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V. CORRIDOR NEEDS

A. CRASH ANALYSIS

Traffic congestion causes driver delays, leads to driver frustration, and causes drivers to make risky maneuvers and other erratic behavior. High traffic volumes, numerous turning vehicles, changing speed limits, frequent signalized intersections, and an inconsistent roadway section result in an area conducive to a large number of crashes. This describes the Stoughton Road corridor. Taken as a whole, the corridor crash rates are not extreme for an urban street. But Stoughton Road is a combination of an urban street, urban arterial, and rural expressway so further analysis of the crashes is necessary. There are definite locations where a high number of crashes occur. The City of Madison's 2001 Traffic Crash Report includes four street segments within the study corridor among the High Crash Frequency Street Segments in the City. The 3000-3999 blocks of East Washington Avenue, the area near the Stoughton Road crossing, are at the top of the list. The list also includes East Washington Avenue, Pflaum Road and Buckeye Road intersections as well. The following section provides the analysis of these and other problem crash areas.

A.1 NUMBER OF CRASHES

Based on crash information provided by WisDOT, there were a total of 971 crashes on Stoughton Road and the side road approaches between 1998 and 2000 as shown in Exhibit 17. More than one out of every three crashes (393) resulted in injury. Four of the crashes were fatal. Seventy-six of the crashes were alcohol-related (56 injury and three fatality crashes). These results show that, on average, a crash occurred nearly every day on Stoughton Road, including almost three per week with injuries. As expected the majority of the crashes, 872, happened at the intersections. The STH 30 interchange and the Pflaum Road, Buckeye Road, and East Washington Avenue intersections accounted for nearly half of all crashes (475) and more than half of the injury crashes (210). Not coincidentally, these are also the areas with some of the highest traffic volumes.

The Rieder Road intersection area accounted for 13 crashes, six with injuries and one fatality. Four of the crashes, including the fatal crash, occurred when vehicles turning left from Rieder Road failed to yield to northbound traffic on Stoughton Road. Since that time, the intersection has been reconfigured and left-turns from Rieder Road are no longer allowed.

A.2 CRASH TYPES AND CAUSES

Types – WisDOT crash information is taken from police reports. The reports provide checklists for accident (crash) types – what the vehicle collided with – and manner of collisions. As referenced in this analysis, crash types is a combination of accident type and manner of collisions as they appear in the police reports. This is done to provide as much detail about the crashes as possible. The types that occurred often in the study corridor were – rear-end, angle, side swipe, deer, fixed object, pedestrian, bicycle, and single vehicle.

The most predominate type of crash in the project corridor was a rear-end crash. Rear-end crashes on Stoughton Road happened in all areas, but most frequently near the signalized intersections. The rear end crashes were the major percentage of crashes at the intersections of Buckeye Road, Pflaum Road, STH 30, East Washington Avenue, and Anderson Street.

Click here for EXHIBIT 17 CRASH MAPS PDF (2.4 MB)

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Angle crashes also constituted a high percentage of the remaining incidents at many intersections. High percentages of angle crashes took place at Terminal Drive, the South Beltline Interchange, East Broadway, Milwaukee Street, Commercial Avenue, Kinsman Boulevard, and Rieder Road.

The number of crashes involving pedestrians or bicycles was low (perhaps not surprising since the existing facility discourages use by pedestrians and bicyclists). There were a total of five crashes involving pedestrians and one crash involving a bicycle between 1998 and 2000. In three of these crashes alcohol was a factor.

Causes – Police reports also provide a checklist for contributing circumstances of crashes. These are similar to what is listed on the crash citation. Causes, as referenced in this document, are essentially the contributing circumstances as described on the police reports. The most common causes for the crashes in the study corridor were: disregarding traffic control, failure to yield, driving too fast for conditions, exceeding the speed limit, following too close, inattentive driving, and improper turn.

Many of the rear-end crashes listed following too close, inattentive driving, or too fast for conditions as contributing circumstances. These crashes are most likely caused by large vehicle queues waiting on Stoughton Road at the traffic signals. Vehicles approaching the intersections and attempting to pass through the green phase of the signal overtake queued or slower-moving vehicles. Even those crashes caused by inattentive driving can in some context by attributed to the large queues at intersections. The long queues place cars in locations where approaching drivers do not expect them.

Angle crashes occurred when a driver tried to enter a gap in traffic and misjudged either the speed or direction of the oncoming traffic. In many situations a driver was trying to make a left turn in the yellow or red phase of signal cycle after being at the intersection through one or more green phases. The causes of angle crashes were almost summarily the failure of a driver to yield or driving too fast for conditions.

Weather-related crashes were an issue on the Cottage Grove Road interchange ramps. A large number of single-vehicle crashes occurred under wet or icy conditions on the ramps. Speed is listed as a cause for many of these crashes. The configuration of the ramps may also be to blame. There are no deceleration lanes for the exit ramps from Stoughton Road to Cottage Grove Road. The ramps are posted at 25 miles per hour, but it is difficult for a vehicle to slow down in the live lane of traffic on Stoughton Road prior to reaching the ramps without deceleration lanes.

Excessive speed was referenced at the Public Information Meetings as a problem on Stoughton Road. In evaluating the cause of crashes many are functions of excessive speed. In addition to exceeding the speed limit and driving too fast for conditions, disregarding traffic control, failure to yield, and following too close were also considered to be speed-related causes for the crashes. Speed was a factor in 32 percent of all crashes on Stoughton Road by this standard.

A.3 CRASH RATES

An analysis of the crash rates for the overall project shows the rate for Stoughton Road to be 218 crashes per 100 million vehicle miles (cphvm). In comparison the statewide crash rate for 2001 for an urban street is 282 cphvm. This indicates that Stoughton Road has a lower crash rate than the average city street. However, as previously discussed, Stoughton Road functions as a city street for only a short portion of the entire roadway. The statewide rates for rural state trunk highways and county trunk highways are 104 cphvm and 153 cphvm, respectively. These also do not tell the full story since the large number of intersections and their spacing prevent the majority of the section from functioning as a rural arterial.

After consultation with WisDOT Central Office, it was determined that the analysis should focus on the intersections, because they account for the majority of the crashes. A rate of two crashes per million vehicles entering the intersection is an indication that there is a significant concern. An intersection with crashes per million vehicles ranging from 1.5 to 2 is considered a location that may become a concern.

Another measure that was used to determine if crashes are a problem is the number of crashes with injuries. The statewide average for crashes with injuries at intersections in 2001 was approximately 40 percent. Translating this data into a rate of crashes with injuries per million vehicles, the benchmark for a high injury rate would be 0.8 crashes per million vehicles entering the intersection. The summary of the Stoughton Road intersections is included in Table 4.

TABLE 4 – CRASH RATE ANALYSIS AT INTERSECTIONS

Intersection	Ave. # of crashes per year**	Avg. total # of vehicles per day entering intersection*	# of crashes per million vehicles	Ave. # of crashes with injuries per year**	# of crashes with injuries per million vehicles
Terminal Drive	6.0	26210	0.63	2.7	0.28
South Beltline▲	16.7	45764	1.00	7.7	0.46
Broadway	19.3	48225	1.10	7.0	0.40
Pflaum Road	34.7	59400	1.60	14.0	0.65
Buckeye Road	45.7	59025	2.12	20.7	0.96
Cottage Grove Road▲	17.7	30450	1.59	8.7	0.78
Milwaukee Street▲	21.7	38675	1.53	3.67	0.26
STH 30▲	37.7	58900	1.75	17.0	0.79
East Washington Ave.	40.3	75900	1.46	18.3	0.66
Anderson Street	7.3	32000	0.63	3.7	0.31
Kinsman Boulevard	7.3	24975	0.80	4.3	0.48
Pierstorff Street	0.3	17500	0.05	0.0	0.00
Rieder Road	3.0	19100	0.43	1.7	0.24
Hanson Road	0.7	18400	0.10	0.3	0.00
Hoepker Road	7	19650	0.98	3.0	0.42
Acker Road	0.7	19200	0.10	0.0	0.00
CTH CV	9.7	24450	1.08	3.3	0.37
IH 39/90/94▲	8.3	20500	1.11	2.7	0.36

▲ These interchanges actually consist of two or more intersections. In order to achieve the level of detail on crash rates desired for this planning level study, these locations were simplified to act as one intersection. The crashes were grouped for the entire interchange and the average traffic entering the intersections were grouped together. One crash rate was figured for the entire interchange.
* Source: 2001 Wisconsin Highway Traffic Volume Data
** Source: 1998-2000 WisDOT geocoded Crash Reports

The results indicate that the Buckeye Road intersection is a significant problem area. The rate of crashes and injury crashes is well above the intersection crash rate criteria. STH 30 and

Cottage Grove Road are also emerging problem areas based on high injury crash rates. East Washington Avenue, Pflaum Road, and Milwaukee Street qualify as areas that are becoming problems based on either their crash rate or injury-crash rate. These are all signalized intersections with auxiliary lanes provided for turning movements.

B. TRAFFIC ANALYSIS

B.1 TRAFFIC OVERVIEW

The evaluation of current and future roadway operations in the USH 51/Stoughton Road corridor was conducted using a combination of existing traffic volumes, an inventory of roadway and intersection characteristics, the MPO's regional travel demand model, and an intersection analysis network model. The Madison Area MPO's model represents the daily flows of vehicles in the regional network and uses the TRANPLAN platform. The intersection analysis network developed for the Stoughton Road corridor relied on the Synchro/Sim-Traffic software platform. With these background data and analysis tools, the existing and future traffic conditions during the p.m. peak hour were identified and quantified.

The Stoughton Road study corridor, bounded by the IH 39/90/94 interchange to the north and the Terminal Drive/Voges Road intersection to the south, is about ten miles in length. From a traffic operations viewpoint, this corridor can be divided into two distinct segments at about Pierstorff Street. The northern segment generally has higher travel speeds, lower volumes and few traffic signals while the southern segment is characterized by lower travel speeds, higher turning volumes, and many traffic signals. In the next section the major travel characteristics for each of these two segments are discussed.

Recent and current daily traffic counts in the study area were obtained from the Wisconsin DOT and the City of Madison. These traffic counts were supplemented by intersection turning movement counts collected specifically for this study. An inventory of roadway geometry (such as lane use, number of lanes, and turn bay length) and intersection control information (traffic signal, stop sign, and yield sign) was conducted throughout the study corridor. Signal phasing plans were obtained from Wisconsin DOT and the City of Madison for signalized study intersections.

Traffic analysis was conducted for current (year 2002) conditions during the p.m. peak hour. The p.m. peak hour was selected because it corresponds to the hour with the highest hourly traffic volumes throughout the day. In the Stoughton Road corridor, peaking of traffic generally occurs between 4:00 p.m. and 5:00 p.m.

Finally, future conditions for the year 2030 that correspond to the MPO's future-year planning horizon have been analyzed. Although a specific year of 2030 has been assigned to these projections, the land use forecasts used as inputs represent conditions that are dependent on the actual pace and density of development and do not necessarily reflect a specific point in time.

The population and employment forecasts that have been used for the areas and neighborhoods adjacent to the Stoughton Road corridor represent the "build-out" conditions for these locations. These population and employment forecasts reflect estimates prepared for neighborhood plans adopted by the City of Madison and are documented in the East Side Arterial/Collector Roadway Needs Study prepared by the Madison Area Metropolitan Planning Organization and by HNTB in April of 2002. These forecasts are shown in Exhibit 12 (Section III–Future Conditions).

B.2 ROADWAY SEGMENTS

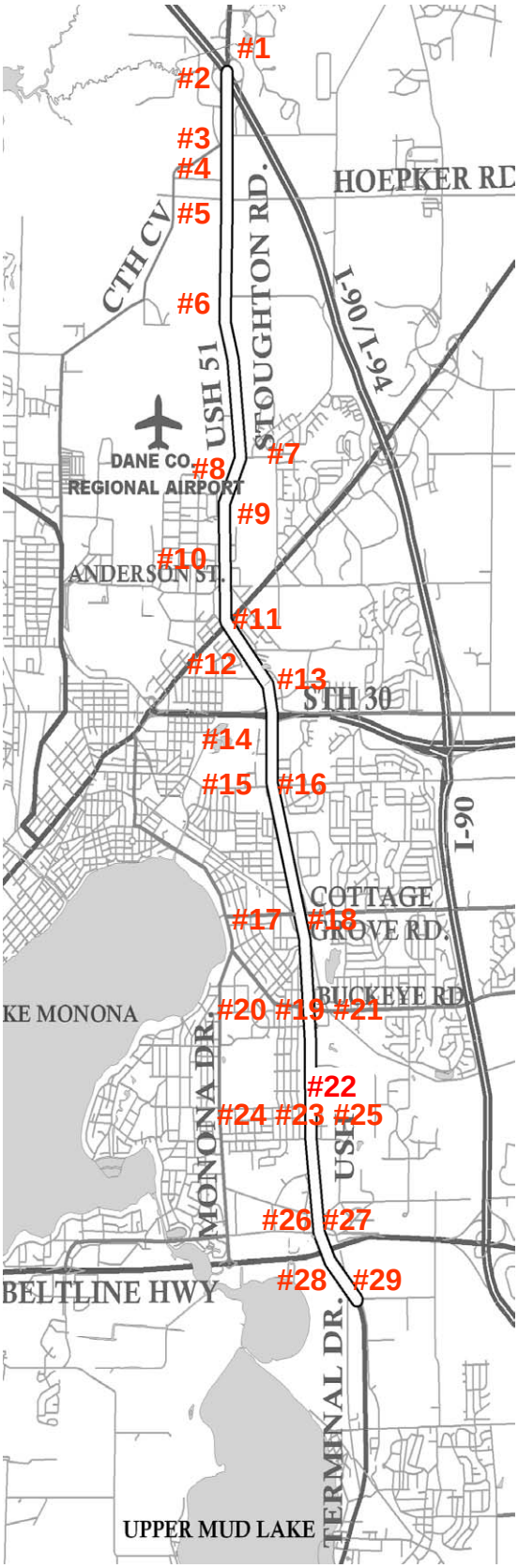
This section presents an overview of the Stoughton Road corridor and briefly documents the existing traffic conditions on the northern and southern portions of the corridor. Exhibit 18 shows a map of the corridor and identifies the key study intersections.

Table 5 shows a comparison of travel characteristics for the northern and southern segment of the corridor. In the following sections, the length of each segment, the number of signalized and unsignalized intersections, and both the current and projected traffic, travel speeds, and travel times on each segment are highlighted.

