



### **III. TECHNICAL ANALYSES FINDINGS SUMMARY**

### **III. TECHNICAL ANALYSES FINDINGS SUMMARY**

Components of this study included detailed analyses of traffic and accidents; identification of natural and cultural resources and environmental issues; and preliminary development of engineering and technical feasibility studies. An important element of the project study considerations was the recently adopted land use plans of the eight townships directed by the Butler County Department of Economic Development (see [Exhibit 4](#)). In addition, the adopted land use plan of the City of Oxford was also reviewed in its context to transportation plans in the NBTS.

#### **Review of Local and Regional Plans and Studies**

Several recent local and regional transportation studies and land use plans for the area were reviewed in this study to help in formulating the understanding of the area's problems and needs. The following studies were reviewed:

- *Butler County Regional Transit Authority Strategic Plan (1999-2001), 1998;*
- *Butler County Township Land Use Plans, 1998;*
- *Butler County, Ohio Thoroughfare Plan, 1998;*
- *City of Oxford Comprehensive Plan, 1998;*
- *City of Oxford Truck Origin-Destination Study, March 1999;*
- *Oxford Township Community Survey, 2000;* and
- *Trenton Area Access Study, 2000.*

Each of these studies provided important insight to the problem identification and goal setting for the Northwest Butler Transportation Study. However, early in the study process, the Advisory Committee recognized the particular importance of three of these studies and their relationship the transportation planning process. The three key studies were: the Township Land Use Plans, the Oxford Comprehensive Plan and the Oxford Truck Origin-Destination Study.

The land use planning efforts of the eight townships, Butler County and the City of Oxford provided a current, up-to-date vision of what local planners and citizens envisioned for Northwest Butler County. The Advisory Committee reviewed these future land use plans and used these to evaluate how alternative transportation improvements could not only support the land use goals, but also be compatible with desired land use development patterns. As discussed in the next section, the Committee established one of the NBTS Plan's goal to be the preservation of the rural character of the Northwest Butler County area and the small town ambience of the Oxford, Millville, Darrrtown, and the other communities in the area, while at the same time addressing pressing transportation needs and desires.

The Oxford Truck Origin - Destination Study was also an area of focus in that it provided some key quantitative measurement of the perceived concerns over increased heavy truck traffic in the area. This study, conducted in 1998, concluded that there is a significant volume of truck traffic serving the northwest Butler County area and the City of Oxford, but there was also a significant portion of that truck traffic that was just passing through. The study measured the truck volume in and through the City of Oxford and concluded that while three-fourths of the daily truck (and bus) volumes related to business in Oxford, almost half of the heavy truck volume during the peak hours of the day was only passing through. In other words, the truck volumes perceived to be the most problematic in terms of motorist and pedestrian safety and congestion, were indeed caused by through trucks. The study further concluded that removal of the heavy trucks during peak hours, by re-routing, would reduce truck volumes in Oxford by almost 60%. As the Northwest Butler Transportation Study progressed, the issue of trucks and particularly their effect on travel safety and on pedestrian conflicts in Oxford and through the Miami University campus was reviewed continually in the alternative improvement plan development and evaluation process.



### **Inventory and Analysis of Existing Conditions**

A key component of the Northwest Butler Transportation Study involved the detailed analyses of the efficiency and safety of current roads in the study area. The technical data was reviewed by, and combined with input from, the community to identify critical transportation needs and to develop alternative improvement plans.

In the NBTS area, there are more than 150 miles of roadway with nearly 80 miles of state and federally maintained highways and numerous miles of county, township and other roads. The overwhelming majority of these roads are two lanes wide.

