Oldham County Mobility System: Existing Conditions and Issues

Phase I Deliverable

prepared for
the
Oldham County Planning and Zoning Commission

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August 2003
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I. INTRODUCTION

Oldham County is located in northern Kentucky and is bordered by Jefferson, Shelby, Henry and Trimble Counties and Indiana, as shown in Figure 1 in Appendix A. LaGrange is the county seat and the principal population center in Oldham County.

In recent years, Oldham County has seen growth in both traffic volumes and residential development. Interstate 71 is the major highway corridor which spans the county from west to east, carrying about 55,000 vehicles per day on the southern end of the county. Other principal routes, such as US 42 and KY 146, provide connections between urban centers, major and minor roadways. The population centers of LaGrange and PeWee Valley have seen substantial increases in population associated with the construction of several new subdivisions on the perimeter of town. The countywide population has increased over 40 percent during the past ten years.

The Oldham County transportation network will require careful planning and the implementation of roadway improvements to maintain its current level of service (LOS) and provide an efficient means of transportation for the future. Oldham County has embarked on a program to implement a “capacity-based” approach to planning: balancing necessary public services with future growth. The purpose of this major thoroughfare plan is to establish capacity planning guidelines and recommendations for the thoroughfare system in Oldham County, Kentucky.

In February of 2002, the Oldham County Planning and Zoning Commission completed its update of the Oldham County Comprehensive Plan. The transportation element of the comprehensive plan includes a number of goals, objectives and policies concerning transportation improvements within Oldham County. In order for the Planning Commission to study in greater detail and develop an implementation schedule for these recommended improvements, this study was designed to analyze the existing roadway network and alternatives for roadway improvements. The final project document will summarize the detailed study of the current and future transportation need in Oldham County, and proposes a transportation plan for the implementation of recommended improvements.

The scope of the study is generally limited to the analysis of present and future automobile travel, transit services and pedestrian facilities; additionally, consideration is given to recent and planned highway improvements within Oldham County. For this Existing Conditions and Issues report, information regarding the existing roadway network, public involvement to-date, socioeconomic data, and the county-wide traffic model is contained in this report.
II. MAJOR HIGHWAY CHARACTERISTICS

Characteristics of the major highways in the study area are identified in the following sections. Included are geometric data, traffic conditions, crash history, non-motorized transportation, and planned highway improvements.

A. Geometric Characteristics

In order to provide guidance to highway designers and uniformity in geometric design standards, the American Association of State Highway and Transportation Officials (AASHTO) compiles *A Policy on Geometric Design of Highways and Streets*. The manual covers all areas of geometric roadway design including basic design criteria for various roadway classifications. A summary of these standards, based on speed limit, traffic volume, pavement width, and shoulder width is shown in Table 1 for the general categories of local/collector and arterial roadways.

These design criteria are intended for reference during the design of new or reconstructed roadways. Such a set of standards could be adopted by Oldham County for use in future design projects. These standards could also be used to determine whether or not the geometry of an existing road could safely withstand additional traffic volumes. In this way, a set of design criteria could become a tool for the consideration of future traffic increases along area roadways. It is important to note that the adoption of geometric design standards for roadways is not recommended to be retroactive. In other words, adopting standards for the purposes defined here would not require that all existing rural routes be reconstructed to meet such standards.

The local/collector and arterial roads in Oldham County are considered against these typical standards in Figures 2 and 3. As shown, the majority of the local/collector and arterial routes in the study area do not meet the typical geometric standards set forth by AASHTO for new or reconstructed routes:

- Major routes such as US 42, KY 22, KY 53, KY 146 and KY 393 throughout the county; and
- More minor routes or portions of routes, including KY 524, KY 1315, KY 1408 and others.

Portions of some routes do meet the typical design standards, including: portions of KY 146, KY 329, KY 524 and Fendley Mill Road.

B. Existing Traffic and Level of Service

Existing (Year 2003) traffic volumes and levels of service (LOS) have been identified for the major study area routes and are discussed further in the following subsections. These existing traffic and operational conditions are shown in Figures 4 and 5.

1. Existing Traffic Volumes

Existing traffic volumes (Year 2003) for the study area routes were summarized based on information provided in the Kentucky Transportation Cabinet’s (KYTC) Highway Information System (HIS) database. The KYTC conducts traffic counts along state maintained roadways in Kentucky on a two to four year cycle. Traffic volumes are estimated for routes when counts are not conducted in a particular year.
The traffic volumes shown in Figure 4 represent vehicles per day (vpd) along a roadway segment. The figure summarizes traffic volumes by flow rate categories, shown in the legend. The thicker lines in the figure represent roads carrying higher traffic volumes. As shown in the figure, the following traffic volumes are expected along the study area routes:

- I-71 carries the highest traffic volumes, ranging from 32,000 vpd to 54,600 vpd in the southern part of the county;
- Other high volume routes include portions of KY 146 and KY 53;
- Traffic volumes are generally higher and roadways are more concentrated in the southern and southwestern portions of the county; and
- The northern portion of the county generally carries the lowest traffic volumes.

