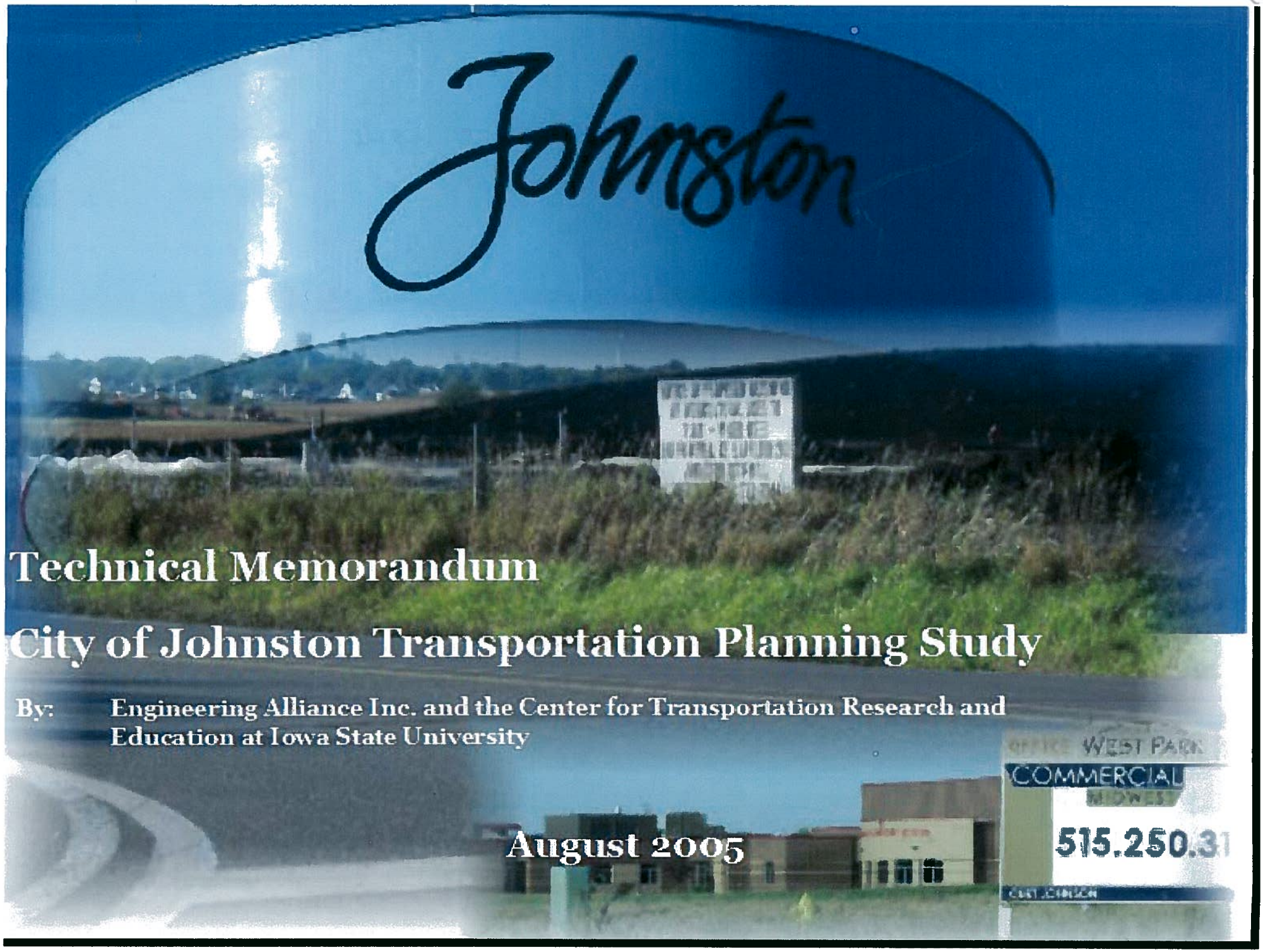


Technical Memorandum

City of Johnston Transportation Planning Study

By: Engineering Alliance Inc. and the Center for Transportation Research and Education at Iowa State University

August 2005

INTRODUCTION:

This document summarizes the findings of a transportation planning study conducted for the City of Johnston, Iowa.

This effort developed a tool for staff to conduct land use and transportation scenario planning and was also used in sizing up the capacity needs of the principal roadways serving the western portion of the City. The study area is shown within the dashed lines to the right.

This analysis was performed, from the limits of NW 86th Street to Highway 141, for the following roadways segments:

- NW 54th Avenue
- NW 62nd Avenue
- NW 70th Avenue
- NW 86th Street
- NW 100th Street

The tools developed serve as living documents to be updated on a continuous basis in an effort to improve traffic projections within the study area.

This work was a cooperative effort led by the Center for Transportation Research and Education (CTRE) at Iowa State University. Additional study team members included staff from the City of Johnston and Engineering Alliance Inc. (EAI). Hereinafter, this group will be referred to as the Study Team.

All aerial images were provided by the City of Johnston unless otherwise noted. All photos were provided by Neal Hawkins.

Study Tasks:

This effort consisted of the following tasks.

Task 1 –Traffic Forecasts/Tools

Description – Based on existing travel patterns and anticipated future land uses, this task developed the tools which allow for the ability to rapidly change land use assumptions and directly measure their impacts on traffic demands and future traffic operations. This information provided both AM and PM peak hour demands. This included working with City staff to calibrate this information and in understanding how to use the tools to modify land use assumptions in the future. This task included providing software and training on the traffic analysis software used. Existing travel and land use information was provided by either EAI or City staff. City staff provided mapping in an ArcView format.

TASK 2 – NW 62nd Avenue

Description – Due to the immediate nature of design activities for this roadway, this effort utilized the research tools developed in Task 1 to calculate the range of future peak hour traffic demands to NW 62nd Avenue (from NW 86th Street to NW 100th Street) and the impact of additional changes within the western City limits. The Study Team worked to incorporate this information into the design process and to evaluate geometric design considerations.

TASK 3 – Adjacent Roadways

Description – this task utilized the research tools developed in Task 1 to evaluate the range of traffic impacts to NW 54th Avenue and NW 70th Avenues, from NW 86th Street to the west City limits, as well as NW 100th Street, from NW 54th Avenue to NW 70th Avenue.

The intent on this document is to summarize the findings from Task 1 through 3. These findings are presented under the following headings:

A. Existing Conditions

- **Roadway – Roadway functions and existing characteristics.**
- **Traffic – Field data collection of current peak hour traffic demands.**
- **Land Uses – Current land uses within the area, documentation of changes over time along with evaluation of local area trip rates.**

B. Future Conditions

- **Land Uses – Future planned or anticipated land uses within the study area.**

C. Scenario Planning Tools

- **Traffic – Traffic generated from proposed land use changes within the area.**
- **Roadway – Anticipated roadway geometry needs based on future traffic demands.**

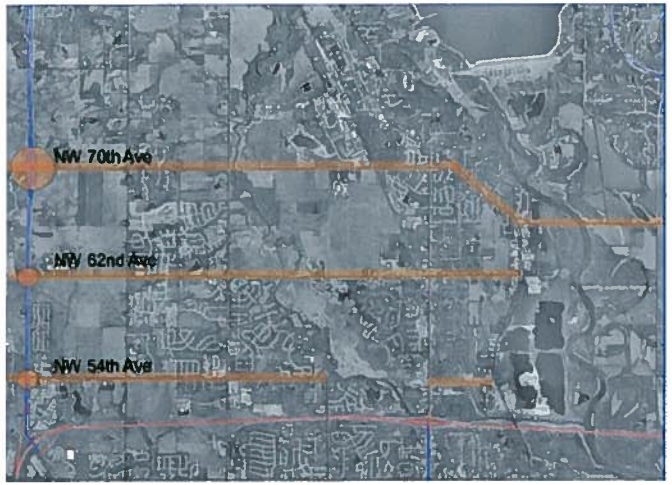
D. Summary

A. Existing Conditions:

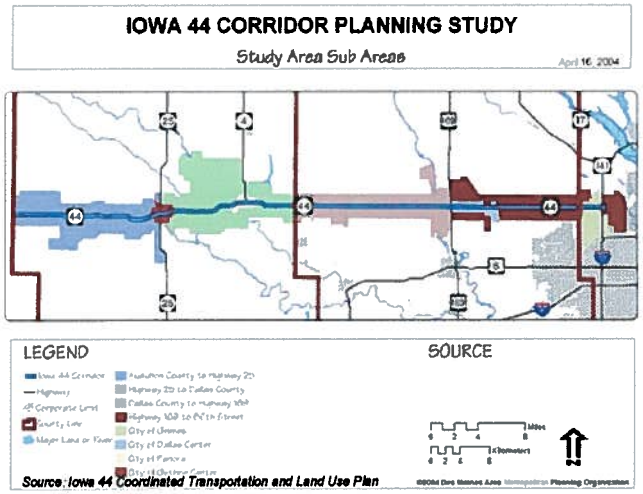
- •Roadway
- •Traffic
- •Land Use

ROADWAY

The information on this page, and the two following, provide a general overview of existing roadway characteristics, intersection control, and roadway segment speed limits within the study area.

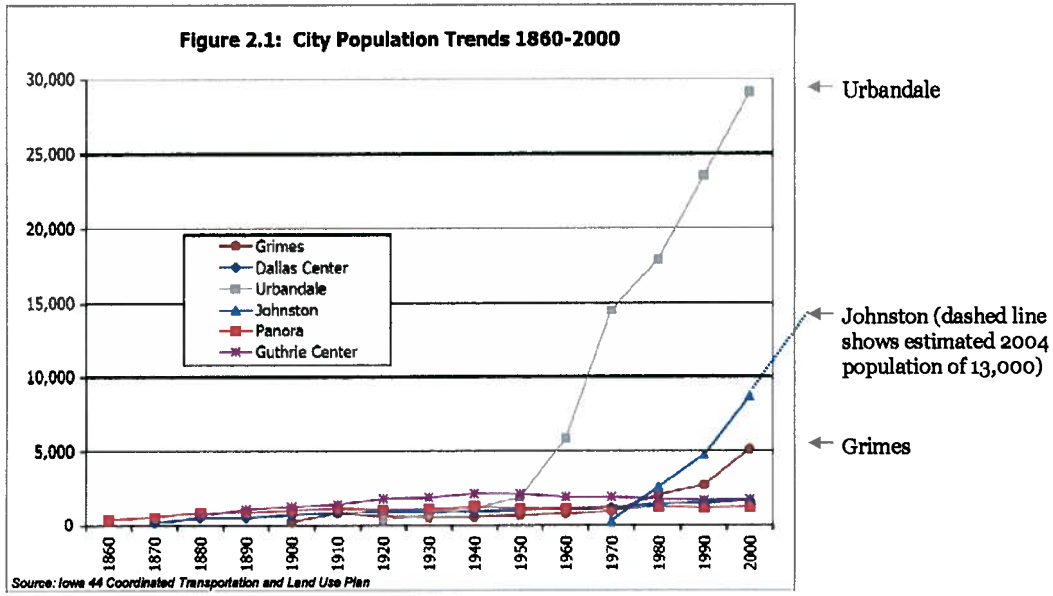


CIRCULATION – As shown above, east to west travel across the City of Johnston is limited to only three major roadways (with NW 54th Ave not being a continuous route). Maintaining good performance on these limited east to west roadways is critical as they must serve a variety of uses including through trips, circulation to other north-south roadways, access to major employment centers and schools, and access to a variety of other business, residential, and other uses.

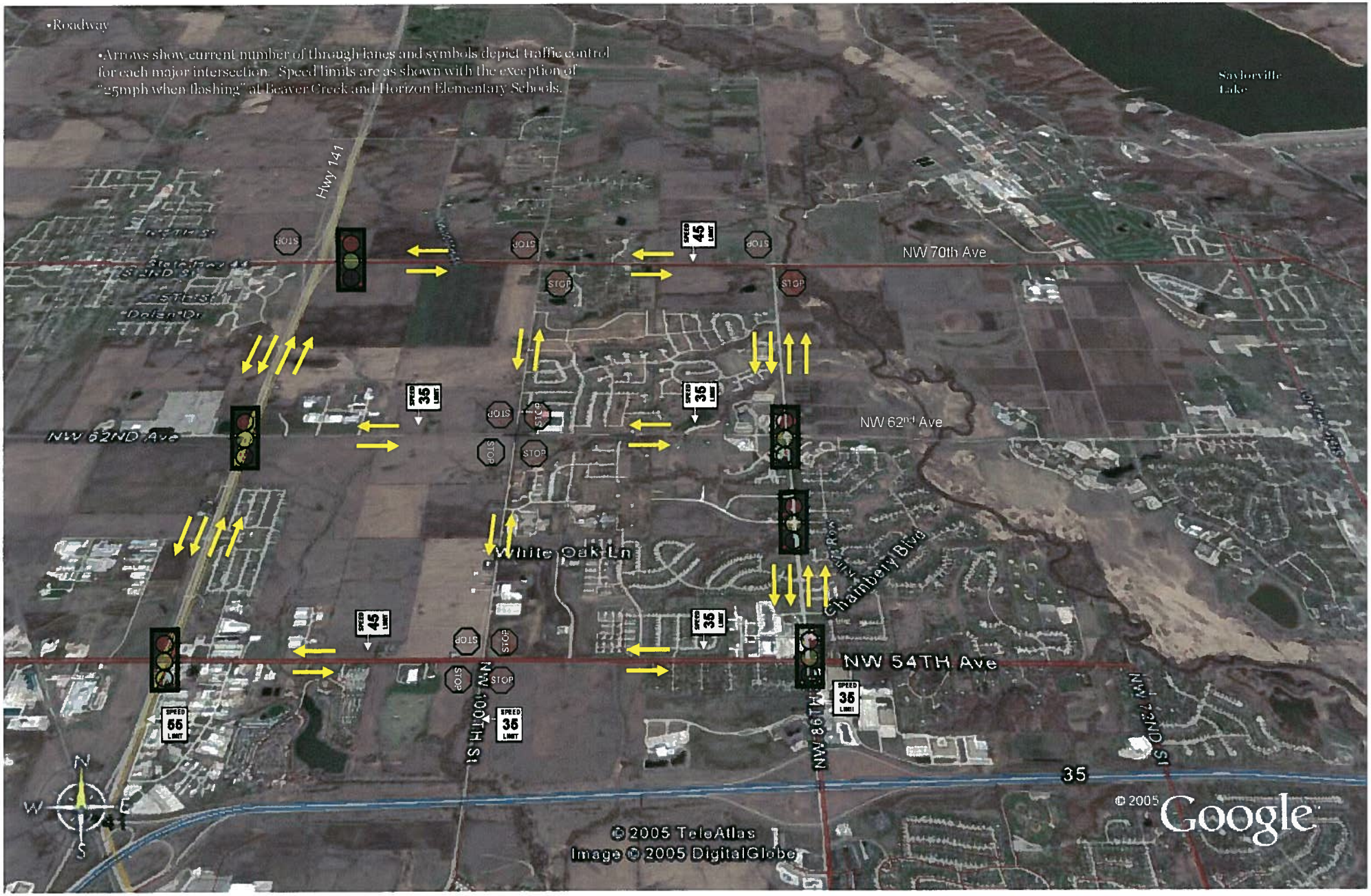


ROADWAY NETWORK – NW 70th Avenue to the east of Hwy 141 is called Highway 44. A recent Des Moines Area Metropolitan Planning Organization study showed that population and traffic along this corridor, and also on Highway 141, have grown significantly over the last 10 years.

CHANGING DEMANDS - The graph to the right shows the change in population for communities either along Hwy 44 or NW 70th Avenue (or within the immediate study area). Note the significant increases for the communities of Urbandale, Grimes and Johnston.



A. Existing Conditions:



A. Existing Conditions:

- ➡ •Roadway
- •Traffic
- •Land Use

ROADWAY CONDITIONS - The photos above depict today's conditions along NW 62nd Avenue, which like NW 54th Avenue and NW 70th Avenue are a two-lane roadways today. The growth in traffic volumes along Hwy 141 (and the traffic signal at NW 62nd Avenue shown above left) has increased peak hour demands and congestion along this critical adjacent corridor.

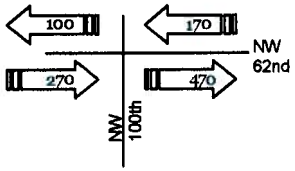
A. Existing Conditions:

- Roadway
- ⇨ Traffic
- Land Use

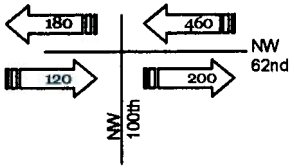
TRAFFIC VOLUMES - The circles in the graphic to the right depict the locations where both AM and PM peak hour traffic counts were conducted for this study. The majority of these counts were completed from 6:45am to 8:15am and from 4:30pm to 5:30pm within the month of November of 2004 with some follow up counts being conducted in March and April of 2005. Peak hour factors were calculated for all movements as shown in the example for NW 70th Ave at NW 100th St to the right. Vehicle peak hour count data are included within the Appendix of this report.

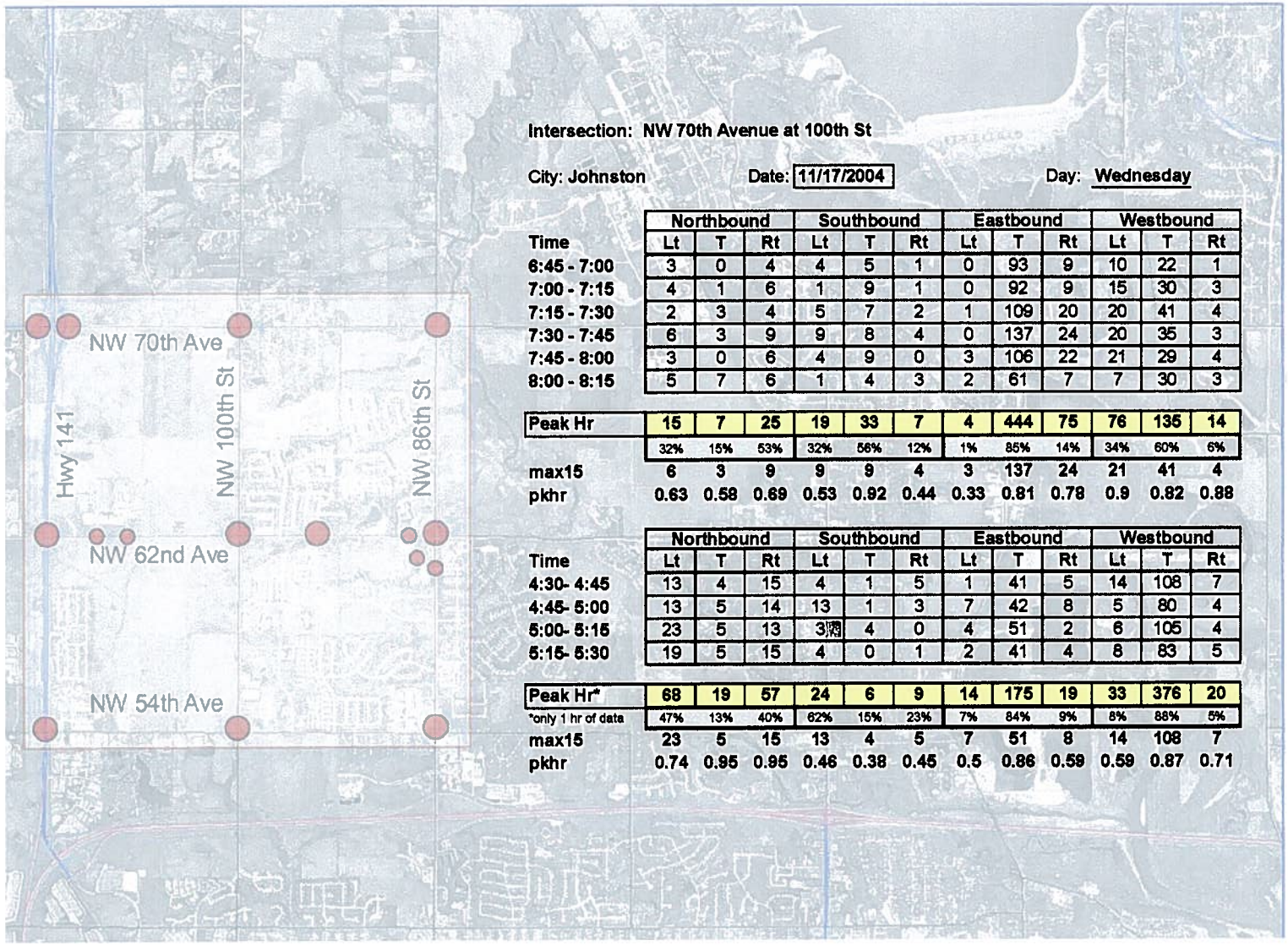
Traffic volume patterns for NW 62nd Avenue were found to change significantly at NW 100th St as shown below:

•peak hr 7:15-8:15a



•peak hr 4:30-5:30p





Intersection: NW 70th Avenue at 100th St

City: Johnston **Date: 11/17/2004** **Day: Wednesday**

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00	3	0	4	4	5	1	0	93	9	10	22	1
7:00 - 7:15	4	1	6	1	9	1	0	92	9	15	30	3
7:15 - 7:30	2	3	4	5	7	2	1	109	20	20	41	4
7:30 - 7:45	6	3	9	9	8	4	0	137	24	20	35	3
7:45 - 8:00	3	0	6	4	9	0	3	106	22	21	29	4
8:00 - 8:15	5	7	6	1	4	3	2	61	7	7	30	3
Peak Hr	15	7	25	19	33	7	4	444	75	76	135	14
	32%	15%	53%	32%	56%	12%	1%	85%	14%	34%	60%	6%
max15	6	3	9	9	9	4	3	137	24	21	41	4
pkhr	0.63	0.58	0.69	0.53	0.92	0.44	0.33	0.81	0.78	0.9	0.82	0.88

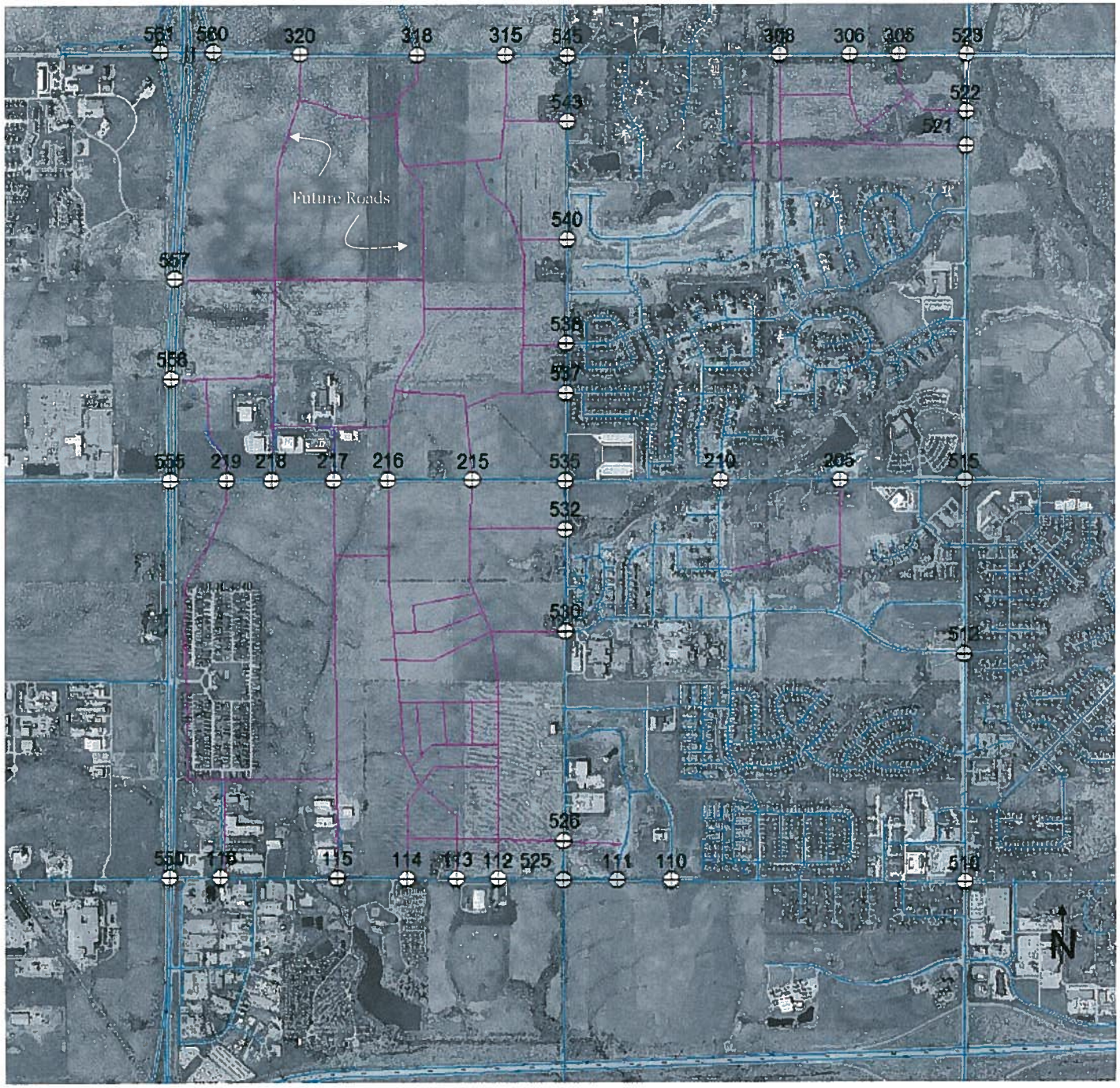
Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:30- 4:45	13	4	15	4	1	5	1	41	5	14	108	7
4:45- 5:00	13	5	14	13	1	3	7	42	8	5	80	4
5:00- 5:15	23	5	13	3[illegible]	4	0	4	51	2	6	105	4
5:15- 5:30	19	5	15	4	0	1	2	41	4	8	83	5
Peak Hr*	68	19	57	24	6	9	14	175	19	33	376	20
*only 1 hr of data	47%	13%	40%	62%	15%	23%	7%	84%	9%	8%	88%	5%
max15	23	5	15	13	4	5	7	51	8	14	108	7
pkhr	0.74	0.95	0.95	0.46	0.38	0.45	0.5	0.86	0.59	0.59	0.87	0.71

A. Existing Conditions:

- Roadway
- ⇨ **Traffic**
- Land Use

TRAFFIC VOLUMES - The anticipated future roadway network, future intersections, and existing intersections are shown over the aerial photo to the right. Intersection numbers which correspond to analysis intersection id's are also shown.

