



# Kane County Transportation Planning Area Study

Elgin Far West Planning  
Area Roadway  
Improvement Plan

**CH2MHILL**

January 2003

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*Report*

# **Elgin Far West Planning Area Roadway Improvement Plan**

Submitted to  
**Kane County Division of Transportation  
and the City of Elgin**

January 2003

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# Introduction

## Background

The Kane County Division of Transportation along with CH2M HILL began a transportation planning study in October 2000 to develop plans for future transportation improvements. This study began with an analysis of existing and future conditions for the entire county. A travel demand model was used to analyze travel demand, characteristics, and performance for both existing and future land use scenarios. Transportation performance was also analyzed separately for each of the county's Planning Partnership Areas (PPA). To achieve the desired planning detail, transportation improvement programs were developed separately for individual planning areas within the county. A method of delineation and prioritization was developed to determine the order in which the planning areas would be considered. This report describes the results of the modified planning area process for the Far West Elgin area and presents a recommended roadway plan for the Elgin Far West Planning Area.

## Analysis of Existing and Future Conditions

Existing transportation facilities in Kane County are comprised of highways, public transportation routes and facilities, and accommodations for non-motorized modes. There are approximately 550 miles of highway in the county including two interstate highways, three U.S. highways, 11 state highways, and 307 route miles of county highway. Kane County is also served by Metra commuter rail and Pace buses as well as by a network of bike/pedestrian trails.

Performance of the existing transportation system was evaluated in three categories: (1) traffic service, (2) congestion, and (3) traffic safety. Measures of performance in terms of traffic service include Vehicle Miles of Travel (VMT), Vehicle Hours of Travel (VHT), and Vehicle Hours of Delay (VHD). In examining the traffic performance of all highways in the county, principal arterials which account for only approximately one quarter of the lane miles, were found to carry the bulk of traffic (approximately 50 percent) and experience an even larger portion of delay (approximately 55 percent). The primary performance measure for congestion is Level of Service (LOS).<sup>1</sup> Under existing conditions, 14 percent of the route miles in Kane County were found to be operating at LOS D, E, or F, and consequently were judged to be congested. Existing traffic safety performance was measured using predictive crash frequency models. Fifteen intersections and fifteen miles of county roads were classified in the highest priority category for safety.

The next step in the countywide analysis was to forecast future travel demand based on projected growth of population and employment. Population of Kane County is expected to grow from 317,000 in 1990 to 552,000 in 2020 and employment is expected to grow from 174,000 to 211,000 during the same period. Future travel demand was determined by incorporating increased population and employment by traffic analysis zone (TAZ) into the county travel forecasting model. Growth factors were calculated for each highway segment using a comparison of modeled volumes for the base year and 2020. These growth factors

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<sup>1</sup> A discussion of Level of Service (LOS) classifications is found on page 16 of *Existing Transportation Conditions and Forecasts of Future Travel Demand*, CH2M HILL (May 2001).

were then applied to 1997 counts to predict 2020 average daily traffic (ADT). Areas with the largest anticipated traffic growth would be Sugar Grove, West Geneva/West Batavia, Elgin, and the West Upper Fox area.

The 2020 trip table was then assigned to a network including both existing highways and committed projects. Future traffic service and congestion measures were calculated and compared to existing performance. Between 1997 and 2020, VMT within the county is expected to grow by 93 percent, VHT by 105 percent, and VHD by 750 percent. Also, by 2020, it is anticipated that 56 percent of the lane miles of highway within the county will be congested compared with just 14 percent in 1997.

The final step in the analysis of the existing and future transportation conditions was the aggregation of performance measures by Planning Partnership Area (PPA). The five measures analyzed for each PPA were:

- VMT per lane mile,
- VHT per lane mile,
- VHD per lane mile,
- Change in speed, and
- Percent-congested lane miles.

For each performance measure, the PPAs were classified into priority categories: immediate need, near-term need, and long-term need. See Figure 1. The Greater Elgin PPA was determined to be the only area exhibiting the highest priority, immediate need, for all categories of performance. The West Upper Fox area fell into the immediate need category for three of the five performance measures. For more information regarding the analysis of existing and future transportation conditions in Kane County, refer to the *Existing Transportation Conditions and Forecast of Future Travel Demand* (May 2001) report.

## **Product of Delineation and Prioritization Process**

The delineation and prioritization of planning areas in Kane County was accomplished using a five-step process.

1. Analysis of Planning Partnership Areas
2. Layering of performance measures
3. Delineation of transportation planning districts
4. Prioritization of districts
5. Selection of planning areas for further study

Step one, the analysis of existing and future performance summarized by PPA, was a product of the countywide analysis described above. Areas where each of the individual performance measures exhibited poor performance were shaded and layered in order to highlight concentrations of performance issues. In step two, areas that had a clustering of performance problems were delineated to define the planning districts and then compared to one another to prioritize the order of study. See Figure 2. Three areas have been designated for further study – the Elgin Far West Area, which is the subject of the remainder of this report, and West Upper Fox, and South Central Kane County. For more information regarding the delineation and prioritization of planning areas refer to the report, *Delineation*

*and Prioritization of Planning Areas* (July 2001). The Elgin Far West planning effort was sponsored jointly by the Kane County Division of Transportation and the City of Elgin.

## **Elgin Far West Area**

### **Study Area**

The Elgin Far West Area is bounded by Randall Road on the east, Muirhead Road on the west, Highland Road on the north, and McDonald Road on the south. Figure 3 delineates the study area and the potentially impacted intersections. The Elgin Far West Area is expected to grow rapidly over the next ten to twenty years with full build out expected by approximately 2020. Twenty-eight developments are anticipated to occur in the Elgin Far West Area. The new developments would be expected to add 11,000 new households, 2.8 million square feet of new commercial floor space, and 2.3 million square feet of new industrial land uses. The ultimate buildout of proposed developments by 2020 would add approximately 17,600 weekday PM peak hour trips to the area's roadways. The City of Elgin expects eleven of the proposed developments to be completed or partially completed by the year 2010 adding 4,900 new households and 1.7 million square feet of new commercial development. This interim stage of development would add approximately 8,200 additional vehicle trips in the PM peak hour on a weekday.

### **Planning Process**

The process for developing area plans as part of the Kane County Transportation Planning Area Study comprises the following steps:

- Establish travel demand
- Review area specific performance and analyze travel characteristics
- Establish objectives and constraints
- Identify improvements
- Analyze improvements relative to "measures of effectiveness"
- Develop recommended plan

The Kane County travel demand model was used to determine the performance of transportation improvements. The model works well for areas with limited collaborative planning efforts in place. The level of detail is limited to daily traffic assignments; the product is average daily traffic (ADT).

