CHAPTER FOUR

# SELECTED ROADWAY CAPACITY ANALYSIS

## 4.1 SELECTED ROADWAY CAPACITY ANALYSIS

### Introduction

Capacity analysis was performed on six selected roadways within the Dearborn County study area using the most recent version of the Transportation Research Board's Highway Capacity Software. The following explains the procedures and results of the analysis.

### Roadway Capacity Analysis Procedure

In order to perform the roadway capacity analysis, highways must be categorized as one of two Classes. Class I highways are two-lane facilities on which motorists expect to travel at high speeds. They are major intercity routes, primary arterials connecting major traffic generators, daily commuter routes, or primary links in the state or national highway network. Class II roadways are also two-lane highways, but motorists do not expect to travel at high speeds. These facilities function as access routes to Class I roadways, serve as scenic or recreational routes, and are not primary arterials.

The congestion on a roadway is measured using Level of Service (LOS) from LOS A to LOS F. LOS A represents the best operating conditions or a free-flow system; LOS F represents the worst condition or a congested system. In general, a LOS C on a rural roadway is considered acceptable. When the LOS falls below C, the roadway becomes crowded and the mobility of the facility is degraded. In general, a roadway with a LOS D, E or F should be analyzed to determine if capacity adding improvements are necessary. Figure 4-1 is an illustration of LOS at a signalized intersection.

The LOS for two-lane facilities is a function of mobility as defined by the Highway Capacity Manual, 2000. Mobility of these facilities is measured in two ways. For Class I facilities where efficient mobility is paramount, two factors are utilized; percent-time following another vehicle and average travel speed. Both criteria are outputs of the capacity analysis. On Class II highways where mobility is less critical the LOS is defined only in terms of percent-time following another vehicle. The LOS for Class I and Class II roadways are calculated differently because drivers have varying expectations from the facilities. The tables below present the LOS criteria for Class I and II two-lane facilities.

To complete the capacity analysis, input criteria specific for each roadway is needed. These inputs include the roadway geometry, terrain and traffic operations. Traffic operations data includes the direction of traffic flow, the hourly volume of the roadway and the peak-hour factor. Each of these specific criteria helps to determine the LOS of the roadway. The results of the analysis are presented in Table 4C.

**Table 4A – Level of Service and Volume to Capacity Ratio**
**Class I Roadways**

| Level of Service | Percent Time-Spent Following | Average Travel Speed (mph) |
|---|---|---|
| A | < 36 | >55 |
| B | 35-49 | 55-51 |
| C | 50-64 | 50-46 |
| D | 65-79 | 45-41 |
| E | >80 | <40 |
| F | *LOS F applies whenever the flow rate (>3200 passenger cars per hour) exceeds the capacity of the roadway* | |

*Source: Highway Capacity Manual, 2000*


**Figure 4-1 – Level of Service for Signalized Intersections**

**Table 4B – Level of Service and Volume to Capacity Ratio**
**Class II Roadways**

| Level of Service | Percent Time-Spent Following |
|---|---|
| A | < 41 |
| B | 40-54 |
| C | 55-69 |
| D | 70-84 |
| E | >85 |
| F | *LOS F applies whenever the flow rate (>3200 passenger cars per hour) exceeds the capacity of the roadway* |

*Source: Highway Capacity Manual, 2000*

To complete the capacity analysis, input criteria specific for each roadway is needed. These inputs include the roadway geometry, terrain and traffic operations. Traffic operations data includes the direction of traffic flow, the hourly volume of the roadway and the peak-hour factor. Each of these specific criteria helps to determine the LOS of the roadway. The results of the analysis are presented in Table 4C.

Both the existing (2003) and the future year (2030) LOS were determined for each roadway. In order to calculate the future year traffic, a growth factor of 1.5% per year was utilized. This factor was determined in coordination with OKI and is consistent with OKI's Long Range Transportation Plan.

## Roadway Capacity Analysis Results

As illustrated in Table 4C and Figure 4-2, there are minimal changes in the LOS for each of the roadways. The complete data sheets for each roadway are included in the appendices of this report.