2. Level of Service

Level of Service (LOS) is a qualitative measure defined in the 2000 Highway Capacity Manual, published by the Transportation Research Board (TRB). LOS is the industry standard used to describe traffic conditions. Individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Chapters 15, 20 and 21 of the 2000 Highway Capacity Manual provide guidelines on the analytical procedures for estimating LOS for streets and highways.

Six (6) levels of service are defined and are given letter designations from A to F, with LOS A representing free flow conditions and LOS F representing severe congestion. Sometimes it is easiest to think of levels of service like grades in school, where A is good and F is bad. Typically, a minimum of LOS D is acceptable in urban areas and LOS C in rural areas.

Figure 5 shows existing LOS calculated for segment s of each route in the study area. Congested conditions are identified along the following roadway segments:

- The western portion of I-71;
- KY 22 and KY 146 through the PeWee Valley area;
- US 42 near the Jefferson County line;
- KY 393 near the I-71 interchange; and
- KY 53 through LaGrange.

Most other routes in the county currently operate at what are considered to be acceptable levels.

C. Crash Analysis

Vehicle crash information can often be analyzed to identify areas that are more prone to accidents than others. Such routes have historical crash rates which are higher than those for similar highway segments. Identification of these ‘high accident locations’ is an important step in recognizing potential safety concerns and/or improvement opportunities. The typical method used to consider vehicle crash information is presented in the Kentucky Transportation Center’s (KTC) Analysis of Traffic Accident Data in Kentucky (1995-1999).
Crash data for the state maintained routes in the study area were considered for a four-year period from January 1, 1998, to December 31, 2001. Crashes with valid milepoint designations, recorded in the HIS database, were used to determine the location of high crash segments in the study area. A segment of roadway is considered to have a high crash rate when the total crash rate is higher than the critical crash rate for similar roads in the area.

As part of this process, each crash was classified into one (1) of three (3) categories based on the degree of severity: fatal, injury, or property-damage-only. During the period studied, there were 13 fatal, 809 injury, and 2,069 property-damage-only crashes on state maintained roads in Oldham County.

**Figure 6** displays the crash data by severity and location. The identified high and potentially high crash segments are also shown in the figure and are summarized as follows:

- Portions of I-71 near the Jefferson County line and the KY 146 interchange;
- KY 22 east and west of Crestwood;
- Portions of KY 53 through LaGrange and near the Shelby County line;
- KY 146 through PeWee Valley and LaGrange;
- KY 393 near the I-71 interchange; and
- Small segments of other area routes.

### D. Non-Motorized Transportation

With increasing traffic volumes and congestion on major area routes, non-motorized transportation will likely become an important alternative. A number of alternative transportation modes and systems are already in place in the county and others are in the planning stage. These non-motorized options are generally shown in **Figure 7** and summarized in the following subsections.

#### 1. Transit

Transit service to Oldham County is currently provided by the Transit Authority of River City (TARC), which is based in Louisville. TARC provides one express route into Oldham County: Route Number 64. This route follows Kentucky 146 from the Jefferson/Oldham County line through PeeWee Valley, Crestwood, Buckner and into LaGrange at the Oldham Plaza. Service is provided on weekdays only during morning and afternoon peak hours. A total of six (6) trips per day (three (3) outbound and three (3) inbound) are made along this route. In eastern Jefferson County, this route serves major employment centers (e.g., the Ford Motor Company Plant) and joins I-71 at Brownsboro Road into downtown Louisville.

Ridership on this route is approximately 108 per day, with only about half of these originating in Oldham County. Costs to provide this service is wholly borne by TARC, with revenue from occupational license fees. Express service into Oldham County is partially justified because its users are typically employees of businesses in Jefferson County.

#### 2. Bicycle

Bicycle transportation is currently limited in Oldham County to on-road facilities, with no dedicated bike lanes and only minimal shoulders for use by bicyclists. However, construction is
set to begin this spring on the first section of the "Oldham County Interurban Greenway," which will be a shared use path utilizing the right-of-way of the rail line that once connected Oldham and Jefferson County. The first section will be 0.6 miles in length and extend from East Main Street in LaGrange to Sixth Street. The total length of the Greenway will be 13 miles, connecting LaGrange, Buckner, Crestwood and PeWee Valley. The trail will be ten (10) feet in width. Oldham County has submitted an application for funding under the KYTC 2003 Transportation Enhancement Program for two additional trail segments totaling approximately three (3) miles.

The Kentuckiana Regional Planning and Development Agency (KIPDA) has also developed a map of bicycle and pedestrian projects. The Oldham County Interurban Greenway is also shown on this map in Figure 8.

US 42 is the only route in Oldham County that is designated as a scenic byway. Kentucky defines a scenic highway or byway as a road which has roadsides or viewsheds of aesthetic, cultural, historical and/or archaeological value worthy of preservation, restoration, protection and enhancement. At this time, there are no other known routes anticipated to become scenic byways.

3. Pedestrian

Pedestrian transportation facilities in Oldham County are currently limited to sidewalks in older areas of the community and within newer subdivision developments. The previously mentioned Greenway trail will provide additional facilities for pedestrians. Sidewalks are required for new subdivision development per Section 8.6(E) of the Oldham County Subdivision Regulations, as follows:

Sidewalks shall be required on both sides of all public streets that are located in an incorporated city, and on both sides of all public streets in unincorporated areas where the average lot frontage is 80 feet or less. Sidewalks are not required for open space developments designed in conformance with Section 9.6.

