



Project Memorandum

To: Jim Hartman, PE
Project Manager
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Client: MDOT Metro Region
Project Name: I-96/ I-275/ I-696 Transportation
Planning Study
Location: Novi and Wixom, MI
Project No.: URS JN 12942213
Issue Date: June 22, 2010

From: **Michael T. De Vries, PE - URS**
Ray Schneider, AICP - URS

Subject: **DRAFT Crash Analysis and Safety Review**
I-96 I-275 I-696 Novi Transportation Planning Study

Message:

A crash analysis and safety review was performed for I-96/I-275/I-696 Transportation Planning Study in Novi and Wixom, Michigan. The overall study area is depicted in **Figure 1**. The safety study encompasses a review of crashes on 31 separate roadway segments in the study area, including:

- Grand River Avenue from Napier Road to Haggerty Road
- 12 Mile Road from Wixom Road to Haggerty Road
- Meadowbrook Road from Grand River Avenue to 12 Mile Road
- Haggerty Road from Grand River Avenue to 12 Mile Road.

The limits of each segment was determined by a change in roadway cross-section or when reaching a signalized intersection. The longest segment in the study area was 1.01 miles, while the average segment length was 0.48 miles.

Intersection crash analyses were also completed for 23 signalized intersections within the study area.

A segment-by-segment review of crashes was not completed for the Wixom Road, Beck Road, and Novi Road corridors because these roads have a high density of traffic signals within the study limits, and the intersection crash analyses completed provided a sufficient accounting of crash history on these streets.

The analysis is based on crash data received from the Traffic Improvement Association for a 3-year period (January 1, 2007 through December 31, 2009).

SEGMENTAL CRASH FINDINGS

A summary of crash findings for the 31 study area segments is depicted in **Table 1**. A review of the data in Table 1 indicates that five (5) of the 31 segments have a greater-than-average crash rate (MDOT Traffic & Safety Division Average Crash Rates, 1999). The five segments with greater-than-average crash rates are shown in **Figure 2**. No fatalities were reported on any of the segments during the 3-year period.

TABLE 1
SEGMENT CRASH DATA SUMMARY
January 1, 2007 through December 31, 2009

From	To	Segment Length	Total Crashes	ADT	Crash Rate ⁽¹⁾	Road Type ⁽²⁾
Grand River Avenue						
Napier Rd	12 Mile Rd/Meijer Dr	0.74	26	23,000	140	2LU
12 Mile Rd/Meijer Dr	Wixom Rd	0.23	23	23,000	402	4LU
Wixom Rd	Beck Rd	1.00	70	15,200	421	5LU
Beck Rd	Taft Rd	0.98	31	14,600	197	5LU
Taft Rd	Novi Rd	0.99	33	17,200	177	5LU
Novi Rd	Constitution	0.43	54	13,200	867	4LU
Constitution	Meadowbrook Rd	0.56	29	13,200	361	3LU
Meadowbrook Rd	Haggerty Rd	1.01	62	20,000	280	3LU
12 Mile Road						
Beck Rd	Taft Rd	0.94	36	14,900	234	2LU
Taft Rd	Beginning of Boulevard	0.33	2	14,900	38	2LU
Eastbound 12 Mile Road						
Beginning of Boulevard	Novi Rd	0.62	21	9,200	669	4LD
Novi Rd	West of Meadowbrook Rd	0.82	27	8,100	740	4LD
West of Meadowbrook Rd	Meadowbrook Rd	0.10	2	8,100	451	6LD
Meadowbrook Rd	SB M-5 On-Ramp	0.27	2	16,000	84	6LD
SB M-5 On-Ramp	NB M-5 Off-Ramp	0.22	12	16,000	620	6LD
NB M-5 Off-Ramp	Haggerty Rd	0.31	10	11,700	500	6LD
Westbound 12 Mile Road						
Beginning of Boulevard	Novi Rd	0.62	13	13,100	291	4LD
Novi Rd	West of Meadowbrook Rd	0.82	22	13,800	354	4LD
West of Meadowbrook Rd	Meadowbrook Rd	0.09	3	13,800	422	6LD
Meadowbrook Rd	SB M-5 Off-Ramp	0.31	11	12,200	533	6LD
SB M-5 Off-Ramp	NB M-5 On-Ramp	0.22	7	13,100	438	6LD
NB M-5 On-Ramp	Haggerty Rd	0.28	30	24,000	827	6LD
Haggerty Road						
Grand River Ave	North of Regency Dr	0.25	9	20,400	162	5LU
North of Regency Dr	EB I-96 Ramp to SB I-275	0.20	0	20,400	0	2LU
EB I-96 Ramp to SB I-275	WB I-696 Ramp to NB M-5	0.51	5	16,400	54	2LU
WB I-696 Ramp to NB M-5	Ruston Blvd	0.13	0	19,200	0	2LU
Ruston Blvd	North of J R Blvd	0.19	11	19,200	277	3LU
North of J R Blvd	12 Mile Rd	0.37	9	19,200	115	4LU
Meadowbrook Road						
Grand River Ave	11 Mile Rd	0.29	3	9,000	106	3LU
11 Mile Rd	North of I-96	0.38	0	9,000	0	2LU
North of I-96	EB 12 Mile Rd	0.53	5	9,300	93	3LU

⁽¹⁾ Per 100 million vehicle miles

⁽²⁾ LU – lane undivided, LD = lane divided

Source: Traffic Improvement Association

Note: Shaded intersections have higher-than-average segment crash rate

INTERSECTION CRASH FINDINGS

The purpose of the intersection crash analysis was to identify the existence of any correctable crash patterns and the presence of any general safety concerns. Intersection crash rates were computed based on crashes within 200 feet of each intersection for each intersection leg, encompassing a three-year period from January 1, 2007 through December 31, 2009.

A summary of the crash data for all 23 study area intersections is depicted in **Table 2**. As is common with signalized intersections, the most common crash types were:

- **Rear-End (53.6% of total intersection crashes)**. Rear-end crashes are commonly associated with signalized intersections due to the nature of starting and stopping. Rear-end crashes can occur due to driver inattentiveness, limited signal visibility, less-than-optimal signal progression, or large turn volumes.
- **Angle (17.7%)**. Angle crashes are also common at signalized intersections and typically involve turning traffic. Angle crashes can occur due to restricted sight distance, inadequate clearance interval timing (red-light running), and high volumes of turning traffic.
- **Side Swipe Same (9.1%)**. Side-swipe crashes are common at intersections with side-by-side turn lanes (dual left-turns, dual right-turns, etc.) and can occur due to excessive lane changing or due to inadequate pavement marking delineation or inadequate signing.

Intersection crash rates were compared to metropolitan Detroit average crash rates to identify possible trouble spots. The average intersection crash rates in metro Detroit are as follows (Source: Southeast Michigan Council of Governments, Traffic Safety Manual, 2nd Edition):

- 1.70 crashes per 100 million vehicle miles traveled (VMT) for intersections with an entering AADT between 10,000 and 20,000 vehicles per day
- 1.43 crashes per 100 million vehicle miles traveled (VMT) for intersections with an entering AADT between 20,000 and 30,000 vehicles per day
- 1.21 crashes per 100 million vehicle miles traveled (VMT) for intersections with an entering AADT between 30,000 and 40,000 vehicles per day
- 1.14 crashes per 100 million vehicle miles traveled (VMT) for intersections with an entering AADT between 40,000 and 50,000 vehicles per day
- 1.18 crashes per 100 million vehicle miles traveled (VMT) for intersections with an entering AADT between 50,000 and 60,000 vehicles per day

As depicted in the shaded rows of Table 2, eight (8) intersections have an above average intersection crash rate. Five (5) of these eight (8) intersections are located along Grand River Avenue. Intersections with higher-than-average crash rates are also depicted in **Figure 3**.

TABLE 2
INTERSECTION CRASH DATA SUMMARY
January 1, 2007 through December 31, 2009

Intersection	Crash Type										Total Crashes	Injury Crashes	Fatalities	Total Entering AADT	Crash Rate*
	Single Vehicle	Head-On	Head-On Left-Turn	Angle	Rear-End Straight	Rear End Left-Turn	Rear End Right-Turn	Side Swipe Same	Side Swipe Opposite	Unknown					
Grand River Ave @ Napier Rd	2	0	1	3	3	0	1	2	1	0	13	0	0	16,235	0.73
Grand River Ave @ 12 Mile Rd (W of Wixom)	0	0	5	4	3	0	0	4	2	1	19	4	0	24,819	0.70
Grand River Ave @ Wixom Rd	3	1	11	31	40	1	3	8	1	4	103	19	0	37,770	2.49
Grand River Ave @ 12 Mile Rd (E of Wixom)	1	0	2	1	7	0	0	1	1	2	15	4	0	n/a	n/a
Grand River Ave @ Beck Rd	0	2	4	11	60	1	1	10	2	3	94	16	0	40,290	2.13
Grand River Ave @ Taft Rd	0	1	0	1	18	1	0	1	0	2	24	6	0	18,030	1.22
Grand River Ave @ Novi Rd	2	1	4	12	93	4	3	10	4	7	140	22	0	45,840	2.79
Grand River Ave @ Market St	1	0	1	1	23	0	0	1	0	4	31	3	0	19,490	1.45
Grand River Ave @ Meadowbrook Rd	2	0	1	4	37	1	2	2	0	1	50	5	0	26,320	1.75
Grand River Ave @ Haggerty Rd	0	0	7	22	32	1	1	11	2	1	77	17	0	32,740	2.15
12 Mile Rd @ Beck Rd	0	0	2	6	25	0	0	1	1	0	35	5	0	32,660	0.98
12 Mile Rd @ Novi Rd	3	0	0	7	30	1	11	8	1	0	61	12	0	32,980	1.69
12 Mile Rd @ 12 Oaks Mall Entrance	3	0	1	7	10	1	0	1	0	0	23	6	0	n/a	n/a
12 Mile Rd @ Meadowbrook Rd	3	0	0	5	16	0	3	2	2	4	35	4	0	n/a	n/a
12 Mile Rd @ M-5 SB Off-ramp	0	0	1	4	1	0	2	0	0	0	8	1	0	23,660	0.31
12 Mile Rd @ M-5 NB Off-ramp	1	0	0	1	5	0	2	0	0	0	9	1	0	23,660	0.35
12 Mile Rd @ Haggerty Rd	1	1	0	22	49	0	12	7	0	2	94	22	0	52,900	1.62
Wixom Rd @ I-96 SPUI **	1	0	1	3	6	0	0	2	0	0	13	3	0	25,640	1.39
Beck Rd @ I-96 SPUI	4	1	0	5	21	1	3	5	0	0	40	6	0	29,340	1.25
Novi Rd @ W Oaks Dr/Mall Entrance	3	0	1	7	10	1	0	1	0	0	23	6	0	n/a	n/a
Novi Rd @ I-96 WB Off-ramp	1	0	0	9	19	0	6	6	0	0	41	8	0	21,480	1.74
Novi Rd @ I-96 EB Off-ramp	0	0	1	4	8	0	0	4	1	0	18	5	0	19,610	1.68
Novi Rd @ Crescent Blvd	0	0	2	12	36	0	3	7	1	2	63	8	0	n/a	n/a
TOTAL	31	7	45	182	552	13	53	94	19	33	1029	183	0		
% of TOTAL	3.0	0.7	4.4	17.7	53.6	1.3	5.2	9.1	1.8	3.2	100.0	17.8	0		

* - per million entering vehicles

Note: Shaded intersections have higher-than-average intersection crash rate.

** - The Wixom SPUI opened in fall 2008. Crash data and rate is for 2009 only.

n/a –ADT data is not available

Source: Traffic Improvement Association

Intersections with Higher-Than-Average Crash Rates

Grand River Avenue at Wixom Road

The intersection is characterized by a large presence of high turnover businesses generating steady traffic volumes during peak hours on three of the four intersection corners—two gas station/convenience marts, one fast-food restaurant. The intersection crash rate of 2.49 crashes per MEV is more than double the metropolitan Detroit average crash rate of 1.21 crashes per MEV (corresponding average rate based on 30,000 to 40,000 AADT entering the intersection). A collision diagram is shown in **Appendix A**. A total of 43% of the crashes were rear-end, while 30% were angle and 11% were head-on left-turn. The rear-end, angle, and head-on left-turn crashes are described below.

- Rear-End (44 crashes) – Peak period and road conditions may have been a factor in many of the crashes, as a total of 53% of the crashes occurred during a peak period, mostly at midday (three morning, thirteen midday, five afternoon) and 38% of the crashes occurred under wet or wintry road conditions. Rear-end crashes were evenly distributed across all four approaches.
- Angle (31 crashes) – Peak period conditions may have been a factor in many of the crashes, as a total of 48% of the crashes occurred during a peak period (three morning, six midday, six afternoon). Angle crashes were fairly evenly distributed throughout the intersection. A total of 68% of the angle crashes involved a left-turning vehicle. Left-turn peak hour volumes are high at this intersection, particularly for eastbound left-turns (456 vehicles) and to a lesser extent southbound (173) and westbound left turns (160). A box span configuration was recently erected, which may help reduce red-light running.
- Head-On Left-Turn (11 crashes) – Road and weather conditions were not large factors, as only three of the eleven head-on left-turn crashes occurred during wet or wintry surface conditions. Head-on left-turn crashes were fairly evenly distributed throughout the intersection.

Grand River Avenue at Beck Road

The intersection crash rate of 2.13 crashes per MEV is nearly double the metropolitan Detroit average crash rate of 1.14 crashes per MEV (corresponding average rate based on 40,000 to 50,000 ADT entering the intersection). A collision diagram is shown in **Appendix A**. A total of 66% of the crashes at this intersection were rear-end and 12% were angle. The rear-end and angle crashes are described below.

- Rear-End (62 crashes) – Peak period and road conditions were not major factors, as 39% of the rear-end crashes occurred during a peak period (five morning, seven midday, twelve afternoon) and 38% of the rear-end crashes occurred under wet or wintry road conditions. Rear-end crashes were fairly evenly distributed amongst intersection legs, with a slightly higher incidence on the northbound Beck Road approach.
- Angle (11 crashes) – Light conditions may have been a factor in many of the crashes, as six of the 11 angle crashes occurred after dark. Six of the eleven angles crashes involved a southbound and westbound vehicle. Seven of the eleven crashes involved a left-turning vehicle. Left-turn peak hour volumes are high at this intersection, particularly for eastbound left-turns (463 vehicles), and to a lesser extent northbound (202) and southbound (175).

Grand River Avenue at Novi Road

This intersection had the highest crash rate of intersections evaluated in the study area. The intersection crash rate of 2.79 crashes per MEV is more than double the metropolitan Detroit average crash rate of 1.14 crashes per MEV (corresponding average rate based on 40,000 to 50,000 ADT entering the intersection). A collision diagram is shown in **Appendix A**. A total of 71% of the crashes at this intersection were rear-end as described below.

- Rear-End (100 crashes) – Light conditions may have been a factor in some of the crashes, as 38% of the crashes occurred after dark. There was a strong pattern of southbound Novi Road rear-end crashes, as 51% of all rear-end crashes occurred on the southbound Novi Road approach (next highest being westbound Grand River Avenue at 20%). High left-turn and/or right-turn volumes (200+ left-turn or right-turn vehicles per hour per lane) exist on three of the four legs during the afternoon peak hour. In particular, the Novi Road southbound right-turn volume is very heavy (601 vehicles in the afternoon peak hour), with extensive queuing, and lacks an exclusive right-turn only lane. The City of Novi will be constructing a ring road in the northwest quadrant that will connect to Grand River Avenue, which should reduce congestion at the Grand River Avenue/Novi Road intersection and reduce crash experience.

Grand River Avenue at Meadowbrook Road

The intersection crash rate of 1.75 crashes per MEV is above the metropolitan Detroit average crash rate of 1.43 crashes per MEV (corresponding average rate based on 20,000 to 30,000 ADT entering the intersection). A collision diagram is shown in **Appendix A**. A total of 80% of the crashes at this intersection were rear-end.

