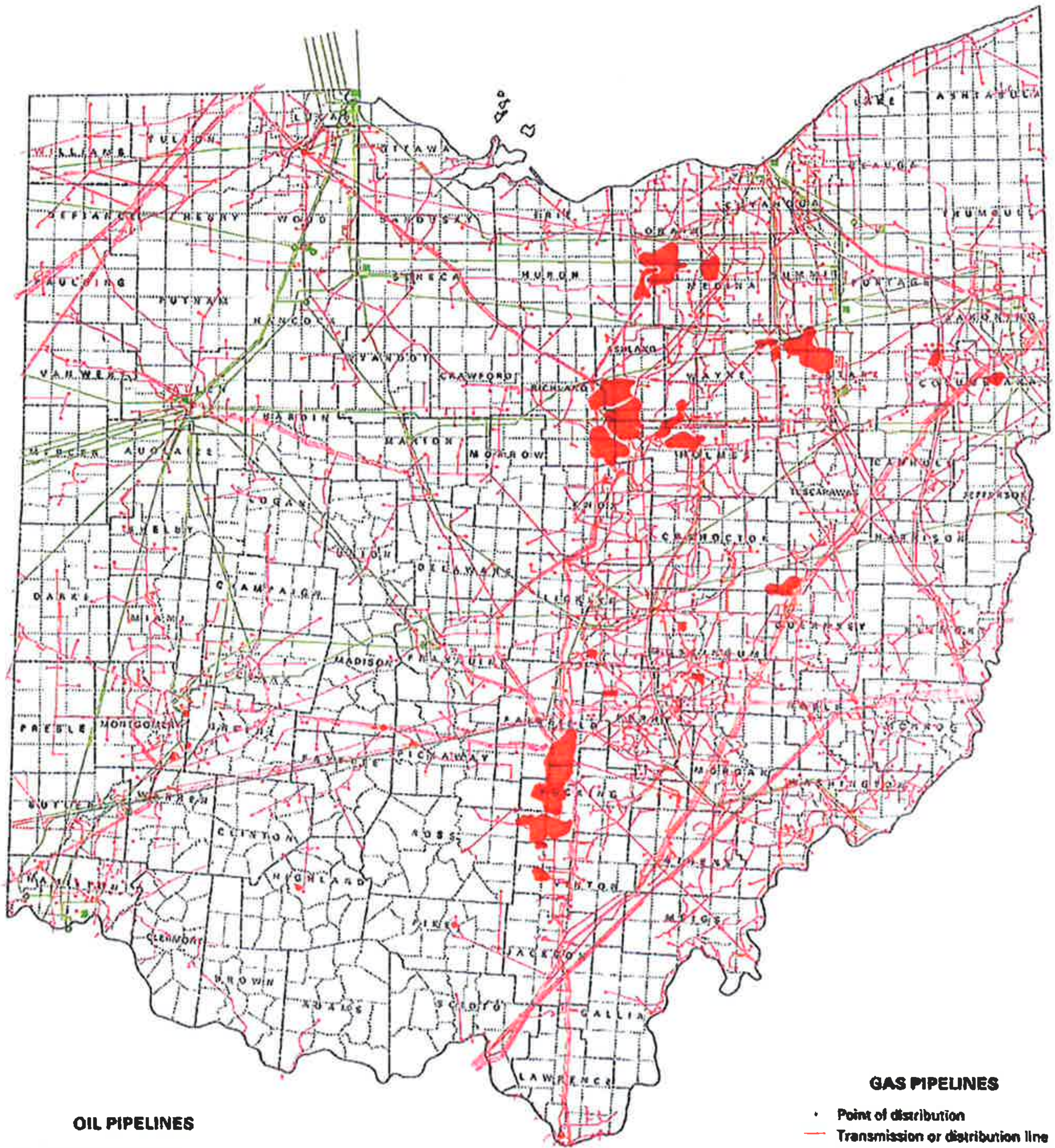
This map is one of the results of a 7-year effort by the ODNR, Division of Geological Survey to map the bedrock geology of Ohio. Bedrock-topography maps are essential to producing accurate bedrock-geology maps of glaciated Ohio and of partially buried valleys beyond the glacial limit. Bedrock-topography maps were created for all 788 7.5-minute topographic quadrangles in the state and are available from the Division's Geologic Records Center. Some pre-existing county bedrock-topography maps (1:62,500 scale) and data were photographically enlarged to 1:24,000 scale, revised, and utilized in the compilation of 1:24,000-scale, bedrock-topography maps. Data concentration and contour intervals on the original maps vary widely across the state in response to changing geologic and topographic conditions. Data consists mainly of water-well logs on file at the ODNR, Division of Water, supplemented by outcrop data, Ohio Department of Transportation bridge-boring data, and oil-and-gas-well data.

Elevation contours and over 158,000 data points from the 788 bedrock-topography maps were digitized and compiled for the glaciated portions of the state and for the major valleys beyond the glacial boundary containing significant accumulations of sediment deposited during and after glaciation. The bedrock-topography contours were digitally converted in the ARC GIS environment into a continuous grid model (60 meter grid spacing). This surface was shaded from the northwest slightly above the horizon to produce the appearance of a three-dimensional surface.

The land surface represents the topography of the bedrock surface in southeastern Ohio (excluding valleys beyond the glacial boundary) and in some glaciated areas near the glacial limit where meltwater sediments are thin or absent. Land-surface topography is based largely on data derived from the U.S. Geological Survey's National Elevation Dataset (30 meter grid spacing).

FIGURE 1.—Shaded elevation map of Ohio with the glacial boundary. Note the smooth landscape of glaciated northern and western Ohio compared to the high-relief landscape of unglaciated southeastern Ohio.

FIGURE 2.—Bedrock-topography map of Ohio showing the extent of the main Teays valley, the unglaciated portion of the state, and the ice-scoured and water-eroded portions of glaciated Ohio (C = Circleville, W = Wheelersburg).



**GAS PIPELINES**

- • Point of distribution
- — Transmission or distribution line
- —■— Compressor station
- ● Propane plant
- ▭ Major control point
- ● Gas storage area

**OIL PIPELINES**

- ○ Refinery and terminal
- —■— Pumping station
- — Pipeline
- ■ Liquid petroleum storage area

# OIL AND GAS PIPELINES IN OHIO 1989

10 0 10 20 30 40 miles

10 0 10 20 30 40 50 kilometers

STATE OF OHIO
George V. Voinovich, Governor
DEPARTMENT OF NATURAL RESOURCES
Frances S. Buchholzer, Director
DIVISION OF GEOLOGICAL SURVEY
Thomas M. Berg, Chief

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY

Map available also at a scale of 1 inch = approximately 8 miles

An Equal Opportunity Employer - M/F/H

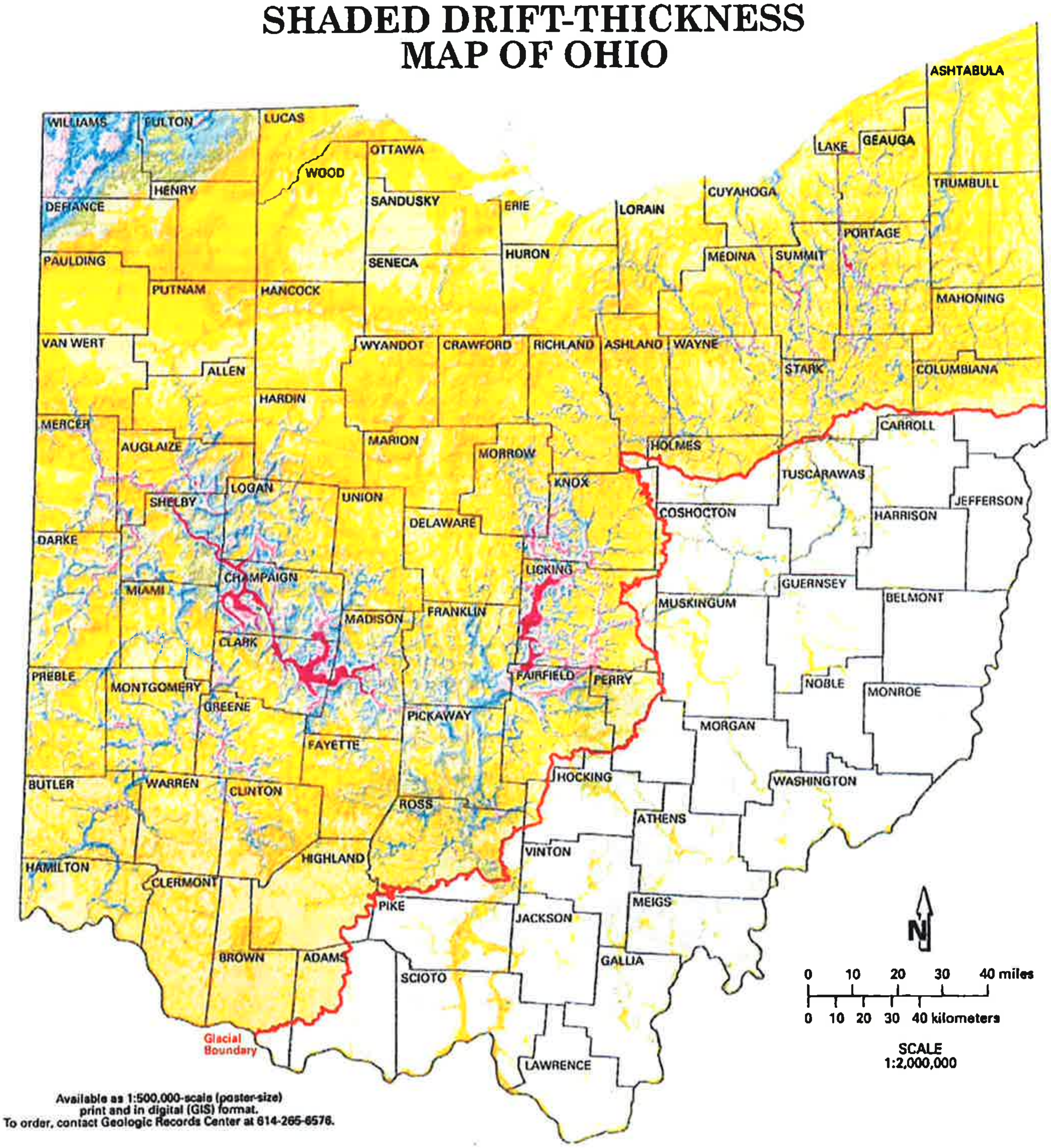
Recommended citation: Ohio Division of Geological Survey, 1989, Oil and gas pipelines in Ohio: Ohio Department of Natural Resources, Division of Geological Survey, page-size map, 1 p., scale 1:1,900,000.

