

Chapter 7

DEFICIENCIES

The identification of system deficiencies is a prerequisite to the examination of alternatives and selection of projects. The traditional long range transportation plan development process addressed deficiency analysis near exclusively through the modeling process.⁹ While this is still a key analytical tool, the management systems, basic traffic engineering analysis, and other approaches have advanced in relative importance. This advancement has been promoted by the increasing necessity to preserve (and improve) the structural and functional integrity of the existing system. Sensitivity to social, environmental, and economic factors place increased emphasis on making better use of the existing system.

CAPACITY DEFICIENCIES

The travel demand forecasting model was the basic tool used to identify capacity deficiencies. The modeling process is discussed in Travel Demand Model chapter of this document.

Deficient links or “sections of roadways” are determined by the comparison of volume/capacity (v/c) ratios. These ratios are initially identified by comparing base year (2008) volumes to the existing network capacities (V_{2008}/C_{2008}). This is an indication of where current network problems exist. To evaluate the ability of the existing system to handle future traffic (2035), the V_{2035}/C_{2014} ratios are reviewed. These two deficiency indicators provide the initial basis for selection of projects where capacity improvements may be merited.

Another step is the comparison of 2035 traffic volumes to the capacity of an improved network with proposed projects included (V_{2035}/C_{2035}). This step was done on 3 different alternative groups of potential capacity improvement projects.

The network results of the comparisons of 2035 traffic on the Alternative networks analyzed for the 2035 Transportation Plan are compared in this section:

1. Future trips (based on 2035 socio-economic data) on the committed network (road system as it will stand in 2014). Future trips are assigned to the committed network. This alternative displays future capacity and congestion problems if no improvements to the system are made beyond those that are currently committed. This is called the 2035 Base or “No Build” alternative and includes the existing system, plus any projects which are committed to be through 2014, the current Transportation Improvement Program. This scenario will be referred to as 2014 TIP in the following tables.
2. Future trips (based on 2035 socio-economic data) on the future system (road system as it is proposed to be in 2035). In developing the Preferred Alternative for the 2035 Plan, two separate alternative groups of capacity improvement projects were modeled. These alternatives are called Alternative 1 and Preferred Alternative. Based on the model results and consultation, the Preferred Alternative was selected for the 2035 Plan. It includes suggested improvements to alleviate congested subareas or corridors.

⁹ Consideration of “immediate action programs,” Transportation Systems Management, the traffic operations program to increase capacity and safety (TOPICS), and others, have been emphasized in the process at different points in time.

The alternative models were compared on vehicle miles of travel (VMT) and vehicle hours of travel (VHT). VMT is defined as the assignment volume on a link multiplied by the distance on the link. VHT is defined as the assigned volume on a link multiplied by the travel time on the link. As congestion increases travel time increases and VHT reflects this. VMT and VHT are measures of travel intensity and network deficiencies. Through a consultation process that considered the differences in VMT and VHT for the alternative networks and considered the 2035 Plan goals and objectives. The network comparisons of VMT and VHT are shown in the following table.

**KALAMAZOO AREA TRAVEL CHARACTERISTICS
NETWORK SUMMARIES**

Network	Vehicle Miles of Travel (VMT)	Change in VMT	Vehicle Hours of Travel (VHT)	Change in VHT
2008 Base	6103200		152571	
2011 Transportation Improvement Program	6266325		157111	
2014 Transportation Improvement Program	6355635		159717	
2035 No Build	6922919	567284	180907	21190
2035 Alternative 1	6930561	574927	179074	19357
2035 Preferred Alternative	6922473	566839	180767	21050

A second deficiency analysis process used in the identification of projects is the Pavement Management System (PMS). In contrast to the measurement of inadequate capacity to serve existing and future travel demand (modeling), PMS measures the condition of the existing system. This is a direct measurement of the existing systems' relative ability to serve the motoring public in a safe, comfortable, and efficient manner.

Other deficiencies are identified using data from the Safety Management System, traffic volume counting programs, operational studies, local planning, and local knowledge. Safety improvements are incorporated into projects as design progresses.

Capacity Deficient Segments

The model compared distributed 24-hour traffic for an average workday to the 24-hour capacity of the network segments. Maps were prepared for Base Year 2008, 2011, 2014, and 2035, which were identified as the Transportation Plan's horizon years. These maps showed segments that had 24-hour volume to 24-hour capacity ratio grouped by:

24-Hour Volume to 24-Hour Capacity Ratio by Group

Group	Volume/Capacity Ratio Range
1	0 to 0.50
2	0.50 to 0.80
3	0.80 to 1.00
4	1.00 to 1.20
5	1.20 +

Segments were identified where their volume to capacity ratio was 0.80 or higher. There were 112 segments identified. Twenty-three segments were at or over capacity (ratio 1.00 or higher) by 2035. The remaining 89 segments had volume to capacity ratio between 0.80 and 1.00. The number of segments identified by agency with volume to capacity ratios greater than 1.0 (there are no segments with this ratio greater than 1.2) are:

Segments with V/C Ratio 0.80 to 1.00 by Agency

Agency	Segments with V/C Ratio 0.80 to 1.00
MDOT	38
City of Kalamazoo	21
City of Portage	8
Kalamazoo County Road Commission	21
City of Galesburg	1
Total	89

The majority of the segments showing capacity deficiencies are part of the trunkline system since these roads generally have higher volumes. Because of the KATS's goal to emphasize preserving the system instead of adding to it, segments showing future volumes to capacities ratio greater than 1.00 will be the ones considered to be deficient for capacity in the 2035 Transportation Plan.