The general transportation planning process was similar to that used in the West Upper Fox Planning Area.<sup>2</sup> Due to prior planning efforts in the Elgin Far West Area, however, a different method of analysis was adopted for this study area. The desired study outcomes required a more detailed assessment of traffic patterns along with further analyses of the operational performance of intersections and roadway segments in the study area. The analysis method used for the Elgin Far West Area combined background traffic with site generated traffic from planned developments for two future time periods -- 2010, and 2020. The traffic from each of the developments was traced through the network, so that the cost of improvements could be apportioned back to the development based on its relative impact

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<sup>2</sup> *West Upper Fox Planning Area Transportation Improvement Plan*, CH2M HILL, July, 2002



on the roadway system. The analysis for 2020 would represent the ultimate plan, while the 2010 analysis would serve as an aid in prioritizing improvements. It is envisioned that Kane County and the City of Elgin will use the results in working with developers.

## Existing Traffic

Twenty-eight intersections that will be influenced by traffic growth in the Elgin Far West area are identified in Figure 3. Existing peak hour traffic volumes were obtained for as many of these intersections as possible. However, intersection peak hour traffic counts were not available for eighteen intersections. Other means had to be used, therefore, to arrive at total peak hour traffic demand.

The procedure used to establish peak hour traffic movements relied on a knowledge or approximation of the volume of daily traffic on each leg of an intersection. Extensive Average Daily Traffic (ADT) data for 2000 and 2001 were available from the Kane County Division of Transportation. These ADT data were supplemented with counts from previous years and travel demand model output. Also, at some locations, there were 30-minute short counts that could be expanded.

The first step in the process of calculating intersection turning movements from ADT counts was to determine the percentage of traffic in the peak hour (K) and directional distribution (D) of the peak hour traffic. Assumptions for K and D were made through analysis of locations with known turning movements and ADT's. The resulting K factors were eight percent in the morning peak and ten percent in evening peak. The trend for D factors was a 60/40 split with the higher volumes in the southbound and westbound directions. An exception to the directional distribution assumption was Water Road. At the intersection of Water Road and Bowes Road the directional distribution would be sixty percent northbound and the directional distribution would be sixty percent eastbound at the intersection of Water Road and Nesler Road. It is believed that this disparity occurs because Water Road serves primarily residential land uses, hence PM peak travel would consist largely of trips returning home. In general, the K and D factors are consistent with other locations within Kane County.

The K and D factors were then used to determine intersection approach volumes. To generate peak hour intersection turning volumes, general assumptions were applied at locations where specific information was not available. The following intersection turning percentages were assumed.

- 4-leg intersections
  - 80 percent through traffic
  - 10 percent right turning traffic
  - 10 percent left turning traffic
- 3-leg intersections with minor leg oriented north-south
  - 75 percent of traffic turning east
  - 25 percent of traffic turning west
- 3-leg intersections with minor leg oriented east-west
  - 50 percent of traffic turning north
  - 50 percent of traffic turning south

Figure 4 and 4a show the existing turning movement counts at the potentially impacted intersections.

Intersection condition diagrams were prepared for each intersection analyzed in the study. Field studies were made to verify the intersection geometry in terms of intersection control and the number and location of turn lanes.

## Future Traffic Demand

The future traffic demand incorporates background traffic with site generated traffic. The background traffic represents growth in the existing traffic on the network. Site generated traffic consists of additional trips attributable to each new development site. Total traffic was projected for the two study years 2010 and 2020.

### Background Traffic

Background traffic was generated by growing the existing traffic to projected 2010 and 2020 volumes. The growth rate used from the existing count year to 2010 was two percent per year compounded. The 2010 traffic volumes were then increased at a growth rate of one percent per year to project 2020 traffic volumes. The growth rates are consistent with expected growth throughout the remainder of the county.

### Site Generated Traffic

The City of Elgin provided information regarding areas planned for future development. Various levels of detail were provided for each of the twenty-eight development sites. Traffic impact studies had already been completed for five of the developments. For two other developments, specific information was available regarding the type of proposed land use and number of units. Limited information was available for the remaining developments. Where data was unavailable, estimates were made using a set of assumptions provided by the City of Elgin to determine the intensity of development based on gross acreage and type of development. Table 1 shows the assumptions used in the process.

**TABLE 1**  
Land Use Development Assumptions

Type of Land Use	Net Acres as a Percentage of Gross Acres	Development Density
Residential (Single Family)	75%	3 units/Net acre
Residential (Multi-Family)	75%	6 units/Net acre
Commercial	100%	Floor Area =25% of Net Acres
Industrial	75%	Floor Area =40% of Net Acres

These assumptions were used in conjunction with data presented in the Institute of Transportation Engineers (ITE) publication, *Trip Generation*<sup>3</sup>, to calculate site-generated

<sup>3</sup> *Trip Generation*, Sixth Edition, Institute of Transportation Engineers, Washington D.C., 1997

traffic. Table 2 shows the ITE categories used for each development and the trip generation calculation assumptions. The weighted average rate was assumed when the divergence from the measured data points was small. When the divergence was large, a regression equation was used to more accurately represent trip generation. The trip generation rates and equations pertain to the AM and PM peak hour of the adjacent street.

**TABLE 2**  
Methods Used to Calculate Trip Generation

Land Use Type	ITE Category	Trip Generation Estimation Method - AM Peak Hour (Rate)	Trip Generation Estimation Method PM Peak Hour (Rate)
Single Family	210	Weighted average rate (0.75)	Regression equation; $\ln(T)=0.901 \ln(X)+0.527$
Multi Family	230	Weighted average rate (0.44)	Weighted average rate (0.54)
Retail	820	Weighted average rate (1.03)	Regression equation; $\ln(T)=0.660\ln(X)+3.403^*$
Office Park	750	Weighted Average rate (1.74)	Weighted average rate (1.50)
Warehouse	150	Weighted average rate (0.45)	Weighted average rate (0.51)
Manufacturing	140	Weighted average rate (0.73)	Weighted average rate (0.74)

\* Times 0.70 to adjust for pass-by trips

Figures 5 and 6 illustrate the developments anticipated to occur in the Elgin Far West Area by 2010 and 2020, respectively. Tables 3 and 4 show the resulting trip generation by development for the study years 2010 and 2020, respectively. In 2010, approximately 5,000 new trips would be added in the AM peak hour and 8,200 in the PM peak hour. In 2020, the approximate number of new trips generated in the AM peak hour would be 12,400, and about 17,600 trips would be added to the network in the PM peak hour.

