



# MEMORANDUM

**DATE:** January 19, 2016

**TO:** Steve Mosing  
Don Elwood  
Chris Engelmann

**CC:**

**FROM:** Mike Anderson, PE, PTOE

**SUBJECT:** 3<sup>rd</sup> Avenue S Redesign – Proposed Alternative Traffic Operation  
Analysis Summary

---

The following memorandum summarizes the traffic operation analysis completed for the 3<sup>rd</sup> Avenue S Redesign proposed layout. This traffic analysis evaluates the feasibility of the downtown street system to accommodate the proposed roadway design changes. This is measured by assessing the quality of traffic flow for both the existing and proposed conditions and comparing it against the expected traffic operation of the intersections. In addition, mitigation strategies have been identified to optimize the traffic flow and the resulting expected performance is documented.

## 1. Analysis Scenarios

The following scenarios are evaluated and the results presented in this memorandum.

- AM and PM peak hour existing conditions
- AM and PM peak hour proposed layout (60% layout attached in Appendix A)
- AM and PM peak hour proposed layout with mitigation (See Section 3 for the list of mitigation measures)

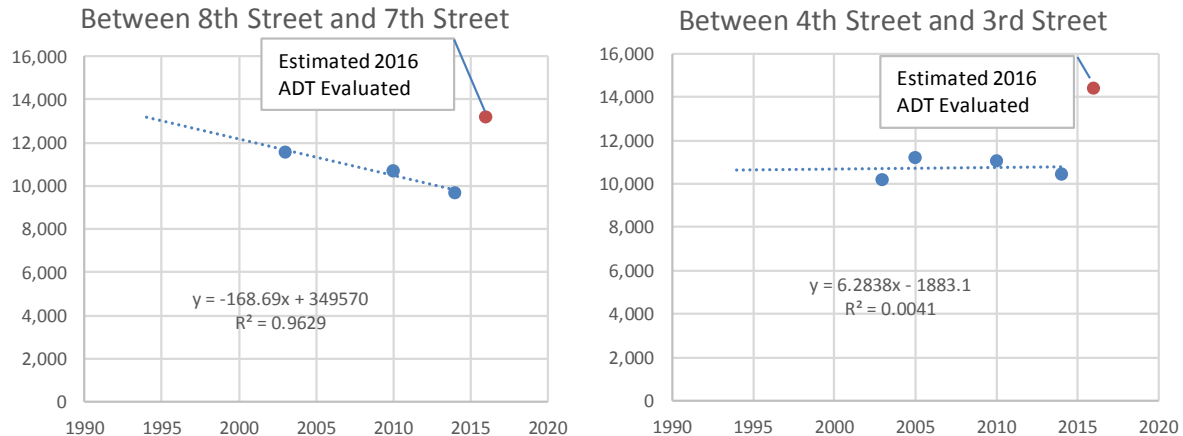
The analysis evaluates a normal weekday condition under the two peak time periods of the day (AM – 7:45 to 8:45) and (PM – 4:45 to 5:45). The next highest peak hour occurs during the lunch hour (12:15 to 1:15), but consists of approximately 40-60% less traffic volume (depending on location along corridor) than the PM peak hour. Therefore, the off peak period was not evaluated, as acceptable traffic operations are expected.

## 2. Traffic Volumes

The traffic volumes evaluated are provided for reference in Appendix B. The intersection volumes are based upon data collected in the spring of 2011 and inflated by 0.5% per year to provide a conservative estimation of the year 2016 traffic conditions. The City of Minneapolis database records for historical average daily volumes since the 2001 reconstruction project (between 2001 and 2014, excluding 2007-2008 due to 35W bridge closure) have shown very

little change. The south end has seen a slight decline in traffic (about 1 % per year) over this period and the north end has seen a slight increase (about a 0.1% per year). Table 1 illustrates the historical average daily traffic volume trend. The red plotted dot represents the daily traffic volume level evaluated in this study (based on the estimated 2016 peak hours volumes extrapolated to a daily value), which assumes an approximate 30% increase above the historic average traffic volume level. In addition, the analysis does not assume any diversion of traffic to other streets on the downtown grid network.

**Table 1. 3<sup>rd</sup> Avenue Historical Traffic Volumes**



Source: City of Minneapolis Traffic Count Management System

### 3. Mitigation Measures

The 3<sup>rd</sup> Avenue S/5<sup>th</sup> Street intersection is problematic under both the existing conditions and the proposed layout. To address existing queuing congestion, the following mitigation was evaluated:

- Consider the installation of LRT track detection at the 3<sup>rd</sup> Avenue S/5<sup>th</sup> Street intersection. Track circuit detection should be located at the westbound stop bar (City Hall Station), and the Marquette Avenue eastbound stop bar (Nicollet Mall Station). With detection and no trains present, northbound/southbound motorists would only be stopped for the duration of the pedestrian clearance interval to cross 3<sup>rd</sup> Avenue, allowing additional green time each cycle to be allocated to northbound/southbound 3<sup>rd</sup> Avenue.
- Consider a Traffic Control Agent (TCA) at the 3<sup>rd</sup> Avenue/5<sup>th</sup> Street intersection during the AM time period (7:30 to 8:45), and potentially the PM peak hour (4:45 to 5:45). The TCA is expected to accomplish a similar result as LRT track circuit detection.

To address the loss of exclusive left turn lanes at select locations along 3<sup>rd</sup> Avenue (3<sup>rd</sup> Street to 7<sup>th</sup> Street), the following mitigation was evaluated:

- Provide traffic signal detection for all existing left turn arrows along 3<sup>rd</sup> Avenue (1<sup>st</sup> Street to 16<sup>th</sup> Street). This will allow the arrow to not be activated if there are no left turn motorists present.

- Provide minor signal timing revisions at the following intersections to rebalance the allocation of green time for the shared left/through lane movements:
  - 3<sup>rd</sup> Avenue S/3<sup>rd</sup> Street
  - 3<sup>rd</sup> Avenue S/Washington Street
  - 3<sup>rd</sup> Avenue S/1<sup>st</sup> Street
  - 3<sup>rd</sup> Avenue S/4<sup>th</sup> Street

To address the loss of exclusive left turn lanes at the 3<sup>rd</sup> Avenue/1<sup>st</sup> Street intersection, the following mitigation was evaluated:

- Install a No Left Turn (4 to 6 pm) prohibition for the southbound 3<sup>rd</sup> Avenue approach at 1<sup>st</sup> Street
- Provide an exclusive northbound left turn lane at 2<sup>nd</sup> Street to encourage an alternative route in access of 1<sup>st</sup> Street.

Although the above noted mitigation measures were identified to address AM and PM peak period traffic operations, they will provide benefit during off peak periods and other special events that may occur within downtown.

## 4. Traffic Operation Analysis

A traffic operation analysis was completed for each of the scenarios denoted in Section 1 for the AM and PM peak periods. The key measures of effectiveness (MOE) evaluated include intersection delay, corridor travel time and average speed.

### Analysis Approach

The CBD is a complex and dynamic system, including many variables that influence motor vehicle mobility. As mentioned previously, the traffic operation analysis considers only typical day conditions. In other words, bad weather, lane or street closures, area road construction, on-street parking violations, stadium events, or any other of many possibilities that may decrease corridor capacity or increase traffic demand on 3<sup>rd</sup> Avenue are not evaluated.

The primary variables influencing capacity along the corridor include traffic volume, traffic signal timing, pedestrian/bicycle volumes and lane configuration. Due to the interaction of closely spaced traffic signals on a grid network system, the traffic mobility of the corridor was evaluated using micro-simulation traffic modeling. The traffic operation analysis was completed using SimTraffic8.0, the existing downtown signal timing and operation, and a 15-minute interval volume demand distribution.

### Level of Service

The Level of Service (LOS) criteria as defined by the HCM for both signalized intersections and urban arterials is illustrated in Table 2.

**Table 2. Level of Service Description**

LOS	Description	Intersection Delay (Seconds / Vehicle)	Urban Street LOS
		Signalized Intersection	Base Speed (30 mph)  Average Travel Speed (mph)
<b>A</b>	<b>Free Flow.</b> Low volumes and no delays.	<b>0 - 10</b>	<b>&gt;26</b>
<b>B</b>	<b>Stable Flow.</b> Speeds restricted by travel conditions, minor delays.	<b>&gt;10 - 20</b>	<b>&gt;20</b>
<b>C</b>	<b>Stable Flow.</b> Speeds and maneuverability closely controlled due to higher volumes.	<b>&gt;20 - 35</b>	<b>&gt;15</b>
<b>D</b>	<b>Stable Flow.</b> Speeds considerably affected by change in operating conditions. High density traffic restricts maneuverability, volume near capacity.	<b>&gt;35 - 55</b>	<b>&gt;12</b>
<b>E</b>	<b>Unstable Flow.</b> Low speeds, considerable delay, volume at or slightly over capacity.	<b>&gt;55 - 80</b>	<b>&gt;9</b>
<b>F</b>	<b>Forced Flow.</b> Very low speeds, volumes exceed capacity, long delays with stop and go traffic.	<b>&gt; 80</b>	<b>&lt;=9</b>

Source: Highway Capacity Manual, 2010 Edition, Transportation Research Board, Exhibit 18-4 for Signalized Intersections and Exhibit 16-4 for Urban Street Facilities.

## Analysis Results

The overall intersection delay comparison for each scenario is shown in Table 3. LOS A and B are color coded green, LOS C and D are yellow and LOS E and F are color coded red. The detailed intersection approach delay for each scenario are provided for reference in Appendix C.

**Table 3. Overall Intersection Delay (seconds/vehicle) Comparison**

### AM Peak Hour

Node	Intersection	Existing Conditions	Proposed Layout	Proposed Layout with Mitigation
289	3rd Avenue S at 16th Street E	18.7	18.1	18.3
418	3rd Avenue S at 14th Street E	3.2	3.8	3.5
664	12th Street S at 3rd Avenue S	17.5	19.5	18.6
726	11th Street S at 3rd Avenue S	14.2	14.8	15.5
727	10th Street S at 3rd Avenue S	10.8	11.7	14.0
728	9th Street S at 3rd Avenue S	16.7	18.6	21.0
729	8th Street S at 3rd Avenue S	11.9	10.0	12.3
730	7th Street S at 3rd Avenue S	11.7	13.7	17.0
731	6th Street S at 3rd Avenue S	11.2	26.1	13.8
732	5th Street S at 3rd Avenue S	70.8	82.8	49.2
733	4th Street S at 3rd Avenue S	44.5	50.5	29.4
734	3rd Street S at 3rd Avenue S	27.1	42.2	13.6
735	Washington Avenue S at 3rd Avenue S	35.0	51.5	27.8
736	2nd Street S at 3rd Avenue S	21.7	44.6	11.3
737	1st Street S at 3rd Avenue S	46.4	112.5	22.6

**Table 3. Overall Intersection Delay (seconds/vehicle) Comparison Cont'd****PM Peak Hour**

Node	Intersection	Existing Conditions	Proposed Layout	Proposed Layout with Mitigation
289	3rd Avenue S at 16th Street E	20.1	21.8	22.8
418	3rd Avenue S at 14th Street E	3.5	4.7	5.0
664	12th Street S at 3rd Avenue S	17.8	20.1	20.0
726	11th Street S at 3rd Avenue S	14.0	18.0	17.8
727	10th Street S at 3rd Avenue S	15.8	19.8	20.9
728	9th Street S at 3rd Avenue S	10.7	14.9	13.4
729	8th Street S at 3rd Avenue S	20.4	23.6	21.9
730	7th Street S at 3rd Avenue S	13.4	16.3	16.0
731	6th Street S at 3rd Avenue S	15.5	25.0	16.5
732	5th Street S at 3rd Avenue S	33.9	51.1	29.0
733	4th Street S at 3rd Avenue S	9.0	11.3	12.7
734	3rd Street S at 3rd Avenue S	16.7	19.9	19.5
735	Washington Avenue S at 3rd Avenue S	28.1	29.6	27.9
736	2nd Street S at 3rd Avenue S	35.9	43.6	38.0
737	1st Street S at 3rd Avenue S	32.0	55.7	42.0

1. Delays computed using SimTraffic.

The corridor travel times for each scenario are shown in Table 4. The travel time results are estimated based on peak volume occurrences. The primary use of this data is to provide a relative comparison between scenarios and to help assess the estimated change. With the proposed mitigation measures, the overall travel time along 3<sup>rd</sup> Avenue is expected to increase by approximately 10-17%, with exception to the southbound direction in the AM peak, where a 40% improvement is estimated (due to the LRT detection or TCA).

**Table 4. 3<sup>rd</sup> Avenue S Estimated Travel Time Comparison****Northbound**

3rd Avenue (16th Street to 1st Street) Travel Times	AM Peak Hour Average		PM Peak Hour Average	
	Min	Sec	Min	Sec
Existing Conditions	6	0	6	10
Proposed Layout	7	39	8	6
Proposed Layout with Mitigation	6	37	6	53
Percent Change	-10%		-12%	

1. AM Peak and PM Peak travel times computed using SimTraffic.

AM Peak is 7:45 a.m. to 8:45 a.m.