STATE OF OHIO
Ted Strickland, Governor

DEPARTMENT OF NATURAL RESOURCES
Sean D. Logan, Director

DIVISION OF GEOLOGICAL SURVEY
Lawrence H. Wickstrom, Chief

# SHADED DRIFT-THICKNESS MAP OF OHIO



SCALE
1:2,000,000

Available as 1:500,000-scale (poster-size) print and in digital (GIS) format.
To order, contact Geologic Records Center at 614-265-6576.

## EXPLANATION

Thickness (in feet) of drift in glaciated areas and some non-glaciated areas along glacial boundary, and of outwash and glaciolacustrine deposits in sediment-filled valleys beyond the glacial boundary.

0 - 20 ▨
21 - 50 ▨
51 - 80 ▨
81 - 120 ▨
121 - 160 ▨
161 - 210 ▨
211 - 260 ▨
261 - 330 ▨
331 - 440 ▨
441 - 726 ▨

**Recommended citation:** Ohio Division of Geological Survey, 2004, Shaded drift-thickness map of Ohio: Ohio Department of Natural Resources, Division of Geological Survey Map SG-3, generalized page-size version with text, 3 p., scale 1:2,000,000.

# SHADED DRIFT-THICKNESS MAP OF OHIO

## INTRODUCTION

The drift-thickness map of Ohio depicts the thickness and distribution of glacially derived sediments (called drift) and post-glacial stream sediments overlying the buried bedrock surface. This map was produced by subtracting bedrock-surface elevations from land-surface elevations to produce a residual map of drift thickness. Colors portray thickness intervals of glacial and modern sediments, which can range up to several hundred feet.

Prior to the onset of continental glaciation in the Early Pleistocene Epoch, approximately 1.8 million years before present, the Ohio landscape was dominated by rolling hills and deeply incised, mature rivers and streams. A reduced version of the Division of Geological Survey's Shaded-Bedrock Topography map of Ohio (fig. 1) reveals some aspects of this old land surface. Erosion and deposition by Ice-Age continental glaciers advancing into northern and western Ohio produced a low-relief land surface compared to the unglaciated, high-relief land surface of southeastern Ohio (fig. 2). Comparing the shaded elevation map (fig. 2) with the shaded bedrock-topography map (fig. 1) reveals the dramatic impact of glaciation on the state's current landscape.

Drift thickness in western and northern Ohio (fig. 3) is highly variable, a consequence of numerous geologic factors acting in combination or alone. In some areas, drift has been deposited on a relatively flat bedrock surface and changes in drift thickness are primarily the result of variations in the amount of glacial material deposited. In other areas, drift has infilled a deeply incised buried-bedrock surface, and changes in drift thickness are primarily the result of variations in bedrock-surface elevation. In still other instances, the drift surface parallels the underlying bedrock surface to produce areas of relatively uniform drift thickness.

Distinct, narrow linear patterns of thick drift in western and central Ohio are the result of deep incisions in the underlying limestone and dolomite bedrock by a large, northwest flowing drainage system, the Teays Valley system, that existed prior to and during early glaciations (fig. 1). The main Teays Valley entered the state at Wheelersburg (Scioto County), where remnants of the Teays Valley are still evident on the modern land surface. At Chillicothe (Ross County), the valley disappears under glacial sediments which cover western Ohio. However, the valley continues north, below the surface, to Circleville (Pickaway County) and then northwest to Mercer County where the valley exits the state into Indiana. Early southward-advancing glaciers blocked the north-flowing river system of the Teays and created immense lakes in southeastern Ohio.

In northeastern Ohio, narrow thick-drift areas south of Lake Erie were also preglacial bedrock valleys. These valleys were partially filled with thick deposits of till and glaciolacustrine (glacial lake) sediment and then re-excavated by later northward-flowing rivers such as the Cuyahoga River and the East Branch of Rocky River.

In northwestern Ohio, repeated scouring of the relatively soft bedrock surface by glacial ice flowing southwestward from the Lake Erie Basin destroyed most pre-existing drainage systems. In this part of Ohio, the bedrock surface is smooth and the upper surface of the drift has been planed off by wave action and deposition by a post-glacial, high-level ancestral Lake Erie. In the extreme northwest corner of Ohio, in Williams County and portions of Defiance County, drift thickens considerably because of numerous moraines that formed along the northwestern edge of the Erie Lobe.

In western Ohio, draping linear features of thick drift, called ridge moraines, formed along the temporarily stationary ice-front as glacial sediment was released from the ice. These ribbons of thick drift define the lateral dimensions of glacial ice lobes, particularly those of the last Wisconsinan ice sheet (figure 4). Many ridge moraines in western and northeastern Ohio have a draped appearance because south-flowing ice, impeded by bedrock highlands, moved more easily along major lowlands. The numerous resistant bedrock highlands in northeastern Ohio caused ridge moraines to be especially arcuate and closely stacked.

Southeastern Ohio is unglaciated and devoid of ice-deposited sediment (glacial till). Many southeast Ohio valleys, however, carried

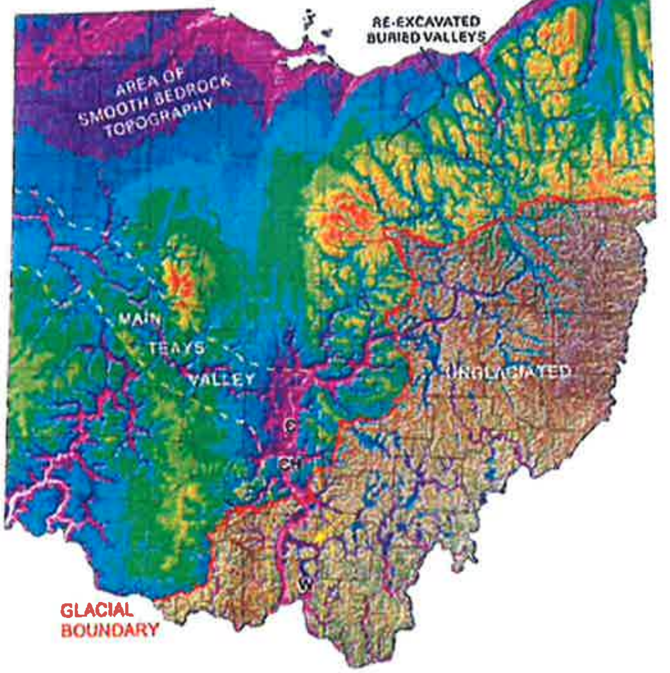


FIGURE 1.—Shaded bedrock-topography map of Ohio showing the sculpted bedrock surface that lies beneath glacial drift in northern and western Ohio and the land surface in unglaciated southeastern Ohio. Note the surface expression of the Teays Valley System south of the glacial boundary (arrow), the location of the main Teays Valley (between yellow dashed lines), the area of smooth bedrock topography, and the area of re-excavated preglacial bedrock valleys in northeastern Ohio. (**W** = Wheelersburg, **C** = Circleville, **CH** = Chillicothe) (modified from Ohio Division of Geological Survey, 2003).

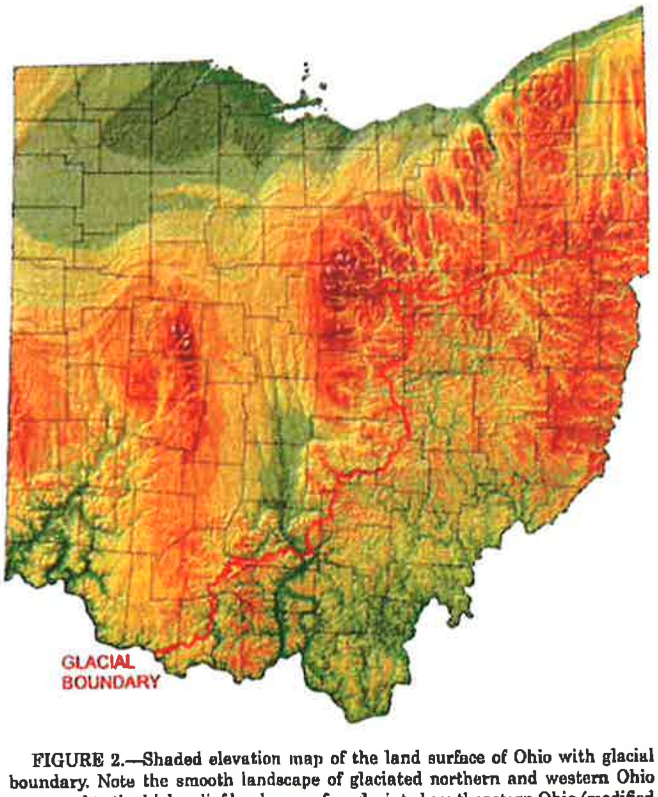


FIGURE 2.—Shaded elevation map of the land surface of Ohio with glacial boundary. Note the smooth landscape of glaciated northern and western Ohio compared to the high-relief landscape of unglaciated southeastern Ohio (modified from Powers, Laine, and Pavey, 2002).

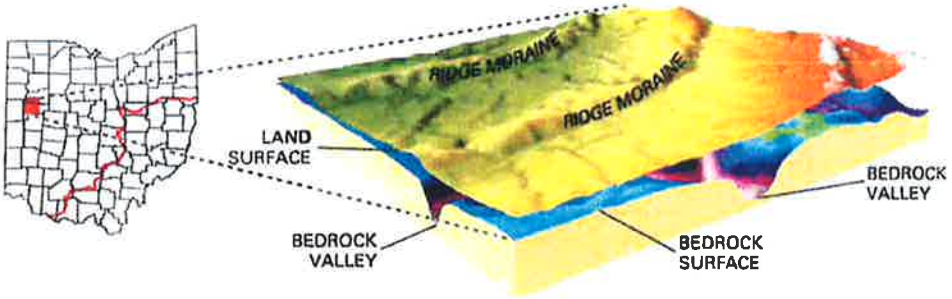


FIGURE 3.—Schematic cross section of glacial drift overlying the bedrock surface. Note areas where drift thickness is controlled by thickening of glacial sediment over a relatively flat bedrock surface, by drift infilling bedrock valleys, or by fluctuations in both the land surface and the bedrock surface. Also note areas where valleys in the buried-bedrock surface are not evident on the land surface (illustration by Donovan M. Powers).

huge volumes of glacial meltwater away from the ice front and toward the Ohio River. In the process, many of these valleys were at times made deeper by the erosive force of fast-flowing meltwater streams, and at other times were partially filled with sediment. Some valleys in unglaciated Ohio contain thick deposits of clay and silt that accumulated on the bottoms of lakes that formed when glacial ice blocked the flow of rivers or when rapidly accumulating meltwater sediments blocked the mouths of smaller tributaries.