- Rear-End (40 crashes) – Road and peak period conditions may have been a factor in many of the crashes, as 38% of the crashes occurred under wet or wintry road conditions and 33% of the crashes occurred during a peak period (four morning, two midday, seven afternoon). A strong pattern of rear-end crashes occurred on the eastbound Grand River Avenue approach, which accounted for 63% of all rear-end crashes.

Grand River Avenue at Haggerty Road

The intersection is characterized by a high presence of high turnover businesses generating steady traffic volumes during peak hours on three of the four intersection corners – one fast-food restaurant, one quick lube service, and a strip mall. The intersection crash rate of 2.15 crashes per MEV is nearly double the metropolitan Detroit average crash rate of 1.21 crashes per MEV (corresponding average rate based on 30,000 to 40,000 ADT entering the intersection). A collision diagram is shown in **Appendix A**. A total of 44% of the crashes at this intersection were rear-end and 29% were angle. Rear-end and angle crashes are described below.

- Rear-End (34 crashes) – Peak period and road conditions may have been a factor in many of the crashes, as 47% of the crashes occurred during a peak period (two morning, five midday, eight afternoon) and 31% of the crashes occurred under wet or wintry road conditions. Rear-end crashes were fairly evenly distributed across all four legs of the intersection. High left-turn and/or right-turn volumes (200+ left-turn or right-turn vehicles per hour per lane) exist on three of the four legs during the afternoon peak hour.
- Angle (22 crashes) – Peak period conditions may have been a factor in many of the crashes, as one-half of all angle crashes occurred during a peak period (two morning, three midday, six afternoon). Angle crashes were evenly distributed throughout the intersection.

12 Mile Road at Novi Road

The intersection crash rate of 1.69 crashes per MEV is greater than the metropolitan Detroit average crash rate of 1.21 crashes per MEV (corresponding average rate based on 30,000 to 40,000 ADT entering the intersection). A collision diagram is shown in **Appendix A**. A total of 69% of the crashes at this intersection were rear-end.

- Rear-End (42 crashes) – Peak period and road conditions may have been a factor in many of the crashes, as 40% of the crashes occurred during a peak period (six morning, five midday, six afternoon) and 36% of the crashes occurred under wet or wintry road conditions. Rear-end crashes were more common on the eastbound 12 Mile Road approach (35% of all rear-end crashes) and the northbound Novi Road approach (33%). The eastbound and northbound approaches also had the highest volumes of right-turning traffic

during the afternoon peak hour (357 right-turners on eastbound 12 Mile Road and 224 right-turners on northbound Novi Road).

12 Mile Road at Haggerty Road

The intersection crash rate of 1.62 crashes per MEV is greater than the metropolitan Detroit average crash rate of 1.18 crashes per MEV (corresponding average rate based on 50,000 to 60,000 ADT entering the intersection). A collision diagram is shown in **Appendix A**. A total of 65% of the crashes at this intersection were rear-end and 23% of the crashes were angle. Rear-end and angle crashes are described below:

- Rear-End (61 crashes) – Peak period conditions may have been a factor in many of the crashes, as 64% of the crashes occurring during a peak period (thirteen morning, eight midday, eighteen afternoon). Rear-end crashes were most common on the northbound Haggerty Road approach (42% of all rear-end crashes) and the eastbound 12 Mile Road approach (30%). The northbound and eastbound approaches also had the highest volumes of right-turning traffic during the afternoon peak hour (602 right-turners on northbound Haggerty Road and 302 right-turners on eastbound 12 Mile Road).
- Angle (22 crashes) – Road and peak period conditions may have been a factor in many of the crashes, as 41% of the angle crashes occurred under wet or wintry road conditions and 32% of the crashes occurred during a peak period (two morning, two midday, three afternoon). Angle crashes were evenly distributed throughout the intersection.

Novi Road at I-96 Westbound Off-ramp

The intersection crash rate of 1.74 crashes per MEV is greater than the metropolitan Detroit average crash rate of 1.43 crashes per MEV (corresponding average rate based on 20,000 to 30,000 ADT entering the intersection). A collision diagram is shown in **Appendix A**. A total of 61% of the crashes at this intersection were rear-end and 22% of the crashes were angle. Rear-end and angle crashes are described below.

- Rear-End (25 crashes) – Peak period conditions may have been a factor in some of the crashes, as 32% of the crashes occurred during a peak period (four midday, four afternoon). Rear-end crashes were clustered on the southbound Novi Road approach (70% of all rear-end crashes) and the westbound off-ramp (30%).
- Angle (9 crashes) – Road and light conditions may have been a factor in many of the crashes, as four of the angle crashes occurred under wet or wintry road conditions and three of the angle crashes occurred after dark. Angle crashes were evenly distributed throughout the intersection.

Should you have questions regarding this memo, please feel free to contact me at (616) 574-8591.

Signed: Michael T. De Vries, PE
URS Corporation Great Lakes

cc:

APPENDIX A
Intersections with Above Average Crash Rates
Collision Diagrams

Grand River Avenue Intersections

- @ Wixom Road**
- @ Beck Road**
- @ Novi Road**
- @ Meadowbrook Road**
- @ Haggerty Road**

12 Mile Road Intersections

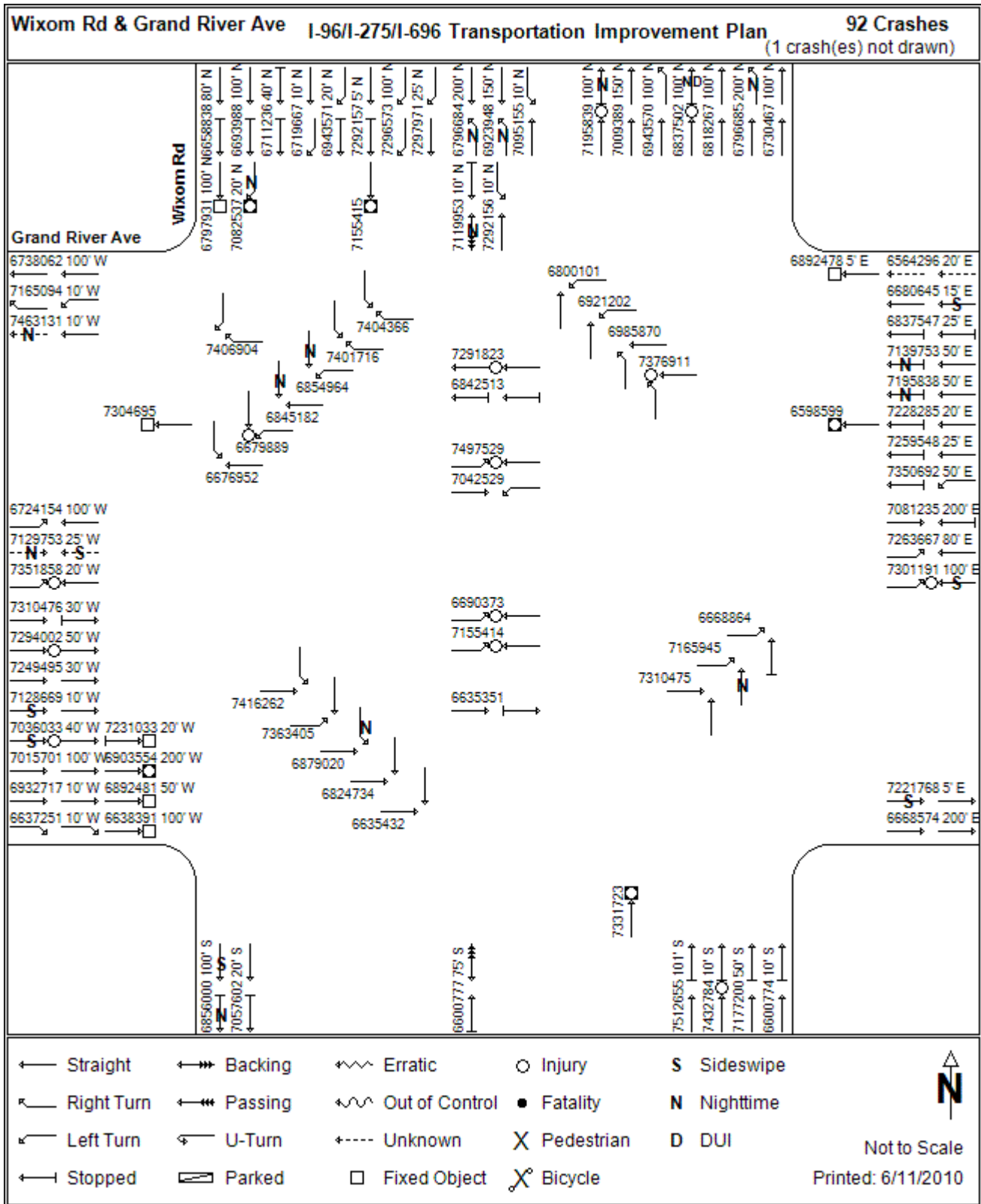
- @ Novi Road**
- @ Haggerty Road**

Novi Road Intersections

- @ I-96 Westbound Off-ramp**



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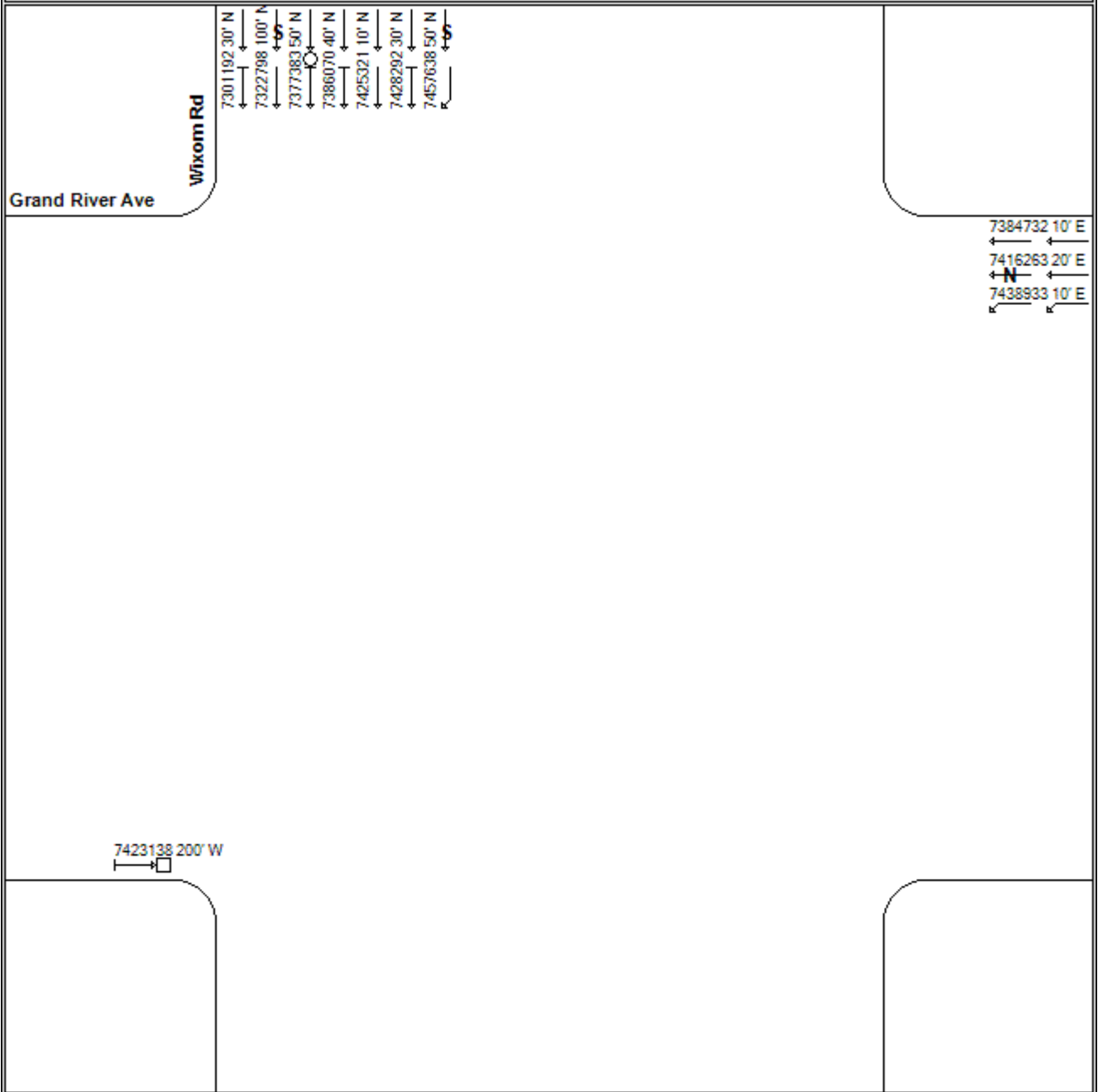




Traffic Improvement Association



Wixom Rd & Grand River Ave I-96/I-275/I-696 Transportation Improvement Plan 11 Crashes
 (0 crash(es) not drawn)

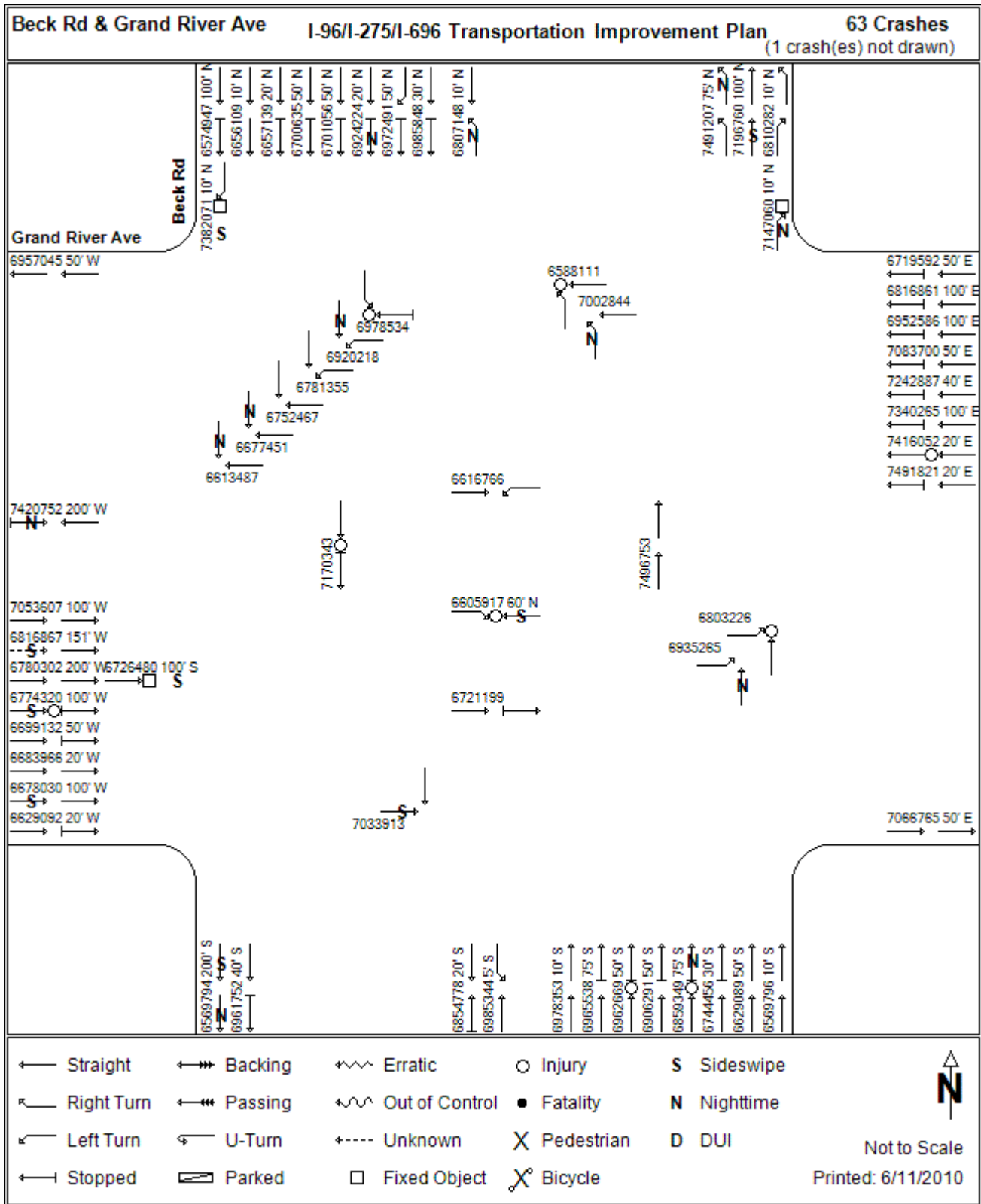


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↘ Right Turn	↔ Passing	⚡ Out of Control	● Fatality	N Nighttime
↙ Left Turn	↺ U-Turn	⋯ Unknown	⊗ Pedestrian	D DUI
⊥ Stopped	▭ Parked	□ Fixed Object	⊗ Bicycle	