TABLE 5 – STOUGHTON ROAD TRAVEL CHARACTERISTICS

Characteristic	**Southern Segment** Pierstorff St. to Terminal/Voges Rd.	**Northern Segment** IH 39/90/94 to Pierstorff St.	**Entire Study Corridor** IH 39/90/94 to Terminal/Voges Rd.
Length (miles)	6	4	10
Number of signals on Stoughton Rd.	12	1	13
Signals per mile	2	0.25	1.3
Year 2002 Average Daily Traffic (vehicles per day)	Between 21,000 – 52,000	Between 17,000 – 27,000	Between 17,000 – 52,000
Year 2002 Average Travel Speed (mph) p.m. peak hour	27	46	32
Year 2002 Average Travel Time (minutes) p.m. peak hour	13	5	18
Year 2030 Average Daily Traffic (vehicles per day)	Between 30,000 – 63,000	Between 20,000 – 30,000	Between 20,000 – 63,000
Year 2030 Average Travel Speed (mph) p.m. peak hour	22	43	27
Year 2030 Average Travel Time (minutes) p.m. peak hour	16	5	21

EXHIBIT 18 KEY STUDY INTERSECTIONS



B.2.1 Southern segment between Pierstorff Street and Terminal Drive

The six-mile segment of Stoughton Road between Pierstorff Street south to Terminal Drive/Voges Road is the more densely developed segment of the corridor. Through traffic on Stoughton Road encounters twelve signalized intersections and two overpasses at Milwaukee Street and Cottage Grove Road. The study intersections in this segment include:

9. Kinsman Blvd.*
#10. Anderson Street*
#11. East Washington Avenue*
#12. Lexington Avenue*
#13. STH 30 Westbound ramps*
#14. STH 30 Eastbound ramps*
#15. Milwaukee Street - west intersection*
#16. Milwaukee Street - east intersection*
#17. Cottage Grove - west intersection*
#18. Cottage Grove - east intersection*
#19. Buckeye Road*
#20. Buckeye Road /West Frontage Road
#21. Buckeye Road/Blossom Lane
#22. Buckeye Road/East Frontage Road
#23. Pflaum Road*
#24. Pflaum Road/West Frontage Road
#25. Pflaum Road/East Frontage Road
#26. Broadway*
#27. USH 12/18 Westbound ramps*
#28. USH 12/18 Eastbound ramps*
#29. Terminal Drive/Voges Road*

**signalized intersection*

Land uses along this segment of Stoughton Road include many retail establishments and commercial businesses. Unlike the northern segment of the corridor, the intersecting streets are controlled by traffic signals.

In the six-mile segment of Stoughton Road between Pierstorff Street and Terminal/Voges Road, drivers encounter twelve traffic signals, or about one signal every one-half mile. Several major arterials and highway ramps intersect with Stoughton Road in this segment, forming high volume intersections with heavy turns. Four of these signals are located at highway interchanges – two each at STH 30 and USH 12/18. Average daily traffic (ADT) flows vary between 21,000 vpd and 52,000 vpd. The highest corridor volumes occur between Broadway and USH 12/18.

The p.m. peak hour traffic flows in this southern segment are generally between 1,100 vph and 2,100 vph. Unlike the northern segment where the dominant travel pattern is “through trips’, the southern segment serves several travel patterns including “through trips”, interstate to local trips, local to interstate trips, and local to local trips.

During the p.m. peak hour, this southern segment of Stoughton Road is characterized by average travel speeds of about 27 mph in each direction. This average speed accounts for the travel times between intersections and for the delays encountered at signalized intersections throughout the corridor. Travel time is estimated at 13 minutes for this six-mile southern segment of the corridor.

B.2.2 Northern segment between IH 39/90/94 and Pierstorff Street

The northern four-mile segment, between IH 39/90/94 and Pierstorff Street, has less dense land use development and is characterized mostly by unsignalized intersections. Starting at the northern end, this segment has the following study intersections:

#1. IH 39/90/94 Northbound off-ramp
  #1a. to Stoughton Road southbound
  #1b. to USH 51 northbound
#2. IH 39/90/94 Southbound off-ramp
  #1a. to USH 51 northbound
  #1b. to Stoughton Road southbound
#3. CTH CV*
#4. Acker Road
#5. Hoepker Road
#6. Hanson Road
#7. Rieder Road
#8. Pierstorff Street

* - *signalized intersection*

Stoughton Road traffic generally flows unimpeded along this segment, because there is only one signalized intersection at CTH CV (#3) to obstruct traffic flow. At the remaining intersections, only the side-street traffic is required to stop and wait for an acceptable gap in traffic before turning onto Stoughton Road. Average daily traffic (ADT) flows in this segment of the corridor are markedly higher north of CTH CV at about 27,000 vehicles per day (vpd), while between CTH CV and Pierstorff Street, ADT flows are about 17,000 vpd. The traffic count of 17,000 vpd is the lowest ADT within the Stoughton Road study corridor.

During the p.m. peak hour, the northern segment of Stoughton Road is characterized by average travel speeds between 46 mph and 51 mph. Travel time between IH 39/90/94 and Pierstorff Street is generally four to five minutes during this time. Side-street traffic turning left or right onto Stoughton Road is delayed between 15 seconds and 90 seconds while waiting for an acceptable gap in the Stoughton Road traffic flow.

Northbound traffic on this segment is predominant during the p.m. peak hour. Most of the northbound traffic is “through traffic” originating from points south of Rieder Road and continuing to IH 39/90/94 or points further north. Just north of Pierstorff Street, the northbound p.m. peak hour volumes are about 1,500 vehicles per hour (vph). About 15% of this traffic (roughly 250 vehicles) turns right onto Rieder Road, accessing residential neighborhoods to the east of Stoughton Road. The remaining “through volume” of about 1,300 vph continues north through the study corridor and accesses either IH 39/90/94 or continues north on USH 51. At the CTH CV intersection, about 400 vph turn left onto Stoughton Road northbound from CTH CV

eastbound, resulting in a 1,700 vph volume in the short section between CTH CV and IH 39/90/94.

In the southbound direction, traffic volumes are generally about 600 vph during the p.m. peak hour. The southbound direction represents the off-peak travel direction in this segment of the corridor.

B.3 ANALYSIS METHODOLOGIES

This section describes the methodologies used to assess traffic conditions and future growth in the Stoughton Road Corridor, including the approach used to analyze intersection operations and the process of using the Madison Area model to develop future-year p.m. peak hour traffic volumes.

B.3.1 Methodology for Intersection Operation Analysis

The standard methodologies used by traffic engineers to evaluate roadways and intersections are documented in the 2000 Highway Capacity Manual (HCM 2000)[1]. The Synchro/Sim-Traffic software program, which follows the methodologies of Chapters 16 and 17 of the HCM 2000, was used to evaluate the study intersections. As presented in the HCM 2000 and shown in Table 6, a letter grade is assigned to each delay threshold for signalized and unsignalized intersections.

Intersection level of service is characterized by the average delay drivers encounter at an intersection. At a signalized intersection, this delay is caused by time spent in queue and time spent waiting at a red traffic signal. At an unsignalized intersection, most of the intersection delay is borne by side street traffic which must stop or yield to main street traffic. However, any main street traffic turning left across oncoming traffic contributes to the measure of overall intersection delay. Main street through traffic at unsignalized intersections does not have any delay because these vehicles travel through without stopping.

Level of Service (LOS) A, B or C indicates that an intersection is operating under capacity with minor delays. Under LOS D, the intersection is operating near capacity and drivers experience longer delays. LOS E and LOS F indicate that the intersection is operating at or above capacity and drivers typically experience lengthy delays and queues. LOS D or better is generally considered acceptable in an urban area such as Madison.

[1] "Highway Capacity Manual – HCM 2000", Transportation Research Board, National Research Council, 2000.

TABLE 6 – INTERSECTION LEVEL OF SERVICE THRESHOLDS

Level of Service (LOS)	Signalized Intersections Control Delay Per Vehicle (sec)	Unsignalized Intersections Control Delay Per Vehicle (sec)
A	< 10	< 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Results of base-year and future-year intersection level of service analysis for each signalized and unsignalized intersection are presented in B.4 – Analysis Results.

B.3.2 Methodology for Projecting Future-Year Traffic Volumes

The Madison Area MPO maintains an area-wide multi-modal TRANPLAN model to evaluate existing and projected daily travel patterns in the metropolitan area. To ensure consistency with other past and on-going studies in the region, this model was adopted and further adjusted for use on the Stoughton Road Study. Because the MPO model was developed for daily travel and traffic conditions, it was necessary to expand the modeling procedures to include p.m. peak hour traffic model forecasts.

To analyze p.m. peak traffic conditions required adjustment of the daily trip-making characteristics to reflect p.m. peak hour travel conditions. Estimates for the percentage of daily trips that occurred during the p.m. peak were used to factor the trip tables for each of the trip purposes in the existing model. The resulting total p.m. peak trip table was then assigned to the network using hourly capacities for each facility in the network.

The model was first applied to the 2002 base year to develop p.m. peak hour flows in the corridor. These model-derived volumes were compared to actual p.m. peak hour counts collected specifically as part of this study. An iterative validation process was then initiated to ensure that the resulting base-year volumes on Stoughton Road segments and on key intersecting streets matched closely the observed traffic counts.

During validation, increased emphasis was placed on matching model estimates and observed counts on key segments that experience a higher volume of p.m. peak traffic. At the end of this iterative process, a close overall match was obtained with the total estimated traffic on 97 key roadway segments in the corridor falling within 1.2% of the corresponding base-year counts.

The analysis of existing conditions relied on traffic count data and did not utilize the p.m. peak hour base-year volumes produced by the TRANPLAN model. However, a validation of the model for existing p.m. peak hour conditions was necessary to ensure that reasonable forecasts of p.m. peak hour conditions were produced when the model was used to project future-year traffic in the corridor.

The validated model was then applied to the future year in order to forecast changes in traffic resulting from transportation improvements and land use changes.[2] The growth rate between base-year and future-year model volumes was calculated for each intersection. The resulting difference in traffic was then added to the current base-year counts to produce adjusted future-year volumes. These volumes became input to the level of intersection service analysis for the future year traffic conditions.

Finally, the projected changes in land use patterns resulted in considerable corridor traffic growth for the projected future-year. In particular, the distribution of employment and population growth along the corridor generated the increased traffic volumes. Exhibit 10 shows growth in "built-out" population and employment as summarized in this study and used in our analysis of projected p.m. peak hour traffic conditions along the Stoughton Road corridor.
Several capacity improvements were included in the future model as summarized in Section III Future Conditions and shown in Exhibit 11.

B.4 ANALYSIS RESULTS

Table 7 summarizes level of service results for signalized intersections under Year 2002 and Year 2030 conditions during the p.m. peak hour. Table 8 and Table 9 summarize level of service results for unsignalized intersections for existing and future-year conditions, respectively.

TABLE 7

Stoughton Road – Intersection Level of Service Summary
Signalized Locations – P.M. Peak Hour

		Year 2002 Existing		Year 2030 Future	
Location		**Control Delay Per Vehicle (seconds)**	**Level of Service (LOS)**	**Control Delay Per Vehicle (seconds)**	**Level of Service (LOS)**
3	CTH CV / Anderson Road	31	C	50	D
9	Kinsman Blvd.	16	B	27	C
10	Anderson Street	21	C	131	F
11	East Washington Avenue	87	F	168	F
12	Lexington Avenue	11	B	20	C
13	STH 30 Westbound ramps	28	C	49	D
14	STH 30 Eastbound ramps	25	C	53	D
15	Milwaukee Street – west intersection	19	B	19	B
16	Milwaukee Street – east intersection	15	B	16	B
17	Cottage Grove – west intersection	21	B	39	D
18	Cottage Grove – east intersection	6	A	15	B
19	Buckeye Road	60	E	89	F
23	Pflaum Road	71	E	98	F
26	Broadway	28	C	51	D
27	USH 12/18 Westbound ramps	36	D	56	E
28	USH 12/18 Eastbound ramps	24	C	35	C
29	Terminal Drive/Voges Road	11	B	21	C

[2] Because the Madison Area MPO has developed numerous versions of the model to evaluate a variety of future-year conditions, it was necessary to identify the version for use in the Stoughton Road corridor study. The Technical Advisory Committee of this study directed the consultant team to use the improvements in the Long Range Transportation plan with the Transport 2020 MOS commuter rail right-of-way alternative from Greenway Center to East Towne. Bus service in this model reflects assumptions contained in the Long Range Plan. A rail frequency of 15 minutes during the peak and 30 minutes during the off-peak is assumed for the rail alternative.

TABLE 8

Stoughton Road - Intersection Level of Service Summary
Unsignalized Locations - Year 2002 PM Peak Hour

Stoughton Road Intersections	Northbound Stoughton Road		Southbound Stoughton Road		Eastbound Approach		Westbound Approach		Overall Average Delay (sec.)	Lowest Approach Level of Service (LOS)
	Delay (sec.)	Level of Service (LOS)	Delay (sec.)	Level of Service (LOS)	Delay (sec.)	Level of Service (LOS)	Delay (sec.)	Level of Service (LOS)		
1a. I-90/I-94 NB off-ramp - left onto Stoughton SB	0.0	A	0.0	A	na		40.2	E	1.5	E
2a. I-90/I-94 SB off-ramp - left onto USH 51 NB	0.0	A	0.0	A	19.8	C	na		0.1	C
4. Acker Road	0.3	A	0.0	A	14.4	B	na		0.3	B
5. Hoepker Road	0.7	A	0.2	A	90.6	F	54.5	F	6.4	F
6. Hanson Road	0.0	A	0.2	A	na		21.1	C	0.4	C
7. Reider Road	0.0	A	1.0	A	na		18.9	C	1.3	C
8. Pierstorff Street	0.1	A	0.0	A	38.8	E	22.7	C	3.1	E

Other Intersections	Northbound Approach		Southbound Approach		Eastbound Approach		Westbound Approach		Overall Average Delay (sec.)	Lowest Approach Level of Service (LOS)
	(sec.)	(LOS)	(sec.)	(LOS)	(sec.)	(LOS)	(sec.)	(LOS)		
20. Buckeye Road /West Frontage Road	13.2	B	na		0.0	A	2.1	A	3.2	B
21. Buckeye Road/Blossom Lane	na		16.6	C	2.0	A	0.0	A	2.5	C
22. Buckeye Road/East Frontage Road	114.9	F	na		0.0	A	0.3	A	20.1	F
24. Pflaum Road/West Frontage Road	10.6	B	41.6	E	1.1	A	0.6	A	7.5	E
25. Pflaum Road/East Frontage Road	20.0	C	12.9	B	2.2	A	0.1	A	2.4	C

TABLE 9

Stoughton Road - Intersection Level of Service Summary
Unsignalized Locations - Year 2030 PM Peak Hour

Stoughton Road Intersections	Northbound Stoughton Road		Southbound Stoughton Road		Eastbound Approach		Westbound Approach		Overall Average Delay (sec.)	Lowest Approach Level of Service (LOS)
	Delay (sec.)	Level of Service (LOS)	Delay (sec.)	Level of Service (LOS)	Delay (sec.)	Level of Service (LOS)	Delay (sec.)	Level of Service (LOS)		
1a. I-90/I-94 NB off-ramp - left onto Stoughton SB	0.0	A	0.0	A	na		51.3	F	2.2	E
2a. I-90/I-94 SB off-ramp - left onto USH 51 NB	0.0	A	0.0	A	25.3	D	na		0.1	D
4. Acker Road	0.1	A	0.0	A	31.9	D	na		1.4	D
5. Hoepker Road	0.0	A	1.3	B	>1000	F	>1000	F	1000.0	F
6. Hanson Road	0.0	A	0.5	A	na		795.0	F	114.4	F
7. Reider Road	0.0	A	0.4	A	na		29.9	D	2.1	D
8. Pierstorff Street	0.4	A	0.0	A	534.0	F	25.1	D	31.9	F

Other Intersections	Northbound Approach		Southbound Approach		Eastbound Approach		Westbound Approach		Overall Average Delay (sec.)	Lowest Approach Level of Service (LOS)
	(sec.)	(LOS)	(sec.)	(LOS)	(sec.)	(LOS)	(sec.)	(LOS)		
20. Buckeye Road /West Frontage Road	15.1	C	na		0.0	A	2.3	A	3.8	C
21. Buckeye Road/Blossom Lane	na		23.0	C	2.8	A	0.0	A	3.7	C
22. Buckeye Road/East Frontage Road	363.0	F	na		0.0	A	0.4	A	71.3	F
24. Pflaum Road/West Frontage Road	11.0	B	80.6	F	1.2	A	0.7	A	13.6	F
25. Pflaum Road/East Frontage Road	19.9	C	12.9	B	2.6	A	0.1	A	2.7	C

Existing Conditions

Of the 17 signalized intersections, 13 operate at an acceptable level of service at a LOS C or better. Intersections where level of service is D or worse during the base year include the following (see Exhibits 19, 20, 21 and 22):

- The USH 12/18 westbound ramps intersection (#27) operates at LOS D.
- The Stoughton Road intersections at Buckeye Road (#19) and Pflaum Road (#23) each operate at LOS E, with average intersection delays of 61 and 70 seconds, respectively.
- The intersection of Stoughton Road at East Washington Avenue (#11) operates at LOS F with the highest average delay in the corridor at 87 seconds.

