MEMORANDUM

Date: September 8, 2005

Landscape Architecture
Urban Design
Community Planning
Civil Engineering

To: Lance McGrath
McGrath Associates
103 North Hamilton Street
Madison, WI 53703

From: John Lichtenheld, P.E. and Lee Gibbs
Project: Union Corners
SAA #: 1899.01

Re: Traffic Comparison for Union Corners Redevelopment

The following memorandum summarizes the results of a traffic comparison performed by Schreiber/Anderson Associates (SAA) for the proposed redevelopment of the Union Corners site located in Madison, Wisconsin. The Union Corners site is proposed to comprise of approximately 300 residential dwelling units; approximately 40,000 square feet of retail space; approximately 30,000 square feet of office space; and an approximately 40,000 square-foot supermarket. SAA analyzed the traffic impacts of this development, publishing the results in December 2004 report. It is our understanding, though, that consideration is being given to adding an additional 150 residential dwelling units to the site for a total of 450 residential units.

The purpose of this memorandum is to identify the additional traffic that the proposed 150 residential dwelling units will generate and to determine the additional impact the proposed dwelling units will have on the adjacent street network.

Traffic Comparison

As previously mentioned, SAA performed a traffic impact analysis for the redevelopment of the Union Corners site in December 2004. To determine the impact traffic from the Union Corners site will have on the external streets, projected Year 2020 traffic volumes were utilized as baseline conditions for analysis purposes. Included in the Year 2020 volumes was traffic that is generated by land uses on the existing Union Corners site; however, upon redevelopment, these users will be eliminated. Therefore, to include the addition of 150 residential dwelling units to the adjacent streets may not accurately represent traffic volumes entering and exiting the Union Corners development. Thus, a traffic comparison between the existing land uses and the proposed 150 residential dwelling units was conducted to determine if more traffic will be added to the adjacent street network upon redevelopment. **Table 1** illustrates the existing and proposed land uses and their projected weekday morning and evening peak hour trips that would be generated. It should be noted that the peak hour traffic listed in **Table 1** were based on trip rates published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 7th Edition.* In addition, several buildings on the Union Corners site are currently vacant; however, for purposes of this comparison, it was assumed that they would be generating traffic to and from the site as it is unknown whether their occupancy was considered in the Year 2020 traffic projections.

Table 1
TRAFFIC COMPARISON SUMMARY

Land Use	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Existing Land Uses				
10,440 sf Specialty Retail	7	4	12	16
10,260 sf Fitness Center	5	7	21	20
4,000 sf Furniture Store	1	0	1	1
2,000 sf Cafe	12	11	13	9
1,080 sf Tavern	---	---	8	4
12 Residential Dwelling Units	1	6	6	2
Total Existing Trips	26	28	61	52
Proposed Land Use				
150 Residential Dwelling Units	11	55	52	26
Difference in Trips	**15**	**-27**	**9**	**26**

The results of the traffic comparison indicate that the existing land uses generate more peak hour traffic than the proposed residential homes. As such, because the existing land uses were not removed from projected traffic volumes in the December 2004 traffic impact analysis, the addition of 150 residential dwelling units will not increase traffic volumes than what has been analyzed; therefore, no additional traffic analysis will be needed to account for this additional development.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

APPENDIX

1. INTRODUCTION

Purpose

The Union Corners project represents an opportunity to redevelop an under-utilized area along one of the City of Madison's major transportation corridors. Redevelopment of this site may serve as a catalyst for the redevelopment of parcels in the near east side of the community and a model for involving community participation in the process. To facilitate this process, a planning studio was created in April, 2003 to assist in advising the developer as plans moved through the process from concept to detail. The planning studio comprised of a number of stakeholders including representatives from the neighborhood, City of Madison staff, and the development team.

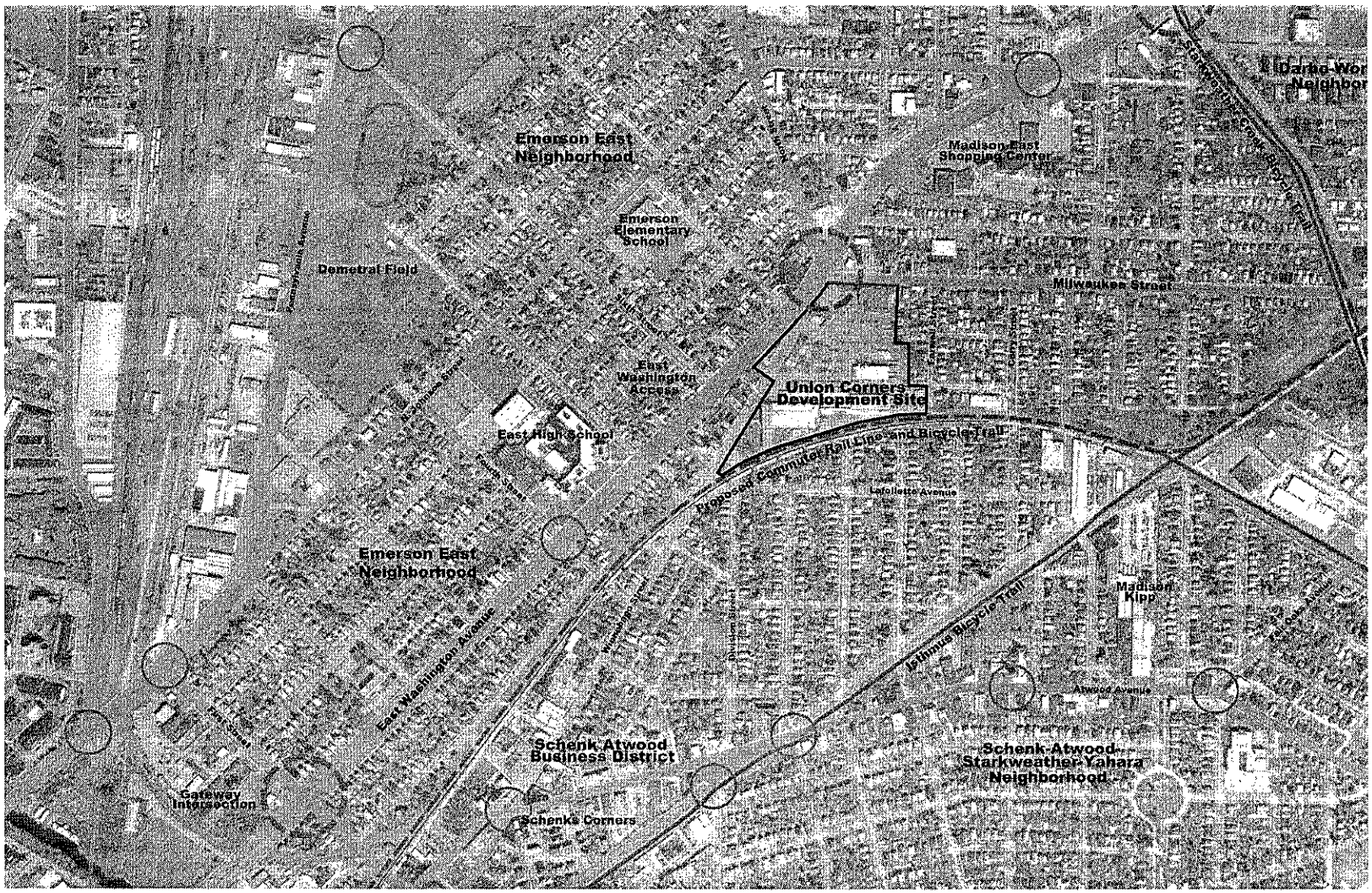
The purpose of this study is to document and develop a transportation system for the redevelopment and surrounding area that meets the needs of both the neighborhoods and development as well as captures the unique opportunities of the site.

Previous Studies

The transportation study for the Union Corners development is embodied in three separate transportation documents. The first study, Phase 1 Traffic Analysis Summary, documents historical vehicular volumes in the area and evaluates three alternative access options for the development. The second study, Phase 2 Traffic Signal System Analysis, is an evaluation of traffic signals operations along the East Washington Avenue corridor under several different access scenarios for the development (as recommended in the first study). The third study, which comprises this report, analyzes the opportunity for vehicular, transit, pedestrian, and bicycle transportation to and from the site. This report will also outline a series of transportation improvements to the area that are integrated with the proposed site to minimize the site's impact on vehicular traffic in the surrounding area and maximize the opportunities to promote alternative transportation modes to the site.

Study Area

The Union Corners redevelopment, approximately 16 acres in size, is located on the east side of East Washington Avenue, south of Milwaukee Street. However, for purposes of this study, the study area for this report encompasses a larger area bounded by Atwood Avenue, Pennsylvania Avenue, First Street, and Johnson Street. The site is currently zoned C-2 and is occupied by the vacant Rayovac Distribution Center and a vacant Kohls grocery store. The site is surrounded by the Schenk-Atwood and Emerson residential neighborhoods with retail users fronting the East Washington Avenue, Milwaukee Street, and Winnebago Street corridors. The Madison East High School, Emerson Elementary School, and the Madison East Shopping Center are located within the study area. Figure 1 illustrates the site location and surrounding street network.



LEGEND

- ARTERIAL ROAD
- SIGNALIZED INTERSECTION
- PROPOSED COMMUTER RAIL
- EXISTING BICYCLE TRAIL
- PROPOSED BICYCLE TRAIL

PROJECT NO. 1899
SCALE: 1"=500'

0 250' 500' 1000'

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Union Corners Transportation System Analysis