The future roadway network information was provided by the City of Johnston.

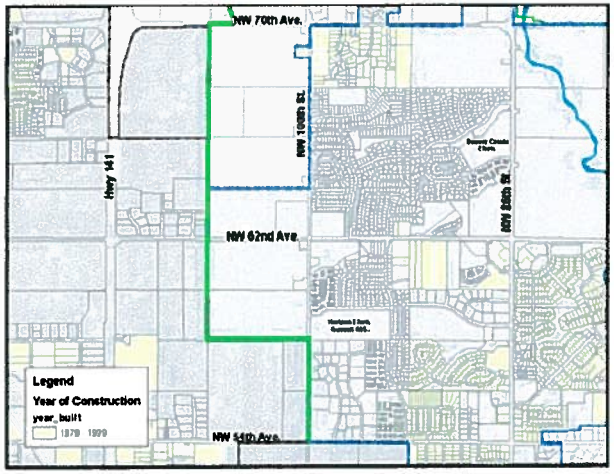


A. Existing Conditions:

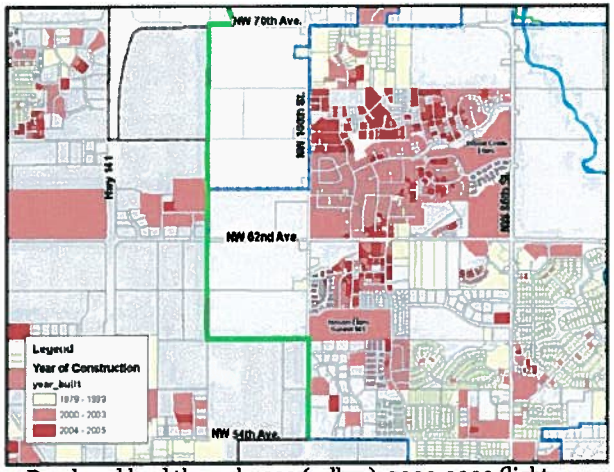
- Roadway
- Traffic
- ⇨ Land Use

LAND USES – A significant amount of development has occurred over the last several years within the study area with the majority of this area now being either developed or under construction. This study documented this growth as shown below in the following three images beginning at the top left.

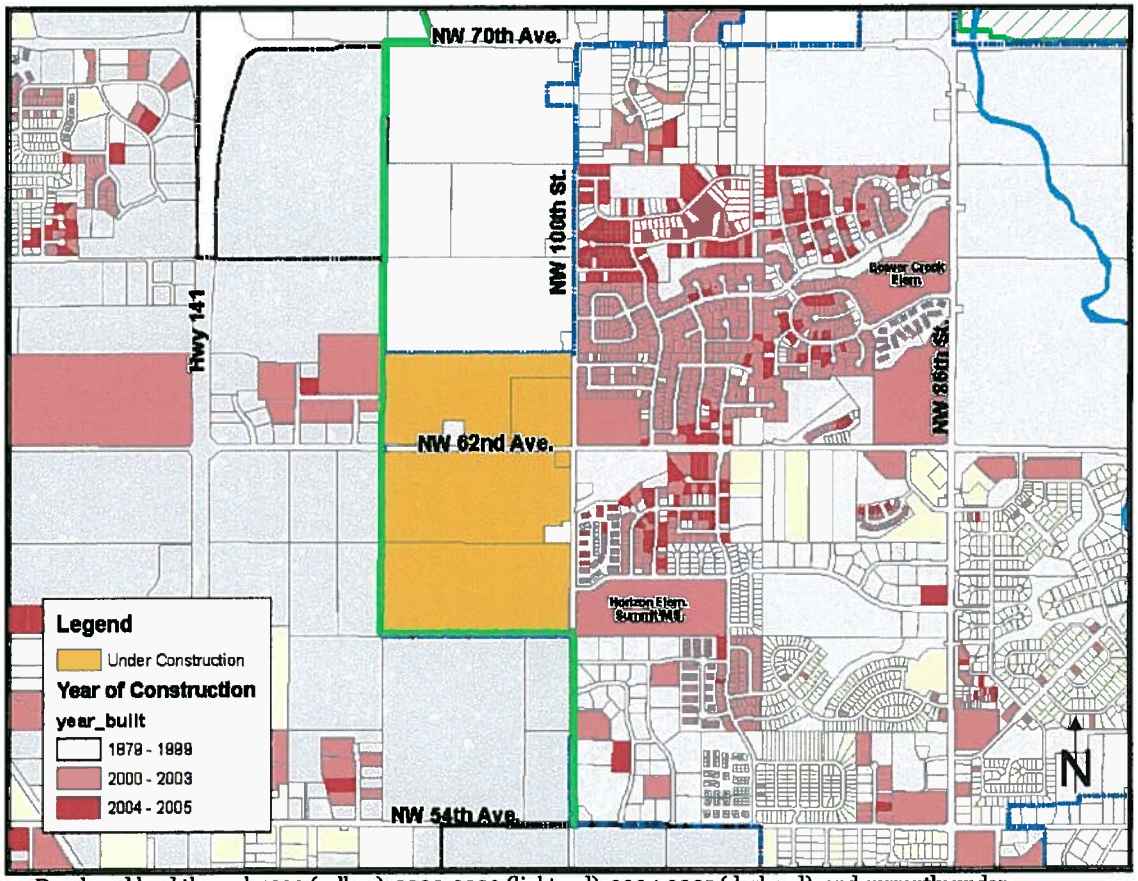
CURRENT DEVELOPMENT – Large site development work underway within the southwest corner of NW 62nd Ave and NW 100th St.



1. Developed land through 1999 (shown in yellow).



2. Developed land through 1999 (yellow), 2000-2003 (light red), and 2004-2005 (dark red).



3. Developed land through 1999 (yellow), 2000-2003 (light red), 2004-2005 (dark red), and currently under construction (orange).

A. Existing Conditions:

- Roadway
- Traffic
- ⇨ Land Use

TRIP GENERATION – The analysis of future conditions requires populating large tracts of undeveloped land with specific uses.

To improve the accuracy of this process, field studies were conducted to document trip production into and out of both industrial and commercial uses within the Johnston area. These areas evaluated for each specific land use are depicted in the graphic to the right.

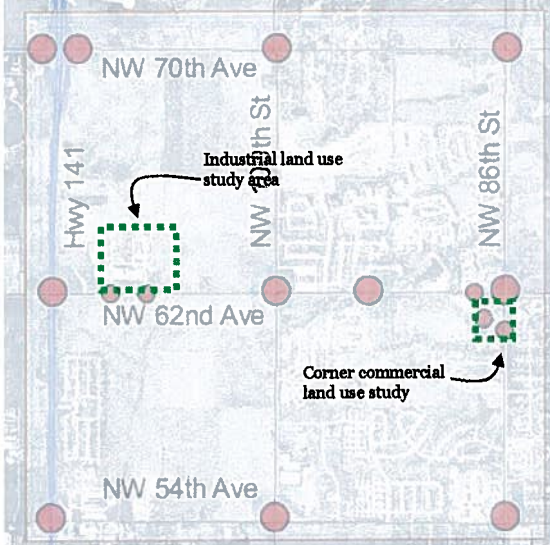
This information was also used to supplement the assignment of truck percentages where the FedEx transfer facility has such a strong influence along NW 62nd Avenue.

Trip generation calculations were based upon the ITE Trip Generation 7th Edition and supplemented with additional Des Moines metro market local values where available.

The graph on the following page contrasts traffic volume impacts between different land uses.

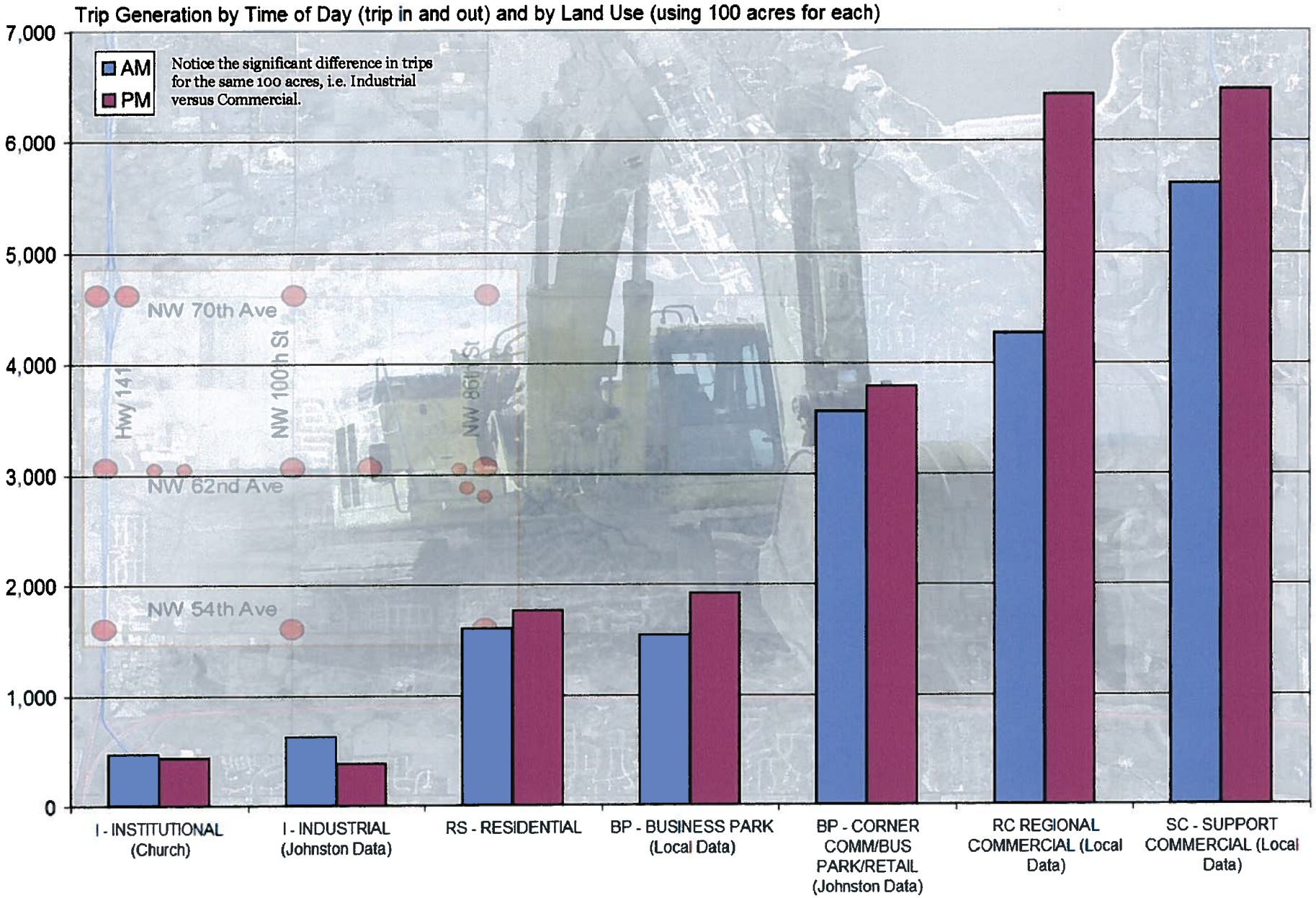
Local Trip Rates

- Local values
- Trucks



NW 86th Street at NW 62nd Avenue (southwest corner) – Corner commercial area reviewed includes mix of gas station, retail, and office.

Trip Generation Summary



B. Future Conditions:

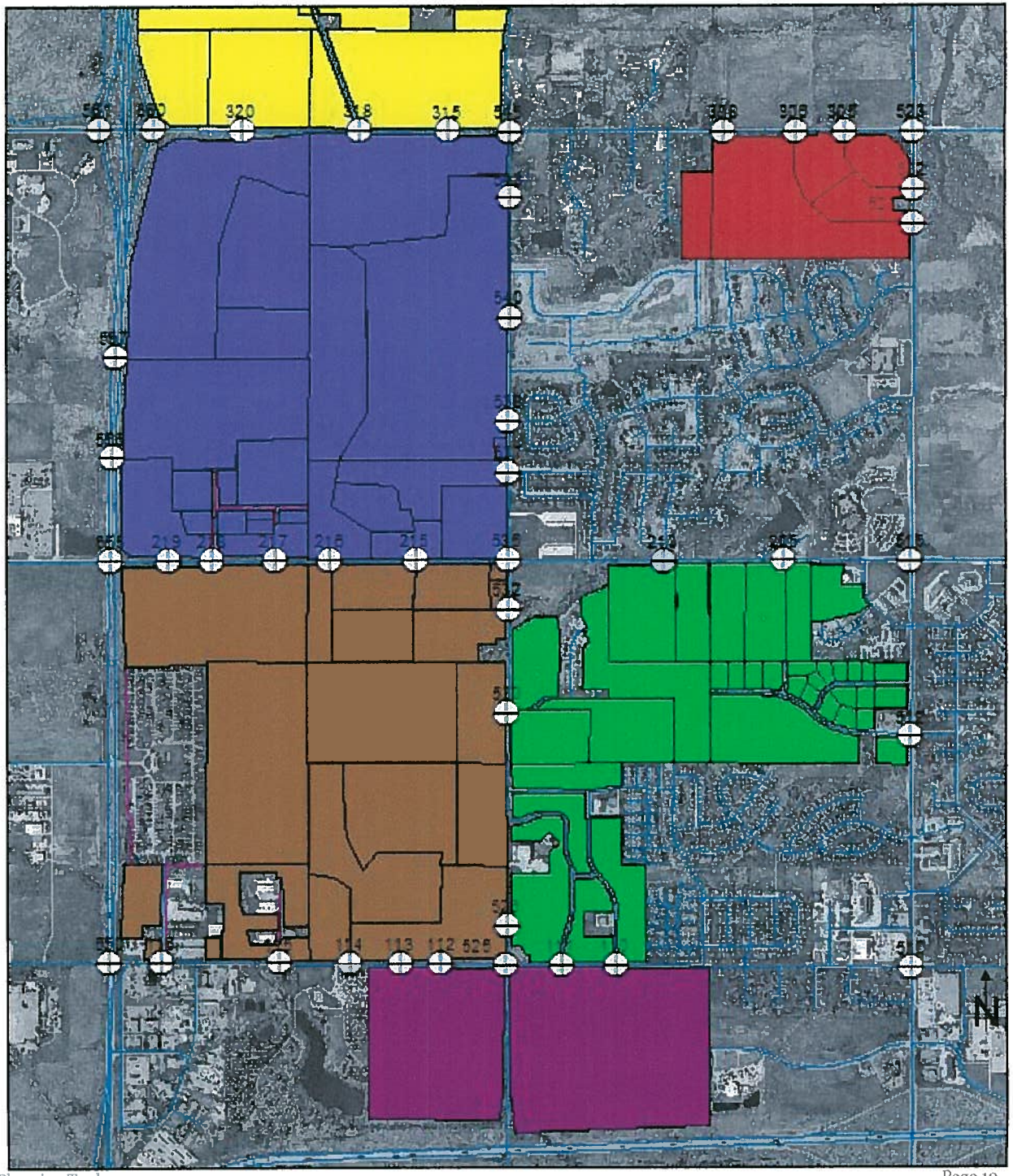
•Land Use

FUTURE LAND USES - The anticipated future development within the study area is depicted over the aerial photo to the right. Specific uses and acreages within each area were provided by the City of Johnston. This information was used to calculate future trips generated to and from each parcel or parcel group. These trips were then distributed to intersections throughout the study network.

As a reference, the study process categorized each area as follows:

COLOR	AREA NAME	SUB-AREAS
Blue	NW (north-west)	10
Brown	WW (west-west)	7
Purple	SW (south-west)	2
Green	CC (central-central)	2
Red	CN (central-north)	1
Yellow	NXNW (north-northwest)	2

The degree to which an area was subdivided depended on the mix of land uses and the ingress/egress routes assumed. Complex areas were subdivided more to allow for higher levels of detail in the analysis. The tool developed as part of this study allows for the acreages within any sub area to be changed and then calculates the resulting traffic volume changes throughout the study area. For example, within a specific sub-area the City may wish to evaluate the traffic impacts of 100 acres of commercial versus 50 acres and to then understand the traffic impacts at each of the intersections within the study area.

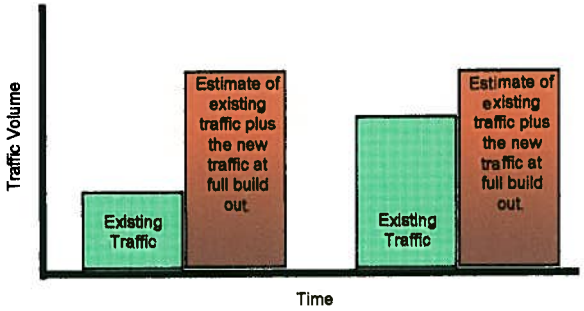


C. Analysis Tools:

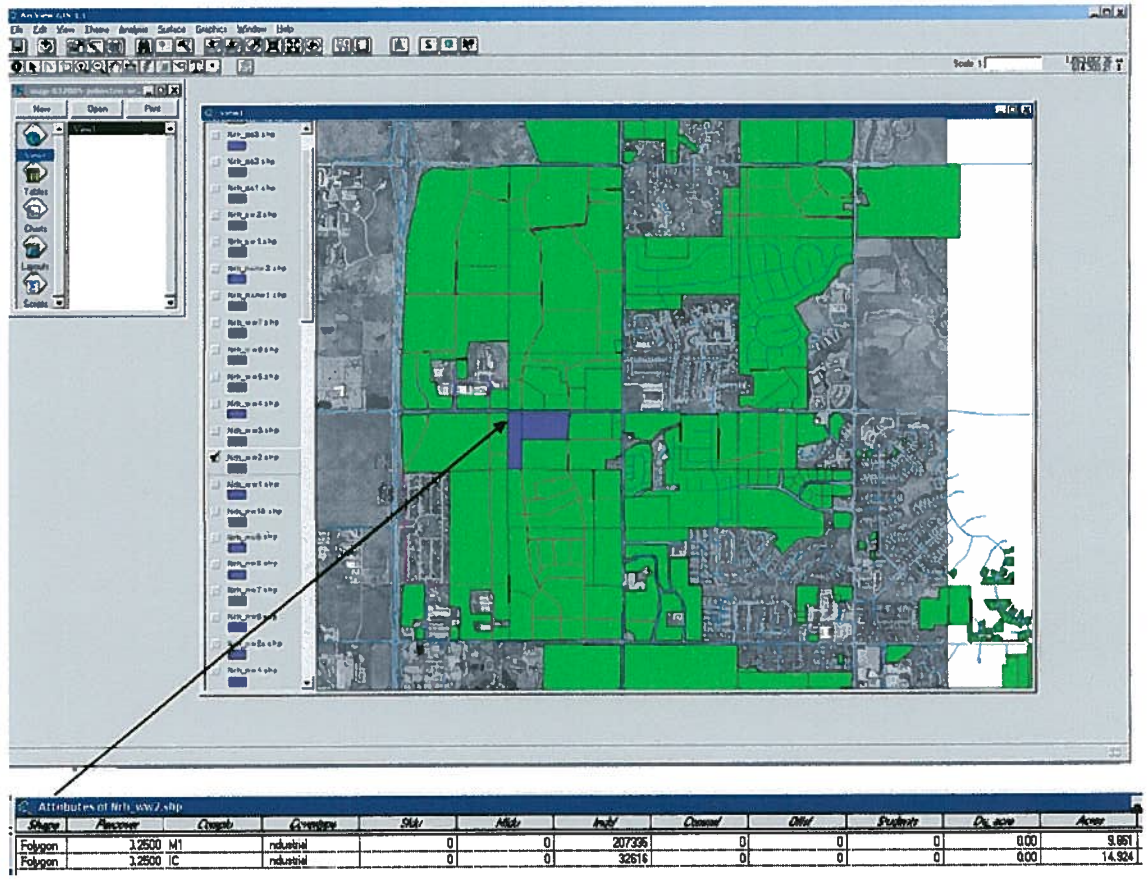
- Traffic
- Roadway

SCENARIO PLANNING – The methodology for obtaining new volume impacts begins with inputting the acres of each type of land use. As shown to the right, these acres can be obtained via Arc View (the City's graphic based planning tool with exported tabular data) or simply by typing the information in. Once the acres are set, the tool then calculates total trips in and out of the parcel and also distributes these trips across all study intersections. These intersection volumes are automatically formatted for use in the traffic analysis model.

As shown by the graph below, each year new growth within the area adds to existing volumes. Today, we are trying to estimate the volume of traffic from this eventual new growth. The ability to evaluate a range of land use options helps in sizing up needed roadway geometry to accommodate a range of land use development plans.