E. Programmed Highway Improvements

In addition to the Oldham County Major Thoroughfare Plan, there are several other projects which are planned and programmed for study area routes in the KYTC’s Six Year Highway Plan (FY 2003-2008). The Six Year Highway Plan is the KYTC’s funding mechanism for highway improvement projects in the Kentucky. The Plan is updated by the legislature every two years and is therefore a constantly changing document. Project funds are scheduled and set aside for improvements listed in the first two years of the Plan (FY 2003 and FY 2004). Project funds are estimated, but not necessarily available, for the latter four years of the Plan (FY 2005 through FY 2008).

The planned projects listed in the Six Year Highway Plan for Oldham County are shown in Figure 9. This figure shows locations of highway improvement projects for demonstrative purposes only and is not intended to represent alignments or final project locations. The Six Year Highway Plan items for Oldham County include:

- Major widening of KY 393 is planned from KY 22 to north of KY 146. This project is listed in the Six Year Highway Plan as Item Numbers 05-230.10 and 05-234.00. For the section south of I-71, construction funds of $6.5 million are scheduled for Year 2004. For the section north of I-71, the following funds are planned: $3.0 million for right-of-way in FY 2004, $0.5 million for utilities in FY 2004, and $6.5 million for construction in FY 2006.
• Widening of KY 22 is planned from Pryor Avenue in Crestwood to KY 393 (Item Number 05-304.01). Construction funds of $14.0 million are planned for FY 2006.

• The construction of a new route is planned from the Old Henry Road interchange at I-265 in Jefferson County to the Crestwood Bypass (KY 329B) in Oldham County. The alignment of this route has not been finalized at this time. This project is listed in the Six Year Highway Plan as Item Numbers 05-367.00 and 05-367.01.

  Item Number 05-367.00 includes the following funding in the Six Year Highway Plan: $7.5 million for right-of-way in FY 2004, $3.0 million for utilities in FY 2005, and $0.5 million for construction in Year 2007. Additional construction funds of $10.0 in FY 2008 are listed under Item Number 05-367.01.

• The correction of a rockfall hazard is planned along KY 1793 in the northwestern portion of the county (Item Number 05-5005.00). The project limits are from milepoint 1.8 to 2.15. Right-of-way activities ($0.2 million) are planned for FY 2006.
III. PUBLIC INVOLVEMENT

Public involvement is an integral part of the Oldham County Major Thoroughfare Plan. It is essential in determining the transportation needs of those who will be served by the recommendations of this plan and to effectively account for the community issues that might be involved with future projects. Effective involvement activities are fundamental to the quality of planning and degree of acceptance and implementation of the plan recommendations. This chapter describes the involvement activities of local citizens and public officials that occurred throughout Phase I of the study process and summarizes the comments and input received as a result of these efforts.

A. Task Force Meeting I

Task Force Meeting I, the project kick-off meeting, was held on February 14, 2003. This purposes of this meeting included: 1) to provide an overview of the makeup and purpose of the Task Force; 2) explain the basis for this planning study and relate its purpose to the recently adopted Comprehensive Plan and implementation of the “capacity planning” approach; and 3) gather input about the issues and concerns of the community. The role of the Task Force was also discussed at length. Consultant staff suggested the Task Force would serve as a guide, acting by consensus, for the development of the plan. Task Force members would be asked to help with the public workshops— assisting with facilitation of meetings and community education.

Task Force members were provided with a project folder that included: a meeting agenda; a newsletter-type Project Overview; a bulleted scope of work; project schedule; list of Task Force members; and a post-it note exercise page.

The Task Force discussed several issues including:

- Community concern about future development in Oldham County;
- How the “capacity planning” approach would be defined in this study process;
- The effectiveness of the “open house” style of meeting in providing participants with an assurance that their input will be considered; and
- Scheduling of future meetings to avoid conflicts with city council and fiscal court meetings.

A number of responses to the post-it note exercise were received at the meeting. Answers to the question “What are the most important transportation issues in Oldham County?” included:

- Existing capacity/congestion problems and planning for future growth;
- Geometric deficiencies along existing routes and the need for access management;
- Preservation of rural character along existing and new transportation corridors;
- Public transportation considerations between Oldham and Jefferson Counties;
- Development of planning tools to consider future population growth and proposed developments; and
- Specific safety and capacity improvement needs along area routes, including I-71, US 42, KY 22, KY 53, KY 148, KY 329 and the potential for new area connectors.
B. Task Force Meeting II

The second meeting of the Oldham County Transportation Task Force was held on March 25th, 2003, prior to the first Public Input Meeting.

Meeting attendees received a project folder that included: meeting agenda; summary of Task Force Meeting I; and copies of the various maps and other presentation information.

The consultant staff gave a brief summary of the previous meeting and an overview of completed project activities, including: traffic model development; an initial level of service “scorecard” for existing County roads; a preliminary analysis of pavement width conditions for County roads developed from Kentucky Transportation Cabinet (KTC) data; and other maps assembled to depict an analysis of existing conditions and possible transportation issues for Oldham County. In addition to the roadway information, consultant staff identified existing pedestrian, bicycle and transit services within the County and spoke briefly about the role these modes of transportation would play in the overall planning effort.