## METHODS

Two digital data layers are required to generate the drift-thickness map: the surface-elevation layer and the bedrock-topography layer. Drift thickness is calculated by subtracting the bedrock-topography elevation from the land surface elevation. The bedrock-topography component is one of the products resulting from a multi-year effort by the ODNR, Division of Geological Survey to map the bedrock geology of Ohio. Bedrock-topography maps are required to determine the relief on the bedrock surface beneath thick layers of glacial drift. Bedrock-topography maps were created by the Division of Geological Survey for all 788 7½-minute topographic quadrangles in the state as part of a process to produce accurate bedrock-geology maps for glaciated portions of Ohio and for those areas beyond the glacial boundary where valleys are infilled with sediment. Data concentration and contour intervals on the original, hand-drawn bedrock-topography maps vary widely across the state in response to changing geologic and topographic conditions. These data consist mainly of water-well logs on file at the ODNR, Division of Water, supplemented by outcrop data, Ohio Department of Transportation bridge-boring data, and oil-and-gas-well data. During the course of mapping, over 162,000 data points were interpreted for bedrock-surface elevation and in some cases drift thickness. These points were plotted on maps and used as control for the bedrock-topography lines. Individual 24,000-scale bedrock-topography maps are available from the Division's Geologic Records Center.

Elevation contours and data points from the 788 bedrock-topography maps were digitized and compiled for the glaciated portions of the state and for the valleys beyond the glacial boundary containing significant accumulations of sediment deposited during and after glaciation. The bedrock-topography contours were digitally converted in an ArcGIS environment to create a continuous grid model (60 meter grid spacing). A statewide compilation map and digital dataset of the bedrock topography of Ohio (modified from Ohio Division of Geological Survey, 2003) are available from the Division of Geological Survey.

Uncolored areas of southeastern Ohio represent extensive portions of unglaciated Ohio where the land surface and the bedrock surface are essentially the same. On the original maps in these areas, bedrock-topography lines were restricted to the buried-valley portions of the map and were not drawn in upland portions.

The second component needed to create the drift-thickness map, the land-surface topography, is based largely on data derived from the U.S. Geological Survey's National Elevation Dataset (30 meter grid spacing). These data have been modified extensively by the Ohio Division of Geological Survey to replace some anomalous errors that are inherent in portions of the National Elevation Dataset. A statewide compilation map and digital dataset of the shaded elevation of Ohio (modified from Powers, Laine, and Pavey, 2002) are available from the Division of Geological Survey.

A grid of the digitized bedrock-topography contours was subtracted from a grid of the land-surface Digital Elevation Model to derive a third grid (60 meter grid spacing) representing the thickness of the drift. This grid surface was shaded from the northwest, slightly above the horizon, to produce the appearance of a three-dimensional surface.

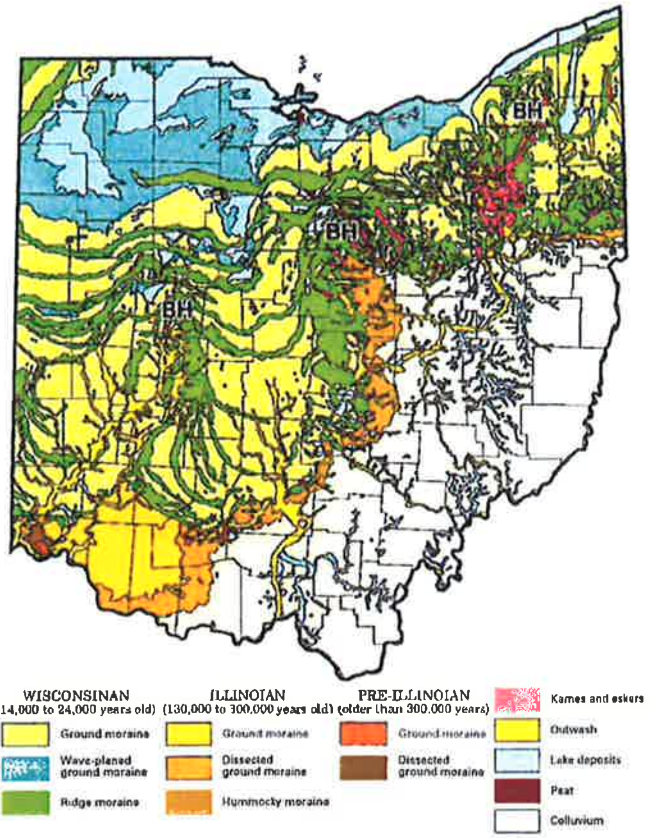


FIGURE 4.—Glacial map of Ohio showing the distribution of glacial sediments and their relative ages. Note glaciated northern and western Ohio, unglaciated southeastern Ohio, and the position of ridge moraines and the lake deposits and wave-planed ground moraine of the Lake Erie Basin. Bedrock highlands (**BH**) impeded the southward advance of glacial ice causing the moraines to form a lobate configuration (illustration by Lisa Van Doren; modified from Pavey and others, 1999).

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Ohio Division of Geological Survey, 2003 (revised 2004), Shaded bedrock-topography of Ohio (ver. 1.1): Ohio Division of Geological Survey, Map BG-3, scale 1:500,000.

Pavey, R. R., Goldthwait, R. P., Brockman, C. S., Hull, D. N., Swinford, E. M., and Van Horn, R. G., 1999, Quaternary Geology of Ohio: Ohio Division of Geological Survey Map 2, scale 1:500,000.

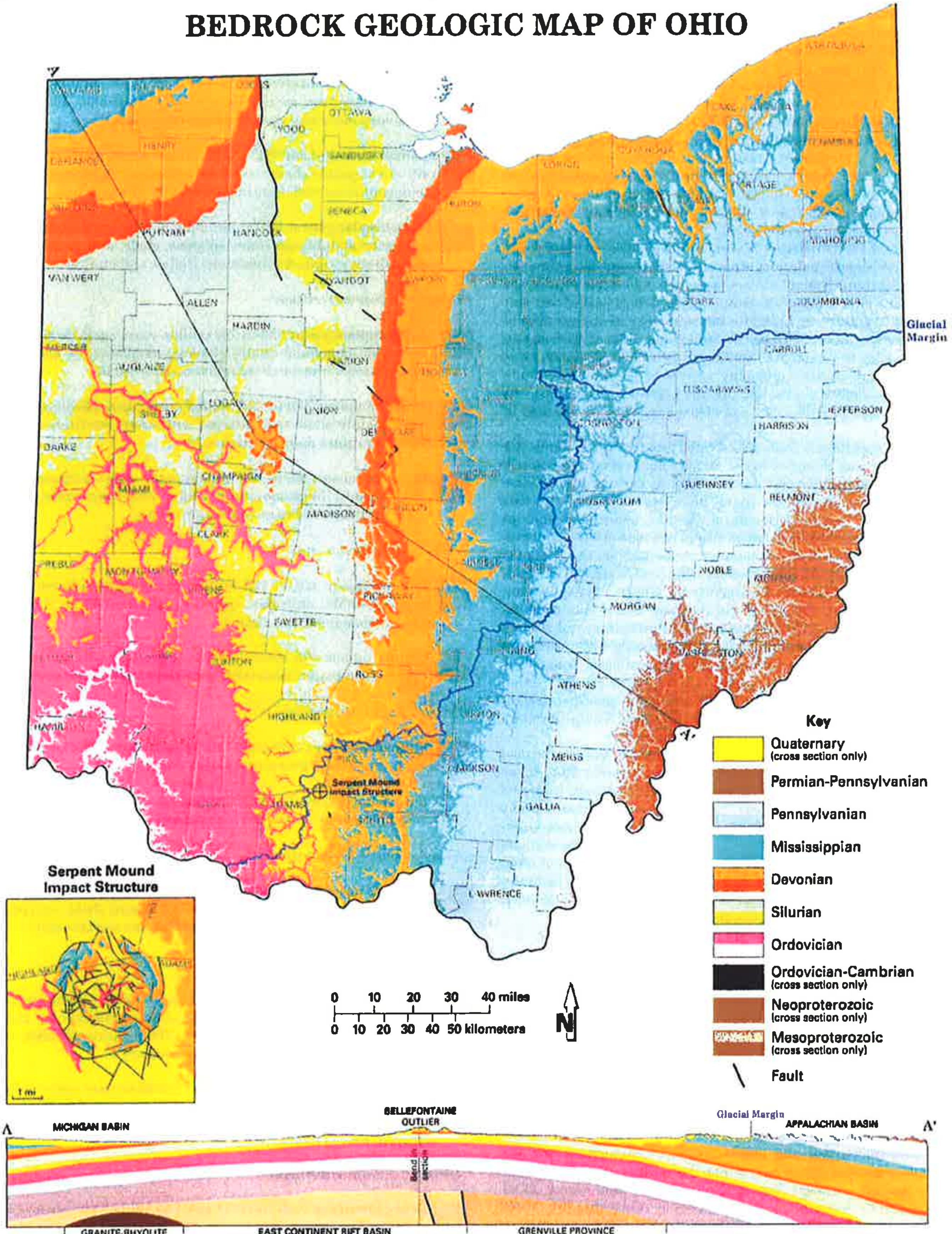
Powers, D. M., Laine, J. F., and Pavey, R. R., 2002 (revised 2003), Shaded elevation map of Ohio: Ohio Division of Geological Survey MG-1, scale 1:500,000.

STATE OF OHIO
Ted Strickland, Governor

DEPARTMENT OF NATURAL RESOURCES
Sean D. Logan, Director

DIVISION OF GEOLOGICAL SURVEY
Larry Wickstrom, Chief

# BEDROCK GEOLOGIC MAP OF OHIO



**Recommended citation:** Ohio Division of Geological Survey, 2006, Bedrock geologic map of Ohio: Ohio Department of Natural Resources, Division of Geological Survey Map BG-1, generalized page-size version with text, 2 p., scale 1:2,000,000.

This map is a generalization of the Bedrock Geologic Map of Ohio (Slucher and others, 2006)—the first statewide 1:500,000-scale bedrock-geology map compiled by the Ohio Division of Geological Survey since 1920 and the first to properly portray the bedrock geology that exists beneath the extensive deposits of Quaternary sediments that cover much of the bedrock in the state. Overall, the bedrock geology of Ohio consists of flat lying to gently dipping carbonate, siliciclastic, evaporite, and organoclastic strata of sedimentary origin that range in age from Upper Ordovician to Upper Carboniferous-Lower Permian. At depth, as illustrated in the cross section, older sedimentary, igneous, and metamorphic rocks that range from Lower Ordovician to Mesoproterozoic in age occur. At the surface, an irregular veneer of mainly unconsolidated Quaternary sediments conceal most bedrock units occurring northward and westward of the glacial margin.

Strata of the Ordovician System are the oldest exposed rocks in Ohio and consist mainly of alternating shale and limestone sequences. Silurian System strata are mostly dolomites with lesser amounts of shale. Rocks of the Devonian System consist of two contrasting types. Lower and Middle Devonian-age strata are mainly carbonate rocks whereas Upper Devonian-age rocks consist mostly of clastic rocks. In Champaign and Logan Counties, Devonian rocks occur on a small erosional remnant referred to as the Bellefontaine Outlier by geologists. Coincidentally, the highest topographic point in Ohio (Campbell Hill–1,549 feet above sea level) occurs also in this area.