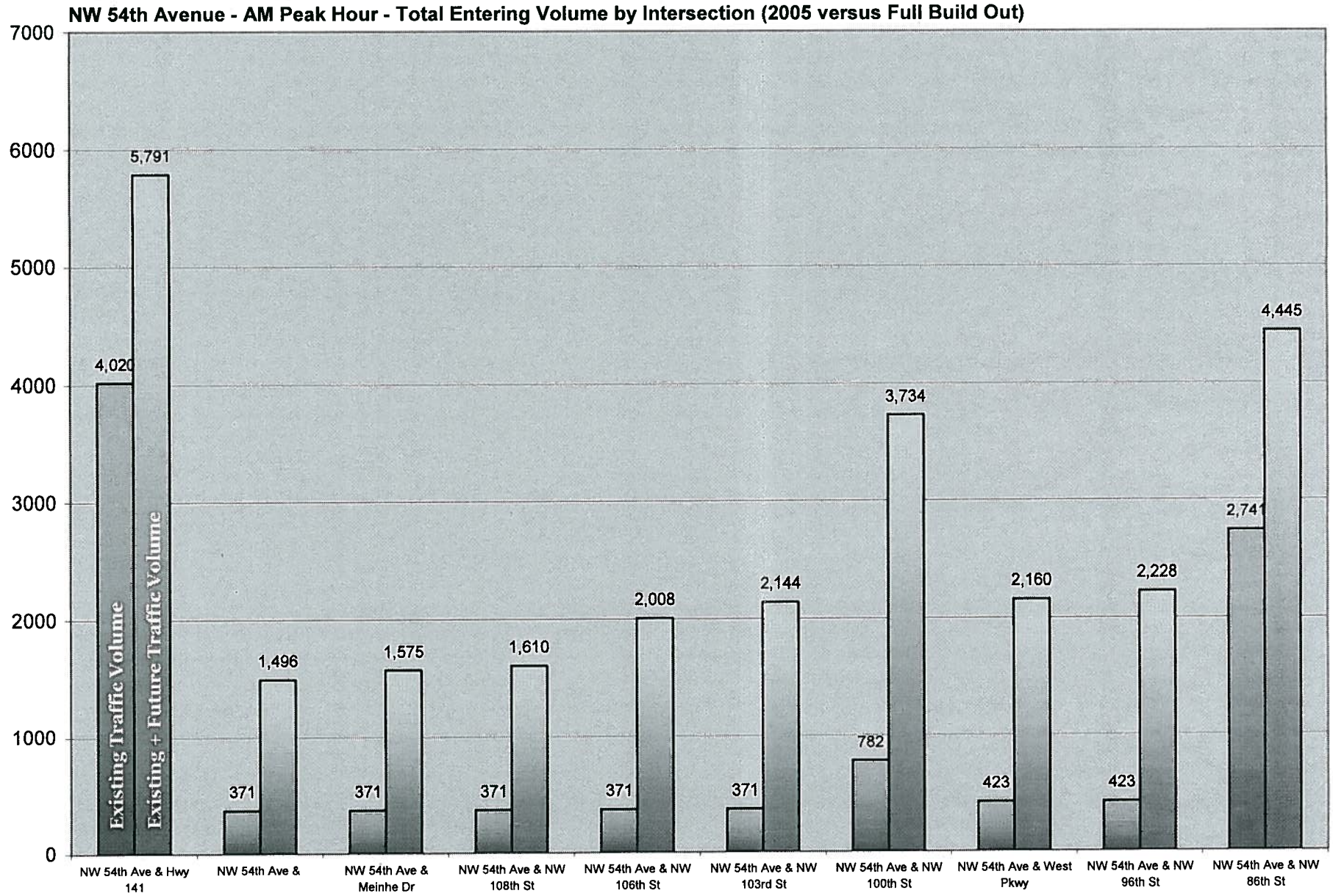


This is better illustrated using actual study information as demonstrated on the next 6 pages. Each graph shows existing and estimated total traffic entering each intersection (sum of all movements entering the intersection). These graphs are by AM and PM time periods by corridor. This information helps contrast intersection traffic control and geometry demands by corridor and individual intersection.



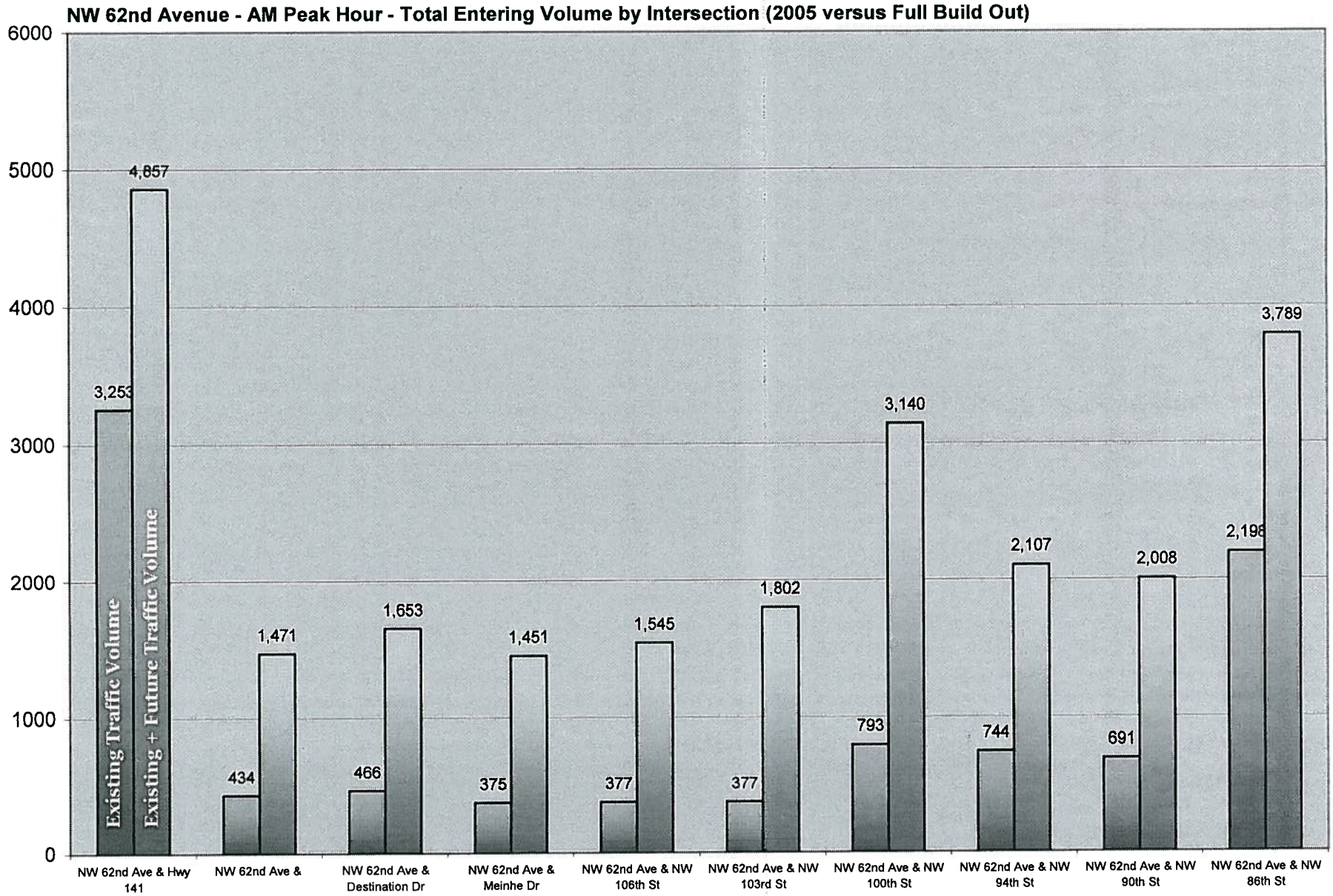
C. Analysis Tools:

- Traffic
- Roadway



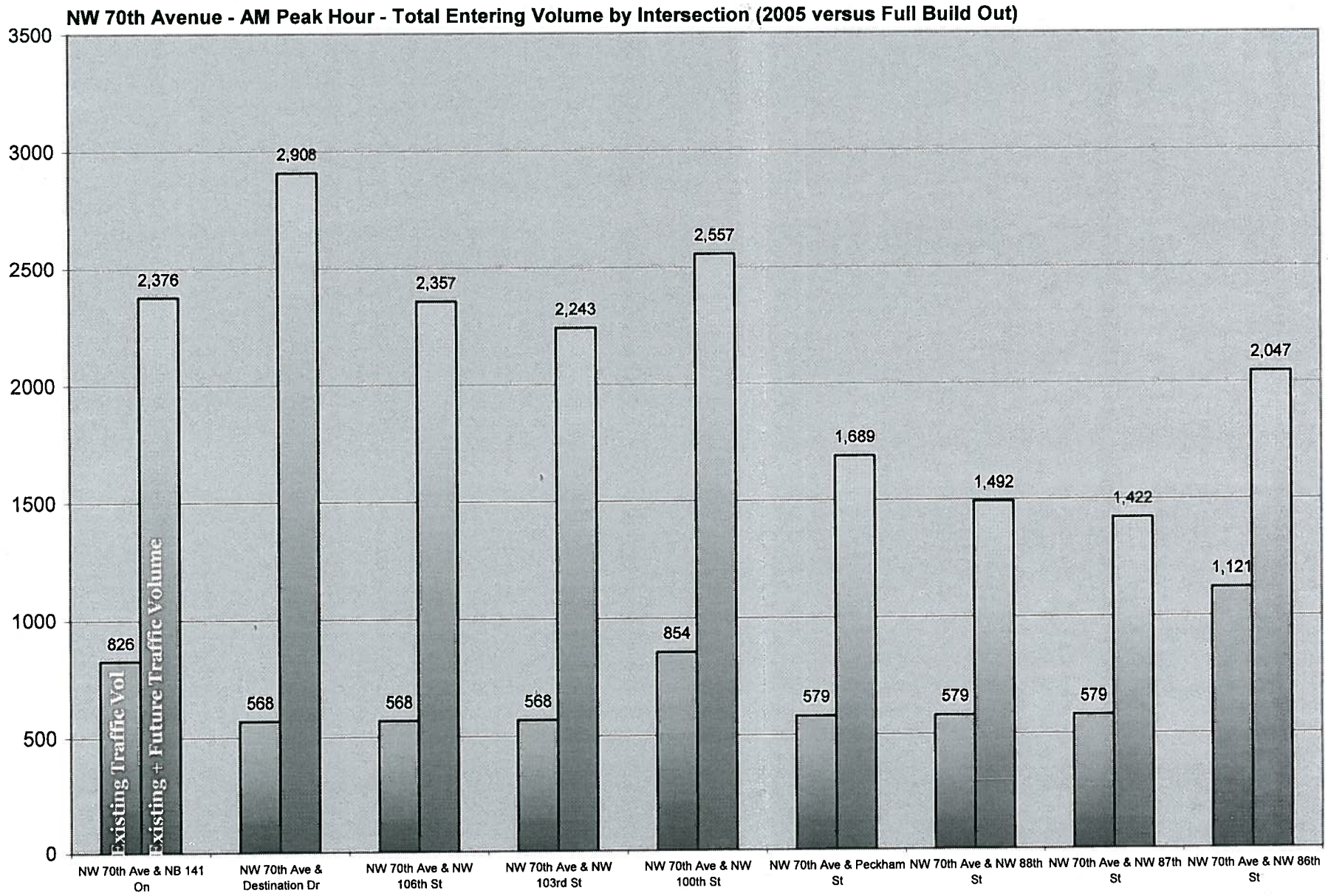
C. Analysis Tools:

- Traffic
- Roadway



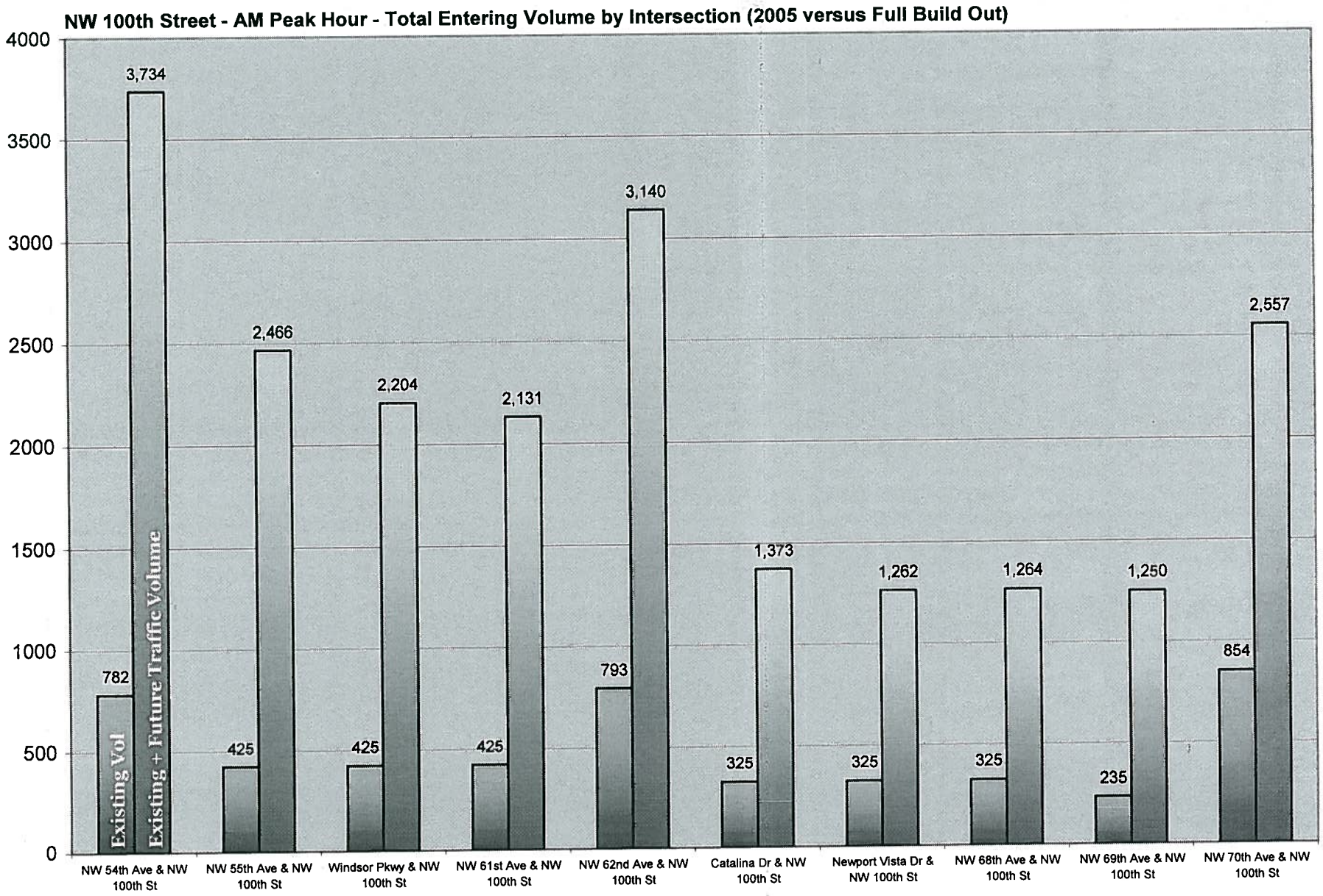
C. Analysis Tools:

- Traffic
- Roadway



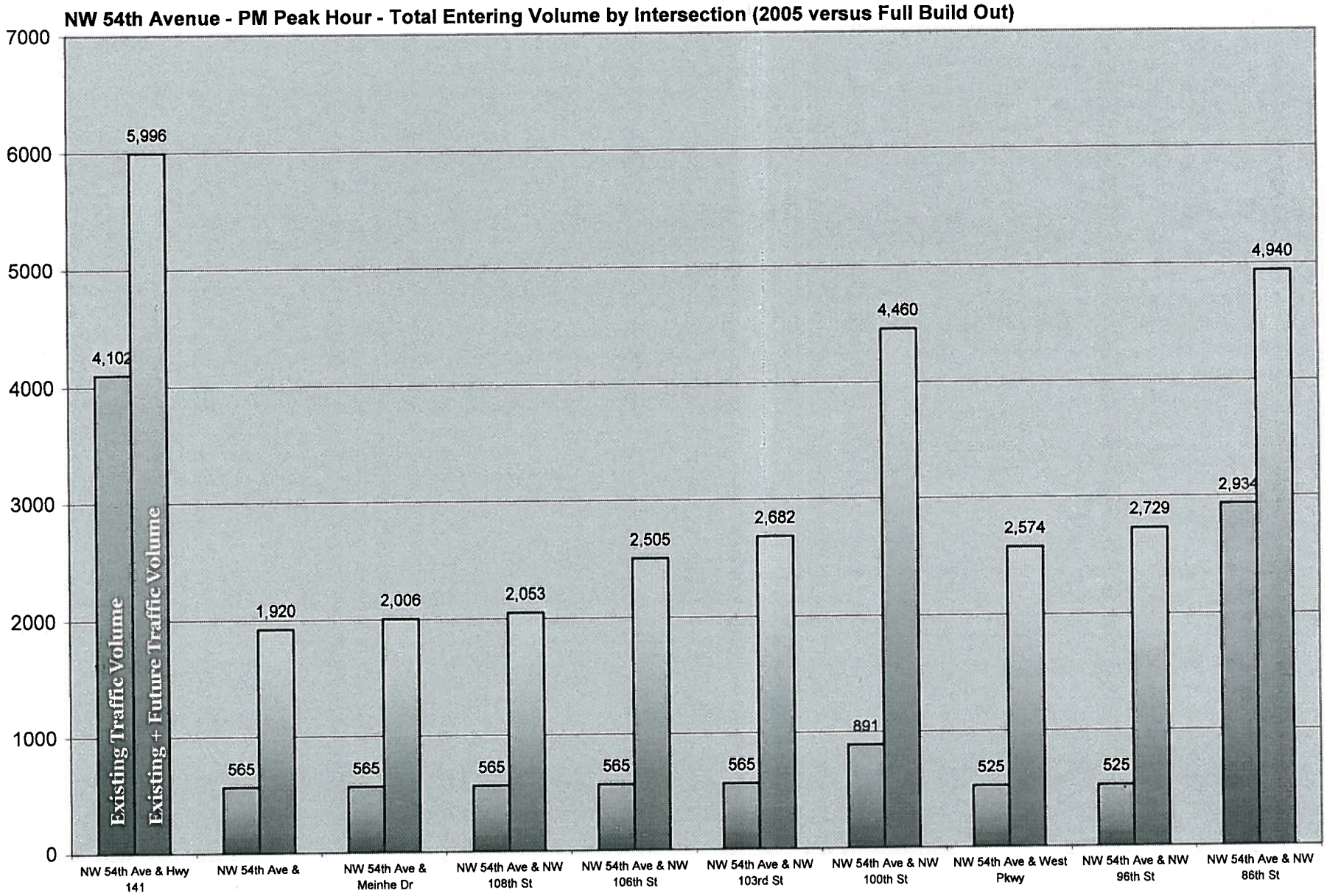
C. Analysis Tools:

- Traffic
- Roadway



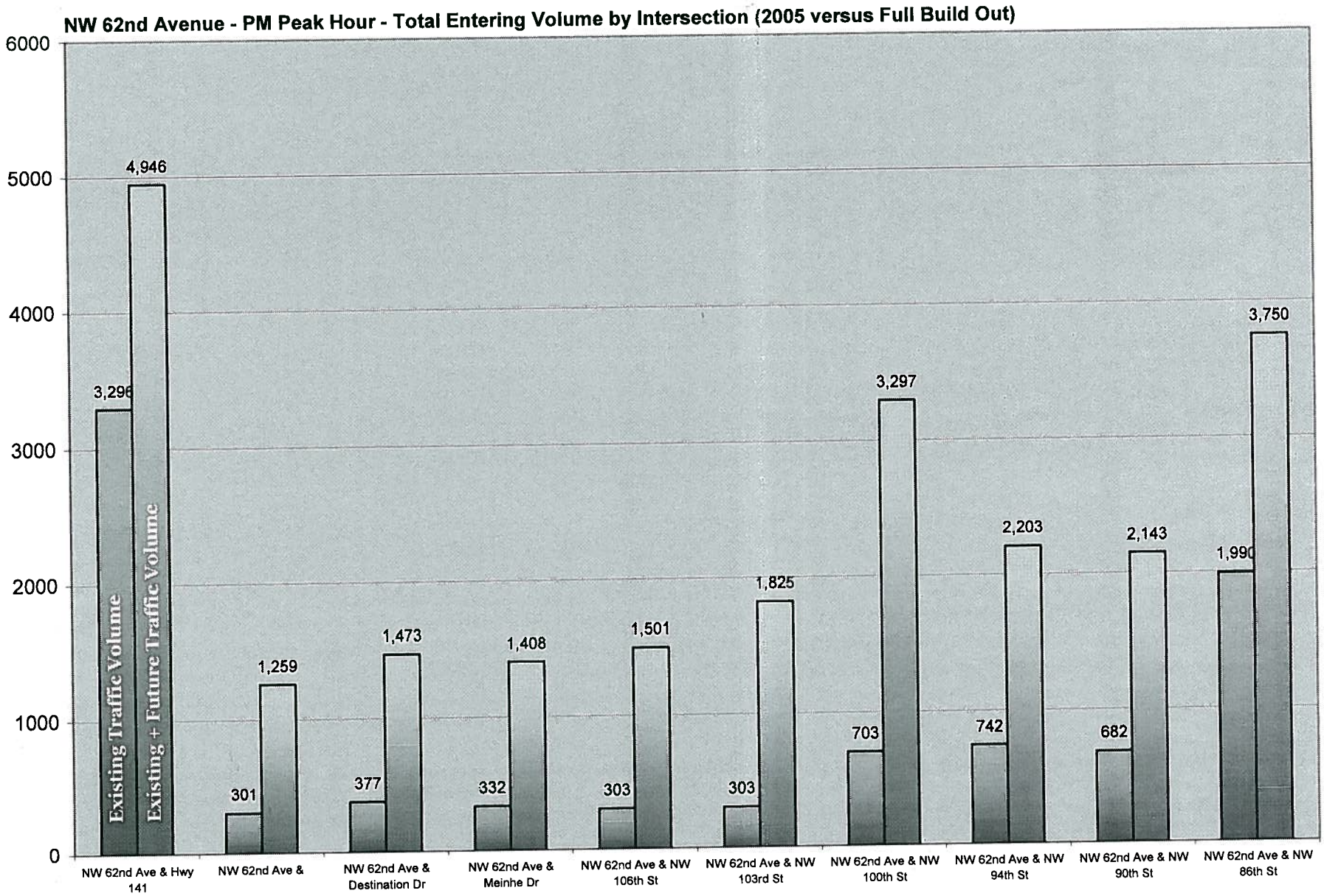
C. Analysis Tools:

- Traffic
- Roadway



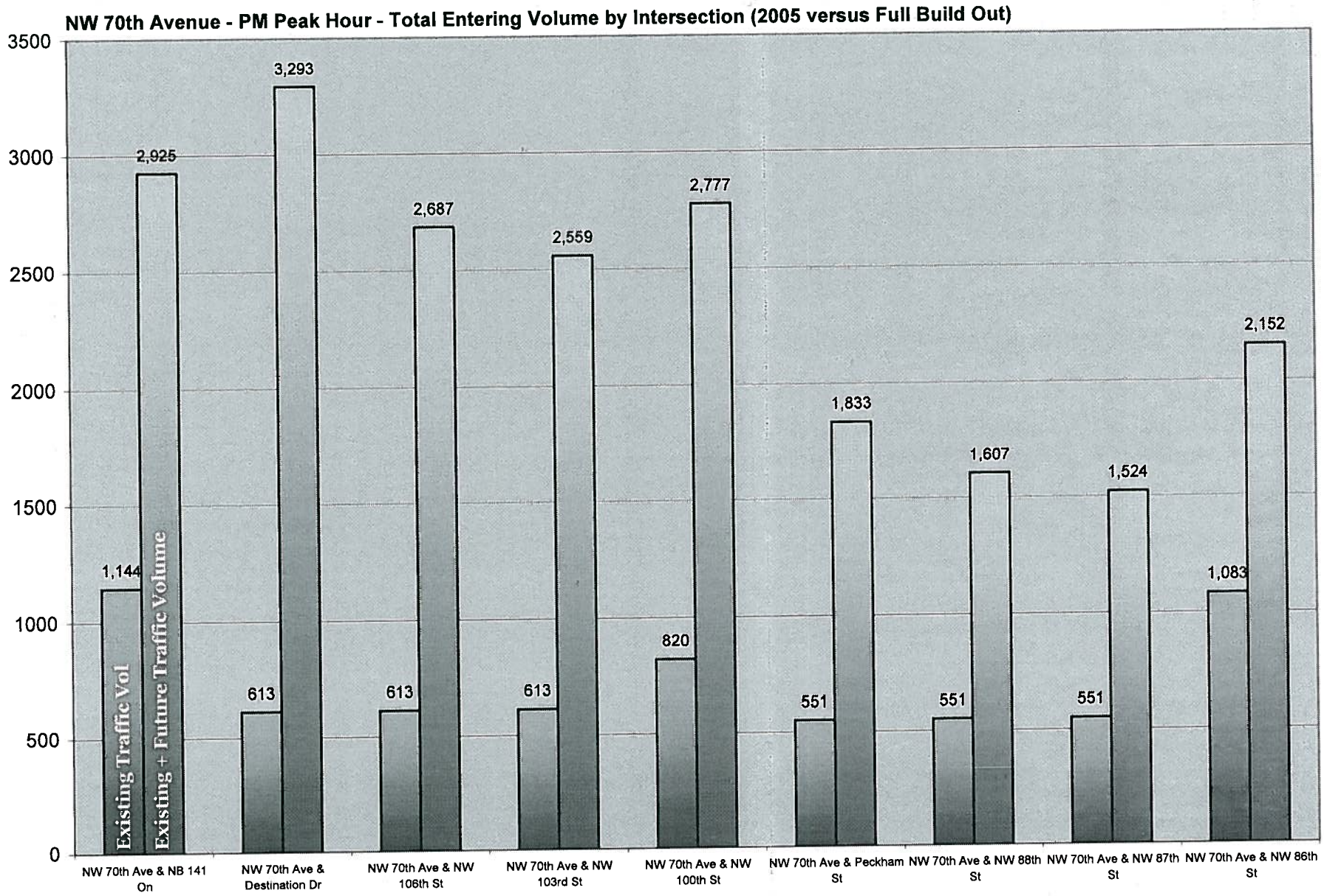
C. Analysis Tools:

- Traffic
  - Roadway



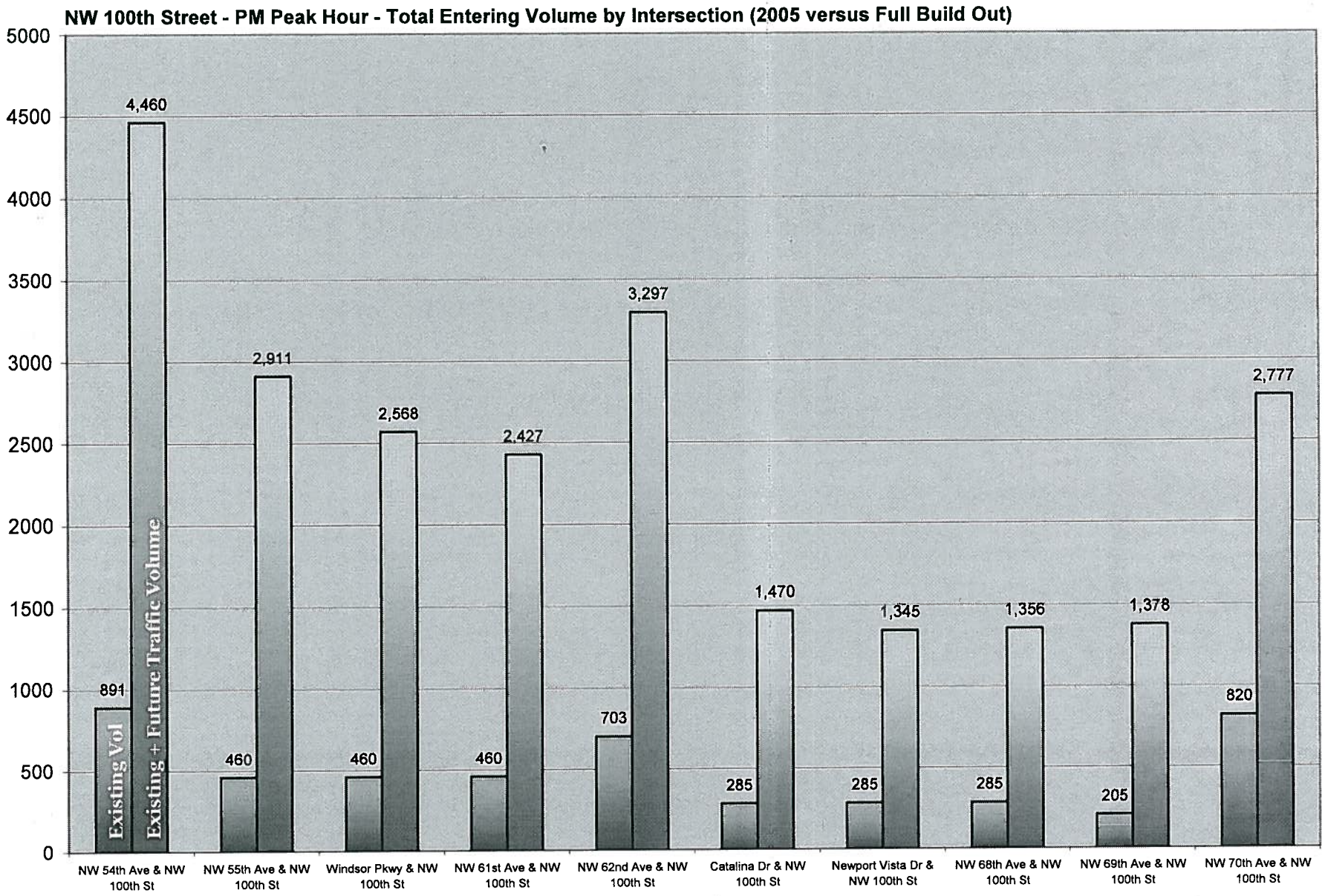
C. Analysis Tools:

- Traffic
- Roadway



C. Analysis Tools:

- Traffic
  - Roadway



C. Analysis Tools:

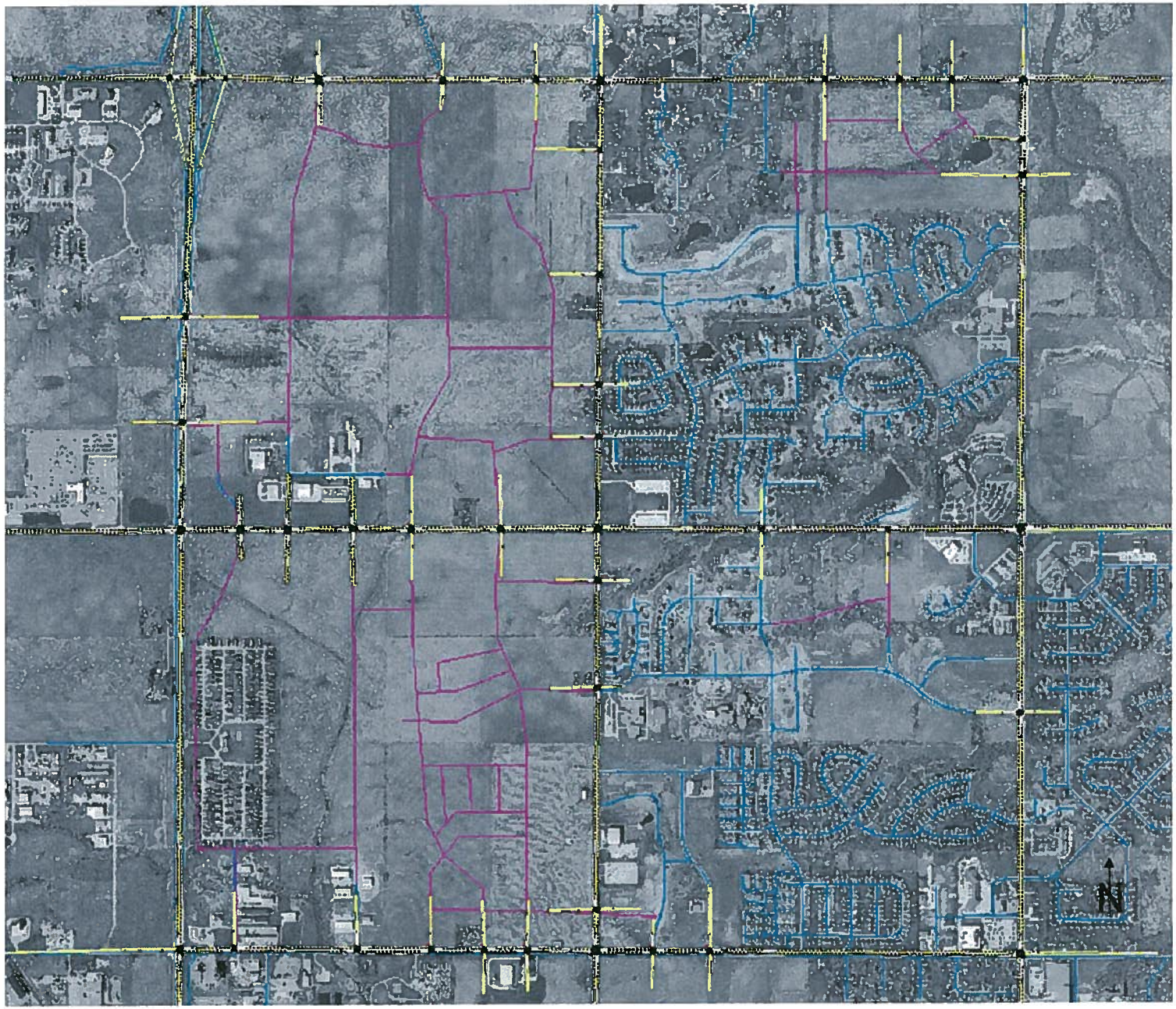
•Traffic

•Roadway

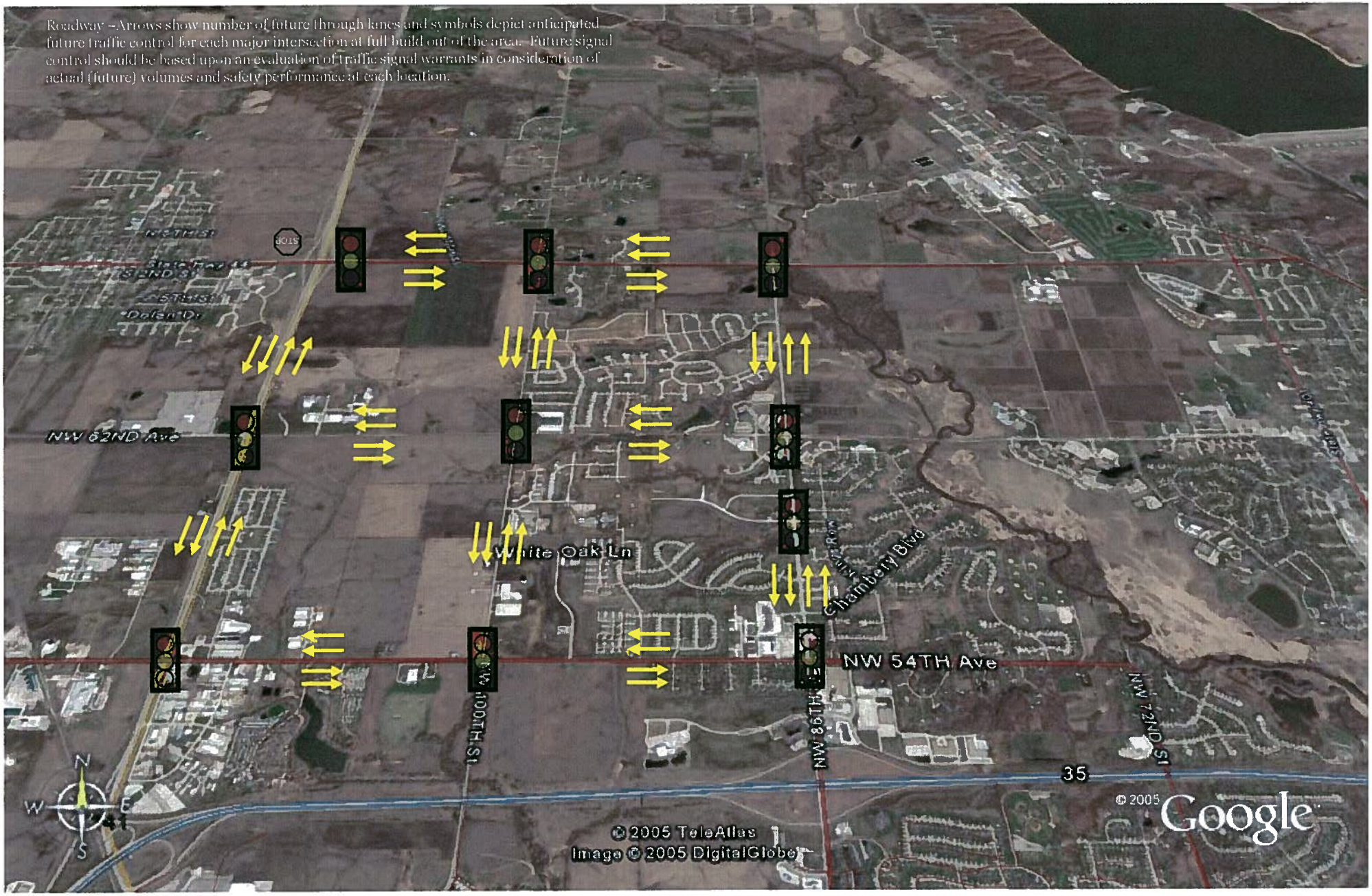
ROADWAY GEOMETRY – This section provides a graphic summary of future roadway needs given the anticipated full build out of each land use within the study area.

The information is presented by major roadway with some side-street intersections having assumed names (unknown at time of this report).

The depictions, by default, show medians, however, this study does not address where medians should or should not be considered.



C. Analysis Tools:



D. Summary

The City of Johnston now has a tool staff can use to update and continuously improve the ability to predict the traffic impact from changing land uses and development scenarios within the western portion of the City. This tool also provides staff with an estimate of traffic performance through use of a sophisticated traffic model which is integrated with land uses and background traffic volumes within the study area. This information will support CIP planning and other on-going planning activities within this dynamic portion of the Johnston community.

Appendix

Traffic Counts

Intersection: NW 54nd Avenue at 86th 11/16/04

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00	32	166	5	9	124	1	5	10	50	18	16	25
7:00 - 7:15	3	175	25	12	173	2	9	9	60	15	16	13
7:15 - 7:30	36	224	1	13	185	4	14	11	67	27	21	29
7:30 - 7:45	46	281	4	20	240	3	22	8	70	35	25	50
7:45 - 8:00	61	282	4	31	225	8	14	11	78	24	23	32
8:00 - 8:15	38	176	10	16	123	3	14	10	49	28	10	17
Peak Hr	**146**	**962**	**34**	**76**	**823**	**17**	**59**	**39**	**275**	**101**	**85**	**124**
	13%	84%	3%	8%	90%	2%	16%	10%	74%	33%	27%	40%
max	61	282	10	31	240	8	22	11	78	35	25	50
pkhr	0.6	0.85	0.85	0.61	0.86	0.53	0.67	0.89	0.88	0.72	0.85	0.62

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:30- 4:45	72	113	13	25	300	6	10	18	72	23	23	22
4:45- 5:00	67	190	18	23	250	4	21	21	61	15	26	15
5:00- 5:15	81	192	20	21	250	2	16	35	74	19	25	31
5:15- 5:30	82	180	82	18	226	8	10	17	79	17	16	25
Peak Hr*	**302**	**675**	**133**	**87**	**1026**	**20**	**57**	**91**	**286**	**74**	**90**	**93**
*only 1 hr of data	27%	61%	12%	8%	91%	2%	13%	21%	66%	29%	35%	36%
max	82	192	82	25	300	8	21	35	79	23	26	31
pkhr	0.92	0.88	0.41	0.87	0.86	0.63	0.68	0.65	0.91	0.8	0.87	0.75

Intersection: NW 54nd Avenue at 100th 11/16/04

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00	2	14	4	0	30	11	7	15	4	7	30	10
7:00 - 7:15	3	23	3	9	29	7	16	23	0	10	21	7
7:15 - 7:30	2	18	7	9	46	13	12	30	5	11	26	10
7:30 - 7:45	3	20	5	16	40	19	22	19	1	19	20	15
7:45 - 8:00	2	28	13	12	37	13	15	35	7	26	38	7
8:00 - 8:15	1	16	5	5	24	9	12	36	2	12	29	10
Peak Hr	**8**	**82**	**30**	**42**	**147**	**54**	**61**	**120**	**15**	**68**	**113**	**42**
	7%	68%	25%	17%	60%	22%	31%	61%	8%	30%	51%	19%
max	3	28	13	16	46	19	22	36	7	26	38	15
pkhr	0.67	0.73	0.58	0.66	0.8	0.71	0.69	0.83	0.54	0.65	0.74	0.7

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:30- 4:45	2	34	9	6	20	12	13	31	4	12	35	12
4:45- 5:00	2	34	16	10	26	16	12	34	4	9	42	8
5:00- 5:15	2	42	16	15	29	13	13	56	6	11	28	18
5:15- 5:30	1	38	23	22	14	14	16	34	4	17	39	17
Peak Hr*	**7**	**148**	**64**	**53**	**89**	**55**	**54**	**155**	**18**	**49**	**144**	**55**
*only 1 hr of data	3%	68%	29%	27%	45%	28%	24%	68%	8%	20%	58%	22%
max	2	42	23	22	29	16	16	56	6	17	42	18
pkhr	0.88	0.88	0.7	0.6	0.77	0.86	0.84	0.69	0.75	0.72	0.86	0.76

Intersection: NW 54nd Avenue at Hwy 141 11/16/04

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00	58		40	21		1	2	11	45	19	9	5
7:00 - 7:15	36		20	10		3	5	18	49	41	14	11
7:15 - 7:30	59		24	21		2	4	14	55	49	11	16
7:30 - 7:45	41		14	12		2	6	17	79	42	9	12
7:45 - 8:00	59		30	32		3	3	20	89	45	9	23
8:00 - 8:15	36		16	24		3	7	19	41	47	10	15
Peak Hr	195	0	84	89	0	10	20	70	264	183	39	66
	70%	0%	30%	90%	0%	10%	6%	20%	75%	64%	14%	23%
assume 3000a	11%	84%	5%	6%	94%	1%						
assume	195	1500	84	89	1500	10	20	70	264	183	39	66

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:30- 4:45	26		22	23		7	10	13	68	62	11	38
4:45- 5:00	23		31	17		6	7	21	38	60	12	48
5:00- 5:15	35		32	20		3	14	25	60	51	12	36
5:15- 5:30	34		22	20		4	3	13	41	67	22	45
Peak Hr*	118	0	107	80	0	20	34	72	207	240	57	167
*only 1 hr of data	52%	0%	48%	80%	0%	20%	11%	23%	66%	52%	12%	36%
assume 3000a	7%	87%	6%	5%	94%	1%						
assume	118	1500	107	80	1500	20	34	72	207	240	57	167

Intersection: NW 62nd Avenue at 86th 11/16/2004

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00	49	69	60	19	36	10	2	36	13	19	15	6
7:00 - 7:15	42	50	61	27	60	3	2	53	15	30	25	3
7:15 - 7:30	57	64	87	36	96	9	6	67	30	31	24	5
7:30 - 7:45	56	74	161	54	93	6	4	64	31	40	32	7
7:45 - 8:00	43	133	137	53	81	9	4	67	32	62	40	7
8:00 - 8:15	46	69	73	30	60	10	2	44	17	11	22	12
Peak Hr	202	340	458	173	330	34	16	242	110	144	118	31
	20%	34%	46%	32%	61%	6%	4%	66%	30%	49%	40%	11%
max	57	133	161	54	96	10	6	67	32	62	40	12
pkhr	0.89	0.64	0.71	0.8	0.86	0.85	0.67	0.9	0.86	0.58	0.74	0.65

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:30- 4:45	22	62	42	15	78	4	6	42	84	79	43	10
4:45- 5:00	26	81	55	14	62	3	5	34	29	79	55	10
5:00- 5:15	30	95	65	17	86	4	15	39	48	94	65	24
5:15- 5:30	23	96	59	15	63	2	3	26	27	95	46	13
Peak Hr*	101	334	221	61	289	13	29	141	188	347	209	57
*only 1 hr of data	15%	51%	34%	17%	80%	4%	8%	39%	53%	57%	34%	9%
max	30	96	65	17	86	4	15	42	84	95	65	24
pkhr	0.84	0.87	0.85	0.9	0.84	0.81	0.48	0.84	0.56	0.91	0.8	0.59

Intersection: NW 62nd Avenue at 94th St — **Mar 29 2005**

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00	0	0	5	5	0	1	0	46	1	1	24	1
7:00 - 7:15	1	0	7	8	0	1	1	69	1	6	17	2
7:15 - 7:30	3	0	14	11	2	2	0	102	2	7	26	1
7:30 - 7:45	1	3	16	17	8	3	0	113	4	14	27	5
7:45 - 8:00	1	3	26	7	7	2	1	131	4	13	36	2
8:00 - 8:15	0	2	12	6	0	3	2	71	0	5	26	3
Peak Hr	5	8	68	41	17	10	3	417	10	39	115	11
%byappr	6%	10%	84%	60%	25%	15%	1%	97%	2%	24%	70%	7%
max 15min	3	3	26	17	8	3	2	131	4	14	36	5
peak hr	0.417	0.667	0.654	0.603	0.531	0.833	0.375	0.796	0.625	0.696	0.799	0.55

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:00- 4:15	2	3	10	2	0	2	1	35	3	5	65	7
4:15- 4:30	4	1	8	5	2	1	2	26	1	6	74	2
4:30- 4:45	2	3	4	5	0	2	3	39	4	11	97	9
4:45- 5:00	1	0	7	12	0	4	2	43	5	5	90	12
5:00- 5:15	3	3	4	5	1	2	4	40	0	6	108	15
5:15- 5:30	3	4	3	9	1	3	9	45	1	16	82	15
Peak Hr*	9	10	18	31	2	11	18	167	10	38	377	51
%byappr	24%	27%	49%	70%	5%	25%	9%	86%	5%	8%	81%	11%
max 15min	3	4	7	12	1	4	9	45	5	16	108	15
peak hr	0.75	0.625	0.643	0.646	0.5	0.688	0.5	0.928	0.5	0.594	0.873	0.85

Intersection: NW 62nd Avenue at 100th — **11/17/2004**

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00	2	14	17	9	22	2	5	30	4	10	18	5
7:00 - 7:15	0	9	17	13	20	2	6	32	8	20	13	3
7:15 - 7:30	5	10	18	19	36	6	2	40	8	19	18	2
7:30 - 7:45	3	15	24	16	37	8	7	50	12	14	16	3
7:45 - 8:00	5	15	18	22	49	3	4	62	21	21	17	5
8:00 - 8:15	5	15	12	15	17	5	7	43	11	10	17	6
Peak Hr	18	55	72	72	139	22	20	195	52	64	68	16
	12%	38%	50%	31%	60%	9%	7%	73%	19%	43%	46%	11%
max	5	15	24	22	49	8	7	62	21	21	18	6
pkhr	0.9	0.92	0.75	0.82	0.71	0.69	0.71	0.79	0.62	0.76	0.94	0.67

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:30- 4:45	2	22	15	3	14	8	8	19	5	18	51	16
4:45- 5:00	0	23	18	4	22	1	6	16	5	21	36	10
5:00- 5:15	4	42	16	2	14	1	4	25	4	29	46	14
5:15- 5:30	6	35	17	3	15	2	4	15	1	16	34	11
Peak Hr*	12	122	66	12	65	12	22	75	15	84	167	51
*only 1 hr of data	6%	61%	33%	13%	73%	13%	20%	67%	13%	28%	55%	17%
max	6	42	18	4	22	8	8	25	5	29	51	16
pkhr	0.5	0.73	0.92	0.75	0.74	0.38	0.69	0.75	0.75	0.72	0.82	0.8

Intersection: NW 62nd Avenue at Meinhe Dr 12/15/04

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00				2		1	3	28			17	1
7:00 - 7:15				0		0	0	32			19	8
7:15 - 7:30				2		1	2	63			16	3
7:30 - 7:45				2		0	2	94			21	6
7:45 - 8:00				2		1	5	67			21	1
8:00 - 8:15				0		0	1	45			18	2
Peak Hr				**6**		**2**	**10**	**269**			**76**	**12**
				75%		25%	4%	96%			86%	14%
max				2		1	5	94			21	6
pkhr				0.75		0.5	0.5	0.72			0.9	0.5

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:30- 4:45				2		0	1	33			40	0
4:45- 5:00				2		4	1	24			48	1
5:00- 5:15				3		3	5	34			64	0
5:15- 5:30				2		0	5	28			32	0
Peak Hr*				**9**		**7**	**12**	**119**			**184**	**1**
*only 1 hr of data				56%		44%	9%	91%			99%	1%
max				3		4	5	34			64	1
pkhr				0.75		0.44	0.6	0.88			0.72	0.25

Intersection: NW 62nd Avenue at Destination Dr 12/15/04

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00				1		5	15	27			12	3
7:00 - 7:15				2		1	29	31			17	5
7:15 - 7:30				2		5	20	55			12	3
7:30 - 7:45				8		35	9	91			20	1
7:45 - 8:00				10		16	10	62			17	4
8:00 - 8:15				3		15	6	45			16	1
Peak Hr				**23**		**71**	**45**	**253**			**65**	**9**
				24%		76%	15%	85%			88%	12%
max				10		35	20	91			20	4
pkhr				0.58		0.51	0.56	0.7			0.81	0.56