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 Not to Scale
 Printed: 6/11/2010

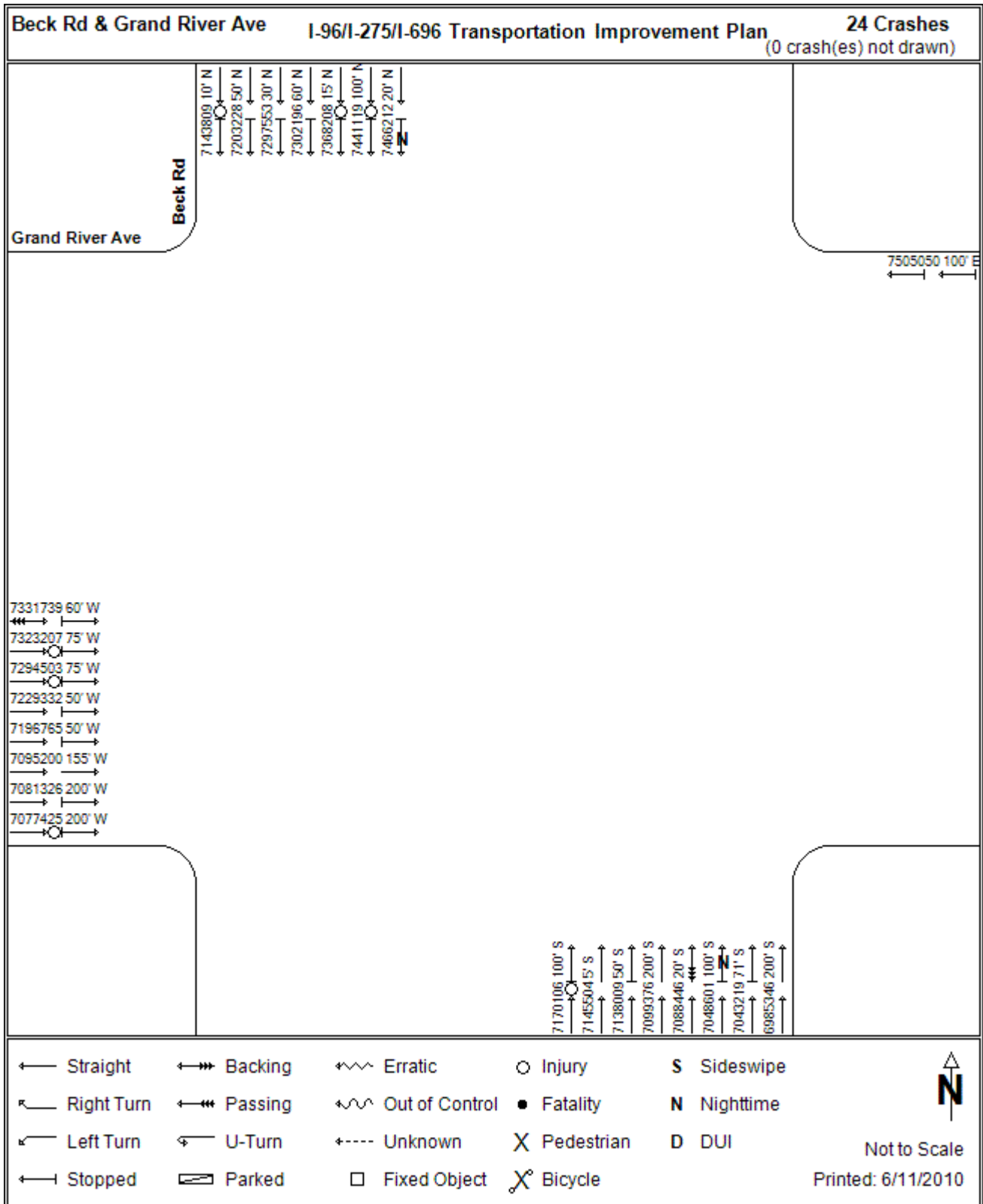


Traffic Improvement Association





Traffic Improvement Association

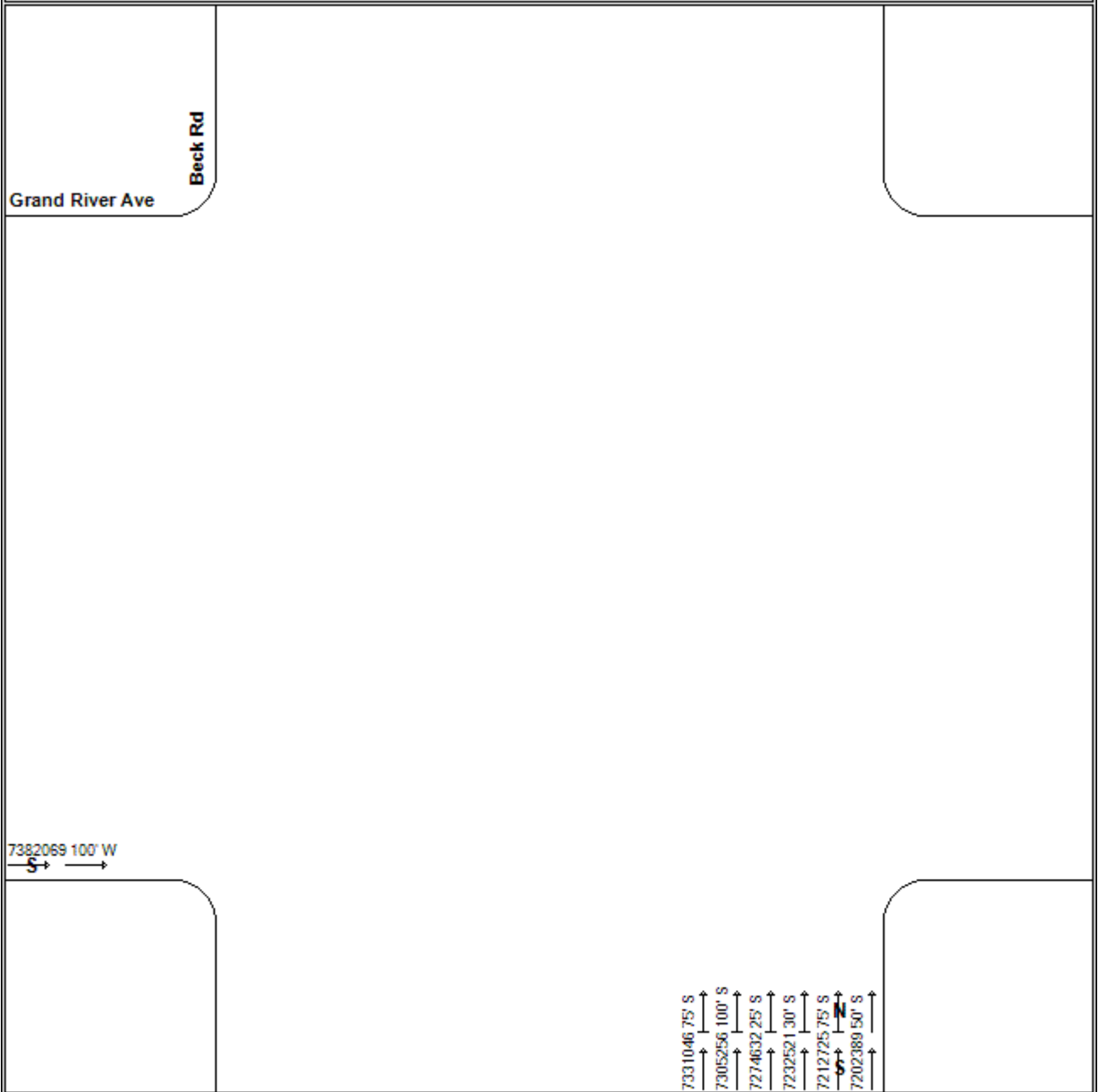




Traffic Improvement Association



Beck Rd & Grand River Ave I-96/I-275/I-696 Transportation Improvement Plan 7 Crashes
(0 crash(es) not drawn)

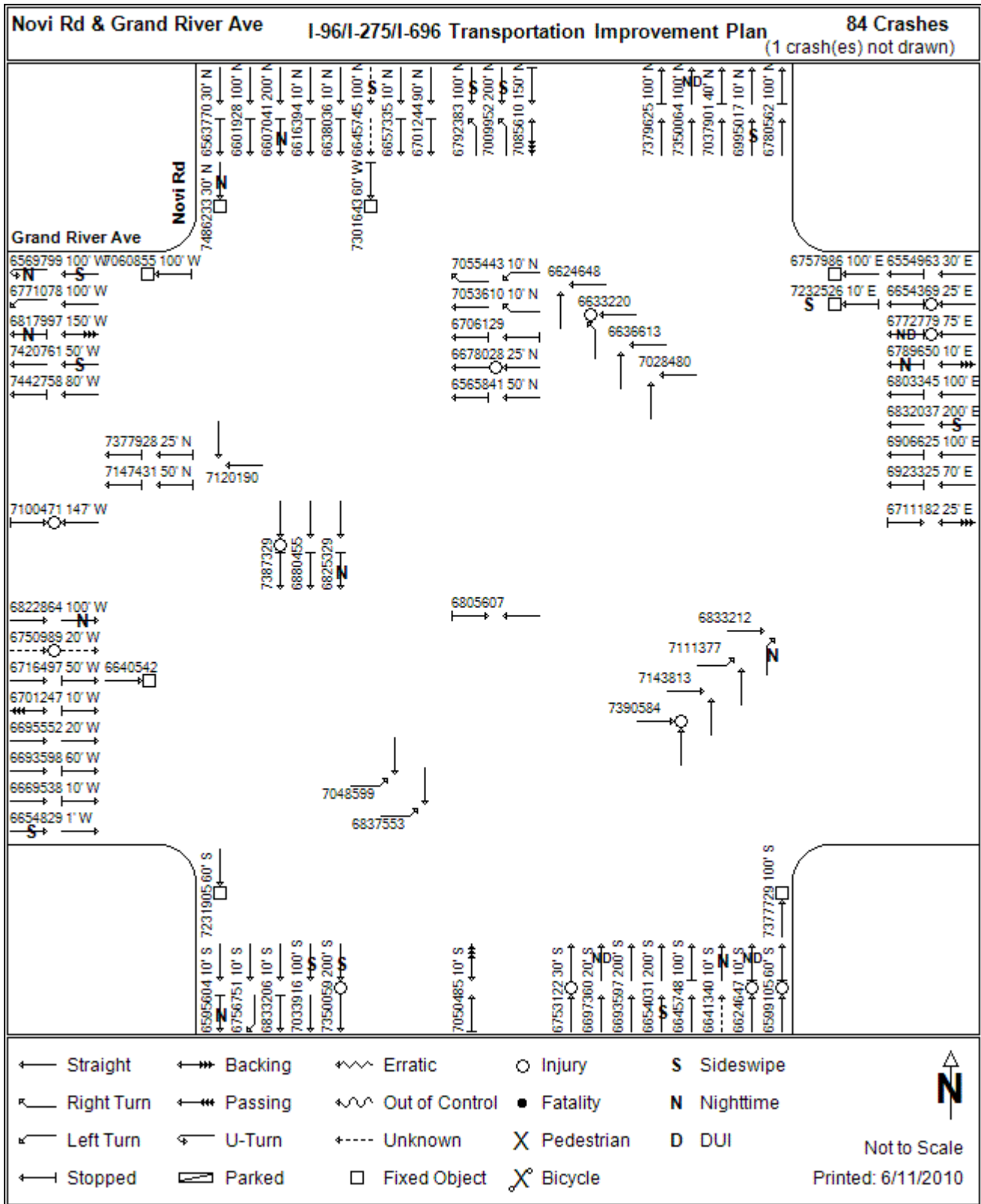


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↙ Left Turn	↺ U-Turn	⋯ Unknown	X Pedestrian	D DUI
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Not to Scale
Printed: 6/11/2010