PM Peak is 4:45 p.m. to 5:45 p.m.

**Southbound**

3rd Avenue (1st Street to 16th Street) Travel Times	AM Peak Hour Average		PM Peak Hour Average	
	Min	Sec	Min	Sec
Existing Conditions	15	30	7	24
Proposed Layout	25	1	9	22
Proposed Layout with Mitigation	9	15	8	38
Percent Change	40%		-17%	

**Congestion Map**

In a downtown grid environment of closely spaced intersections, using only intersection delay as the MOE can be misleading as the accumulated delay caused by problematic locations is spread across many intersections. The results may look as if there are no issues; but congested operation may still occur. Generally speaking, the use of intersection delay as a barometer of intersection performance in a CBD shouldn't be considered on its own. Congestion in the downtown is generally expected during the peak periods; however, a problem that results in

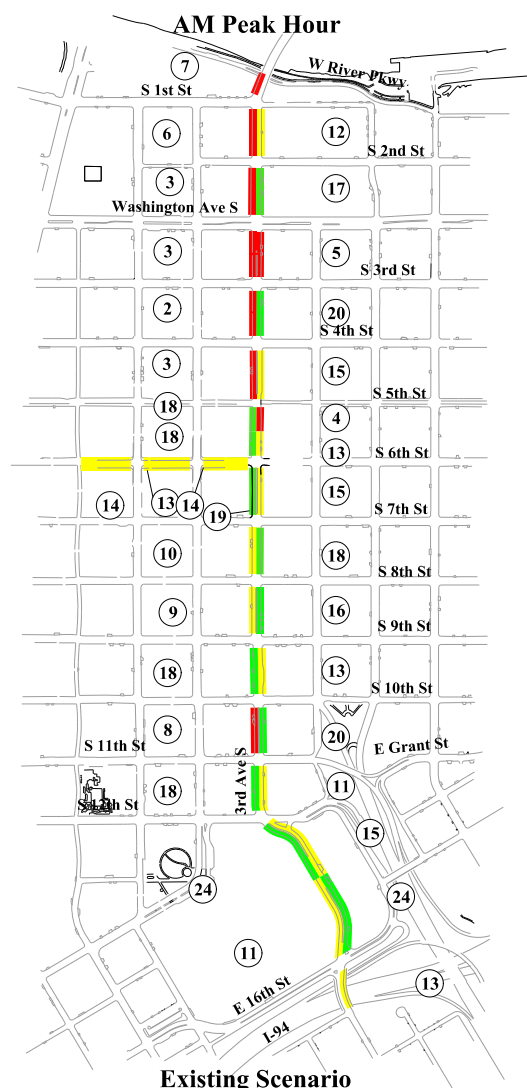
congestion creating excessive propagation of vehicle queues or vehicle queues that create congestion on adjacent streets should be mitigated. To help illustrate and compare the expected congestion level with each scenario, a color coded congestion map is developed. The key measure is average motorist operating speed (thresholds documented in Table 2) and the graph is color coded red, yellow, and green. Low motorist speeds (red) may be indicative of congestion, whereas higher operating speeds (green) occur with smoother traffic flow. Multiple consecutive blocks that are color coded red indicate stopped congestion, or slow moving block length vehicle queues that may impact traffic flow on cross-street roadways, parking ramps or adjacent streets. The congestion maps for each scenario are illustrated in Figure 1 (AM peak hour) and Figure 2 (PM peak hour).

## 5. Conclusions

Based on the analysis, the following conclusions are made:

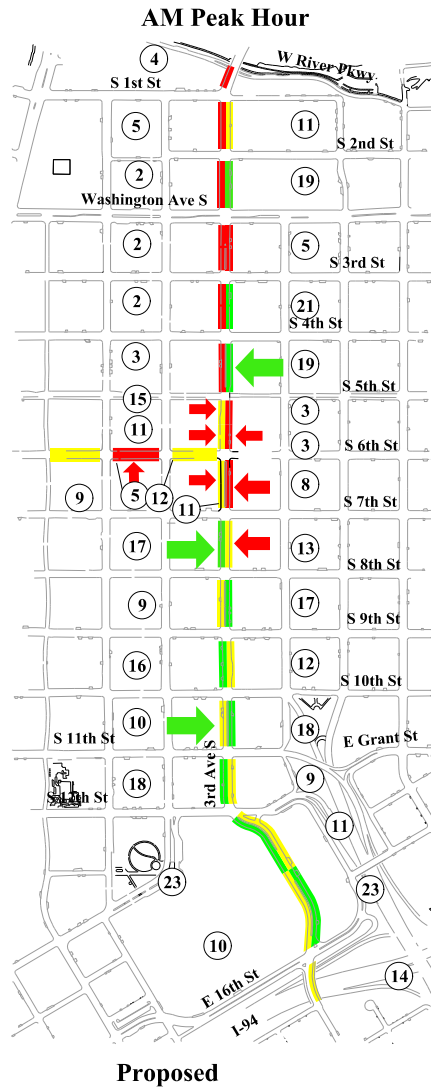
- The 3<sup>rd</sup> Avenue/5<sup>th</sup> Street intersection is expected to be the most problematic location. The proposed mitigation measures are expected to improve the operations of this intersection during both the AM and PM peak hours. This conclusion is based upon the reduction in overall intersection delay estimated and the improved southbound travel time (reduction in vehicle queue) over the existing conditions.
- The removal of the left turn lanes between 1<sup>st</sup> Street and 2<sup>nd</sup> Street are needed to provide a protected bike lane in both directions on this block. The traffic operation analysis indicates that added congestion on this block is expected, but the congestion does not appear to impact flow on adjacent blocks or intersections. With the No Left Turn restriction in the southbound direction (PM Peak Period), and the added northbound left turn lane at 2<sup>nd</sup> Street, acceptable operations are expected.
- Maintaining the “center” medians and adding the protected bike lanes south of 8<sup>th</sup> Street is expected to operate at a reasonable level during normal weekdays. It should be noted, that maintaining exclusive left turn and/or right turn lanes to each one way cross-street in this segment is critical. Also, periods of block long queues are likely to form, this may have some limited impact to the east/west cross-street motorists turning onto 3<sup>rd</sup> Avenue; however, a system impact was not observed in the traffic operation analysis. The impact to parking ingress/egress may be the primary concern.

Although slightly more delay and vehicle queuing is expected; overall, the evaluation found that with the suggested mitigation measures, the 3<sup>rd</sup> Avenue corridor and the proposed layout is expected to operate at a reasonable level of service during peak periods.



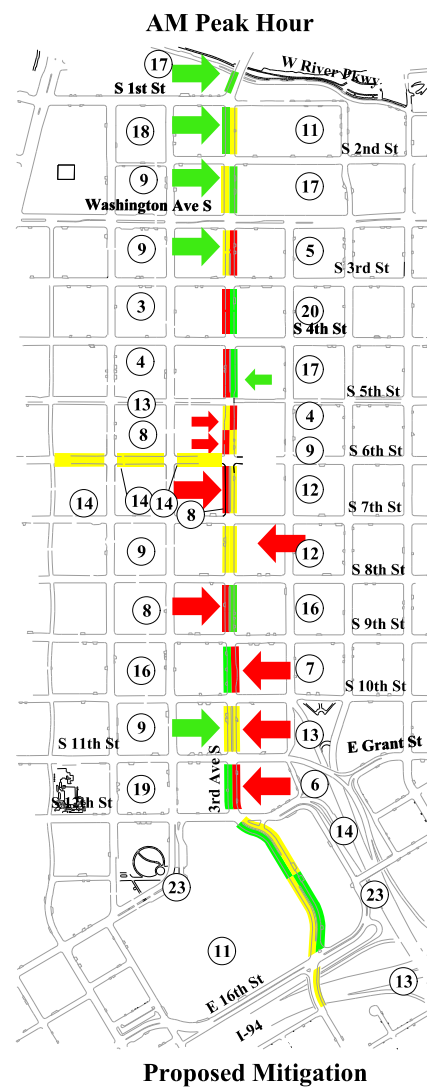
**Existing Scenario**

-12 Green Segments  
 -14 Yellow Segments  
 -9 Red Segments  
 -Average Speed 13 mph



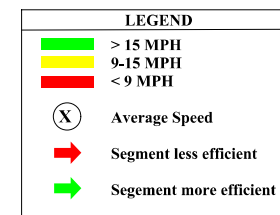
**Proposed**

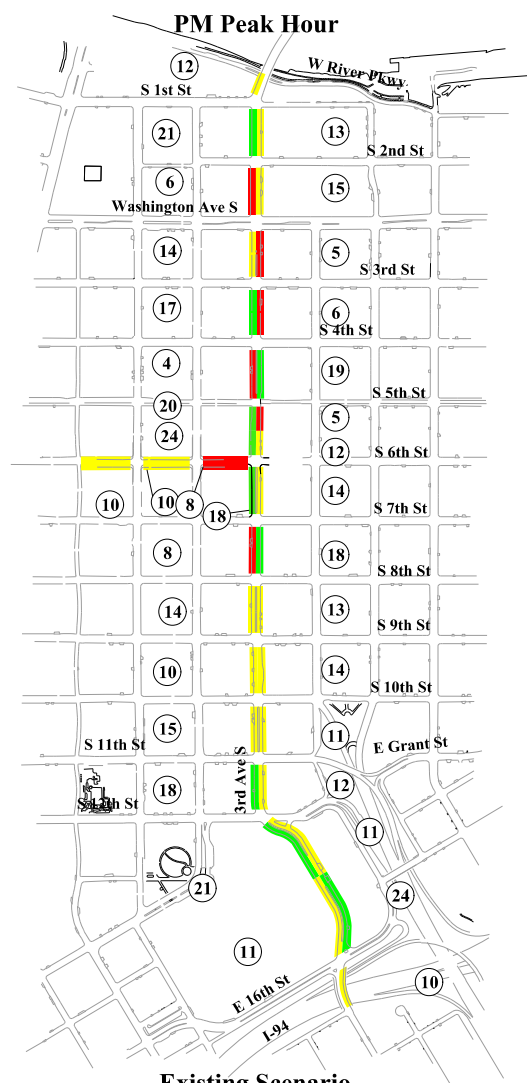
-25 segments no change  
 -7 segments less efficient  
 -3 segments more efficient  
 -9 red segments before  
 -11 red segments after  
 -Average speed 11mph



**Proposed Mitigation**

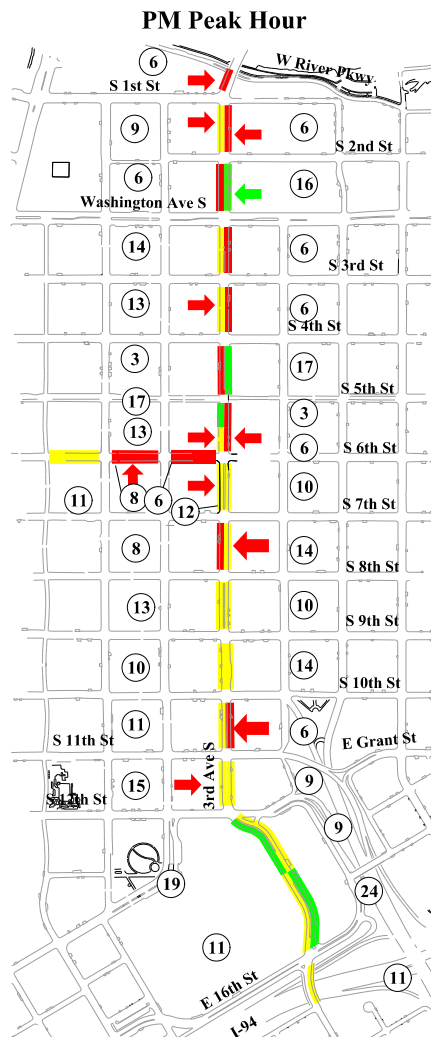
-21 segments no change  
 -8 segments less efficient  
 -6 segments more efficient  
 -9 red segments before  
 -9 red segments after  
 -Average speed 12 mph