**Table 4C – Highway Capacity Analysis Results**

| Roadway | Facility Class | % Time Spent Following | | Average Travel Speed (MPH) | | LOS | |
|---|---|---|---|---|---|---|---|
| | | *2003* | *2030* | *2003* | *2030* | *2003* | *2030* |
| Wilson Creek | Class II | 49.0% | 55.5% | NA | NA | B | C |
| York Ridge | Class II | 40.6% | 42.8% | NA | NA | B | B |
| Cole Lane | Class II | 39.5% | 44.9% | NA | NA | A | B |
| N Dearborn Road | Class I | 35.1% | 38.1% | 32.8 | 31.7 | E | E |
| State Line Road | Class I | 44.6% | 51.3% | 29.7 | 28.0 | E | E |
| Jamison Road | Class I | 54.6% | 59.1% | 27.0 | 26.7 | E | E |

Wilson Creek Road, York Ridge Road and Cole Lane are currently functioning at an appropriate LOS and should continue to in the future. While immediate capacity adding projects for the Class II roadways is not warranted at this time, regular and appropriate maintenance on these roadways should continue.

North Dearborn Road, State Line Road and Jamison Road are all exceeding an appropriate LOS at the present time and continue to maintain a LOS E in the horizon year. One option to correct this problem is to increase the capacity of the roadway by utilizing a four-lane section. Given the existing development and current geometry, widening these roadways could be an expensive proposition and may be disruptive to