Study Area

FIGURE 1

2. PROPOSED DEVELOPMENT

Land Use

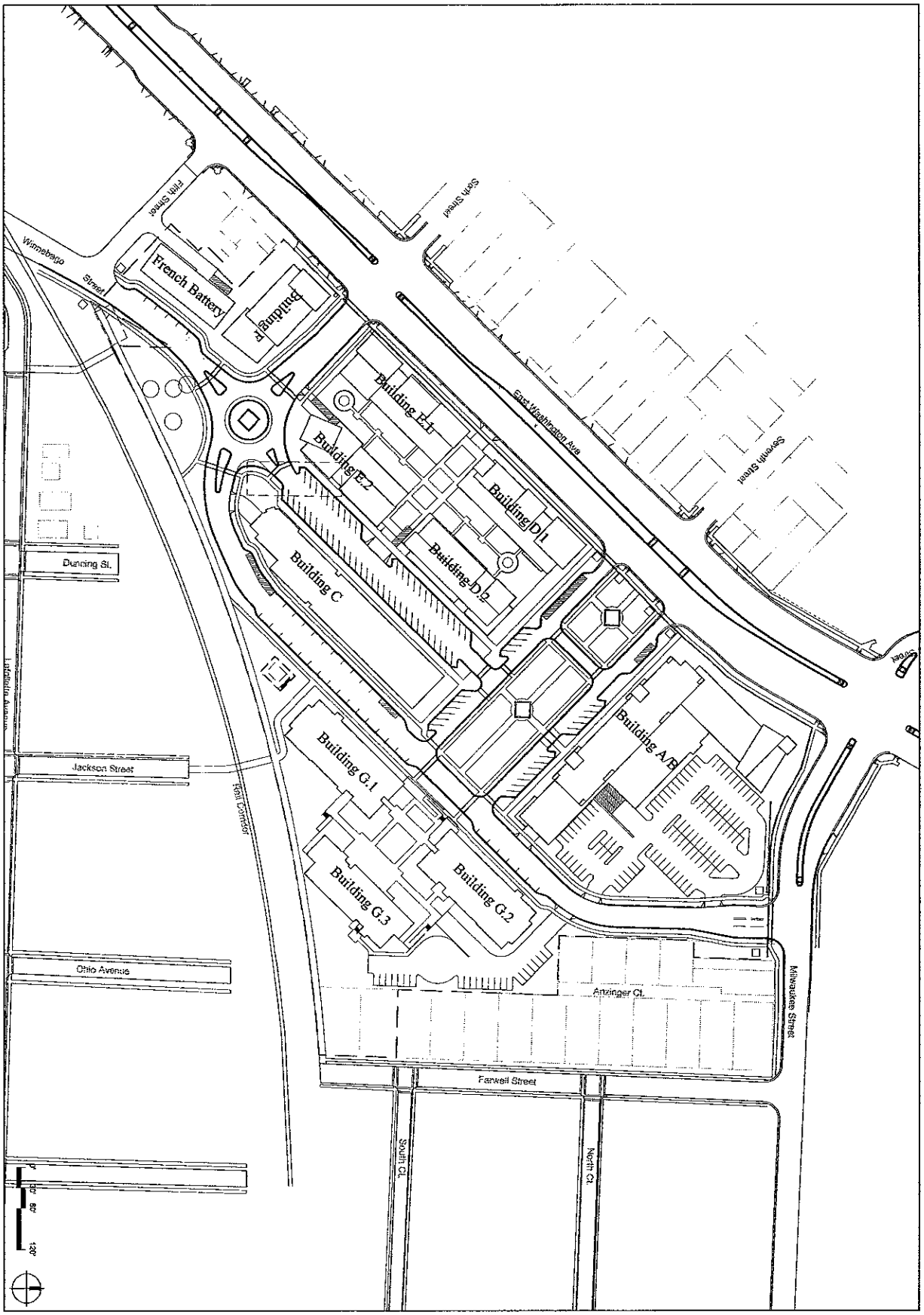
The proposed Union Corners site will consist of approximately 300 residential dwelling units, approximately 40,000 square feet of retail space, approximately 30,000 square feet of office space, and an approximately 40,000 square-foot supermarket. Figure 2 illustrates the proposed site plan of the Union Corners development. It is our understanding that a grocery store will comprise a part of the retail/office space with the remaining building area containing ancillary specialty retail and office uses. The retail component will front East Washington Avenue and Milwaukee Street with mixed commercial and office in the central part of the development. The residential component will be located above the commercial and office space and in buildings that will front the southern and western frontages of the site.

Access

The current concept is to introduce a grid system into the proposed development via a connection of public streets and smaller residential drives. Major access points to the site will be provided on East Washington Avenue at Sixth Street (via a proposed traffic signal) and on Milwaukee Street via a proposed public street. In addition, several restricted right-in, right-out access drives will be located on East Washington Avenue. It is also proposed that pedestrian connections tie both the south and west neighborhoods to the development. A bus stop will be also be provided on Milwaukee Street in front of the development. The signalization of the intersection of East Washington Avenue at Sixth Street will allow pedestrian access across East Washington Avenue as well as permit turning movements for buses from East Washington Avenue to Winnebago Street.

Phasing

Because of the size and various land uses of the project, it will be developed in several phases. The first phase will consist of the razing of all existing buildings onsite except for the front portion of the French Battery building. It is our understanding that this building will be renovated into residential units as part of the first phase. The exact phasing of the development beyond this first phase has not been determined at this time.



MARCH 29, 2006

SITE PLAN

McGrath Associates • Schreiber/Anderson Associates, Inc. • Engberg Anderson Design Partnership, Inc.

UNION CORNERS

3. EXISTING TRANSPORTATION SYSTEM

Roadway System

The site is bounded by East Washington Avenue (also known as U.S. Route 151), one of the major community arterials carrying approximately 45,000 vehicles per day. Milwaukee Street on the east carries approximately 10,000 vehicles per day, and Winnebago Street carries approximately 5,000 vehicles per day. The neighborhood transportation system in the area is shown in Figure 3 along with the most current traffic volumes. These traffic counts were obtained in 2004 to supplement the city of Madison traffic count data.

Transit System

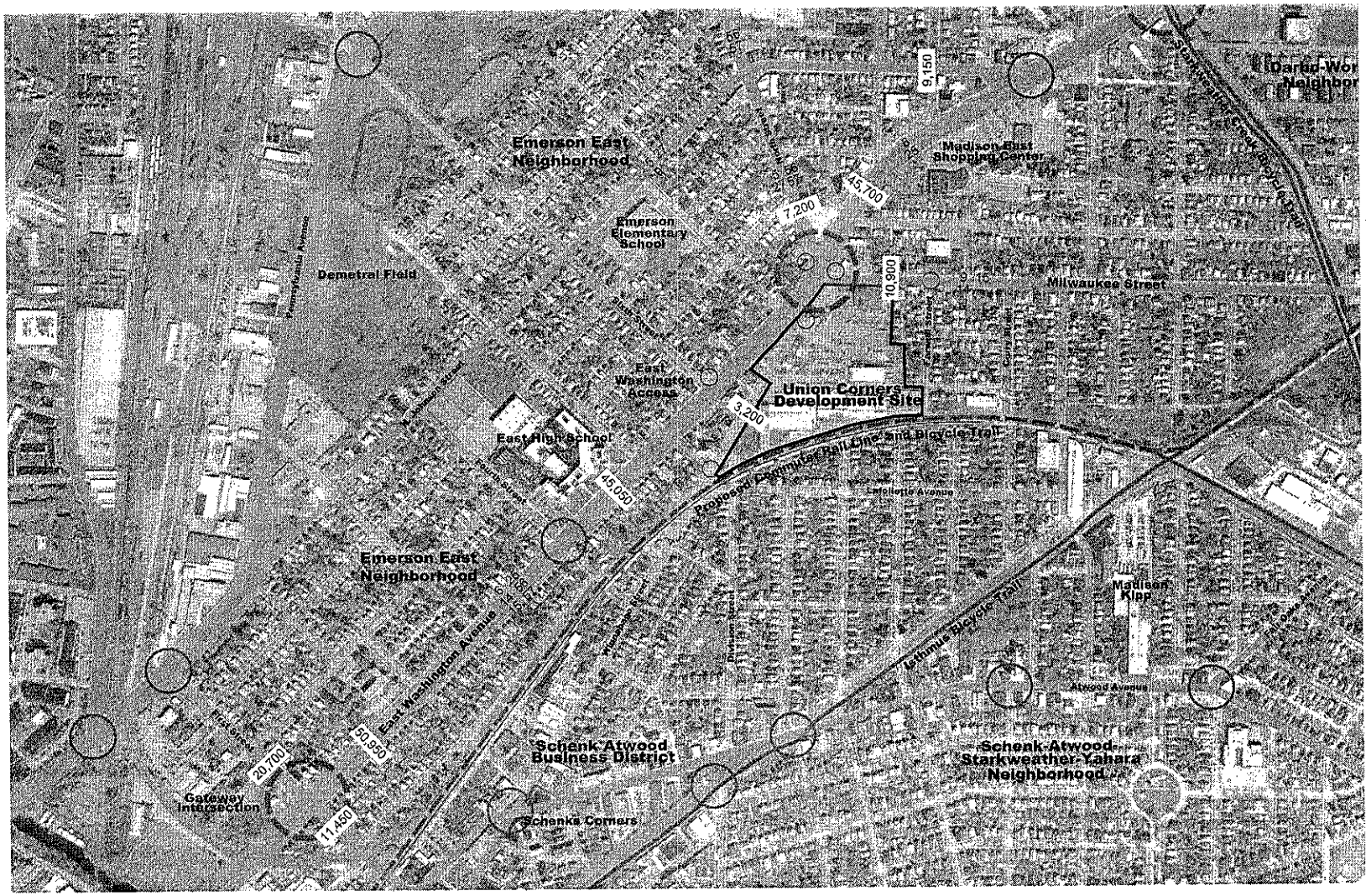
East Washington Avenue functions as a major connection for the Madison Metro bus system. Two of the cities four transfer points are connected by this corridor: the north transfer point located on Huxley Avenue at Aberg Avenue, and the east transfer point located on Milwaukee Street at Corporate Drive. Because of this, as many as twelve bus routes utilize East Washington Avenue daily, with as many as 22 during peak traffic periods. In the vicinity of the development, bus stops are located on Winnebago Street, just north of Sullivan Street; on each side of Milwaukee Street, between East Washington and Farwell Street; on North Street, just north of East Washington Avenue; and on East Washington Avenue, between North Street and Seventh Street.

Bike, Pedestrian, and Rail System

An extensive bikeway system is established in the area, including the Isthmus Bike Trail and Starkweather Creek. At this time, no existing connections to the bike path system from the development area occur.

Sidewalk exists along Milwaukee Street, Winnebago Street, and East Washington Avenue. The signalized intersections of East Washington Avenue at Milwaukee Street and Fourth Street provide a pedestrian crossing phase with marked cross walks.

As stated earlier, the proposed development borders an existing railroad corridor. The current commuter rail plans for the area show this transit line as a secondary route for a future commuter rail line.