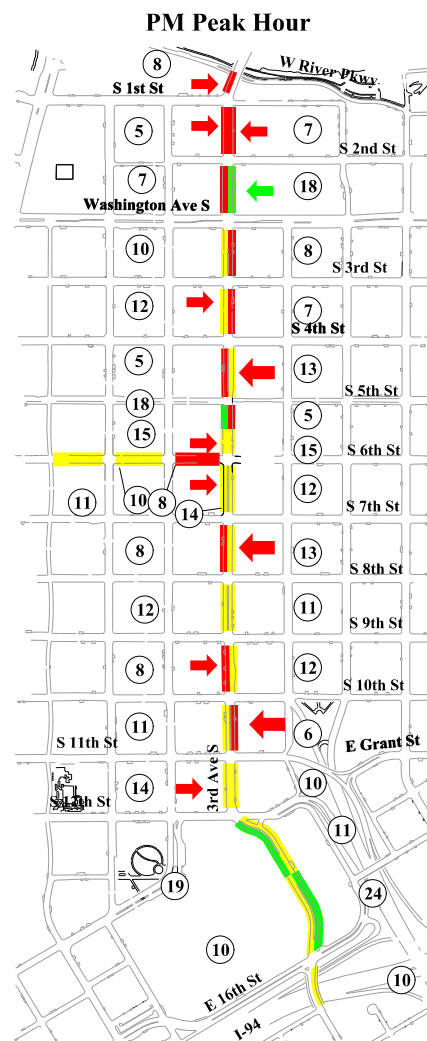
**Existing Scenario**

-10 Green Segments  
 -18 Yellow Segments  
 -7 Red Segments  
 -Average Speed 13 mph



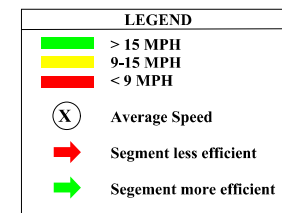
**Proposed**

-23 segments no change  
 -11 segments less efficient  
 -1 segment more efficient  
 -7 red segments before  
 -12 red segments after  
 -Average speed 11 mph



**Proposed Mitigation**

-23 segments no change  
 -11 segments less efficient  
 -1 segments more efficient  
 -7 red segments before  
 -12 red segments after  
 -Average speed 11mph

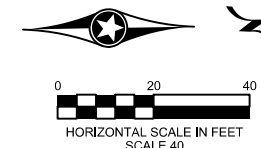
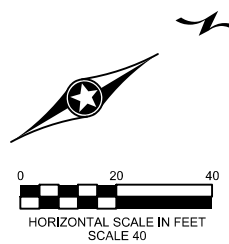




---

**Appendix A:**

Proposed Layout



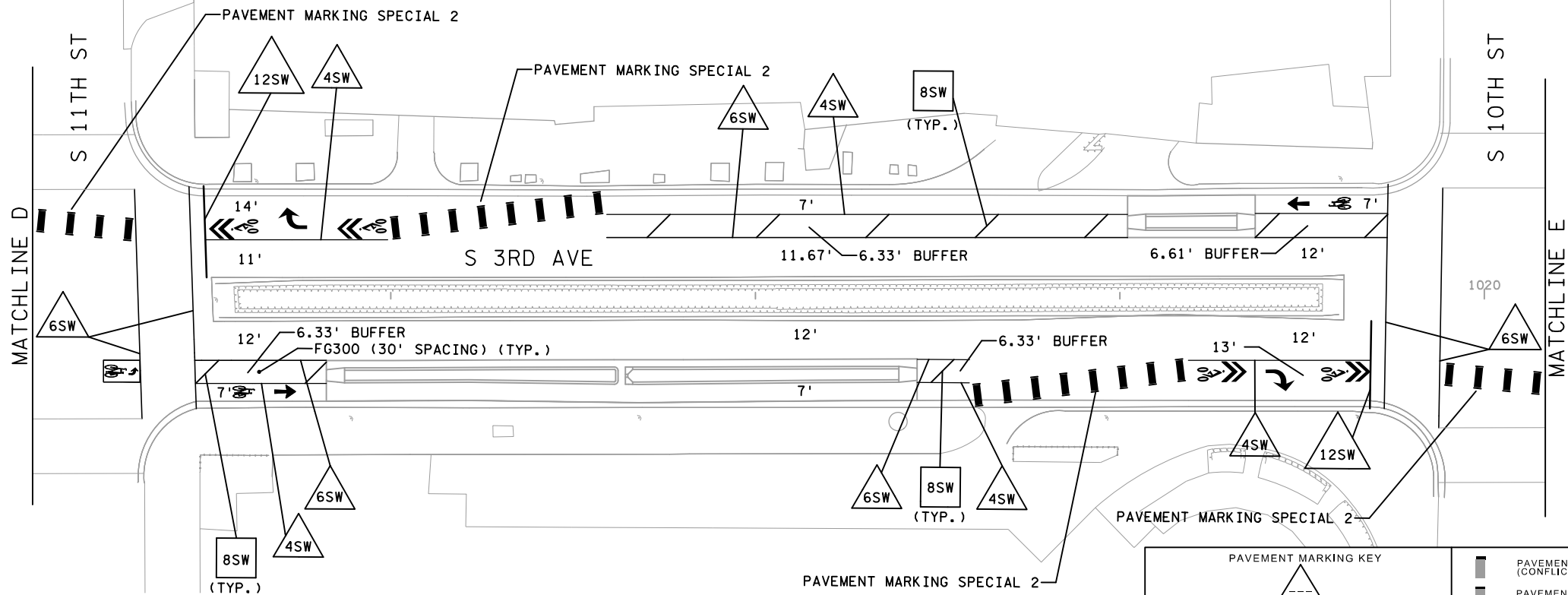
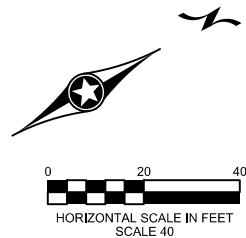
PAVEMENT MARKING KEY				
1ST DIGIT WIDTH 4", 8", ETC.	2ND DIGIT PATTERN S - SOLID B - BROKEN D - DOTTED/DOUBLE	3RD DIGIT COLOR W - WHITE Y - YELLOW B - BLACK		PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW - SPECIAL 1)*
				PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW AND 4DW - SPECIAL 2)*
				FLEXIGUIDE 300 DELINEATOR WHITE (FG300)
				FLEXIGUIDE 300 INTERSTATE GRADE CURBSYSTEM (WHITE) (FG300-IGS)
				PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (LANE ARROW)
EXAMPLE:  = 4" SOLID LINE WHITE-PAINT				PAVEMENT MARKING - PREFORMED THERMOPLASTIC (BIKE SYMBOL W/ ARROW)
BROKEN PAVEMENT MARKINGS HAVE A 10' STRIPE AND 30' GAP UNLESS OTHERWISE NOTED.				PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (TWO-STAGE TURN BOX)
* SEE PAVEMENT MARKING DETAIL SHEET 55				PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (SHARED LANE MARKING)
RECTANGLE - THERMOPLASTIC	TRIANGLE - PAINT			PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONTINUOUS COLORED BACKGROUND SHARED LANE MARKINGS)

PAVEMENT MARKING NOTES:  
1. ALL EXISTING PAVEMENT MARKINGS SHALL BE REMOVED

DESIGN TEAM	Ø		12/31/15		<div>I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.</div> <div>Certified By: _____ Date: _____</div> <div>Printed Name: _____ Date: _____</div>	<div><div><div><div></div><div>Minneapolis</div><div>City of Lakes</div></div></div><div><div><div></div><div>Alliant</div><div>ENGINEERING</div></div></div><div><div>233 Park Ave S, Ste 300</div><div>Minneapolis, MN 55415</div><div>612.758.3080 MAIN</div><div>612.758.3099 FAX</div><div>www.alliant-inc.com</div></div></div>	<div>MINNEAPOLIS, MINNESOTA</div> <div>CITY PROJ. XXXXX</div> <div>S.A.P. 141-305-011</div>	<div>3RD AVE PROTECTED BIKEWAY</div> <div>PERMANENT PAVEMENT MARKING PLANS</div> <div>16TH ST. TO 12TH ST.</div>	FILE NO.	<div>56</div> <div>96</div>
DRAWN BY: JJG				115-0023						
DESIGNER: EWP				2						
CHECKED BY: MPM	NO.	BY	DATE	REVISIONS					OF 9	

5:51:23 PM  
12/31/2015  
c:\pw\_work\ng\project\se\p\email\dms37862\cd150023\_pm01.dgn





**PAVEMENT MARKING KEY**

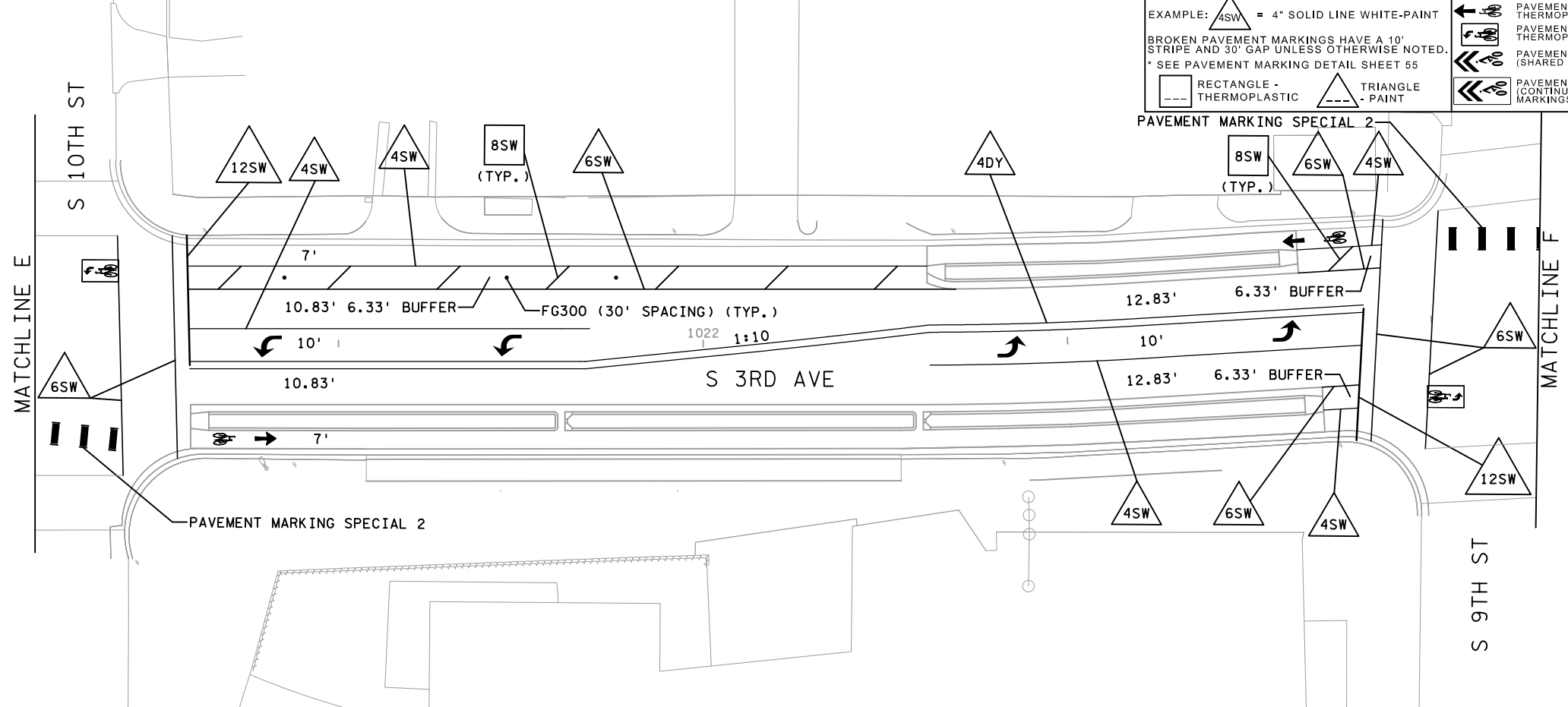
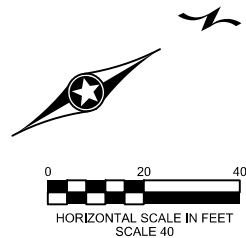
1ST DIGIT WIDTH 4", 8", ETC.	2ND DIGIT PATTERN	3RD DIGIT COLOR
S - SOLID	W - WHITE	Y - YELLOW
B - BROKEN	D - DOTTED/DOUBLE	B - BLACK

EXAMPLE: 4SW = 4" SOLID LINE WHITE-PAINT

BROKEN PAVEMENT MARKINGS HAVE A 10' STRIPE AND 30' GAP UNLESS OTHERWISE NOTED.  
\* SEE PAVEMENT MARKING DETAIL SHEET 55

RECTANGLE - THERMOPLASTIC	TRIANGLE - PAINT
[Symbol]	[Symbol]

PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW - SPECIAL 1)*
[Symbol]
PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW AND 4DW - SPECIAL 2)*
[Symbol]
FLEXIGUIDE 300 DELINEATOR WHITE (FG300)
[Symbol]
FLEXIGUIDE 300 INTERSTATE GRADE CURBSYSTEM (WHITE) (FG300-IGS)
[Symbol]
PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (LANE ARROW)
[Symbol]
PAVEMENT MARKING - PREFORMED THERMOPLASTIC (BIKE SYMBOL W/ ARROW)
[Symbol]
PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (TWO-STAGE TURN BOX)
[Symbol]
PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (SHARED LANE MARKING)
[Symbol]
PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONTINUOUS COLORED BACKGROUND SHARED LANE MARKINGS)
[Symbol]