### Trip Distribution and Assignment

The next steps in the process were to determine the pattern of trip distribution for each new development and to assign site generated traffic onto the network. To assist in determining the pattern of trip distribution from each new development, a select link analysis was performed using the corresponding centroid connectors from the nearest Traffic Analysis Zone (TAZ). In essence, a select zone trip table was created and reassigned to the network. Each zone was then analyzed individually to determine the manner in which trips had been distributed onto the network. Percentage distributions to nearby roadways were calculated for each zone. These proportions were then applied to the respective site-generated traffic to establish how much should be added to each of the various intersections and roadway segments in the study area. Finally, the distribution of traffic was reviewed for completeness and slight adjustments were made according to existing traffic patterns.

When new collector roads were added to the network, a similar process was used to redistribute traffic onto the revised network. It was assumed, however, that the effect of widening existing roads would not significantly alter the distribution of site-generated traffic.

Table 3  
West Elgin Trip Generation Summary 2010

	Development Area	Land Use	Gross Acres	Net Acres	Net Square Feet	Multiplier	Build Out	Trip Generation Rate		Peak-Hour Trip Generation			
								A.M. Peak	P.M. Peak	A.M. Peak		P.M. Peak	
										Inbound	Outbound	Inbound	Outbound
<b>Residential</b>	R9	Single Family	114	85.5		3	257	0.75	0.98	0.25	0.75	0.64	0.36
	B&B sec 1	Single Family					69	0.75	1.11	15	40	50	30
	B&B sec 2	Single Family					208	0.75	1.00	40	115	135	75
	B&B sec 3	Single Family					112	0.75	1.06	20	65	75	45
	Wyndam DeerPoint	Single Family					289	0.75	0.97	55	165	180	100
	Town & Country						1138			205	615	685	415
	Pulte						1050			80	145	155	85
	Kimball Hill						380			75	190	250	135
	Bowes Creek						774			180	440	510	315
										0.17	0.83	0.67	0.33
	R15	Multi Family	22	16.5		6	99	0.44	0.54	5	35	35	20
	R16	Multi Family	112	84		6	504	0.44	0.54	40	185	180	90
	Wyndam Deerpoint	Multi Family					66	0.44	0.54	5	25	25	10
	<b>Total</b>					<b>4946</b>			<b>770</b>	<b>2165</b>	<b>2440</b>	<b>1410</b>	
<b>Commercial</b>								<b>retail</b>	<b>0.61</b>	<b>0.39</b>	<b>0.48</b>	<b>0.52</b>	
								<b>office</b>	<b>0.89</b>	<b>0.11</b>	<b>0.14</b>	<b>0.86</b>	
	C3	Retail	47	47	2,047,320	0.25	512	1.03	2.52	320	205	620	670
		Office	47	47	2,047,320	0.25	512	1.74	1.5	795	100	105	660
	McKay Property						650			415	290	1050	1260
	<b>Total</b>					<b>1,674</b>			<b>1530</b>	<b>595</b>	<b>1775</b>	<b>2590</b>	
<b>TOTAL</b>									<b>2300</b>	<b>2760</b>	<b>4215</b>	<b>4000</b>	
<b>Total Site Generated Trips</b>									<b>5060</b>	<b>5060</b>	<b>8215</b>	<b>8215</b>	

Table 4  
West Elgin Trip Generation Summary 2020

	Development Area	Land Use	Gross Acres	Net Acres	Net Square Feet	Multiplier	Build Out	Trip Generation Rate		Peak-Hour Trip Generation			
								A.M. Peak	P.M. Peak	A.M. Peak		P.M. Peak	
										Inbound	Outbound	Inbound	Outbound
<b>Residential</b>										<b>0.25</b>	<b>0.75</b>	<b>0.64</b>	<b>0.36</b>
	R1	Single Family	459	344.25		3	1033	0.75	0.85	195	580	565	315
	R2	Single Family	20	15		3	45	0.75	1.16	10	25	35	20
	R3	Single Family	86	64.5		3	194	0.75	1.01	35	110	125	70
	R4	Single Family	560	420		3	1260	0.75	0.84	235	710	675	380
	R5	Single Family	113	84.75		3	254	0.75	0.98	50	145	160	90
	R6	Single Family	412	309		3	927	0.75	0.86	175	520	510	285
	R7	Single Family	17	12.75		3	38	0.75	1.18	5	20	30	15
	R8	Single Family	222	166.5		3	500	0.75	0.92	95	280	295	165
	R9	Single Family	228	171		3	513	0.75	0.91	95	290	300	170
	R10	Single Family	36	27		3	81	0.75	1.10	15	45	55	30
	R11	Single Family	168	126		3	378	0.75	0.94	70	215	230	130
	R12	Single Family	35	26.25		3	79	0.75	1.10	15	45	55	30
	R13	Single Family	61	45.75		3	137	0.75	1.04	25	75	90	50
	R14	Single Family	211	158.25		3	475	0.75	0.92	90	265	280	155
	R17	Single Family	180	135		3	405	0.75	0.93	75	230	240	135
	B&B sec 1	Single Family					69	0.75	1.11	15	40	50	30
	B&B sec 2	Single Family					208	0.75	1.00	40	115	135	75
	B&B sec 3	Single Family					112	0.75	1.06	20	65	75	45
	Wyndam DeerPoint	Single Family					289	0.75	0.97	55	165	180	100
Town & Country						1138			205	615	685	415	
Pulte						1050			80	145	155	85	
Kimball Hill						380			75	190	250	135	
Bowes Creek						774			180	440	510	315	
									<b>0.17</b>	<b>0.83</b>	<b>0.67</b>	<b>0.33</b>	
R15	Multi Family	22	16.5		6	99	0.44	0.54	5	35	35	20	
R16	Multi Family	112	84		6	504	0.44	0.54	40	185	180	90	
Wyndam Deerpoint	Multi Family					66	0.44	0.54	5	25	25	10	
	<b>Total</b>					<b>11007</b>			<b>1905</b>	<b>5575</b>	<b>5925</b>	<b>3360</b>	
<b>Commercial</b>								<b>retail</b>	<b>0.61</b>	<b>0.39</b>	<b>0.48</b>	<b>0.52</b>	
								<b>office</b>	<b>0.89</b>	<b>0.11</b>	<b>0.14</b>	<b>0.86</b>	
	C1	Retail	25	25	1,089,000	0.25	272	1.03	3.13	170	110	410	445
		Office	25	25	1,089,000	0.25	272	1.74	1.5	420	50	55	350
	C2	Retail	28	28	1,219,680	0.25	305	1.03	3.01	190	120	440	475
		Office	28	28	1,219,680	0.25	305	1.74	1.5	470	60	65	395
	C3	Retail	47	47	2,047,320	0.25	512	1.03	2.52	320	205	620	670
		Office	47	47	2,047,320	0.25	512	1.74	1.5	795	100	105	660
McKay Property						650			415	290	1050	1260	
	<b>Total</b>					<b>2,828</b>			<b>2780</b>	<b>935</b>	<b>2745</b>	<b>4255</b>	
<b>Industrial</b>								<b>Warehouse</b>	<b>0.82</b>	<b>0.18</b>	<b>0.24</b>	<b>0.76</b>	
								<b>Manufacturing</b>	<b>0.77</b>	<b>0.23</b>	<b>0.36</b>	<b>0.64</b>	
	I1	Warehouse	80	60	2,613,600	0.4	1,045	0.45	0.51	385	85	130	405
		Manufacturing	35	26	1,143,450	0.4	457	0.73	0.74	255	75	120	215
	I2	Warehouse	41	31	1,339,470	0.4	536	0.45	0.51	200	50	65	210
	Manufacturing	18	14	588,060	0.4	235	0.73	0.74	130	40	65	110	
	<b>Total</b>					<b>2,274</b>			<b>970</b>	<b>250</b>	<b>380</b>	<b>940</b>	
<b>TOTAL</b>									<b>5655</b>	<b>6760</b>	<b>9050</b>	<b>8555</b>	
<b>Total Site Generated Trips</b>									<b>12415</b>			<b>17605</b>	