LEGEND

- ARTERIAL ROAD
- SIGNALIZED INTERSECTION
- 10,900 AVG. WEEKDAY TRAFFIC PER 2001 DATA
- PROPOSED COMMUTER RAIL
- EXISTING BICYCLE TRAIL
- PROPOSED BICYCLE TRAIL
- 5 27 9 EXISTING BUS ROUTES
- BUS STOP

PROJECT NO. 1899
SCALE: 1"=500'

0 250' 500' 1000'

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Union Corners Transportation System Analysis

Transportation Connections and Current Traffic Volumes

FIGURE 3

4. SCHEDULE IMPROVEMENTS AND TRAFFIC PROJECTIONS

Over the next five years, a number of roadway improvements re scheduled to be completed on the near east side of the city of Madison, which are described below:

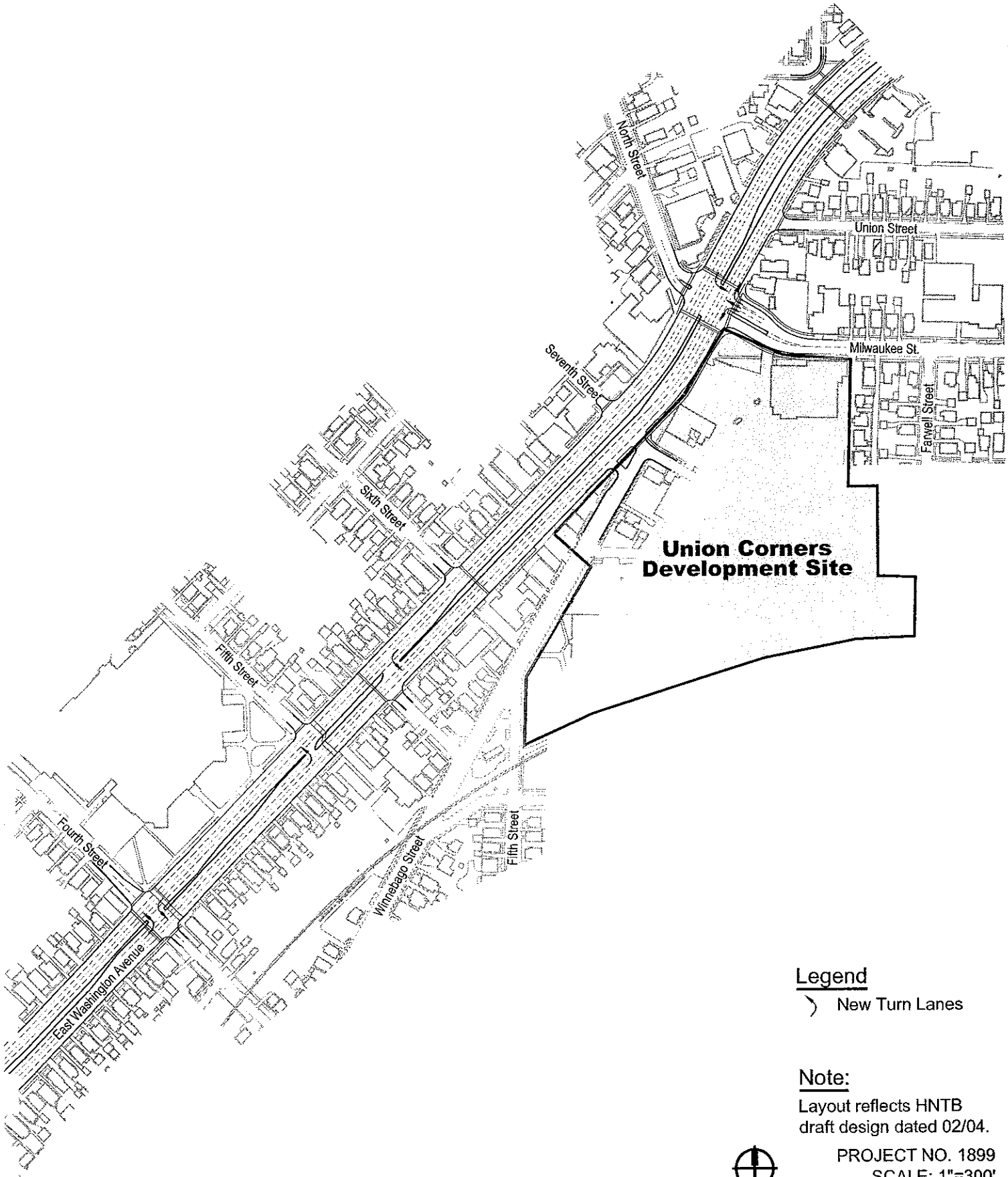
Scheduled Improvements

The most significant improvement project targeted for this area is the improvements of East Washington Avenue, scheduled to begin in 2004 with anticipated completion in 2009. The segment of East Washington Avenue from First Street to STH 30 is scheduled for reconstruction in 2007. At the time of this study, the final design for this particular segment of roadway has not been completed. The current preliminary design (Figure 4) calls for the addition of a raised median, which will restrict left-turning movements except at the Fifth Street intersection. At the Milwaukee Street intersection, the minor legs (Milwaukee Street and North Street) will be realigned to remove the existing offset legs at this location. In addition, exclusive turning lanes will be added to the westbound approach of East Washington Avenue as well as the North Street and Milwaukee Street approaches. Winnebago Street will also be realigned at East Washington Avenue to remove the existing skewed intersection.

Other improvements scheduled as part of the East Washington Avenue project are improvements at the First Street intersections. These improvements will provide dual left-turn lanes on eastbound East Washington Avenue traffic to facilitate movement onto First Street. In addition, dual right-turn lanes will be provided on the north approach of First Street for traffic turning westbound onto East Washington Avenue. To further encourage traffic to utilize Pennsylvania Avenue via First Street, the intersection of First at Pennsylvania Avenue will also be improved to provide dual left-turn lanes for westbound traffic on Pennsylvania Avenue.

Reconstruction of the STH 30 interchange will provide a full diamond interchange, which will encourage traffic to use STH 30 for connections to the west and north, as opposed to the local neighborhood streets.

Local street improvements are also scheduled in the next few years. Third Street is slated for reconstruction in 2004, which will comprise of traffic calming measures to discourage cut-through traffic. Sixth Street is also proposed to have traffic calming measures added to the street, which is scheduled to occur in 2004/2005. The city has also scheduled several improvements to traffic access in the Schenk Atwood neighborhood. This includes allowing two-way traffic on Winnebago Street at Eastwood Avenue to provide better access to the business community in the area. The aforementioned programmed improvements for the area are shown in Figure 5.



Legend

New Turn Lanes

Note:

Layout reflects HNTB draft design dated 02/04.

PROJECT NO. 1899

SCALE: 1"=300'

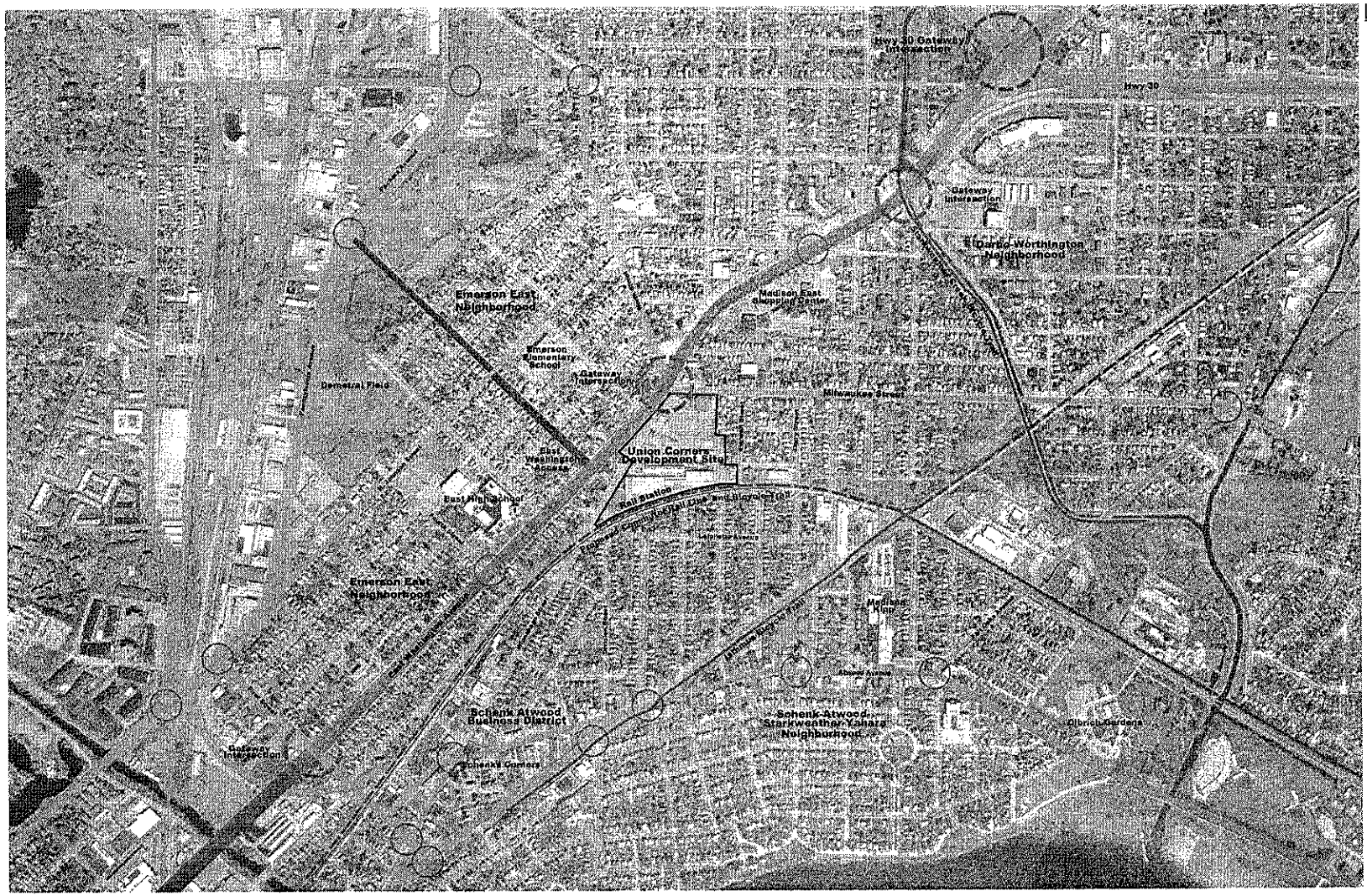
0 150' 300' 600'

Union Corners Transportation System Analysis

Improvements for East Washington Avenue

FIGURE 4

SAA Schreiber / Anderson Associates, Inc



LEGEND

- ARTERIAL ROAD
- SIGNALIZED INTERSECTION
- TRAFFIC CALMING IMPROVEMENTS
- SEGMENT ONE EAST WASHINGTON AVE. IMPROVEMENTS- 2004
- SEGMENT TWO EAST WASHINGTON AVE. IMPROVEMENTS- 2006
- SEGMENT THREE EAST WASHINGTON AVE. IMPROVEMENTS- 2007
- SEGMENT FOUR EAST WASHINGTON AVE. IMPROVEMENTS- 2009
- PROPOSED COMMUTER RAIL
- EXISTING BICYCLE TRAIL
- PROPOSED BICYCLE TRAIL

PROJECT NO. 1899
SCALE: 1"=800'

0 400' 800' 1600'

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Union Corners Transportation System Analysis

Programmed Improvements

FIGURE 5

Year 2020 Traffic Projections

Traffic projections for the corridor were taken from the peak hour turning movement counts in the East Washington Avenue Corridor Study. This study included turning movement counts at major intersections along the corridor during the weekday morning and evening peak hours obtained in 1999. Figure 6 illustrates the results of these counts. The study also included Year 2020 intersection turning movement projections under a build or full improvement scenario, as currently shown in the corridor design in Figure 5.