PAVEMENT MARKING NOTES:  
1. ALL EXISTING PAVEMENT MARKINGS SHALL BE REMOVED

5:51:30 PM  
12/31/2015  
C:\Users\jg\OneDrive\work\projects\115-0023\115-0023.dgn

DESIGN TEAM	0	12/31/15	
DRAWN BY:	JJG		
DESIGNER:	EWP		
CHECKED BY:	MPM		
NO.	BY	DATE	REVISIONS

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer in the State of Minnesota.  
Certified By: [Signature]  
Printed Name: [Name] Date: [Date]

**Minneapolis**  
City of Lakes

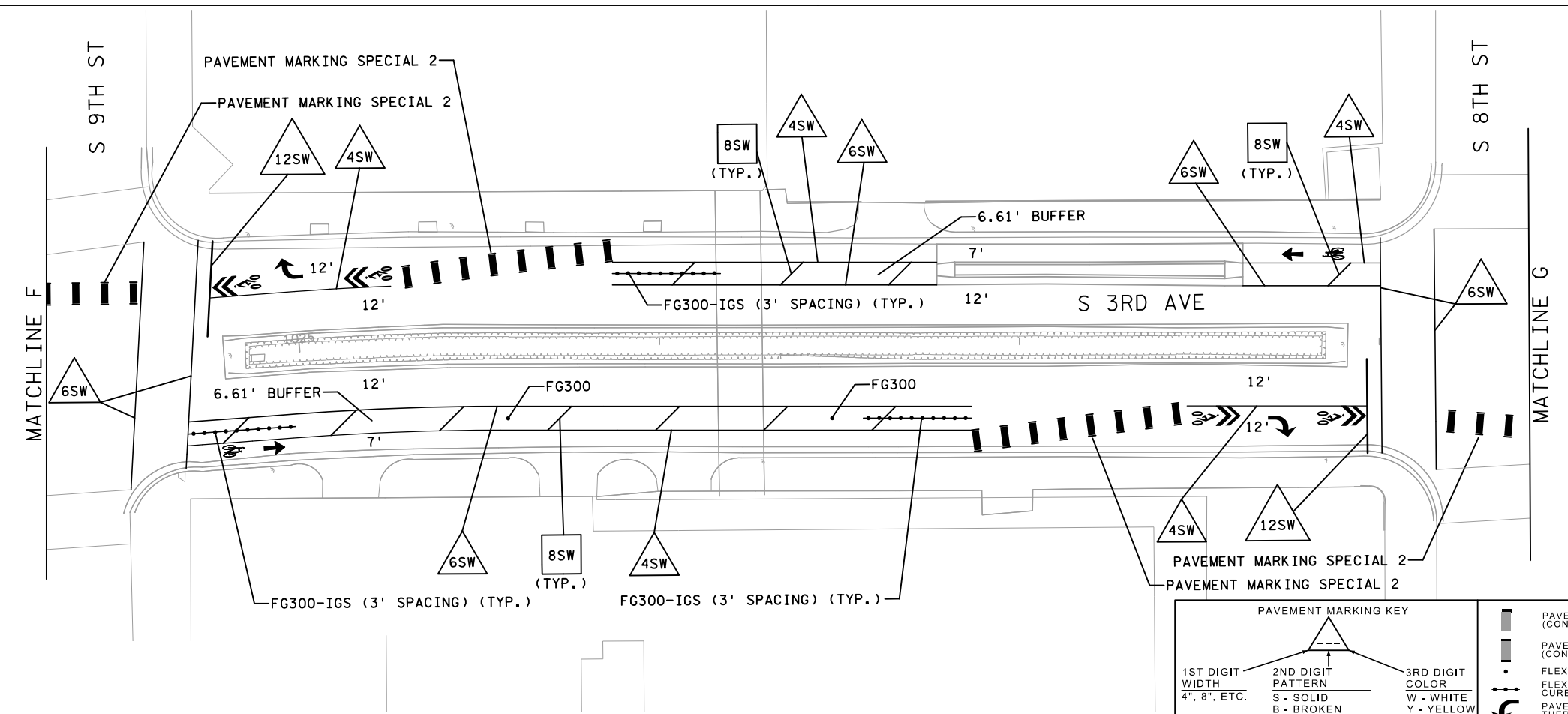
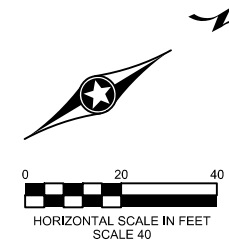
**ALLIANT**  
ENGINEERING

233 Park Ave S, Ste 300  
Minneapolis, MN 55415  
612.758.3080 FAX  
612.758.3099 FAX  
www.alliant-inc.com

**MINNEAPOLIS, MINNESOTA**  
CITY PROJ. XXXXX  
S.A.P. 141-305-011

**3RD AVE PROTECTED BIKEWAY  
PERMANENT PAVEMENT MARKING PLANS  
11TH ST. TO 9TH ST.**

FILE NO. 115-0023	58
4 OF 9	96



**PAVEMENT MARKING KEY**

1ST DIGIT WIDTH 4", 8", ETC.	2ND DIGIT PATTERN	3RD DIGIT COLOR
S - SOLID	W - WHITE	Y - YELLOW
B - BROKEN	B - BLACK	B - BLACK
D - DOTTED/DOUBLE		

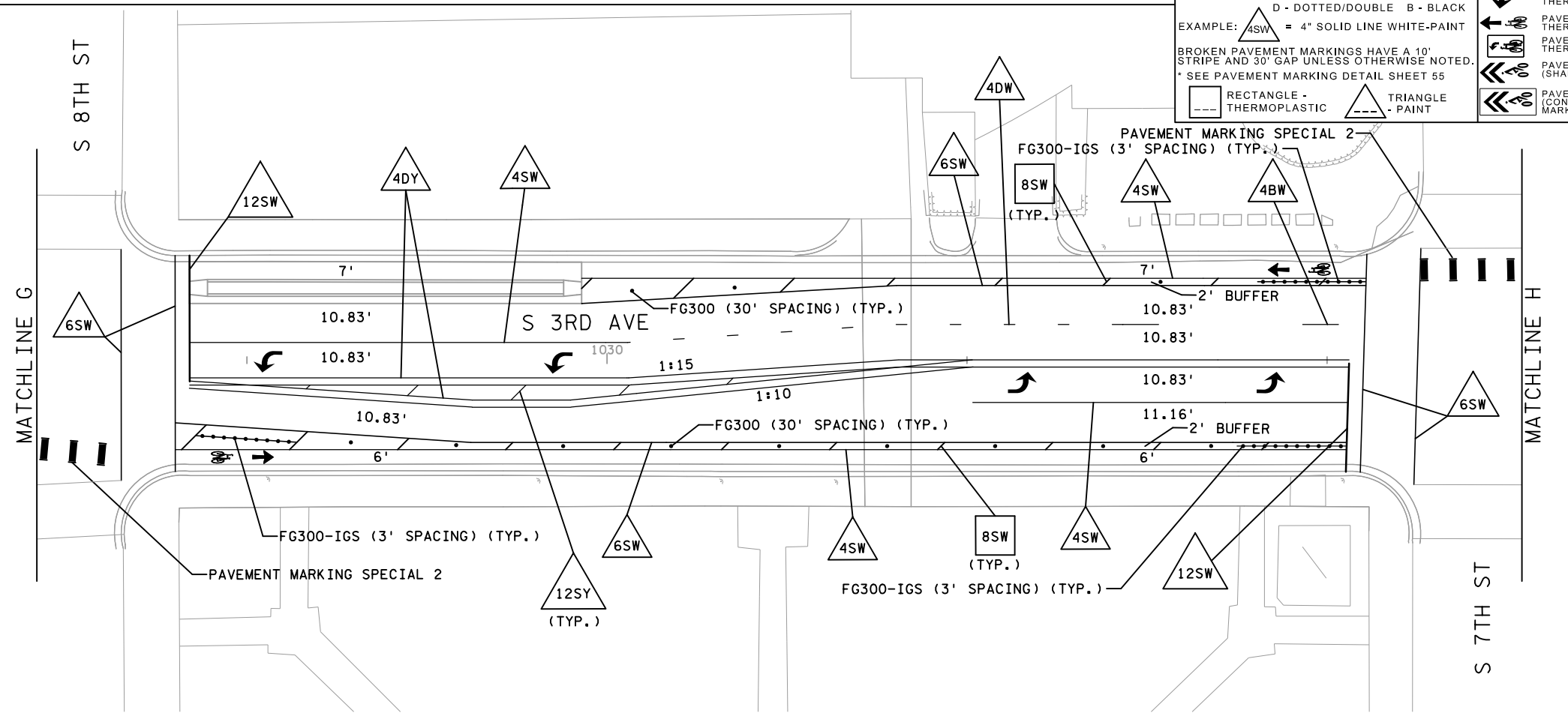
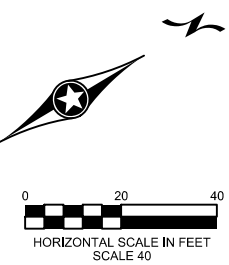
EXAMPLE: 4SW = 4" SOLID LINE WHITE-PAINT

BROKEN PAVEMENT MARKINGS HAVE A 10' STRIPE AND 30' GAP UNLESS OTHERWISE NOTED.  
\* SEE PAVEMENT MARKING DETAIL SHEET 55

SHAPE	TYPE
Rectangle	Thermoplastic
Triangle	Paint

**PAVEMENT MARKING SPECIAL 2**

- PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW - SPECIAL 1)\*
- PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW AND 4DW - SPECIAL 2)\*
- FLEXIGUIDE 300 DELINEATOR WHITE (FG300)
- FLEXIGUIDE 300 INTERSTATE GRADE CURBSYSTEM (WHITE) (FG300-IGS)
- PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (LANE ARROW)
- PAVEMENT MARKING - PREFORMED THERMOPLASTIC (BIKE SYMBOL W/ ARROW)
- PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (TWO-STAGE TURN BOX)
- PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (SHARED LANE MARKING)
- PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONTINUOUS COLORED BACKGROUND SHARED LANE MARKINGS)



**PAVEMENT MARKING NOTES:**  
1. ALL EXISTING PAVEMENT MARKINGS SHALL BE REMOVED

5:51:34 PM  
12/31/2015  
C:\Users\jg\OneDrive\Documents\Projects\3rd Ave\3rd Ave.dgn

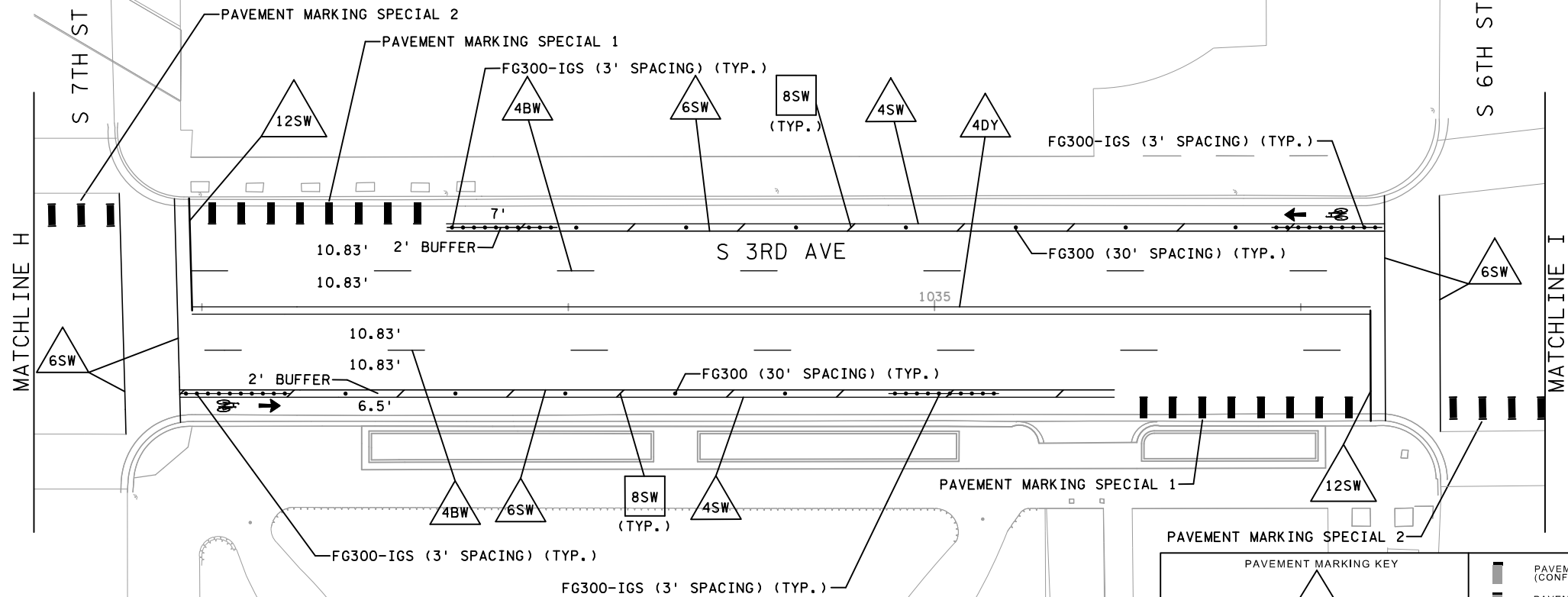
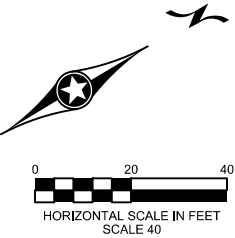
DESIGN TEAM	0		12/31/15	
DRAWN BY: JJG				
DESIGNER: EWP				
CHECKED BY: MPM				
	NO.	BY	DATE	REVISIONS