Task Force members asked a number of questions about the transportation service and facility maps and data including: level of service categories; whether safety considerations were included in the definition of substandard pavement width for County roads; and, how the information may be used to develop a long-range transportation plan and funding program. A request was made to make sure that the community would be fully briefed about the meaning of the pavement width data in order to avoid misunderstandings.

A slide program devoted to methods of “capacity planning” was presented by the consultant staff, outlining the relationship of this type of planning with the County’s comprehensive Plan. Three possible approaches to capacity planning were presented, including the purpose of each and some of the “tools” that might be used with each approach. Discussion of the presentation included such topics as: preservation of private property rights; what could happen if a development proposal created adverse level of service conditions; and the role of the KYTC in the capacity planning process. Consultant staff explained that an “Options Workbook” would be distributed to members for the next meeting. This workbook would provide a series of choices to help guide the Task Force with development of a capacity planning model specific to Oldham County.

The meeting was concluded with a discussion of public meeting logistics and a run through of the Public Input Meeting that was to follow the Task Force Meeting. Task Force members planning to attend were requested to be present and assist in facilitating discussion at four areas devoted to different study issues.

C. Public Information Meeting

A public meeting/workshop was held on Tuesday, March 25, 2003 following Task Force Meeting II. The purpose of this meeting was to present information on the Oldham County Thoroughfare Plan and to receive early input from the public. Approximately 44 citizens registered their attendance at this meeting. The citizens were in addition to Oldham County and Consultant Team Staff members who were also on-hand.

The format of the meeting included an overview presentation at the beginning of the meeting. This presentation summarized the purpose, objectives and schedule for the Oldham County
Thoroughfare Plan. Following the presentation, the public was invited to participate in a workshop activity in which four areas were provided for the discussion. These areas included: Roadway Character, Design and Safety; Traffic Congestion and Transportation Improvements; Community Information; and Alternative Transportation Modes.

The workshop activity lasted for approximately 1 hour, providing the citizens with time to visit each of the stations, gather information, ask questions and offer comments. Consultant staff and representatives from Oldham County were on-hand at each workshop area to facilitate discussion with the public and record the information that was received. Following the period of the workshop, the public meeting was reconvened and the citizens were briefed on the information that was received at each of the four areas. The following is a summary of the information that was received.

1. Roadway Character, Design and Safety

   - A number of issues were identified along US 42: minimal geometric standards, traffic congestion, speed limit variation, signal timing and designation as a scenic byway.
   
   - Issues along KY 22 include: accident problems at the bridge east of Crestwood, intersection problems at Haunz Lane, and poor intersection alignment and sight distance near the Jefferson County line.
   
   - A number of issues were identified along KY 146: minimal geometric standards, problem railroad crossings, and the need for intersection improvements (possibly signalization) at KY 362 (Ash Avenue).
   
   - Incident management for I-71 diverts traffic onto other roads (KY 22, KY 146 and US 42) where traffic congestion is often already an issue.
   
   - Input should be sought from sources such as: school bus drivers, police, fire and other emergency service workers.
   
   - The existing character of rural routes should be considered and preserved as part of any recommended improvements.

2. Traffic Congestion and Transportation Improvements

Locations identified for transportation improvements include the following:

   - KY 53 through LaGrange and north and south of I-7;
   
   - I-71 west from exit 14 (KY 329) toward Jefferson County (widening);
   
   - US 42 on western end toward Jefferson County;
   
   - KY 22 through Crestwood;
   
   - A new connection is needed from Oldham County directly to I-64.
   
   - A new interchange on I-71 in Jefferson County at KY 1694 should be constructed.

Other suggested improvements included:
• Widen Aiken Road and KY 1408 to bypass Crestwood;

• Improvements to traffic flow along KY 146 in Crestwood should be provided through the bypass around town, rather than through town;

• Turn lanes along KY 146 through Pewee Valley would improve traffic flow (one example is Ash Avenue);

• The US 42 and KY 393 intersection is skewed and could be improved for better sight distance; and

• KY 146 should be widened to provide for truck traffic in the area of the business park on the west side of LaGrange.

3. Community Information

• It was requested that the study team put comments onto the County’s web site, which is already planned.

• Concerns were expressed for preserving the historic character of cities in relation to this plan for transportation. This is slightly different perspective on context sensitive design than what we heard regarding the US 42 scenic corridor.

• Another comment involved the concern that employers using county roads, such as for construction jobs, impact the roadway but do not contribute (directly) to its upkeep.

• There was also a comment regarding how the process (i.e. modeling) will track new jobs and people traveling into Oldham County.

4. Alternative Transportation Modes

• One of the most repeated comments is the regret that the inter-urban line into Louisville no longer exists. In this regard, however, there was support for a shared use path and it was suggested that this be extended to Louisville.

• Bicycling and pedestrian transportation should be accommodated. Sidewalks and bikeways should be required in subdivisions on both sides of streets. Sidewalks in Crestwood were raised as a concern also. This may be indicative that some older established areas may be lacking some pedestrian access as well.