Many of the road segments that have future volume to capacity ratios greater than 1.0 are not included in the 2035 Transportation Plan proposed capacity project list. The following table includes capacity deficient road segments that following review were not included in specific Plan capacity projects. Reasons for not including these projects for added lanes include limited right-of-way, fronting property uses that make widening impractical, and other community goals and values.

**CAPACITY DEFICIENT SEGMENTS
TO BE ADDRESSED WITHOUT ADDING LANES**

Agency	Street	From	To	Proposed Action	Volume/ Capacity
Road Commission	12th Street	Stadium Drive	Michigan Avenue	Transportation System Management Actions	1.0 - 1.2
Road Commission	12th Street	Briarhill Drive	ON Avenue	Included in proposed capacity projects #33	1.0 - 1.2
MDOT	M-43 (Gull Road)	28th Street	EF Avenue	Transportation System Management Actions	1.0 - 1.2
MDOT	M-43 (Gull Road)	Riverview Drive	Humphrey Street	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
MDOT	I-94 EB Off Ramp	At Sprinkle Road		Included in proposed capacity projects #42	1.0 - 1.2
MDOT	M-43 (Kalamazoo)	M-331 (Westnedge Avenue)	Rose Street	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
Road Commission	KL Avenue	West of 11th Street	East of US-131	Included in proposed capacity projects #3	1.0 - 1.2
MDOT	M-96	Village of Augusta West Limit	Lincoln Avenue	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
MDOT	M-43 (Michigan)	Mills Street	M-43 (Riverview)	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
MDOT	M-43 (Michigan)	Harrison Street	BL-94 (King Hwy)	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
MDOT	M-43 (Michigan)	M-43 (Kalamazoo)	Harrison Street	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
MDOT	M-43 (Michigan)	M-331 (Westnedge)	M-331 (Park)	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
Road Commission	Mosel Avenue	Kalamazoo River	Commerce Drive	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
Kalamazoo	Parkview Avenue	At Drake Road		Transportation System Management Actions	1.0 - 1.2
Kalamazoo	Parkview Avenue	Knox Street	Broadway Avenue	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
Road Commission	Sprinkle Road	I-94 WB On Ramp	I-94 BL	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
MDOT	I-94 BL US-131BR (Stadium)	US-131 Northbound to Eastbound Off Ramp	Drake Road	Turn lanes are being added using Congestion Mitigation Air Quality funds (future year)	1.0 - 1.2
MDOT	US-131 NB Off Ramp	To EB M-43		Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
MDOT	US-131 SB Off Ramp	At Centre Avenue		Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2

Agency	Street	From	To	Proposed Action	Volume/ Capacity
MDOT	M-43 (West Main)	10 th Street	US-131 SB to WB Off Ramp	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2
MDOT	M-43 (West Main)	US-131 SB to WB Off Ramp	US-131 NB to EB Off Ramp	Transportation System Management Actions, Right of Way restrictions	1.0 - 1.2

Other capacity deficient segments are included in the 2035 Transportation Plan proposed capacity projects list.

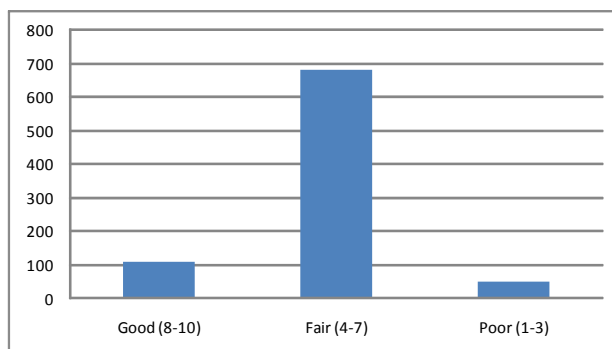
Road Condition Deficiencies

The Kalamazoo Area Transportation Study, in cooperation with the Michigan Department of Transportation, the Kalamazoo County Road Commission, and the cities of Kalamazoo and Portage rate the surface condition of all federal-aid roads in Kalamazoo County over a two year period as part of the KATS pavement management system. The pavement management system used in Kalamazoo County is the PASER system.¹⁰ This system is being used throughout the State of Michigan and is maintained through the Michigan Department of Transportation Asset Management Council and Michigan Technology Institute.