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:30- 4:45				2		7	12	30			35	3
4:45- 5:00				5		8	5	21			53	1
5:00- 5:15				3		9	4	37			64	1
5:15- 5:30				5		5	6	28			30	3
Peak Hr*				**15**		**29**	**27**	**116**			**182**	**8**
*only 1 hr of data				34%		66%	19%	81%			96%	4%
max				5		9	12	37			64	3
pkhr				0.75		0.81	0.56	0.78			0.71	0.67

Intersection: NW 62nd Avenue at Hwy 141 — 11/17/2004

Time	Northbound Lt	Northbound T	Northbound Rt	Southbound Lt	Southbound T	Southbound Rt	Eastbound Lt	Eastbound T	Eastbound Rt	Westbound Lt	Westbound T	Westbound Rt
6:45 - 7:00	6		32	28		2	2	15	6	11	3	3
7:00 - 7:15	3		24	26		4	0	5	1	14	3	6
7:15 - 7:30	3		26	41		3	0	6	2	16	2	4
7:30 - 7:45	5		24	43		15	2	8	1	20	6	11
7:45 - 8:00	13		31	38		14	1	17	5	33	8	10
8:00 - 8:15	2		14	20		4	3	15	6	21	2	19
Peak Hr	23	0	95	142	0	36	6	46	14	90	18	44
	19%	0%	81%	80%	0%	20%	9%	70%	21%	59%	12%	29%
assume 3000a	1%	93%	6%	8%	89%	2%						
assume	23	1500	95	142	1500	36	6	46	14	90	18	44
max	13	0	31	43	0	15	3	17	6	33	8	19
pkhr	0.44		0.77	0.83		0.6	0.5	0.68	0.58	0.68	0.56	0.58

Time	Northbound Lt	Northbound T	Northbound Rt	Southbound Lt	Southbound T	Southbound Rt	Eastbound Lt	Eastbound T	Eastbound Rt	Westbound Lt	Westbound T	Westbound Rt
4:30- 4:45	13		16	5		2	6	9	4	24	14	25
4:45- 5:00	10		14	9		0	6	4	4	23	17	26
5:00- 5:15	12		21	7		2	10	6	17	18	16	22
5:15- 5:30	10		15	12		0	8	12	5	24	11	23
Peak Hr*	45	0	66	33	0	4	30	31	30	89	58	96
*only 1 hr of data	41%	0%	59%	89%	0%	11%	33%	34%	33%	37%	24%	40%
assume 3000a	3%	93%	4%	2%	98%	0%						
assume	45	1500	66	33	1500	4	30	31	30	89	58	96
max	13	0	21	12	0	2	10	12	17	24	17	26
pkhr	0.87		0.79	0.69		0.5	0.75	0.65	0.44	0.93	0.85	0.92

Intersection: NW 70th Avenue at 86th St — 11/17/2004

Time	Northbound Lt	Northbound T	Northbound Rt	Southbound Lt	Southbound T	Southbound Rt	Eastbound Lt	Eastbound T	Eastbound Rt	Westbound Lt	Westbound T	Westbound Rt
6:45 - 7:00	1	2	25	3	0	1	0	50	8	18	24	2
7:00 - 7:15	4	2	30	1	0	0	1	84	20	37	32	0
7:15 - 7:30	7	3	24	0	2	3	0	87	29	47	46	2
7:30 - 7:45	3	1	34	1	1	1	2	107	51	65	45	9
7:45 - 8:00	8	0	60	2	1	2	1	95	46	74	44	1
8:00 - 8:15	9	1	29	0	4	2	0	53	36	49	33	1
Peak Hr	27	5	147	3	8	8	3	342	162	235	168	13
	15%	3%	82%	16%	42%	42%	1%	67%	32%	56%	40%	3%
max	9	3	60	2	4	3	2	107	51	74	46	9
pkhr	0.75	0.42	0.61	0.38	0.5	0.67	0.38	0.8	0.79	0.79	0.91	0.36

Time	Northbound Lt	Northbound T	Northbound Rt	Southbound Lt	Southbound T	Southbound Rt	Eastbound Lt	Eastbound T	Eastbound Rt	Westbound Lt	Westbound T	Westbound Rt
4:30- 4:45	35	0	63	3	1	6	2	50	12	45	91	3
4:45- 5:00	28	1	33	5	2	2	1	47	21	37	60	1
5:00- 5:15	48	1	56	6	1	0	1	58	14	39	76	2
5:15- 5:30	33	1	45	1	2	0	1	43	13	31	60	2
Peak Hr*	144	3	197	15	6	8	5	198	60	152	287	8
*only 1 hr of data	42%	1%	57%	52%	21%	28%	2%	75%	23%	34%	64%	2%
max	48	1	63	6	2	6	2	58	21	45	91	3
pkhr	0.75	0.75	0.78	0.63	0.75	0.33	0.63	0.85	0.71	0.84	0.79	0.67

Intersection: NW 70th Avenue at 100th St — 11/17/2004

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00	3	0	4	4	5	1	0	93	9	10	22	1
7:00 - 7:15	4	1	6	1	9	1	0	92	9	15	30	3
7:15 - 7:30	2	3	4	5	7	2	1	109	20	20	41	4
7:30 - 7:45	6	3	9	9	8	4	0	137	24	20	35	3
7:45 - 8:00	3	0	6	4	9	0	3	106	22	21	29	4
8:00 - 8:15	5	7	6	1	4	3	2	61	7	7	30	3
Peak Hr	15	7	25	19	33	7	4	444	75	76	135	14
	32%	15%	53%	32%	56%	12%	1%	85%	14%	34%	60%	6%
max15	6	3	9	9	9	4	3	137	24	21	41	4
pkhr	0.63	0.58	0.69	0.53	0.92	0.44	0.33	0.81	0.78	0.9	0.82	0.88

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:30- 4:45	13	4	15	4	1	5	1	41	5	14	108	7
4:45- 5:00	13	5	14	13	1	3	7	42	8	5	80	4
5:00- 5:15	23	5	13	3	4	0	4	51	2	6	105	4
5:15- 5:30	19	5	15	4	0	1	2	41	4	8	83	5
Peak Hr*	68	19	57	24	6	9	14	175	19	33	376	20
*only 1 hr of data	47%	13%	40%	62%	15%	23%	7%	84%	9%	8%	88%	5%
max15	23	5	15	13	4	5	7	51	8	14	108	7
pkhr	0.74	0.95	0.95	0.46	0.38	0.45	0.5	0.86	0.59	0.59	0.87	0.71

Intersection: EAST RAMP - NW 70th Avenue and Highway 141 — 11/17/2004

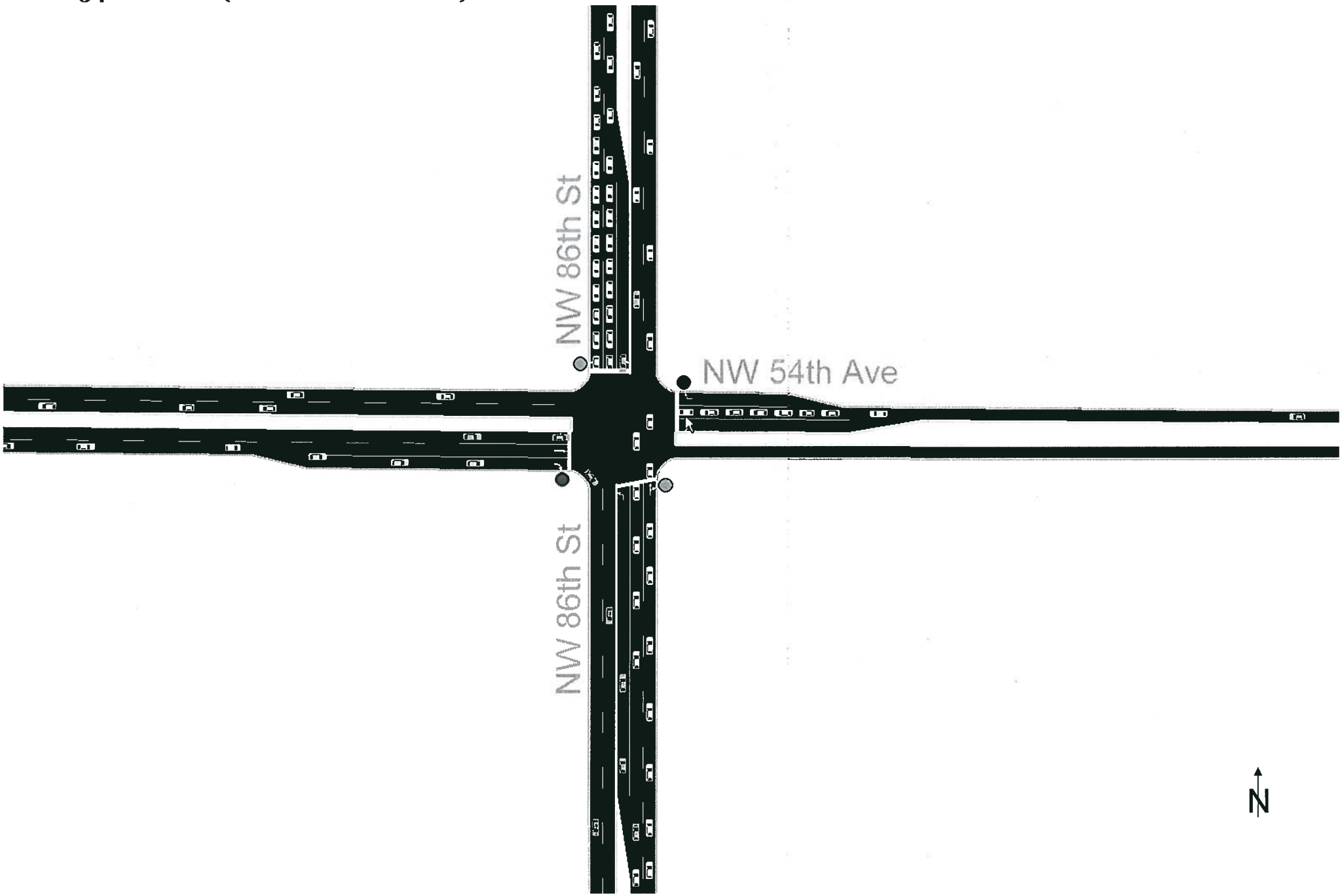
Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
6:45 - 7:00	55		6				5				22	1
7:00 - 7:15	34		6				10				32	3
7:15 - 7:30	63		10				15				34	7
7:30 - 7:45	47		8				14				37	6
7:45 - 8:00	50		16				15				29	7
8:00 - 8:15	39		9				15				28	9
Peak Hr	199		43				59	368			128	29
	82%		18%				14%	86%			82%	18%
max 15min	63		16				15				37	9
peak hr	0.79		0.672				0.983				0.865	0.806

Time	Northbound			Southbound			Eastbound			Westbound		
	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt	Lt	T	Rt
4:30- 4:45	93		8				39				102	24
4:45- 5:00	113		7				35				82	19
5:00- 5:15	95		11				20				87	26
5:15- 5:30	110		9				26				91	27
Peak Hr*	411		35				120	120			362	96
*only 1 hr of data	92%		8%				50%	50%			79%	21%
max 15min	113		11				39				102	27
peak hr	0.909		0.795				0.769				0.887	0.889

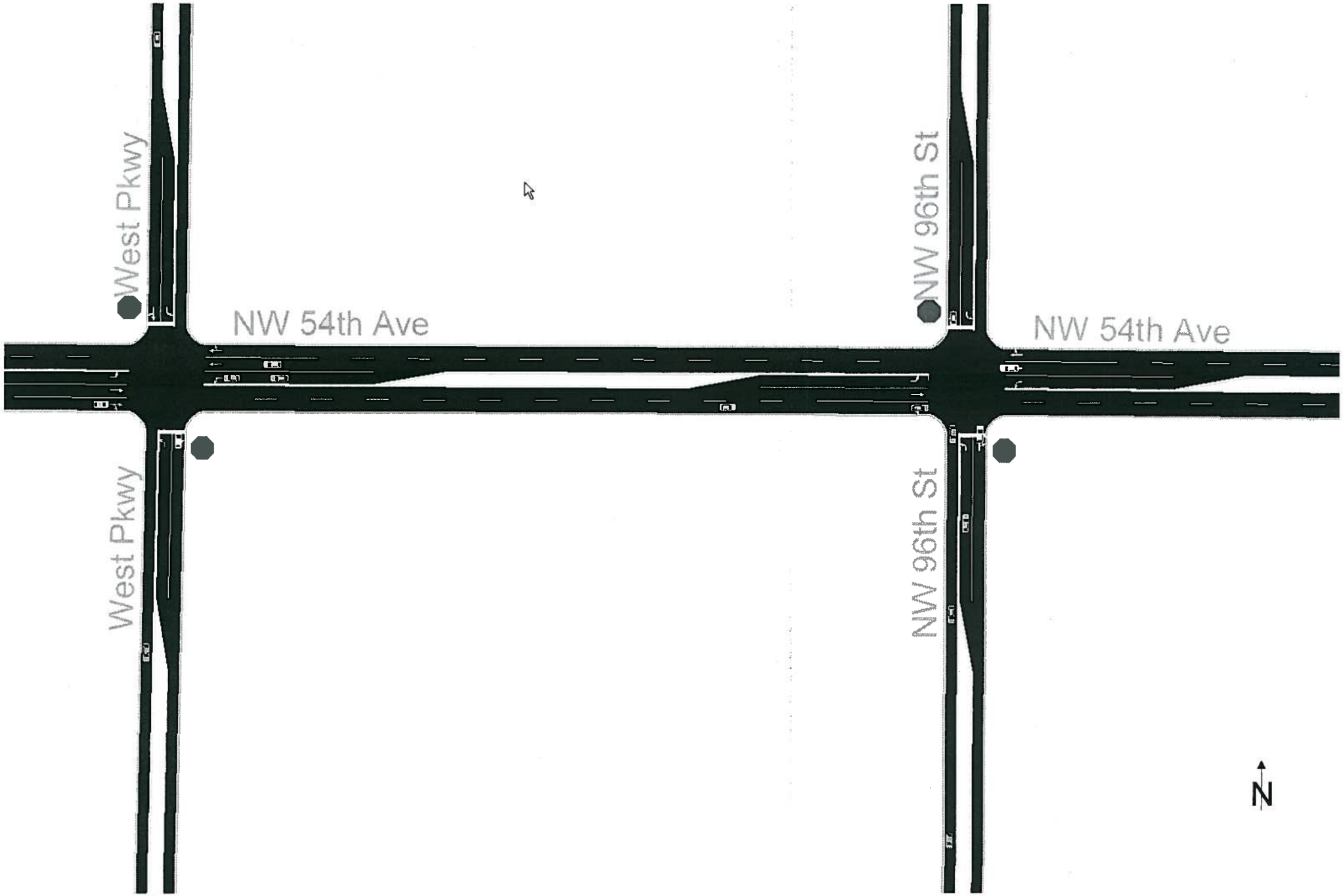
Appendix

Future Geometry – NW 54th Avenue

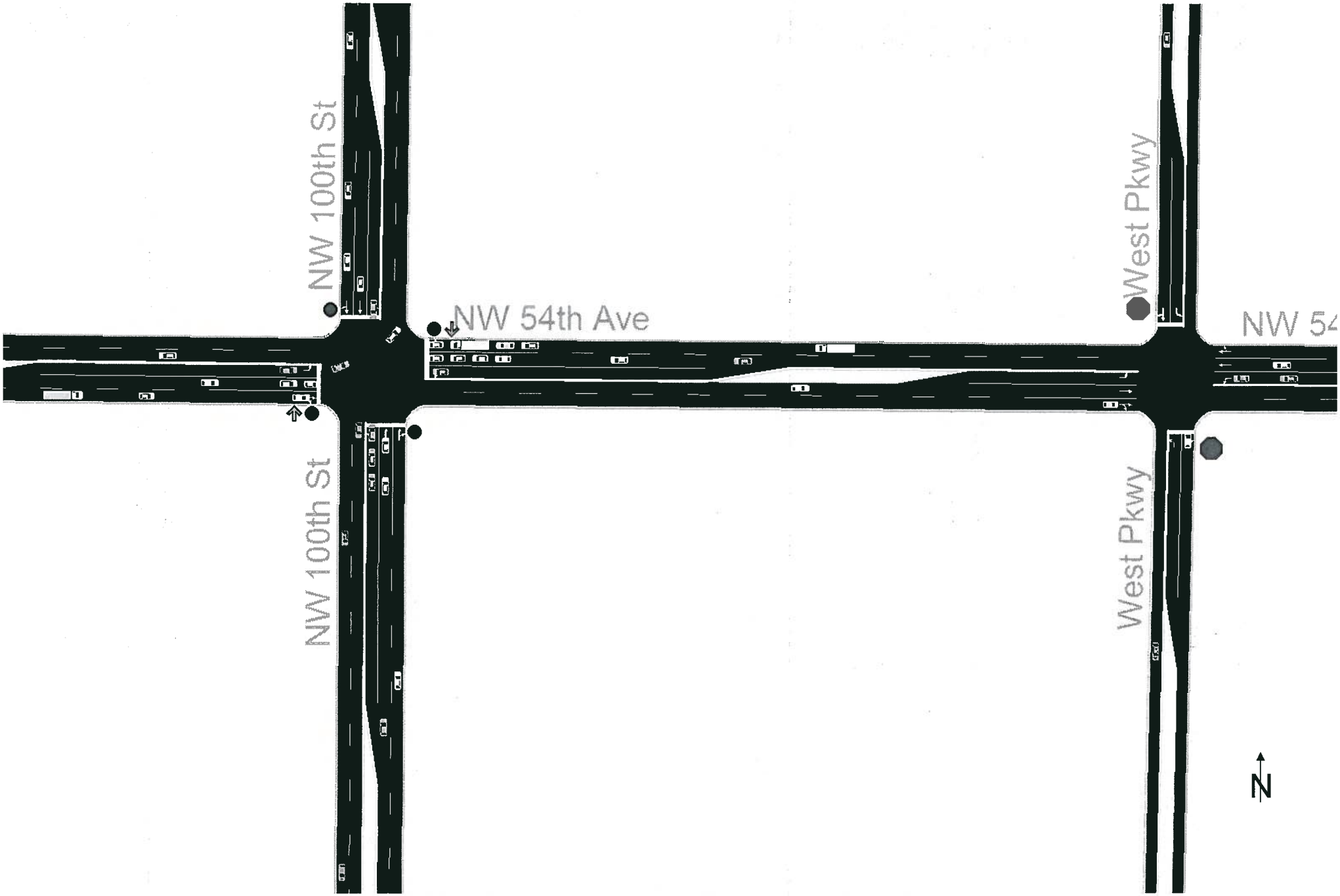
NW 54th Avenue (Intersection Details)



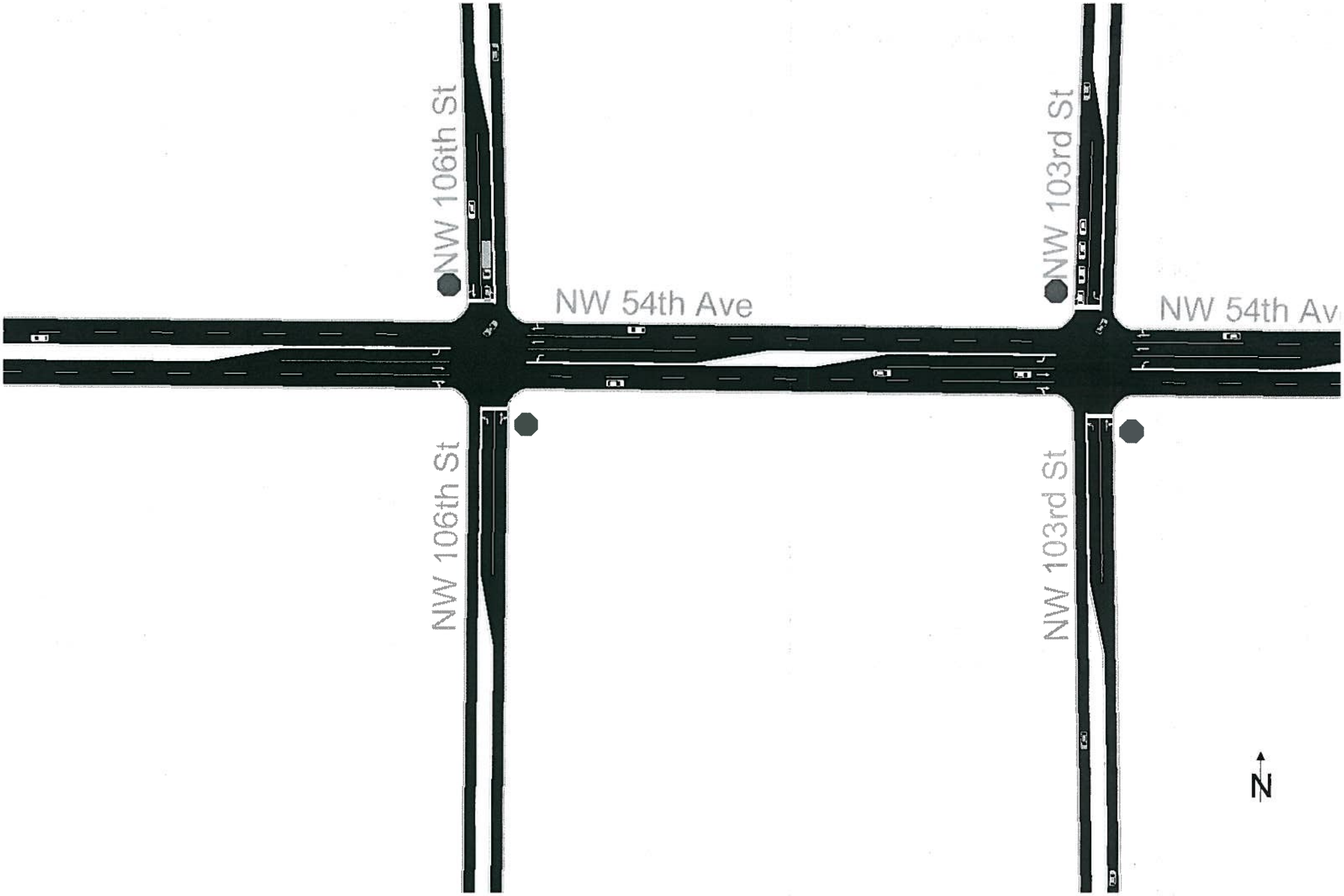
NW 54th Avenue (Intersection Details)



NW 54th Avenue (Intersection Details)



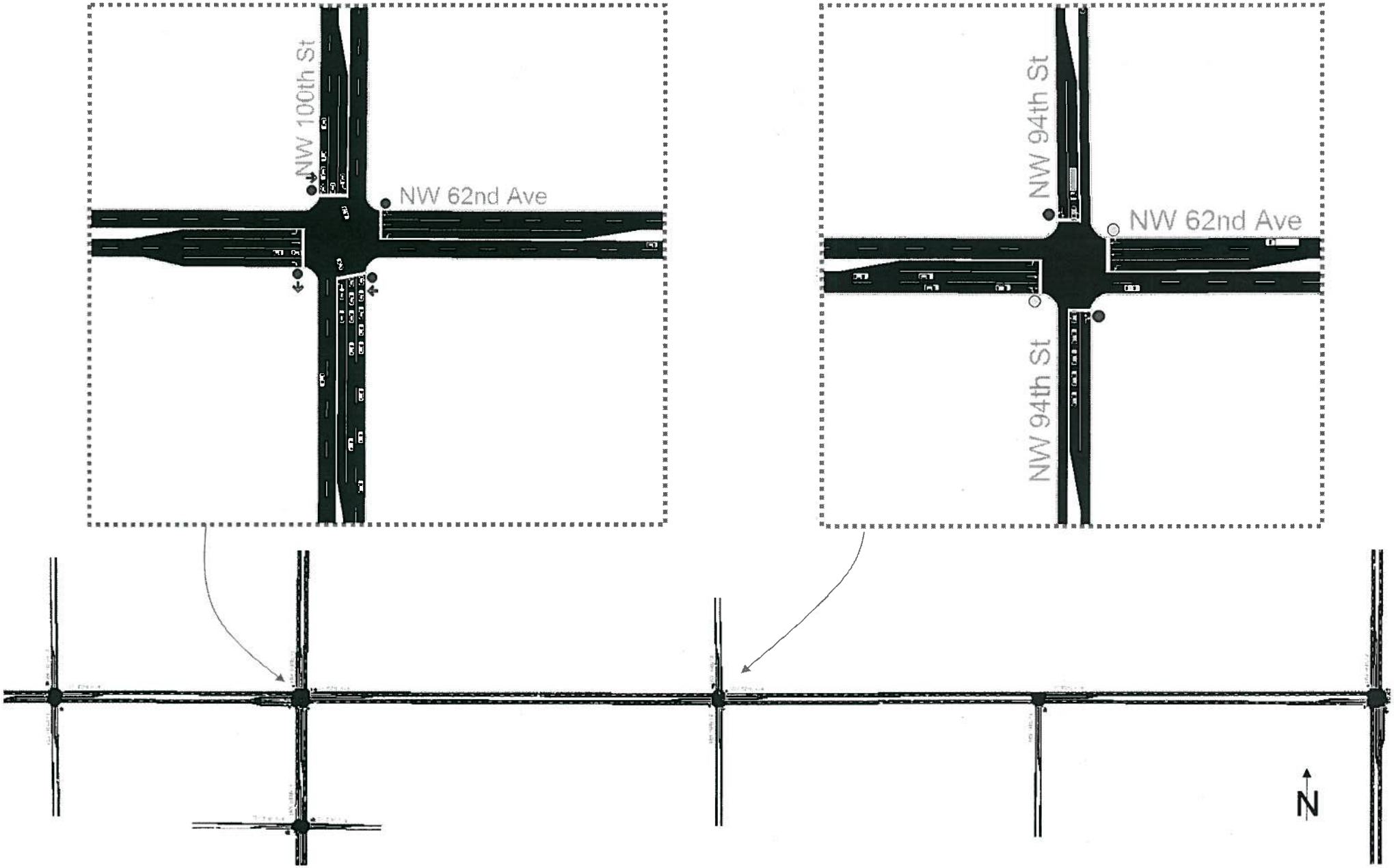
NW 54th Avenue (Intersection Details)