The Carboniferous System is divided into two Subsystems, the Mississippian and Pennsylvanian. Mississippian strata are mostly shales and sandstones that occur locally in various proportions. Pennsylvanian strata consist mainly of a diverse array of alternating sandstones, siltstones, shales, mudstones, limestones, and underclays; economic coal beds occur also in portions of this sequence. The youngest interval of sedimentary rocks in Ohio, the Dunkard Group, occurs only in southeastern Ohio and consists of strata similar in composition to the underlying Upper Pennsylvanian-age rocks; however, the age of the Dunkard Group has been debated since the late 1800s. Dunkard strata contain a well-studied late Pennsylvanian-age assemblage of plant fossils with infrequent early Permian-age forms. Yet, fossil plant spores found in coal beds in the interval only support a late, but not latest Pennsylvanian age. Thus, until more definitive fossils are found, geologist are unable to determine the exact age of the Dunkard Group beyond a combined Permian-Pennsylvanian age assignment.

In west-central Ohio, the ancient Teays River system extended across much of Ohio during the late Neogene to early Quaternary Periods and sculptured an extensive network of deeply dissected valleys into the bedrock surface. The spatial configuration of many geologic units on this map clearly reflects the major channel networks of these former drainage systems. Also, four major regional structural geology elements affect the spatial distribution of rocks in Ohio: the Appalachian and Michigan basins, and the Cincinnati and Findlay arches which occur between the two basins. Locally, several high-angle normal faults displace rocks in the state.

The Serpent Mound Impact Structure in southern Ohio is a circular area of deformed and broken rocks that is approximately four and one-half miles in diameter. Recent investigations indicate the feature is the result of a meteorite impact believed to have occurred between 256 and 330 million years ago.

Cross section A-A' traverses Ohio from the northwest to the southeast and intersects the southern portion of the Michigan Basin, the area between the Cincinnati and Findlay arches, and the western Appalachian Basin, respectively. The stratigraphic units shown in this profile illustrate the broad, arching geometric distortion to the bedrock in Ohio created mainly by periods of tectonic subsidence within these regional structural basins. For specific details on the various rock units, economic commodities, and geologic hazards within Ohio, see either the printed or digital version of the Bedrock Geologic Map of Ohio (Slucher and others, 2006). Both products are available for purchase by contacting the ODNR Geologic Records Center by calling 614-265-6576 or emailing: geo.survey@dnr.state.oh.us.

🟨 **Quaternary** (about 1.8 million years ago to present)—Unconsolidated sediments: till, gravel, sand, silt, clay, and organic debris. Continental origin. (Shown in cross section only)

*Period of widespread erosion*

🟥 **Permian and Pennsylvanian** (about 298 to 302 million years ago)—Sedimentary rocks: mainly shale, sandstone, siltstone, mudstone, and minor coal. Continental origin.

⬜ **Pennsylvanian** (about 302 to 307 million years ago) Sedimentary rocks: mainly shale, sandstone, siltstone, mudstone, limestone, and some coal. Continental and marine origin.

⬜ **Pennsylvanian** (about 307 to 318 million years ago)—Sedimentary rocks: mainly sandstone, siltstone, shale, and conglomerate, with some coal and limestone. Deltaic and marine origin.

*Period of widespread erosion*

🟦 **Mississippian** (about 322 to 359 million years ago)—Sedimentary rocks: sandstone, shale, siltstone, conglomerate, and minor limestone. Marine to marginal marine origin.

🟧 **Devonian** (about 359 to 385 million years ago)—Sedimentary rocks: mainly shale and siltstone with some sandstone. Marine to marginal marine origin.

🟥 **Devonian** (about 385 to 407 million years ago)—Sedimentary rocks: mainly limestone and dolomite with some shale, and minor sandstone. Marine and eolian origin.

*Period of widespread erosion*

⬜ **Silurian** (about 416 to 423 million years ago)—Sedimentary rocks: dolomite, anhydrite, gypsum, salt, and shale. Marine and restricted marine origin.

🟨 **Silurian** (about 423 to 435 million years ago)—Sedimentary rocks: dolomite and shale with some limestone. Marine origin.

*Period of widespread erosion*

🟪 **Ordovician** (about 446 to 450 million years ago)—Sedimentary rocks: shale and limestone. Marine origin.

⬜ **Ordovician** (about 450 to 460 million years ago)—Sedimentary rocks: limestone and shale. Marine origin.

*Period of widespread erosion*

⬜ **Ordovician and Cambrian** (about 486 to 510 million years ago)—Sedimentary rocks: mainly dolomite, sandstone, shale, with minor limestone. Marine origin. (Shown in cross section only)

*Period of widespread erosion*

🟧 **Neoproterozoic** (between 900 million and 1 billion years ago)—Metamorphic rocks: gneiss, schist, amphibolite, and marble; and igneous rocks: granite. Form during collision of tectonic plates. (Shown in cross section only)

🟨 **Mesoproterozoic** (between 1.0 and 1.2 billion years ago)—Sedimentary rocks: sandstone and siltstone; and igneous rocks: basalt and rhyolite. Form during rifting of continental landmass. (Shown in cross section only)

*Period of widespread erosion*

🟫 **Mesoproterozoic** (between 1.45 and 1.52 billion years ago)—Igneous rocks: granite and rhyolite. Formed during crustal evolution and differentiation. (Shown in cross section only)

## Program Funding

**The Abandoned Mine Land Program is funded by a federal severance tax on mined coal. On an annual basis, the Division of Mineral Resources Management (DMRM) applies to the Office of Surface Mining Reclamation and Enforcement for funds to investigate, design and construct corrective measures for the highest priority abandoned mine land (AML) problems.**

## Problem Eligibility and Selection for Reclamation Funding

Any problem qualifies for funding if it meets the following conditions:

- The problem was caused by surface mining that took place before August 3, 1977 or underground mining that occurred before September 1, 1982;
- There is no existing reclamation bond on the mined site responsible for the problem; and
- The problem meets a priority health and safety or environmental designation.

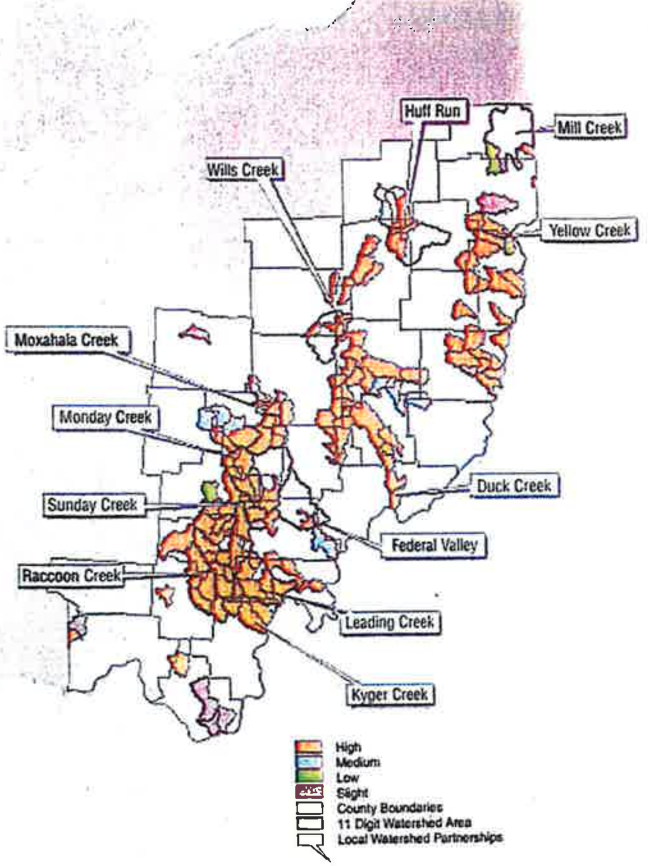
Through observations, past records, and any documentation the landowner can provide, division experts determine whether the problem is eligible for funding and how serious the problem is.

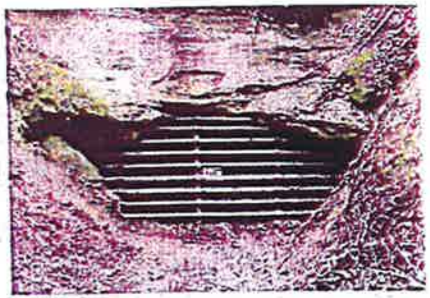
Problems are classified in three categories:

- Emergency Health and Safety: An immediate and substantial threat to the safety of the public;
- Non-emergency Health and Safety: A high risk of personal injury or significant property damage; or
- Land and Water Restoration: Environmental problems associated with degradation of soil, water, recreational resources and agricultural productivity.

The Abandoned Mine Land Program cannot pay for channelizing streams or repairing structures damaged by mine-related flooding, landslides or subsidence. **Further, AML sites that have been developed for residential or commercial uses are not eligible for reclamation funding, should mine-related problems occur.**

**Southeastern Ohio Watersheds Impacted by Mining**





An abandoned deep mine entry in Vinton County, considered a non-emergency health and safety problem, is closed in a manner that prevents human access without restricting movement of the endangered Indiana bat.

**MAJOR ACCOMPLISHMENTS OF FEDERAL AML PROGRAM**

| | | |
|---|---|---|
| Abandoned strip mine land reclaimed | 8,035 | acres |
| Coal refuse reclaimed | 353 | acres |
| Deep mine entries sealed or gated | 382 | entries |
| Mine shafts sealed | 294 | shafts |
| Dangerous highwall safeguarded | 19 | miles |
| Sediment-choked streams restored | 52 | miles |
| Landslides stabilized | 457 | acres |
| Polluted residential water supplies replaced | 272 | supplies |
| Deep mine subsidence stabilized | 150 | acres |

A F T E R

## Effects of Unregulated Mining

Poorly regulated mining during its first 150 years of existence in Ohio left impacts on the environment and the social fabric of its citizens. By 1972 the problems included:

- 1,300 miles of streams polluted by acid mine drainage,
- 500 miles of streams affected by sediment deposition,
- Nearly 119,000 acres of land in need of major reclamaion efforts,
- Hundreds of acres of land prone to deep mine subsidence,
- Polluted domestic water supplies, and
- Hundreds of acres of landslides, among other problems.

In recognition of these abandoned mine land problems, the federal government passed the Surface Mining Control and Reclamation Act of 1977. Not only did this legislation mirror Ohio's effective reclamation law of 1972 for the regulation of active mining, it created an abandoned mine land program to address the highest priority public health and safety, and environmental problems associated with mining that occurred prior to August 3, 1977.

**DMRM MISSION:** To provide for the responsible development of Ohio's energy and mineral resources in a safe, environmentally sound manner.