The most recent surface condition ratings for the federal-aid eligible system in Kalamazoo County are:

KALAMAZOO COUNTY PASER RATINGS 2009 - 2010

PASER RATING	Number of Miles
Good (8-10)	107.875
Fair (4-7)	618.461
Poor (1-3)	48.958
Total Miles Rated	

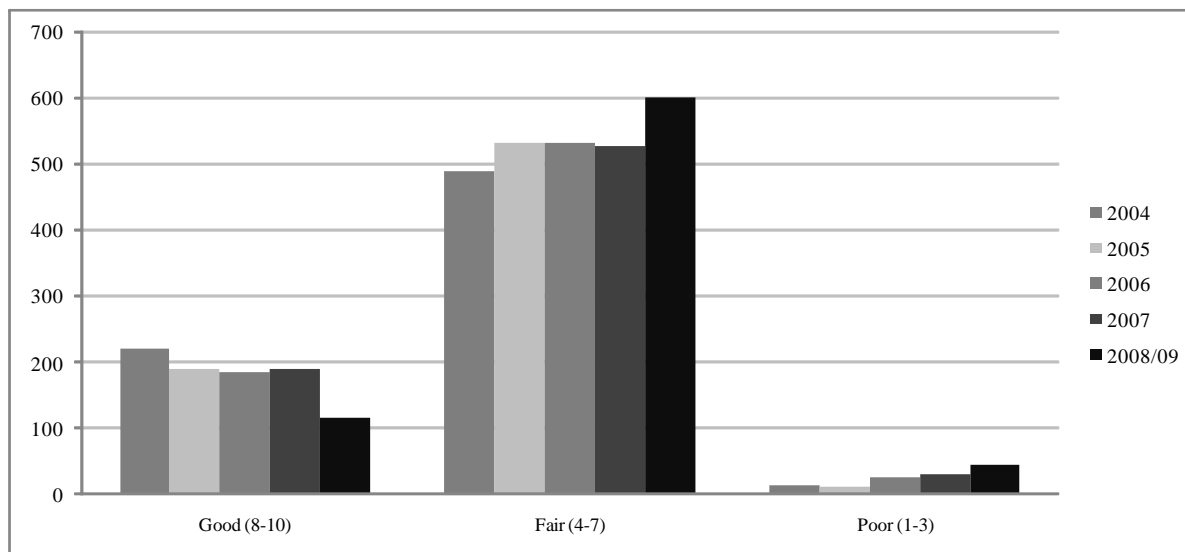


The road surface condition ratings show that over 93% of the federal aid system road miles in Kalamazoo County are in Fair or better condition. The bulk of those road miles are rated Fair or Good.

Looking at the federal aid eligible system surface condition rating from 2004 through 2009, it is apparent that while the system is being maintained, there is a distinct shift from Very Good and Good rated street miles to streets rated at Fair and worse.

¹⁰ Pavement Surface Evaluation and Rating (PASER), University of Wisconsin. Used on coordination with RoadSoft-GIS through the Michigan Tech Transportation Institute at Michigan Technology University.

**PASER RATINGS - FEDERAL AID ROAD MILES BY YEAR
Kalamazoo County**



PASER Ratings by Year	2004	2005	2006	2007	2008/09
Good (8-10)	220.327	189.769	184.975	189.388	116.37
Fair (4-7)	489.121	531.725	532.783	527.225	600.672
Poor (1-3)	13.495	12.786	27.187	31.208	45.878
Miles Rated	722.943	734.28	744.945	747.821	762.92

This indicates that future investment is needed to prevent these roads rated as Fair from deteriorating to Poor condition. The 2035 Transportation Plan does include significant funds for system preservation. Even the projects identified for capacity improvements contain significant preservation work since they are adding capacity to existing roads, improving the surface condition.

Other Deficiencies

The 2035 Transportation Plan list of capacity improvement projects includes several road segments where center turn lanes are being added. These projects are not on segments that have volume to capacity ratios of 1.0 or greater. These segments are those where local agency judgement, knowledge, and development potential, have projected a need based on past experience and growth.

PUBLIC TRANSPORTATION SYSTEM DEFICIENCIES

The identification of public transportation system deficiencies is done differently than the identification of road system deficiencies. The public transportation system deficiencies can involve limitations in areas covered by public transportation service and more demand for service than the system can handle.

Service Area Deficiencies

Since the entire Kalamazoo County area has public transportation service available through the combination of fixed route and its associated ADA service in the urban area and countywide demand response service, no area in Kalamazoo County is excluded from public transportation. Public comments and market surveys have indicated a desire to have public transportation service that goes outside of Kalamazoo County. Currently the only regular public transit service that goes outside of Kalamazoo County is a one day a week connection to the Veterans Administration complex in Calhoun County.

Service Level Deficiencies

Public market surveys and other public comment has identified the desire to increase the service levels provided. These desired increased service levels include:

- Adding service on Sundays; and
- Increasing the hours of service to cover third shift workers or late night business.
- Linking rural areas to fixed route service.

The lack of these identified service level increases can be considered unmet needs, lack of capacity, or public transportation deficiencies.

One deficiency noted in the 2030 Transportation Plan, increasing the hours of operations of the demand response paratransit Metro County Connect to match those of the fixed route service, has been implemented.

A deficiency noted in the Public Transit Human Services Coordinated Plan to improve bus shelters is being addressed through a bus stop shelter replacement program and an adopt a shelter program being spearheaded by the Disability Network. Current service levels of public transportation will be maintained under this plan.