Of the 12 unsignalized intersections, each has an overall average intersection delay of 20 seconds or less. However, the five intersections below have individual approaches that operate at LOS E or F due to lengthy delays while waiting for acceptable gaps in major street traffic flow.

- The IH 39/90/94 northbound exit ramp (#1) left turns will operate at LOS E.
- At the Stoughton Road/Hoepker Road intersection (#5), both the eastbound and westbound Hoepker Road approaches operate at LOS F.
- At the Stoughton Road/Pierstorff Street (#8), the left turns from Pierstorff Street eastbound operate at LOS E.
- At the Buckeye Road/East Frontage intersection (#22), the northbound Frontage Road approach operates at LOS F.
- At the Pflaum Road/West Frontage Road intersection (#24), the southbound West Frontage Road traffic operates at LOS E.

The p.m. peak travel speeds in the corridor are higher on the northern segment of Stoughton Road between IH 39/90/94 and Kinsman Road where average speeds vary between 46 mph and 51 mph. Along the southern segment between Kinsman Road and Terminal Drive, average travel speeds are 27 mph for both directions.

Future Conditions

With the increased traffic volumes projected under future conditions, several Stoughton Road intersections will deteriorate into LOS E or F. Seven of the signalized Stoughton Road intersections are forecast to operate acceptably at LOS C or better, compared to thirteen under existing conditions.

- Intersections that will operate at LOS D include the CTH CV intersection (#3), both STH 30 ramp intersections (#13 and #14), the Stoughton Road southbound ramp at Cottage Grove (#17), and the Stoughton Road/Broadway intersection (#26).
- One location, the USH 12/18 westbound ramps intersection (#27), will operate at LOS E.
- Four intersections will operate at LOS F including Anderson Street (10#), East Washington Avenue (#11) Buckeye Road (#19), and Pflaum Road (#23).

EXHIBIT 19 LOS – SIGNALIZED INTERSECTIONS 2002 VS. 2030
P.M. PEAK HOUR – LEVEL OF SERVICE

		Year 2002 Existing	Year 2030 Future
3	CTH CV / Anderson Road	C	D
9	Kinsman Blvd.	B	C
10	Anderson Street	C	F
11	East Washington Avenue	F	F
12	Lexington Avenue	B	C
13	STH 30 Westbound ramps	C	D
14	STH 30 Eastbound ramps	C	D
15	Milwaukee Street – west intersection	B	B
16	Milwaukee Street – east intersection	B	B
17	Cottage Grove – west intersection	B	D
18	Cottage Grove – east intersection	A	B
19	Buckeye Road	E	F
23	Pflaum Road	E	F
26	Broadway	C	D
27	USH 12/18 Westbound ramps	D	E
28	USH 12/18 Eastbound ramps	C	C
29	Terminal Drive/Voges Road	B	C

Click here for EXHIBIT 20 INTERSECTIONS OPERATING POORLY PDF (226 KB)

EXHIBIT 21 SIGNALIZED INTERSECTIONS AVERAGE DELAYS

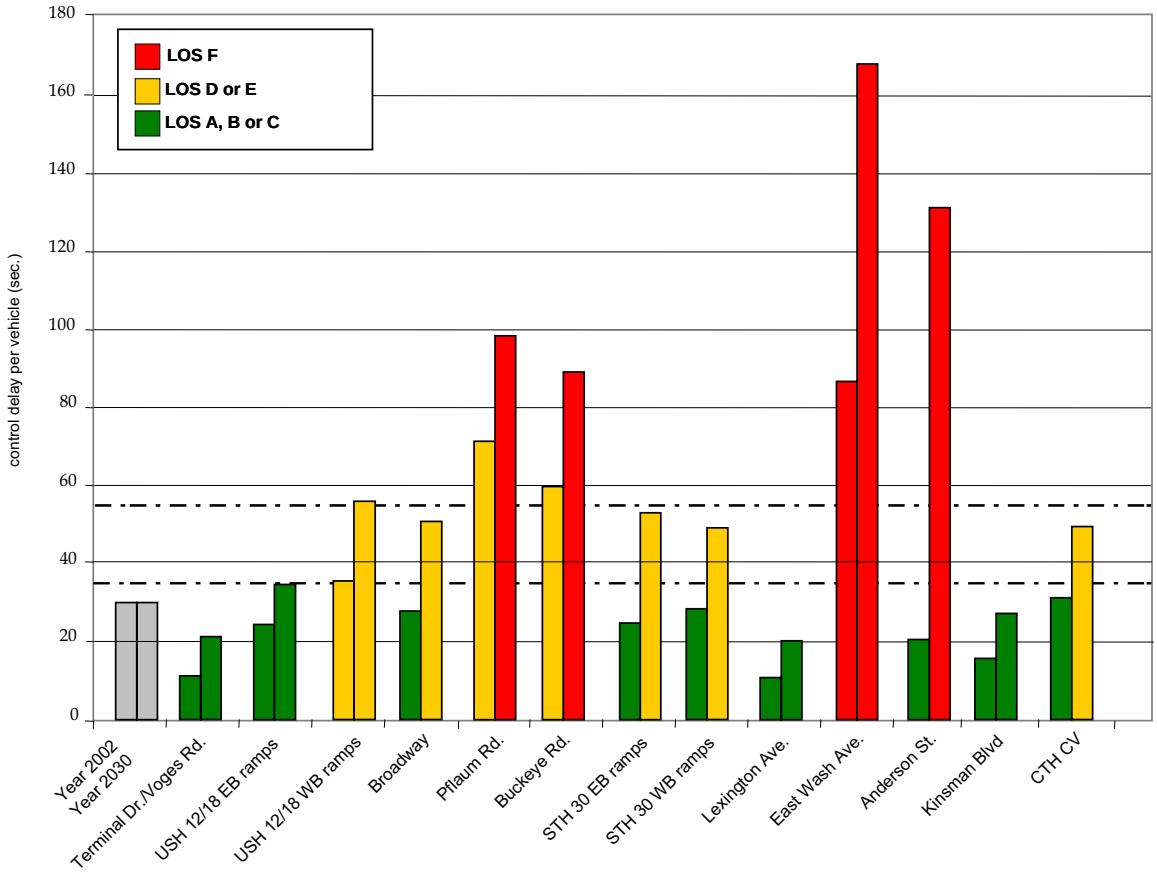
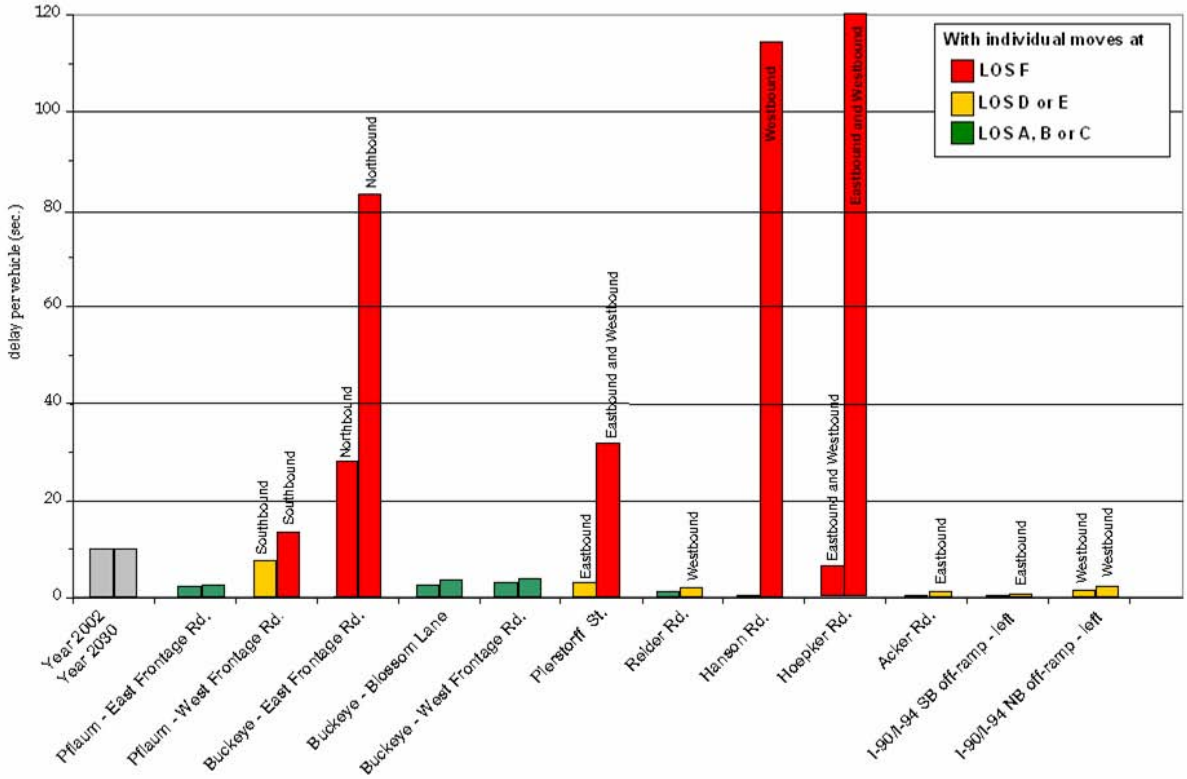


EXHIBIT 22 UNSIGNALIZED INTERSECTIONS AVERAGE DELAYS



Eight of the twelve unsignalized intersections will operate with overall average intersection delay of 25 seconds or less. However, six of the intersections will have individual approaches that will operate at LOS E or F due to lengthy delays while waiting for acceptable gaps in major street traffic flow, compared to five under existing conditions.

- The five intersections that have approaches operating at LOS E or F under existing conditions will continue to have lengthy side-street delays in the future.
- At the Stoughton Road/Hanson Road intersection (#6), the westbound Hanson Road approach will operate at LOS F.

The p.m. peak travel speeds in the corridor will be lower in the future reflecting the higher traffic volumes and longer intersection delays. Along the northern segment of Stoughton Road between IH 39/90/94 and Kinsman Road, average speeds will vary between 43 mph and 46 mph. Along the southern segment between Pierstorff Street and Terminal Drive, average travel speeds are 22 mph for both directions.

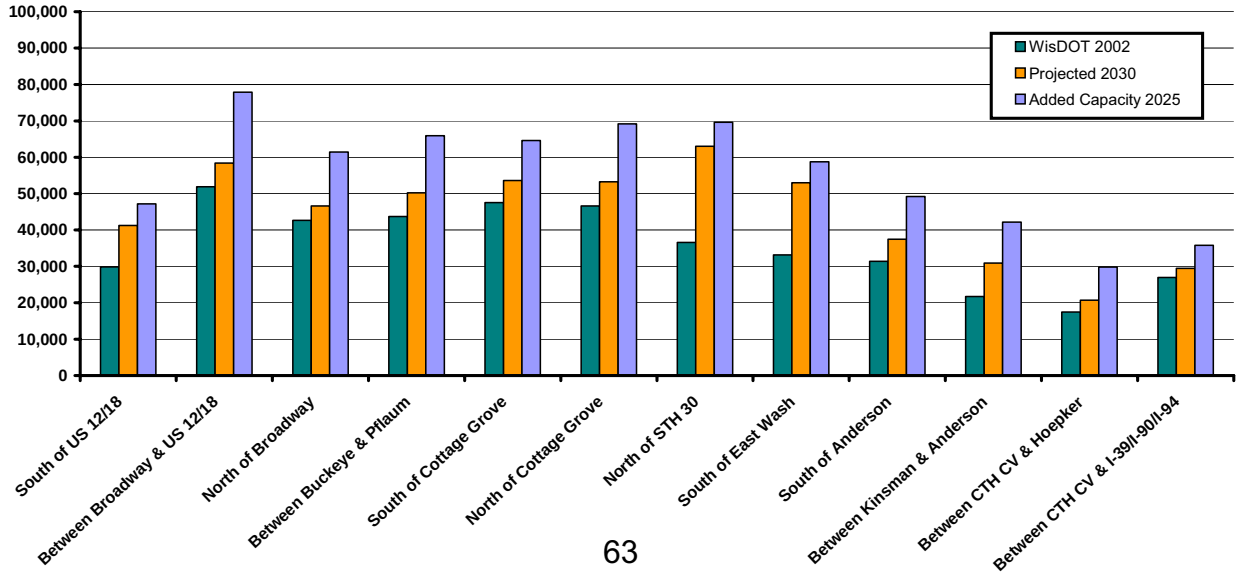
The results of the traffic modeling are included in Technical Appendix 2.

Daily Volumes

An analysis was completed to compare the ADT for existing conditions with future conditions in 2030 utilizing the projected population and employment presented in this report. Congestion levels on the roadway shown in Exhibit 24 are a comparison of ADT with volume to capacity ratios (v/c) for existing and future conditions. Capacity is based on number of lanes and delays experienced on each section of the roadway. The evaluation of daily volumes between existing and future conditions did not show significant increases in traffic along Stoughton Road. This is due to two major reasons – Stoughton Road is at or near capacity in many locations currently, so there is not much opportunity for growth and with the construction of new or improved roadways (i.e. Reiner/Sprecher arterial) some of the traffic utilizing Stoughton Road would be diverted to these routes. Because of the capacity constraints, some traffic desiring to use Stoughton Road diverts to neighborhood streets, other arterials or the Interstate. To help determine the potential future traffic volumes if capacity were increased on Stoughton Road, the model was run with these conditions. The following exhibit shows the comparison in daily volumes for each of the three conditions (see Exhibit 23)

EXHIBIT 23 STOUGHTON ROAD ADT

Stoughton Road Traffic Data Daily Volumes (Two-Way)



Click here for EXHIBIT 24 - DAILY ROADWAY CONGESTION PDF (280 KB)

C. Geometric Deficiencies

In order to analyze the geometrics of each intersection the existing conditions were compared to the future intersection needs. Current signal timings and traffic projections were used with CorSim software to obtain current and estimated future queue lengths. These queue lengths were then compared to existing conditions to determine where the deficiencies are or will be in the future. The existing geometrics, including lane widths, radii, taper lengths, turn lane lengths and number of lanes were compared to current Facilities Development Manual (FDM) and American Association of State Highway and Transportation Officials (AASHTO) standards and any deficiencies were recorded. The following discussion identifies these deficiencies (see Table 10). A summary chart of all movements on Stoughton Road at the intersections is provided in Technical Appendix 3.