• Transit service is desired and pull-off areas should be constructed to provide for buses to pull completely out of travel lanes for picking-up/letting off riders. Park and ride lots were also mentioned, particularly along I-71 in the vicinity of the Oldham/Jefferson line.
IV. TRAFFIC MODEL DEVELOPMENT

A travel demand model was developed for Oldham County as part of this project as a tool to simulate existing travel characteristics, forecast future traffic volumes, and allow for system-wide analysis of alternative transportation improvements. In addition, this model provides decision-makers with a tool whereby alternative transportation concepts can be tested and evaluated against a predetermined set of criteria (goals and objectives). Finally, the model also provides a means for continual evaluation of the transportation system for future developments or projects.

The Oldham County Travel Demand Model was developed using the TransCAD modeling package. In addition, the KIPDA Regional Travel Demand Model and the Kentucky Transportation Cabinet’s (KYTC’s) Sub-Area Travel Demand Model were used as references during the development of the Oldham County Model. While attempts were made to keep consistency between the new Oldham County Model and the KIPDA and KYTC models, differences do exist as a result of the Oldham County Model being built specifically for Oldham County.

For instance, the KIPDA model encompasses a large portion of the Louisville/Jefferson County Metropolitan area. As a result, the attention given to Oldham County in the KIPDA Model is not as detailed. Improvements for the Oldham County Travel Demand Model compared to the KIPDA model include a more refined traffic analysis zone system and a geographically-correct highway network. Also, it should be noted that KYTC sub-area model only includes a portion of Oldham County. As a result, detailed information for the highway network and traffic analysis zones (TAZs) for the eastern portion of Oldham County did not exist.

The following tasks were undertaken as part of this effort to develop the Oldham County Travel Demand Model: 1) Develop Network and Traffic Analysis Zone System; 2) Develop Socioeconomic Data; 3) Develop Base Year Model / Calibration; and 4) Conduct Future Year Network Assignments.

These tasks are described in more detail in the following sections.

A. Highway Network System and Zone System

The first step in the model development process involved establishing the desired level of system detail to be covered by the model. After a careful analysis of the options that were available, it was decided that all of Oldham County in addition to a ‘band’ around Oldham County would be included in the highway network and zonal system. This defined model study area can be seen in Figure 10. It should be noted that portions of both the KIPDA model and the KTYC Sub-Area Model were used as a result of the overlap in the study area.

With respect to the highway network, it was determined that all state-maintained facilities as well as major local routes would be included. A field review was conducted to determine which local roads would be important to the model. The highway network system for the Oldham County Travel Demand Model employed the use of an ArcView/ArcInfo GIS to identify and code roadways within Oldham County. Figure 11 displays the final highway network.

The KYTC’s HIS data was used as a basis for developing highway network attributes. Also, in order to achieve consistency, capacity values based upon functional classification were assigned to each facility. These values, seen in Table 2, were derived from the Kentucky...
The capacities found in this report were based upon average capacities along the various functional classification facilities within Kentucky. Though the capacities from the KYSTM report are given as hourly values, the capacities were adjusted in order to obtain daily capacities.

Once the changes to the system attributes were completed, the network segment data was then imported into TransCAD software for further GIS manipulation and model preparation, including verifying segment endpoint and node location and data validity.

The traffic analysis zone (TAZ) structure was developed to accommodate the highway network definitions that were previously identified for this model effort. The TAZ network was built from United States Census Bureau ‘blocks’, the smallest unit of Census Bureau geography. The blocks were aggregated to form larger geographical shapes using the road network and KIPDA TAZs as the boundaries. Common boundaries, related spaces, and the position of the newly created network segments were all taken into consideration to create these new internal TAZs for the Oldham County Model. The resulting TAZ system can be seen in Figure 12.

B. Socioeconomic Data

Socioeconomic data for population and employment throughout Oldham County were developed for the base year by TAZ. The socioeconomic data provide the foundation for the traffic model assignments and for future projections of population and employment growth in the study area.

1. Population/Households

Population and household information are important inputs into a travel demand model. United States Census Bureau 2000 was obtained at the block level. This information was factored to a base year 2003 using growth rates from the KIPDA model and population projections by the Kentucky State Data Center. Figure 13 displays population within the study area.

2. Employment

In addition to population and households, employment is the third zonal input that is important in a travel demand model. Dun & Bradstreet (D&B) data was used for this project since it provides detailed geographic information related to employment. D&B provides customized information and software products designed to meet the needs of the client. Business and employment data are available at the census block level for 11 broad economic sectors. From these sectors, retail and non-retail employment were derived. It should also be noted that D&B data was obtained at the Census block level which was then aggregated to the TAZ level. Finally, KIPDA employment growth factors were used to obtain a base year of 2003. Figure 14 displays employment within the study area.

Population, household, and employment information was provided to the Oldham County Planning and Zoning Commission for review.

C. Base Year Model/Calibration

This chapter provides discussion on the generation and distribution procedures used to create model trip tables, the initial assignment and calibration of the base year model and a Year 2000

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Model Application. A specific series of model development tasks were outlined for the purposes of this effort.