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer in the State of Minnesota.  
Certified By: [Signature] Licensed Professional Engineer  
Printed Name: [Name] Date: [Date]



MINNEAPOLIS, MINNESOTA  
CITY PROJ. XXXXX  
S.A.P. 141-305-011

3RD AVE PROTECTED BIKEWAY PERMANENT PAVEMENT MARKING PLANS 9TH ST. TO 7TH ST.	FILE NO. 115-0023	59
	5 OF 9	96



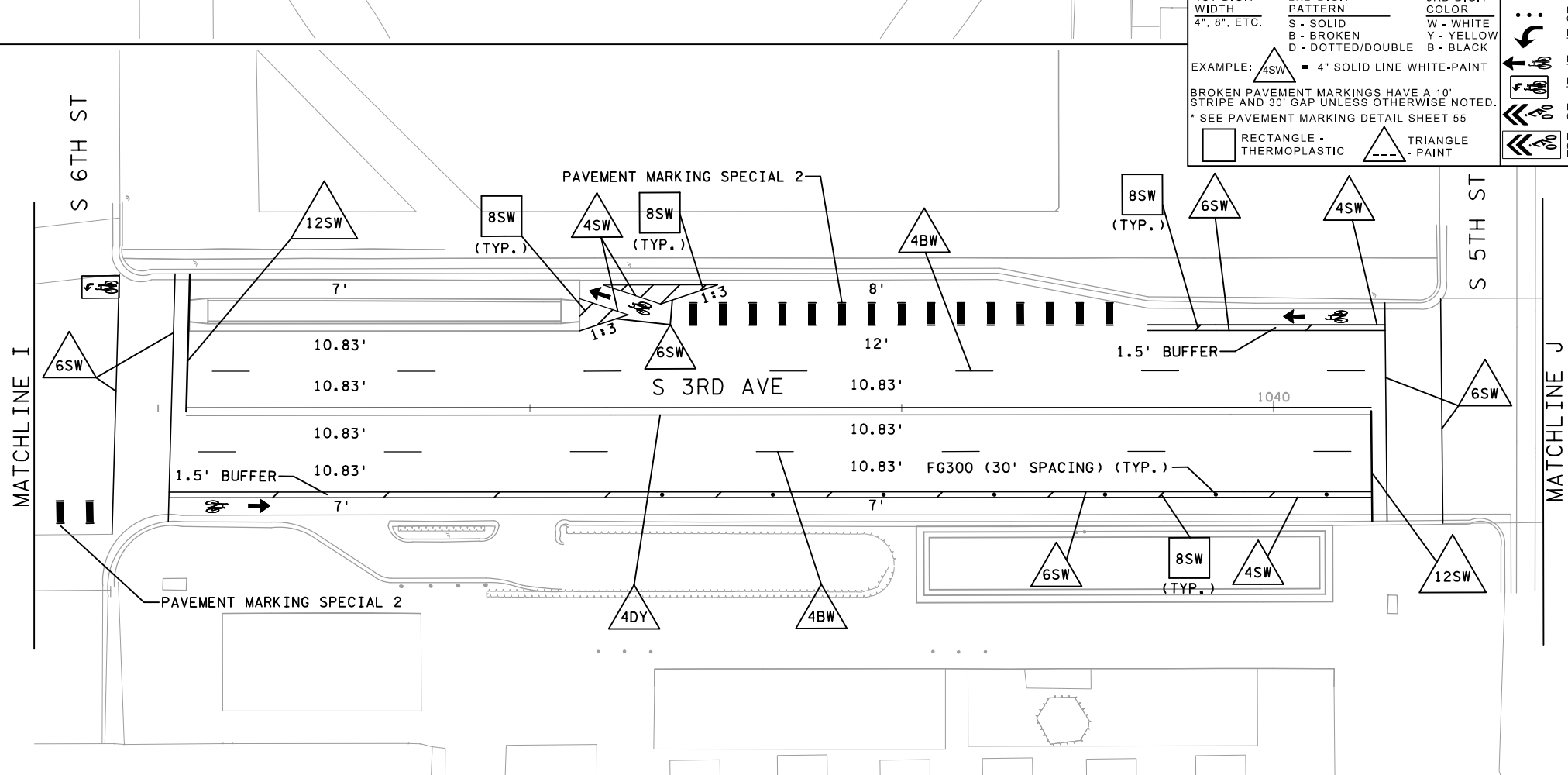
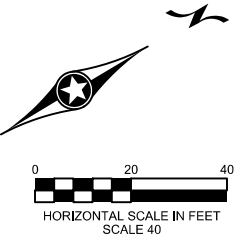
**PAVEMENT MARKING KEY**

1ST DIGIT WIDTH 4", 8", ETC.	2ND DIGIT PATTERN	3RD DIGIT COLOR
S - SOLID	W - WHITE	Y - YELLOW
B - BROKEN	Y - YELLOW	B - BLACK
D - DOTTED/DOUBLE	B - BLACK	

EXAMPLE: = 4" SOLID LINE WHITE-PAINT

BROKEN PAVEMENT MARKINGS HAVE A 10' STRIPE AND 30' GAP UNLESS OTHERWISE NOTED.  
\* SEE PAVEMENT MARKING DETAIL SHEET 55

PAVEMENT MARKING	PAVEMENT MESSAGE
RECTANGLE - THERMOPLASTIC	PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW - SPECIAL 1)*
TRIANGLE - PAINT	PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW AND 4DW - SPECIAL 2)*
	FLEXIGUIDE 300 DELINEATOR WHITE (FG300)
	FLEXIGUIDE 300 INTERSTATE GRADE CURBSYSTEM (WHITE) (FG300-IGS)
	PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (LANE ARROW)
	PAVEMENT MARKING - PREFORMED THERMOPLASTIC (BIKE SYMBOL W/ ARROW)
	PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (TWO-STAGE TURN BOX)
	PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (SHARED LANE MARKING)
	PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONTINUOUS COLORED BACKGROUND SHARED LANE MARKINGS)



PAVEMENT MARKING NOTES:  
1. ALL EXISTING PAVEMENT MARKINGS SHALL BE REMOVED

5:51:38 PM  
12/31/2015  
C:\Users\jg\OneDrive\Projects\3rd Ave\3rd Ave.dgn

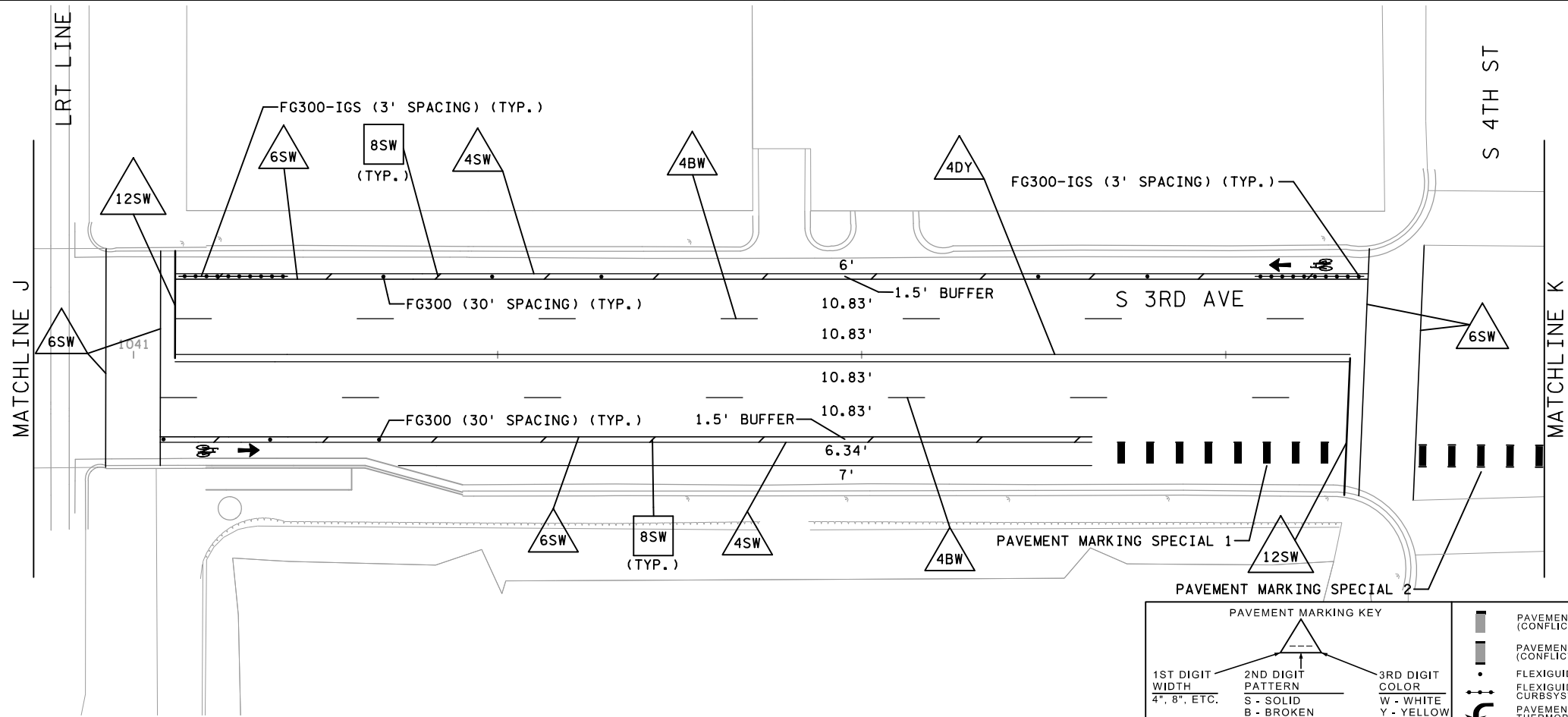
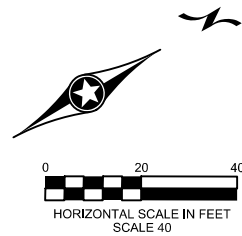
DESIGN TEAM	0	12/31/15
DRAWN BY:	JJG	
DESIGNER:	EWP	
CHECKED BY:	MPM	
NO.	BY	DATE
REVISIONS		

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer in the State of Minnesota.  
Certified By: [Signature]  
Printed Name: [Name] Date: [Date]