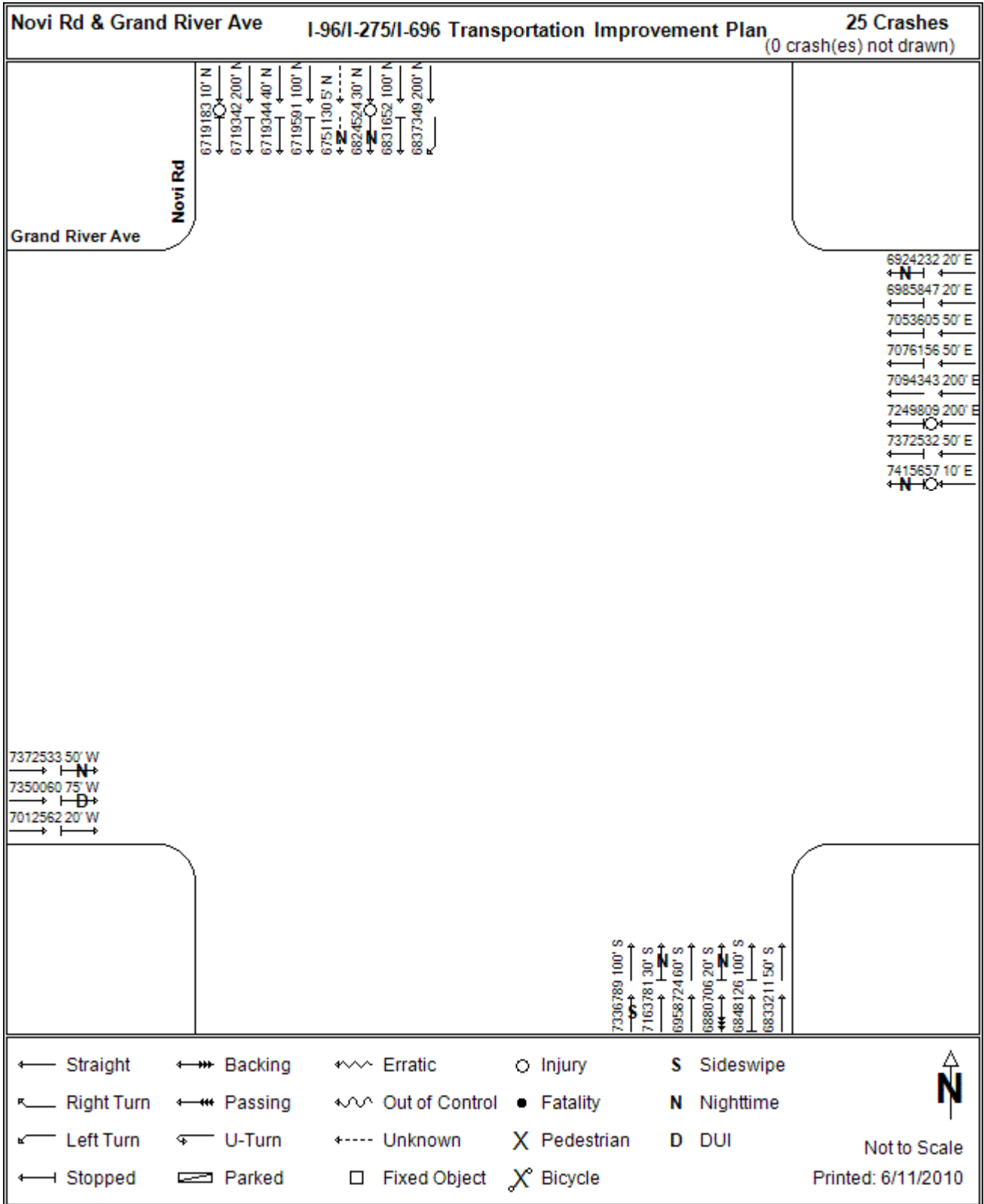


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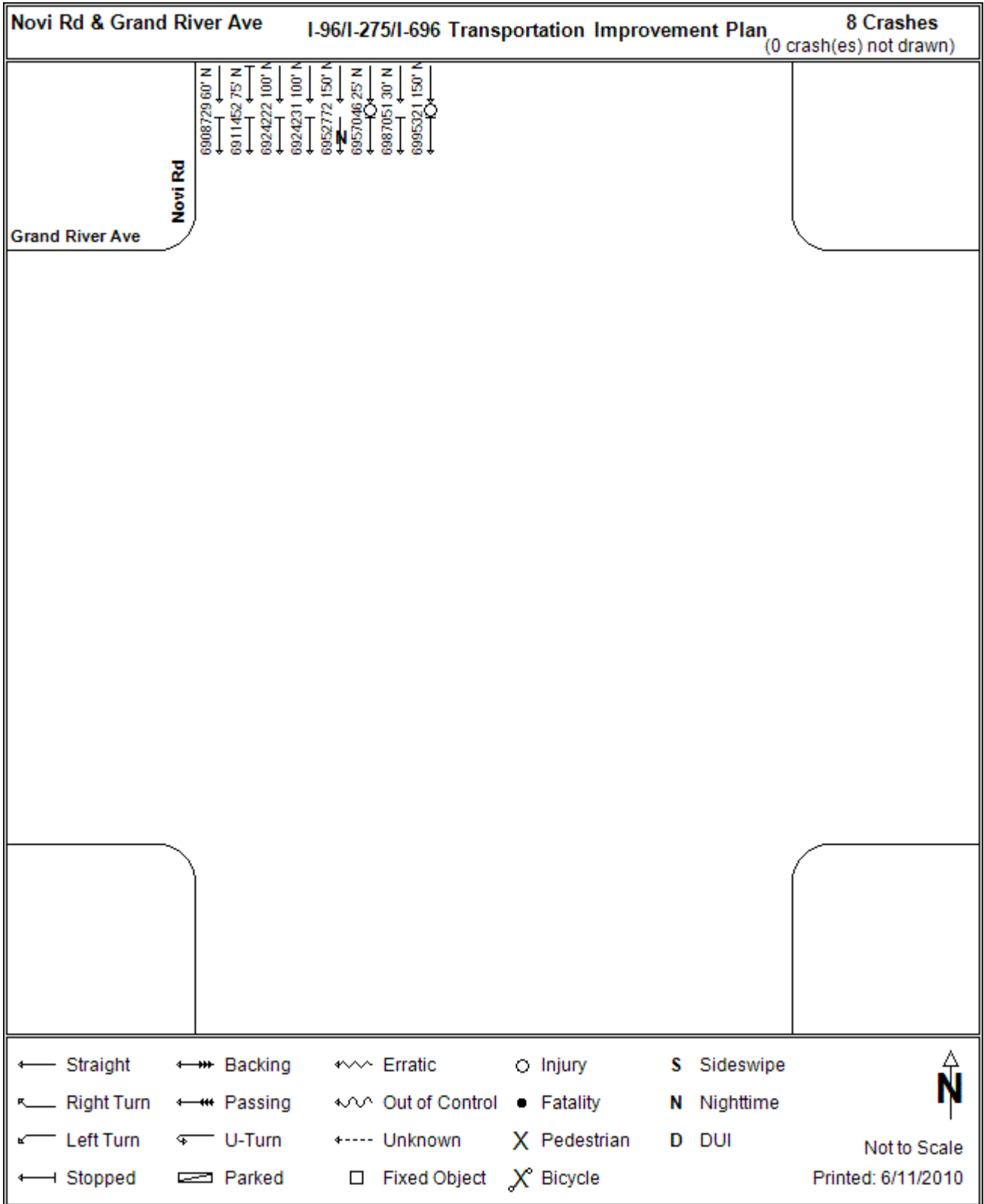


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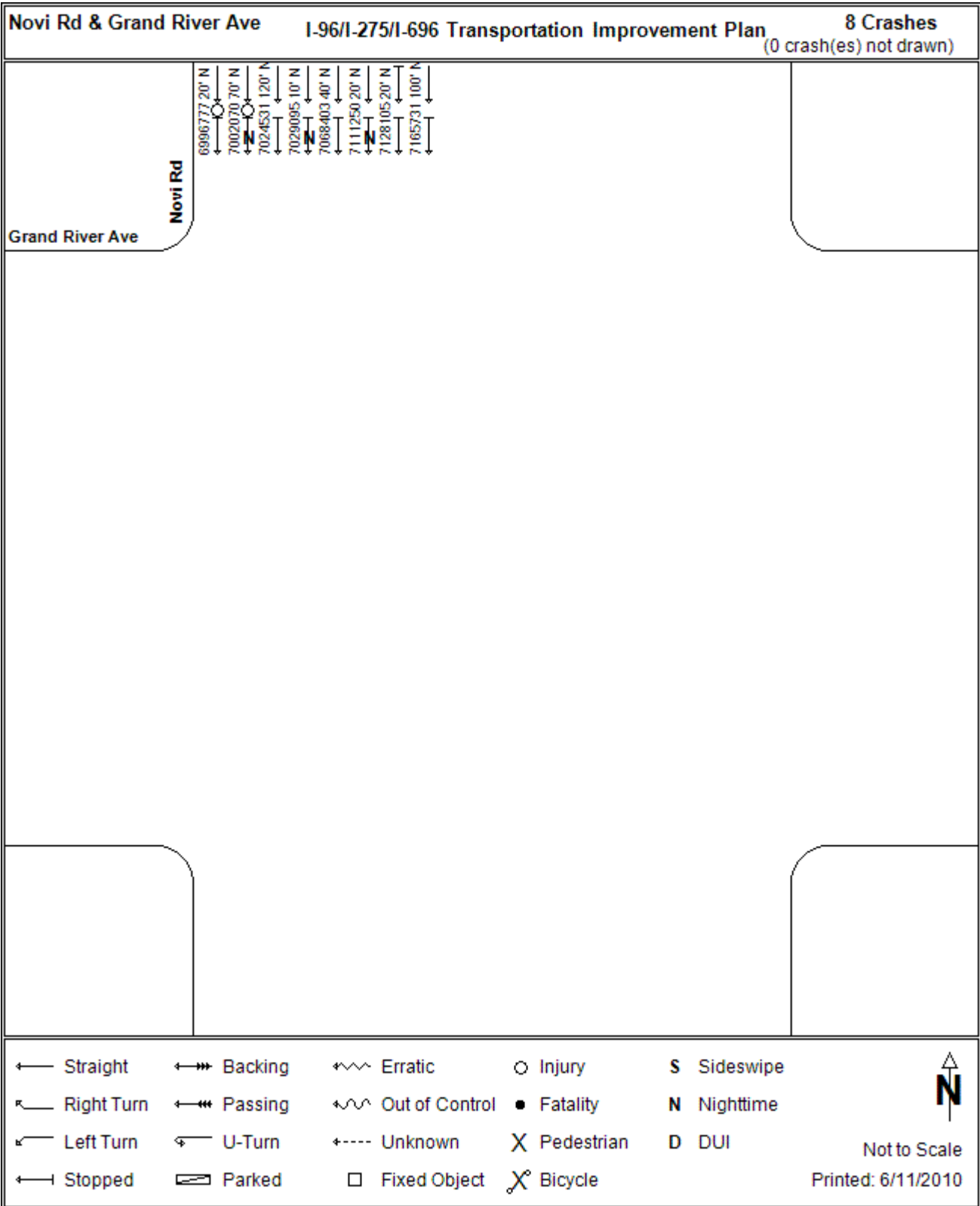


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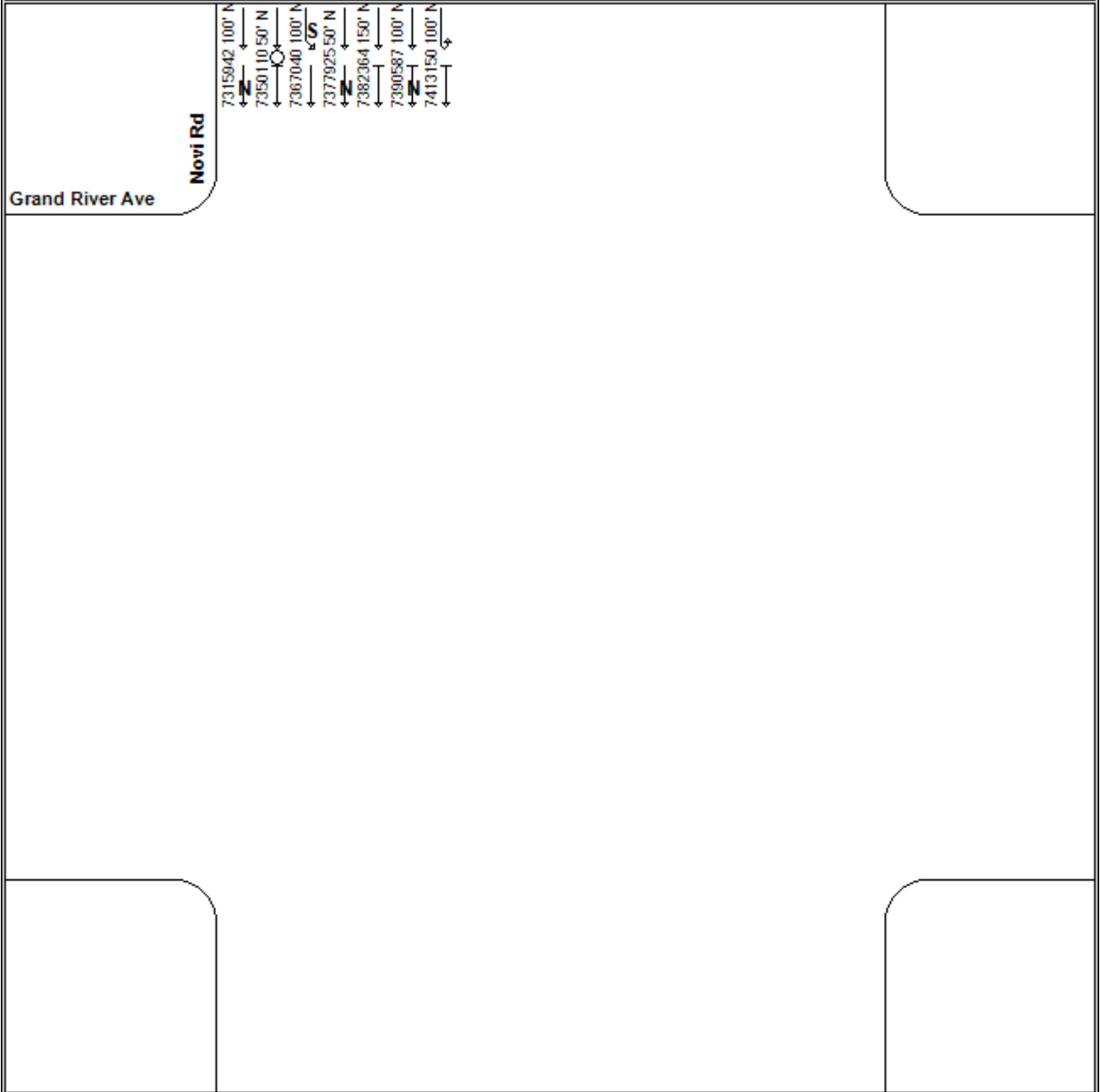




Traffic Improvement Association



Novi Rd & Grand River Ave **I-96/I-275/I-696 Transportation Improvement Plan** **7 Crashes**
 (0 crash(es) not drawn)

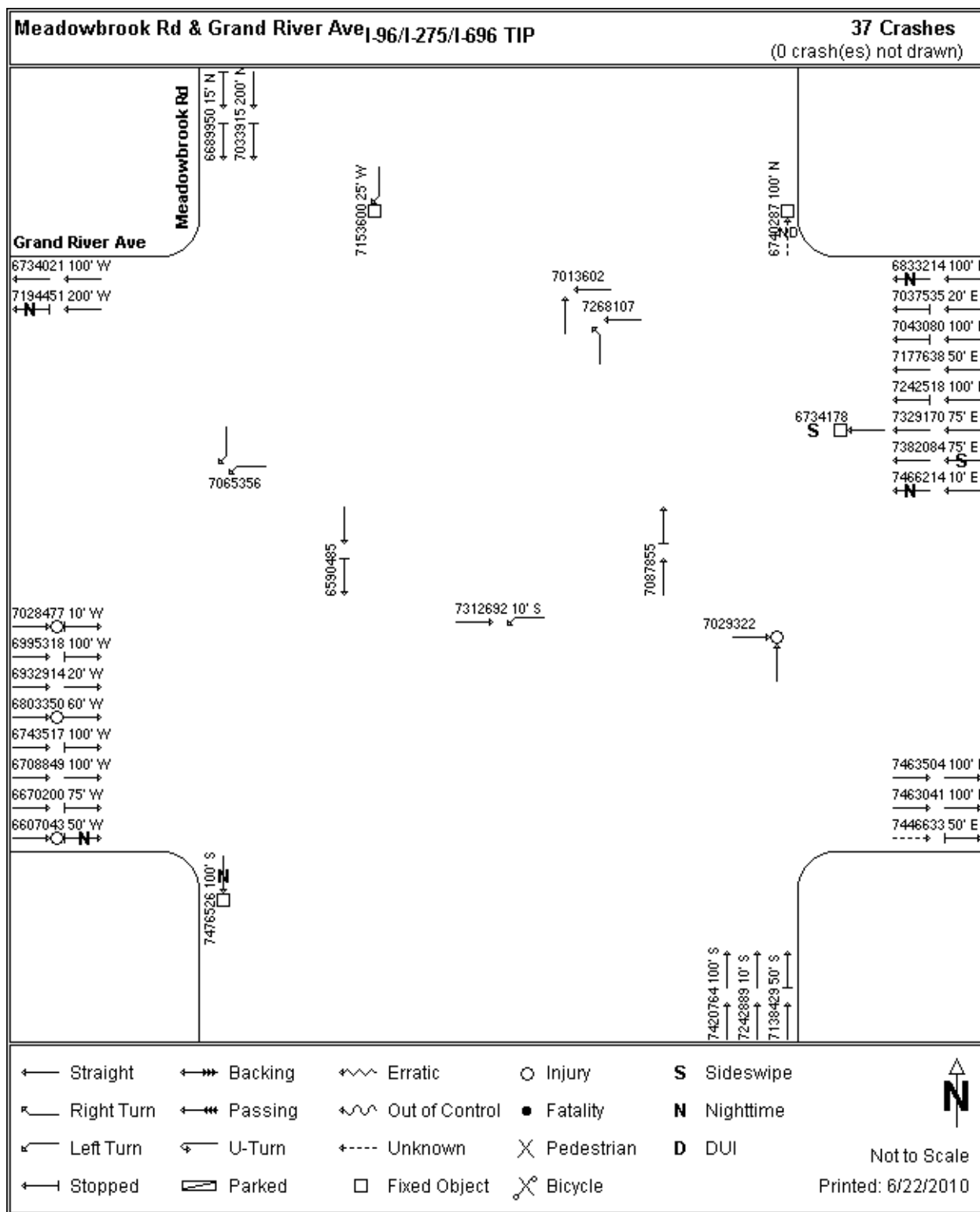


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↘ Right Turn	↔ Passing	⚡ Out of Control	● Fatality	N Nighttime
↙ Left Turn	↺ U-Turn	⋯ Unknown	⊗ Pedestrian	D DUI
⊥ Stopped	▭ Parked	□ Fixed Object	⊗ Bicycle	