1. **External Trip Generation**

External – External (E-E) trips were first extracted from the KIPDA Regional Travel Demand Model at the specified external stations using a select link analysis. Each station was analyzed based on a corresponding link with the KIPDA network. The select analysis was used to determine the percentage of E-E and External – Internal (E-I) trips at the station. This percentage was then applied to the known traffic count to derive the actual number of E-E and E-I trips.

The NCHRP 365 method was used for determining external – internal travel allocates the E-I vehicle trips by trip purpose (Home-Based-Work (HBW), Home-Based-Other (HBO) and Non-Home Based (NHB)) based on default percentages. Rather than treating E-I trips as a separate trip purpose, as is done in many models, the NCHRP 365 method integrates the trips into the three main internal purposes (HBW, HBO, and NHB).

2. **Internal Trip Generation**

TransCAD Quick Response Method (QRM) was used in this project for trip attraction, production and balancing. The QRM is based on the following inputs:

- The population of the study area;
- The amount of retail and non-retail employment in each TAZ; and
- Production and attraction rates from NCHRP Report 365.

In traffic modeling, productions and attractions balanced during the trip generation step can either be balanced on the production side, attraction side, or both. In the case of Oldham County, the trips were balanced on the production side. With HBW, and HBNW trips, P-As increase when the trip rate is increased. The increase is balanced among the column of productions while being integrated with the attractions.

3. **Trip Distribution**

A gravity model incorporating the gamma function was used for the trip distribution component of the Oldham County model. Gravity models were originally motivated by the observation that flows decrease as a function of the distance separating zones just as the gravitational pull between two objects decreases as a function of the distance between the objects. As implemented for planning models, the Newtonian analogy has been replaced with the hypothesis that the trips between zones $i$ and $j$ are a function of trips originating in zone $i$ and the relative attractiveness and/or accessibility of zone $j$ with respect to all zones\(^2\).

NCHRP 365 provides parameters that are used to define the trip distribution (or friction) factors. The “b” and “c” parameters to be used from NCHRP 365 are provided in **Table 3**. The parameter “a” included in the gamma function is a scaling factor that is omitted.

4. **Assignment**

After the trip distribution process, the gravity model trip tables (HBW, HBO, and NHB) and the E-E trip table were combined and balanced. The trip matrix was assigned to the highway

\(^2\) Travel Demand Modeling with TransCAD, Caliper Corporation, 1998, page 72
network for an initial traffic assignment. Tests were then conducted on the model in order to
determine whether the model was assigning reasonable volumes to the observed conditions.
The first test included comparing KYTC ground counts with the assigned traffic volumes on
each link. The result of this test indicated that the model was overestimating the number of trips
on an overall basis. One measure to address the problem would be to adjust the auto
occupancy rates that were used as inputs to the model. This is a procedure that was performed
using FHWA model calibration guidelines. **Table 4** displays the adjustments.

A second assignment was performed using the new auto occupancy rates. This assignment
seemed to reduce the number of trips in the model. However, further analysis indicated the
number of overall trips in the model was high. It was decided that a process called matrix
estimation would be used. Matrix estimation is an iterative procedure which matches model
assigned volumes to actual ground counts by adjusting the model trip tables until ground counts
are met. An additional model run confirmed that the results of the calibrated model improved to
an acceptable level.

**Table 5** displays a comparison of existing traffic volumes to the calibrated model volumes by
functional classification. As shown in this table, the overall ratio of calibrated volumes to ground
counts is 0.98. In addition, rural links within the model performed exceptionally well with ratios
ranging from 0.97 to 1.03.

A percent root mean square error (%RMSE) test was also conducted on the calibrated model.
**Table 6** displays these results. As shown, the overall %RMSE for the Oldham County Travel
Demand Model was calculated to be 27%, an acceptable value.
V. SOCIOECONOMIC DATA

Population and employment characteristics play a key role in forecasting and evaluating existing and future traffic conditions and levels of service for State and County roads. These characteristics include total population, number of households, and jobs that are located in Oldham County. Socioeconomic factors are evaluated for the County as a whole and for smaller geographic areas that are referred to as ‘traffic analysis zones’. In addition, the traffic analysis zones have been aggregated into larger analysis areas that correspond with the eight “planning areas” that form the basis for Oldham County’s Comprehensive Plan. These areas are referred to as: Brownsboro; Goshen/North Oldham; Westport/L’Esprit; Buckner; LaGrange; Centerfield & Ballardsville; Crestwood; and Pewee Valley.

A. Existing Socioeconomic Data

Socioeconomic data for 2000 and 2003 were developed from several sources including the 2000 Census, a Dun & Bradstreet survey of Oldham County jobs, and population and employment data and forecasts prepared by the Kentuckiana Regional Planning and Development Agency (KIPDA). Additional discussion related to the existing socioeconomic data is included in Chapter IV of this document.

B. Preliminary Future Socioeconomic Data

Preliminary forecasts of data for 2012 and 2025 have been prepared and/or compiled based on commonly used sources and procedures. These sources include the Oldham County Board of Education, the LaGrange Bypass Study, the Future Traffic Conditions Analysis prepared for the Old Henry Road Extension Project, KIPDA, and the Kentucky State Data Center.