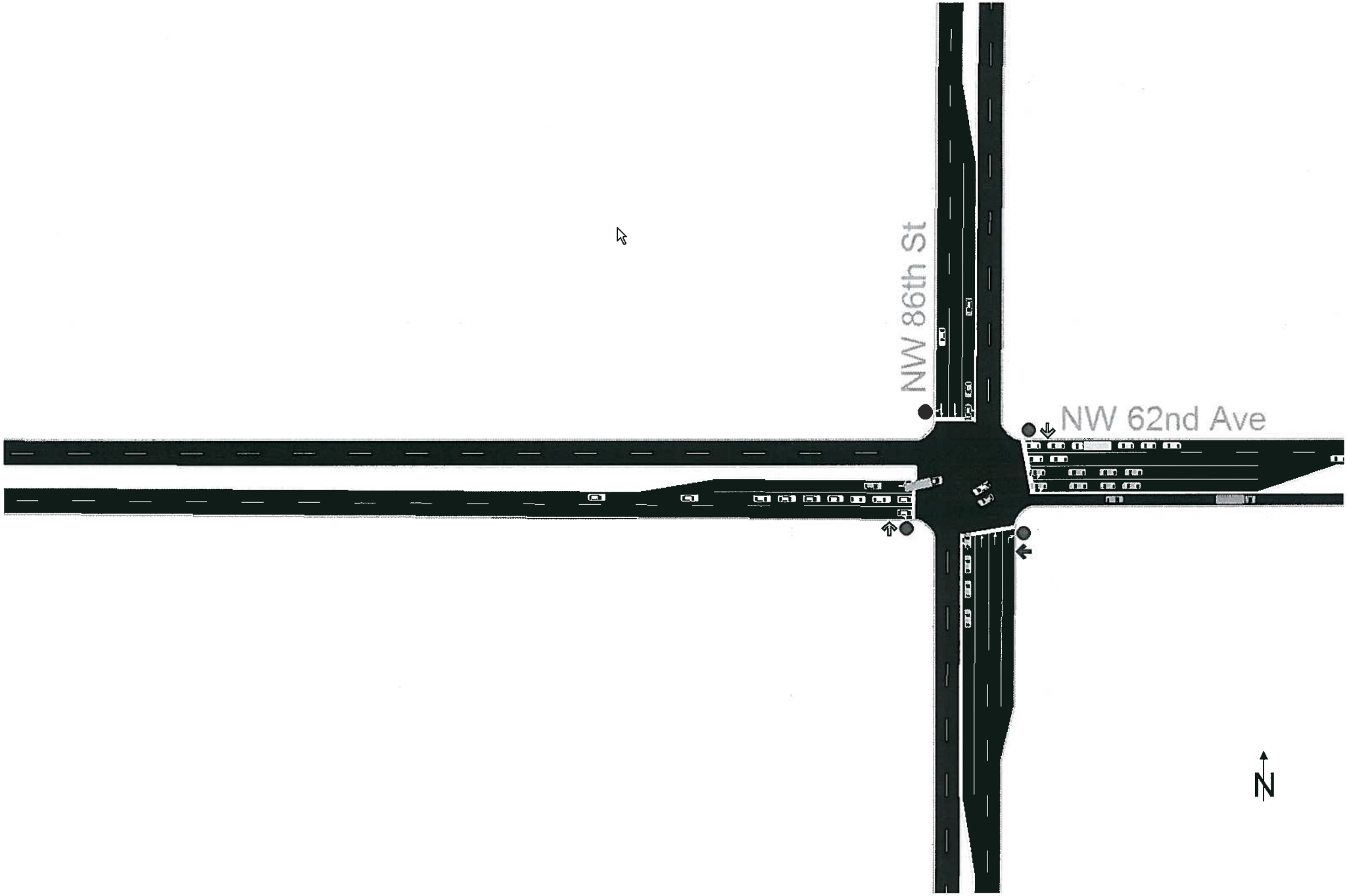
Appendix

Future Geometry – NW 62nd Avenue

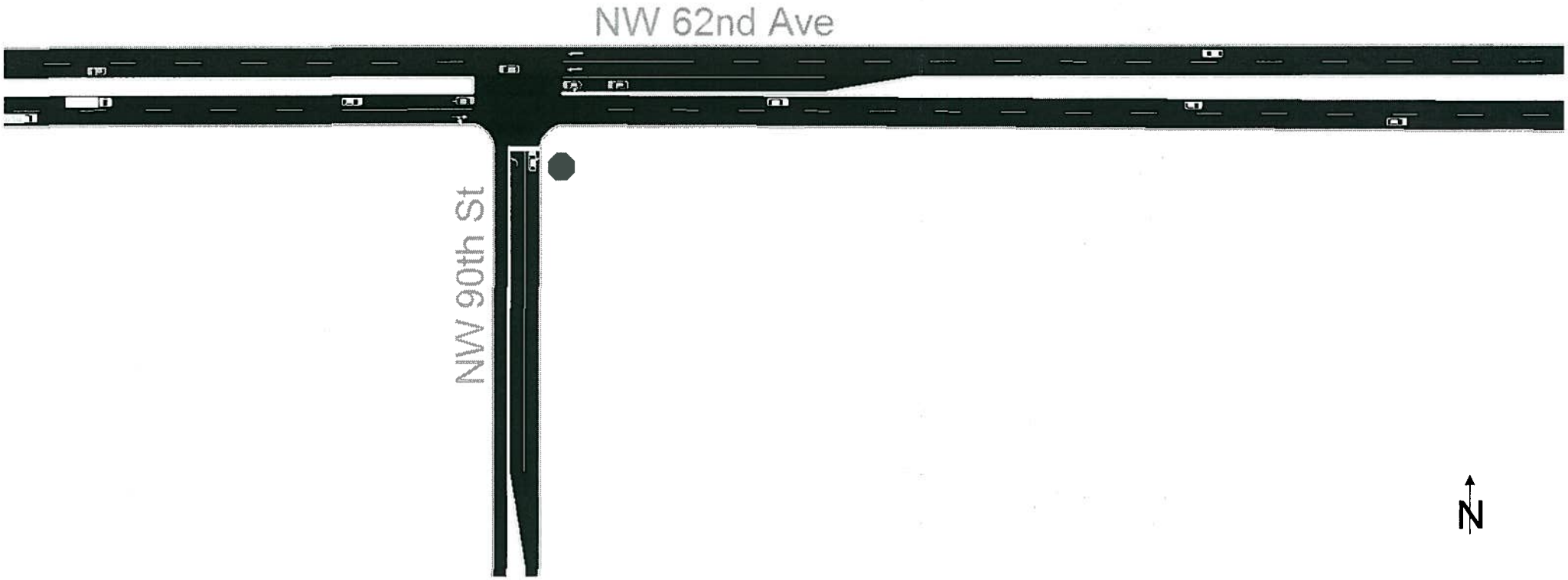
NW 62nd Avenue (Overview)



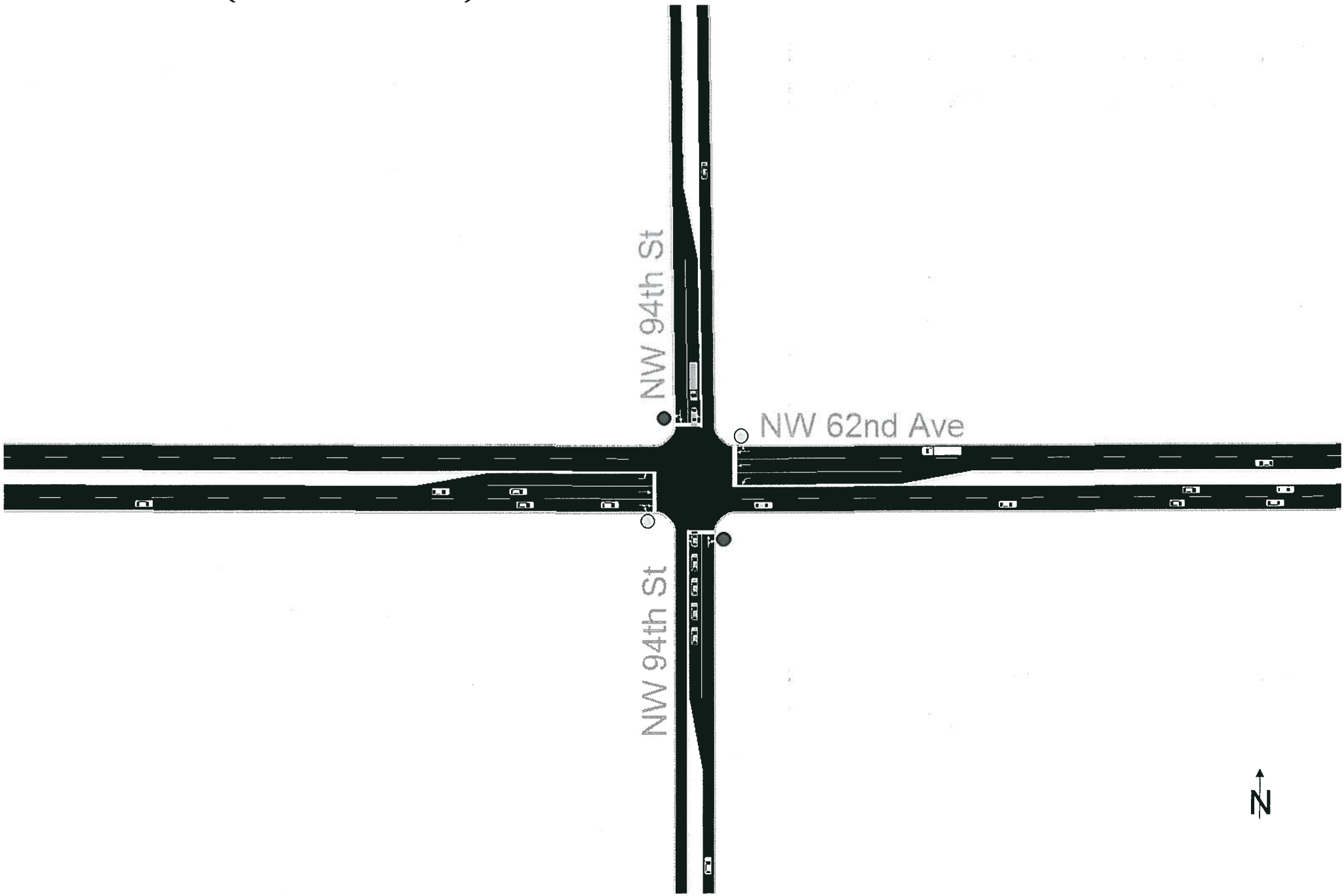
NW 62nd Avenue (Intersection Details)



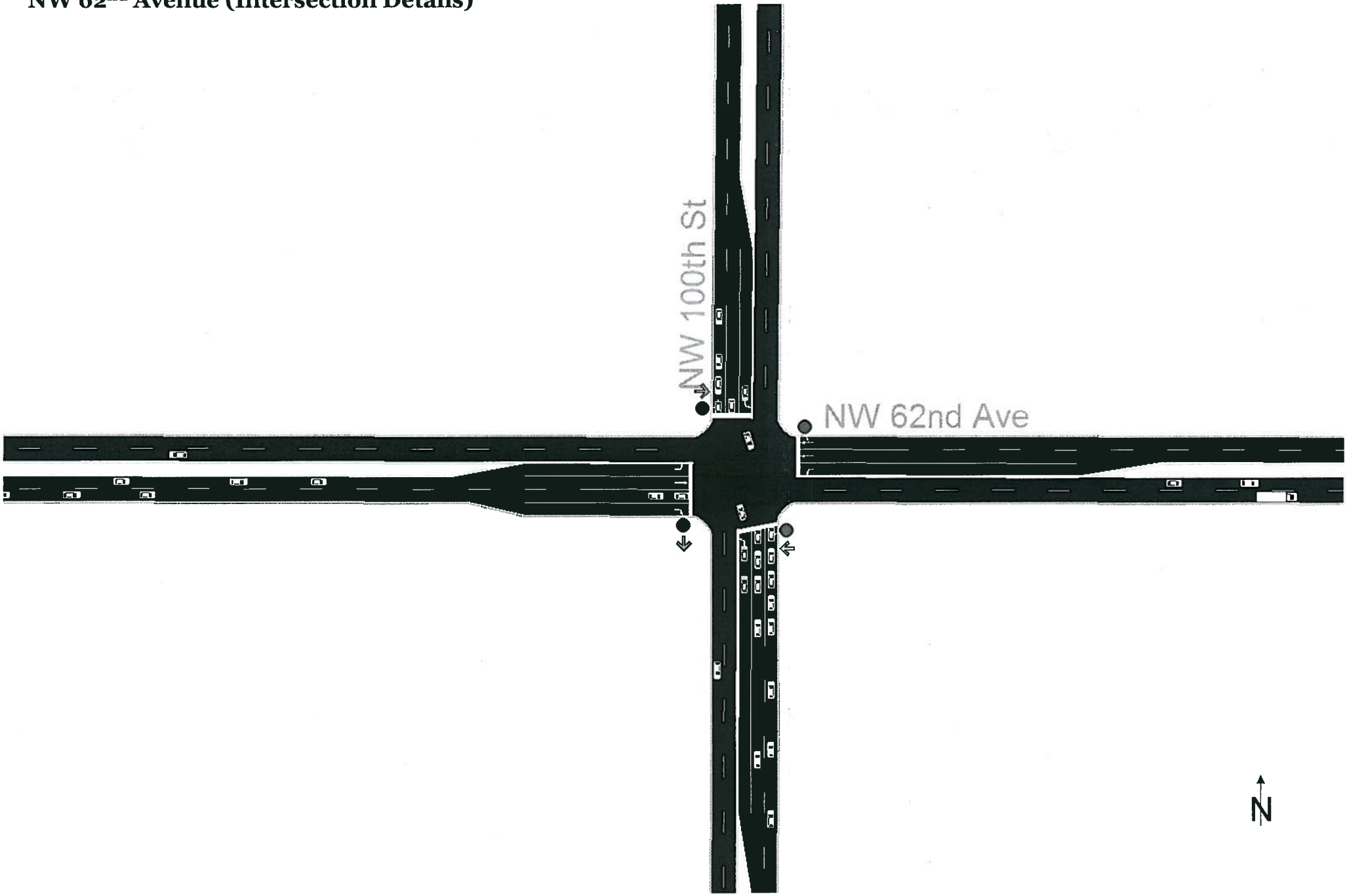
NW 62nd Avenue (Intersection Details)



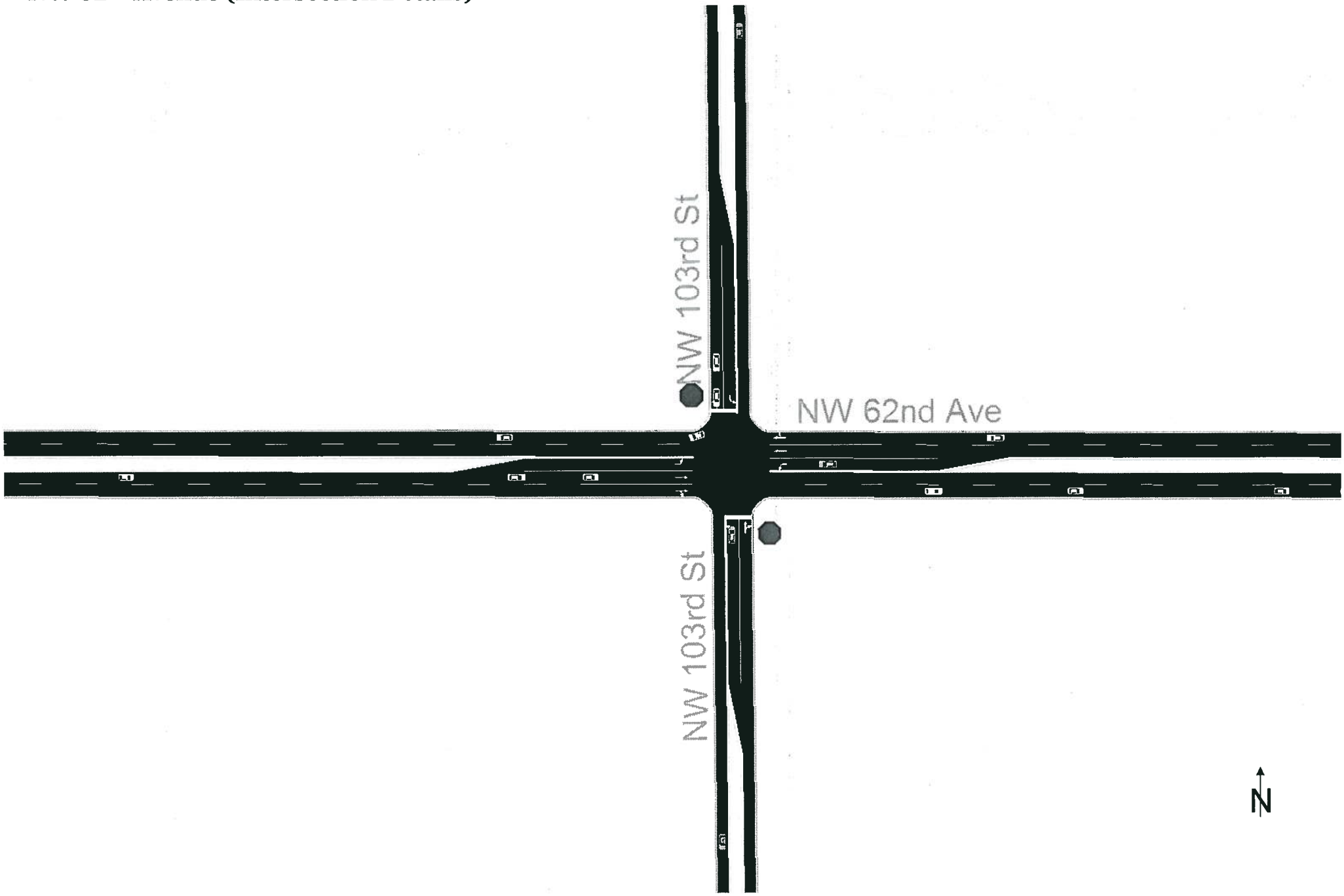
NW 62nd Avenue (Intersection Details)



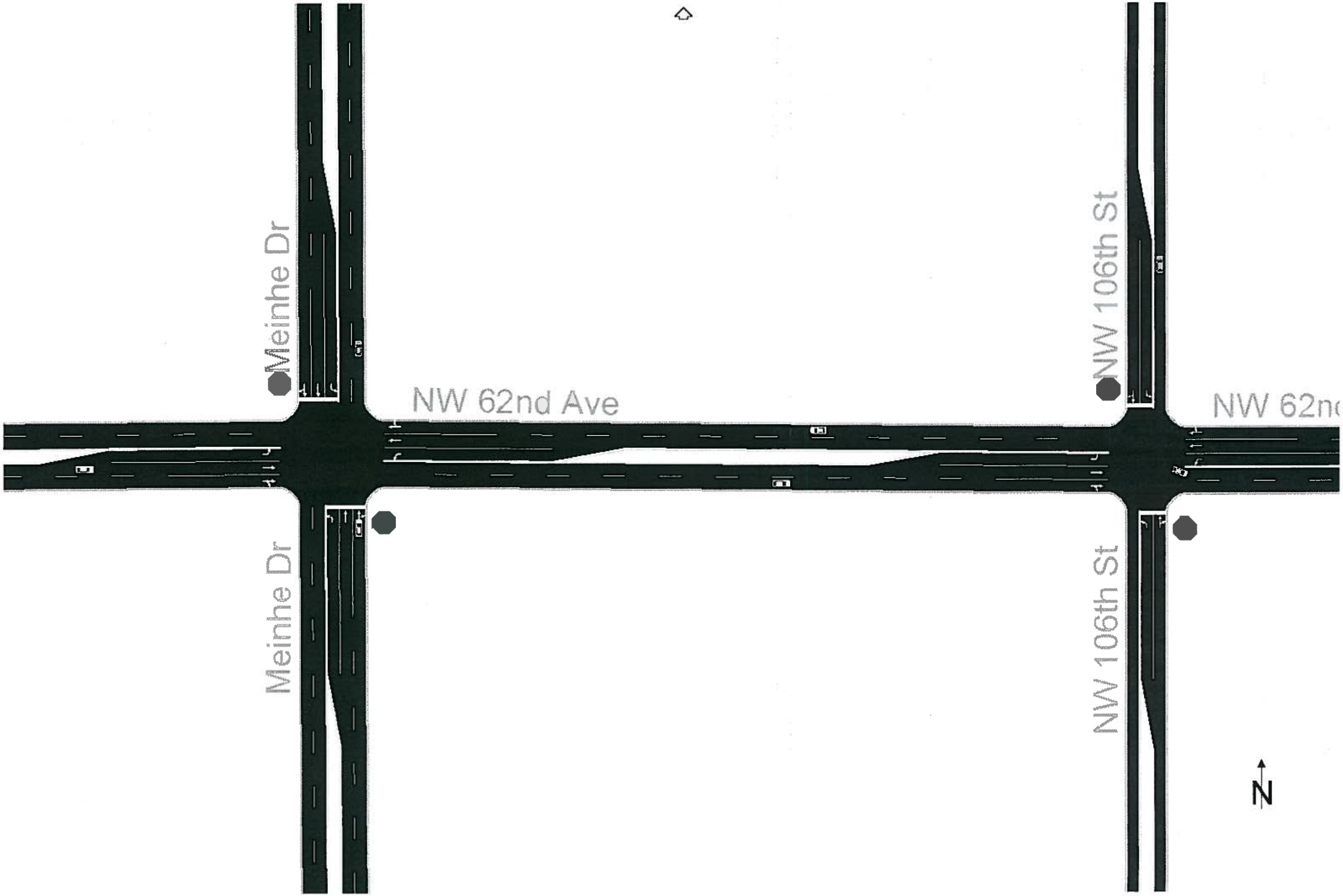
NW 62nd Avenue (Intersection Details)



NW 62nd Avenue (Intersection Details)