MINNEAPOLIS, MINNESOTA  
CITY PROJ. XXXXX  
S.A.P. 141-305-011

3RD AVE PROTECTED BIKEWAY PERMANENT PAVEMENT MARKING PLANS 7TH ST. TO 5TH ST.		FILE NO. 115-0023	60
		6 OF 9	96



**PAVEMENT MARKING KEY**

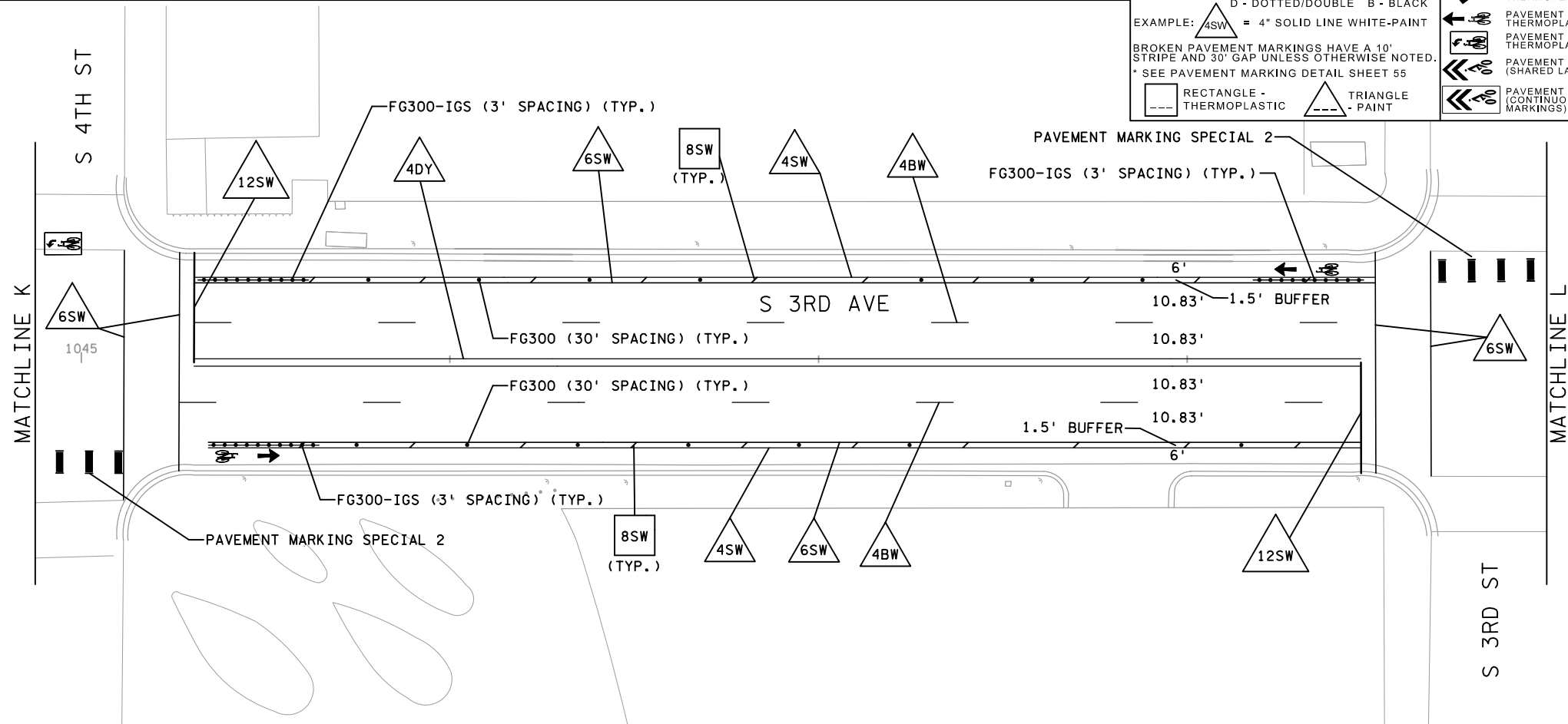
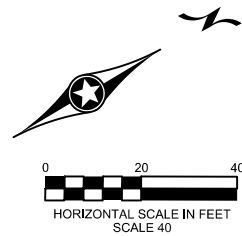
1ST DIGIT WIDTH 4", 8", ETC.	2ND DIGIT PATTERN	3RD DIGIT COLOR
S - SOLID	S - SOLID	W - WHITE
B - BROKEN	B - BROKEN	Y - YELLOW
D - DOTTED/DOUBLE	D - DOTTED/DOUBLE	B - BLACK

EXAMPLE: 4SW = 4" SOLID LINE WHITE-PAINT

BROKEN PAVEMENT MARKINGS HAVE A 10' STRIPE AND 30' GAP UNLESS OTHERWISE NOTED.  
\* SEE PAVEMENT MARKING DETAIL SHEET 55

RECTANGLE - THERMOPLASTIC	TRIANGLE - PAINT
[Symbol]	[Symbol]

PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW - SPECIAL 1)*	PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW AND 4DW - SPECIAL 2)*
[Symbol]	[Symbol]
FLEXIGUIDE 300 DELINEATOR WHITE (FG300)	FLEXIGUIDE 300 INTERSTATE GRADE CURBSYSTEM (WHITE) (FG300-IGS)
PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (LANE ARROW)	PAVEMENT MARKING - PREFORMED THERMOPLASTIC (BIKE SYMBOL W/ ARROW)
PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (TWO-STAGE TURN BOX)	PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (SHARED LANE MARKING)
PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONTINUOUS COLORED BACKGROUND SHARED LANE MARKINGS)	



PAVEMENT MARKING NOTES:  
1. ALL EXISTING PAVEMENT MARKINGS SHALL BE REMOVED

5:51:42 PM  
12/31/2015  
C:\Users\jg\OneDrive\Documents\Projects\3rd Ave\3rd Ave.dgn

DESIGN TEAM	0		12/31/15	
DRAWN BY:	JJG			
DESIGNER:	EWP			
CHECKED BY:	MPM			
NO.	BY	DATE	REVISIONS	

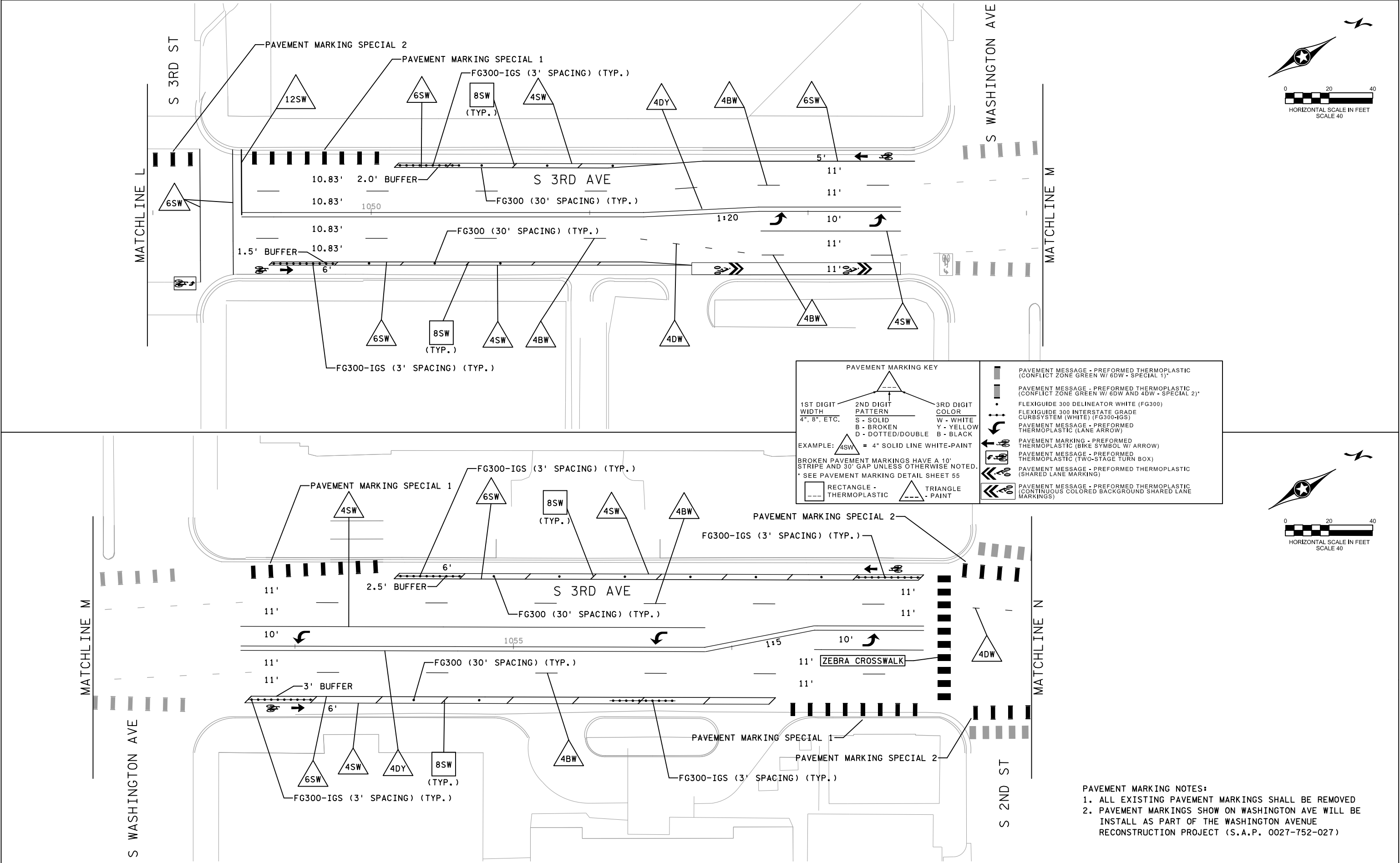
I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer in the State of Minnesota.  
Certified By: [Signature] Licensed Professional Engineer  
Printed Name: [Blank] Date: [Blank]



MINNEAPOLIS, MINNESOTA  
CITY PROJ. XXXXX  
S.A.P. 141-305-011

3RD AVE PROTECTED BIKEWAY PERMANENT PAVEMENT MARKING PLANS 5TH ST. TO 3RD ST.		FILE NO. 115-0023	61
		7 OF 9	96

5:51:46 PM  
12/31/2015  
C:\Users\jg\OneDrive\Documents\Projects\3rd Ave\3rd Ave.dgn



**PAVEMENT MARKING NOTES:**

1. ALL EXISTING PAVEMENT MARKINGS SHALL BE REMOVED
2. PAVEMENT MARKINGS SHOW ON WASHINGTON AVE WILL BE INSTALL AS PART OF THE WASHINGTON AVENUE RECONSTRUCTION PROJECT (S.A.P. 0027-752-027)

DESIGN TEAM	Ø	12/31/15
DRAWN BY:	JJG	
DESIGNER:	EWP	
CHECKED BY:	MPM	
NO.	BY	DATE
REVISIONS		

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer in the State of Minnesota.

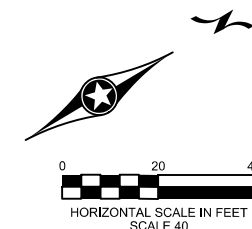
Certified By: \_\_\_\_\_  
Printed Name: \_\_\_\_\_  
Date: \_\_\_\_\_



**MINNEAPOLIS, MINNESOTA**  
CITY PROJ. XXXXX  
S.A.P. 141-305-011

3RD AVE PROTECTED BIKEWAY PERMANENT PAVEMENT MARKING PLANS 3RD ST. TO 2ND ST.		FILE NO. 115-0023	62
		8 OF 9	96





PAVEMENT MARKING KEY				
1ST DIGIT WIDTH 4", 8", ETC.	2ND DIGIT PATTERN S - SOLID B - BROKEN D - DOTTED/DOUBLE	3RD DIGIT COLOR W - WHITE Y - YELLOW B - BLACK		
EXAMPLE:  = 4" SOLID LINE WHITE-PAINT				
BROKEN PAVEMENT MARKINGS HAVE A 10' STRIPE AND 30' GAP UNLESS OTHERWISE NOTED.				
* SEE PAVEMENT MARKING DETAIL SHEET 55				
RECTANGLE - THERMOPLASTIC	TRIANGLE - PAINT		PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW - SPECIAL 1)*	PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONFLICT ZONE GREEN W/ 6DW AND 4DW - SPECIAL 2)*
			FLEXIGUIDE 300 DELINEATOR WHITE (FG300)	FLEXIGUIDE 300 INTERSTATE GRADE CURBSYSTEM (WHITE) (FG300-IGS)
			PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (LANE ARROW)	PAVEMENT MARKING - PREFORMED THERMOPLASTIC (BIKE SYMBOL W/ ARROW)
			PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (TWO-STAGE TURN BOX)	PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (SHARED LANE MARKING)
			PAVEMENT MESSAGE - PREFORMED THERMOPLASTIC (CONTINUOUS COLORED BACKGROUND SHARED LANE MARKINGS)	

DESIGN TEAM	Ø		12/31/15		<div>I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.</div> <div>Certified By: _____ Date: _____</div> <div>Licensed Professional Engineer</div> <div>Printed Name: _____ Date: _____</div>	<div> <b>Minneapolis</b> City of Lakes</div>	<div> <b>ALLIANT</b> ENGINEERING</div> <div>233 Park Ave S, Ste 300 Minneapolis, MN 55415 612.758.3080 MAIN 612.758.3099 FAX www.alliant-inc.com</div>	<div><b>MINNEAPOLIS, MINNESOTA</b> CITY PROJ. XXXXX S.A.P. 141-305-011</div>	<div>3RD AVE PROTECTED BIKEWAY PERMANENT PAVEMENT MARKING PLANS 2ND ST. TO 1ST ST.</div>	FILE NO. 115-0023	63			
DRAWN BY: <b>JJG</b>												9	96	
DESIGNER: <b>EWB</b>														OF 9
CHECKED BY: <b>MPM</b>	NO.	BY	DATE	REVISIONS										

5:51:49 PM  
12/31/2015  
c:\pw\work\ing\projectw\se\p\eme\dms37862\cd150023\_pm08.dgn