## **2010 Forecasted Traffic Volumes**

Combining background traffic with site generated traffic associated with planned 2010 land development produced forecasted traffic for 2010. The background traffic grown from the existing count year at two percent per year was combined with the site generated traffic determined from planned new developments that have been projected to occur by 2010. The resulting 2010 traffic forecast was used subsequently in the development of the "interim plan" for the Elgin Far West Area.

## **2020 Forecasted Traffic Volumes**

Forecasts of 2020 traffic utilized a similar process, building upon the 2010 projections. Background traffic was increased by one percent per year for the period from 2010 to 2020. Then, site-generated traffic from all of the developments was added to the forecasted background traffic.

## **Data Management and Analysis Procedures**

A data management system was developed to facilitate entry, maintain, and manipulate the large amount of data required and procedures developed to exchange data with traffic analysis software. A geographical information system (GIS) database was used to store the necessary spatial and non-spatial data such as the various traffic data and geometric data. Data exchange with traffic analysis software was also incorporated into the process to allow for more efficient and accurate traffic operational analysis. The data management and analysis procedures used allowed seamless transfer of data between data entry, analysis, and mapping software.

### **Database**

A database was developed to organize and manage the extensive number of traffic volumes. The database developed in Access, a Microsoft Office Suite program, and in conjunction with a GIS database served as a central data repository to support many processes used throughout the planning study. Attributes of the traffic data included information regarding the alternative network, intersection, development, and peak period (AM or PM). The database was set up to trace traffic generated by each individual development through the entire study area. This provided a tool that could be used in considering the appropriate apportionment of costs to each of the development projects.

At each intersection, the turning movements generated by each development were summed together with the background traffic to create total intersection turning volumes. Summing the opposing intersection approach volumes at either end of a roadway segment created segment volumes. Export routines were developed to transfer the traffic data for each network and design year to Synchro, a traffic analysis software package. Finally, once the operational results were compiled, the database provided a linkage to GIS (geographic information systems software) for mapping.

### **Traffic Analysis Tools**

Synchro is a traffic analysis program that applies Highway Capacity Manual (HCM) procedures to determine the level of service (LOS) of intersections given the traffic volume, geometric configuration, and control type. There were three reasons for selecting Synchro

for use in this project. First, the input volumes and analysis results could be easily transferred to/from the database eliminating the need to re-key data. Secondly, efficiency could be increased by analyzing multiple intersections in one analysis. Finally, Synchro's enhanced ability to analyze coordinated signals, such as those along Randall Road, would be especially valuable.

Synchro provides tools to optimize cycle length, signal splits, timing, and offsets. However, signal phasing was optimized manually. Guidelines and parameters that were applied in traffic operational analyses are presented in Appendix A.

## **Plan Development**

The plan development phase of the study consisted of three stages. First, an operational analysis was conducted of present traffic demand on the existing roadway network. The intent of this analysis was to establish how much of the cost of roadway and intersection improvements would be attributable to existing deficiencies. This was followed by analysis and plan development assuming conditions expected in 2010. This analysis would indicate the level of improvement needed for an "interim plan." In addition, the 2010 recommended improvements would reflect the highest priority needs for the public agencies to consider in implementing transportation improvements as development occurs. Finally, the 2020 analysis would serve as the "ultimate plan". The ultimate plan would recommend a list of improvements needed to address the projected extensive growth in population and employment in the Elgin Far West Area. The 2020 ultimate plan would provide for the roadway capacity needs for the area, along with pedestrian/bike crossings and railroad safety improvements. Furthermore, an extension of Corron Road is incorporated into the plan to provide an additional north-south regional connection through the area that would divert some traffic from Randall Road and adjacent roadways.

Proposed improvements for both 2010 and 2020 were developed using a stepwise process. The intent of this process was to evaluate performance of the improvements at each step thereby assessing the extent of capacity enhancement needed to obtain an adequate level of service (LOS E) during the PM peak hour. Figure 7 is a flowchart showing the sequence of steps followed in plan development. The order of considering improvements for each planning horizon provided initially for incorporation of collector roads into the network, followed by modifications to intersection control, geometric improvements to intersections, and finally widening of existing roads where the throughput traffic volume warranted additional capacity. As shown in the flowchart, the plan development process was cumulative, adding sets of improvements leading to the creation of an overall plan.

## **Existing Network and Traffic Analysis**

The analysis of present traffic demand on the existing network showed three intersections to be severely congested (operating at LOS F) under current conditions. See Figure 8. The costs of improving these intersections have been excluded from the cost estimates used in the allocation process, thereby removing the cost of existing deficiencies from the overall cost attributable to future development.

## 2010 Interim Plan

Assignment of 2010 traffic to the existing roadway system showed that slightly less than one-half of the study area intersections would operate at LOS F. Figure 9 shows system performance of the existing network with 2010 traffic demand. Table 5 shows the analysis results at the conclusion of each phase of the process.