TABLE 10 – INTERSECTION DEFICIENCIES

Intersection	Deficiencies
Terminal Drive/Voges Road	None
South Beltline Interchange	Turn lanes from the Beltline back up on the ramps and extend back to the Beltline. The right-turn lane from SB Stoughton Road to the Beltline backs up through the Broadway intersection.
Broadway	Conflicts mentioned above (South Beltline Interchange)
Pflaum Road	Queues on the through lanes prevent turning vehicles from reaching the turn lanes. Queues on Pflaum Road back up beyond the frontage road intersections. Frontage roads are too close to the Stoughton Road intersection.
Buckeye Road	Queues on the through lanes prevent turning vehicles from reaching the turn lanes. Queues on Buckeye Road back up beyond the frontage road intersections. West frontage road is too close to the Stoughton Road intersection. Increase in traffic is expected on east frontage road due to Dean Clinic.
Cottage Grove Road Interchange	There are no deceleration lanes exist on Stoughton Road for the exit ramps. Acceleration lanes are too short for the entrance ramps.
Milwaukee Street Interchange	Close proximity to the STH 30 interchange causes weaving problems. High demand for SB exit ramp from Stoughton Road conflicts with STH 30 WB exit ramp.
STH 30 Interchange	Conflicts are mentioned above (Milwaukee Street). EB exit ramp left-turn traffic backs up and prevents right turns. WB exit right-turns back up beyond the turn lane length.
Lexington/Commercial Avenue	None.
East Washington Avenue	SB, WB, and EB, left-turn lanes, and WB and NB right-turn lanes are saturated. Through movements on East Washington are negatively impacted by the Mendota Street signal. Intersection is operating beyond capacity.
Anderson Street	EB right-turns are delayed despite free-flow lane.
Kinsman Boulevard	Queue for WB left-turns exceeds existing lane lengths
Pierstorff Street	Left-turns onto Stoughton Road from this location are dangerous due to sight distance.

TABLE 10 – INTERSECTION DEFICIENCES (CONTINUED)

Intersection	Deficiencies
Rieder Road	None with current configuration.
Hanson Road	None
Hoepker Road	Long queues for through and left-turning vehicles on WB Hoepker block right-turning vehicles.
Acker Road	None
CTH CV	In future conditions, left-turn from EB CTH CV will cause back-ups due to inadequate storage length.
IH 39/90/94	Left-turns from WB exit ramp cause back-ups. Daentl Road intersection is located on the EB exit ramp.

C.1 SIGNALIZED INTERSECTIONS

Terminal Drive – Westbound traffic that travels along Terminal Drive incurs delays when crossing Stoughton Road. The volume of traffic on Stoughton Road makes through and left turn movements from Terminal Drive difficult. The turn lane lengths are all adequate for existing and future conditions. The frontage roads off of Voges Road are an acceptable distance from Stoughton Road.

Broadway – Stoughton Road expands from a four-lane road to a nine-lane road at the intersection of Broadway. The numerous sign bridges directing traffic onto the Beltline interchange and Broadway and the close proximity of the interchange make lane differentiation at this intersection very confusing to motorists, even those who are familiar with the area. There are no geometric deficiencies at this intersection according to FDM and AASHTO standards.

Pflaum Road – The large volume of through traffic on Stoughton Road affects turning movements along the corridor. The left turn lanes at the intersection with Pflaum Road, in both the northbound and southbound directions are of adequate length to handle the turning movement, 760 feet and 800 feet respectfully. However, the volume of through traffic stopped at the traffic signal backs up beyond the entrance of the left turn lane rendering it useless. There are frontage roads along both sides of Stoughton Road from Pflaum Road north to Buckeye Road. These frontage roads are an acceptable distance from Stoughton Road based on FDM standards; still they do not function adequately due to the high volume of traffic on the sideroads. Through traffic along the side roads that is stopped at the traffic signal blocks the turning traffic into and out of the frontage road causing major traffic back ups at these points.

Buckeye Road – This intersection suffers from many of the same problems that Pflaum Road does. There is such a high volume of through traffic queued at the intersection that turning vehicles cannot access the designated lanes. The left and right turn lanes are adequate in length, but not being fully utilized. Frontage road separation west of the intersection is adequate according to the FDM, however, the westbound left and right turn lane lengths at Buckeye Road are too short and cause blockages to through traffic, which in turn causes blockages at the frontage road.

On the east side of the intersection, Blossom Lane provides access to the residences north of Buckeye Road. This roadway is located so close to the intersection with Stoughton Road that queues back up across this intersection. The frontage road that goes south to Pflaum Road is adequate distance away from the Stoughton Road intersection. However, there will be a need for additional turn lanes at the frontage road and Buckeye Road intersection for the expected increase of traffic due to the construction of the Dean Care facility on the frontage road. The City of Madison has a project to address this concerned scheduled for the summer of 2003. Conduit for signals are also included as part of that project.

East Washington Avenue – The intersection of Stoughton Road and East Washington Avenue is one of the most troublesome intersections along the corridor due to the expanse of this intersection and the large volume of traffic. There are extremely high volumes of turning traffic on all legs of the intersection. There are double left turn lanes for southbound traffic and a double right turn lane for northbound traffic. Eastbound and westbound double left turn lanes are currently at capacity. At peak hours the eastbound and westbound traffic stopped at the traffic signal often blocks the entrance to the left turn lanes causing back ups further down East Washington Avenue. Mendota Street is in close proximity to this intersection, is also signalized, but is not linked to the signals at the Stoughton Road intersection. These signals running separately causes back-ups on eastbound East Washington Avenue which at peak hours affects turning traffic from Stoughton Road. WisDOT and the City of Madison are working together to try to interconnect the signals at Stoughton Road and Mendota Street.

Anderson Street – Vehicles in the free-flow right turn lane slow or stop during the right turn movement. A reason for the hesitation when making this movement could be the need for traffic to make a left-turn on East Washington Avenue. The intersections are fairly close and right-turns from Anderson Street need to get to the left lane after turning onto Stoughton Road. Drivers may not feel comfortable making this merge then crossing three lanes to get to the left-turn lane in the short distance. The distance to make the maneuver becomes even shorter when traffic backs up at East Washington Avenue.

Kinsman Boulevard – The westbound left turn lane queue exceeds the existing turn lane length at Kinsman Boulevard. The existing length is 150 feet and the estimated future length needed is 210 feet.

CTH CV – There is a high volume of left turn traffic from CTH CV to northbound Stoughton Road. There will not be adequate storage length for this movement on CTH CV in future conditions.

C.2 INTERCHANGES

The interchanges along the Stoughton Road also pose numerous problems. Because the interchanges were constructed in an urban area, efforts were made to minimize the impacts to the adjacent properties and environmentally sensitive resources. Deficiencies at the interchanges are detailed below.

Beltline – The eastbound and westbound exit ramps from the Beltline are inadequate to handle the current capacity. Currently there are two left turn lanes and two right turn lanes on the eastbound ramp and one left and one right-turn lane on the westbound ramp. At peak hours these ramps back up onto the through lanes of the Beltline. The left-turns from the eastbound exit ramp to Stoughton Road cause the extended queue. On the westbound ramp, the right turn lane is not adequate. Queues for left-turning traffic prevent vehicles from reaching the right-turn lane. The queues back to the Beltline cause undue congestion and even stopped traffic on the Beltline.

Cottage Grove Road – The acceleration lanes for the northbound and southbound traffic entering Stoughton Road from Cottage Grove Road are too short and force vehicles to merge into traffic at a slow speed causing traffic on Stoughton Road, traveling at higher speeds, to weave around this entering traffic. According to AASHTO and FDM standards the minimum acceleration lane should be 910 feet with a 300 feet taper. The southbound acceleration lane is 500 feet and the northbound is 600 feet. Both taper lengths are currently 300 feet. There are no deceleration lanes for the northbound and southbound traffic exiting Stoughton Road onto Cottage Grove Road. Traffic exiting Stoughton Road slows before the ramps, causes back ups, stopped traffic, and crashes. The tapers are adequate - 250 feet southbound and 300 feet northbound. According to AASHTO and FDM standards the minimum deceleration lane length should be 520 feet with a 250 feet taper.

Milwaukee Street – The close proximity to the STH 30 interchange causes weaving of northbound traffic from the Milwaukee Street entrance ramp that desires to turn westbound at the STH 30 interchange. Traffic has to cross five lanes to make this maneuver. There is also a high demand for the southbound exit ramp from Stoughton Road. This conflicts with the STH 30 eastbound exit ramp traffic turning right onto Stoughton Road. The right-turn from STH 30 is a free-flow movement, but this right-turn lane becomes the exit ramp for Milwaukee Street. The short distance and high volume of traffic in the area prevent the STH 30 exit ramp from being a free-flow movement.

STH 30 – The left turns on the eastbound exit ramp, and the right turns on the westbound exit ramp, back up beyond the dedicated turn lane and block traffic. The existing eastbound left-turn lane is approximately 400 feet long, the right turn lane is 330 feet long. According to predicted future traffic queues the left turn lane will need to be 830 feet and the right turn lane will need to be 500 feet long. Some of the congestion on these ramps currently is due to the traffic diverting to STH 30 and Thompson Road to avoid the East Washington intersection.

IH 39/90/94 – Left-turns from the westbound exit ramp cause back-ups on the ramp. There is a high volume of truck traffic in this area. Vehicles, including trucks, get caught in the median and block turning traffic from Stoughton Road to IH 39/90/94.

C.3 NON-SIGNALIZED INTERSECTIONS

Problems observed on the side roads at non-signalized intersections along the corridor are due to the high volumes and high speeds of traffic on Stoughton Road. All of the non-signalized intersections (except the Pflaum Road and Buckeye Road frontage road intersections) are in the expressway section on the north end of the study corridor.

Pierstorff Street – Left turns from Pierstorff Street are difficult to make because there is not good sight distance along Stoughton Road. Pierstorff Street is an employee entrance to WisDOT District One and a back entrance to some of the industries west of Wright Street. WisDOT has discussed removing this movement at the intersection as a safety enhancement.

Rieder Road – The source of most crashes at this intersection in the past was vehicles making left-turns from Rieder Road. The curve of Stoughton Road from the south seemed to camouflage the speed of northbound traffic from those exiting Rieder Road. In 1999, WisDOT put temporary measures in place to prevent this movement. WisDOT has a project programmed for 2003 to make these measures permanent. Lack of left-turns causes vehicles to turn right onto Stoughton Road and then make a u-turn at Amelia Earhardt Drive or avoid the intersection. This u-turn movement has caused fewer crashes than the left-turns from Rieder Road.

Hanson Road – Industrial development is planned in this area. Additional turn lanes will need to be constructed as the development proceeds. However, there are currently no geometric deficiencies at this intersection.

Hoepker Road – The large volume of traffic on Stoughton Road causes back-ups eastbound and westbound on Hoepker Road. Traffic at times gets stranded in the middle of the intersection before the maneuver can be completed, thus blocking the separated left turns on northbound and southbound Stoughton Road. The Hanson Road and Rattman Road developments will continue to increase traffic at this location and cause greater back-ups on the sideroad.

Acker Road – This roadway is a low volume roadway with no expected geometric deficiencies.

Two unsignalized intersections that were not studied geometrically, but have an influence on Stoughton Road are the Orin Road and Daentl Road intersections.

Orin Road – The Orin Road intersection is located between Anderson Street and Kinsman Boulevard. It is located within 500 feet of the Anderson Street intersection. There is a median opening at this location so left and right turns are allowed. It is a location that Madison Metro buses use to get to the bus stop on Orin Road. Because of its proximity to the Anderson Street intersection it is a substandard location. Also, Orin Road can be easily accessed from the Anderson Street/Stoughton Road intersection, making this access unnecessary. Currently there is a frontage road between Anderson Street and Kinsman Boulevard. It is discontinuous at Orin Road. Connection of this frontage road would make the Orin Road access to Stoughton Road even less important.

EXHIBIT 25 DAENTL ROAD INTERSECTION

Daentl Road – This road actually runs from CTH CV just west of the Stoughton Road intersection to some residences west of IH 39/90/94. It is also an access to a truck stop just off the Stoughton Road and IH 39/90/94 interchange. Another leg of Daentl Road intersects near the merging area of the IH 39/90/94 exit ramp and Stoughton Road. The access to Daentl Road is used by vehicles to get to the truck stop and as a shortcut rather than going to the CTH CV intersection. It is an unsuitable location because it adds another conflict point to the high-speed

merge (see Exhibit 25). It is also an unnecessary access, because traffic can easily reach Daentl Road from the CTH CV intersection.

D. STRUCTURES AND PAVEMENT ANALYSIS

An analysis of the existing roadway infrastructure was done to determine current needs of the pavement and structures on Stoughton Road. The structural integrity of the bridges, box culverts, and existing pavements were evaluated using WisDOT Facilities Development (FDM) and the WisDOT Bridge Manual standards.

D.1 STRUCTURES

There are six structures that carry traffic on and seven structures crossing over Stoughton Road (see Table 11). The structures were analyzed for inventory load/operating load, sufficiency rating, and vertical clearance.

TABLE 11 – STRUCTURE SUMMARY

Structure Number	Structure Location	Structure Type	Inventory/ Operating Load	Sufficiency Rating	Vertical Clearance	Const. (Rehab.) Year	Meets Standards (Y/N)
B-13-8	Cottage Grove Road	On USH 51 NB	HS 18 / HS 26	75.1	16.67’	1949 (1980)	N (sufficiency rating)
B-13-61	USH 12/18 Interchange	Box Culvert	HS 20 / HS 30	80.7	----	1956 (1986)	Y
B-13-98	IH 39/90/94 EB	Overpass	HS 22 / HS 34	94.8	15.0’	1960 (1984)	N (vertical clearance)
B-13-99	IH 39/90/94 WB	Overpass	HS 22 / HS 34	94.8	15.0’	1960 (1984)	N (vertical clearance)
B-13-210	Cottage Grove Road	On USH 51 SB	HS 17 / HS 29	91.9	18.8’	1967 (1967)	Y
B-13-267	North of Broadway	Box Culvert	HS 20 / HS 30	85.0	----	1967	Y
B-13-320	Beltline WB	Overpass	HS 20.9 / HS 31.7	96.0	16.3’	1988	Y
B-13-321	Beltline EB	Overpass	HS 23 / HS 34	96.0	16.8’	1988	Y
B-13-322	STH 30 WB	Overpass	HS 23 / HS 45	99.4	16.75’	1996	Y
B-13-323	STH 30 EB	Overpass	HS 23 / HS 45	99.4	16.8’	1996	Y
B-13-324	Milwaukee St.	On USH 51 SB	HS 24 / HS 47	98.0	17.5’	1996	Y
B-13-325	Milwaukee St.	On USH 51 NB	HS 24	98.0	16.0’	1996	Y
B-13-341	Portland Parkway	Pedestrian Overpass	Ped.	---	17.2’	1979	Y

According to the Bridge Manual, inventory load is a measure of a structure's serviceability. Structures are designed for an inventory load rating of HS 20. If a structure's inventory load rating is below HS 20, rehabilitation should be considered. A structure may also be posted if the operating load is below HS 20. The operating load is a measurement of the structure's maximum safe carrying capacity. The two structures at the Cottage Grove Road interchange have insufficient inventory load ratings. Their operating load ratings, however, are greater than the minimum of HS 20.

Sufficiency rating is a measurement of the overall condition of the structure. The ratings range from 0 to 100. A rating of less than 50 indicates that a structure is eligible for federal replacement funding. Once replaced, no funds can be expended on the structure for 30 years. A rating of less than 80 indicates that a structure is eligible for rehabilitation funding. The structure must be rehabilitated so that it's condition results in a score greater than 80. Once rehabilitated, no funds can be expended on the structure for 7 to 10 years. A structures sufficiency rating can be adequate and still have features that need replacement. The only structure with a sufficiency rating below 80 is the northbound Stoughton Road structure at the Cottage Grove Road interchange (B-13-8). The results of this study will determine when and if this structure is rehabilitated. All other structures meet the sufficiency rating requirements and no significant rehabilitations are required according to the inspection reports and coordination with WisDOT District One Maintenance section. The Cottage Grove Road structures (B-13-8 and B-13-210) are scheduled for painting in 2004.