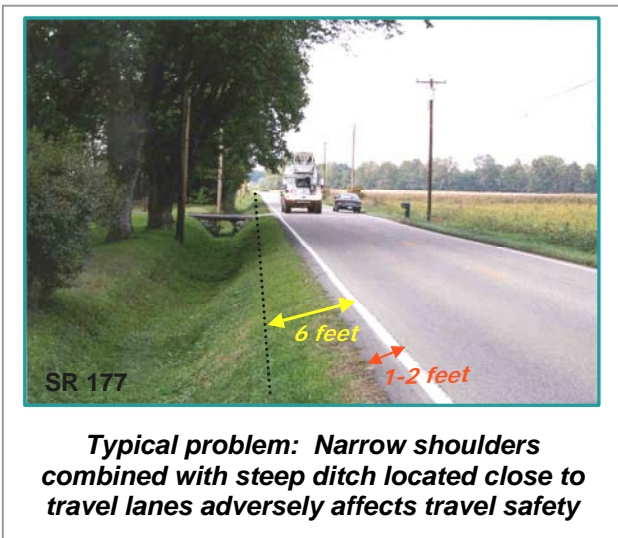
Level of service (LOS) is a quantitative and qualitative measure of traffic and road conditions. LOS takes into account several factors, including: total traffic, truck volumes, speed, travel time, traffic interruptions, freedom to maneuver, safety and operating costs. Transportation efficiency is measured on an “A” to “F” scale, with “A” being the best, “C” being the acceptable standard, and



ratings below “C” indicating the need to consider improvements. This rating is determined for roads during their peak hours of traffic demand, which usually occur during the morning and afternoon commute times.

In the NBTS area, there are more than 150 miles of roadway with nearly 80 miles of state and federally maintained highways and numerous miles of county, township and other roads. The overwhelming majority of these roads are two lanes wide.

Many of the roads, or segments of roads, in the study area currently provide an acceptable level of service, although with projected traffic increases level of service will decrease unless transportation improvements are implemented. Traffic demands, high percentages of heavy truck volume, roadway inadequacies such as the number or location of access points (over 400 driveways on US 27 south of Oxford), or the need for turn lanes or signalization or a combination of factors are contribute to inadequate level of service. Some of the problem areas are related to congested conditions at intersections, some are due to narrow lane and shoulder widths, and some are related to insufficient opportunities for passing slower moving traffic on two-lane roads.



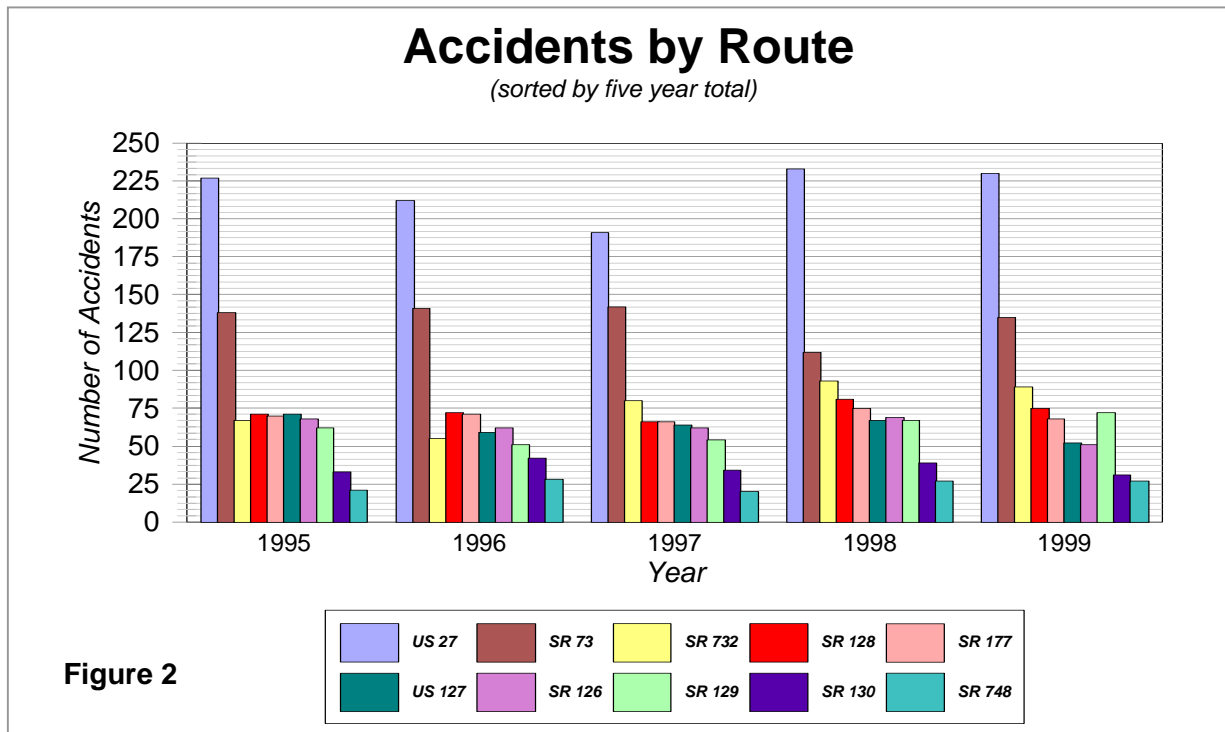
Exhibits 5a through 5c depict some of the roadway characteristics of the NBTS network contributing to the area’s transportation problems.