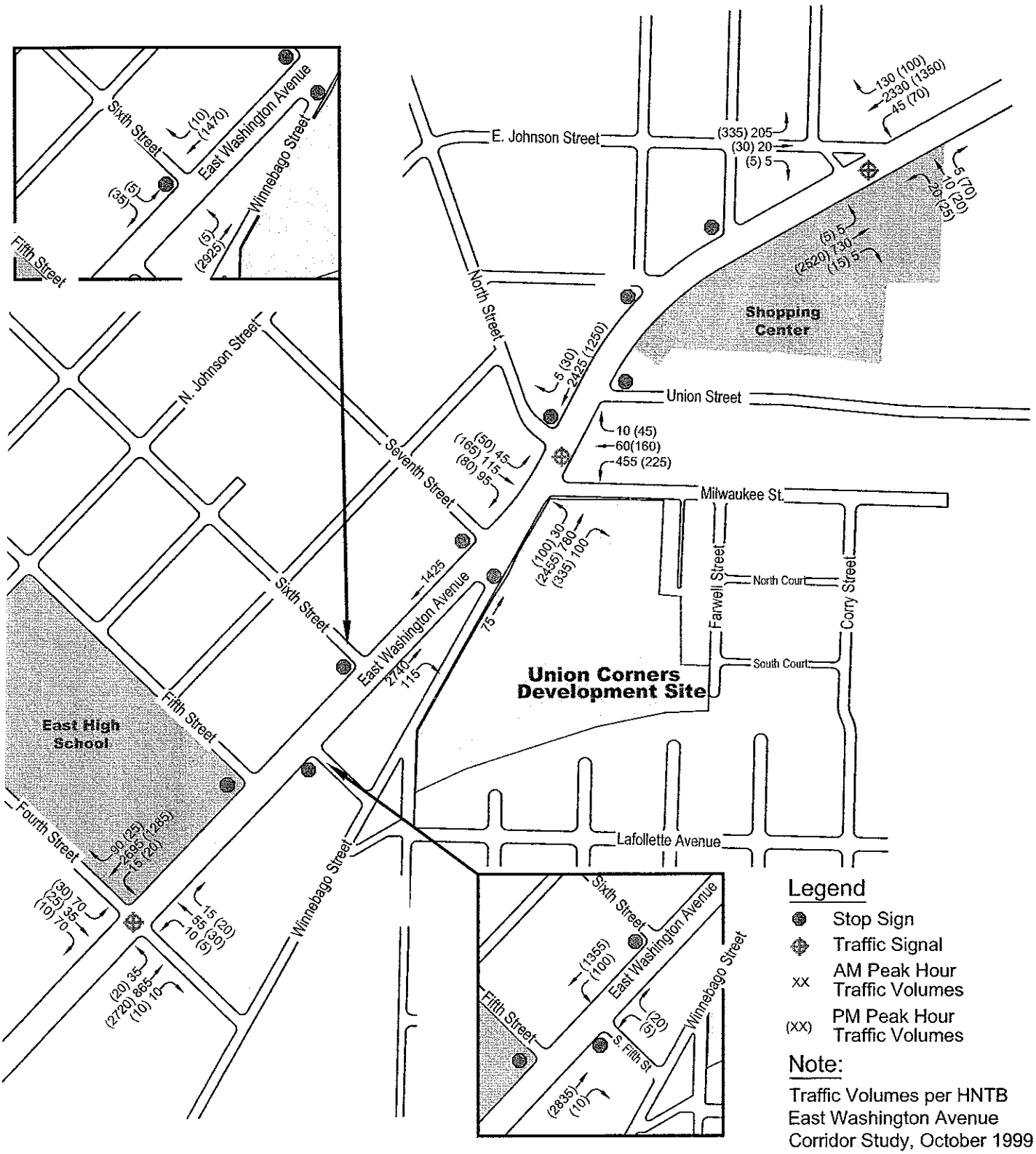
These 2020 peak hour counts were used as a baseline condition for the analysis conducted for this study. Specifically, the projected volumes detailed under the "Build" option of the study were utilized, which are illustrated in Figure 7.

5. SITE TRAFFIC

Trip Generation

The first phase of the study assumed trip generation rates based on daily projections from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 6th Edition. It was estimated that the development would produce approximately 8,100 trips per day. Accounting for multi-purpose trips and the density of the development, it was assumed that the trip generation production would be reduced to approximately 7,000 trips per day.

This phase of the study used peak hour trips to make the determination of capacity on the external street network. Both the morning and evening peak hour trips were determined based peak hour trip generation rates from the aforementioned trip generation manual. A detailed breakdown of the trip generation rates is shown in Table 1. It was assumed that the site included 40,000 sf of specialty retail, 30,000 sf of office, 300 apartment units, and a 40,000 sf grocery store.



Union Corners Transportation System Analysis

Existing Conditions(1999) Peak Hour Turning Movements

FIGURE 6

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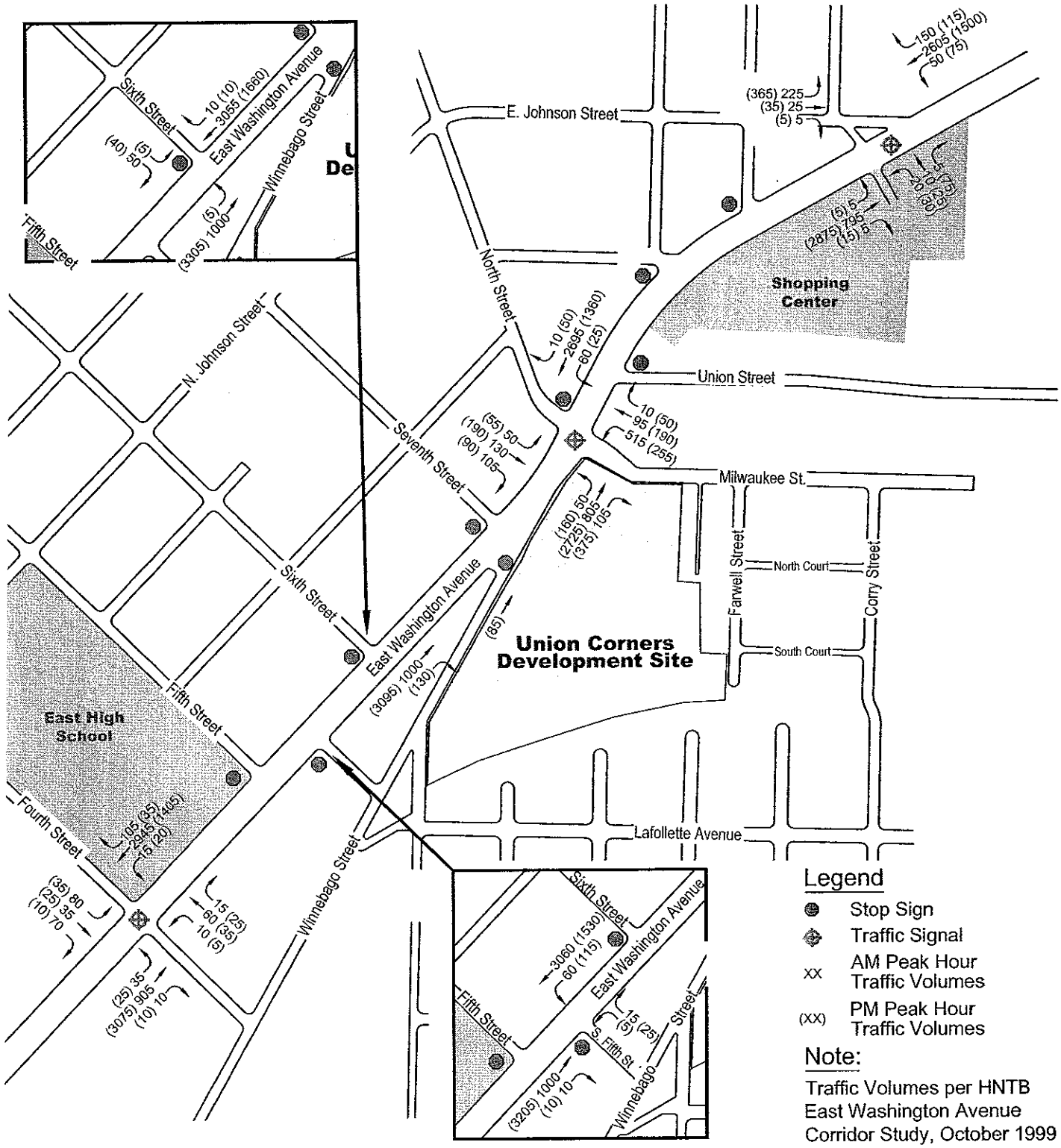

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Union Corners Transportation System Analysis

2020 Build Peak Hour Turning Movement Projections

FIGURE 7

Project #1899.01

Table 1
Union Corners Development Peak Hour Trip Generation Rates

(814) Specialty Retail	40,000 sf		
AM	6.41 trips per 1,000 sf	48% in and 52% out	peak hour of generation
PM	2.59 trips per 1,000 sf	43% in and 57% out	peak hour of adjacent street
	40 x 6.41 = 256 trips with 128 in and 128 out		
	40 x 2.59 = 104 trips with 52 in and 52 out		
(710) Office	30,000 sf		
AM	1.56 trips per 1,000 sf	88% in and 12% out	peak hour of generation
PM	1.49 trips per 1.000 sf	17% in and 83% out	peak hour of generation
AM	30 x 1.56 = 47 trips with 42 in and 5 out		
PM	30 x 1.49 = 45 trips with 8 in and 37 out		
(230) Residential Condo/Apt	300 units		
AM	.44 trips per unit	17% in and 83% out	peak hour of adjacent street
PM	.54 trips per unit	67% in and 33% out	peak hour of adjacent street
AM	300 x .44 = 132 trips with 26 in and 106 out		
PM	300 x .54 = 162 trips with 107 in and 55 out		
(850) Supermarket	40,000 sf		
AM	3.25 trips per 1,000 sf	60%in and 40% out	peak hour of adjacent street
PM	11.5 trips per 1,000 sf	50% in and 50% out	peak hour of adjacent street
AM	40 x 3.25 = 130 trips with 78 in and 52 out		
PM	40 x 11.5 = 460 trips with 230 in and 230 out		

Total AM Trips	274 in	565 total trips
	291 out	40% reduction
		350 total trips or half of pm trips
Total PM Trips	397 in	771 total trips
	374 out	10% reduction
		700 total trips

Because of the retail nature of the development, site trip generation will be higher in the weekday evening peak hour than the weekday morning peak hour. Based on the estimated trip production, the morning peak hour was estimated to generate approximately 350 trips, of which about 50% are inbound and 50% outbound. The evening peak hour produces approximately 700 trips, of which about 50% are inbound and 50% outbound. Although in both the cases, the sum of the morning and evening inbound and outbound traffic is almost equal (50%), the distribution of inbound and outbound traffic is not equal for each land use. The mixed nature and balance of the land uses evens out any disparity. The total number of trips produced was reduced by 10 to 15% to account for the mixed-use nature of the development. The reduction was higher in the morning, because the peak hour of the retail trip generation did not coincide with the peak hour of the adjacent streets. The morning peak hour generated about half of the trips generated in the evening peak hour.