---

**Appendix B:**  
Traffic Volumes

# AM Peak Volumes

		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
3rd Avenue S at 16th Street E	AM 1 (Seeding)	6	55	26	5	33	8	19	26	10	7	14	8
	AM 2	5	43	24	4	42	15	17	30	13	6	12	7
	AM 3	8	51	27	10	35	7	16	22	7	2	16	5
	AM 4	5	40	27	6	33	16	16	29	8	4	17	7
	AM 5	5	35	27	7	34	12	18	24	9	5	21	6
	Simtraffic Hour Sum	23	169	105	27	144	50	67	105	37	17	66	25
3rd Avenue S at 14th Street E	AM 1 (Seeding)	0	54	0	7	42	0	0	0	0	2	0	4
	AM 2	0	68	3	7	61	0	0	0	0	0	0	2
	AM 3	0	57	5	5	40	0	0	0	0	0	0	2
	AM 4	0	73	0	15	59	0	0	0	0	0	0	2
	AM 5	0	76	5	10	46	0	0	0	0	0	0	5
	Simtraffic Hour Sum	0	274	13	37	206	0	0	0	0	0	0	11
12th Street S at 3rd Avenue S	AM 1 (Seeding)	0	33	0	32	35	0	72	126	14	0	0	0
	AM 2	0	51	0	31	47	0	84	111	19	0	0	0
	AM 3	0	39	0	33	26	0	66	97	16	0	0	0
	AM 4	0	48	0	32	62	0	75	112	13	0	0	0
	AM 5	0	60	0	34	38	0	67	101	13	0	0	0
	Simtraffic Hour Sum	0	198	0	130	173	0	292	421	61	0	0	0
11th Street S at 3rd Avenue S	AM 1 (Seeding)	29	88	0	0	43	42	0	0	0	32	453	55
	AM 2	31	101	0	0	32	55	0	0	0	33	448	66
	AM 3	19	98	0	0	21	37	0	0	0	39	441	45
	AM 4	30	104	0	0	45	28	0	0	0	50	474	92
	AM 5	28	91	0	0	35	33	0	0	0	40	383	80
	Simtraffic Hour Sum	108	394	0	0	133	153	0	0	0	162	1746	283
10th Street S at 3rd Avenue S	AM 1 (Seeding)	0	124	19	6	58	0	47	114	11	0	0	0
	AM 2	0	141	23	13	73	0	57	164	5	0	0	0
	AM 3	0	139	24	6	55	0	43	126	5	0	0	0
	AM 4	0	152	29	7	69	0	57	151	7	0	0	0
	AM 5	0	153	22	12	57	0	40	118	12	0	0	0
	Simtraffic Hour Sum	0	585	98	38	254	0	197	559	29	0	0	0
9th Street S at 3rd Avenue S	AM 1 (Seeding)	28	132	0	0	76	31	0	0	0	9	249	25
	AM 2	44	168	0	0	55	24	0	0	0	9	302	19
	AM 3	42	159	0	0	72	34	0	0	0	14	318	21
	AM 4	52	165	0	0	42	30	0	0	0	10	290	27
	AM 5	25	160	0	0	58	21	0	0	0	13	242	21
	Simtraffic Hour Sum	163	652	0	0	227	109	0	0	0	46	1152	88
8th Street S at 3rd Avenue S	AM 1 (Seeding)	0	94	44	28	94	0	13	106	9	0	0	0
	AM 2	0	128	50	31	78	0	29	113	13	0	0	0
	AM 3	0	110	46	42	104	0	24	108	5	0	0	0
	AM 4	0	104	58	38	75	0	25	102	7	0	0	0
	AM 5	0	124	52	50	71	0	16	124	5	0	0	0
	Simtraffic Hour Sum	0	466	206	161	328	0	94	447	30	0	0	0
7th Street S at 3rd Avenue S	AM 1 (Seeding)	29	71	0	0	100	35	0	0	0	31	251	43
	AM 2	30	102	0	0	99	30	0	0	0	37	290	50
	AM 3	36	102	0	0	110	37	0	0	0	35	286	51
	AM 4	29	86	0	0	95	42	0	0	0	34	302	71
	AM 5	38	92	0	0	96	28	0	0	0	42	293	59
	Simtraffic Hour Sum	133	382	0	0	400	137	0	0	0	148	1171	231
6th Street S at 3rd Avenue S	AM 1 (Seeding)	0	118	24	20	105	0	31	187	23	0	0	0
	AM 2	0	131	29	30	120	0	42	203	31	0	0	0
	AM 3	0	147	25	37	124	0	44	241	24	0	0	0
	AM 4	0	162	38	23	133	0	73	215	26	0	0	0
	AM 5	0	169	25	27	127	0	53	230	24	0	0	0
	Simtraffic Hour Sum	0	609	117	117	504	0	212	889	105	0	0	0
5th Street S at 3rd Avenue S	AM 1 (Seeding)	43	66	0	0	187	21	0	0	0	0	0	0
	AM 2	46	91	0	0	206	23	0	0	0	0	0	0
	AM 3	43	69	0	0	189	21	0	0	0	0	0	0
	AM 4	51	67	0	0	205	25	0	0	0	0	0	0
	AM 5	52	83	0	0	192	32	0	0	0	0	0	0
	Simtraffic Hour Sum	192	310	0	0	792	101	0	0	0	0	0	0
4th Street S at 3rd Avenue S	AM 1 (Seeding)	3	65	4	22	178	0	28	159	28	0	7	2
	AM 2	0	84	11	22	194	0	15	183	25	0	15	2
	AM 3	0	64	11	23	174	0	26	190	36	0	10	0
	AM 4	0	61	19	22	208	0	32	212	26	0	8	2
	AM 5	0	72	15	16	188	0	27	195	42	0	11	0
	Simtraffic Hour Sum	0	281	56	83	764	0	100	780	129	0	44	4

AM Peak Volumes

		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
3rd Street S at 3rd Avenue S	AM 1 (Seeding)	14	69	0	0	160	18	0	0	0	16	113	6
	AM 2	21	66	0	0	178	31	0	0	0	18	127	8
	AM 3	14	59	0	0	132	23	0	0	0	26	116	12
	AM 4	18	54	0	0	158	17	0	0	0	17	153	19
	AM 5	14	64	0	0	157	26	0	0	0	20	126	8
	Simtraffic Hour Sum	67	243	0	0	625	97	0	0	0	81	522	47
Washington Ave S at 3rd Avenue S	AM 1 (Seeding)	8	46	13	65	130	5	23	144	16	19	106	11
	AM 2	11	57	13	86	173	11	28	140	9	35	155	12
	AM 3	10	56	11	53	142	13	29	174	16	21	138	27
	AM 4	4	56	15	72	140	19	21	139	21	28	150	20
	AM 5	12	65	8	50	149	15	27	159	15	32	153	39
	Simtraffic Hour Sum	37	234	47	261	604	58	105	612	61	116	596	98
2nd Street S at 3rd Avenue S	AM 1 (Seeding)	8	64	30	47	205	2	8	12	14	14	9	13
	AM 2	5	65	38	36	248	4	5	18	12	11	17	20
	AM 3	7	72	31	30	222	8	5	7	12	11	20	18
	AM 4	5	72	27	24	207	6	6	12	14	12	20	14
	AM 5	6	63	30	21	143	10	4	11	9	11	18	7
	Simtraffic Hour Sum	23	272	126	111	820	28	20	48	47	45	75	59
1st Street S at 3rd Avenue S	AM 1 (Seeding)	8	77	3	23	228	43	21	14	26	2	31	12
	AM 2	14	92	2	13	239	42	21	15	22	4	29	17
	AM 3	15	80	4	22	217	46	22	19	25	0	27	17
	AM 4	16	64	3	14	189	50	20	22	16	0	29	21
	AM 5	8	74	0	20	174	50	26	20	20	3	23	17
	Simtraffic Hour Sum	53	310	9	69	819	188	89	76	83	7	108	72

**PM Peak Volumes**

		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
3rd Avenue S at 16th Street E	PM 1 (Seeding)	9	35	84	19	73	29	15	27	4	5	47	4
	PM 2	10	44	65	35	78	28	13	16	6	6	48	9
	PM 3	17	32	74	30	85	44	9	27	11	6	58	7
	PM 4	21	32	70	27	104	33	13	19	10	10	50	7
	PM 5	18	27	79	27	100	34	7	27	6	6	59	4
	Simtraffic Hour Sum	66	135	288	119	367	139	42	89	33	28	215	27
3rd Avenue S at 14th Street E	PM 1 (Seeding)	0	62	3	3	87	0	0	0	0	0	0	4
	PM 2	0	54	0	2	113	0	0	0	0	2	0	4
	PM 3	2	63	6	5	126	0	0	0	0	0	0	6
	PM 4	0	55	3	3	172	0	0	0	0	2	0	7
	PM 5	0	54	3	0	188	0	0	0	0	2	0	6
	Simtraffic Hour Sum	2	226	12	10	599	0	0	0	0	6	0	23
12th Street S at 3rd Avenue S	PM 1 (Seeding)	0	50	0	50	83	0	34	199	13	0	0	0
	PM 2	0	42	0	50	99	0	37	223	18	0	0	0
	PM 3	0	47	3	64	106	0	35	215	24	0	0	0
	PM 4	0	40	0	58	150	0	53	252	26	0	0	0
	PM 5	0	50	0	58	170	0	50	233	19	0	0	0
	Simtraffic Hour Sum	0	179	3	230	525	0	175	923	87	0	0	0
11th Street S at 3rd Avenue S	PM 1 (Seeding)	22	69	0	0	62	28	0	0	0	64	219	45
	PM 2	18	70	0	0	93	43	0	0	0	67	223	59
	PM 3	12	74	0	0	89	45	0	0	0	73	252	45
	PM 4	16	83	0	0	121	45	0	0	0	83	232	40
	PM 5	16	94	0	0	140	45	0	0	0	87	210	35
	Simtraffic Hour Sum	62	321	0	0	443	178	0	0	0	310	917	179
10th Street S at 3rd Avenue S	PM 1 (Seeding)	0	104	24	18	62	0	67	291	13	0	0	0
	PM 2	0	105	26	26	86	0	73	322	17	0	0	0
	PM 3	0	106	18	24	75	0	74	368	12	0	0	0
	PM 4	0	99	32	29	105	0	63	435	10	0	0	0
	PM 5	0	105	30	42	139	0	65	451	13	0	0	0
	Simtraffic Hour Sum	0	415	106	121	405	0	275	1576	52	0	0	0
9th Street S at 3rd Avenue S	PM 1 (Seeding)	27	156	0	0	83	36	0	0	0	27	189	31
	PM 2	27	147	0	0	87	53	0	0	0	26	198	43
	PM 3	17	149	0	0	102	50	0	0	0	24	194	38
	PM 4	24	155	0	0	96	42	0	0	0	31	172	43
	PM 5	17	138	0	0	103	30	0	0	0	40	171	43
	Simtraffic Hour Sum	85	589	0	0	388	175	0	0	0	121	735	167
8th Street S at 3rd Avenue S	PM 1 (Seeding)	0	154	29	23	109	0	46	166	12	0	0	0
	PM 2	0	147	42	12	120	0	42	157	17	0	0	0
	PM 3	0	160	35	28	133	0	38	177	14	0	0	0
	PM 4	0	171	38	28	129	0	43	195	24	0	0	0
	PM 5	0	142	33	20	117	0	43	252	21	0	0	0
	Simtraffic Hour Sum	0	620	148	88	499	0	166	781	76	0	0	0
7th Street S at 3rd Avenue S	PM 1 (Seeding)	31	189	0	0	120	25	0	0	0	22	229	42
	PM 2	27	200	0	0	100	21	0	0	0	40	213	33
	PM 3	22	199	0	0	132	18	0	0	0	30	251	54
	PM 4	39	169	0	0	120	26	0	0	0	19	227	32
	PM 5	21	175	0	0	120	16	0	0	0	15	199	31
	Simtraffic Hour Sum	109	743	0	0	472	81	0	0	0	104	890	150
6th Street S at 3rd Avenue S	PM 1 (Seeding)	0	160	37	12	69	0	46	175	23	0	0	0
	PM 2	0	170	51	17	88	0	60	174	25	0	0	0
	PM 3	0	191	47	21	101	0	43	214	26	0	0	0
	PM 4	0	170	34	25	111	0	40	230	33	0	0	0
	PM 5	0	230	32	18	121	0	57	239	22	0	0	0
	Simtraffic Hour Sum	0	761	164	81	421	0	200	857	106	0	0	0
5th Street S at 3rd Avenue S	PM 1 (Seeding)	14	175	0	0	112	4	0	0	0	0	0	0
	PM 2	17	221	0	0	147	12	0	0	0	0	0	0
	PM 3	35	221	0	0	141	19	0	0	0	0	0	0
	PM 4	31	211	0	0	161	6	0	0	0	0	0	0
	PM 5	18	247	0	0	159	16	0	0	0	0	0	0
	Simtraffic Hour Sum	101	900	0	0	608	53	0	0	0	0	0	0
4th Street S at 3rd Avenue S	PM 1 (Seeding)	0	155	6	16	105	0	17	136	15	0	9	2
	PM 2	0	199	11	11	114	0	39	150	19	0	9	0
	PM 3	0	214	8	14	136	0	38	126	17	0	9	0
	PM 4	0	182	5	17	129	0	43	159	22	0	12	0
	PM 5	0	233	12	15	144	0	23	166	8	0	7	0
	Simtraffic Hour Sum	0	828	36	57	523	0	143	601	66	0	37	0