### **Travel Safety: Accident History Analysis**

The Ohio Department of Public Safety compiles traffic accident reports from local, county and state police jurisdictions in a comprehensive statewide database. The database includes the following information: location; number and type of vehicles involved; severity of accident (property damage only, personal injuries, or fatalities); weather; lighting; road conditions; direction of travel; type of accident (head-on, rear end, passing, turning, etc.); contributing factors (alcohol, animal action); citation; fault; and driver action.

Accident data from 1995 through 2001<sup>1</sup> was analyzed to identify roadway inadequacies or problem areas. While many accidents are caused by driver errors, these errors often are related to roadway characteristics or problems such as traffic congestion, narrow lane or shoulder widths, or a high frequency of roadway or driveway intersections. To help determine if a road's accident history reflects roadway conditions that can be corrected, accident data is combined with traffic data.

Each year for the last five years, there has been an average of 1,400 accidents on the roads in the NBTS area. Figure 2 shows the annual number of accidents for each of the

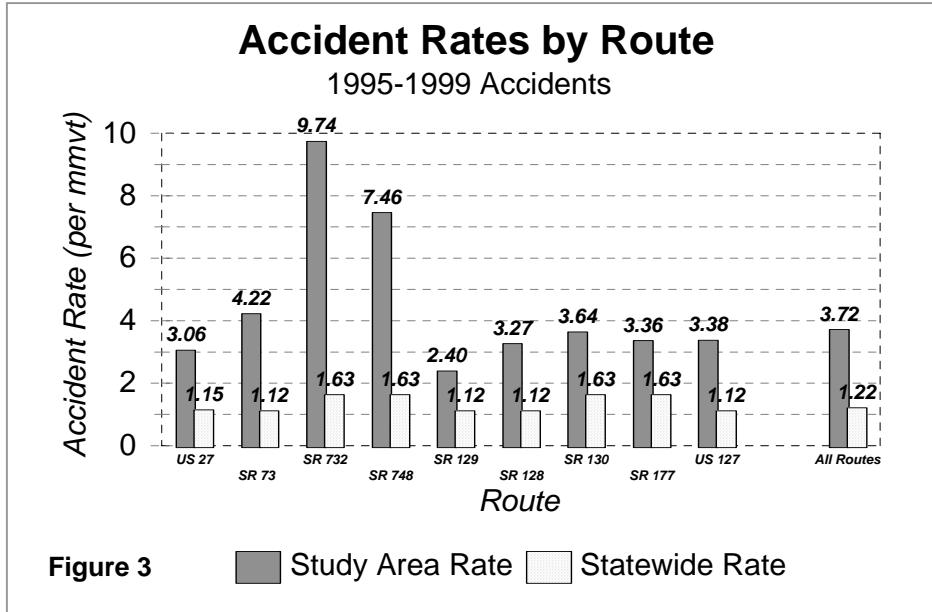


area's state and U.S. routes between 1995 and 1999. A review of the 2000 and 2001 accident data for US 27 and SR 73 (when it was released by the Ohio Department of Public Safety) revealed that the trends evident in the five years prior depicted in the above graph are continuing.