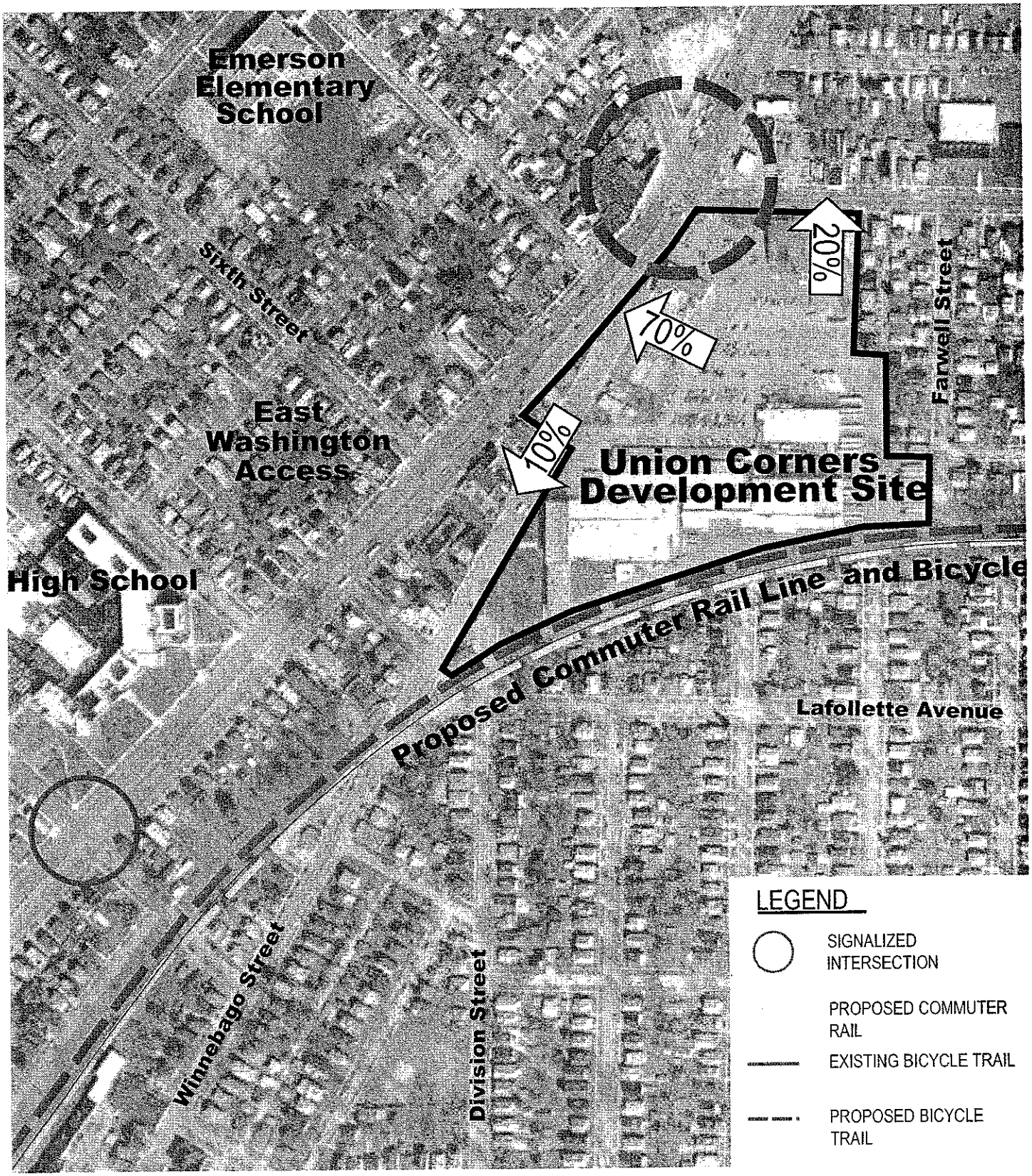
Distribution and Assignment

Traffic generated from the proposed development was distributed to the local street network based on the weighted average of the existing traffic volumes, as outlined in the first report, Phase 1 Traffic Analysis Summary. This resulted in the following distribution, as shown in Figure 8:

East Washington Avenue	70%
Milwaukee Street	20%
Winnebago Street	10%

The assignment also took into consideration directional splits. Traffic is much higher coming into the downtown area in the morning and traveling out of the downtown area in the evening. For the purposes of this study, in the evening peak hour, 60 to 65% of the site traffic was weighted toward the east. In the morning peak hour, because of the lack of retail traffic, 50 to 60% of the site traffic was weighted toward the west.

The majority of site trips during the peak hours (65-70%) are retail trips. A portion of these trips are pass-by trips. Pass-by trips are existing trips that utilize a site, and then continue in the same direction of travel. Pass-by trips are not new trips to the street network for they originate in the existing traffic volumes. The amount of pass-by trips to a site varies; however, traffic studies have found that this condition accounts for thirty to fifty percent of the retail trips. In the trip assignment phase of this project, pass-by trips were not deducted, meaning that additional trips were added to the street system. Therefore, external streets, particularly East Washington Avenue, will be analyzed with higher volumes than what will actually occur based on the assumed projections.



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Development Directional Split

FIGURE 8

Another issue that needs to be considered on this project is that the baseline year traffic counts and the projections include traffic from developments that no longer exists. At the time of the Year 1999 counts, both the Kohl's grocery store and Rayovac distribution buildings were still in operation; however, they are no longer occupied. Therefore, the 2020 projections incorporated an additional amount of trips that will be removed by the redevelopment.

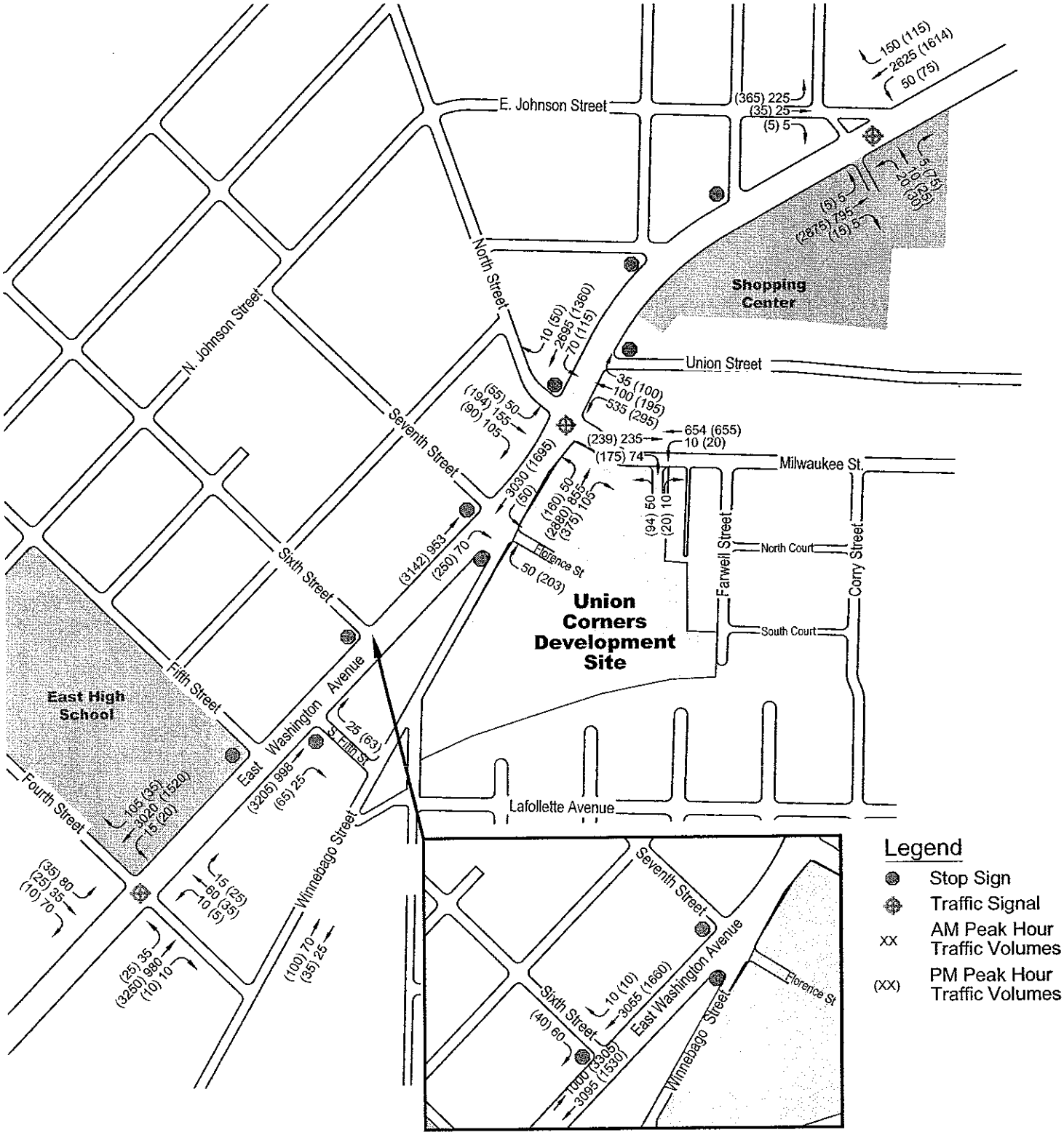
6. TRANSPORTATION ANALYSIS

A major consideration for development of the site is whether site traffic can be accommodated by the existing traffic signal on East Washington Avenue at Milwaukee Street, or if an additional traffic signal could be placed between Milwaukee Street and Fourth Streets. Although the site will have good neighborhood pedestrian and transit access, automobile access will have a major bearing on the types of development that can be attracted to the site. Currently, access into the site is limited due to the turning restrictions on East Washington Avenue at Milwaukee Street for westbound, left-turn movements and the existing alignments of North Street and Milwaukee Street and East Washington Avenue. However, with improvement of this intersection, access to and from the site via Milwaukee Street will be greatly improved.