Vertical clearance as defined by the FDM and Bridge Manual should be 16.25 feet to 16.75 feet for all bridges over interstate or state trunk highways, and a minimum of 14.75 feet over other roadways. Pedestrian overpasses should be a minimum of 17.25 feet over all roadways. If a structure clearance is less than 14.5 feet and off the freeway system it shall be posted with low clearance signing. According to the inspection reports, the IH 39/90/94 structures do not meet the required vertical clearance but do not require low clearance signing. The Portland Parkway also does not meet the required vertical clearance according to the inspection reports. However, the clearance is within 0.5 inches and is not considered a deficiency for this study.

D.2 PAVEMENT

The Wisconsin Information System for Local Roads (WISLR) catalogues pavement information for local municipalities. The information provided by WISLR was used to analyze the pavement conditions on Stoughton Road. Pavement conditions are measured by several different indices. Pavement Distress Index (PDI) is the measure that WisDOT uses to determine when pavements will require maintenance. PDI ranges from 0 (new) to 100 (deficient). Values greater than 65 on major arterials such as Stoughton Road indicate that a roadway is in need of repair. WISLR calculated the PDI values out to the year 2006 and these are shown for sections of Stoughton Road in Table 12.

The results indicate that the majority of the roadway pavement is in satisfactory condition. The only section currently that requires maintenance, using the PDI standards, is the section from CTH CV to the IH 39/90/94. A rehabilitation project is scheduled by WisDOT in 2004 starting at CTH CV north to Reardon Road to address the pavement condition. Comments were received regarding the pavement at the Cottage Grove Road ramp areas. A concrete pavement repair of the faulted joints and surface grinding treatment was done in this area in 1996. Since that time, the tined pavement has worn and the roadway becomes slippery in wet weather conditions. The majority of Stoughton Road has had a rehabilitation completed within the last 11 years. The maintenance cycle is continuing and within the next 5 to 10 years there will be additional

maintenance projects necessary. Currently no other pavement rehabilitation or reconstruction projects are programmed for Stoughton Road in the next six years.

TABLE 12 – PAVEMENT SUMMARY

From	To	Pavement Type	Miles	Resurf Year	PDI 2000	PDI 2002	PDI 2004	PDI 2006
VOGES RD.	BROADWAY (CTH BW)	Concrete	0.51	1986	6	24	28	32
BROADWAY (CTH BW)	PFLAUM RD	AC Pavement over Conc.	1.00	1996	6	19	25	31
PFLAUM RD	COTTAGE GROVE RD	AC Pavement over Conc.	1.39	1996	0	27	33	39
COTTAGE GROVE RD BRIDGE	MILWAUKEE ST BRIDGE	AC Pavement over Conc.	1.08	1996	11	13	19	25
MILWAUKEE ST	STH 30 OVERPASS	Concrete	0.83	1996	0	2	6	10
STH 30 OVERPASS	EAST WASHINGTON (USH 151)	Concrete	0.64	1992	3	8	12	16
EAST WASHINGTON (USH 151)	PIERSTORFF ST.	Concrete	0.84	1992	7	14	18	22
PIERSTORFF ST.	MESSERSCHMIDT RD.	Concrete	1.54	1990	3	5	9	13
MESSERSCHMIDT RD.	CTH CV	Concrete	1.49	1990	3	5	9	13
CTH CV	IH 39/90/94	AC Pavement over Conc.	0.45	1990	41	88	94	100

E. BICYCLE / PEDESTRIAN NEEDS

E.1 BICYCLE NEEDS

In most locations Stoughton Road represents a significant barrier to bicycle travel both across and along the corridor. In fact, according to Madison's *Bicycling Resource Guide & Route Map*, bicycling is not recommended on most of the road. Partially because of its geographical features and partially because of its political and social atmosphere, Madison has the highest level of bicycling within the state and this trend will likely continue in the future. Madison has a good bikeway system but there are significant gaps in the system within the study area. Many of these gaps are created by Stoughton Road itself. (See Exhibit 26 Dane County Bike Map.) The other major roadways in the study area – IH 39/90/94, the Beltline (Beltline), and STH 30 - combine to surround and, to some extent, isolate this section of the City from the bicycle facilities available in the area. Parallel and intersecting streets and off-road corridors within the study corridor present an opportunity to enhance bicycle movements.

Click here for EXHIBIT 26 DANE COUNTY BICYCLE MAP PDF (218 KB)

Bicycling is a key component of a balanced transportation system. The bicycle can be used for both recreation and transportation. Bicycling can decrease traffic congestion and pollution, provide low cost transportation, improve physical fitness reducing illness and disease and promote a sense of community. Bicyclists tend to have the same desired destinations as motorists (work, school, shopping, recreation, etc.). These destinations are already served by our primary transportation system – roads. However, because of perceived and actual barriers, including safety, many bicyclists are unable or reluctant to use some roads or may be prohibited from using them by law (e.g. limited access highways). Shared use paths allow bicyclists, and other non-motorized users, to access some locations but most destinations are only served by roads shared with motor vehicles. According to the Nationwide Personal Transportation Survey, 1990, "the average length of a travel trip is nine miles (well within the range of most cyclists). Trips to work are slightly longer, while shopping and other utilitarian trips are shorter."

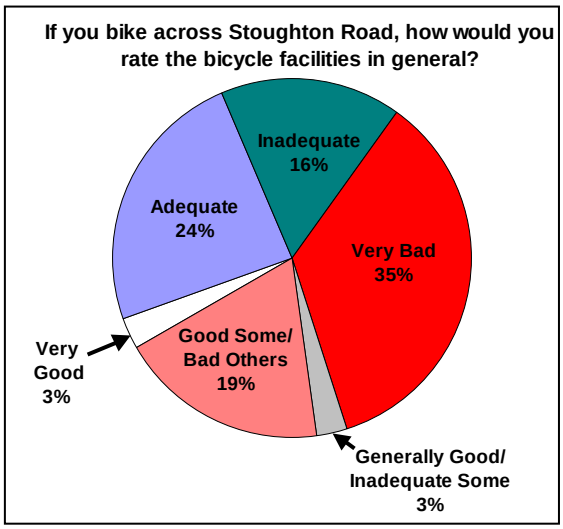
LENGTH OF BICYCLE TRIPS (NATIONALLY)

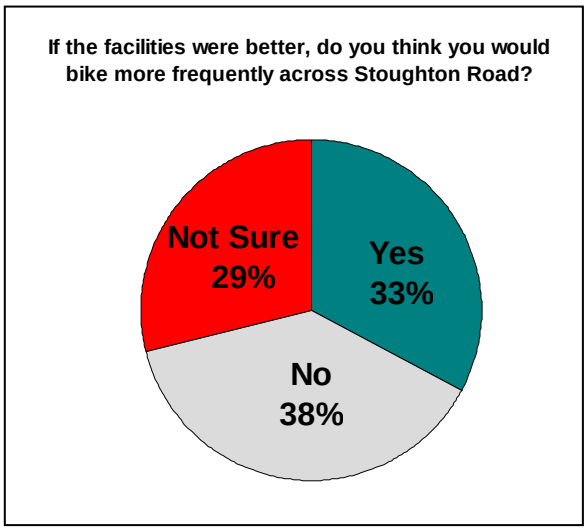
10 miles or less	79.4%
5 miles or less	62.7%
3 miles or less	48.8%
2 miles or less	39.6%
1 mile or less	27.5%
Less than ½ mile	13.7%

The three major factors which affect the suitability of a given road segment for bicycling are traffic volume, curb lane width, and speed. In general, the greater the traffic volume and the greater the speed (especially over 25 mph), the less desirable a road is for bicycling. Paved shoulders or curb lane widths over 12' tend to improve conditions for bicycle travel. A minimum four-foot paved shoulder or four-foot bike lane is desirable. As speed and volume increase, more width is advisable. While all three factors are interdependent, positively modifying one or two factors for bicycling may make a road more suitable for bicycling overall.

A Public Opinion Survey was distributed for the project. It included questions regarding bike accommodations for the corridor (see Exhibit 27). Seventy-seven percent of the respondents stated that they bike on or across Stoughton Road less than once per month. Fifty-one percent of respondents rated the bicycle facilities as either generally inadequate (16 percent) or very bad (35 percent), while only twenty-six percent rated the facilities as generally adequate. In response to the question "Do you think you would bike or walk more frequently if the facilities were better?" 33 percent responded, yes, 38 percent responded, no and 29 percent were not sure.

EXHIBIT 27 PUBLIC OPINION SURVEY





Bicyclists

In order to assess the needs of bicyclists it is helpful to break them into three broad categories based on their relative abilities and comfort levels. **Advanced or experienced adults** are capable of operating on most roads under most traffic conditions and need only minor accommodation. **Casual or novice adults and teenagers** are less confident in their ability to operate in traffic on collector and arterial streets without provisions for bicyclists. **Children,** less than nine or ten years of age are not mature enough mentally or physically, and, therefore, are not capable of bicycling safely without adult supervision.

It is important to recognize that some casual or novice riders will eventually become experienced cyclists if an encouraging bicycle system is developed. It has been estimated that about 20 percent of the cyclists (advanced/experienced) ride about 80 percent of the bicycle miles, while 80 percent of the cyclists (casual or novice and children) bike about 20 percent of the miles.

Bicycle Crashes

Most people tend to dramatically overestimate the danger of bicycling. Relatively speaking, bicycling is not dangerous. Based on national data the leading causes of bicycle crashes are:

Cause of Crash	Percentage
Falls	50
Fixed objects	14-29
Other Bicyclists	9-17
Motorists	11-17

(Kaplan, 1975; Moritz, 1998; Rivara, et al, 1996)

Collisions between bicyclists and motorists are usually the most severe. More than 90 percent of bicyclist fatalities occur in crashes with motor vehicles (Baker, Susan P., et al, 1993). Nationally, in 2001, 728 bicyclists were killed and 45,000 injured in reported crashes with motor vehicles in the U. S. (United Stated Dept. of Transportation, 2002). In Wisconsin in 2001, nine bicyclists were killed and 1179 injured in reported crashes with motor vehicles (Wisconsin Dept. of Transportation, 2002). Within the project area from 1995 to 2000, five bike related crashes occurred, one where alcohol was a factor (rider condition). The East Washington Avenue intersection was the site of three of these incidents. Overall, this is not a high number, but given that there are few crossing facilities, bicyclists are probably avoiding the area.

E.2 EXISTING BICYCLE FACILITIES

There are five basic types of bicycle accommodations: shared roadway (no bikeway designation), signed shared roadway, bicycle lane, bicycle boulevard, shared use path. These are in order from their suitability for more experienced riders to less experienced riders. The majority of Stoughton Road is access controlled and biking is not recommended. Shoulders are paved along many areas of Stoughton Road; however, they are not wide enough for comfortable bike travel. Many of the roadways crossing Stoughton Road are either designated bicycle routes or suitable for bicycle travel. However, very few have marked bike lanes.

Bike/pedestrian overpasses provide a crossing of a major roadway that is much less complex and stressful for the majority of bicyclists to use. These simplified crossings can greatly improve the safety, mobility and access of less experienced cyclists. The only overpass currently within the project limits is at Portland Parkway, near Milwaukee Street.

Bicyclists face special challenges at the Beltline, Cottage Grove Road, and IH 39/90/94 interchanges. At times motorists do not come to a complete stop at exit ramps and fail to yield to bicycle traffic. This is more likely to occur if the cyclist is on the sidewalk, rather than on the road. At entrance ramps, motorists are in the process of accelerating when they cross the bicyclist's lane of travel. This could potentially be a problem for a cyclist on Stoughton Road. Further, the design of streets approaching interchanges typically encourages higher speeds.

There are several signalized intersections crossing Stoughton Road. Terminal Drive, Broadway, Pflaum Road, Buckeye Road, Lexington/Commercial Avenue, East Washington Avenue, Anderson Street, Kinsman Boulevard, and CTH CV are all signalized intersections that have or could have high bicycle demands. Signalized crossings that are at street level create more of a neighborhood feeling and are easier to cross for bicyclists when traffic volumes and speeds are low. However, as traffic volumes and speeds increase, these crossings become much more difficult. The distance of these crossings and the amount of green time is critical to bicyclist safety and comfort. The addition of turn lanes on the crossing streets also complicates the bicyclist's crossing.

If Stoughton Road was a superior bicycle facility, like a bicycle boulevard, it is safe to say that, because of its location and continuity, it would be heavily used by bicyclists. High traffic volumes at high speeds and no defined bicycle lanes along Stoughton Road make bicycle travel exceedingly difficult and not recommended. Additionally, there are no continuous/uninterrupted parallel routes in the Stoughton Road corridor.

Because there are no safe crossing points at the Beltline, bicycle travel to Madison from communities to the south is cut off. There are also limited connections to businesses located on the Stoughton Road frontage roads from the neighborhoods located behind these businesses. Bicyclists need to be able to move safely and comfortably along the Stoughton Road corridor, and to be able to access destinations.

WisDOT will address some of these needs in the near future. WisDOT has a project planned for 2005 to improve pedestrian and bicycle access crossing the Beltline on Stoughton Road. The project will include adding bike lanes and paths on Stoughton Road as it crosses under the Beltline and continues to East Broadway. These will provide access through the Beltline to the more experienced bicyclist. Also, to meet the needs of the developing Marsh Road neighborhood, an overpass of the Beltline will be constructed connecting Marsh Road to Agriculture Drive. Bicycle accommodations will be part of the construction. This will provide a link to the Village of McFarland and other communities to the south through several north-south bikeways that are planned as part of the Marsh Road Neighborhood Development. However, the distance between the Marsh Road overpass and Stoughton Road is nearly a mile, adding greatly to the bicycle trip distance for less-experienced bikers. Some crossing of the Beltline, possibly in the Dutch Mill Road area, would provide a more direct route.

A map showing the existing bicycle facilities in the corridor is shown in Exhibit 28.

<u>South of Terminal Drive</u> – Terminal Drive ends at the south Madison city limits and offers an acceptable alternative to Stoughton Road between Larson Beach Road in McFarland and the intersection with Stoughton Road near South Dutch Mill Road in Madison. The road from McFarland north travels through an industrial area and consists of two lanes without shoulders. The road may be bikeable for some advanced or experienced riders but is a challenge because of the narrow road surface, which is in poor condition, and the lack of bicycle accommodations. The intersection with Stoughton Road is at-grade and has no bicycle accommodations, making it a challenging and possibly intimidating crossing for most riders.

Click here for EXHIBIT 28 EXISTING BICYCLE FACILITIES PDF (475 KB)

Triangle Street travels north/south, parallel to Stoughton Road from Siggelkow Road to Voges Road where it becomes South Dutch Mill Road. The road starts out wide with three lanes and sidewalks on both sides but narrows and loses the sidewalks to the north. The bikeability of Triangle Street and South Dutch Mill Road will be improved when bicycle lanes under the Beltline on Stoughton Road are constructed.

Terminal Drive to Broadway - The underpass of the Beltline at Stoughton Road is currently the only way for motorists and bicyclists to cross the six-lane freeway on the east side of the metropolitan area. There are no defined bike lanes on Stoughton Road in this area. Accommodations for bicyclists on this stretch of road are so poor that only the most competent, fearless and/or needy bicyclists will attempt to use it. Others simply forgo their bicycles for other modes of transportation, if available. The intersection south of the Beltline is reportedly so uncomfortable to use by cyclists that many choose to run the red light while traveling north bound in order to beat following motorists to the underpass where the road narrows. Because of its directness, this section of road will likely continue to be the main north-south route used by cyclists for the foreseeable future. The connections on Stoughton Road under the Beltline and on Marsh Road over the Beltline will greatly enhance bicycle accessibility in this area.