For comparison of the area's accident experience, annual accident rates in accidents per million vehicle miles traveled are derived based on roadway characteristics, functional classification, daily traffic volumes and annual average of traffic accidents. In this way, an area's roads can be fairly compared to other similar roads across the state.

<sup>1</sup> At the time of the analysis for this study, full yearly data only extended to 1999, so the detailed analysis focused on the 1995 through 1999 data. Near the end of the study, two additional years of data were released by ODPS and the analysis was updated to include 2000-2001 data for US 27 and SR 73.

Many roads in the area are experiencing traffic accidents at a rate that exceeds the statewide rates for similar roads. In fact, all the major roads in the Northwest Butler



Transportation Study area are experiencing rates exceeding the statewide rates (by two to six times the equivalent statewide rates for similar roads). Figure 3 depicts the annual accident rates for the major roads in the area compared with the statewide rates for similar roads, carrying similar volumes of traffic.

Exhibit 6 displays the historical accident data and rates for the NBTS area.

Based on these findings, travel safety was identified early in this study as the most critical component of the NBTS purpose and need for both short term and long range transportation improvements. The following tables summarize the accident data for this area.

Table 1: Annual Accidents 1995 – 1999 (5 Year Period)		
YEAR	TOTAL BUTLER COUNTY	TOTAL NORTHWEST BUTLER STUDY AREA
1995	9,783	1,444 (15%)
1996	10,175	1,424 (14%)
1997	10,247	1,346 (13%)
1998	10,293	1,408 (14%)
1999	10,424	1,405 (14%)
<b>TOTAL</b>	<b>50,922</b>	<b>7,027 (14%)</b>

Table 2 displays the accident severity history. While the Northwest Butler area accounts for about 14% of all Butler County accidents, 25% of the County's fatal accidents occur in the Northwest Butler area.

<b>Table 2: Total Accidents 1995 – 1999 (5 Year Period)</b>		
<b>TYPE</b>	<b>BUTLER COUNTY</b>	<b>NORTHERN BUTLER STUDY AREA</b>
Property Damage Only	32,813	4,794
Personal Injury	17,962	2,196
Fatality	147	37

The following points briefly summarize the key findings from the accident history analysis:

**Total NBTS Area (all roads)**

Over 7,000 accidents in study area between 1995-1999

- over 1,400 per year on about 150 miles of roadway
- almost a third involved injuries
- 37 fatalities, almost 8 per year
- over a third are access related (driveways, intersections)
- about half involved only one vehicle
- 65 involved pedestrian (about 2/3 in Oxford or on campus)
- 12% involved truck

**State and US Routes in Study Area**

Almost 5,000 accidents on state and US routes in study area (about 2/3 of total)

- almost a third involved injuries
- 41 fatalities
- about half involved only one vehicle
- 13% involved truck
- all have accident rates exceeding statewide rates

**State and US Routes in Oxford**

Over 1,000 accidents on US 27, SR 73 and SR 732

- about a third involved injuries
- almost 60% access related
- almost 75% involved two vehicles
- 9% involved truck

**On US 27**

Almost 300 accidents per year (1,464 in five years)

- about 30% involved injuries
- average 1 fatality per year (although 3 in 1998, and 2 in 1999)
- almost 40% access related
- almost 40% involved only one vehicle
- 14% involved truck

**On SR 73**

Over 90 accidents per year (456 in five years)

- almost 40% involved injuries
- almost 40% access related
- almost half involved only one vehicle
- 17% involved truck

**Environmental Inventory**

An important part of this study was the inventory of Northwest Butler County's environmental features and resources including identification and accurate mapping using



***Important environmental features, including Four Mile Creek pictured here, were mapped in GIS for accurate location***

secondary source information that included mapping, publications, and coordination with the following: a) United States and Ohio Environmental Protection Agency, b) Ohio Department of Natural Resources, c) United States Department of Agriculture, d) United States Department of the Interior Fish and Wildlife Service, e) United States Geological Survey (USGS), f) State and local agencies, g) Miami University, and h) other organizations and pertinent publications.