**Abandoned Mine Land Program**

**REGIONAL OFFICES:**
2050 E. Wheeling Avenue
Cambridge, OH 43725-8866
740-439-9079

34 Portsmouth Street
Jackson, OH 45640-1622
740-286-6411

2207 Reiser Avenue SE
New Philadelphia, OH 44663-3333
330-339-2207

3601 Newgarden Road
Salem, OH 44460-9571
330-222-1527

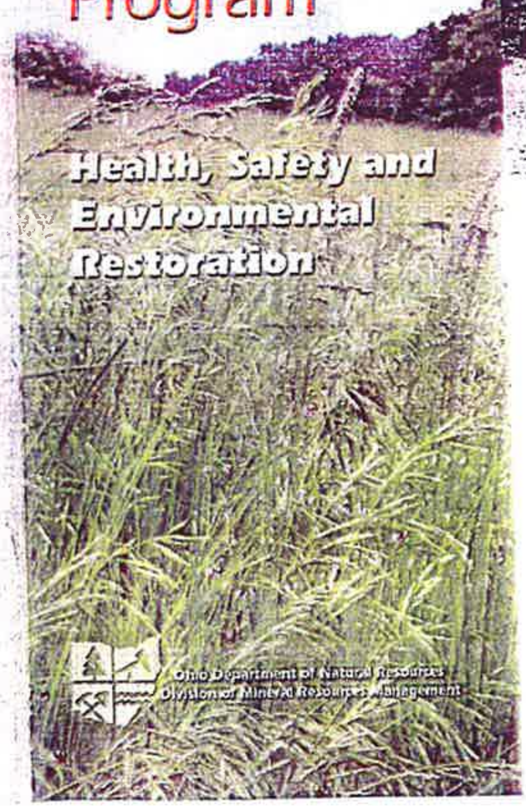
**CENTRAL OFFICE:**
2045 Morse Road, Bldg. H2
Columbus, OH 43229-6605
614-265-6633

COVER PHOTO: Established grassland prevents erosion of slopes of a Gallia County reclaimed strip mine

printed on recycled paper.

Ohio Department of Natural Resources
Division of Mineral Resources Management

# Abandoned Mine Land Program



## Health, Safety and Environmental Restoration

Ohio Department of Natural Resources
Division of Mineral Resources Management

B E F O R E

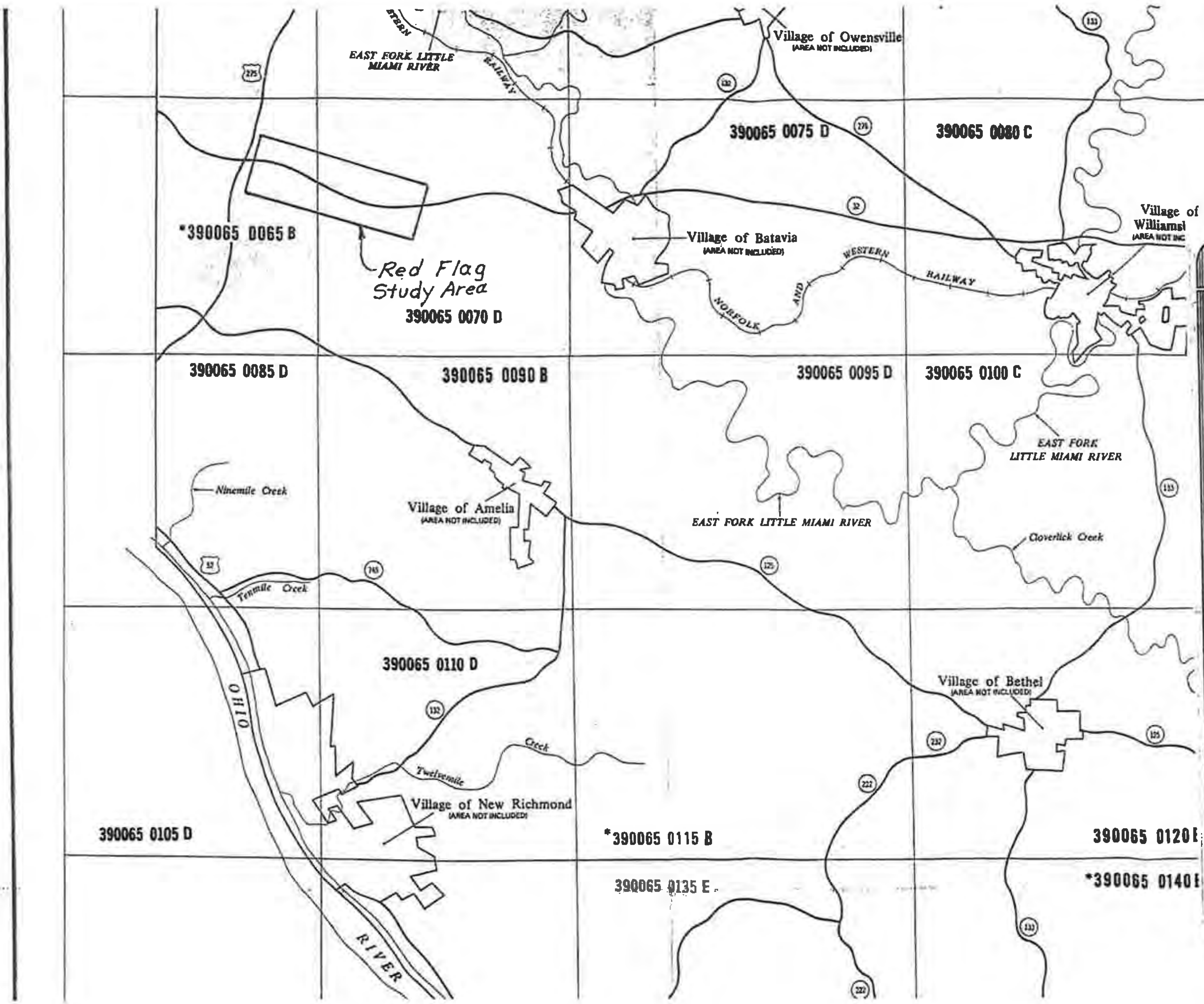
Ohio's rich 200-year old mining legacy played a large part in fueling the nation's industrial development. More than 3.6 billion tons of coal have been extracted from Ohio's coal-bearing region since 1800. As a result, the state was left with nearly 450,000 acres of land that were surface mined for coal prior to Ohio's stringent 1972 reclamation law and 6,000 underground coal mines that exist below 600,000 acres of land.

Ohio's Abandoned Mine Land Program was created to abate the priority health and safety effects of past mining as well as to provide environmental restoration of degraded areas.

BEFORE AND AFTER PHOTOS.

Reclamation of an unreclaimed strip mine in Noble County reduced erosion of sediment that caused flooding and environmentally degraded stream habitat

# Appendix 8
# FEMA Flood Insurance Map



**NATIONAL FLOOD INSURANCE PROGRAM**

E24

# FIRM

**FLOOD INSURANCE RATE MAP**

CLERMONT COUNTY,
OHIO
(UNINCORPORATED AREAS)

# MAP INDEX

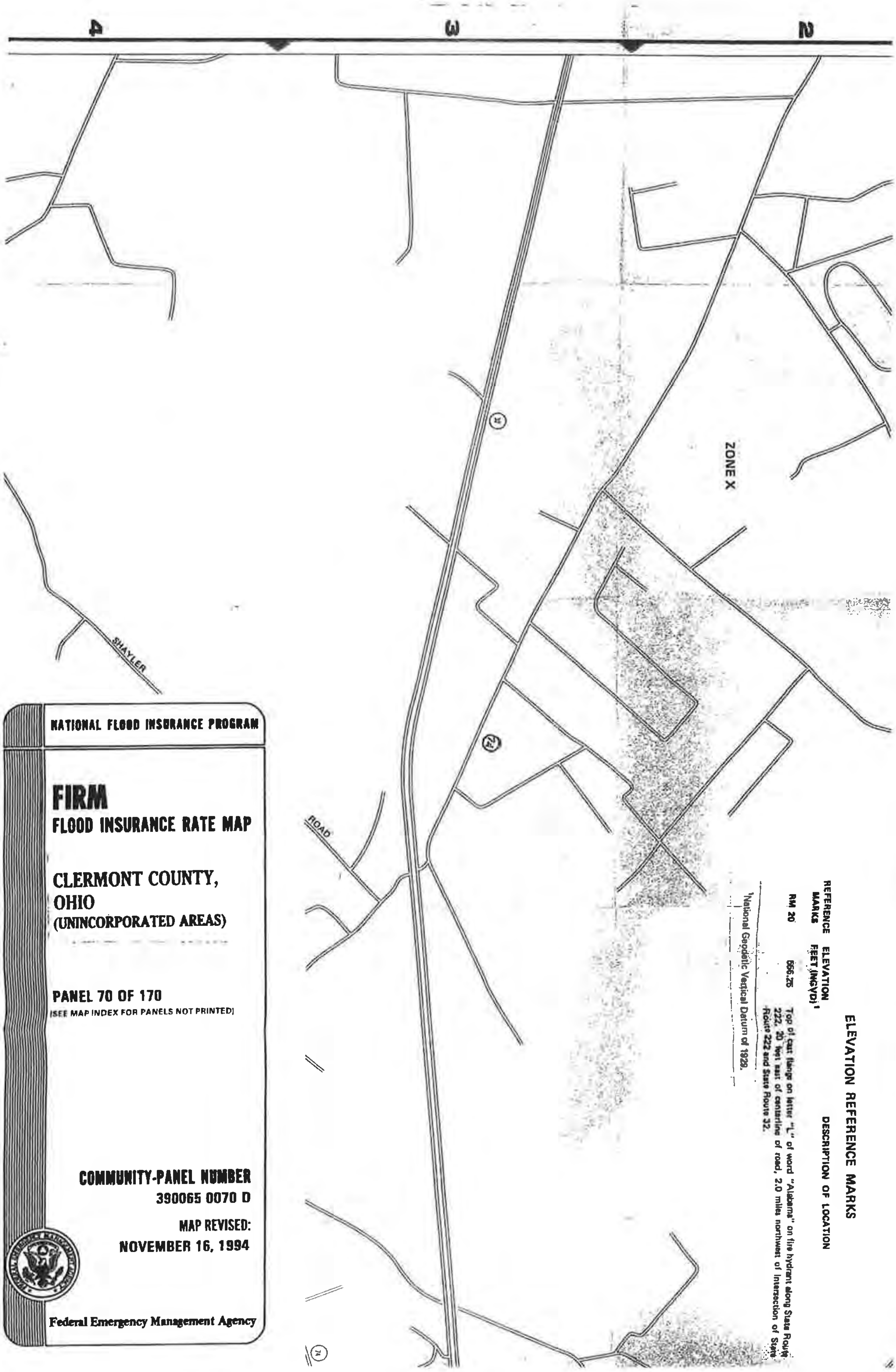
NEED NEED

PANELS PRINTED:5, 10, 15, 20
25, 35, 45, 50, 55, 60, 70, 75,
80, 85, 90, 95, 100, 105, 110,
120, 130, 135, 145, 150, 160, 165,
170

**COMMUNITY-PANEL NUMBERS**
**390065 0001-0170**

**MAP REVISED:**
**NOVEMBER 16, 1994**

Federal Emergency Management Agency



## ELEVATION REFERENCE MARKS

| REFERENCE MARKS | ELEVATION FEET (NGVD)¹ | DESCRIPTION OF LOCATION |
|---|---|---|
| RM 20 | 666.26 | Top of cast flange on letter "L" of word "Alabama" on fire hydrant along State Route 222, 20 feet east of centerline of road, 2.0 miles northwest of intersection of State Route 222 and State Route 32. |

¹National Geodetic Vertical Datum of 1929.