**New Roads.** The first step in the plan development process was to incorporate the new collector roads into the traffic network. See Figure 10. The new collector roads would serve a dual function of providing mobility as well as access to abutting land uses. An efficient and continuous collector road network could provide many benefits to the City of Elgin and Kane County. The collectors would be effective in diverting some traffic from arterials, thereby providing enhanced mobility and would provide an alternative route if an incident occurred or during a special event. In addition, collector roads would provide easy and safe access to abutting residential areas and would help to control access onto the arterials.

The addition of approximately 16-route-miles of new roads along with the Corron Road extension would improve system operational performance by redistributing some of the traffic from the existing arterial system. For planning purposes, it was assumed that the entire collector road system as well as the Corron Road extension would be constructed initially. This allowed for impartial comparisons of system performance with either 2010 or 2020 traffic volumes. Any new intersection added on the county system should incorporate full channelization for left and right turns. The Corron Road extension would be a new north-south arterial connection from Bowes Road to IL 72 using Switzer and McCornack Roads for a portion of its length. It was assumed that seven percent of the background traffic would be diverted from Randall Road to extended Corron Road. Figures 11 and 11A illustrate the 2010 PM peak hour traffic on the proposed system.

The redistribution of traffic would translate into operational performance improvements. Although the same number of existing intersections would operate at a LOS F after provision of the Corron Road extension and collector roads, thirteen intersections would realize a reduction in the delay experienced by drivers. Just one intersection (Nesler Road/Bowes Road) would improve from LOS F to a higher level of service (LOS D). Performance of two intersections (U.S. 20/Switzer Road and Corron Road/McDonald Road) would degrade in performance to LOS F. Three intersections in the existing network, U.S. 20/Plank Road, Bowes Road/Water Road, and Plank Road/Coombs Road were eliminated from the future network due to the effects of realigning some existing roadways. Of the thirteen new intersections created by the network additions, two would operate at a LOS F (North/South Road/Bowes Road and the Russell Extension/U.S. 20). The poor LOS at these locations would result mainly from demand associated with diversion of traffic to the Corron Road extension, and of provision of new intersections tying into already congested roadways. See Table 5.

Provision of the proposed collectors generally would improve performance on existing roads. The required number of lanes for acceptable operation on Randall Road would drop from a six-lane cross-section to the existing 4-lanes from McDonald Road to north of Bowes



TABLE 5  
2010 Forecast Traffic Performance

Intersection	Control Type	Existing Network		Future Network – + New Roadways		Future Network – + Intersection Control		Future Network – + Geometric Improvements		Future Network – + Widening	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Coombs Rd. & Highland Ave.	all way stop controlled	B	11.4	B	11.3	B	11.3	B	11.3	B	11.3
US 20 & Switzer Rd.	two way stop controlled	E	35.3	F	***	F	***	F	***	F	***
Randall Rd. & Highland Ave.	signal	F	100.2	F	84.7	F	84.7	F	80.1	C	21.4
Plank Rd. & Switzer Rd.	two way stop controlled	B	12.8	D	31.8	D	31.8	D	31.8	D	31.8
Coombs Rd. & US 20	two way stop* controlled	F	***	F	***	C	23.4	C	23.4	C	23.4
Plank Rd. & US 20	two way stop controlled	C	24.2								
Russell Rd. & Plank Rd.	two way stop controlled	B	11.3	E	43	E	43	E	43	E	43
Nesler Rd. & US 20	two way stop* controlled	F	***	F	***	D	42.8	D	43.2	D	43.3
Weld Dr. & US 20	two way stop* controlled	F	***	F	***	E	71.7	E	71.7	E	71.7
Randall Rd./US 20/Foothill Rd.	signal	F	196.8	F	192.7	F	192.7	F	143.9	F	113.5
Randall Rd./US 20/Weld Rd.	signal	F	119.2	F	113.8	F	113.8	F	106.4	E	55.4
Randall Rd. & Weld Dr.	signal	F	88	E	77	E	77	E	68.6	B	15.9
Muirhead Rd. & Russell Rd.	two way stop controlled	B	11	B	10.6	B	10.6	B	10.6	B	10.6
Randall Rd. & South St.	signal	F	96.5	F	89.5	F	89.5	F	84.6	C	34.3
Nesler Rd. & Water Rd.	two way stop controlled	B	12.9	B	13	B	13	B	13	B	13
Randall Rd. & College Green Dr.	signal	F	103.2	F	83.1	F	83.1	F	82.4	B	10.4
Crawford Rd. & Bowes Rd.	two way stop controlled	B	10.2	A	9.8	A	9.8	A	9.8	A	9.8
Corron Rd. & Bowes Rd.	two way stop** controlled	C	24	F	***	E	42.7	E	42.7	E	42.7
Nesler Rd. & Bowes Rd.	two way stop controlled	F	68.5	D	28.6	D	28.6	D	28.6	D	28.6
Randall Rd. & Bowes Rd.	signal	F	219	F	189.8	F	189.8	F	133.1	F	98.9
Water Rd. & Bowes Rd.	two way stop controlled	F	***								
Nolan Rd. & Bowes Rd.	two way stop controlled	C	20	B	14	B	14	B	14	B	14
Randall Rd. & Hopps Rd.	signal	F	233.8	F	257.8	F	257.8	F	119.5	E	72
Hopps Rd. & Stevens Rd.	two way stop controlled	A	9	A	9	A	9	A	9	A	9
Corron Rd. & McDonald Rd.	two way stop** controlled	E	38	F	149.1	C	18.4	C	18.4	C	18.4
McDonald Rd. & Stevens Rd.	two way stop controlled	C	22.3	E	36.8	E	36.8	E	36.8	E	36.8
Randall Rd. & McDonald Rd.	signal	B	19.6	B	18.8	B	18.8	B	18.2	B	18.3
Coombs Rd. & Plank Rd.	two way stop controlled	B	14.8								
North/South Rd. & Bowes Rd.	two way stop controlled			F	91.1	F	91.1	F	58.9	F	58.9
Randall Backage & Bowes Rd.	two way stop controlled			B	14.7	B	14.7	B	14.7	B	14.7
East/West 3 & Randall Rd.	signal			B	14.2	B	14.2	B	12.7	A	6.6
Nesler Rd & East/West 1	two way stop controlled			D	28.3	D	28.3	D	28.3	D	28.3
Russell Ext & US 20	two way stop controlled			F	71.5	F	71.5	F	71.5	F	71.5
Nesler Ext & Highland	two way stop controlled			A	9.5	A	9.5	A	9.5	A	9.5
North/South Rd & East/West 1	all way stop controlled			A	8.1	A	8.1	A	8.1	A	8.1
Russell Rd & East/West 1	two way stop controlled			B	10.5	B	10.5	B	10.5	B	10.5
Russell Rd & Corron Ext	all way stop controlled			A	8.8	A	8.8	A	8.8	A	8.8
North/South Rd & East/West 2	all way stop controlled			A	8.5	A	8.5	A	8.5	A	8.5
Hopps Rd & Randall Backage	two way stop controlled			B	12.6	B	12.6	B	12.6	B	12.6
Coombs & Russell Ext	two way stop controlled			A	9.7	A	9.7	A	9.7	A	9.7
Nesler Ext & US 20 Backage	two way stop controlled			A	0	A	0	A	0	A	0