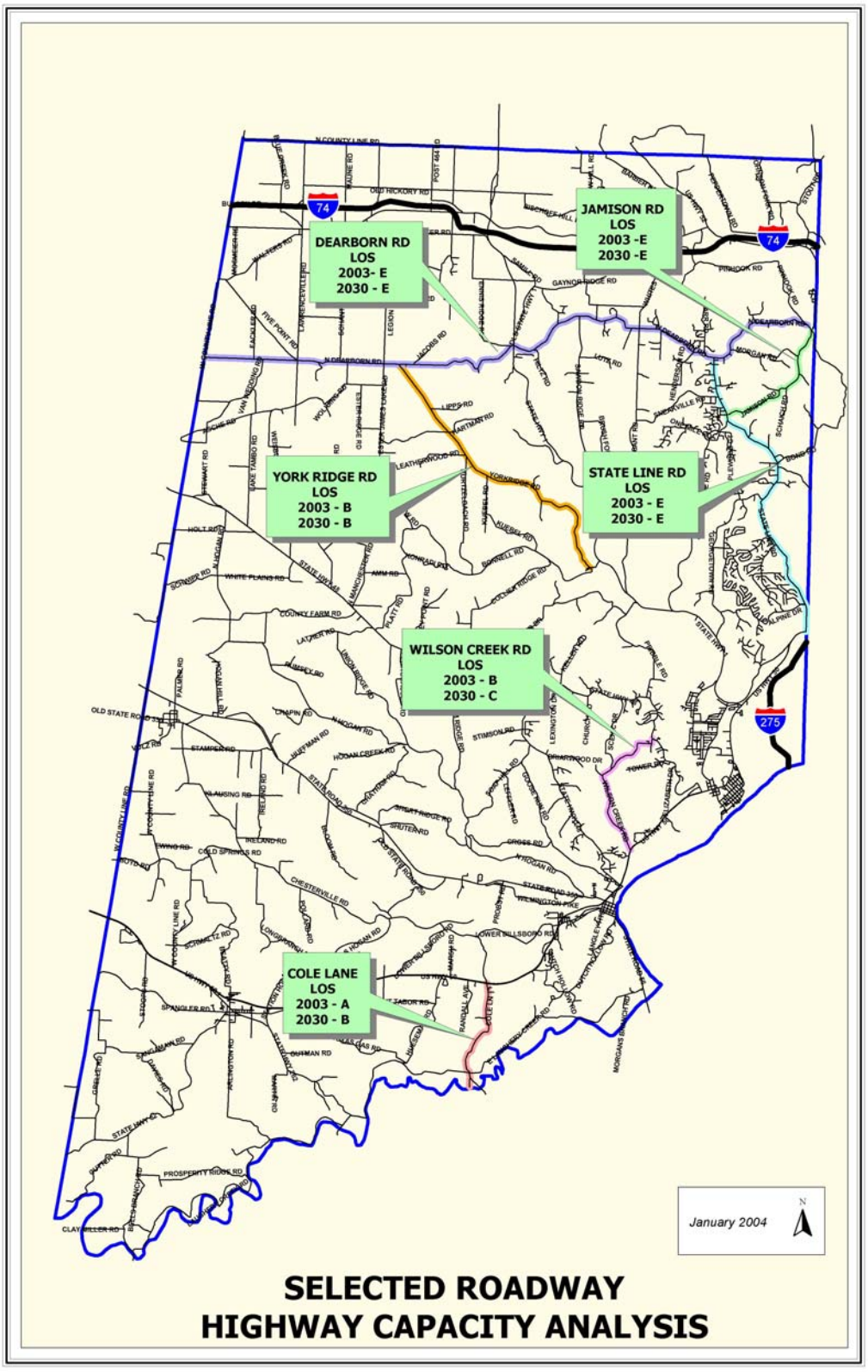


**Figure 4-2 – Capacity Analysis Results**

- *Providing adequate spacing between intersections*. It is important to keep an appropriate spacing between access points and intersection points in order to avoid traffic conflicts. Driveways should not be located within the "functional section" of the intersection, see Figure 4-3. The functional area includes not only the required vehicle storage length, but also an appropriate driver decision distance.

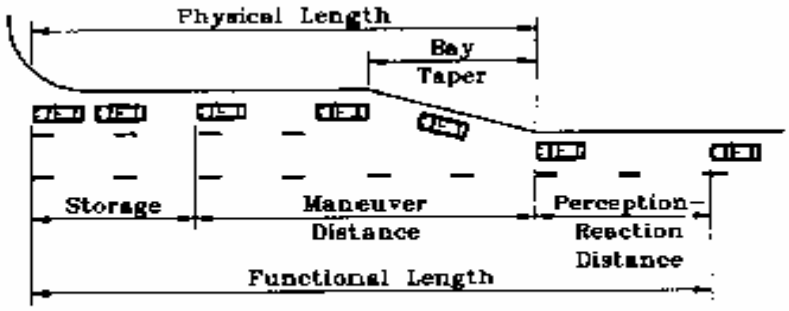


**Figure 4-3 – Interchange Functional Area**

- *Utilizing shared driveways*. A shared driveway consists of one or more properties utilizing a single access point. They are most commonly used for multiple commercial properties, but can also be utilized for residential properties.

- *Utilizing a three-lane cross-section*. Three-laning an intersection, meaning construction of separate lanes for left-turning vehicles, is a significant capacity-increase factor. When left-turning vehicles impede the flow of through traffic, capacity decreases dramatically. The impact is felt even when the left-turning movement is relatively light. A two-lane road augmented by left-turn lanes can forestall the need for a four-lane road. At the same time, a four-lane road without left-turn lanes may have little more capacity than a two-lane road with left-turn lanes. A left-turn lane is generally effective for roadways with less than 17,000 vehicles per day. This would be a compromise between adding capacity and keeping the existing configuration.

- *Utilizing frontage roads*. Frontage roads generally work best when they are utilized in an area that is not fully developed and where there is a development plan. Frontage roads allow for more dense development with a minimal number of access points.

North Dearborn Road, State Line Road and Jamison Road all exhibit similar characteristics; they serve residential traffic with some commercial and/or light manufacturing/distribution and all appear to use minimum Access Management practices. While the traffic may not grow significantly in the future, Access Management may become a considerable problem. Currently, each resident or business have at least one individual access point. Beginning to utilize best management practices now will help relieve traffic problems later. While Dearborn County is still growing, it may be helpful to adopt some of the Access Management practices listed above. In the case of Access Management it is much easier to implement in the beginning of a project then to try to retrofit into a development later.