**PM Peak Volumes**

		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
3rd Street S at 3rd Avenue S	PM 1 (Seeding)	42	149	0	0	104	19	0	0	0	6	241	30
	PM 2	61	180	0	0	109	22	0	0	0	5	252	36
	PM 3	54	220	0	0	115	16	0	0	0	15	277	29
	PM 4	56	205	0	0	110	27	0	0	0	15	210	36
	PM 5	48	228	0	0	121	21	0	0	0	18	238	40
	Simtraffic Hour Sum	219	833	0	0	455	86	0	0	0	53	977	141
Washington Ave S at 3rd Avenue S	PM 1 (Seeding)	23	123	24	33	92	23	25	159	14	17	178	54
	PM 2	19	149	27	42	121	34	30	132	12	10	229	53
	PM 3	30	195	35	35	96	15	28	162	12	16	215	49
	PM 4	20	175	23	35	107	32	35	169	12	26	191	58
	PM 5	31	214	39	33	104	18	25	186	13	24	186	52
	Simtraffic Hour Sum	100	733	124	145	428	99	118	649	49	76	821	212
2nd Street S at 3rd Avenue S	PM 1 (Seeding)	10	184	18	17	106	2	12	14	3	20	23	35
	PM 2	7	225	22	21	126	4	8	11	4	23	17	47
	PM 3	17	239	18	18	132	2	9	10	2	14	27	49
	PM 4	2	260	16	18	121	3	12	12	0	31	32	52
	PM 5	6	264	27	15	144	6	8	18	4	21	28	66
	Simtraffic Hour Sum	32	988	83	72	523	15	37	51	10	89	104	214
1st Street S at 3rd Avenue S	PM 1 (Seeding)	26	217	3	8	141	27	50	18	13	2	31	43
	PM 2	28	268	2	10	138	27	50	15	22	2	25	68
	PM 3	28	263	6	8	124	39	50	17	16	2	43	51
	PM 4	34	241	6	12	130	38	49	23	23	3	44	56
	PM 5	27	278	6	9	161	35	59	15	16	3	35	56
	Simtraffic Hour Sum	117	1050	20	39	553	139	208	70	77	10	147	231

## **Appendix C:**

---

### 3<sup>rd</sup> Avenue S Delay and LOS Tables

**Table C-1. 3<sup>rd</sup> Avenue S - Existing Conditions Delay and LOS**

Intersection	AM Peak Hour							PM Peak Hour						
	EB Delay (s/v)	WB Delay (s/v)	NB Delay (s/v)	SB Delay (s/v)	Int. Delay (s/v)	Total hour Delay	LOS	EB Delay (s/v)	WB Delay (s/v)	NB Delay (s/v)	SB Delay (s/v)	Int. Delay (s/v)	Total hour Delay	LOS
3rd Avenue S at 16th Street E	22.1	18.5	16.5	18.4	18.7	4.3	B	17.7	19.3	23.1	18.7	20.1	8.5	C
3rd Avenue S at 14th Street E	0.0	5.7	3.5	2.7	3.2	0.5	A	0.0	11.2	3.2	3.2	3.5	0.8	A
12th Street S at 3rd Avenue S	18.5	0.0	10.6	22.3	17.5	6.5	B	19.2	0.0	14.6	16.6	17.8	10.5	B
11th Street S at 3rd Avenue S	0.0	12.4	16.2	21.7	14.2	9.9	B	0.0	15.9	14.8	8.9	14.0	9.2	B
10th Street S at 3rd Avenue S	12.4	0.0	9.8	8.3	10.8	5.3	B	13.9	0.0	18.1	19.8	15.8	11.8	B
9th Street S at 3rd Avenue S	0.0	19.3	11.4	18.1	16.7	11.5	B	0.0	11.1	11.5	9.2	10.7	6.8	B
8th Street S at 3rd Avenue S	8.8	0.0	9.3	19.3	11.9	5.9	B	26.7	0.0	11.2	21.2	20.4	13.4	C
7th Street S at 3rd Avenue S	0.0	13.4	8.9	9.2	11.7	8.5	B	0.0	18.2	8.9	9.6	13.4	9.9	B
6th Street S at 3rd Avenue S	11.9	0.0	14.1	6.0	11.2	7.5	B	24.9	0.0	11.2	3.6	15.5	11.5	B
5th Street S at 3rd Avenue S	0.0	0.0	37.1	<b>92.8</b>	<b>70.8</b>	24.3	E	0.0	0.0	23.2	51.5	33.9	16.3	C
4th Street S at 3rd Avenue S	12.6	11.1	7.8	<b>111.8</b>	44.5	25.5	D	16.2	17.0	3.5	6.5	9.0	5.7	A
3rd Street S at 3rd Avenue S	0.0	14.1	5.3	53.2	27.1	14.0	C	0.0	16.6	20.9	9.0	16.7	13.3	B
Washington Avenue S at 3rd Avenue S	13.0	43.5	41.9	44.7	35.0	27.8	D	13.7	30.8	35.9	30.3	28.1	28.8	C
2nd Street S at 3rd Avenue S	41.6	<b>73.6</b>	7.1	16.3	21.7	10.1	C	37.8	<b>154.2</b>	9.9	6.4	35.9	21.7	D
1st Street S at 3rd Avenue S	17.6	47.7	12.4	<b>66.1</b>	46.4	24.9	D	31.8	<b>73.8</b>	11.2	44.2	32.0	24.2	C

1. AM Peak and PM Peak delays computed using SimTraffic.

**Table C-2. 3<sup>rd</sup> Avenue S – Proposed Layout Delay and LOS**

Intersection	AM Peak Hour							PM Peak Hour						
	EB Delay (s/v)	WB Delay (s/v)	NB Delay (s/v)	SB Delay (s/v)	Int. Delay (s/v)	Total hour Delay	LOS	EB Delay (s/v)	WB Delay (s/v)	NB Delay (s/v)	SB Delay (s/v)	Int. Delay (s/v)	Total hour Delay	LOS
5th Street S at Marquette Avenue S	0.0	28.8	15.1	18.5	19.2	4.7	B	0.0	30.8	21.1	3.8	19.7	4.9	B
5th Street S at 2nd Avenue S	0.0	6.8	25.8	24.1	20.7	6.3	C	0.0	8.3	31.4	23.9	22.4	5.0	C
3rd Avenue S at 16th Street E	21.7	18.1	15.3	18.9	18.1	4.2	B	17.0	21.1	23.0	22.5	21.8	9.4	C
3rd Avenue S at 14th Street E	0.0	7.6	4.5	2.8	3.8	0.6	A	0.0	9.2	4.5	4.7	4.7	1.1	A
12th Street S at 3rd Avenue S	19.0	0.0	16.5	24.4	19.5	7.1	B	19.6	0.0	22.7	20.2	20.1	12.0	C
11th Street S at 3rd Avenue S	0.0	12.9	21.0	15.9	14.8	10.3	B	0.0	19.2	21.2	12.9	18.0	11.9	B
10th Street S at 3rd Avenue S	12.4	0.0	10.9	11.2	11.7	5.7	B	17.2	0.0	28.3	20.0	19.8	14.5	B
9th Street S at 3rd Avenue S	0.0	21.9	13.0	17.8	18.6	12.5	B	0.0	17.7	15.9	8.4	14.9	8.8	B
8th Street S at 3rd Avenue S	12.1	0.0	8.1	9.9	10.0	4.9	B	26.1	0.0	20.1	23.5	23.6	14.8	C
7th Street S at 3rd Avenue S	0.0	13.0	11.9	18.0	13.7	9.7	B	0.0	18.0	13.0	17.6	16.3	11.7	B
6th Street S at 3rd Avenue S	33.9	0.0	24.0	11.7	26.1	16.8	C	39.7	0.0	17.0	7.7	25.0	18.0	C
5th Street S at 3rd Avenue S	0.0	0.0	<b>58.1</b>	<b>98.7</b>	<b>82.8</b>	25.6	F	0.0	0.0	40.8	<b>68.2</b>	51.1	22.9	D
4th Street S at 3rd Avenue S	13.7	9.3	3.9	<b>139.9</b>	50.5	27.8	D	18.0	14.5	5.0	9.8	11.3	7.0	B
3rd Street S at 3rd Avenue S	0.0	15.9	4.7	<b>96.5</b>	42.2	21.0	D	0.0	16.7	30.1	9.3	19.9	15.5	B
Washington Avenue S at 3rd Avenue S	15.7	<b>55.2</b>	38.3	<b>87.9</b>	51.5	38.7	D	15.3	31.0	38.0	34.0	29.6	29.8	C
2nd Street S at 3rd Avenue S	<b>75.4</b>	<b>161.4</b>	7.3	33.6	44.6	19.7	D	39.7	<b>180.8</b>	8.6	18.0	43.6	25.8	D
1st Street S at 3rd Avenue S	18.8	43.2	13.9	<b>184.6</b>	<b>112.5</b>	58.5	F	32.7	<b>69.8</b>	31.1	<b>101.2</b>	<b>55.7</b>	42.3	E

1. AM Peak and PM Peak delays computed using SimTraffic.



**Table C-3. 3<sup>rd</sup> Avenue S – Proposed Layout with Mitigation Delay and LOS**

Intersection	AM Peak Hour							PM Peak Hour						
	EB Delay (s/v)	WB Delay (s/v)	NB Delay (s/v)	SB Delay (s/v)	Int. Delay (s/v)	Total hour Delay	LOS	EB Delay (s/v)	WB Delay (s/v)	NB Delay (s/v)	SB Delay (s/v)	Int. Delay (s/v)	Total hour Delay	LOS
5th Street S at Marquette Avenue S	0.0	31.2	15.8	21.6	20.8	5.3	C	0.0	29.5	21.0	3.7	19.3	4.8	B
5th Street S at 2nd Avenue S	0.0	10.8	23.7	16.1	15.8	5.0	B	0.0	12.1	31.8	22.4	22.1	4.8	C
3rd Avenue S at 16th Street E	21.9	18.7	15.8	18.2	18.3	4.2	B	18.2	20.8	23.9	24.1	22.8	9.9	C
3rd Avenue S at 14th Street E	0.0	6.6	3.9	2.9	3.5	0.5	A	0.0	14.2	4.6	4.6	5.0	1.2	A
12th Street S at 3rd Avenue S	19.0	0.0	12.1	24.1	18.6	6.7	B	20.6	0.0	16.6	20.3	20.0	11.9	C
11th Street S at 3rd Avenue S	0.0	12.5	26.1	16.1	15.5	10.9	B	0.0	18.2	22.5	13.7	17.8	11.8	B
10th Street S at 3rd Avenue S	15.1	0.0	13.2	12.3	14.0	7.0	B	15.8	0.0	31.1	26.9	20.9	15.8	C
9th Street S at 3rd Avenue S	0.0	19.5	25.2	18.4	21.0	14.3	C	0.0	13.4	15.3	11.3	13.4	8.3	B
8th Street S at 3rd Avenue S	9.2	0.0	9.5	19.6	12.3	6.3	B	26.2	0.0	15.3	22.7	21.9	14.2	C
7th Street S at 3rd Avenue S	0.0	13.9	16.9	25.4	17.0	12.6	B	0.0	18.6	13.9	13.1	16.0	11.5	B
6th Street S at 3rd Avenue S	12.1	0.0	17.3	13.1	13.8	9.5	B	23.7	0.0	14.1	6.1	16.5	12.0	B
5th Street S at 3rd Avenue S	0.0	0.0	31.9	<b>59.2</b>	49.2	18.6	D	0.0	0.0	21.3	42.1	29.0	13.6	C
4th Street S at 3rd Avenue S	16.3	13.1	6.1	<b>56.2</b>	29.4	18.0	C	16.6	16.0	10.8	9.7	12.7	8.0	B
3rd Street S at 3rd Avenue S	0.0	13.1	6.0	17.7	13.6	7.5	B	0.0	19.9	22.4	13.0	19.5	15.6	B
Washington Avenue S at 3rd Avenue S	14.4	47.7	39.8	18.1	27.8	22.8	C	17.7	35.8	25.3	30.4	27.9	28.3	C
2nd Street S at 3rd Avenue S	31.2	35.7	7.7	5.8	11.3	5.5	B	34.8	<b>128.5</b>	7.6	33.4	38.0	23.4	D
1st Street S at 3rd Avenue S	15.0	40.0	13.9	24.3	22.6	12.1	C	33.5	<b>68.2</b>	22.5	<b>64.4</b>	42.0	32.1	D

1. AM Peak and PM Peak delays computed using SimTraffic.