**NATIONAL FLOOD INSURANCE PROGRAM**

# FIRM
## FLOOD INSURANCE RATE MAP

## CLERMONT COUNTY, OHIO
(UNINCORPORATED AREAS)

**PANEL 70 OF 170**
(SEE MAP INDEX FOR PANELS NOT PRINTED)

**COMMUNITY-PANEL NUMBER**
**390065 0070 D**

**MAP REVISED:**
**NOVEMBER 16, 1994**

Federal Emergency Management Agency

# *Appendix 9*
# *Ohio Mineral Industries*

STATE OF OHIO
Ted Strickland, Governor

DEPARTMENT OF NATURAL RESOURCES
Sean D. Logan, Director

DIVISION OF GEOLOGICAL SURVEY
Lawrence H. Wickstrom, Chief

DIVISION OF GEOLOGICAL SURVEY
2045 MORSE RD., BLDG. C-1
COLUMBUS, OHIO 43229-6693
(614) 265-6576
(614) 447-1918 (FAX)
e-mail: geo.survey@dnr.state.oh.us
World Wide Web: http://www.ohiodnr.com/geosurvey/

# 2007 Report on Ohio Mineral Industries: An Annual Summary of the State's Economic Geology

WITH

DIRECTORIES OF REPORTING
COAL AND INDUSTRIAL MINERAL OPERATORS

compiled by

Mark E. Wolfe

Database design and data retrieval: Joseph G. Wells
Interactive mineral industries map/digital cartography: Donovan M. Powers
Typesetting and layout: Lisa Van Doren

Columbus
2008

TABLE 12.—*2007 Employment at Ohio industrial mineral operations, by county and commodity*

| County[1] | Total employees[2] | Number of employees[3] | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total[2] | | Limestone and dolomite | | Sand and gravel | | Sandstone and conglomerate | | Clay | | Shale | | Salt | | Multiple commodities | |
| | | Production | Non production | Production | Non production | Production | Non production | Production | Non production | Production | Non production | Production | Non production | Production | Non production | Production | Non production |
| Adams | 33 | 26 | 7 | 26 | 7 | | | | | | | | | | | | |
| Allen | 39 | 23 | 16 | 20 | 15 | 3 | 1 | | | | | | | | | | |
| Ashland | 19 | 15 | 4 | | | 15 | 4 | | | | | | | | | | |
| Ashtabula | 25 | 16 | 9 | | | 11 | 4 | | | | | | | | | 5 | 5 |
| Athens | 11 | 8 | 3 | | | 4 | 1 | | | | | | | | | 4 | 2 |
| Auglaize | 29 | 25 | 4 | 19 | 4 | 5 | 0 | | | 1 | 0 | | | | | | |
| Belmont | 22 | 16 | 6 | 2 | 1 | 2 | 2 | | | | | | | | | 12 | 3 |
| Brown | 30 | 24 | 6 | 21 | 6 | | | | | | | | | | | 3 | 0 |
| Butler | 91 | 61 | 30 | | | 61 | 30 | | | | | | | | | | |
| Carroll | 9 | 7 | 2 | | | 4 | 2 | 3 | 0 | | | | | | | | |
| Champaign | 22 | 17 | 5 | | | 17 | 5 | | | | | | | | | | |
| Clark | 45 | 31 | 14 | | | 31 | 14 | | | | | | | | | 4 | 0 |
| Clermont | 14 | 8 | 6 | | | 8 | 6 | | | | | | | | | | |
| Clinton | 56 | 35 | 21 | 35 | 21 | | | | | | | | | | | | |
| Columbiana | 56 | 35 | 21 | | | 15 | 10 | | | | | 5 | 2 | | | 15 | 9 |
| Coshocton | 53 | 33 | 20 | | | 18 | 13 | 13 | 6 | | | | | | | 2 | 1 |
| Crawford | 19 | 18 | 1 | 18 | 1 | | | | | | | | | | | | |
| Cuyahoga | 217 | 123 | 94 | | | | | | | | | 4 | 20 | 117 | 71 | 2 | 3 |
| Darke | 15 | 11 | 4 | 11 | 4 | | | | | | | | | | | | |
| Defiance | 4 | 3 | 1 | | | | | | | 3 | 1 | | | | | | |
| Delaware | 52 | 47 | 5 | 47 | 5 | | | | | | | | | | | | |
| Erie | 153 | 128 | 25 | 117 | 24 | | | 11 | 1 | | | | | | | | |
| Fairfield | 12 | 7 | 5 | | | 7 | 5 | | | | | | | | | | |
| Fayette | 11 | 8 | 3 | 8 | 3 | | | | | | | | | | | | |
| Franklin | 202 | 167 | 35 | 110 | 20 | 57 | 15 | | | | | | | | | | |
| Fulton | 13 | 10 | 3 | | | 10 | 3 | | | | | | | | | | |
| Gallia | 19 | 10 | 9 | | | 10 | 9 | | | | | | | | | | |
| Geauga | 77 | 32 | 45 | | | 9 | 1 | 23 | 44 | | | | | | | 1 | 0 |
| Greene | 73 | 47 | 26 | 14 | 11 | 23 | 12 | | | 2 | 1 | | | | | 8 | 2 |
| Guernsey | 11 | 5 | 6 | 5 | 6 | | | | | | | | | | | | |
| Hamilton | 141 | 85 | 56 | | | 77 | 55 | | | | | | | | | 8 | 1 |
| Hancock | 24 | 22 | 2 | 22 | 2 | | | | | | | | | | | | |
| Hardin | 14 | 11 | 3 | 11 | 3 | | | | | | | | | | | | |
| Harrison | 28 | 21 | 7 | 11 | 6 | | | | | | | 10 | 1 | | | | |
| Highland | 62 | 40 | 22 | 37 | 22 | 3 | 0 | | | | | | | | | | |
| Hocking | 17 | 10 | 7 | | | 10 | 7 | | | | | | | | | | |
| Holmes | 29 | 16 | 13 | | | 16 | 13 | | | | | | | | | | |
| Huron | 4 | 2 | 2 | 1 | 1 | | | 1 | 1 | | | | | | | | |
| Jackson | 24 | 17 | 7 | 10 | 4 | | | | | 1 | 2 | | | | | 6 | 1 |
| Jefferson | 5 | 4 | 1 | 4 | 1 | | | | | | | | | | | | |
| Knox | 47 | 33 | 14 | | | 20 | 12 | 12 | 1 | | | 1 | 1 | | | | |
| Lake | 193 | 111 | 82 | | | 5 | 8 | 2 | 2 | | | | | 104 | 72 | | |
| Lawrence | 3 | 1 | 2 | | | 1 | 2 | | | | | | | | | | |
| Licking | 38 | 28 | 10 | | | 21 | 7 | | | 3 | 1 | 3 | 1 | 1 | 1 | | |
| Logan | 56 | 40 | 16 | 32 | 14 | 8 | 2 | | | | | | | | | | |
| Lorain | 9 | 7 | 2 | | | | | 7 | 2 | | | | | | | | |
| Lucas | 59 | 40 | 19 | 37 | 17 | 1 | 1 | | | 2 | 2 | | | | | | |
| Madison | 6 | 4 | 2 | 4 | 2 | | | | | | | | | | | | |
| Mahoning | 70 | 51 | 19 | 12 | 9 | | | 3 | 1 | 1 | 1 | | | | | 35 | 8 |
| Marion | 37 | 27 | 10 | 20 | 7 | 3 | 2 | | | | | 4 | 1 | | | | |
| Medina | 38 | 30 | 8 | | | 30 | 8 | | | | | | | | | | |
| Meigs | 51 | 44 | 7 | | | 44 | 7 | | | | | | | | | | |
| Mercer | 11 | 9 | 2 | 9 | 2 | | | | | | | | | | | | |
| Miami | 80 | 60 | 20 | 51 | 17 | 9 | 3 | | | | | | | | | | |
| Monroe | 6 | 4 | 2 | 4 | 2 | | | | | | | | | | | | |
| Montgomery | 116 | 76 | 40 | 51 | 23 | 26 | 17 | | | | | | | | | | |
| Morgan | 3 | 2 | 1 | | | 2 | 1 | | | | | | | | | | |
| Morrow | 10 | 7 | 3 | | | 7 | 3 | | | | | | | | | | |
| Muskingum | 122 | 94 | 28 | 70 | 22 | 11 | 4 | | | 3 | 1 | 2 | 1 | | | 7 | 2 |
| Noble | 11 | 9 | 2 | 9 | 2 | | | | | | | | | | | | |
| Ottawa | 106 | 85 | 21 | 85 | 21 | | | | | | | | | | | | |
| Paulding | 89 | 50 | 39 | 42 | 11 | | | | | | | | | | | 8 | 28 |
| Perry | 51 | 42 | 9 | | | | | 38 | 7 | 2 | 1 | | | | | 2 | 1 |
| Pickaway | 56 | 48 | 8 | 28 | 5 | 20 | 3 | | | | | | | | | | |
| Pike | 66 | 39 | 27 | 23 | 15 | 10 | 4 | 6 | 8 | | | | | | | | |

## SAND AND GRAVEL

Sand and gravel were sold or produced by 188 companies at 276 operations in 62 Ohio counties during 2007. Sales[6] of sand and gravel totaled 37,194,186 tons (-20.8 percent from 2006). Sand accounted for 20,828,690 tons of the total sand and gravel sold, and gravel accounted for 16,365,496 tons. Portage, Hamilton, Stark, Butler, and Franklin Counties led in sales, accounting for 45.4 percent of the total. Reported known production[6] of sand and gravel totaled 37,122,652 tons in 2007. Ohio ranks 7th nationally in the production of construction sand and gravel out of 50 producing states and Puerto Rico. The states leading Ohio, in descending order of production, are California, Texas, Arizona, Colorado, Washington, and Utah. Ohio ranks 9th nationally in the production of industrial sand and gravel out of 34 states. The states leading Ohio in the production of industrial sand and gravel, in descending order, are Illinois, Florida, Georgia, Wisconsin, Texas, California, Oklahoma, and Minnesota. Ohio ranks 6th nationally in the production of aggregates, including crushed stone. The states leading Ohio in the production of aggregates are California, Texas, Florida, Pennsylvania, and Illinois.[7]

A total of 41,500 tons of sand was reported dredged from Lake Erie in 2007. The Maumee Bay and Maumee River areas are no longer producing sand or gravel.