N
 Not to Scale
 Printed: 6/11/2010

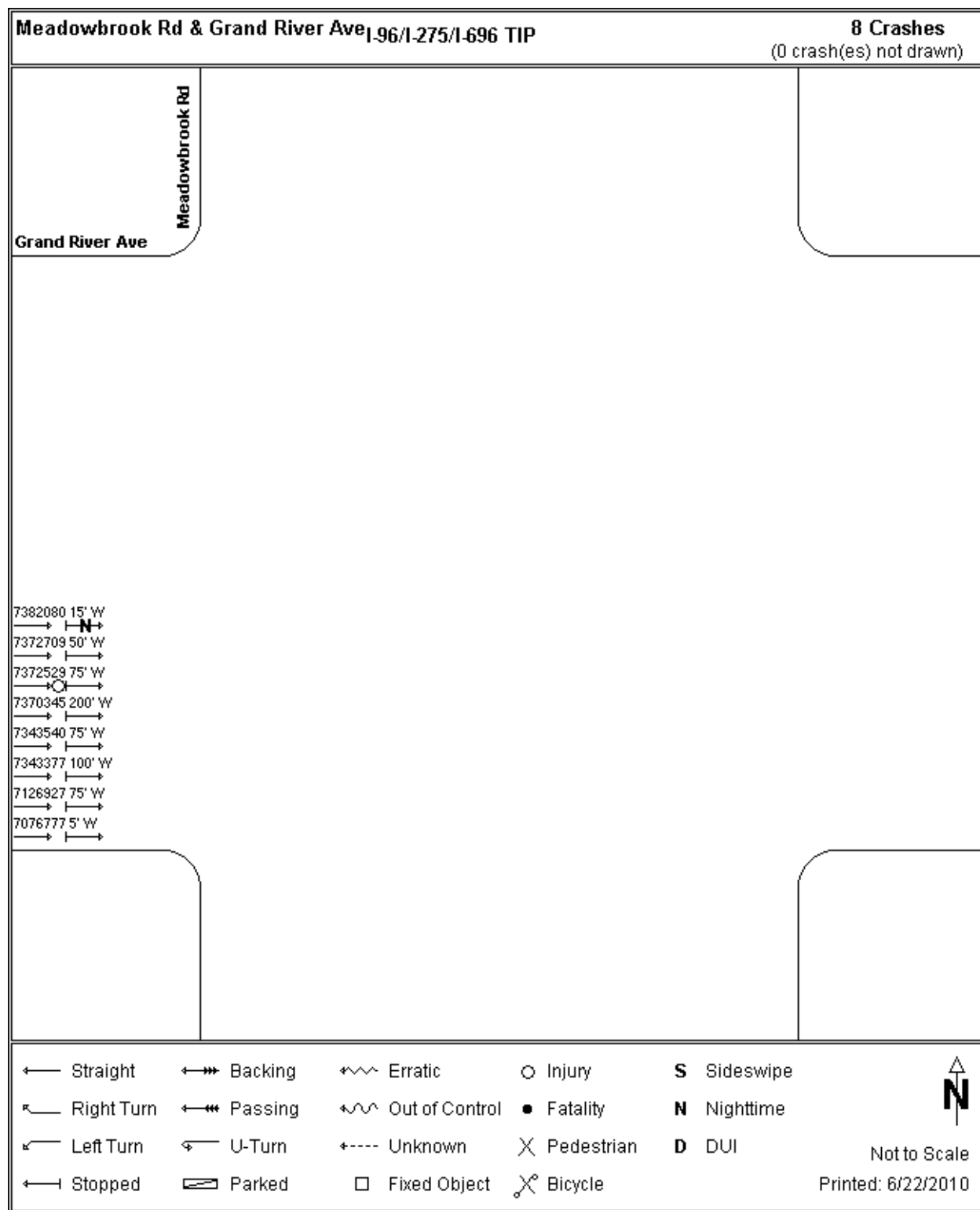


Traffic Improvement Association



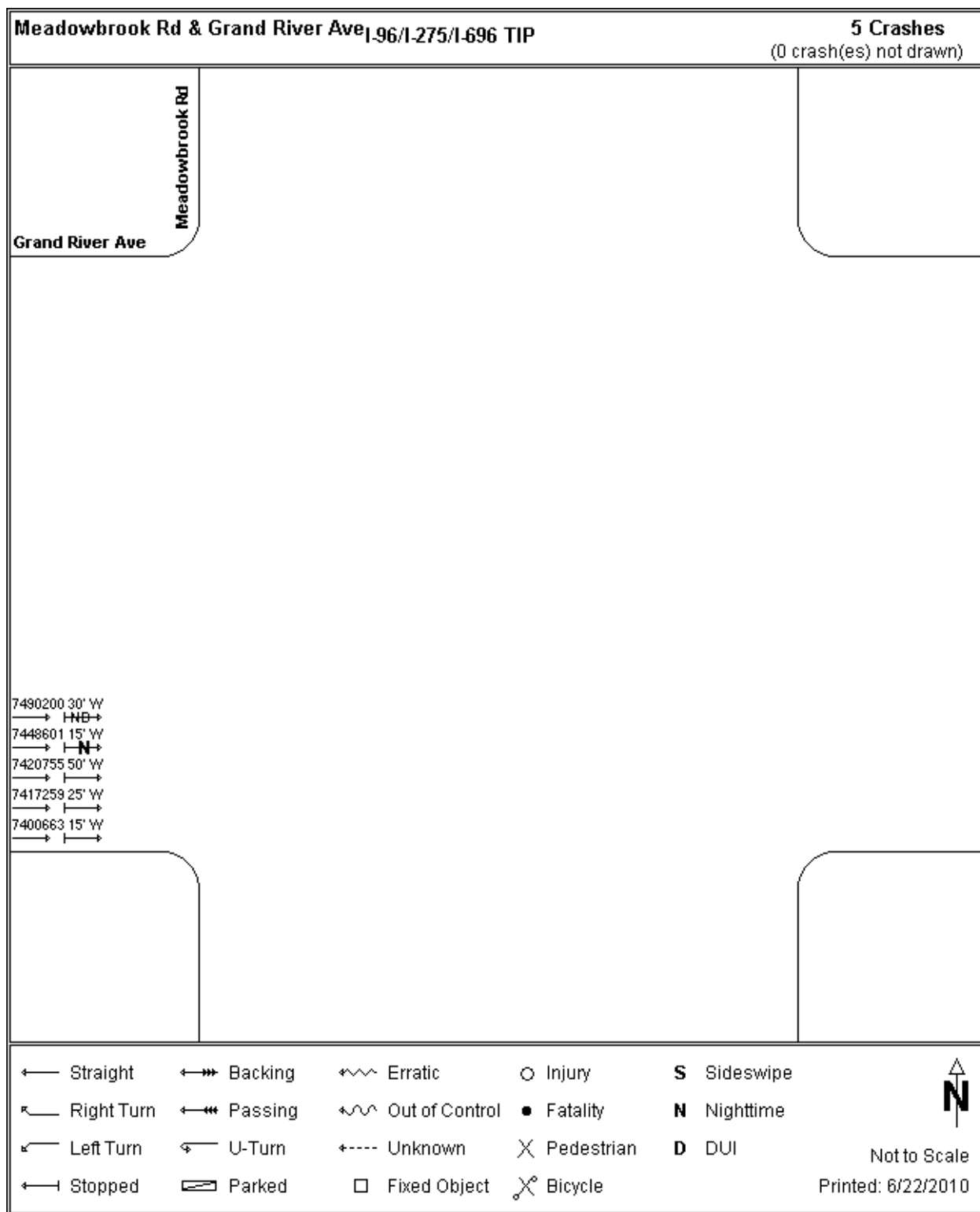


Traffic Improvement Association



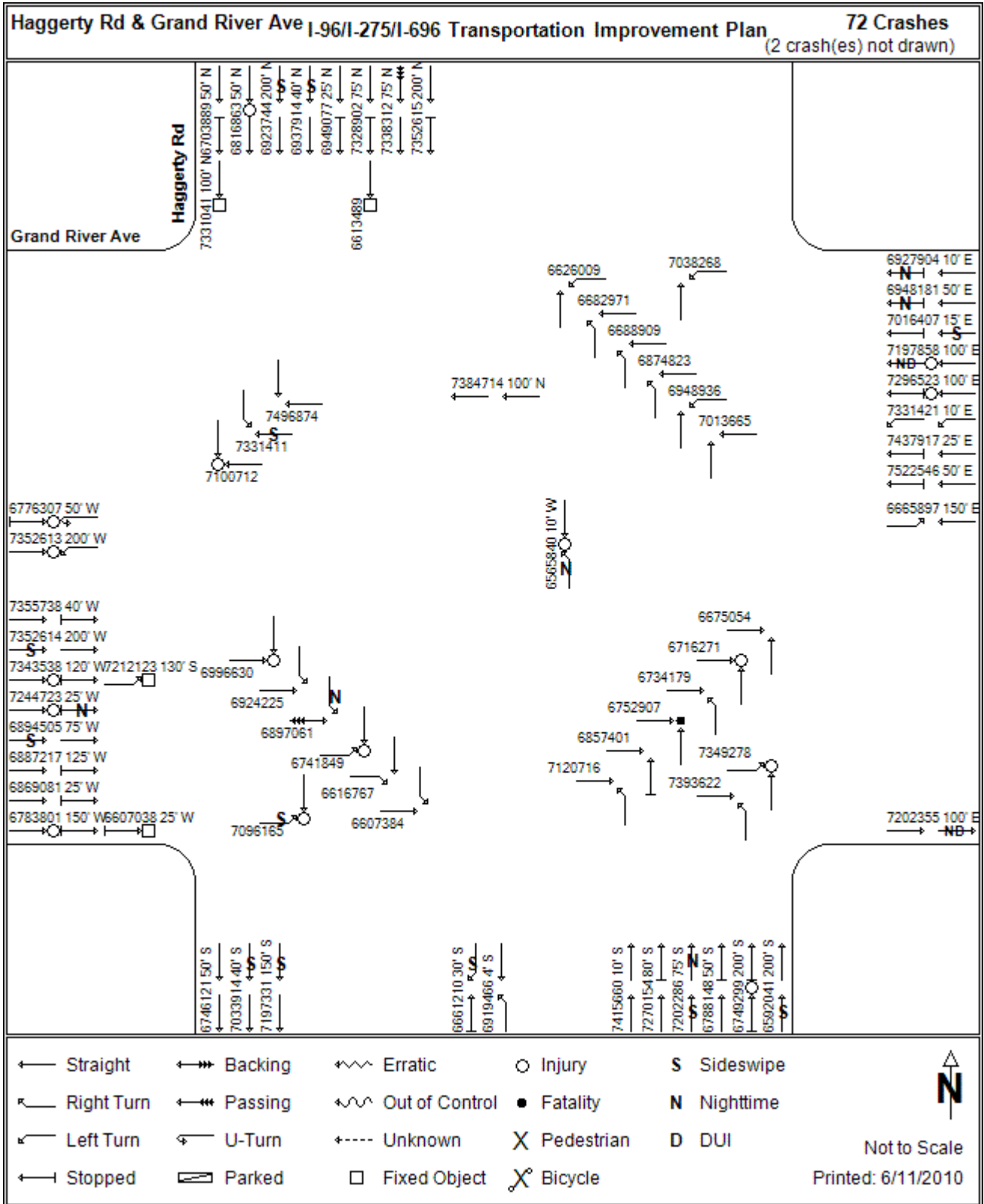


Traffic Improvement Association





Traffic Improvement Association

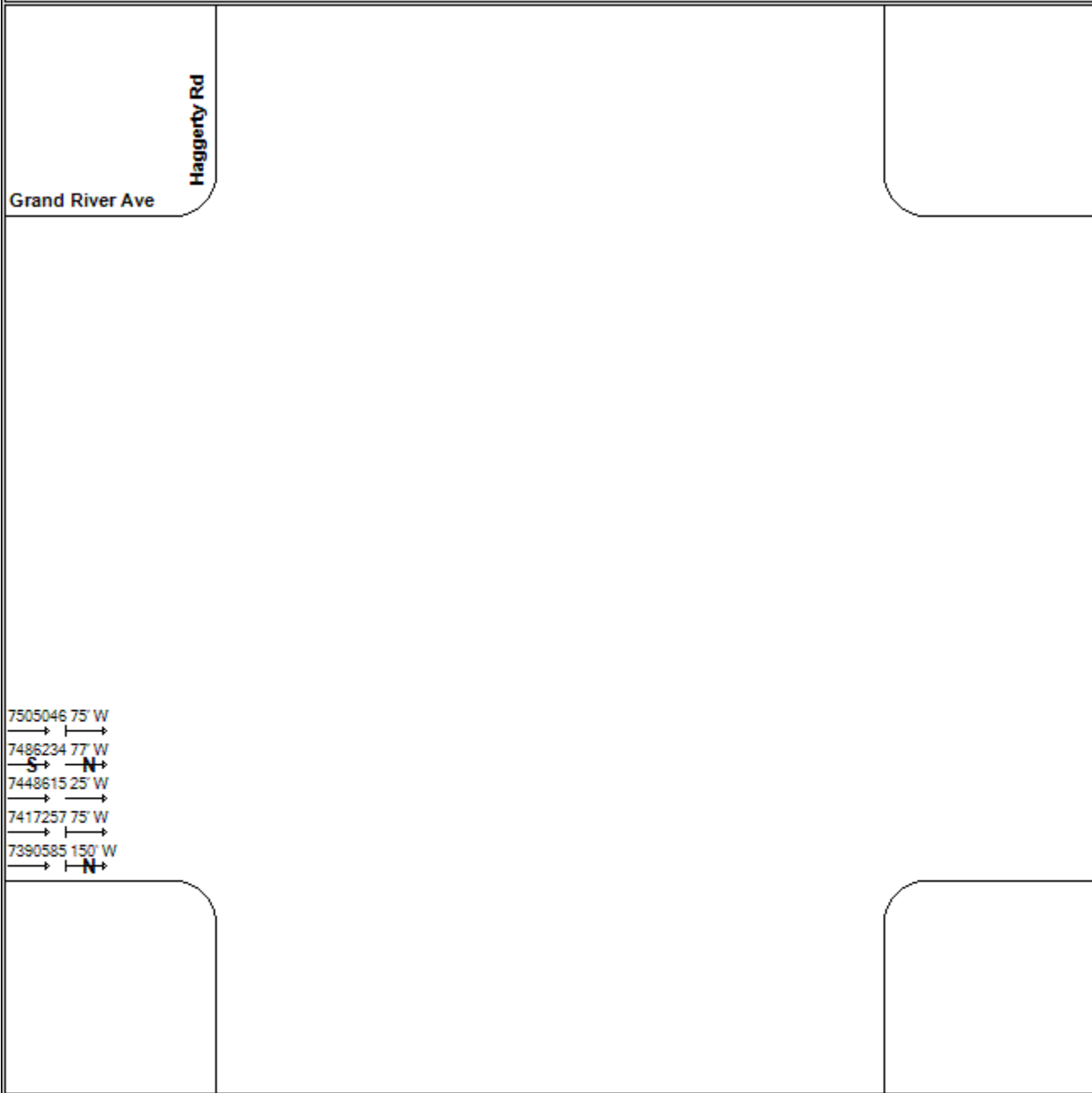




Traffic Improvement Association



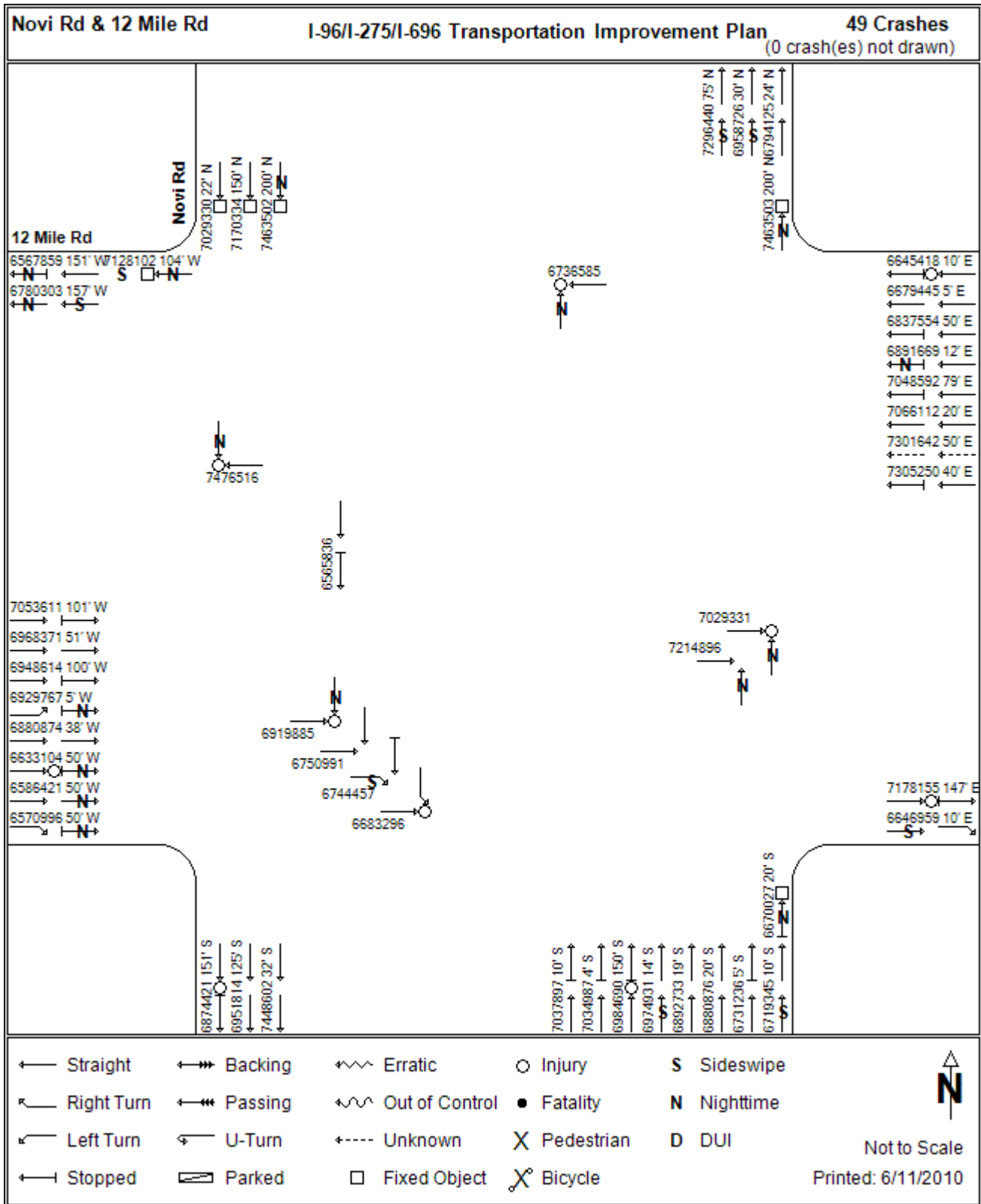
Haggerty Rd & Grand River Ave I-96/I-275/I-696 Transportation Improvement Plan 5 Crashes
(0 crash(es) not drawn)



← Straight	↔ Backing	⚡ Erratic	○ Injury	S Sideswipe
↘ Right Turn	↔ Passing	⚡ Out of Control	● Fatality	N Nighttime
↙ Left Turn	↻ U-Turn	⋯ Unknown	⊗ Pedestrian	D DUI
⊥ Stopped	▭ Parked	□ Fixed Object	⊗ Bicycle	 Not to Scale Printed: 6/11/2010