Broadway to Buckeye Road – The East Broadway Service Road to Progress Road, although not an ideal connection, is the current best option to support bicycle travel parallel to Stoughton Road up to Pflaum Road. The Service Road is a relatively short, two lane, twisting street which goes north from Dutch Mill Road to the intersection of Progress Road and Femrite Drive along the east side of Stoughton Road. It is important to bicycle travel as it serves an indoor skateboard and BMX park on Progress Road but, will become even more important as bicycle accommodations are made on Stoughton Road and Marsh Road to cross the Beltline. Progress Road is the closest north/south road east of Stoughton Road in the area. There are no marked bike lanes but relatively low traffic volumes, and the roadway is paved wide enough to accommodate bicycle travel. However, parking is allowed on Progress Road and there is a high percentage of large truck traffic. Travel south is currently interrupted at Collins Court and travel north is indirect because the road turns east to meet up with Progress Road, which then continues north to Femrite Drive, which heads east and eventually crosses IH 39/90/94. When bicycle connections across the Beltline are completed, the East Broadway Service Road will become much more important to bicycle travel. Femrite Drive has been reconstructed and includes bicycle facilities which will increase bicycle travel and provide access to the Marsh Road overpass as well.

West of Stoughton Road, there is currently a gap where there are no north-south facilities between Femrite Drive and Tompkins Drive.

The service roads on the east and west sides of Stoughton Road between Tompkins Drive, and Buckeye Road are two lanes and serve bicyclists and motorists doing business in the area and traveling along the corridor. No bicycle lanes are currently defined on these roadways and the east and west service road intersections with Pflaum Road and Buckeye Road are difficult for many bicyclists.

Monona Drive runs parallel to Stoughton Road to the west and is a major north/south road and the entrance to the City of Monona from the south. Monona Drive has the potential to be a major north/south route for bicyclists. Improvements to Monona Drive that include bicycle accommodations have been studied and planned by the City of Monona. Construction of these improvements is tentatively planned for 2008. However, because of its distance from Stoughton Road, Monona Drive is not an alternative to the Stoughton Road corridor and other accommodation for bicycle travel in this area must be identified.

Buckeye Road to East Washington Avenue – Dempsey Road is already identified on the *Madison Bicycling Resource Guide & Route Map* as being suitable for most bicyclists and part of the road is designated as a bike route. South of Pinchot Avenue, Dempsey Road intersects Maher Avenue. Together, Maher Avenue and Dempsey Road extend, uninterrupted, from Tompkins Road, all the way to Milwaukee Street. These two roads connect several existing bicycle facilities (Buckeye Road bicycle route, Lake Loop bicycle route, Portland Parkway overpass and bicycle trail and the Milwaukee street bicycle lane) and several possible additional facilities. Bicycle lanes are currently not marked on Dempsey Road.

The Union Pacific Railroad right-of-way from IH 39/90/94, to Dempsey Road, is tremendously important to bicyclists. Regionally, a bicycle facility along the right-of-way would connect two major recreational trails. Locally, a trail here would provide passage for bicyclists and pedestrians along the east side of Stoughton Road from the service road at Buckeye Road to Cottage Grove Road where they could cross under Stoughton Road and continue on to the bike route at Dempsey Road. This is a long desired route and final missing piece for the Capitol City Trail. It would connect the current Capitol City Trail terminus at Dempsey Road and the Glacial Drumlin Trail in Cottage Grove. It would ultimately connect the Military Ridge Trail with the Glacial Drumlin Trail, providing a continuous trail from Dodgeville to Waukesha.

Atlas Avenue east of Stoughton Road connects Cottage Grove Road with Milwaukee Street via Robertson Road and the Service Road. Atlas Avenue and the Service Road are immediately adjacent to Stoughton Road and allow bicyclists to avoid traveling east to Acewood Boulevard. However, Acewood Boulevard more directly connects Buckeye Road with Milwaukee Street (via Stacker Avenue and Dondee Road). Atlas Avenue and the Service Road are local streets that can support bicycle traffic but do not have defined bicycle lanes. Good connections between the neighborhood west of Acewood Boulevard and the industrial area at/around Atlas Avenue currently do not exist.

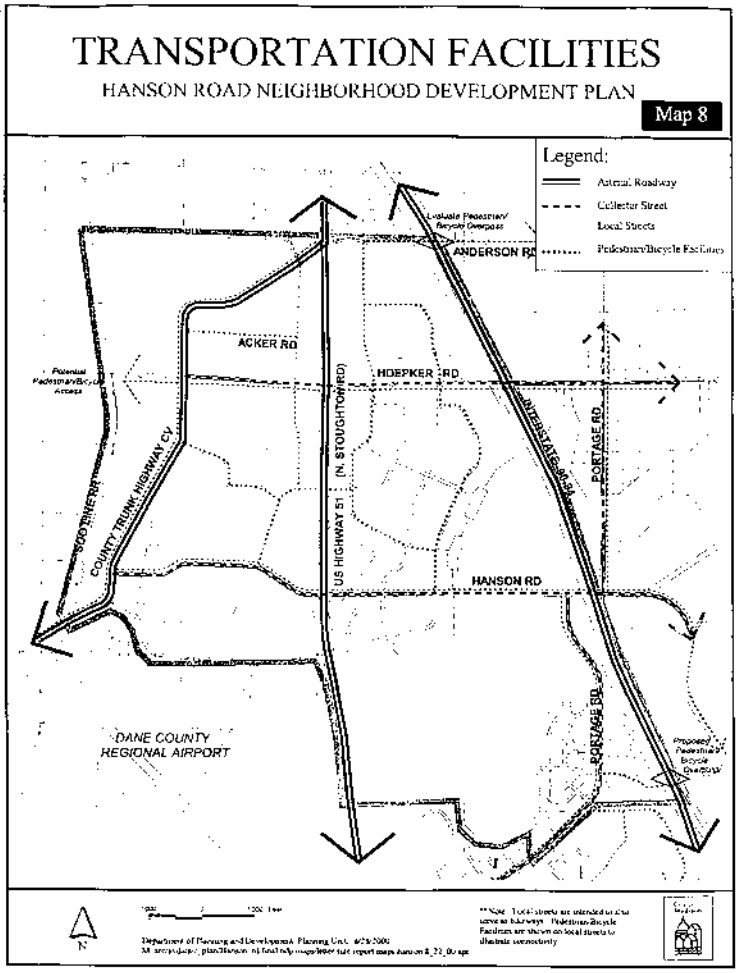
Bicyclists are prohibited from using STH 30 and it, along with Stoughton Road, form two significant barriers to bicycle travel in this area. The first crossing of STH 30 west of Stoughton Road is North Fair Oaks Avenue, a designated bike route located ¾ mile away. East of Stoughton Road, the only crossing of STH 30 is North Thompson Drive, located ¾ mile away. The Marsh View Bike Path is planned to pass under STH 30 on the west side of Stoughton Road, connecting Milwaukee Street with the neighborhood to the west of Starkweather Creek and the railroad. Unfortunately, this will not connect to the Stoughton Road service road to the east. Connecting the Marsh View Bike Path to this service road would provide access to the signalized crossing of Stoughton Road at Lexington Avenue and to the businesses (Wal-Mart and Cub Foods) and other destinations on the east side of Stoughton Road.

East Washington Avenue to Pierstorff Street – From Pierstorff Street to East Washington Avenue, Wright Street is equipped with bicycle lanes. Wright Street and Anderson Street border the Madison Area Technical College (MATC) Truax Campus, so there is a high volume of bicycle and pedestrian traffic in the area. South of East Washington Avenue, Wright Street becomes Fair Oaks Avenue which is designated as a bicycle route. Although not overly convenient to bicyclists who wish to travel adjacent to Stoughton Road to the east, these two roads do connect to the Lexington Avenue bike route, which connects to the Portland Parkway overpass, the Lake Loop bicycle route and the Marsh View bike path. Portage Road is the nearest continuous north/south road east of Stoughton Road and north of East Washington Avenue. Independence Lane, and the multi-use path north to Hayes Road does offer a partial alternative to Portage Road. For some cyclists however, this corridor is even farther east of Stoughton Road than Portage Road. Portage Road is also defined as a bicycle route by the City of Madison. Because of this, Portage Road currently experiences, and can be expected to continue to experience, significant bicycle traffic. However, Portage Road does not currently have defined bicycle lanes.

Pierstorff Street to IH 39/90/94 – From Pierstorff Street north there is no readily accessible bicycle facility parallel to Stoughton Road. County Trunk Highway CV (CTH CV) is listed as a street suitable for bike traffic and intersects with Stoughton Road near the north project limits. However, the roadway does not have defined bicycle lanes, has only three-foot paved shoulders, is heavily traveled by commuters, has severe curves, and deviates well west of the Dane County Regional Airport, making it a less desirable route for those seeking access to Stoughton Road and inexperienced bicyclists.

The Hanson Road area is currently undeveloped but a development plan for the area is approved and development is expected soon. The Hanson Road Development Plan, which encompasses the area between CTH CV and IH 39/90/94, includes parallel routes along Stoughton Road in several areas for bicycles and pedestrians. (See Exhibit 29 Hanson Road Transportation Facilities). Accommodations are not specified as either on- or off-road. Parallel routes will be provided on CTH CV, Portage Road, the collector and arterial streets within the neighborhood. However, on the west side of Stoughton Road, the airport acts as a barrier to any north-south connection of bicycle facilities.

EXHIBIT 29 HANSON ROAD TRANSPORTATION FACILITIES



East/West Movements In and Through the Corridor

Currently there are few crossings of Stoughton Road that are suitable for bicyclists of lower experience levels. Bicyclists need to be able to cross Stoughton Road at reasonable intervals and in a reasonable manner. Transit stops are often placed every 800' so that people will use the system. It has been estimated that a bicyclist will detour from his or her intended route by only one to two blocks to find a more suitable route before giving up the idea of bicycling. Directness of route is most critical to commuter cyclists whose primary concern is speed of travel. The spacing of the crossings of Stoughton Road is critical to the viability of the bicycle system in this area.

The types of crossings provided are critical as well. At-grade crossings of varying levels of accommodation for cyclists currently exist approximately every 1/2-mile along Stoughton Road. The majority of cyclists are not capable of, or comfortable using these crossings. Advanced and experienced cyclists are often capable of, and to a lesser extent comfortable with, crossing major highways like Stoughton Road at-grade. In fact, some commuter cyclists prefer at-grade crossings because they often offer the most direct route to their destination. However, these riders only represent about 20 percent of cyclists. The remaining 80 percent of cyclists will only be comfortable operating on residential streets or their equivalent. For these cyclists to be afforded mobility and access with their bicycles, grade separated crossings such as overpasses and underpasses must be provided.

South of USH 12/18 (Beltline) – Siggelkow Road between Terminal Drive and Marsh Road is a relatively wide road with sidewalks and is currently rideable for most experienced cyclists, even though bike lanes are not defined. However, as the area develops and traffic volumes increase, riding will become more difficult and less comfortable for all but the most advanced riders. In the future even with bike lanes and improvements to the intersection with Stoughton Road it will never be easy for less experienced adults and children to cross Stoughton Road. Voges Road connects South Dutch Mill Road and Triangle Street with Marsh Road to the east on the east side of Stoughton Road. The road currently has two narrow lanes and no shoulders. As the area develops and when the overpass of Marsh Road is created, this road will need to be upgraded to include bicycle lanes to handle the additional bicycle and motor vehicle traffic.

USH 12/18 (Beltline) to Broadway – West of Stoughton Road, Broadway is an exceptional bicycle route. The road has two bicycle lanes, four traffic lanes, a lighted, grass center median and there are sidewalks on both sides of the road. The intersection with Stoughton Road is at-grade with signals and has been partially striped to accommodate bicycle traffic. The large intersection, combined with long signal cycles for traffic on Stoughton Road will continue to make crossings difficult. This is a critical location for bicycle travel. Dutch Mill Road is a connection between Broadway and Femrite Drive. It also passes by the Dutch Mill Park and Ride Facility. Currently Dutch Mill Road consists of four vehicle travel lanes and has not been improved for bicycle travel until it passes the Park and Ride and turns north towards Femrite Drive. At this point, and through Femrite Drive the roadway has recently been reconstructed with bicycle lanes. When the overpass is placed at Marsh Road, Dutch Mill Road will become an important route for bicyclists as a back route access to these businesses and the connection to Broadway.

Broadway to Buckeye Road – Femrite Drive west of Stoughton Road runs from Copps Avenue west to Monona Drive and the proposed bicycle facility on that road. Femrite Drive currently does not intersect with Stoughton Road. Femrite Drive east of Stoughton Road runs from East Broadway Service Road, intersects with Dutch Mill Road, and continues east beyond IH 39/90/94 and CTH AB. Bicycle lanes were included as part of the recent reconstruction between Dutch Mill Road and Agriculture Drive. East of Agriculture Drive and through IH 39/90/94, however, bicycling is not recommended due to the poor accommodations.

West of Stoughton Road Tompkins Drive runs from the Stoughton Road Service Road at Glendale Elementary School to Monona Drive. This road connects the Service Road with the neighborhood to the west and Pflaum Road with Monona Drive. East of Stoughton Road Tompkins Drive connects the Stoughton Road Service Road with Progress Road. Tompkins Road does not currently intersect with Stoughton Road.

Pflaum Road and Buckeye Road are designated bike routes for the majority the area from Agriculture Drive to Monona Drive. Pflaum Road, and the bike route, does continue west as Nichols Road almost to Lake Monona. Buckeye Road joins the Lake Loop bike route and also continues northwest to the shore of Lake Monona. East and west of Stoughton Road, Pflaum Road has two very wide lanes but no bicycle lanes. West of Stoughton Road, Buckeye Road has two lanes with two parking/bike lanes and sidewalks. East of Stoughton Road, Buckeye Road consists of two very wide lanes with bike lanes and there are sidewalks on both sides of the road. Buckeye Road continues east under IH 39/90/94 and eventually becomes CTH AB and heads south, although this section does not have suitable bicycle accommodations.

Both of the Pflaum Road and Buckeye intersections with Stoughton Road are signalized, at-grade, and have bicycle accommodations in the form of bicycle lanes. However, they are very large intersections with long signal phases for traffic on Stoughton Road. They are very difficult intersections for most bicyclists to cross. The intersections are very important to east-west bicycle movements in the area. With the locations of residences, businesses, a golf course, and several schools nearby (including Madison LaFollette and Monona Grove High Schools), there are still few marked bikeways. There is a need to provide designated bikeways on Pflaum Road and Buckeye Road east and west of Stoughton Road to provide a consistent bicycling experience. These areas are a prime opportunity to provide a continuous east-west route connecting these destinations.

<u>Buckeye Road to East Washington Avenue</u> – Cottage Grove Road is CTH BB and extends from the shore of Lake Monona beyond IH 39/90/94 and Sprecher Road. Between Atlas Avenue and Thompson Drive, Cottage Grove Road has four lanes (including wide curb lanes usable by bicyclists) and a center median. Otherwise the road is unimproved for bicyclists. The road crosses Dempsey Road and the Lake Loop bicycle route as well as the Union Pacific Railroad right-of-way which may someday be an important trail link through the area.

There is currently a large amount of pedestrian, bicycle and motor vehicle pressure on the road. The area has many services which all three users need access to, and there is a large elderly population which requires special consideration. New development to the east is putting increased pressure on the road as well. Cottage Grove Road passes under Stoughton Road but this underpass is not improved for bicyclists. In fact, many bicyclists choose to ride the sidewalks at this location to avoid narrow lanes and copious high-speed traffic, and medians, without bicycle and handicap ramps, which extend into the crosswalk.