The population forecast for Oldham County indicates a high level of growth over the planning period (2002-2025). This growth is supported by and based on forecasts prepared by the Oldham County Board of Education and KIPDA. The Board annually updates and prepares ten-year forecasts of population and school age children based on a cohort survival procedure utilizing birth and death rates and estimates of in-migration (from building permit data for Oldham County). Of the three alternative forecasts that the Board prepares each year, the ten-year forecast based on the most recent five-year trends has been utilized as a control total for the year 2012 forecast of population. The distribution of the forecast population among the eighty-eight traffic analysis zones was accomplished through a zone-by-zone analysis of existing land use, zoning, recent development approvals, and existing or planned availability of various types of services.

The population forecast for 2025 extends many of the assumptions from the 2002-2012 planning period forward, and includes the forecast of new housing and employment expected to occur in the area between 2000 and 2025. The County and traffic analysis zone level employment forecasts represent those jobs actually located in Oldham County, as opposed to all jobs held by Oldham County residents regardless of location. The Dun and Bradstreet data indicates that approximately 60% of all jobs held by Oldham County residents or residents of other Counties traveling to Oldham County, are actually located in the County. This data also indicates that the ratio of total households within the County to total jobs located in the County is at approximately ninety (90) percent. This factor has been held constant throughout the forecast period to determine the number of future jobs located in the County – based on the
forecast of population and households. The ratio of retail to total jobs located in the County was also maintained at a constant level of nineteen and one-half (19.5) percent over the planning period.

Although several existing forecasts of households in Oldham County indicate a decline in household size (approximately 2.9 to 2.45) over the planning period, this forecast results in the maintenance of an average household size in 2025 similar to that determined for 2000/2002. The basis for this assumption is the quality of the Oldham County public school system and recently completed studies by the Board of Education of school age children ratios found in Oldham subdivisions. This information indicates that the Oldham population is increasing through the in-migration of households with or expecting children. We believe this trend will continue through the foreseeable future, offsetting current trends in other Kentucky counties toward an aging population with fewer children.

Preliminary forecasts for the socioeconomic data are summarized in Figures 15 and 16. These figures show total percent growth through Year 2025 for population and employment by traffic analysis zone.
APPENDIX A.
FIGURES
Figure 1. Study Area
Figure 2. Geometric Standards on Local Roads and Collectors
Figure 4. Year 2003 Traffic Flow Rates
Figure 5. Year 2003 Traffic Congestion
Figure 6. High Accident Locations
Figure 7. Non-Motorized Transportation Modes
Figure 8. KIPDA Bicycle and Pedestrian Projects

Source: www.kipda.org
New Route from Old Henry Interchange at I-265 to Crestwood Bypass

Major Widening along KY 222 from Pryor Avenue in Crestwood to KY 393

Major Widening of KY 393 from KY 222 to north of KY 146

Correct Rockfall Hazard along KY 1793
Figure 12. Traffic Analysis Zone (TAZ) System
Figure 14. Year 2000 Employment Characteristics
Figure 15. Population Growth through Year 2025
APPENDIX B.
TABLES
Table 1. Typical Design Standards

Local/Collector Roads

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>Minimum Width of Traveled Way (ft) for Specified Design Volume (veh/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>under 400</td>
</tr>
<tr>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>20-40</td>
<td>18</td>
</tr>
<tr>
<td>45-50</td>
<td>20</td>
</tr>
<tr>
<td>55-60</td>
<td>22</td>
</tr>
<tr>
<td>All Speeds</td>
<td>Width of Graded Shoulder on Each Side of the Road (ft)</td>
</tr>
</tbody>
</table>

Arterial Roads

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>Minimum Width of Traveled Way (ft) for Specified Design Volume (veh/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>under 400</td>
</tr>
<tr>
<td>40-45</td>
<td>18</td>
</tr>
<tr>
<td>50-55</td>
<td>18</td>
</tr>
<tr>
<td>60-75</td>
<td>20</td>
</tr>
<tr>
<td>All Speeds</td>
<td>Width of Graded Shoulder on Each Side of the Road (ft)</td>
</tr>
</tbody>
</table>

Source: Adapted from *A Policy on Geometric Design of Highways and Streets, 2001*, by the American Association of State Highway and Transportation Officials (AASHTO).
## Table 2. Capacity by Functional Classification

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Per Lane Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rural Interstate</td>
<td>13,000</td>
</tr>
<tr>
<td>2</td>
<td>Rural Principal Arterial</td>
<td>11,000</td>
</tr>
<tr>
<td>3</td>
<td>Rural Parkway</td>
<td>13,000</td>
</tr>
<tr>
<td>6</td>
<td>Rural Minor Arterial</td>
<td>8,750</td>
</tr>
<tr>
<td>7</td>
<td>Rural Major Collector</td>
<td>5,000</td>
</tr>
<tr>
<td>8</td>
<td>Rural Minor Collector</td>
<td>5,000</td>
</tr>
<tr>
<td>9</td>
<td>Rural Local</td>
<td>4,000</td>
</tr>
<tr>
<td>11</td>
<td>Urban Interstate</td>
<td>16,250</td>
</tr>
<tr>
<td>12</td>
<td>Urban Freeways &amp; Expressways</td>
<td>16,250</td>
</tr>
<tr>
<td>14</td>
<td>Urban Principal Arterial</td>
<td>7,000</td>
</tr>
<tr>
<td>16</td>
<td>Urban Minor Arterial</td>
<td>6,000</td>
</tr>
<tr>
<td>17</td>
<td>Urban Collector</td>
<td>5,000</td>
</tr>
<tr>
<td>19</td>
<td>Urban Local</td>
<td>4,000</td>
</tr>
</tbody>
</table>