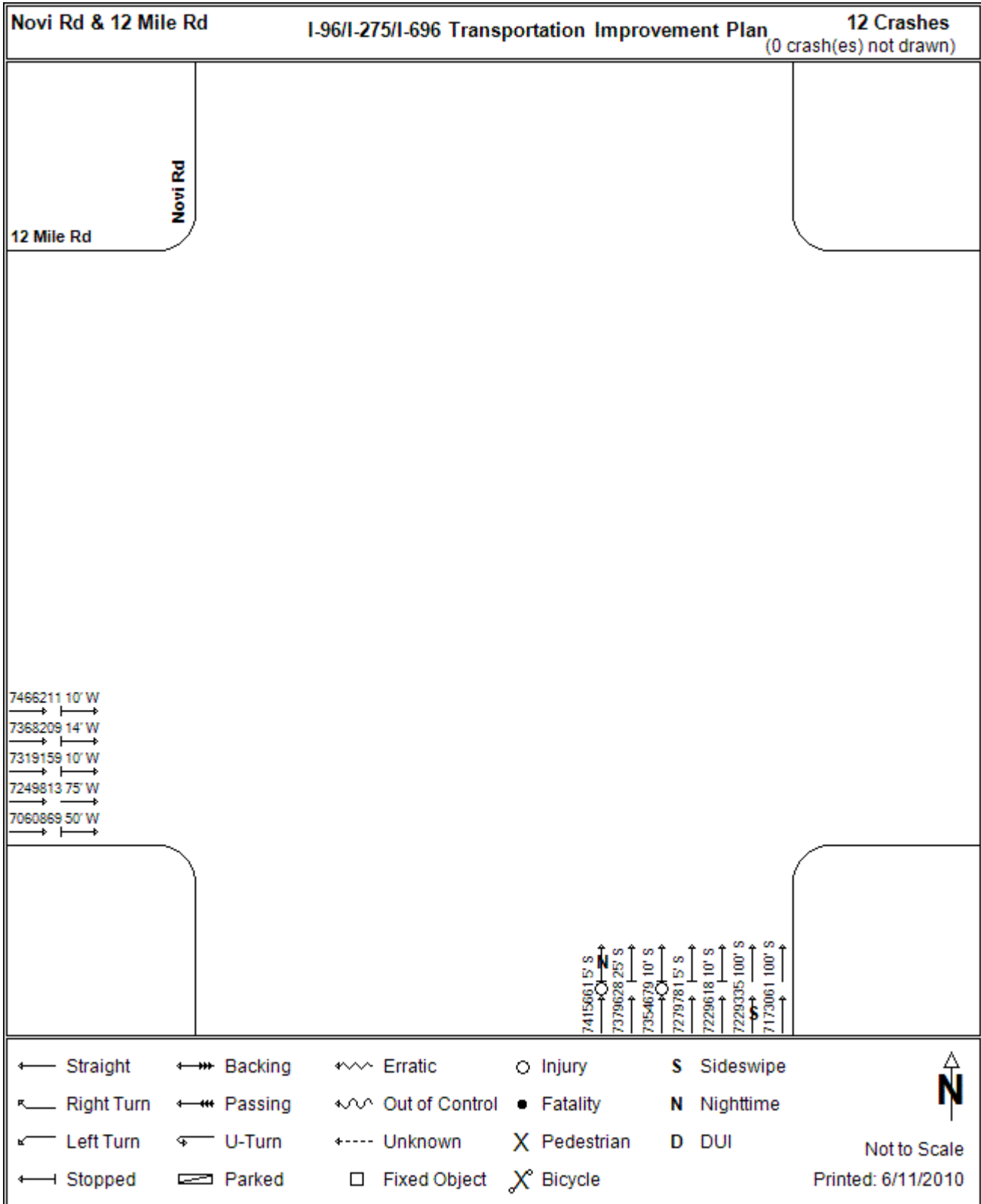


Traffic Improvement Association



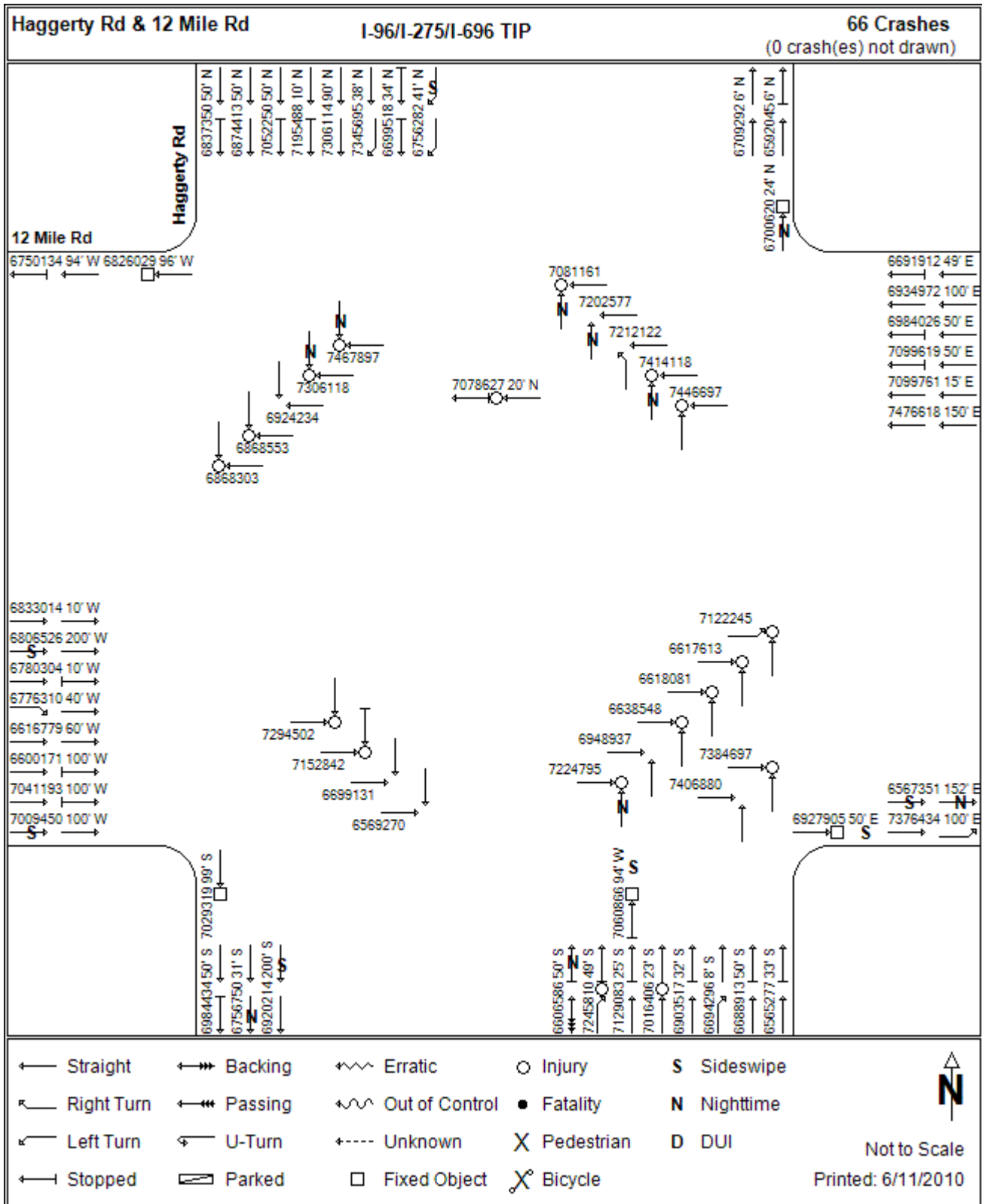


Traffic Improvement Association



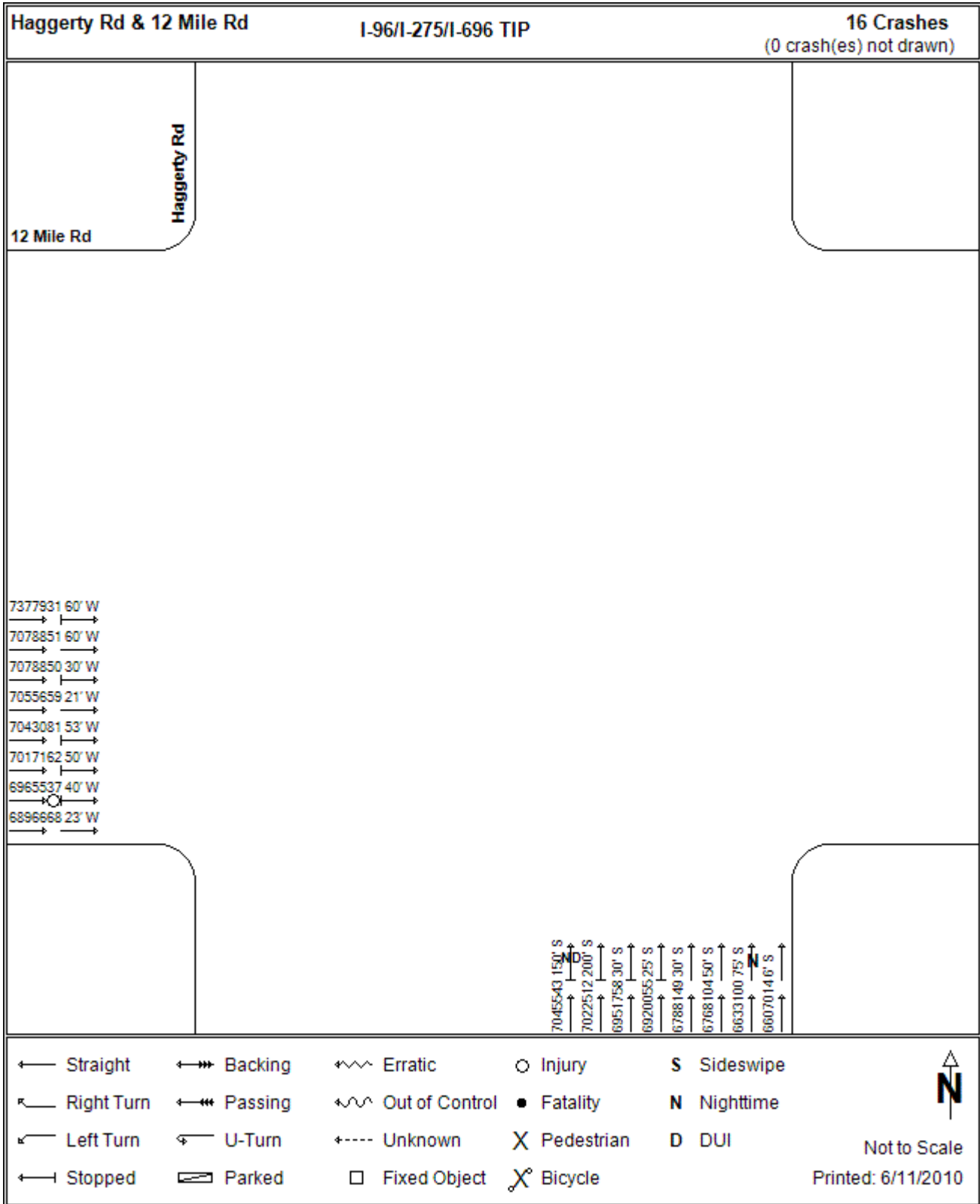


Traffic Improvement Association



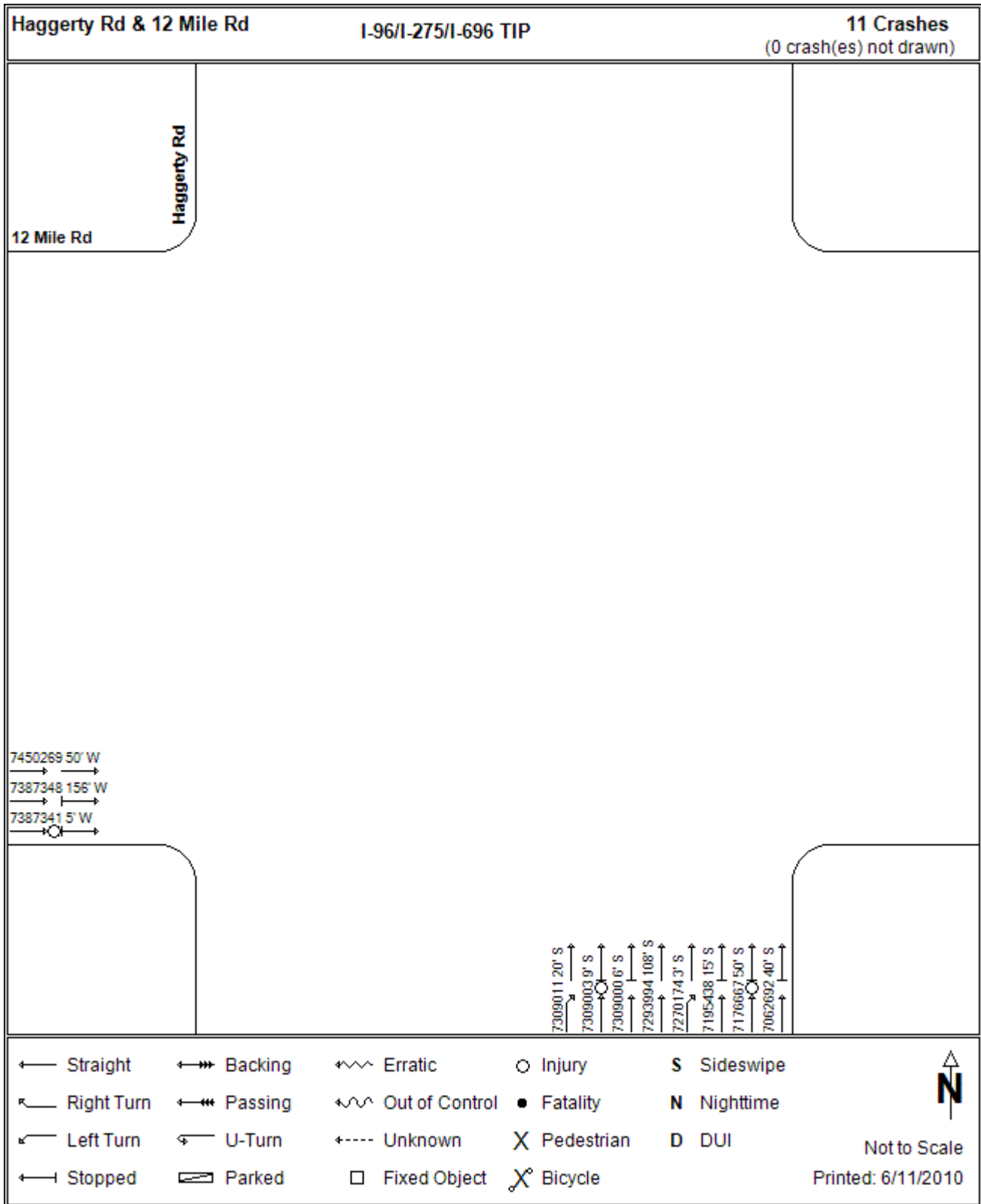


Traffic Improvement Association



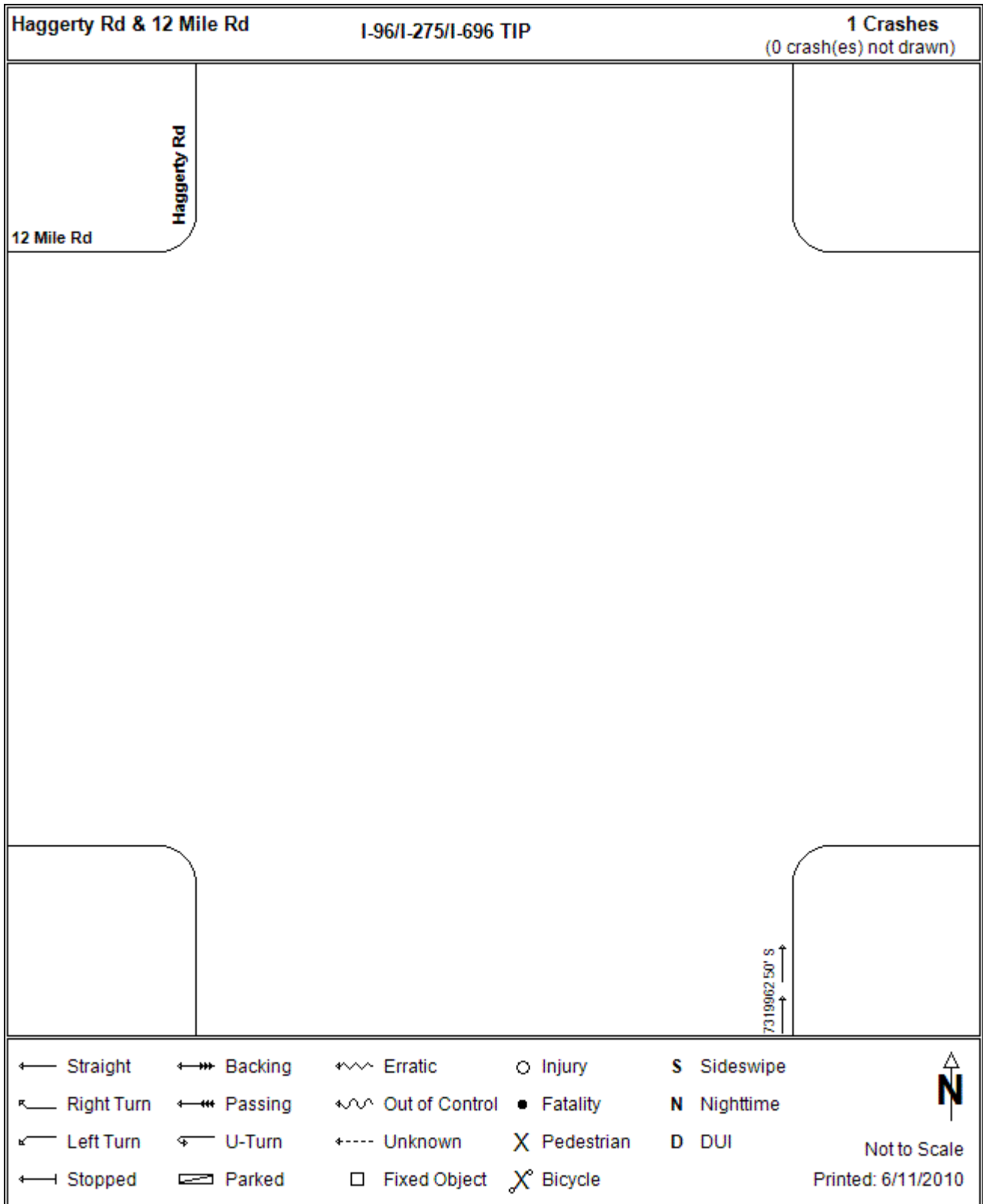


Traffic Improvement Association



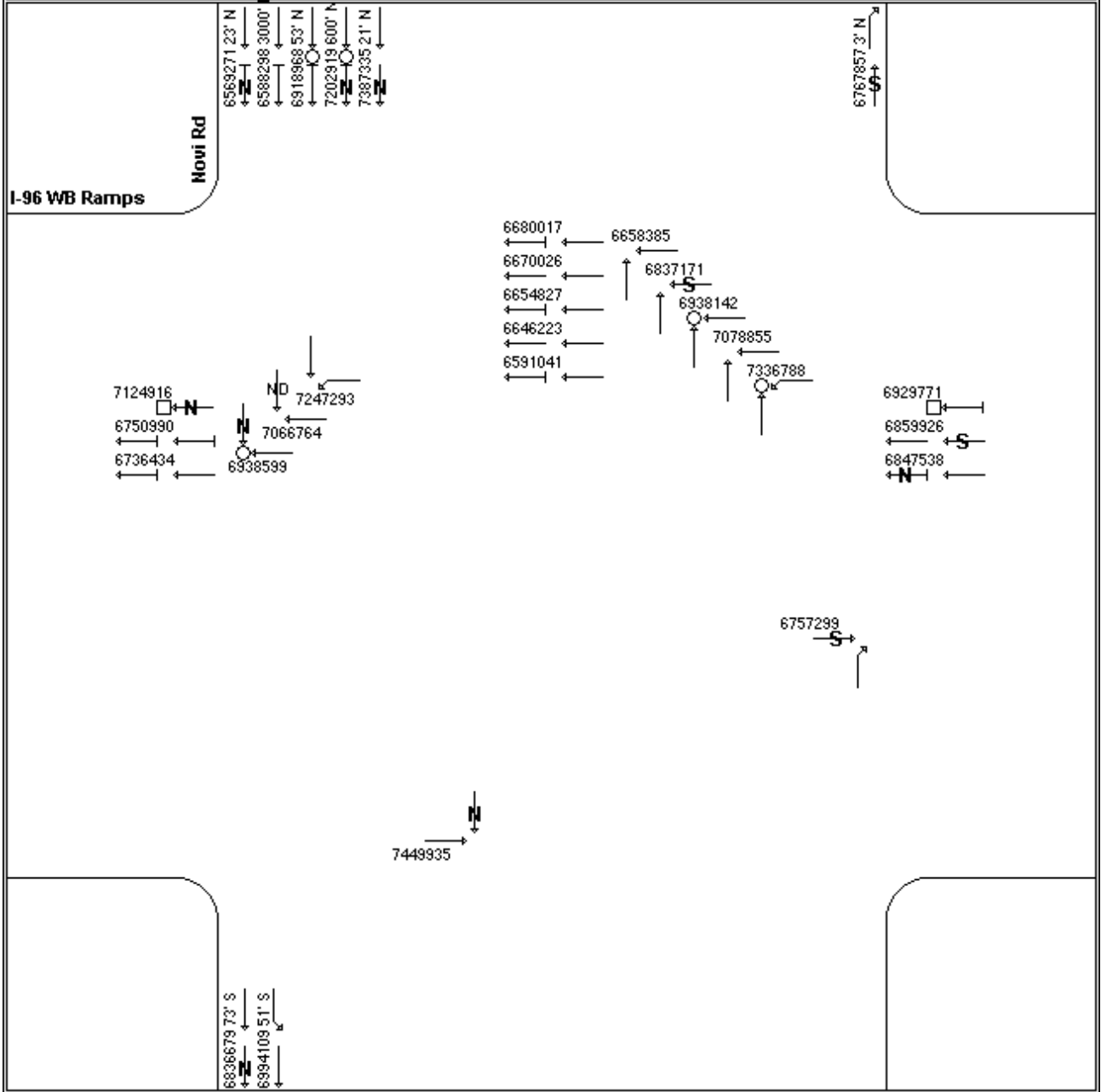


Traffic Improvement Association