\* Signalized in the intersection control step  
 \*\* Changed to all-way stop controlled in intersection control step  
 \*\*\* Represents delay too large to calculate

Road. Both Bowes Road and Hopps Road could be maintained at two-lanes. Four through lanes would be required on U.S. 20 west of Weld Road to Coombs Road. This would represent two more through lanes than are presently provided.

**Intersection Control.** The next step in the plan development process was to determine which of the existing stop-controlled intersections operating at LOS F could benefit from improved intersection control. It was determined that three intersections along U.S. 20 would meet the warrants specified in the 2000 Manual on Uniform Traffic Control Devices (MUTCD) for signalization by 2010.

- U.S. 20 /Weld Drive
- U.S. 20 /Nesler Road
- U.S. 20 /Coombs Road

Two other intersections would be improved to all-way stop controlled.

- Bowes Road /Corron Road
- McDonald Road /Corron Road

In addition to intersection control improvements, geometric modifications such as turn lanes would be added to build-out these intersections. Table 5 lists the improvements and shows the resulting level of service and delay. For each of the intersections listed above, operations would be improved to LOS E or better.

**Intersection Geometric Improvements.** Following the investigation of intersection control improvements, each of the remaining ten intersections still operating at LOS F were evaluated to determine the effect of improving intersection geometry. Geometric improvements would include the addition of turn lanes, and/or modification of signal timing and phasing to maximize performance. These adjustments just minimally improved performance. Although intersection delay would be less for most of the intersections, there would be no improvement in level of service. See Table 5.

**Roadway Widening.** It was evident from the prior steps in the plan development process that improving intersection control and geometrics would yield some benefits, but widening of some existing roads would be needed to manage the significant increase in traffic volumes. The interim plan was augmented, therefore, by widening of Randall Road to six-lanes between Highland Avenue and Hopps Road. Traffic operations would be improved at five traffic signals on Randall Road. There would still be five intersections operating at LOS F, but further network modifications were deemed infeasible. An unreasonable degree of improvement would be required to bring these locations to an acceptable LOS. See Table 5.

**Summary of 2010 System Performance.** As shown in Table 6, the 2010 network would incorporate improvements to signal controls, geometric improvements and road widening. Overall the 2010 network would consist of:

- 15.9 route miles of new roadways (collector roadways and the Corron Road extension),
- Three intersections with improved signals and geometric modifications,
- Two intersections converted to all-way stop control with further geometric improvements,
- Seven intersections with only geometric improvements, and
- 7.4 new lane-miles of widening to existing roadways.

**TABLE 6**  
2010 Improvements to Existing Facilities

Process Step	Intersection/Location	Description of Improvement
Intersection Control	US 20 & Weld Road	Signalize Intersection Add left turn lane – NB/SB Add right turn lane – EB/WB
	US 20 & Nesler Road	Signalize Intersection Add left turn lane – all approaches Add right turn lane – all approaches
	US 20 & Coombs Road	Signalize Intersection Add left turn lanes – all approaches Add right turn lanes – all approaches
	Corron Road & Bowes Road	All-way Stop Control Add left turn lanes – all approaches Add right turn lanes – all approaches
	Corron Road & McDonald Road	All-way Stop Control Add left turn lanes – NB/SB
Geometric Improvements	Randall Road & Highland Avenue	Add right turn lane – EB
	Randall Road/US 20/Foothill Road	Add left turn lanes – WB Add right turn lanes – NB/SB Add dual left turn lanes – EB Add dual right turn lanes – EB
	Randall Road/US 20/ Weld Road	Add right turn lanes – NB/EB Add dual left turn lanes – NB
	Randall Road & Weld Road	Add right turn lanes – EB Add dual left turn lanes – EB
	Randall Road & South Street	Add right turn lanes – NB Add dual left turn lanes – NB
	Randall Road & Bowes Road	Add right turn lanes – SB/EB Add dual left turn lanes – all approaches
	Randall Road & Hopps Road	Add left turn lanes – EB/WB Add right turn lanes – all approaches
Widening	Randall Road	Hopps Road to Highland Road

The improvements and performance of the proposed 2010 interim plan is presented in Figures 12 and 12A. The improvements shown would be future priority projects. These are projects that should be completed in conjunction with development expected to occur by 2010.

### 2020 Ultimate Plan

The process used in developing the 2020 ultimate plan was generally the same as that utilized for the 2010 plan. Table 7 shows the analysis results at the conclusion of each phase of the process. Note that one additional step – assignment of 2020 traffic to the network including proposed 2010 improvement projects – has been incorporated into the analysis.