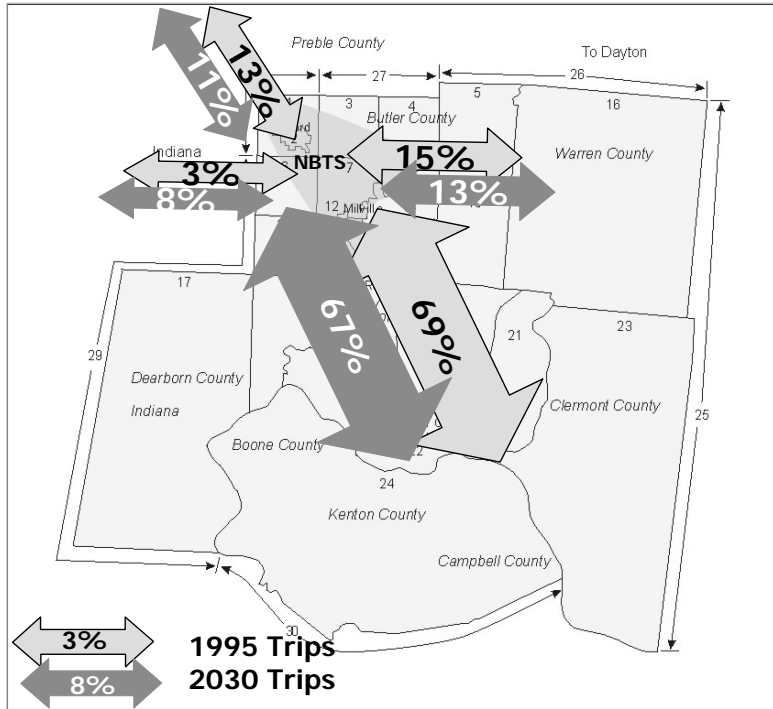
Secondary source information was used to identify and map such significant environmental features as: streams; wetlands; locations of state and federal listed threatened and endangered species; location of the Great Miami Buried Valley Aquifer System; Wellhead Protection Areas; locations of Public Water Service / Supply Wells; locations of Federal Emergency Management Agency (FEMA) mapped 100-year floodplains; locations of parks, preserves, and designated natural areas; and the locations of cultural, historic, and archaeological resources.

All information collected was fully documented and mapped to the Butler County GIS (Geographic Information System, electronic map files) base to be available for use in any advancement of this study into more detailed plan implementation. [Appendix B](#) includes a summary of the environmental inventory conducted for this study.

**Analysis of Forecasted Conditions**

The OKI Regional Travel Demand Model was first used in this study to determine the pattern of travel demand in the NBTS area and the surrounding counties of the OKI region. The model uses existing and projected population data, developed by the Ohio

Department of Economic Development and OKI (derived independently from this transportation study), and existing and future land use, developed by the local planning agencies, to project travel in terms of trips between home and work, school and shopping, and all other destinations. This illustration depicts the total 1995 trips compared to the future 2030 trips, regardless of transportation facilities. In other words, the model illustrates the demand for connection between origins and destinations based on



**Figure 4: Origins and Destinations from OKI Regional Travel Demand Model**

percentage of all trips) remain within the zones or immediate areas of the trip origin. There are also a high percentage of trips being made to the City of Hamilton (an economic and employment center) and northern Hamilton County.