Novi Rd & I-96 WB Ramps **I-96/I-275/I-696 Transportation Improvement Plan** **29 Crashes**
 (0 crash(es) not drawn)

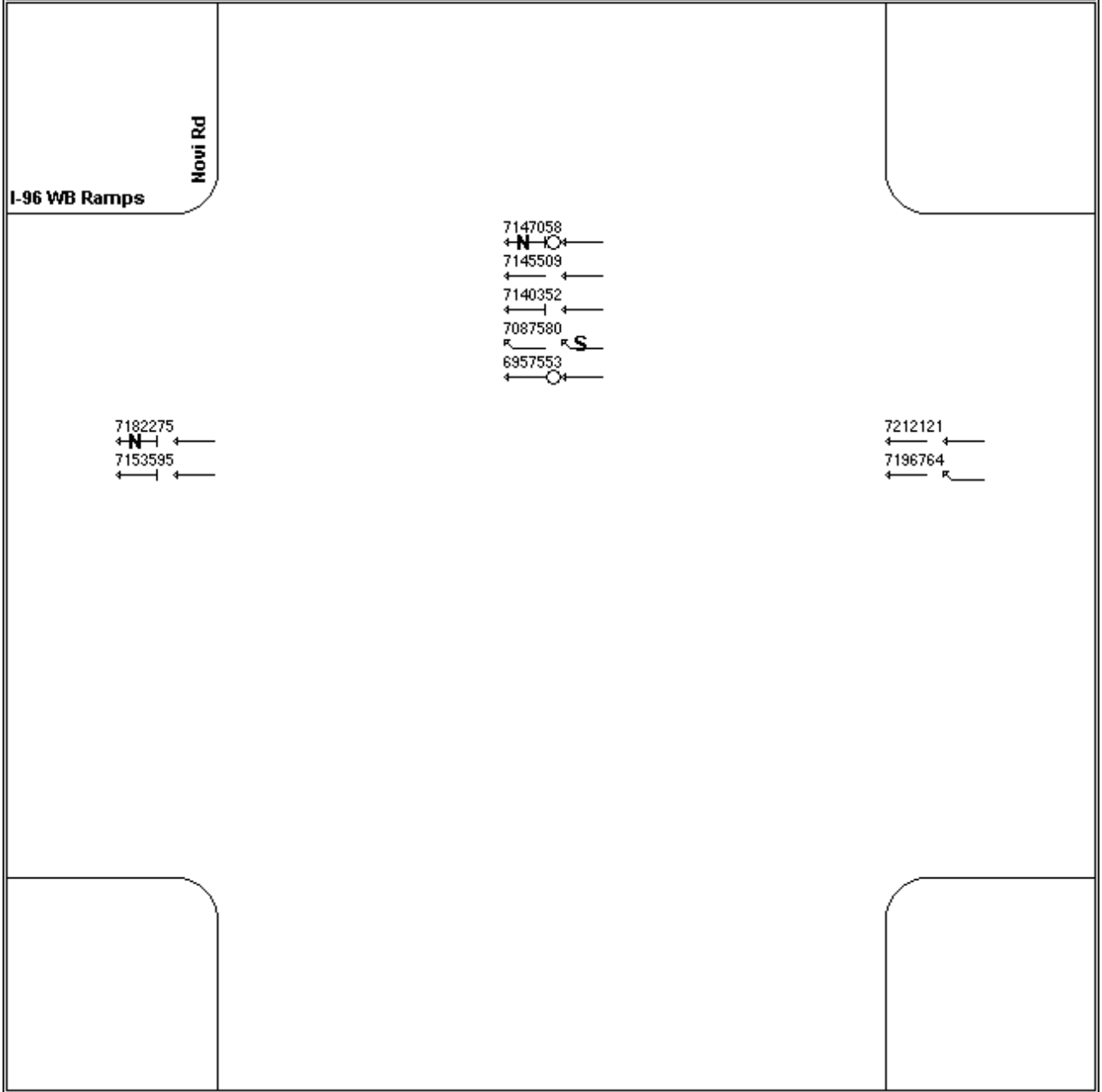


← Straight	↔ Backing	↔ Erratic	○ Injury	S Sideswipe
↘ Right Turn	↔ Passing	↔ Out of Control	● Fatality	N Nighttime
↙ Left Turn	↔ U-Turn	⋯ Unknown	⊗ Pedestrian	D DUI
⊥ Stopped	▭ Parked	□ Fixed Object	⊗ Bicycle	Not to Scale

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Novi Rd & I-96 WB Ramps **I-96/I-275/I-696 Transportation Improvement Plan** **9 Crashes**
 (0 crash(es) not drawn)