TABLE 7  
2020 Forecast Traffic Performance

Intersection	Control Type	Existing Network		Future Network – New Roads		Future Network – Interim Improvements		Future Network – Intersection Control		Future Network – Geometric Improvements		Future Network – Widening	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Coombs Rd. & Highland Ave.	all way stop #	F	80.4	F	125.7	F	125.7	B	16.6	B	16.6	B	14.8
US 20 & Switzer Rd.	two way stop #	F	***	F	***	F	***	D	50.3	D	50.4	D	46.9
Randall Rd. & Highland Ave.	Signal	F	174.6	F	187.6	F	143.3	F	143.3	F	111.7	F	87.7
Plank Rd. & Switzer Rd.	two way stop #	C	21.6	F	***	F	***	C	24	C	22.4	C	23
Coombs Rd. & US 20	two way stop*	F	***	F	***	F	103.7	F	104.8	F	84.2	C	24.7
Plank Rd. & US 20	two way stop	F	***										
Russell Rd. & Plank Rd.	two way stop #	F	375.9	F	***	F	***	B	17.3	B	18.1	C	23
Nesler Rd. & US 20	two way stop*	F	***	F	***	F	207.3	F	204.3	F	175.7	F	94.7
Weld Dr. & US 20	two way stop*	F	***	F	***	F	262.4	F	262.4	F	273.5	E	68.3
Randall Rd./US 20/Foothill Rd.	Signal	F	218.3	F	218.8	F	80.8	F	80.8	F	121.6	F	123.1
Randall Rd./US 20/Weld Rd.	Signal	F	180.4	F	162.8	F	112.7	F	112.7	F	96.8	F	97.1
Randall Rd. & Weld Dr.	Signal	F	146	F	128.5	D	53.8	D	53.8	E	56	E	55.9
Muirhead Rd. & Russell Rd.	two way stop	B	13.9	B	11.2	B	11.2	B	11.2	B	11.2	B	11.2
Randall Rd. & South St.	Signal	F	140	F	139.2	F	95.6	F	95.6	F	84	E	79
Nesler Rd. & Water Rd.	two way stop	F	98.4	D	29.4	D	29.4	D	29.4	D	29.4	D	29.4
Randall Rd. & College Green Dr.	Signal	F	168.8	F	149.2	D	35.1	D	35.1	D	37.5	D	36.4
Crawford Rd. & Bowes Rd.	two way stop controlled	B	10.9	A	9.9	A	9.9	A	9.9	A	9.9	A	9.9
Corron Rd. & Bowes Rd.	two way stop** #	F	408.3	F	***	F	168.7	C	20.1	C	20.1	B	18.9
Nesler Rd. & Bowes Rd.	two way stop #	F	***	F	517.1	F	517.1	B	14.9	B	14.9	B	14.9
Randall Rd. & Bowes Rd.	Signal	F	228.8	F	218.3	F	149.3	F	149.3	F	150	F	97.3
Water Rd. & Bowes Rd.	two way stop	F	***										
Nolan Rd. & Bowes Rd.	two way stop	D	27.2	C	16.1	C	16.1	C	16.1	C	16.1	B	14.8
Randall Rd. & Hopps Rd.	Signal	F	235.1	F	257.2	F	121.1	F	121.2	F	121.2	D	50.1
Hopps Rd. & Stevens Rd.	two way stop	A	9.3	A	9.4	A	9.4	A	9.4	A	9.4	A	9.4
Corron Rd. & McDonald Rd.	two way stop** #	F	301.1	F	***	F	108.5	B	14.2	B	14.2	B	11.2
McDonald Rd. & Stevens Rd.	two way stop##	D	31.1	F	92.4	F	92.4	C	22.5	C	22.5	C	22.5
Randall Rd. & McDonald Rd.	Signal	F	89	E	58.4	D	39.5	D	39.5	D	39.5	D	39.2
Coombs Rd. & Plank Rd.	two way stop	F	268.1										
North/South Rd. & Bowes Rd.	two way stop #			F	***	F	***	B	17.5	B	17.5	B	16.8
Randall Backage & Bowes Rd.	two way stop			C	22.4	C	22.4	C	22.4	C	22.4	C	18.5
East/West 3 & Randall Rd.	Signal			D	42.8	B	11.2	B	11.2	B	11.4	A	9.8
Nesler Rd & East/West 1	two way stop #			F	***	F	***	C	21.5	B	12.7	B	17.1
Russell Ext & US 20	two way stop #			F	***	F	***	D	48.3	D	48.9	C	21.1
Nesler Ext & Highland	two way stop			C	18.7	C	18.7	C	18.7	C	18.7	C	18.5
North/South Rd & East/West 1	all way stop			B	12.9	B	12.9	B	12.9	B	12.9	B	12.9
Russell Rd & East/West 1	two way stop			B	14.4	B	14.4	B	14.4	B	14.4	B	14.1
Russell Rd & Corron Ext	all way stop			B	13.6	B	13.6	B	13.6	B	13.6	B	13.6
North/South Rd & East/West 2	all way stop			C	23.7	C	23.7	C	23.7	C	23.7	C	23.7
Hopps Rd & Randall Backage	two way stop			B	13.4	B	13.4	B	13.4	B	13.4	B	13.4
Coombs & Russell Ext	two way stop #			F	6543.9	F	6543.9	C	21	C	22.1	B	14.8
Nesler Ext & US 20 Backage	two way stop			C	17.8	C	17.8	C	17.8	C	17.8	C	17.8

\* Signalized in the intersection control step (2010), # signalized in intersection control step (2020)

\*\* Changed to all-way stop controlled in intersection control step (2010), ## Changed to all-way stop controlled in intersection control step (2020)

\*\*\* Represents delay too large to calculate

The process began with assignment of forecasted 2020 traffic to the existing roadway network (first column from the left in Table 7). Figure 13 presents system performance of the existing network with projected 2020 traffic demand. Of 28 existing intersections that were analyzed, 22 would operate at LOS F under 2020 forecasted traffic conditions.

**New Roads.** The analysis continued with the assignment of 2020 traffic to the existing network augmented, as described earlier, with new collector roads and the Corron Road extension. See Figures 14 and 14A. As with the 2010 analysis, the redistribution of travel to the new roads would benefit traffic circulation resulting in enhanced performance. Three fewer intersections would operate at LOS F. In addition, delay would be less at eleven existing intersections. Of the thirteen new intersections that would be created by addition of the new roads, four would operate at LOS F.

Addition of collector roads to the transportation network would alleviate the need to widen some existing roads. Without the collector system, Randall Road would have to be widened to 6+ lanes. Presence of the collectors would reduce this need to just one additional lane in each direction (for a total of six) between Hopps Road and Bowes Road. The number of lanes required on Bowes Road west of Randall Road would be reduced from six to four. Widening of Hopps, Nesler and Coombs Roads would also be averted except for Hopps Road at Randall Road and Nesler Road at U.S. 20 where a 4-lane section would be needed at the intersection.

**2010 Interim Improvements.** The next step in the process was to analyze the 2010 interim improvements with 2020 traffic. One effect of the 2010 projects would be to improve LOS at the intersections of Randall Road with Weld Drive, College Green Drive, McDonald Road and East/West Segment 3. Delay would be reduced at eleven additional intersections, but they would still operate at LOS F. The analysis results are also shown in Table 7.

**Intersection Control.** Next, a determination was made of which existing stop-controlled intersections operating at LOS F might benefit from improved intersection control. Eleven of the twelve stop-controlled intersections operating at LOS F would meet signalization warrants specified in the 2000 Manual on Uniform Traffic Control Devices (MUTCD). See Table 7. The remaining intersection would be converted to all-way stop control. Each of these twelve intersections improved to an acceptable level of service.