**Projected Year 2030 Traffic**

The prevailing travel patterns and projected travel patterns are a key component in the development of alternative solutions for the transportation problem in the NBTS area. The OKI Regional Travel Demand Model was also used to determine future traffic volumes compared with existing conditions. Figure 5 depicts the projected routes that will experience more than a doubling of travel demand by the Year 2030, whether or not any new transportation facilities or improvements are implemented.

population, employment and land use data, not on the availability, capacity or inadequacy of the transportation facilities and network. The model then allocates these trips to the available facilities to help determine problem areas and transportation needs.

An analysis of trip origins and destinations data showed that travel demand in the NBTS area is more directly linked to north-south travel as opposed to east-west travel. Additionally, the majority of trips leaving from an origin are ultimately returning to that same origin (i.e., round trips). Most trips in the NBTS area (by

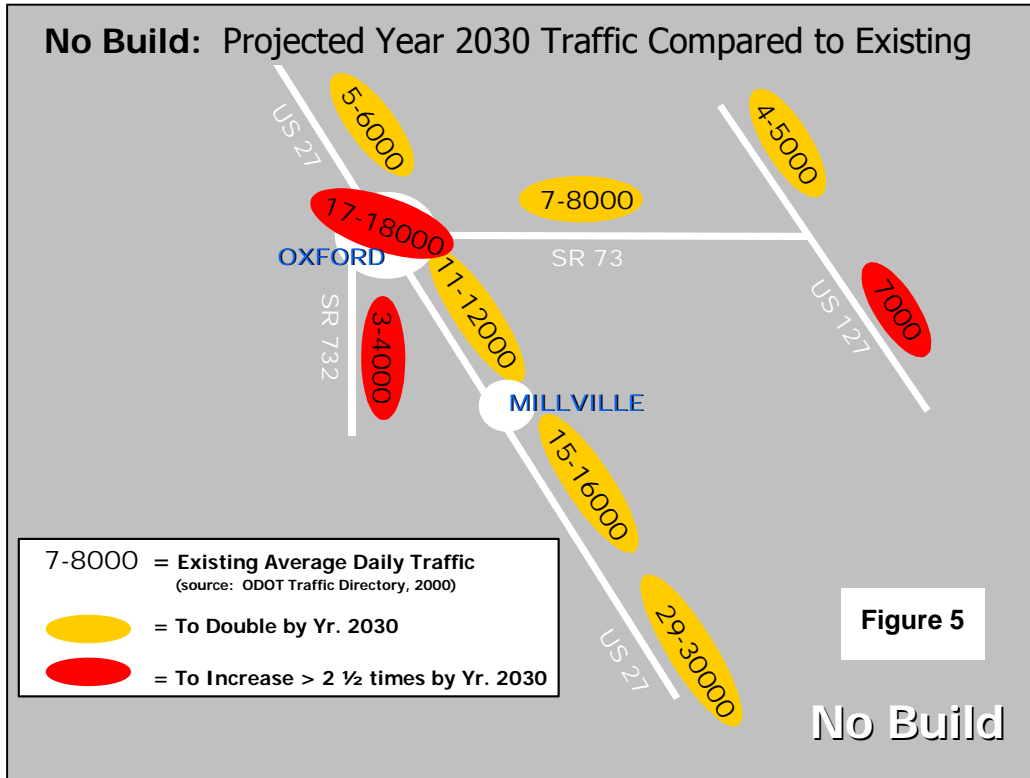


Exhibit 7 is a summary map showing the problem identification that resulted from the Advisory Committee’s review of the roadway and intersection characteristics study, the accident history analysis, and public input. This map became an important blueprint for the establishment of project goals through the development and evaluation of alternative solutions.

Separate technical reports, including more in-depth details on the data collected and analyzed in this study, have been developed as part of this study and will be made available to the project sponsors for use in advancing the recommended plan to implementation. These appendices include:

- Accident History and Analysis;
- Existing Roadway Characteristics Inventory; and
- Environmental Features Inventory (with GIS Mapping).