The total value[8] of sand and gravel sold in 2007 was $217,295,856. Average price per ton was $5.84.

An annual average of 1,030 employees worked an average of 148 days in 2007 to produce sand and gravel. Total wages of $65,887,583 were paid to a total of 1,493 employees (1,030 production employees and 463 nonproduction employees). The average annual wage, based on those employees for whom wages were reported, was $44,131. An additional 59 people (42 production employees and 17 nonproduction employees) were employed by operations mining sand and gravel along with one or more other mineral commodities.

Building, portland cement concrete, asphaltic concrete, and road construction/resurfacing were the major uses for Ohio sand and gravel in 2007.

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[6] Sales and production figures for sand include material dredged from Lake Erie.
[7] Information from U.S. Geological Survey.
[8] Includes reported and estimated values. See footnote 1, p. 1.

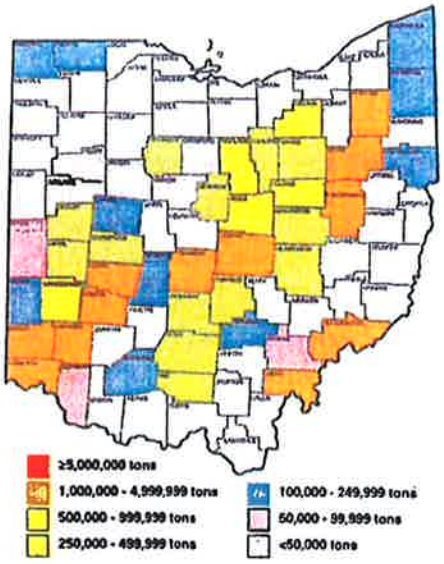

FIGURE 6.—Sales of sand and gravel in Ohio in 2007, by county.

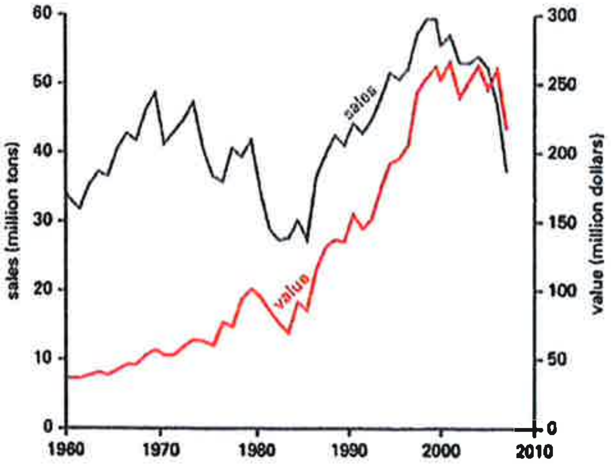

FIGURE 7.—Sales and value of sand and gravel in Ohio. Sales and values from 1984 to 2006 include Lake Erie dredged material.

TABLE 15.—*2007 Ohio sand and gravel sales, by county and type*

| County | Tons sold | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total sand and gravel | Total sand | Total gravel | Building | | Portland cement concrete | | Asphaltic concrete | | Road construction/ resurfacing | | Filtration | | Foundry sand | Industrial sand | Other/unspecified | |
| | | | | Sand | Gravel | Sand | Gravel | Sand | Gravel | Sand | Gravel | Sand | Gravel | | | Sand | Gravel |
| Allen | 34,496 | 31,052 | 3,444 | 1,790 | 400 | 15,201 | | 7,380 | | 773 | 386 | 1,825 | | | | 4,083 | 2,658 |
| Ashland | 395,887 | 158,429 | 237,458 | 84,523 | 118,212 | | | | | 63,348 | 98,188 | | | | | 10,558 | 21,058 |
| Ashtabula | 182.396 | 93,452 | 88,944 | 52,327 | 53,900 | | | 1,658 | | 30,334 | 7,200 | 8.933 | 27,526 | | | 200 | 318 |
| Athens | 78,318 | 37,309 | 41,009 | 17,309 | 19,009 | | | | | 5,000 | 5,000 | | | | | 15,000 | 17,000 |
| Auglaize | 16,970 | 13,526 | 3,444 | 1,995 | 3,444 | 11,531 | | | | | | | | | | | |
| Butler | 3.201,557 | 2,009,817 | 1,222,150 | 741,416 | 800,409 | 420,783 | 159,585 | 268,022 | 62,281 | 200,000 | 146,016 | 15,205 | 32,921 | | | 363,888 | 6,733 |
| Carroll | 20,900 | 10,350 | 10,550 | 10,000 | 10,500 | | | | | 350 | 50 | | | | | | |
| Champaign | 369.455 | 169,412 | 200,043 | 116,376 | 129,948 | 1,000 | 1,000 | 1,000 | 1,000 | 51,036 | 68,024 | | | | | | 71 |
| Clark | 1,195,223 | 651,824 | 543,399 | 160,604 | 197,430 | 141,450 | 54,953 | 158,181 | 193,637 | 101,300 | 73,977 | 17,517 | 15,311 | | | 72,772 | 8,091 |
| Clermont | 94,508 | 70,910 | 23,598 | | | | | 70,910 | 23,598 | | | | | | | | |
| Columbiana | 282,095 | 106,379 | 175,716 | 41,700 | 77,795 | 9,311 | | | | 27,361 | 25,000 | 5,000 | 37,380 | | 10,000 | 13,007 | 35,541 |
| Coshocton | 494,553 | 273,889 | 220,664 | 90.219 | 72,365 | 40,000 | 20.000 | 66,959 | 20,000 | 40.061 | 85,649 | 10,641 | 10,277 | | 10.861 | 15,148 | 12,373 |
| Crawford | 64 | | 64 | | 64 | | | | | | | | | | | | |
| Cuyahoga | 10,113 | 10 113 | | | | | | | | | | | | | | 10,113 | |
| Darke | 72,079 | 43,247 | 28,832 | 43 247 | 28,832 | | | | | | | | | | | | |
| Erie | 1,102 | 842 | 260 | 842 | 260 | | | | | | | | | | | | |
| Fairfield | 390 | 267286,888 | 103,376 | 74,243 | 26,068 | 70,000 | 22,000 | 70,000 | 22,000 | 70.000 | 22,000 | 1,000 | | | | 1,645 | 11,308 |
| Franklin | 2,787,310 | 1,570,967 | 1,216,343 | 252,070 | 547,995 | 804.000 | 156,000 | 453,265 | 349.919 | 50,000 | 70.000 | 10,000 | 10,000 | | | 1,632 | 82,429 |
| Fulton | 108,900 | 108,900 | | 107,673 | | | | | | | | | | | | 1 227 | |
| Gallia | 3.616 | 3,616 | | 3.231 | | | | | | | | 385 | | | | | |
| Geauga | 41,481 | 20.320 | 21.161 | 20,000 | 20.901 | | | | | | 260 | | | | | 320 | |
| Greene | 1,427,835 | 672,347 | 714,007 | 38,694 | 233,923 | 51,744 | 59,664 | 50,265 | 53,376 | | 60,000 | | | | | 531,644 | 307,044 |
| Hamilton | 3.645,420 | 1,923,206 | 1,722,214 | 1,000,344 | 798,863 | 197,996 | 71,530 | 224,520 | 341,989 | 297,300 | 356,237 | | | | | 203.046 | 153,595 |
| Hardin | 550 | | 550 | | | | | | | | 550 | | | | | | |
| Highland | 103,859 | 49,368 | 54,493 | | 3.783 | 24,684 | | | 23,644 | | 6,322 | 24,684 | 18,744 | | | | |
| Hocking | 197,377 | 138,671 | 58,706 | 62,014 | 10,532 | 10,000 | 2,600 | 50,008 | 36,551 | 9,116 | 4,594 | 5,000 | | | | 2,533 | 4,429 |
| Holmes | 656.827 | 357,560 | 299,267 | 13,922 | 117,451 | 93.180 | 27 007 | 122.575 | 20.480 | 107,519 | 121,099 | 18.491 | 7.779 | | | 1,873 | 5.451 |
| Jackson | 4,133 | 2,500 | 1,633 | 2.500 | 1,633 | | | | | | | | | | | | |
| Knox | 612,812 | 374.815 | 237,997 | 122,465 | 78,317 | 121,000 | | 77,000 | 100,000 | 38.650 | 53.650 | | | | | 15,680 | 6,030 |
| Lake | 1,500 | 1,500 | | | | | | | | | | | | | | 1,500 | |
| Lawrence | 1,345 | 1,345 | | | | | | | | | | | | | | 1 345 | |
| Licking | 1,151,935 | 740,555 | 411,380 | 161.300 | 153,700 | 282,000 | 70,000 | 150,000 | 89,000 | 90.000 | 75,000 | 15.000 | 10,000 | | | 42,255 | 13 680 |
| Logan | 108,247 | 43,987 | 64,260 | 37.927 | 63,575 | 4,054 | | | | | 685 | 2.006 | | | | | |
| Lorain | 6,037 | 6,037 | | 6.037 | | | | | | | | | | | | | |
| Madison | 127,785 | 40,127 | 87,658 | 16,788 | 87,658 | | | 23,339 | | | | | | | | | |
| Mahoning | 2.100 | 1,000 | 1,100 | 1.000 | 1,100 | | | | | | | | | | | | |
| Marion | 7.256 | 2,331 | 4,925 | | | | | | | | 4,925 | | | | | 2,331 | |
| Medina | 772,000 | 491.000 | 281,000 | 121,000 | 201,000 | 275,000 | | | | 75,000 | 80,000 | | | | 20,000 | | |
| Meigs | 1,630,252 | 1,057,717 | 572,535 | 178.418 | 108,412 | 254,792 | 211,643 | 194.453 | 130,018 | 150.000 | 70,000 | 12.000 | 23,396 | | | 268,054 | 29,066 |
| Miami | 331,825 | 216.172 | 115,653 | 60,730 | 72,150 | 29.000 | | | | 60,000 | 20,000 | | | | | 66 442 | 23 503 |