The Portland Parkway overpass is the only grade-separated crossing of Stoughton Road designed specifically for bicyclists and pedestrians in the project area. The overpass connects the future Marsh View Bike Path, Dawes Road Bike Route, Starkweather Creek Bike Path, and North Fair Oaks Avenue Bike Route to the west of Stoughton Road with Portland Parkway and ultimately Milwaukee Street to the east. The overpass effectively allows for a neighborhood level crossing of Stoughton Road adjacent to the Milwaukee Street interchange. The overpass is currently acceptable for all bicyclists although some commuter bicyclists may choose to use the bike lanes on Milwaukee Street if they provide a faster, more direct route to their destination.

Milwaukee Street runs from East Washington Avenue to Sprecher Road. Milwaukee Street crosses the Fair Oaks Avenue bike route and the bike path south of Corporate Drive. At Walter Street, Milwaukee Street gains wide curb lanes which continue to Thompson Drive. The street crosses IH 39/90/94 and ends at Sprecher Road. Because of its location, length, crossings of Stoughton Rd and IH 39/90/94, and proximity to several established bicycle routes, Milwaukee Street is very important to bicyclists. Milwaukee Street has bike lanes for a short distance as it passes under the Stoughton Road interchange; however, the bike lanes are not marked on Milwaukee Street in other areas. The overpass at Portland Parkway is an acceptable alternative route to Milwaukee street for bicyclists who are not comfortable using Milwaukee Street.

Lexington Avenue is a designated bike route and connects the Fair Oaks Avenue bike route with the Nakoosa Trail bike route and the Thompson Drive bike route via Commercial Avenue. There are no bike lanes on Lexington Avenue but Commercial Avenue does have bike lanes south and east of Nakoosa Trail. The intersection with Stoughton Road is at-grade and is unimproved for bicyclists. The crossing is further complicated by the railroad tracks which cross Commercial Avenue just east of the Stoughton Road intersection.

East Washington Avenue to Pierstorff Street

East Washington Avenue is also USH 151 and it provides a direct route in and out of Madison for many bicyclists just as it does for many motorists. The road carries very large numbers of motor vehicles and relatively few bicyclists. It is a major commuter route, there are many retail locations in the area, MATC is just north of the Stoughton Road intersection, and there are several schools and neighborhoods located just off of East Washington Avenue. There are currently no bicycle facilities in the area of Stoughton Road. However, East Washington Avenue is scheduled for reconstruction. When rebuilt, East Washington Avenue will have bicycle lanes and can be expected to carry very large numbers of bicyclists.

Anderson Street is the first east/west street south of the Dane County Airport, provides access to MATC, and is the major connection for westbound traffic coming from East Washington Avenue via Stoughton Road into the area. Because of this it carries large amounts of bicycle traffic and has been designated as a bicycle route west of Stoughton Road. Anderson Street connects to the Starkweather Creek Bike Path and crosses the bike route on Wright Street. Although it is a very important part of the bicycle network, there are no designated bike lanes on the four lane undivided roadway between Wright Street and Stoughton Road. Also, the at-grade intersection with Stoughton Road does not accommodate bicycle travel. East of Stoughton Road the bicycle route continues via a short bike path, to Lien Road, and to a bike path through Reindahl Park.

Kinsman Boulevard connects Hoffman Street and Wright Street (and its bicycle route) to Stoughton Road. The intersection with Stoughton Road is at-grade and is not improved for bicycle travel. It provides limited access for bicyclists and there are better alternative routes for bicyclists in the area.

<u>Pierstorff Street to IH 39/90/94</u> – Pierstorff Street could provide access for bicyclists from Pearson Street, adjacent to the east side of the airport, to Stoughton Road. However, there is a locked gate off of Stoughton Road onto a private drive which prevents vehicle access and disrupts bicycle access to the bike lanes and bike route on Wright Street (although many bicyclists simply go around the gate).

The Stoughton Road intersection with Rieder Road experienced at least one fatal vehicle crash in recent years. As a result the intersection has been changed to prevent southbound traffic from turning onto Stoughton Road. There is a school and a growing subdivision to the east of this intersection. Without access to Stoughton Road, bicyclists in this area must travel to Portage Road.

Bicyclists need access to and along Stoughton Road in this area. This could be accomplished by including bicycle lanes, or marked paved shoulders or by creating a multi-use path in the right-of-way adjacent to the road. The Hanson Road Development Plan includes crossings of Stoughton Road in several areas for bicycles and pedestrians. Accommodations are not specified as either on- or off-road. Crossings of Stoughton Road at Hanson Road, Hoepker Road, and CTH CV/Anderson Road are proposed. East-west connections across the Interstate will be made on the Hoepker Road and Portage Road overpasses.

E.3 ASSESMENT OF EXISTING BICYCLE FACILITIES

Stoughton Road and the corridor in which it lies are a vital part of the Madison area transportation system. Motorists, bicyclists and pedestrians all use the corridor. To some it is critical link to their destinations. To others it is a major barrier to be overcome. As the corridor has developed, emphasis has been placed on accommodating the motor vehicle user. Unfortunately, this emphasis has resulted in Stoughton Road and the corridor through which it travels becoming by-and-large a giant impediment to bicycle travel. Future plans for the corridor must seek to improve mobility and access for bicyclists, both for the advanced/experienced user and the casual or novice user. Many of the needed facilities are in place but are in need of greater definition and connectivity. The facilities become even more valuable if additional crossings, such as bicycle and pedestrian overpasses, for the less-experienced bicyclists are included in future roadway improvements. Improved mobility and access for bicyclists will help decrease traffic congestion, decrease pollution, improve citizen fitness, enhance tourism, and create a stronger sense of community in the area.

E.4 PEDESTRIAN NEEDS

The corridor study area includes three major arterials with limited access. Stoughton Road, the Beltline, and IH 39/90/94 divide the corridor area and in many ways define the neighborhoods on the east side of Madison. They are a barrier to those who desire walking to a destination on the other side of these roadways. These barriers also hinder the access to mass transit, further stressing the area transportation system.

The very large intersections also present a problem for pedestrians. At most of the signalized intersections that have pedestrian crossings, Stoughton Road is a minimum of 8 lanes (two lanes for through traffic and separate lanes each for left and right turns in each direction). Normal pedestrian walking speeds are 4.0 feet per second, lower for the elderly or disabled (Manual on Uniform Traffic Control Devices, USDOT & FHWA, December 2000). For pedestrians to safely cross eight twelve-foot lanes with medians and islands (approximately 120 feet), very long signal phases for pedestrians would be needed. Intersections like East Washington cannot provide for the high traffic volumes and provide a long pedestrian phase. Pedestrian phases are not sufficient duration, causing pedestrians to be stranded in the islands or to make risky maneuvers to complete the crossing.

Pedestrian facilities are important for several reasons. Everyone is a pedestrian at some point during their travels. Walking or pedestrian movements provide the young, old, and those with disabilities access they may not otherwise have. The majority of walking trips are made by those under the age of 14 and over the age of 45 (Wisconsin Pedestrian Policy Plan 2020,

March 2002, Wisconsin Department of Transportation, Division of Transportation Investment Management, Bureau of Planning). Walking promotes good health and provides a sense of community. Pedestrian facilities enhance commercial opportunities for food service and retail businesses. Also, walking reduces the number of short-distance vehicle trips and the amount of air pollution.

There are several sections of the project corridor where pedestrian accommodations are not an issue, either because of adequate facilities or lack of destinations. However, the majority of the residential and commercial developed areas are lacking in pedestrian facilities. The focus of the pedestrian needs in the corridor will be on crossing and parallel facilities in these areas.

Crashes Involving Pedestrians

There are an average of 1,885 pedestrian-related crashes per year in Wisconsin (Wisconsin Pedestrian Policy Plan, WisDOT, March 2002). Fifty-eight of these are fatal. The number of fatalities ranks Wisconsin near the middle of all states. However, when comparing the rates per vehicle miles traveled and number of pedestrians, Wisconsin is among the 10 safest states in the nation. In the City of Madison over the past 40 years, the average number of crashes involving pedestrians is 108 per year (City of Madison 2001 Traffic Crash Report, Madison Transportation Department) . The majority (50.7%) occur on primary arterials like Stoughton Road. However, within the project area from 1995 to 2000, only five pedestrian-related crashes occurred, two where alcohol was a factor. Of the three crashes that alcohol was not a factor, one crash each occurred at the East Washington Avenue and Anderson Street intersections. The other occurred at the Beltline ramps. By the numbers, the corridor would appear to be a safe route for pedestrians. However, because Stoughton Road is in general not “pedestrian-friendly” it is more an indication that pedestrians are avoiding the area.

E.5 EXISTING PEDESTRIAN FACILITIES

As previously mentioned, the majority of pedestrians are younger or older individuals. Seventy-one percent of walking trips are less than one mile, emphasizing that pedestrian facilities must be continuous to be attractive. Walking trips are straight line in general. Pedestrians will not stray very far from the shortest distance between points. These are items that are considered in the evaluation of the corridor’s existing pedestrian facilities.

EXHIBIT 30 PEDESTRIAN FACILITIES (KINSMAN ROAD)

EXHIBIT 31 PEDESTRIAN FACILITIES (BUCKEYE ROAD)

In general, there are currently few pedestrian facilities between the Terminal Drive/Voges Road intersection and the Pflaum Road intersection. There is also not a high demand for pedestrian facilities because there are few destinations in the area. The only exceptions are at the Beltline interchange and the Broadway intersection. Access across the Beltline would provide for those

pedestrians who do desire to enter Madison from the south. The Marsh Road Development Plan does provide for some residential development within a mile of the interchange and will have some internal sidewalk systems. WisDOT is planning to provide accommodations across the Beltline with the Marsh Road overpass and sidewalks on Stoughton Road. Broadway to the west of Stoughton Road has sidewalks along both sides and some commercial destinations. There are no sidewalks on Broadway east of Stoughton Road. The Dutchmill Park and Ride, when local bus service to the area is enhanced, will become a pedestrian destination. There is still not a great need for pedestrian facilities in either area.

Sidewalks are provided on Pflaum Road from the west to the Stoughton Road intersection where there is a marked crosswalk. There are several residential developments and schools in the area. The West Service Road south of Pflaum Road provides sidewalks to the Glendale Elementary School. However, there are no sidewalks east of Stoughton Road for pedestrians once they cross the intersection. Crossing the road is difficult for pedestrians even though pedestrian buttons are provided. The signal cycles need to accommodate the large volumes of turning traffic. Therefore they do not provide adequate time for the young or elderly to cross in one cycle and the islands in the intersection offer little protection. But again, there are few destinations in the area of Pflaum Road and not a great need.

Buckeye Road has sidewalks on the north side, from the west to the Stoughton Road intersection where there is a marked crosswalk. The sidewalk continues on the north side of Buckeye Road to the east. There are no sidewalks on the south side of Buckeye Road immediately east or west of the intersection (see Exhibit 31), but there is a marked crosswalk at the Stoughton Road intersection. Crossing the Buckeye Road intersection offers the same challenges as crossing the Pflaum Road intersection because of the size of the intersection and the current traffic signal phasing. With the development of the Dean Clinic facility on the frontage in the area, there is a need to connect the sidewalk along the south side of Buckeye Road across the Stoughton Road intersection. The City of Madison has an improvement project for the Buckeye Road and East Service Road intersection that will provide this connection. Additional sidewalk on the west side of the Stoughton Road intersection will allow residential developments on both sides of Stoughton Road access to schools and the clinic in the area.

Neither of the Service Roads east or west of Stoughton Road between Pflaum and Buckeye Roads have sidewalks or marked crosswalks. Commercial development lines the area between Pflaum Road and Buckeye Road. Parking is allowed and utilized in front of the several of the businesses. While pedestrian crosswalks across the service roads could be added in areas near the retail centers, they would probably not be greatly utilized because pedestrians tend to move in straight lines to their destinations. However, if marked they would raise awareness of pedestrians in the area. There will be sidewalks provided along the East Service Road from Buckeye Road to the Dean Clinic location as part of the Dean Clinic development.

Cottage Grove Road, the Portland Parkway pedestrian overpass, and Milwaukee Street provide sufficient access across Stoughton Road through the freeway section up to the STH 30 interchange. It has been noted that pedestrians in the area still choose to cross Stoughton Road in other areas. Holes have been cut in fences on both sides of Stoughton Road near the Saint Dennis grade school, just south of Portland Parkway, and pedestrians cut across the four-lane divided roadway. This is another example of the pedestrians using a “straight-line” approach. Despite this situation, there is no significant need for additional pedestrian facilities in this area.

As previously mentioned, the crossings of STH 30 are minimal in the area. Because, no sidewalk is provided under STH 30 on Stoughton Road, there is a 1 ½-mile gap between crossings. There is not a significant residential population in the immediate vicinity of Stoughton

Road and also not a great need for pedestrian facilities on Stoughton Road at the STH 30 intersection.

From East Washington Avenue to Kinsman Boulevard there is a significant pedestrian demand. There are several restaurants, retail centers, and a drugstore in the vicinity. It also has a very high pedestrian demand for those going to the MATC campus west of Stoughton Road from bus stops and parking facilities east of Stoughton Road. There are sidewalks along both sides of East Washington Avenue and crossings at the Stoughton Road intersection. However, it is another large intersection with signal phases set to accommodate large volumes of turning traffic. Pedestrians attempting to cross Stoughton Road often get trapped on the islands and are unable to cross in one signal cycle.

Sidewalk parallels Stoughton Road on the west side from East Washington Avenue to Anderson Street. The sidewalk on the east side is discontinuous and pedestrians need to walk through parking lots in some situations. There is sidewalk and a marked crosswalk only on the north side of Anderson Street west of Stoughton Road. The crosswalks bring pedestrians east across Stoughton Road then south across Anderson Street, because Anderson Street east of Stoughton Road has sidewalk only on the south side.

There is sidewalk east of Stoughton Road along the frontage road that runs from Anderson Street to Orin Road where the frontage road ends. Orin Road is a bus stop location and a parking area utilized by MATC students. Paths in the terrace area west of Stoughton Road indicate that pedestrians cross at Orin Road to access buildings on the MATC campus, rather than walk approximately 500 feet to the marked crosswalk and sidewalk at Anderson Street. This indicates a desired straight-line path across Stoughton Road, which may not be a safe crossing point for pedestrians (see Exhibit 32). Between Orin Road and Kinsman Boulevard there is only one section of sidewalk, at the southeast corner of the Kinsman Boulevard intersection (see Exhibit 30). Kinsman Boulevard has sidewalk on the south side, both east and west of Stoughton Road, on the north side west of Stoughton Road, a marked crosswalk at the intersection, but no sidewalk on the north side east of the intersection. There are paths along both sides of Stoughton Road between Orin Road and Kinsman Boulevard indicating a need for sidewalks along Stoughton Road (see Exhibit 33). There is only one vacant parcel preventing the frontage road from being continuous between Anderson Street and Kinsman Boulevard. If the frontage road connection is made, sidewalks should be included to meet the pedestrian demands.

EXHIBIT 32 PEDESTRIAN PATH TO MATC FROM ORIN ROAD

EXHIBIT 33 PEDESTRIAN PATH ALONG STOUGHTON ROAD NEAR MATC

North of Kinsman Boulevard to the end of the project there are no sidewalks and no significant pedestrian demands. The Hanson Road Neighborhood Development Plan which encompasses the majority of this area includes pedestrian accommodations along Hanson Road, Hoepker Road, Acker Road, CTH CV, and on the internal streets that will be constructed. Pedestrian facilities crossing Stoughton Road are also shown in the development plan at Hanson Road and Hoepker Road. A four-lane divided expressway is not a good location for crosswalks. Hanson Road is a planned industrial development, there will probably not be a great demand for pedestrian facilities. North of CTH CV and through the IH 39/90/94 pedestrian facilities are not recommended.