Source: Table II-4 -Kentucky Statewide Traffic Model Calibration Report (February 1997).
Table 3. Gamma Function Coefficients for Friction Factors
Traffic Model Development for Oldham County

<table>
<thead>
<tr>
<th>TRIP PURPOSE</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBW</td>
<td>0.020</td>
<td>0.123</td>
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<tr>
<td>HBO</td>
<td>1.285</td>
<td>0.094</td>
</tr>
<tr>
<td>NHB</td>
<td>1.332</td>
<td>0.100</td>
</tr>
</tbody>
</table>

Source: NCHRP 365, Table 14, p. 41
Table 4. Auto Occupancy Adjustments
Traffic Model Development for Oldham County

<table>
<thead>
<tr>
<th>TRIP PURPOSE</th>
<th>ORIGINAL INPUTS</th>
<th>ADJUSTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBW</td>
<td>1.11</td>
<td>1.20</td>
</tr>
<tr>
<td>HBO</td>
<td>1.67</td>
<td>1.71</td>
</tr>
<tr>
<td>NHB</td>
<td>1.66</td>
<td>1.65</td>
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</table>
### Table 5. Traffic Count Comparison

Traffic Model Development for Oldham County

<table>
<thead>
<tr>
<th>Functional Class Code</th>
<th>Description</th>
<th>Exist Traffic Volume</th>
<th>Calibrated Model Volume</th>
<th>Links w/ Counts</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rural Interstate</td>
<td>736,900</td>
<td>722,307</td>
<td>34</td>
<td>0.98</td>
</tr>
<tr>
<td>6</td>
<td>Rural Minor Arterial</td>
<td>833,190</td>
<td>835,039</td>
<td>79</td>
<td>1.00</td>
</tr>
<tr>
<td>7</td>
<td>Rural Major Collector</td>
<td>416,668</td>
<td>410,234</td>
<td>103</td>
<td>0.98</td>
</tr>
<tr>
<td>8</td>
<td>Rural Minor Collector</td>
<td>224,503</td>
<td>217,820</td>
<td>139</td>
<td>0.97</td>
</tr>
<tr>
<td>9</td>
<td>Rural Local</td>
<td>24,912</td>
<td>25,724</td>
<td>14</td>
<td>1.03</td>
</tr>
<tr>
<td>11</td>
<td>Urban Interstate</td>
<td>54,600</td>
<td>51,851</td>
<td>2</td>
<td>0.95</td>
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<tr>
<td>14</td>
<td>Urban Principal Arterial</td>
<td>220,900</td>
<td>211,063</td>
<td>10</td>
<td>0.96</td>
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<tr>
<td>16</td>
<td>Urban Minor Arterial</td>
<td>900,270</td>
<td>859,783</td>
<td>75</td>
<td>0.96</td>
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<tr>
<td>17</td>
<td>Urban Collector</td>
<td>106,790</td>
<td>101,250</td>
<td>32</td>
<td>0.95</td>
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<tr>
<td>19</td>
<td>Urban Local</td>
<td>12,400</td>
<td>18,305</td>
<td>2</td>
<td>1.48</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td></td>
<td>3,531,133</td>
<td>3,453,376</td>
<td>490</td>
<td>0.98</td>
</tr>
</tbody>
</table>
Table 6. Percent Root Mean Square Error (RMSE) Statistics
Traffic Model Development for Oldham County

<table>
<thead>
<tr>
<th>Link Volume Group</th>
<th>Number of Links</th>
<th>Observed Total Traffic Volume</th>
<th>Model Total Traffic Volume</th>
<th>FHWA %RMSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1000</td>
<td>78</td>
<td>45,083</td>
<td>59,133</td>
<td>86%</td>
</tr>
<tr>
<td>1001-3000</td>
<td>129</td>
<td>242,440</td>
<td>263,646</td>
<td>49%</td>
</tr>
<tr>
<td>3001-5000</td>
<td>47</td>
<td>184,550</td>
<td>178,666</td>
<td>28%</td>
</tr>
<tr>
<td>5001-7000</td>
<td>45</td>
<td>261,930</td>
<td>247,763</td>
<td>29%</td>
</tr>
<tr>
<td>7001-10000</td>
<td>68</td>
<td>595,830</td>
<td>599,824</td>
<td>25%</td>
</tr>
<tr>
<td>10001-12500</td>
<td>33</td>
<td>376,800</td>
<td>345,779</td>
<td>28%</td>
</tr>
<tr>
<td>12501-15000</td>
<td>14</td>
<td>198,200</td>
<td>204,092</td>
<td>13%</td>
</tr>
<tr>
<td>15000+</td>
<td>76</td>
<td>1,626,300</td>
<td>1,554,473</td>
<td>16%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>490</strong></td>
<td><strong>3,531,133</strong></td>
<td><strong>3,453,376</strong></td>
<td><strong>27%</strong></td>
</tr>
</tbody>
</table>