## 2007 OHIO ALPHABETICAL DIRECTORY OF INDUSTRIAL-MINERAL MINE OPERATORS (cont.)

| Name, address, telephone number, and president/owner/ manager of company | Name of mine | County | Commodity | 2007 sales (tons) | 2007 production (tons) | State mine number | Mining and reclamation permit number |
|---|---|---|---|---|---|---|---|
| Evans Gravel, Inc.<br>4229 Round Bottom Rd.<br>Cincinnati, OH 45244<br>513-271-1119<br>Douglas L. Evans, pres. | Evans Gravel, Inc.<br>Evans Gravel, Inc. | Clermont<br>Hamilton | sand & gravel<br>sand & gravel | 94,508<br>43,483 | 147,929<br>67,208 | Ct-9<br>Hmn-E | IM-526<br>IM-2181 |
| Feikert Sand & Gravel, Inc.<br>6871 Township Road 605<br>Millersburg, OH 44654<br>330-674-7245<br>Lynn O. Feikert, pres. | Feikert Sand & Gravel, Inc. | Holmes | sand & gravel | 138,194 | 138,194 | Hs-511 | IM-1048,<br>IM-1240 |
| Fleming Construction Co., Inc.<br>dba Scioto S. & G.<br>P.O. Box 31<br>Marion, OH 43301-0031<br>740-494-2177<br>Sonja E. Fleming, pres. | Pit #1<br>Pit #2 | Marion<br>Marion | sand & gravel<br>sand & gravel | 7,256 | 7,256 | Mn-16<br>Mn-19 | IM-171<br>IM-990 |
| Flesher Sand & Gravel, Inc.<br>3322 Clark Mill Rd.<br>Norton, OH 44203<br>330-745-9239<br>James E. Fisher, Jr., pres. | Flesher Sand & Gravel, Inc. | Summit | sand & gravel | | | St-52 | IM-900 |
| Foureman's Sand & Gravel, Inc.<br>2791 Wildcat Rd.<br>Greenville, OH 45331<br>937-548-1718<br>Gary B. Foureman, pres. | Foureman's Sand & Gravel, Inc. | Darke | sand & gravel | 72,079 | 72,079 | Dke-4 | IM-433 |
| Lloyd B. Fry<br>P.O. Box 1515<br>Piqua, OH 45356<br>937-773-1940<br>Lloyd B. Fry, owner | Lloyd B. Fry | Miami | sand & gravel | 1,935 | 1,935 | Mi-T | IM-696 |
| Frye Sand & Gravel, Inc.<br>P.O. Box 3<br>Dorset, OH 44032-0003<br>440-858-2627<br>Harold L. Frye, owner | Frye Sand & Gravel, Inc.<br>Frye Sand & Gravel, Inc. | Ashtabula<br>Ashtabula | sand & gravel<br>sand & gravel | 250<br>518 | 250<br>518 | Asa-F<br>Asa-10 | IM-1289<br>IM-198 |
| GANS Ltd.<br>800 West Maple St.<br>Hartville, OH 44632<br>330-877-2525<br>Ellis Erb, pres. | Gans Ltd dba Brimfield Sand & Soils | Portage | sand & gravel | 15,507 | 3,050 | Pc-102 | IM-1184 |
| Ganges Gravel Co.<br>P.O. Box 638<br>Mansfield, OH 44901<br>419-896-3660<br>Don Daugherty, pres. | Ganges Gravel Co. | Richland | sand & gravel | 22,500 | 22,500 | Rd-18 | IM-670 |
| John L. Garber Materials, Inc.<br>2745 Gass Rd.-Route 8<br>Lexington, OH 44904<br>419-884-1567<br>John L. Garber, pres. | John L. Garber Materials, Inc.<br>John L. Garber Materials, Inc. | Richland<br>Richland | sand & gravel<br>sand & gravel | 172,328 | | Rd-14<br>Rd-G | IM-436<br>IM-2152 |
| General Motors Power Train<br>26427 State Route 281 East<br>Defiance, OH 43512<br>419-782-7010<br>John Thomas, plant mgr. | GM Powertrain Clay Borrow Area | Defiance | clay | 26,870 | 26,870 | Dc-3 | IM-1351 |
| Gibson Sand & Gravel Co.<br>1475 Knorr Rd.<br>Galion, OH 44833<br>419-468-5820<br>John Gibson, owner | Gibson Sand & Gravel Co. | Crawford | sand & gravel<br>clay | 160<br>64 | 160<br>64 | Cd-G | IM-0693 |

## 2007 OHIO ALPHABETICAL DIRECTORY OF INDUSTRIAL-MINERAL MINE OPERATORS (cont.)

| Name, address, telephone number, and president/owner/ manager of company | Name of mine | County | Commodity | 2007 sales (tons) | 2007 production (tons) | State mine number | Mining and reclamation permit number |
|---|---|---|---|---|---|---|---|
| James Bros. Sand & Gravel Ltd.<br>3930 Boggs Rd.<br>Zanesville, OH 43701<br>740-454-1522<br>Daniel G. James, owner | James Bros. Sand & Gravel Ltd. | Muskingum | sand & gravel | 1,520 | 1,520 | Mum-J1 | IM-2261 |
| Janson & Sons Corp.<br>11829 Spencer Park Rd.<br>Hiram, OH 44234<br>330-274-8896<br>Gary Janson, owner | Janson & Sons Corp. | Portage | sand & gravel | | | Pe-J | IM-2051 |
| Jarrett Sand Co.<br>6605 Skadden Rd.<br>Sandusky, OH 44870<br>419-359-1750<br>James Jarrett, owner | Jarrett Sand Co. | Erie | sand & gravel | 592 | 592 | Ee-29 | |
| Jaymar, Inc.<br>8751 North State Route 7<br>Cheshire, OH 45620<br>740-992-6637<br>Jay Hall, Jr., pres. | Jaymar, Inc. | Gallia | sand & gravel | | | Ga-J | IM-1145 |
| | Plant #4 | Meigs | sand & gravel | 849,820 | 849,820 | Ms-308 | IM-1174 |
| | Plant #5 | Meigs | sand & gravel | | | Ms-L | IM-1159 |
| Johnson Stone Products, Inc.<br>4018 Cleveland Rd East<br>Huron, OH 44839<br>440-315-3699<br>Torry A. Johnson, pres. | Kipton Quarry | Lorain | sandstone | 10,450 | 10,450 | Ln-J | IM-1300 |
| KCI Sand & Gravel<br>P.O. Box 946<br>Logan, OH 43138<br>740-385-6019<br>Edward Kilbarger, pres. | KCI Sand & Gravel | Hocking | sand & gravel | 38,972 | 72,000 | Hg-HA | IM-1320 |
| Keeney Sand & Stone, Inc.<br>13320 Girdled Rd.<br>Painesville, OH 44077<br>440-254-4582<br>Dennis J. Keeney, pres. | Keeney Sand & Stone, Inc. | Lake | sandstone | 66,157 | 66,157 | Lke-K | IM-859 |
| Kimble Clay & Limestone Co.<br>3596 State Route 39 NW<br>Dover, OH 44622-9801<br>330-343-1226<br>Keith B. Kimble, pres. | Kimble Clay & Limestone Co. | Tuscarawas | limestone | 210,832 | 210,832 | Ts-1818 | IM-9 |
| | | | sandstone | 1,587 | 1,587 | | |
| | | | clay | 52,919 | 52,919 | | |
| | | | shale | 111,100 | 111,100 | | |
| King Quarries, Inc.<br>41820 Parrish Ridge<br>Caldwell, OH 43724<br>740-732-2923<br>Mary King, pres. | King Quarries, Inc. | Noble | limestone | 92,135 | 92,135 | Ne-K1 | IM-1292 |
| Kinsman Materials, Ltd.<br>P.O. Box 76<br>Chardon, OH 44024<br>440-286-4757<br>Bill Clemson, pres. | Kinsman Materials, Ltd. | Ashtabula | sand & gravel | 45,246 | 45,246 | Asa-20 | IM-1198 |
| Kipp's Gravel Co., Inc.<br>4987 State Route 222<br>Batavia, OH 45102<br>513-732-1024<br>Melvin M. Kipp, pres. | Kipp's Gravel Co., Inc. | Clermont | sand & gravel | | | Ct-7 | IM-432 |
| Kirby's Sand & Gravel, Inc.<br>4876 County Hwy. 43<br>Upper Sandusky, OH 43351-9155<br>419-927-2260<br>Gene Kirby, owner | Kirby's Sand & Gravel, Inc. | Wyandot | sand & gravel | | | Wt-17 | IM-604 |
| | Kirby's Sand & Gravel, Inc. | Wyandot | sand & gravel | 115,992 | 115,992 | Wt-K | IM-943 |

## APPENDIX F

## National Park Service listing for Clermont County

**United States Department of the Interior**
**National Park Service**
**Land & Water Conservation Fund**

## Detailed Listing of Grants Grouped by County

## OHIO - 39

| Grant ID & Element | Type | Grant Element Title | Grant Sponsor | Amount | Status | Date Approved | Exp. Date | Cong. District |
|---|---|---|---|---|---|---|---|---|
| **CLERMONT** | | | | | | | | |
| 305 - XXX | A | STONELICK STATE PARK | DEPT. OF NATURAL RESOURCES | $198,459.85 | C | 4/18/1974 | 12/31/1976 | 2 |
| 502 - XXX | D | SYCAMORE PARK | CLERMONT COUNTY | $29,650.00 | C | 1/20/1977 | 12/31/1979 | 2 |
| 538 - XXX | D | PLUM STREET PARK | VILLAGE OF NEW RICHMOND | $13,554.00 | C | 3/22/1977 | 12/31/1980 | 2 |
| 576 - XXX | C | D/MONROE TOWNSHIP PK | TOWNSHIP OF MONROE | $18,600.00 | C | 7/27/1978 | 12/31/1980 | 2 |
| 665 - XXX | A | D/CROOKED RUN | DEPT. OF NATURAL RESOURCES | $50,000.00 | C | 10/17/1978 | 12/31/1983 | 2 |
| 863 - XXX | C | D/LOVELAND PARK | CITY OF LOVELAND | $86,769.92 | C | 2/17/1981 | 12/31/1986 | 2 |
| 954 - XXX | C | D/RIVERFEST PARK | VILLAGE OF NEW RICHMOND | $23,915.80 | C | 6/24/1983 | 12/31/1988 | 2 |
| 1066 - XXX | D | UNION TOWNSHIP PARK | TOWNSHIP OF UNION | $66,782.47 | C | 5/27/1986 | 12/31/1991 | 2 |
| 1136 - XXX | D | UNION TOWNSHIP PARK | TOWNSHIP OF UNION | $86,211.00 | C | 6/1/1989 | 12/31/1993 | 2 |
| 1165 - XXX | D | PIERCE TOWNSHIP PARK | TOWNSHIP OF PIERCE | $94,098.40 | C | 8/19/1991 | 12/31/1996 | 2 |
| 1184 - XXX | D | MIAMI TOWNSHIP PARK | TOWNSHIP OF MIAMI | $29,354.68 | C | 8/26/1992 | 12/31/1997 | 2 |
| 1214 - XXX | A | KELLEY NATURE PRESERVE | CLERMONT COUNTY | $92,402.00 | C | 3/31/1995 | 12/31/1999 | 2 |
| 1352 - XXX | R | STATE OF OHIO - EAST FORK STATE PARK | DEPT. OF NATURAL RESOURCES | $415,000.00 | A | 5/3/2010 | 12/31/2012 | 2 |
| | | | **CLERMONT County Total:** | **$1,204,798.12** | | **County Count:** | **13** | |