F. TRANSIT

F.1 SERVICE

Existing transit service in the City of Madison is provided by Madison Metro buses. Currently service along Stoughton Road is provided from Milwaukee Street north to Kinsman Blvd. One of the major destinations for the existing transit routes is MATC. Service in this area is limited because of a lack of safe, convenient bus stops near Anderson Street. An express route from the East Transfer Point on Milwaukee Street to the Department of Agriculture Trade and Consumer Protection Building in the World Dairy Center travels along Stoughton Road in the morning and evening, but does not make any stops. There is no existing transit service to the City of Monona although several routes pass through the City. A map showing existing service in the study corridor is included as Exhibit 34.

Madison Metro completed a survey in January 2003 to assess the transit needs for the east side of Madison. Surveys were sent to approximately 10,000 residents that were located south of STH 30 and east of Monona Drive. As a result of the survey, significant changes are proposed for the east side service. Service along Stoughton Road is proposed from Pflaum Road to Buckeye Road utilizing the frontage road and Turner Avenue, and from Buckeye Road to Milwaukee Street utilizing Dempsey Road. The frontage roads along Stoughton Road between Pflaum Road and Buckeye Road are not proposed for significant use because the existing congestion on the frontage roads and at the intersections would cause difficulty in keeping the buses on schedule.

Proposed routes will cross Stoughton Road at Pflaum Road and Buckeye Road, although Madison Metro also has some concerns with the congestion at these intersections. One major area of concern was the ability of southbound buses on Stoughton Road making a left turn to eastbound Buckeye Road. Service in this area will be critical in the near future with the opening of the new Dean Clinic on Buckeye Road, just east of Stoughton Road.

These proposed changes are being considered by the City of Madison and were presented to the general public at a public hearing in May 2003. Proposed service also includes a route east of IH 39/90/94 via Buckeye Road and service to the City of Monona.

Madison Metro is currently in the process of discussing expansion of their route system to adjacent communities. Transit service for the future traffic modeling included express bus routes noted in the Transport 2020 study, providing service to and from Sun Prairie.

Click here for EXHIBIT 34 METRO SERVICE MAP PDF (433 KB)

F.2 PARK AND RIDE LOTS

Currently the only park and ride lot in the study corridor is the Dutch Mill Park and Ride that is located on Broadway, just east of Stoughton Road. This park and ride lot is utilized by Madison Metro for a commuter route during peak periods. The Dutch Mill Park and Ride is used extensively by coach bus service to Chicago and by vehicle commuters who carpool both in the City and interregionally. The Dutch Mill lot is near capacity on a regular basis (see Exhibit 35). No other official park and ride lots are located within the corridor.

The Wisconsin Department of Transportation completed a Park and Ride study for all of southwestern Wisconsin. The following sites were identified as potential park and ride lots within or near the project corridor. The sites are listed in the order of ranking in the study for providing the best overall service.

EXHIBIT 35 DUTCH MILL PARK AND RIDE

- Expansion of the Dutch Mill Park and Ride
- North Transfer Point (Aberg and Huxley)
- East Transfer Point (Milwaukee St. and Corporate Dr.)
- Cherokee Marsh
- IH 94/CTH N (near Cottage Grove)
- USH 151/CTH C (near Sun Prairie)
- IH 39/90/94 and STH 19/CTH CV
- Sprecher Road/Cottage Grove Road

Madison Metro also received numerous comments in their recently completed survey stating the need for a park and ride at the East Transfer Point, better service to the Dutch Mill Park and Ride and expansion of the existing Dutch Mill Park and Ride.

G. SOCIO-ECONOMIC IMPACTS TO THE EAST SIDE OF MADISON

Stoughton Road is the lifeline for the majority of the east side of Madison. It is the primary access to many businesses and residential developments. Continued growth indicates that the area is an attractive location. However, if traffic congestion continues to increase, Stoughton Road will not be an attractive route. Due to current conditions, those who would use Stoughton Road tend to divert to other routes at peak traffic hours. For some the limited access, high-speed, multi-lane IH 39/90/94 is preferred, even though it adds to the mileage of the trip. Others choose to use the local neighborhood streets that are stop-controlled, lower speed, and more direct. This has an impact to the people who live and work in the area. An assessment of these impacts to the businesses and neighborhoods is a necessary part of evaluating Stoughton Road.

G.1 NEEDS OF BUSINESSES

Stoughton Road provides a high traffic volume facility that supports the commercial and industrial land use along the corridor. Business land use is very prevalent along the USH 51/ Stoughton Road corridor area as shown in Exhibit 5 (Section II.B. – Land Uses). Approximately

27 percent of the land shown on the business inventory maps is zoned for business purposes (Dane County Regional Planning Commission Land Use Maps (2000)). Of that 27 percent, approximately 60 percent of the land is commercial use, meaning retail or service oriented businesses. The other 40 percent of the land consists of industrial uses. Most of the businesses are located between Terminal Drive/ Voges Road and Pierstorff Street. There is also a group of businesses at the north end of this study, concentrated around the IH 39/90/94 interchange. Further industrial developments are planned in the Hanson Road and Marsh Road areas. The area surrounding Stoughton Road is the last true industrial developments in the City of Madison.

Location is always mentioned as the main reason for the success of a business. Two characteristics of location that are important to the viability of the businesses on Stoughton Road are accessibility and visibility. Balancing these with the needs of the traveling public poses a challenge for the future of Stoughton Road.

Accessibility

The roadway issues mentioned most commonly businesses along the corridor consist mainly of access and congestion. There needs to be a balance in areas such as the Stoughton Road corridor between having adequate traffic to support these businesses and a high level of congestion that deters potential customers from visiting businesses.

Businesses based on walk-in traffic depend primarily on good access. Of the properties used for business that have direct frontage along Stoughton Road, the frontage roads, or the intersections with Stoughton Road, approximately 43 percent of the land use is commercial and 57 percent is industrial land use. Industrial businesses require fast efficient transportation for shipping and receiving, but don't necessarily have the prime access requirements of commercial businesses. Increased congestion on Stoughton Road will, however, result in higher transportation and operation costs for these industrial businesses.

There are specific locations where current levels of congestion likely already have an affect on businesses. Traffic congestion may also begin to inhibit further commercial and industrial development as well. Locations where present or future congestion appears to impact access are listed below:

- The Stoughton Road intersections at Pflaum Road and Buckeye Road are both locations where congestion may already discourage customers from visiting businesses located on side roads and frontage roads served by these intersections. This trend will continue to grow worse as traffic congestion increases.
- The area just north of East Washington Avenue has businesses with access directly onto Stoughton Road. There are already significant problems with congestion and safe access because the intersection is so close to these business access points. Problems will continue to grow as traffic volumes increase, possibly causing the need to reduce the number of access points to these businesses out of concern for safety.
- Development to the northern section of Stoughton Road (Hanson Road and Hoepker Road intersection areas) will place further demands on the roadway. Side road access to Stoughton Road could become near impossible for future traffic volumes using the current intersection control. There would then be a great need for major intersection improvements. The risk of making such improvements is a loss of efficiency on mainline Stoughton Road.

Visibility

Those retail businesses that depend on walk-in or drive-by traffic need to be seen. If the consumer is unable to easily see these businesses they will continue to a more visible site. Visibility of office parks, medical facilities, airports, and other services can also be a factor in a businesses desired location. Industrial and storage facilities may prefer to somewhat be hidden from the traveling public, but still need noticeable locations for delivery vehicles.

Limited access roadways provide the greatest opportunity for moving large volumes of traffic past businesses and increase exposure to potential customers. Interchanges are constructed to remove the conflict points caused by intersections. Industrial businesses benefit from the mobility of limited access roadways with interchanges. Interchanges require significant grade separations and do not offer the best visibility to the businesses near them. Advertising, to some extent, can overcome the issue of visibility. Well-known and established businesses are also able to maintain a certain level of customer loyalty that will also overcome lack of visibility. Areas of project corridor where current and future visibility from Stoughton Road impacts businesses are listed below:

- Near the Terminal Drive/Voges Road intersection the majority of the industrial facilities benefit from the lack of visibility from Stoughton Road. There are some retail establishments east of Stoughton Road that can be easily seen and benefit from drive-by traffic.
- The Broadway area businesses do not have a great deal of visibility from Stoughton Road. The majority of these businesses benefit by being seen from the Beltline.
- The section of Stoughton Road between Pflaum Road and Buckeye Road can be easily seen from the current roadway. The west side of Stoughton Road in this area is lined with retail businesses primarily dependent on drive-by traffic. Behind these businesses are mainly residential areas. The east side of Stoughton Road is a mixture of retail, industrial, and service businesses. Beyond this area are several industries and further to the east are industrial and business parks. Both sides immediately adjacent to Stoughton Road benefit from the visibility provided by the current roadway configuration.
- The Milwaukee Street interchange was constructed within the past 15 years and required the relocation of some businesses. Those that remained have continued to thrive despite some losing needed visibility. The interchange construction enhanced the visibility and marketability of the warehouse grocery store and office park along the west side of Stoughton Road.
- The Lexington Avenue and Commercial Avenue intersection area has increasingly developed since reconstruction of Stoughton Road in the area. The commercial and industrial businesses west of Stoughton Road are easily seen from the roadway and are to a degree dependent on that visibility. The commercial and retail areas east of Stoughton Road diminish the impacts of being somewhat obscured from Stoughton Road with increased advertising in the intersection area and visibility from STH 30.
- Businesses from the East Washington Avenue intersection to Kinsman Boulevard are greatly dependent on being seen from Stoughton Road. The current East Washington Avenue intersection was recommended for reconstruction to an interchange by WisDOT in a study done in 1994. If an interchange is constructed to address the traffic demands at this intersection, several of these businesses may be negatively impacted by the decreased visibility.

- North of Kinsman Boulevard to the CTH CV intersection, the majority of the existing businesses are industrial, not easily seen from Stoughton Road, and not greatly impacted by visibility. The Hanson Road Neighborhood Development Plan encompasses the majority of this area and is almost entirely planned as an industrial development.
- Between CTH CV and the IH 39/90/94 interchange area there are only two businesses that depend on Stoughton Road visibility. They are truck stop facilities that are also easily seen from IH 39/90/94.

The business needs for accessibility and visibility need to be considered if alternatives are developed in additional phases of the study. A balance will need to be struck between traffic mobility, business access, and business sightline for the Stoughton Corridor to remain a viable and economic area for all forms of commerce.

G.2 NEEDS OF NEIGHBORHOODS

Stoughton Road, as an access-controlled roadway in many areas, is the dividing line for neighborhoods in the area. There are currently thirteen neighborhoods in the Stoughton Road corridor. The majority of the residential development in the project corridor is between Broadway and STH 30. The other residential areas are located between East Washington Avenue and Hanson Road. The approved neighborhood plan for Marsh Road will add to residential development in the study area. Many of the residential areas near Stoughton Road are established neighborhoods that were developed before the roadway became a four-lane expressway between Broadway and STH 30 in 1968. Some of the areas between Stoughton Road and IH 39/90/94 have been developed more recently and at this time the areas adjacent to Stoughton Road are almost fully developed residentially. The roadway has both a positive and a negative impact on area residents. It is the main north-south access to employment and services for these residents. As the area has grown so has traffic on Stoughton Road. With the increase in traffic volumes, there have been negative impacts to the neighborhoods. Traffic diversion and noise are the two most important issues to the neighborhoods as identified by the Neighborhood Focus Group Workshop and the Policy Advisory Committee.

Traffic Diversion

Traffic volume increases have contributed greatly to the congestion at the intersections, making access from the sideroads to Stoughton Road increasingly difficult. This has caused drivers to use alternate routes around Stoughton Road to reach their destinations. Many of these routes wind through the neighborhoods and impatient drivers are using them at greater than the posted speeds. Developments east of IH 39/90/94 have added to the traffic volumes on the local collectors. Roadways such as: Acewood Boulevard, Thompson Drive, Meadowlark Drive, Camden Road, and Fair Oaks Avenue, are local collectors that have been taking larger traffic volumes than they were designed to accommodate. Construction of a four-lane, local, north-south arterial is planned for the Reiner Road/Sprecher Road/ CTH AB corridor east of IH 39/90/94. With the connection of Lien Road to this local arterial and other improved internal roadway connections, this will ease some of the traffic congestion on Stoughton Road and diversion to local collectors west of IH 39/90/94. It may, however, contribute to increased traffic on some other collector routes. The amount of development anticipated in the project corridor will also impact the use of and the volume of traffic on the Reiner Road/Sprecher Road/ CTH AB corridor. Even with these roadway network improvements, as traffic congestion continues on Stoughton Road, diversion to local collectors is expected to continue.

Noise

The Wisconsin Noise Barrier Study, WisDOT, May 1990, when referring to traffic noise prediction, states simply, “Traffic sound levels increase with vehicle speeds. Traffic sound levels increase as traffic volumes increase. Traffic speeds decrease as traffic volumes increase in capacity-controlled situations.” The Noise Barrier Study was done to satisfy the 1987 Wisconsin Act 27, which required WisDOT to develop criteria and procedures for siting noise barriers. Part of the study identified and prioritized potential noise abatement areas in 28 municipalities throughout the state. They were prioritized based on predicted noise levels, traffic exposure, residential age, and cost-effectiveness. Several areas around the City of Madison were included; among them was the section of Stoughton Road between the Beltline and STH 30.

Developments east of Stoughton Road and IH 39/90/94 have contributed greatly to the noise levels in the project area, not only by increasing the number of vehicles on the roadways but also by removing natural vegetative barriers that enhance sound reduction. Of the 207 study areas statewide, sections near Stoughton Road placed no higher than 154 on the list. Established residential areas west of Stoughton Road between Buckeye Road and Milwaukee Street were on Noise Barrier Study list (#154, #169, and #181). These areas are not topographically shielded from the traffic noise on Stoughton Road. The area south STH 30 and east of Stoughton Road is also on the Noise Barrier Study list (#182). Noise barriers are considered when the decibel levels are greater than 67. The highest predicted noise level (69.2 decibels) in the Stoughton Road corridor was in one of the sections west of Stoughton Road and south of Cottage Grove Road. Areas on the Noise Barrier Study list are eligible for funding as stand-alone projects in their numeric order. However, there is very little Federal and State funding in Wisconsin for individual noise barrier projects. Municipalities are required to share costs when the projects are within their limits. If roadway improvements are made that would increase noise levels (additional lanes, raising roadway elevations, or interchanges) funding can be included as part of the improvements, but there is a limited amount of funding even for these projects.

Traffic modeling shows that traffic volumes will increase and, therefore, traffic noise levels will increase. Noise levels impact residents’ daily lives and are of great concern to those neighborhoods along Stoughton Road.

H. AESTHETICS

Stoughton Road is a gateway to the City of Madison both from the north and the south. As such, a consistent decorative theme or aesthetic treatment would provide a greater sense of place for those entering the City. Aesthetic treatments are in place at the Milwaukee Street and STH 30 interchanges in the form of decorative concrete treatment to the overpass structures and retaining walls (see Exhibit 36). The East Washington Avenue project, which includes some work at the intersection with Stoughton Road, will implement some streetscape attributes to that corridor. Decorative landscaping in urban sections, corridor specific signing, colored concrete at crosswalk areas, and decorative street lighting could enhance the corridor and give a theme to the roadway despite its diverse typical section. It could also enhance the roadway such that it may not seem as such a barrier to the neighborhoods. Further analysis of potential aesthetic treatments will be done if an alternatives phase is warranted.

EXHIBIT 36 AESTHETIC STRUCTURES

STH 30

Milwaukee Street

Milwaukee Street

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