The second report completed for this development, Phase 2 Traffic Signal System Analysis, investigated several alternative traffic signal locations, including Milwaukee Street, Sullivan Street, and Sixth Street. The conclusion of this report was that the Sixth Street location was the best location for the installation of traffic signals. Thus, for purposes of this study, the Sixth Street signal location was compared in more detail to the alternative of no additional traffic signals.

Alternative Traffic Signal Locations

Figure 9 illustrates Year 2020 traffic projections assuming an improved Milwaukee Street access. This scenario is in accordance to the Year 2020 'Build' option from the East Washington Avenue Corridor Study. This condition assumes major access at Milwaukee Street and addition of a westbound, exclusive left-turn lane on East Washington Avenue at Milwaukee Street, as called for in the current improvement plan. This option also includes a reconfiguration of the intersection of Winnebago Street at Florence Street, as shown in Figure 4, and as shown in the current improvement plan. This option also assumes left-turn restrictions on East Washington Avenue west of Milwaukee Street until Fifth Street, as shown on the current improvement plans. Under this option, traffic from the east, south, and north would enter from Milwaukee Street. Traffic traveling to the north, south, or west, would use either Milwaukee Street or Winnebago Street. Under this scenario, a significant increase in left-turn movements westbound and northbound on Milwaukee Street would occur as well as westbound on Winnebago Street due to the lack of other left-turn options on East Washington Avenue.



Legend

- Stop Sign
- Traffic Signal
- XX AM Peak Hour Traffic Volumes
- (XX) PM Peak Hour Traffic Volumes

PROJECT NO. 1899
SCALE: 1"=450'

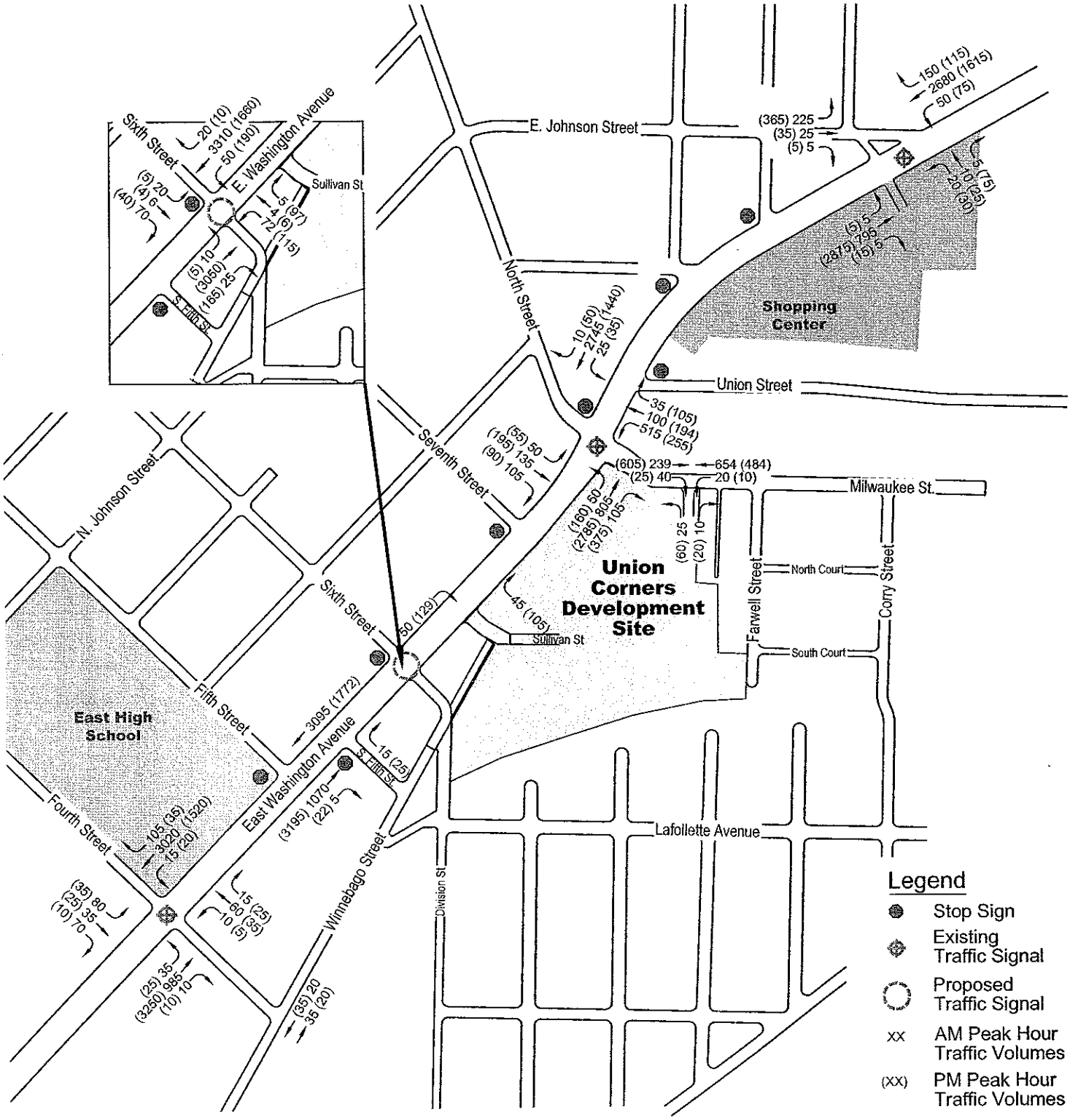
0 225' 450' 900'

SAA Schreiber / Anderson Associates, Inc

Union Corners Transportation Analysis

2020 Build with Development Peak Hour Turning Movements

FIGURE 9



Union Corners Transportation Analysis

2020 Build Sixth Street Signal Peak Hour Turning Movements

FIGURE 10

Schreiber / Anderson Associates, Inc

Another scenario analyzed in this study assumes the extension of Sixth Street from East Washington Avenue to Winnebago Street. The Year 2020 traffic projections under this scenario are illustrated in Figure 10. A westbound, exclusive left-turn lane would be added on East Washington Avenue at Sixth Street to accommodate left-turning movements. The south approach of Sixth Street would also provide an exclusive left turn-lane due to the projected left-turn volumes. As with the first scenario, left-turn access would be restricted on East Washington Avenue between Sixth Street and Milwaukee Street.

Traffic Operations Analysis

The traffic signal operation on East Washington Avenue between Fourth Street and Johnson Street was evaluated under both of the aforementioned Year 2020 scenarios. In addition, these scenarios were compared to a Year 2020 'build with no development' scenario for the weekday morning and evening peak periods, resulting in three options to evaluate.

Traffic operations along the East Washington Avenue corridor between Fourth Street and Johnson Street were modeled under three different scenarios during the weekday morning and evening peak hours, using the software package Synchro and its traffic simulation program, SimTraffic. Synchro coordinates and optimizes a network of traffic signals to maximize traffic flow. SimTraffic differs from traditional Highway Capacity Manual (HCM) software in that a micro-scale simulation of a street network can be executed, using the Synchro input. The randomness of each run can provide more realistic results over a network than static calculations. For this study, each scenario was simulated five different times for a 60-minute period and the results averaged.

It should be noted that Synchro optimized the network cycle length along the East Washington Avenue corridor for 120 seconds during the weekday morning and evening peak hours. However, a 100-second cycle length was used for analysis purposes, per the request of the City of Madison staff (currently, traffic signals along East Washington Avenue operate using a 100-second cycle length). The City staff also requested that pedestrian phasing also be included for a pedestrian crossing at Sixth Street. For the purposes of the modeling, it was assumed that there were 25 pedestrian crossings during the peak hour.

Several iterations of the Synchro model have been conducted and reviewed by the City staff. In turn, City staff provided a Synchro network where analysis should originate from. However, several changes to this network were made to create more realistic traffic conditions, which are listed below:

The saturation flow rate on East Washington Avenue was increased from 1900 vehicles per hour per lane (vphpl) to 2000 vphpl. This was done due to the fact that current planned improvements for East Washington Avenue will provide three exclusive through lanes of travel along this corridor.

At the Fourth Street intersection, the peak hour factor for all movements was increased from 0.91 to 0.92 to reflect the 0.92 peak hour factor analyzed at all other intersections. In addition, the recall mode was changed from 'ped' to 'none' to maximize traffic flow along East Washington Avenue. This condition will allow for adequate green time for pedestrians on Fourth Streetwhen the ped button is activated while allowing adequate green time to East Washington Avenue when the ped button is not activated.

At the Sixth Street intersection, the exclusive left-turn lanes on East Washington Avenue were analyzed having a protected-permissive phasing. This will allow for left-turning vehicles to have protected green time to perform their movement as well as permitting left-turns during the green phase of the East Washington Avenue through movements. This condition is preferable due to the amount of westbound-to-southbound, left-turning vehicles projected to enter the site at this location.

At the Johnson Street intersection, the north approach (Johnson Street) was analyzed with an exclusive left-turn lane and a shared through/left-turn/right-turn lane to reflect existing traffic operations.

Table 2 summarizes the Level of Service (LOS) and delay for the signalized intersections in each modeled scenario during the weekday evening peak hour. LOS is a letter grade measuring an intersection's performance and quality of traffic flow. LOS grades range from 'A' to 'F' to summarize the total amount of delay at each intersection. An LOS 'A' indicates a free-flow condition while an LOS 'F' indicates congested conditions. Accepted intersection LOS is generally targeted at an LOS 'D' or better. Delay is the average total delay per vehicle (in seconds) at each intersection. While both Synchro and SimTraffic analyze vehicular delay, the Synchro value is the signal or intersection delay, which includes both stopped time and time due to slowing. Delay measured in SimTraffic is the difference between a simulated vehicle's actual travel time through the network and the time if there were no signals, signs, or other vehicles present. The total arterial travel time for the eastbound and westbound segments of East Washington Avenue (between Fourth Street and Johnson Street) is also included in the table for comparative purposes. Arterial travel time is the average time from the simulation model taken over the course of the five runs for each scenario.

Table 3 summarizes the LOS and average total delay (SimTraffic) for unsignalized intersections in the vicinity of the site. These intersections include the major access on Milwaukee Street and the restricted access points along East Washington Avenue. The number and location of these intersections varies by each scenario.

Another measure of intersection operation is the length of stacking distance or queue length. The SimTraffic simulation provides a queue length for each lane movement expressed in terms of average queue length and maximum queue length observed during the study period. Table 4 summarizes the average and maximum queue lengths projected to occur on East Washington Avenue at the Fourth Street and Milwaukee Street intersections under all analyzed scenarios.