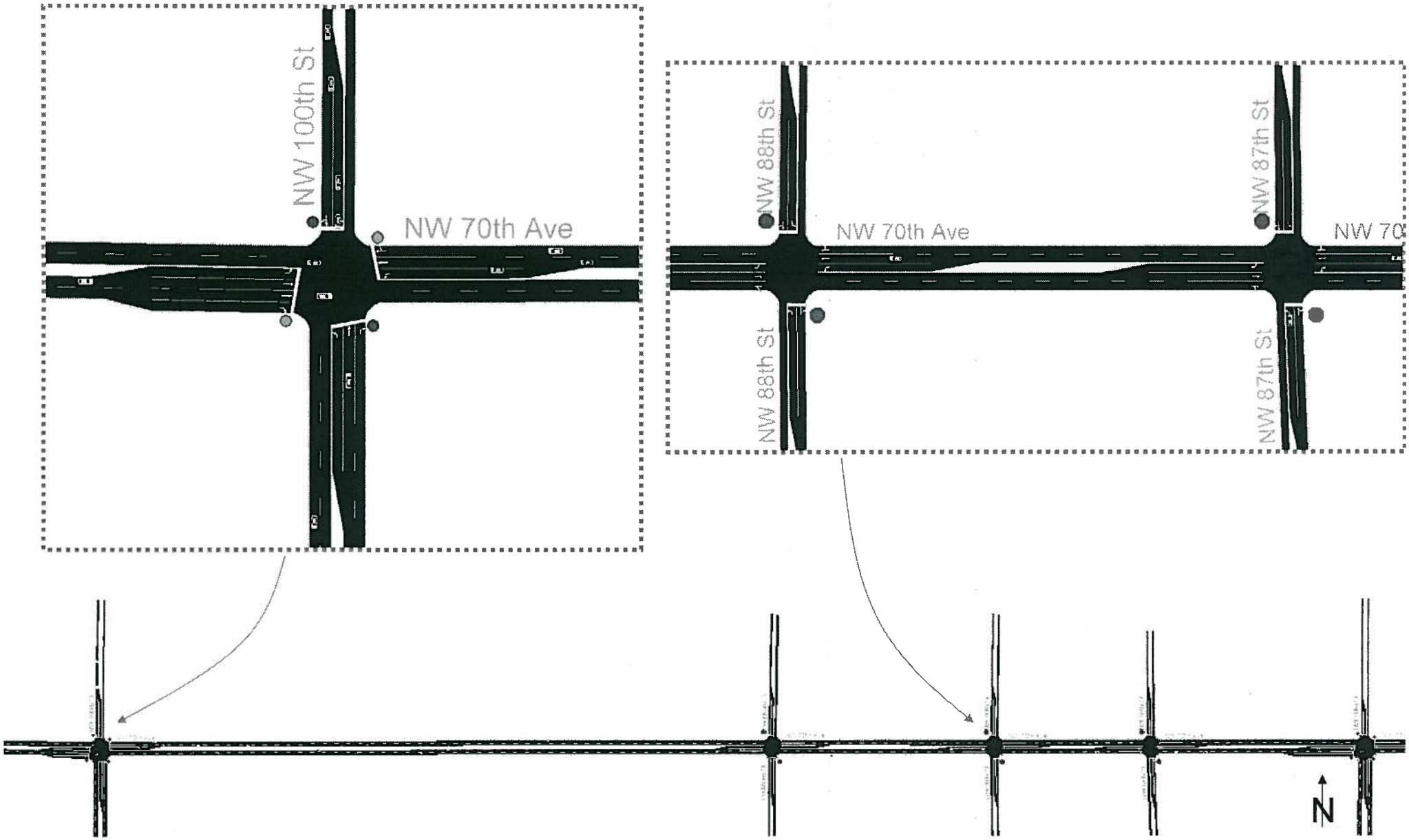
NW 62nd Avenue (Intersection Details)



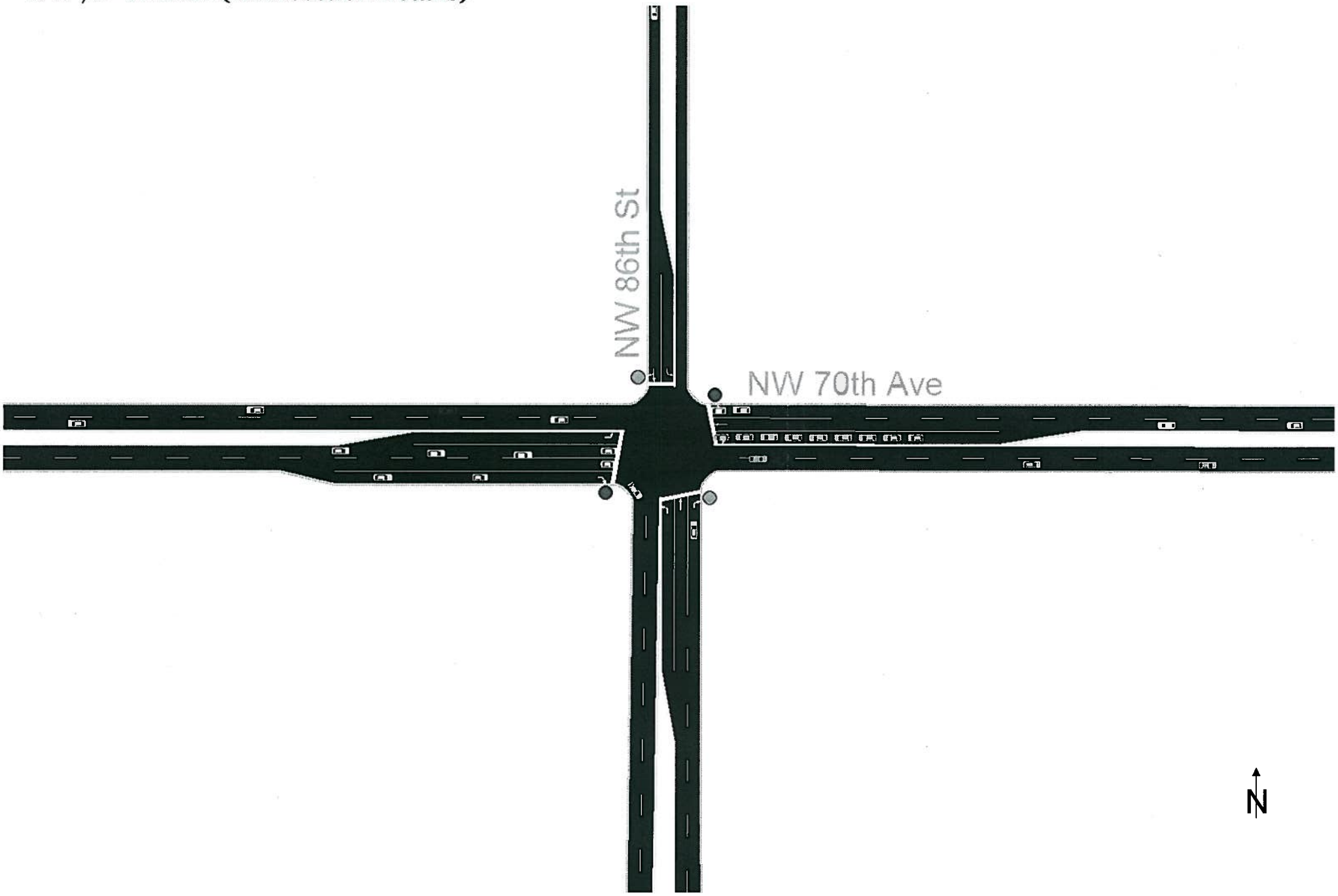
Appendix

Future Geometry – NW 70th Avenue

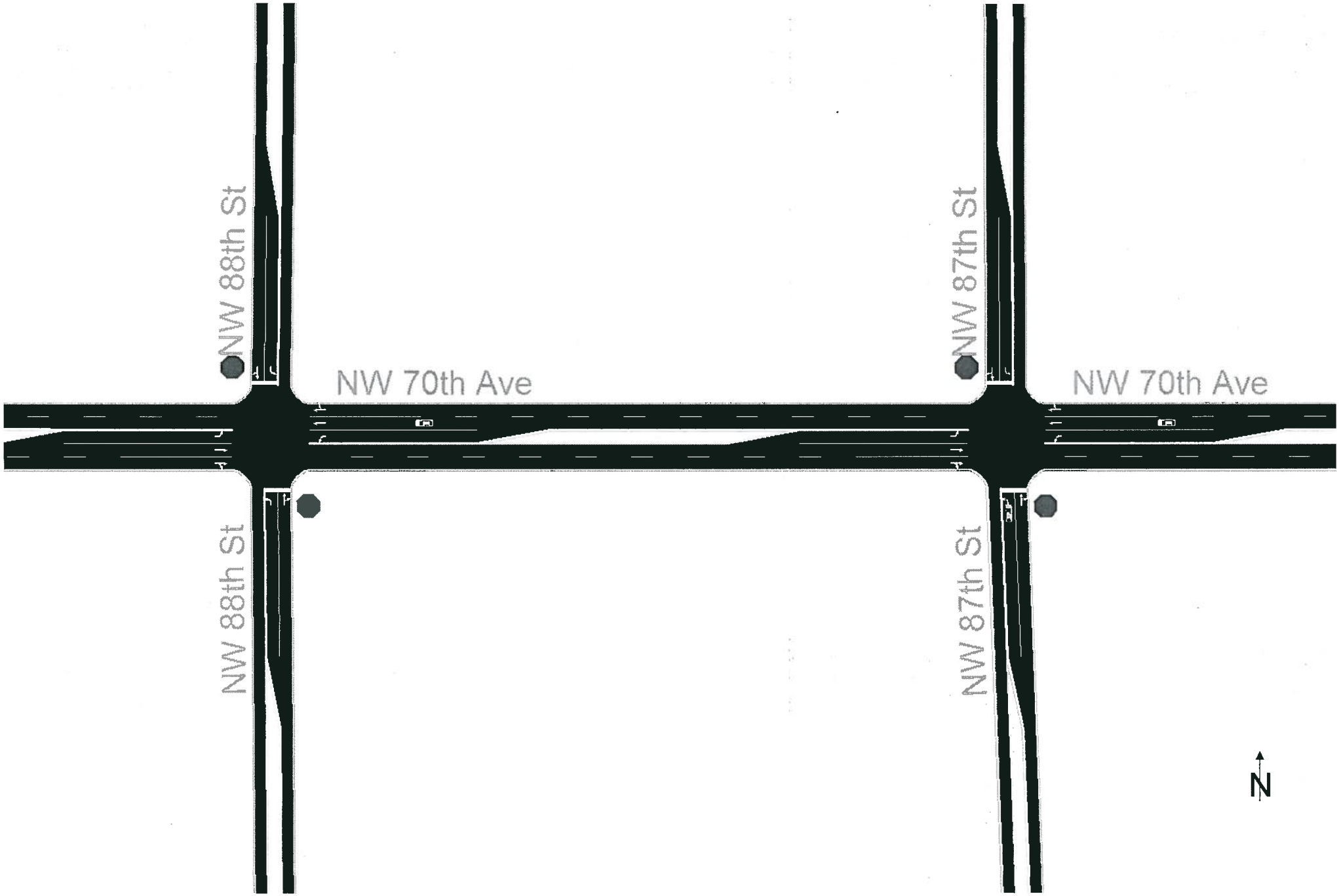
NW 70th Avenue (Overview)



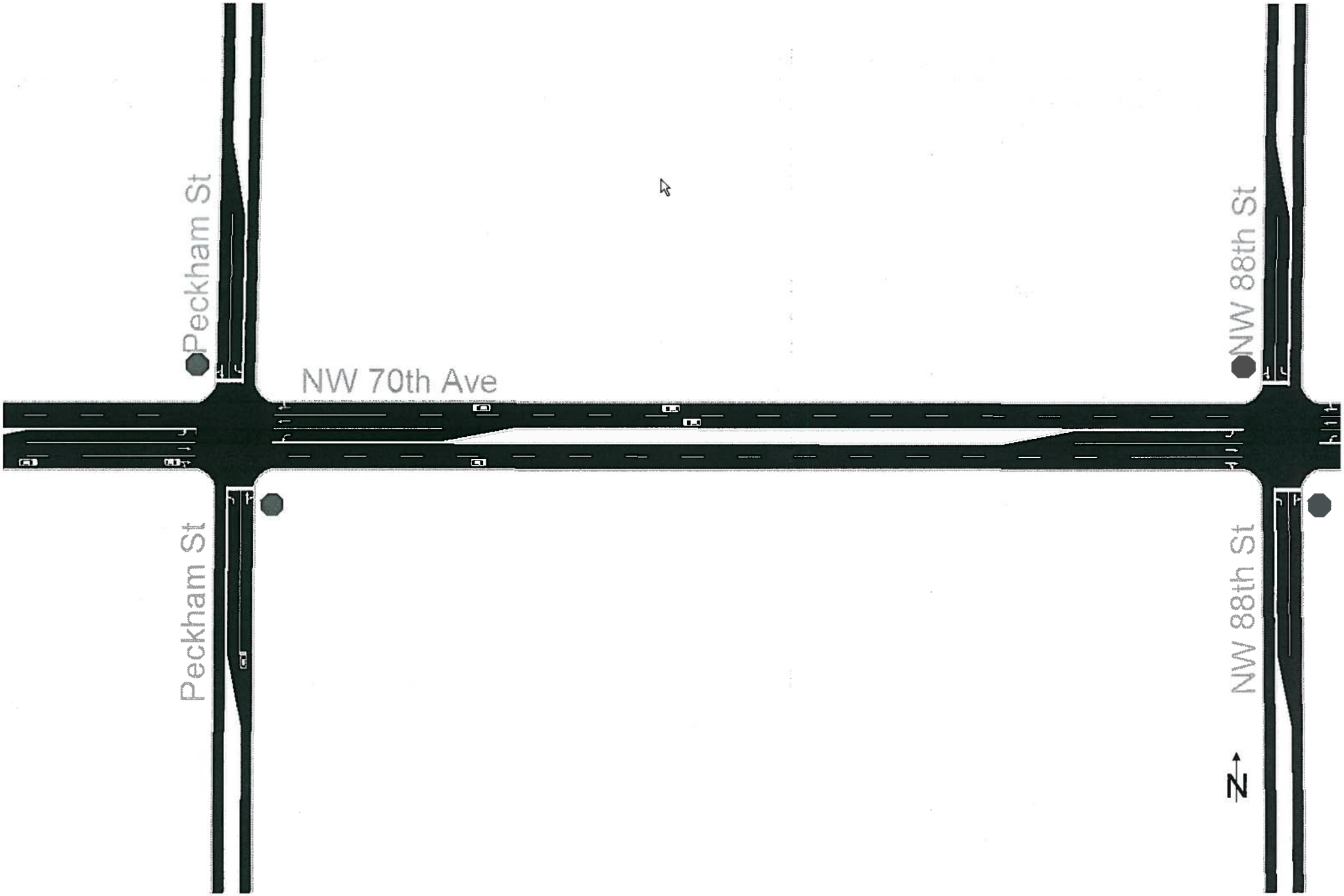
NW 70th Avenue (Intersection Details)



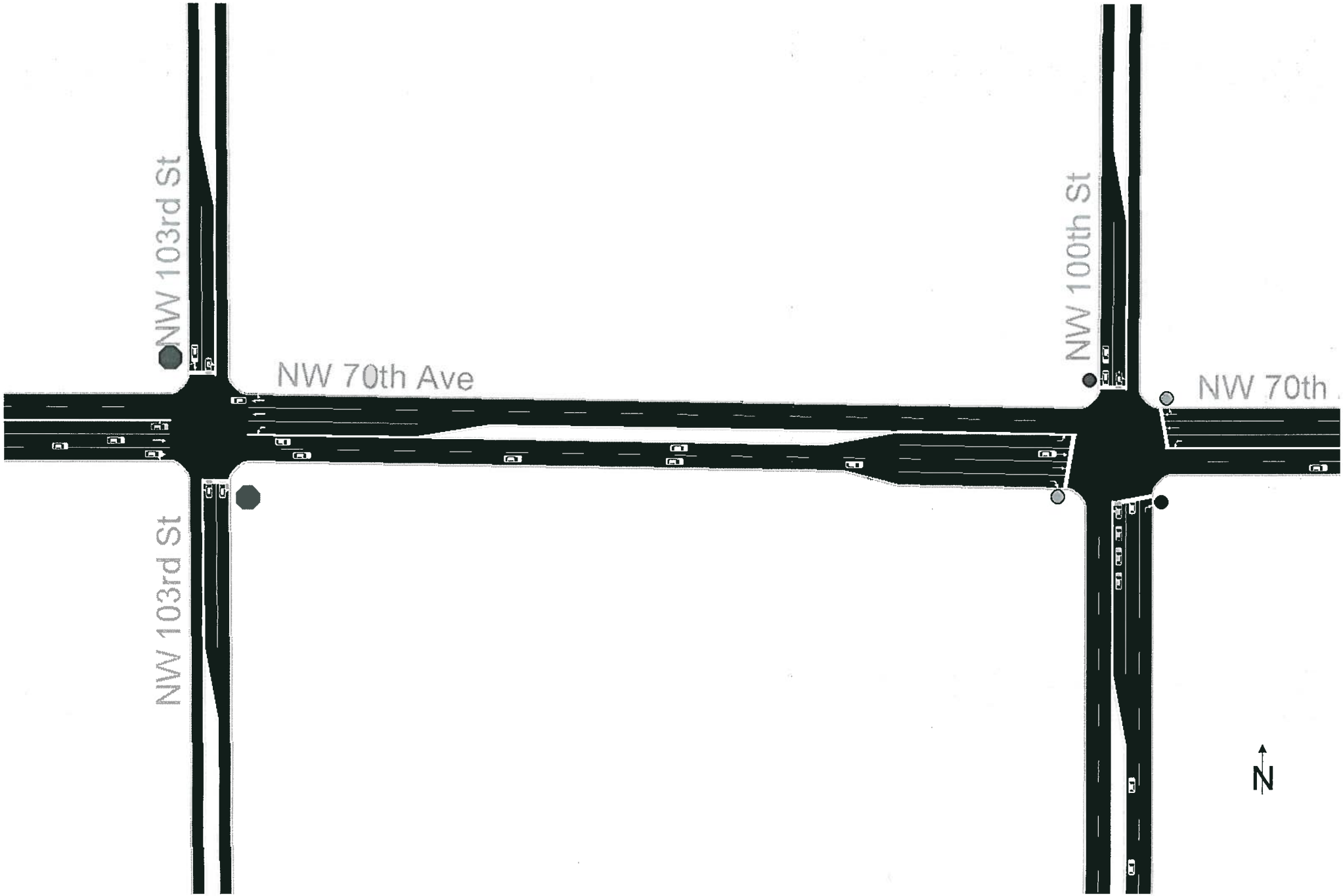
NW 70th Avenue (Intersection Details)



NW 70th Avenue (Intersection Details)



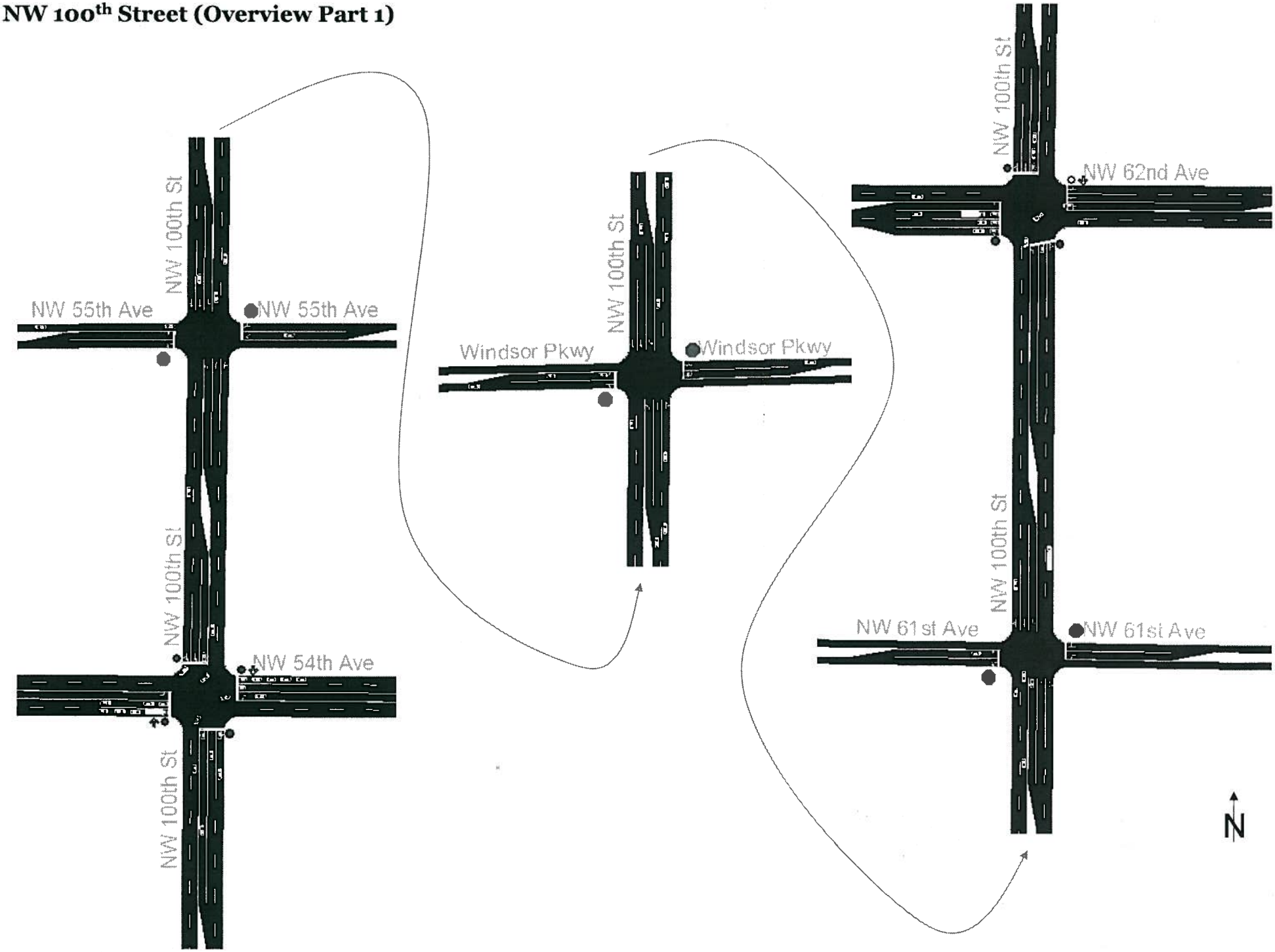
NW 70th Avenue (Intersection Details)