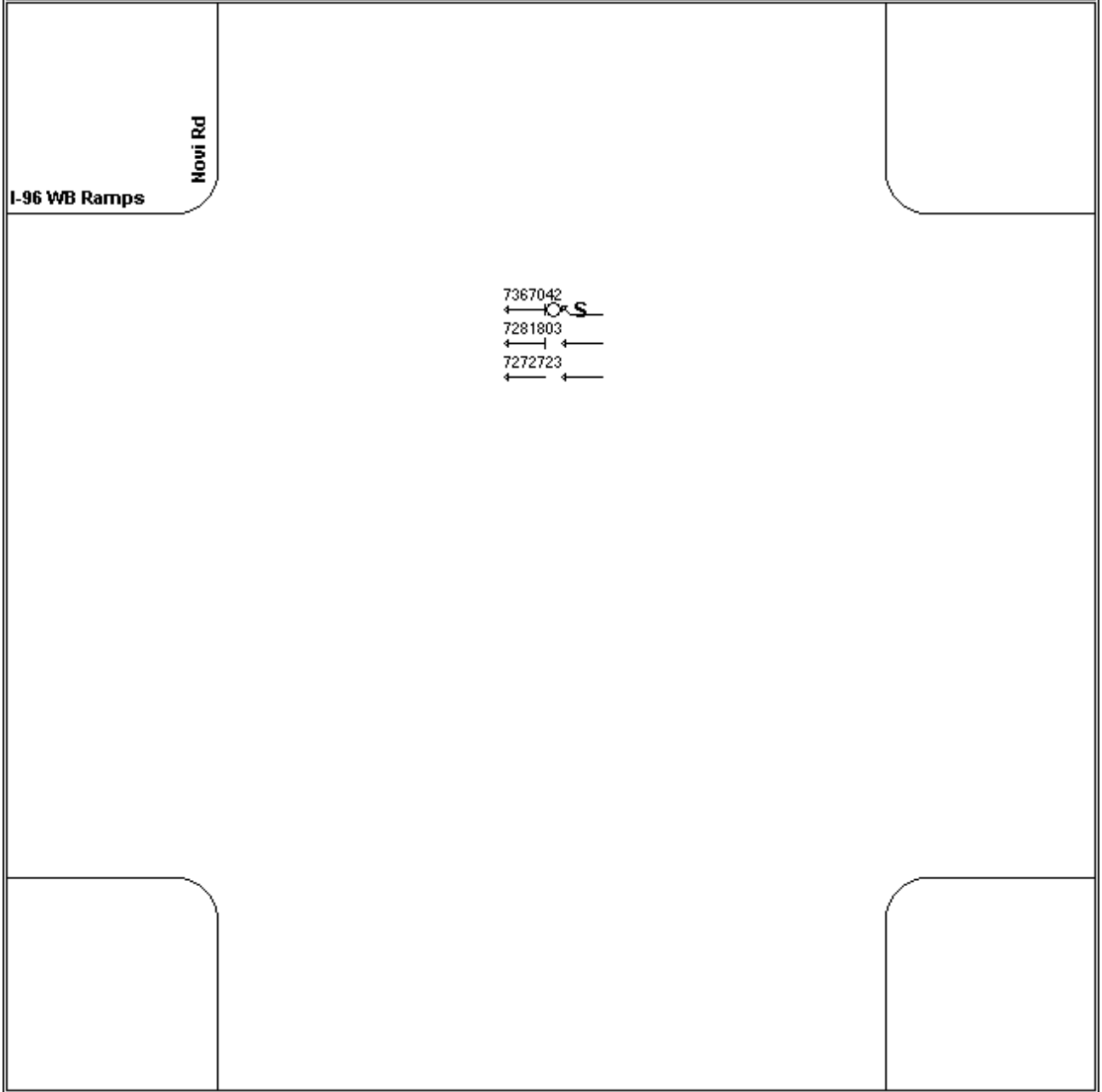


← Straight	↔ Backing	⚡ Erratic	○ Injury	S Sideswipe
↘ Right Turn	↔ Passing	⚡ Out of Control	● Fatality	N Nighttime
↙ Left Turn	↔ U-Turn	⋯ Unknown	⊗ Pedestrian	D DUI
⊥ Stopped	▭ Parked	□ Fixed Object	⊗ Bicycle	


N
 Not to Scale
 Printed: 6/18/2010

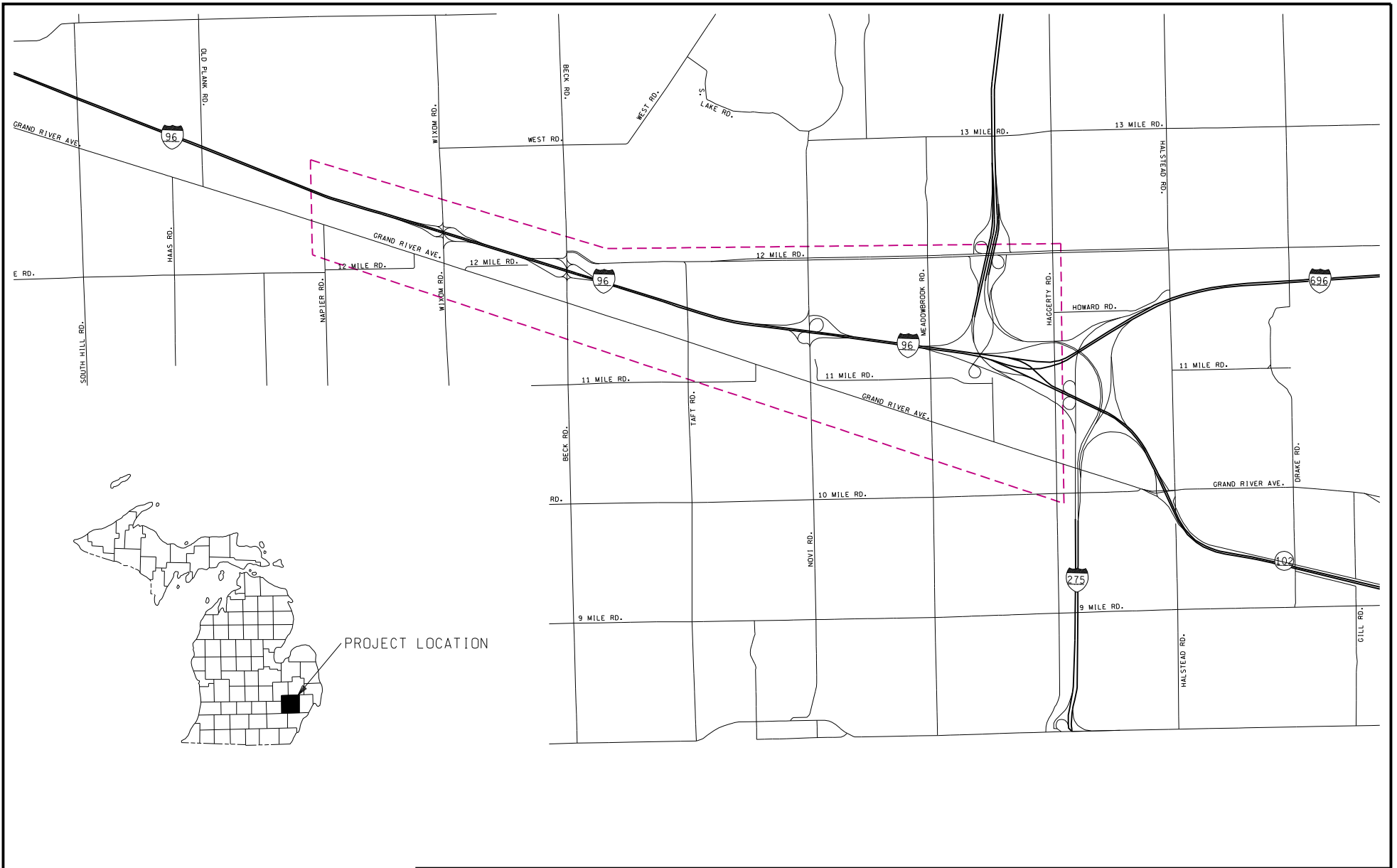


Novi Rd & I-96 WB Ramps **I-96/I-275/I-696 Transportation Improvement Plan** **3 Crashes**
 (0 crash(es) not drawn)



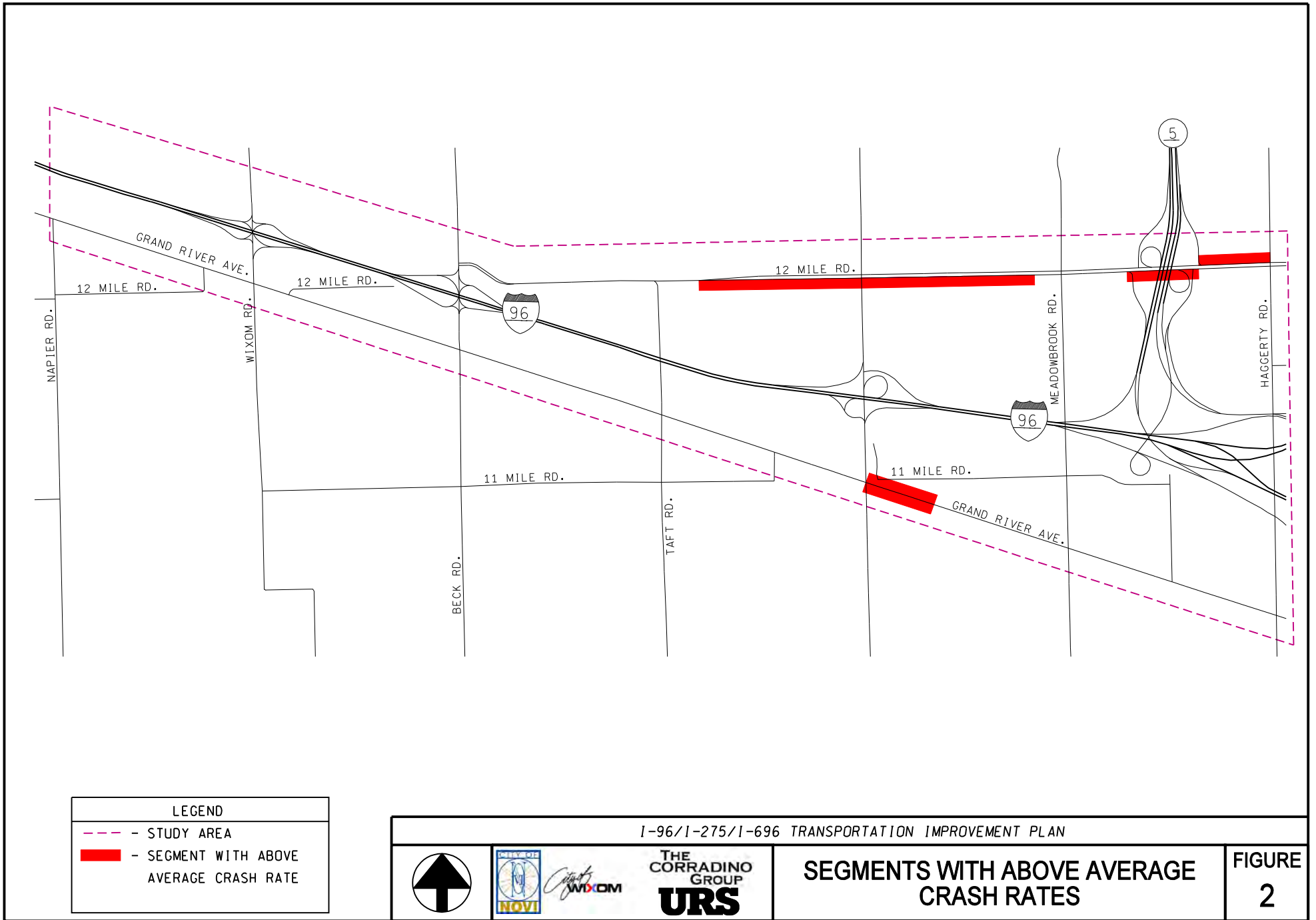
← Straight	←→ Backing	←~ Erratic	○ Injury	S Sideswipe
↘ Right Turn	←↔ Passing	←~ Out of Control	● Fatality	N Nighttime
↙ Left Turn	↔ U-Turn	←- Unknown	⊗ Pedestrian	D DUI
← Stopped	▭ Parked	□ Fixed Object	⊗ Bicycle	

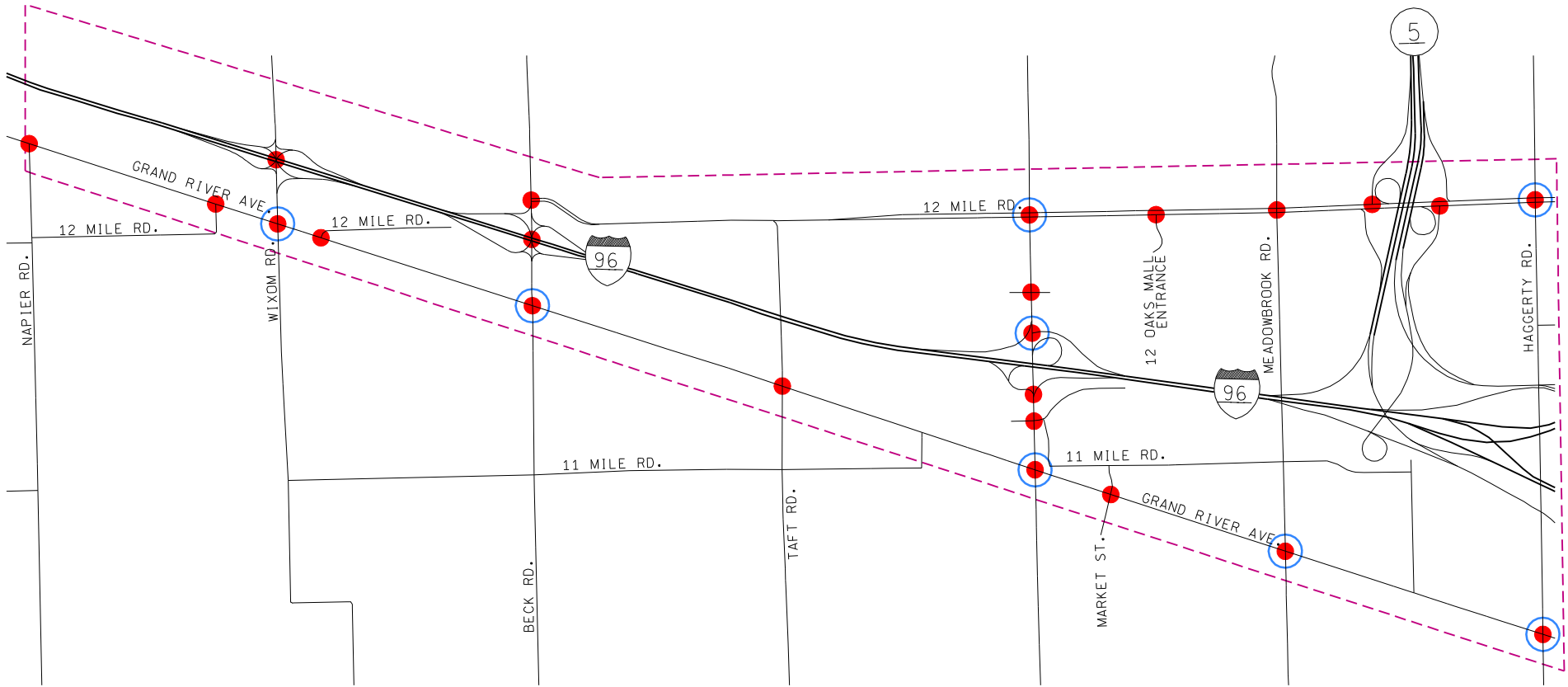

 Not to Scale
 Printed: 6/18/2010



LEGEND	
	- STUDY AREA

I-96/I-275/I-696 TRANSPORTATION IMPROVEMENT PLAN			
		 URS	<h2>VICINITY MAP</h2>
			<h1>FIGURE 1</h1>





LEGEND	
	- STUDY AREA
	- SIGNALIZED INTERSECTION
	- HIGHER THAN AVERAGE CRASH RATE

I-96/I-275/I-696 TRANSPORTATION IMPROVEMENT PLAN			
 	 URS	INTERSECTIONS WITH ABOVE AVERAGE CRASH RATES	FIGURE 3