Table 2: Signalized Intersection Summary, Weekday Evening Peak Hour

Scenario	East Washington & Fourth Street			East Washington & Sixth Street			East Washington & Milwaukee/North Street			East Washington & Johnson Street			Arterial Travel Time (seconds)	
	Total Avg.	Delay/veh (s)		Total Avg.	Delay/veh (s)		Total Avg.	Delay/veh (s)		Total Avg.	Delay/veh (s)			
	LOS	Synchro	Sim	LOS	Synchro	Sim	LOS	Synchro	Sim	LOS	Synchro	Sim	EB	WB
Year 2020, No Sixth Street Signal	A	6.7	10.2	---	---	---	D	43.0	85.4	B	18.3	51.0	171.7	182.8
Year 2020, Sixth Street Signal, No Peds	A	6.6	10.3	C	34.5	19.7	D	35.9	79.0	B	18.7	48.5	204.7	152.8
Year 2020, Sixth Street Signal, Half Peds	B	14.4	37.8	D	40.7	18.3	D	37.0	80.0	B	19.0	44.1	255.2	157.5
Year 2020, Sixth Street Signal, Full Peds	B	15.3	87.4	D	51.7	20.8	C	34.4	76.0	B	18.7	41.6	320.2	162.0

LOS - Level of Service (from Synchro output)
Sim - SimTraffic Output
All 2020 runs assume East Washington reconstruction per HNTB draft design
Cycle length for corridor is 100 seconds
Arterial Travel Time is from SimTraffic

Table 3: Unsignalized Intersection Summary, Weekday Evening Peak Hour

Scenario	East Washington Avenue and Fifth Street		East Washington Avenue and Sixth Street		East Washington Avenue and Sullivan Street		Milwaukee Street and Site Access Road	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Year 2020, No Sixth Street Signal	D	27.2	F	>80.0	E	47.0	C	15.8
Year 2020, Sixth Street Signal, No Peds	D	27.2	---	---	E	47.0	C	15.8
Year 2020, Sixth Street Signal, Half Peds	D	27.2	---	---	E	47.0	C	15.8
Year 2020, Sixth Street Signal, Full Peds	D	27.2	---	---	E	47.0	C	15.8

LOS - Level of Service

Table 4: East Washington Avenue Queue Summary

Maximum Queues

Scenario	Fourth Street								North Street / Milwaukee Street							
	Eastbound				Westbound				Eastbound				Westbound			
	T	T	T	AVG	T	T	T	AVG	T	T	T	AVG	T	T	T	AVG
Year 2020, No Sixth Street Signal	555	501	503	**520**	116	157	162	**145**	368	363	364	**365**	879	797	643	**773**
Year 2020, Sixth Street Signal, No Peds	526	503	486	**505**	77	94	119	**97**	364	356	361	**360**	358	334	326	**339**
Year 2020, Sixth Street Signal, Half Peds	1086	1083	1077	**1082**	279	294	297	**290**	351	348	354	**351**	366	355	336	**352**
Year 2020, Sixth Street Signal, Full Peds	1133	1137	1130	**1133**	328	326	330	**328**	342	336	344	**341**	390	369	358	**372**

Average Queues

Scenario	Fourth Street								North Street / Milwaukee Street							
	Eastbound				Westbound				Eastbound				Westbound			
	T	T	T	AVG	T	T	T	AVG	T	T	T	AVG	T	T	T	AVG
Year 2020, No Sixth Street Signal	241	212	203	**219**	26	44	53	**41**	297	288	269	**285**	358	339	282	**326**
Year 2020, Sixth Street Signal, No Peds	246	220	217	**228**	14	18	29	**20**	210	205	200	**205**	249	234	219	**234**
Year 2020, Sixth Street Signal, Half Peds	789	736	717	**747**	89	94	97	**93**	203	205	210	**206**	249	238	224	**237**
Year 2020, Sixth Street Signal, Full Peds	1044	1019	1007	**1023**	134	143	150	**142**	132	135	139	**135**	264	245	229	**246**

Queues measured in feet
T - one through lane of traffic
AVG - Average of three queue lengths
Queue lengths obtained from SimTraffic output

Complete output from the simulations is provided in the appendix of this study.

No Sixth Street Signal Scenario

The results of the intersection capacity analyses for this scenario show that the intersection of East Washington Avenue with Sixth Street will operate at poor levels of service during the weekday evening peak hour. This condition is the result of vehicles exiting Sixth Street not being provided adequate gaps to perform their movements due to the high volumes of through traffic on East Washington Avenue. Also, when these traffic operations are simulated using SimTraffic, vehicles on East Washington Avenue, wishing to turn left onto southbound Sixth Street, experience extreme delays due to the high volume of eastbound through traffic. The delays, and subsequent queuing, that is caused at this location reduces traffic flow at upstream intersections.

In addition, traffic operations at the intersection of East Washington Avenue with Sullivan Street are projected to operate at a level of service 'E'. As with the Sixth Street intersection, vehicles wishing to enter the East Washington Avenue traffic stream will experience longer than desired delays due to the high volume of through traffic on East Washington Avenue. This is not an uncommon situation, though, especially when minor streets intersect high-volume arterials, such as East Washington Avenue, under stop-sign control.

Sixth Street Signal Scenarios

When the intersection of East Washington Avenue with Sixth Street is analyzed with a traffic signal, the intersection will operate at satisfactory levels of service during the weekday evening peak period of traffic. In addition, all other intersections will operate adequately with the exception of East Washington Avenue with Sullivan Street. This is anticipated given the amount of eastbound traffic on East Washington Avenue.

As indicated earlier, three different pedestrian scenarios were also analyzed under the Sixth Street traffic signal scenario. As illustrated in Table 2 and Table 3, the external street network will accommodate the varying pedestrian scenarios at acceptable levels of service. However, as the amount of pedestrian time was increased, the level of service, and respective queues, at the Fourth Street and Sixth Street intersections increased significantly. This is due to the amount of eastbound traffic on East Washington Avenue not being allotted adequate green time. It should be noted, though, that it was assumed that twenty-five pedestrian calls would occur during the peak hour at these locations. Upon a field review of the area, it was observed that a minimal number of pedestrians crossed East Washington Avenue during the weekday evening peak hour. Furthermore, although pedestrians will likely cross East Washington Avenue after school at Madison East High School has ended for the day, this will occur before the commuter peak hour has occurred. Thus, it is likely that traffic operations on East Washington Avenue will operate similar to the 'no peds' scenario.

Sixth Street Analysis

Concerns of Sixth Street residents has been the impact of a traffic signal on East Washington Avenue at Sixth Street and its potential to encourage more cut-through traffic in the neighborhood during peak hours of traffic. Traffic volumes on Sixth Street currently range between 1,750 and 2,100 vehicles per day. In order to address this concern, a license plate survey was conducted in April, 2004 between the hours of 7:00-8:00 A.M. and 4:15-5:15 P.M. Observers were stationed at the intersections of Sixth Street with Johnson Street, Pennsylvania Avenue, and East Washington Avenue as well as the intersection of East Washington Avenue with Fourth Street. The last four digits of vehicles entering or leaving the area at these locations were recorded and matched to determine where the vehicles were entering or leaving the neighborhood.

During the morning peak hour, the direction of flow recorded was eastward from Pennsylvania Avenue toward East Washington Avenue. During this time a total of 157 vehicles turned onto Sixth Street from Pennsylvania Avenue. Of those, 98 vehicles (63%) turned westbound on Johnson Street. A total of 9 vehicles (6%) turned westbound on East Washington Avenue.

During the evening peak hour, the traffic movement was analyzed from East Washington Avenue turning at both Fourth Street and at Sixth Street (Sixth Street is signed for no left turns permitted during the afternoon peak hour). A total of 92 vehicles were observed entering the neighborhood from these locations and traveling westward. Of this total, 16 (17%) were recorded turning eastbound on Pennsylvania Avenue from Sixth Street. Of the 92 vehicles entering the neighborhood, 42% entered at Fourth Street from East Washington Avenue, 28% entered at Fourth Street via south of East Washington Avenue, and 30% entered from East Washington Avenue at Sixth Street. The results of the survey indicate that there is a small amount of traffic currently cutting through the neighborhood (6%) in the morning peak hour and a somewhat larger number (17%) in the afternoon peak hour. A summary of these results are shown in Figure 11.

Local Street and Transportation System

The additional traffic generated by the Union Corners development is a concern to residents of the adjacent neighborhoods. In particular, the concern is that additional development will generate more through traffic in the neighborhoods. The intent of the improvements to the transportation system is to keep through traffic on the main arterials and off of the neighborhood streets. To that end, the improvements are focused on improving traffic conditions on the main arterial system and discouraging non-neighborhood traffic from using the local streets. Any improvements to the transportation system in this area should be looked at from a systems perspective. A change in traffic patterns in one area may very well impact traffic in another area. As such, several neighborhood streets were analyzed for existing traffic conditions, with alternative improvements suggested to the local street system to further discourage cut-through traffic.

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Union Corners Transportation Analysis

Sixth Street Traffic Survey

FIGURE 11

* *Winnebago Street.* The section of Winnebago Street between the Schenk Atwood area and the proposed development is a two-lane, 44-foot street with onstreet parking. The two retail areas on each end are connected by a residential area in between them. In order to slow and discourage cut-through traffic in the residential areas, several traffic calming measures were investigated, including a boulevard section shown in Figure 12. The boulevard section could be installed within the existing roadway width and effectively narrow the street by six feet, allowing a midstreet refuge for pedestrian crossings. In addition, City staff is investigating the placement of traffic circles on Winnebago Street at Fourth Street and Fifth Street.