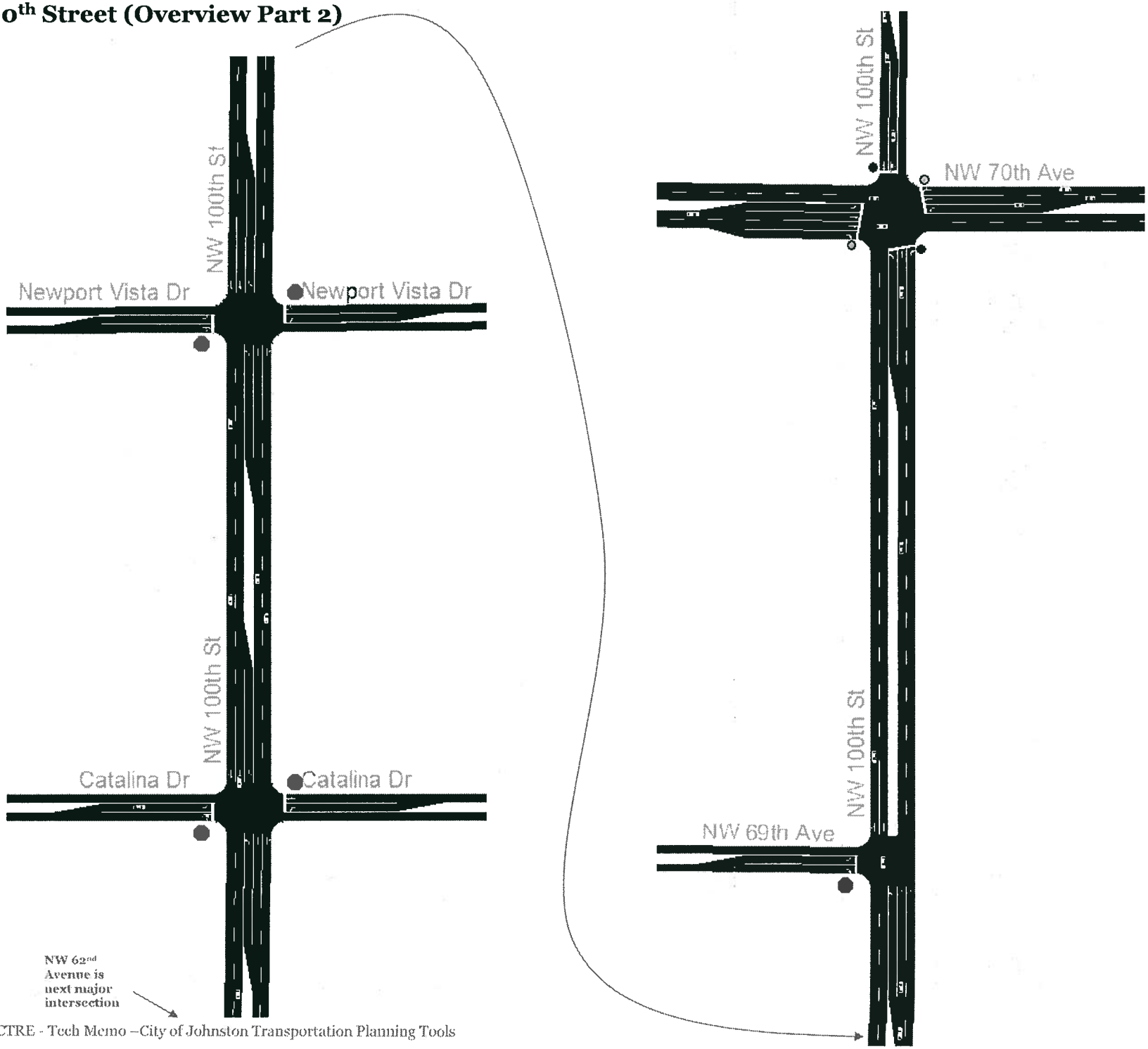
Appendix

Future Geometry – NW 100th Street

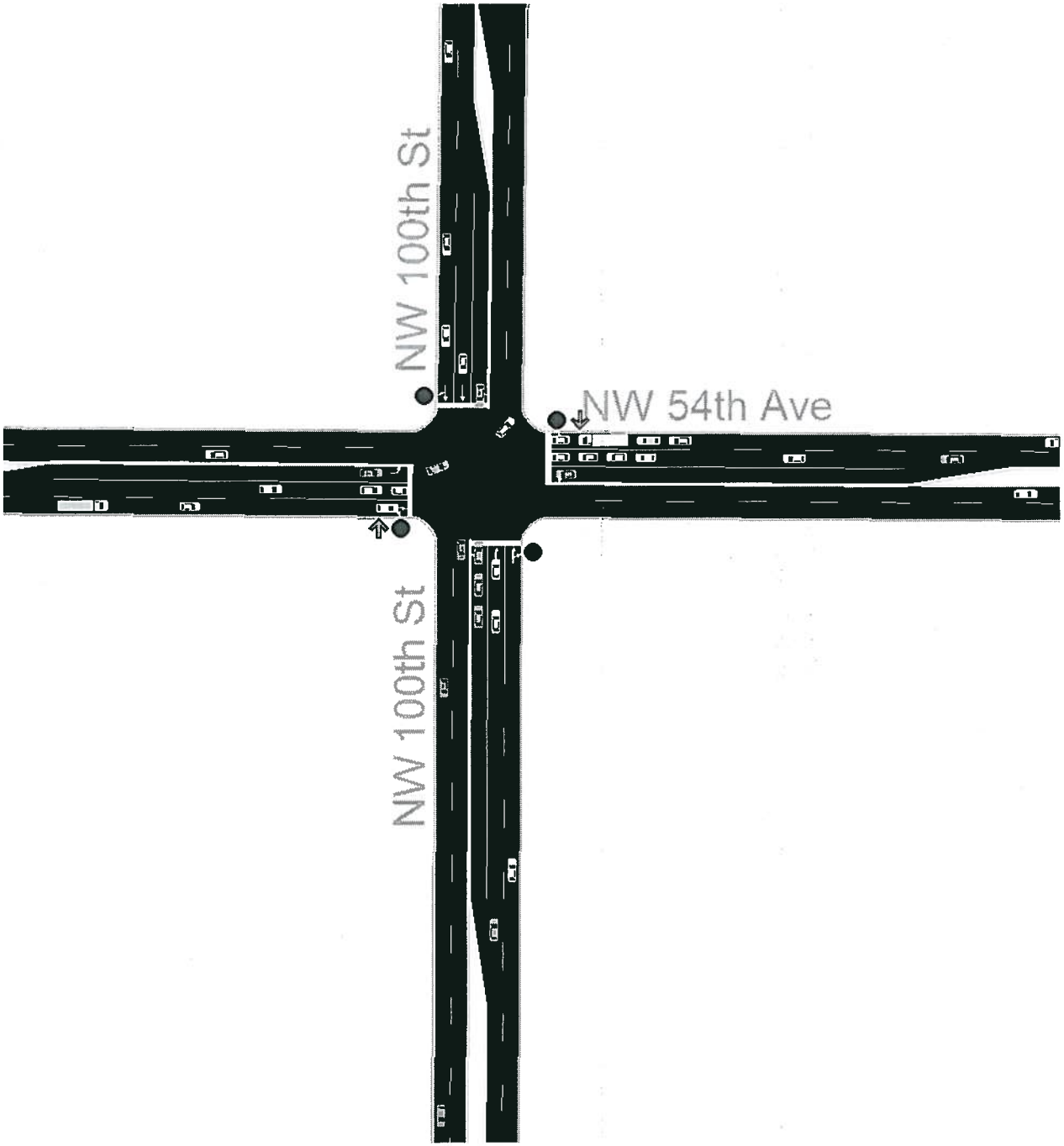
NW 100th Street (Overview Part 1)



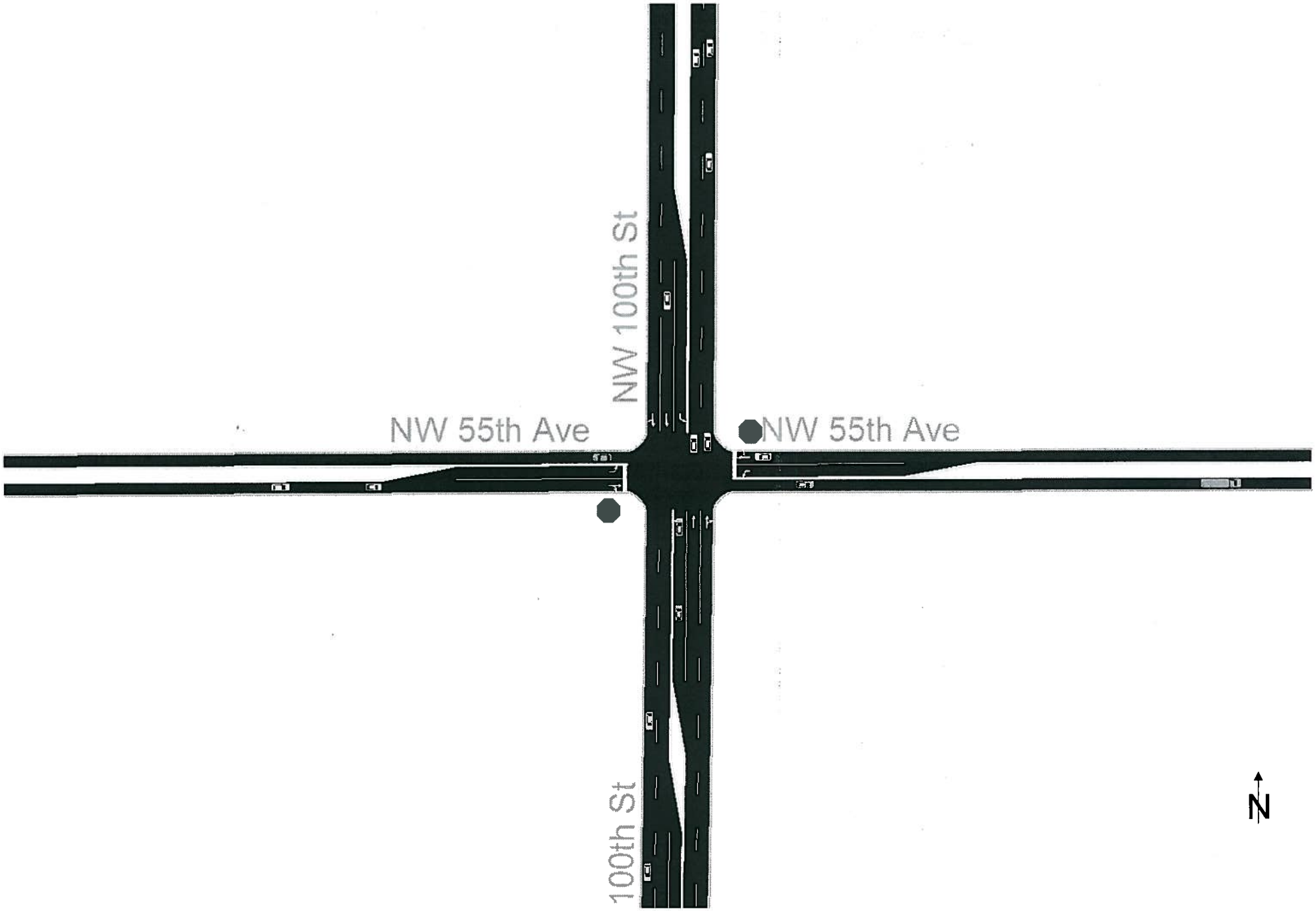
NW 100th Street (Overview Part 2)



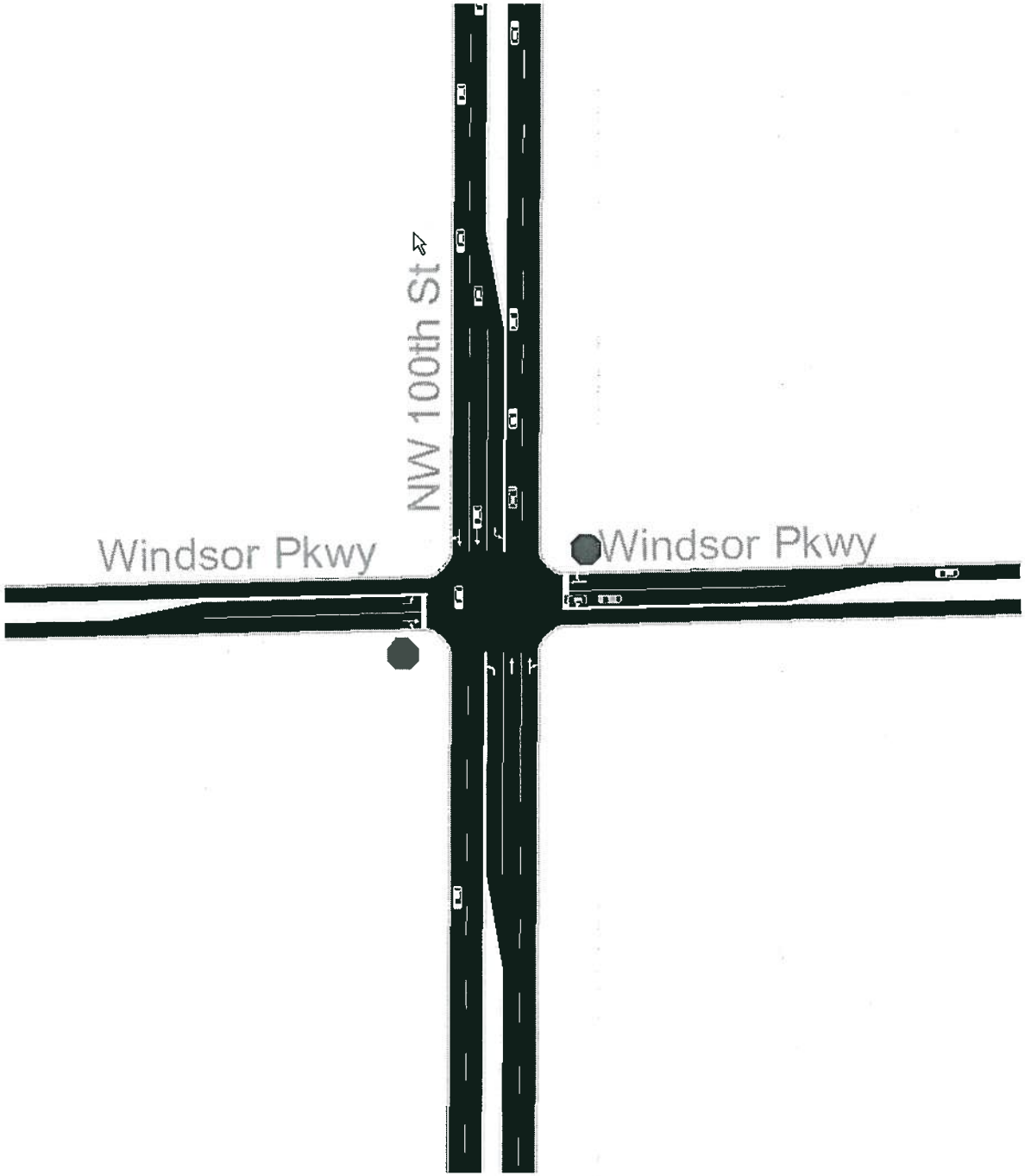
NW 100th Street (Intersection Details)



NW 100th Street (Intersection Details)



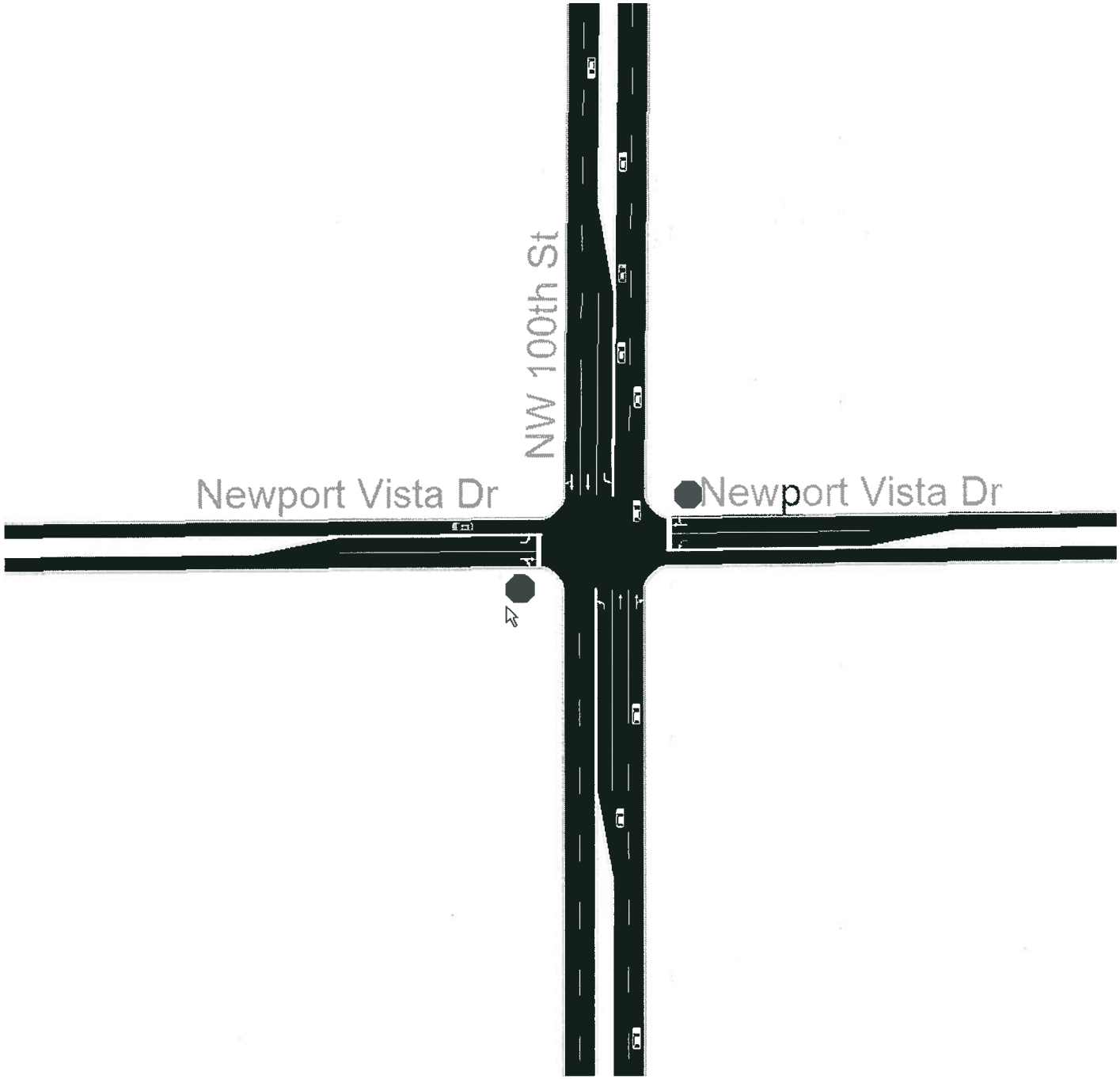
NW 100th Street (Intersection Details)



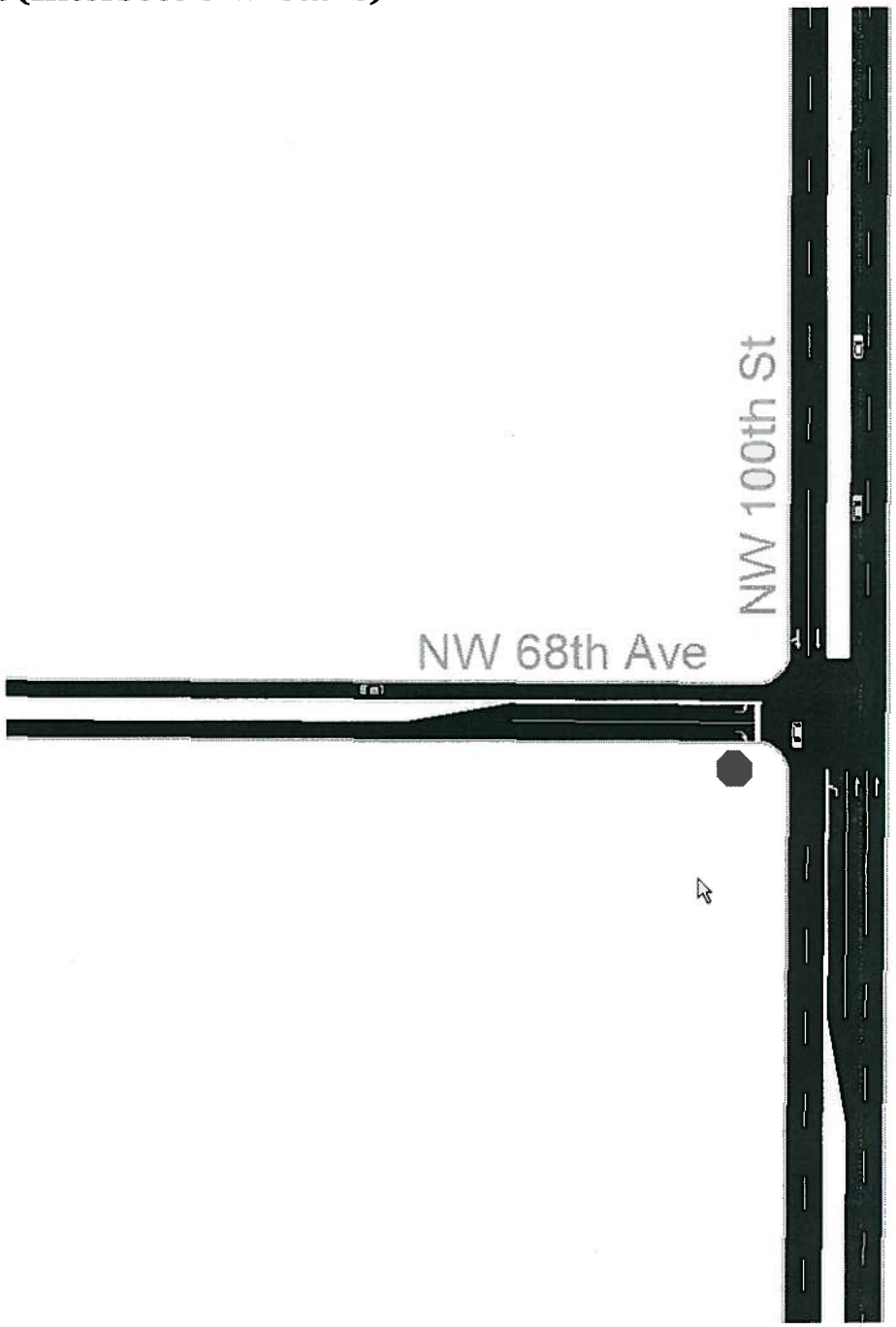
NW 100th Street (Intersection Details)

NW 100th Street (Intersection Details)

NW 100th Street (Intersection Details)



NW 100th Street (Intersection Details)



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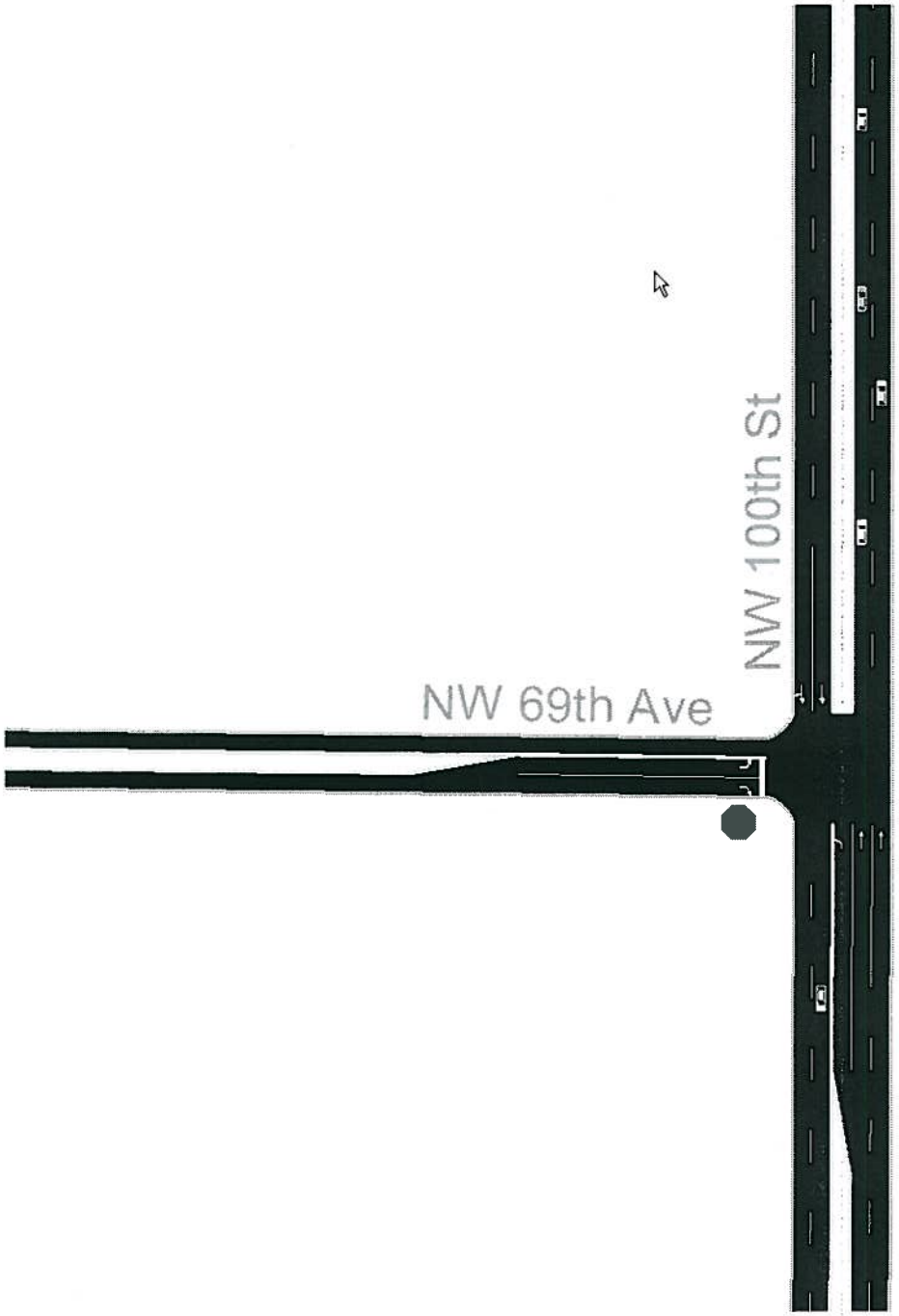
NW 100th Street (Intersection Details)