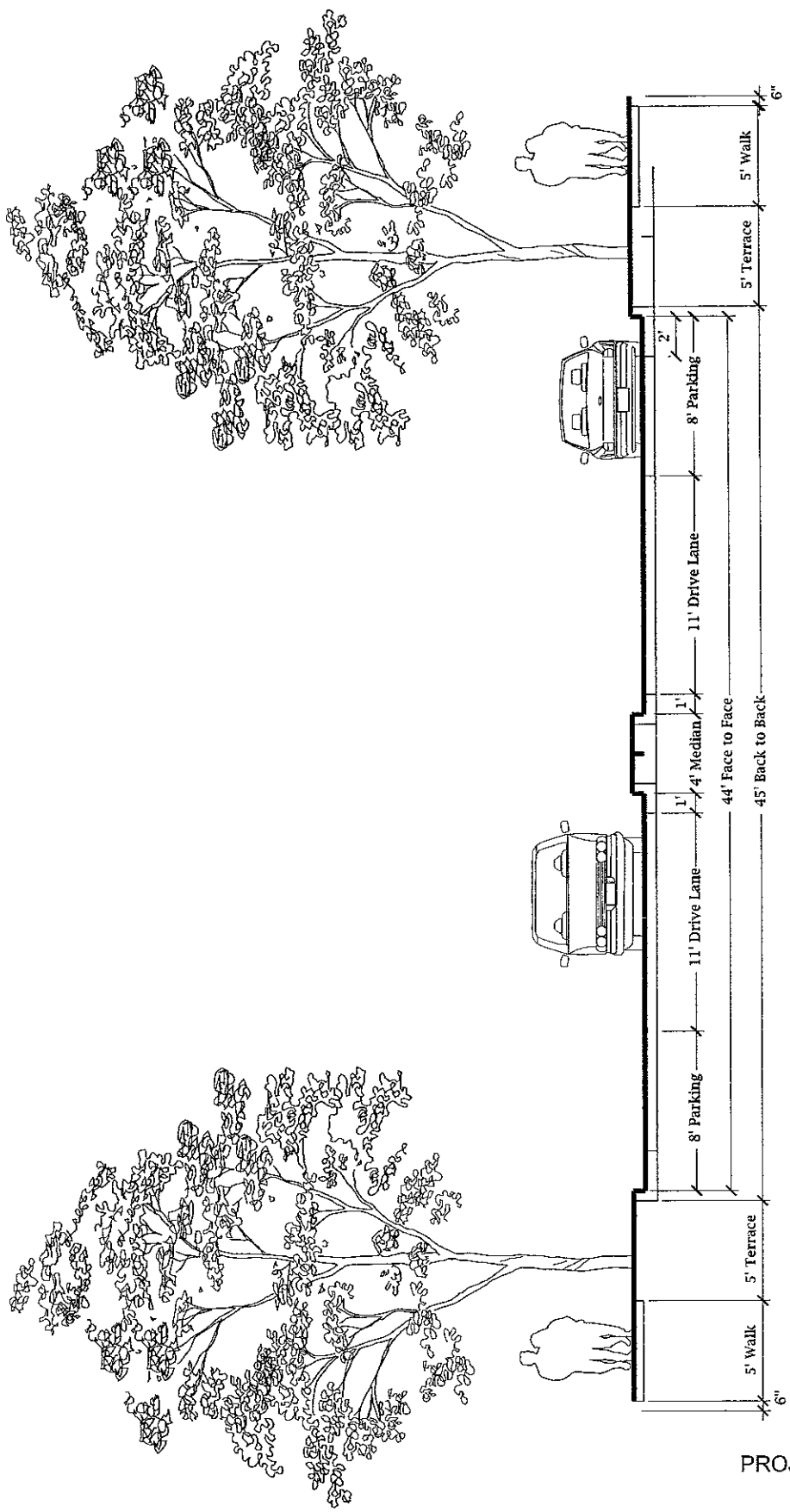
* *Schenk-Atwood.* Changes are also being considered to the one-way system on the south end of Winnebago Street at Eastwood Drive and in the in the commercial area between Eastwood Drive and Atwood Avenue. These improvements include reestablishment of the two-way system, bump outs, and pedestrian crosswalks to improve pedestrian and traffic circulation in this area.

* *Division Street.* In order to improve safety in the area, the elimination of the section of Division Street between Lafollette Avenue and Winnebago Street is being considered. This would eliminate an at-grade railroad crossing and a skewed intersection at Winnebago Street. This vacated area would revert to green space as a part of the Union Corners development.

* *Milwaukee Street.* While not a local street, the area of Milwaukee Street east of East Washington Avenue is being considered for traffic islands to help pedestrian crossings in the area. The intersections currently being considered are Farwell Street and Corry Street.

* *Transit Access.* Transit services to the area would be facilitated by a traffic signal at Sixth Street, which would allow transit movement westbound onto Winnebago Street from East Washington Avenue. In addition, a bump out to serve transit is being analyzed on Milwaukee Street in front of the proposed site.

* *Bike/Pedestrian Connections.* Connecting the neighborhoods to the proposed development is an important goal of this project. A bike/pedestrian path connection southward across the railroad tracks at Jackson Street is being considered. In addition, a bike/pedestrian path is also being considered westward to connect the development at Farwell Street.



BOULEVARD - 66' R.O.W.

WINNEBAGO STREET

PROJECT NO. 1899
SCALE: 1"=4'

0 2' 4' 8'

7. RECOMMENDATIONS

As a result of discussions with the neighborhood, a series of improvements outside of the development's immediate vicinity were discussed and a series of related improvements were developed. These included programmed improvements that are already scheduled and budgeted, improvements that will be completed as a part of the development, and other related improvements that will be completed by the neighborhood or City in response to concerns raised by the neighborhood. Some of these concerns were raised in response to the development, while others are not directly related to the development but do include impacts to the adjacent neighborhood.

As a result of the discussion, a list of neighborhood transportation improvements was developed and is shown in Figure 13. In addition, the neighborhood, developer, and City put together a comprehensive listing of improvements, schedule, and responsibility matrix, as shown in Table 5.

Table 5
Union Corners Redevelopment
Programmed and Recommended Transportation Measures

Location/ Subject	Type of Project	Funding Sources Expected	Status or Steps/Action Required & By Whom	Level of Consensus & Potential Schedule
Sixth St. @ EWA Traffic Signal	Special Median for no left turns in/out residential side	Capital budget and/ or TIF; or EWA Recon project in 2007; or Retrofit project after evaluationg impacts of traffic	Needs: 1. Design Meeting- Project Plan via Neighborhood Meeting 2. Funding in City's Capital budget and/or Union Corners TIF Plan	To be determined. Dependent on level of neighborhood interest. Tentatively scheduled in 2007 with the EWA project
Sixth St. (Packers Ave to EWA) (Dayton Street intersection could be separated out as individual project)	Traffic Calming	City Funds from NTMP Program currently allocated	Needs: 1. Design Meeting- Project Plan via Neighborhood Meeting (10/04) 2. Ballot of residents for approval (60% required) 3. Construction after related street recon/utility work	Planned for 2005, due to street reconstruction, street utility work on Sixth St. scheduled for 2005; traffic calming thereafter
Sixth St. @ Johnson St.	Traffic Safety Islands-Arterial Pedestrian Enhancements	City Funds from Arterial/Pedestrian Enhancement Program	Constructed Project Competed	Done
Third St (Johnson St. to EWA)	Traffic Calming (circles and humps)	City Funds from NTMP Program currently allocated	Resident Ballot Approved-Construction Pending in 2004	Scheduled for 2004
Second Street	Traffic Calming	NTMP Program	Needs: 1. Petition of support 2. Citywide priority list & ranking 3. PBMVC approval 4. Design meeting - Project Plan via Neighborhood Meeting 5. Ballot of residents for approval (60% required) Construction	None at this time
Third St @ Johnson St.	Traffic Safety Islands-Arterial Pedestrian Enhancements	City Funds from Arterial/Pedestrian Enhancement Program	Needs: Funding from Arterial Pedestrian Enhancement Program	2005-2006

Table 5
Union Corners Redevelopment
Programmed and Recommended Transportation Measures

Location/ Subject	Type of Project	Funding Sources Expected	Status or Steps/Action Required & By Whom	Level of Consensus & Potential Schedule
Winnebago St. (Sixth St. to Second St.)	Traffic Calming (circles and/or islands)	City Funds from NTMP. Funds could also be provided by developer/TIF or separate capital budget item.	Needs: 1. Petition of support 2. Citywide priority list & ranking 3. PBMVC approval 4. Design meeting - Project plan via Neighborhood Meeting 5. Ballot of residents for approval (60% required) Construction	1-3 years dependent on citywide NTMP priority list. Also dependent on development schedule and potential plans for wholesale street reconstruction
Winnebago St. (Sixth St. to Second St.)	Street reconstruct - street narrrowing	Capital Budget and/ or TIF, with special assessments for fronting properties	Needs: 1. Design meeting - Project plan via Neighborhood Meeting 2. Funding in City's capital budget and/or Union Corners TIF Plan	2-5 years dependent on development schedule and establishment of TIF district
Jackson St. Ped/Bike Railroad Crossing	Pedestrian/Bike Path Crossing	City Funds	Needs: 1. City Petition RR 2. Prepare design 3. Hearing before RR commissioner 4. Action by RR commissioner to authorize construction	2005
LaFollette Ave (Winnebago St. to Waubesa St.) (or Division St. vacation independently)	Traffic calming (circles and/or islands)	City Funds from NTMP	Needs: 1. Petition of support 2. Citywide priority list & ranking 3. PBMVC approval 4. Design meeting - Project plan via Neighborhood Meeting 5. Ballot of residents for approval (60% required) 6. Construction	1-3 years dependent on citywide NTMP priority list. Also dependent on development schedule and potential plans for wholesale street reconstruction
Milwaukee St.	Onstreet parking additions			Trial in 2004

Table 5
Union Corners Redevelopment
Programmed and Recommended Transportation Measures

Location/ Subject	Type of Project	Funding Sources Expected	Status or Steps/Action Required & By Whom	Level of Consensus & Potential Schedule
Milwaukee St. (EWA - Marquette Street)	Traffic calming & pedestrian enhancements	City Funds from Arterial Pedestrian Enhancements Program	Needs: 1. Petition of support 2. Citywide priority list & ranking 3. PBMVC approval 4. Design meeting - Project plan via Neighborhood Meeting 5. Ballot of residents for approval (60% required) 6. Construction	2-5 years dependent on Citywide priority list (Seminole Hwy using these funds in 2005)
LaFollette Ave / Division St. intersections with Winnebago St. & railroad	Intersection reorientation / closure		Needs: 1. City/developer review of acceptable intersection & site design alternative 2. Neighborhood review of design alternatives via Neighborhood Meeting 3. Petition state railroad commissioner & prepare railroad crossing report 4. Upon RR commissioner approval, secure capital budget or TIF funding 5. Prepare street reconstruction plans & public hearing process 6. Prepare street vacation / realignment real estate documents & public hearing process 7. Secure council approval of street design & street vacation plans 8. Reconstruction	3-5 years dependent on development schedule and establishment of TIF district Also dependent on potential plans for wholesale street reconstruction SIP will depend on this

LEGEND

- ARTERIAL ROAD
- SIGNALIZED INTERSECTION
- INTERSECTION SCHEDULED FOR IMPROVEMENT
- PROPOSED/PROGRAMMED TRAFFIC CALMING IMPROVEMENTS
- SEGMENT ONE EAST WASHINGTON AVE. IMPROVEMENTS- 2004
- SEGMENT TWO EAST WASHINGTON AVE. IMPROVEMENTS- 2006
- SEGMENT THREE EAST WASHINGTON AVE. IMPROVEMENTS- 2007
- SEGMENT FOUR EAST WASHINGTON AVE. IMPROVEMENTS- 2009
- PROPOSED COMMUTER RAIL
- EXISTING BICYCLE TRAIL
- PROPOSED BICYCLE TRAIL

PROJECT NO. 1899
SCALE: 1"=800'

0 400' 800' 1600'

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Union Corners Transportation Analysis

FIGURE 13