**Intersection Geometric Improvements.** Each of the eight remaining intersections operating at LOS F was then evaluated to determine the effect of improving intersection geometry. Geometric improvements would include the addition of turn lanes and/or modifying signal timing and phasing to maximize performance. Although intersection delay would be reduced at several of these intersections, the analysis yielded no change in level of service. See Table 7.

**Roadway Widening.** The final set of improvements incorporated into the 2020 plan would consist of widening existing roads. U.S. 20 would be widened to six-lanes from Randall Road to past Nesler Road, and then widened to four-lanes westerly to just past the Russell Road extension. Bowes Road, Hopps Road, Highland Avenue, and McDonald Road would each be widened to four-lanes in the segments adjacent to Randall Road. See Table 7.

**Summary of 2020 System Performance.** The proposed improvements incorporated into the 2020 transportation plan include those described earlier for the 2010 interim plan along with

signalization and geometric improvement of 11 intersections, all-way stop control at one intersection, further geometric improvements to 15 intersections, and widening of 7.7 lane-miles of roadway. With implementation of these projects, there would be just five intersections in the study area still operating at LOS F:

- **Randall/U.S. 20/Foothill and Randall/U.S. 20/Weld** – These ramp terminal intersections would remain at LOS F because improvement of the upstream intersection of Randall Road and Highland Avenue would allow larger traffic platoons to reach the Randall/U.S. 20 interchange. A further study of the U.S.20/Randall Road interchange is required to determine the best solution to this problem.
- **Randall Road/Highland Avenue, Randall Road/Bowes Road and U.S. 20/Nesler Road** – The costs and impacts of further modifications of these intersections would not justify the benefits gained.

Improvement projects comprising the 2020 recommended plan (excluding projects described earlier for the 2010 plan) are presented below in Table 8. New roadways, intersection control and lane arrangement, and the proposed number of lanes on major roadways in the 2020 plan are shown in Figures 15 and 15A.

**TABLE 8**  
2020 Improvements to Existing Facilities

Process Step	Intersection/Location	Description of Improvements
Intersection Control	Stevens Road & McDonald Road	All-way Stopped Controlled Add left turn lanes – NB/SB Add right turn lanes – EB/WB
	Corron Road & Bowes Road	Signalized
	Nesler Road & Bowes Road	Signalized Add left turn lanes – SB/EB Add right turn lanes – WB
	North/South Road & Bowes Road	Signalized
	Plank Road & Corron Road Extension	Signalized Add left turn lanes – all approaches Add right turn lanes – all approaches
	U.S. 20 & Corron Road Extension	Signalized Add left turn lanes – all approaches Add right turn lanes – all approaches
	U.S. 20 & Russell Road Extension	Signalized
	Russell Road Extension & Coombs Road	Signalized
	Highland Avenue & Coombs Road	Signalized Add left turn lanes – all approaches Add right turn lanes – all approaches
	East/West 1 & Nesler Road	Signalized Add right turn lanes – all approaches
	McDonald Road & Corron Road	Signalized Add left turn lanes – all approaches Add right turn lanes – all approaches

**TABLE 8**  
2020 Improvements to Existing Facilities

<b>Process Step</b>	<b>Intersection/Location</b>	<b>Description of Improvements</b>
	Russell Road & Plank Road	Signalized Add left turn lanes – NB/SB/WB Add right turn lanes – all approaches
Geometric Improvements	U.S. 20 & Coombs Road	Add dual left turn lanes – WB/SB Add dual right turn lanes – NB
	U.S. 20 & Nesler Road	Add dual left turn lanes – WB/SWB Add dual right turn lanes – NEB
	U.S. 20 & Weld Road	Add dual left turn lanes – WB
	Highland Avenue & Randall Road	Add dual left turn lanes – NB/SEB
	Randall Road/US 20/Foothill Road	Add dual left turn lanes – NB Add dual right turn lanes – SB
	Randall Road/US 20/Weld Road	Add dual left turn lanes – EB Add dual right turn lanes – EB
	South Road & Randall Road	Add dual left turn lanes – EB
	Nesler Road & Bowes Road	Add left turn lanes – NB/WB Add right turn lanes – EB
	Nesler Road & Water Road	Add right turn lanes – WB
Widening	US 20	Four-lanes – West of Russell Road Extension to East of Coombs Road
	US 20	Six-lanes – West of Nesler Road to Randall Road
	Bowes Road	Four-lanes – Through Randall Road
	Hopps Road	Four-lanes – Through Randall Road
	Highland Avenue	Four-lanes – Through Randall Road
	McDonald Road	Four-lanes – Through Randall Road

## Cost

One objective of this project was to establish a means to determine the proportion of the total cost of roadway improvements that would be attributable to each proposed land development. The amount that might be attributed to each development would be directly proportional to the percentage of total traffic generated by the development. But in order to arrive at this amount, it was first necessary to develop estimates of the cost of each improvement comprising the 2020 plan.

### Cost Estimating Assumptions

There were three basic types of projects, new roads, widening roads on existing facilities, and intersections. The cost components for the new roadway segments include the following: new roadway, new structures, railroad improvements, and right-of-way. The cost

components for the widening projects are similar to new roadway projects and includes widening, resurfacing, factor for closed drainage, new structures, widening structures, and right-of-way. The components for the intersection improvements included: control upgrades, railroad control upgrades, and turn lanes. The right-of-way cost was attributed to segment cost, either new or widening cost. The assumed right-of-way width was large enough to allow for additional turn lanes at intersections precluding the need for right-of-way cost at intersections. A 20 percent contingency was applied to the construction costs.

The unit costs for various project components were taken from data that had been developed earlier for the Strategic Regional Arterial (SRA) study and supplemented with information from Kane County and the City of Elgin. Table 9 shows the unit cost assumptions based on 2001 prices.

**TABLE 9**  
Unit Cost Assumptions

	<b>Assumptions</b>	<b>Unit Cost</b>	<b>Unit</b>
Segment Cost	Widening	\$500,000	Lane-mile
	Resurfacing	\$1.33	Square-foot
	New Construction	\$2,200,000	Route-mile for 2/3 lanes
		\$4,500,000	Route-mile for 4/5 lanes
	Minor Water-way Bridge	\$1,500,000	6-Lane bridge
		\$1,000,000	4-Lane bridge
	Widening Structures	\$150	Square-foot
	Cost of ROW --Widening	\$10	Square-foot – commercial areas
		\$5	Square-foot – residential areas
		\$3	Square-foot – open areas
	Cost of ROW – New Construction	\$130,000	Acre – open areas
		\$350,000	Acre – mixed areas
	Factor for closed drainage	1.05	Widening and Resurfacing Cost
Railroad grade separation	\$10,000,000	Each	
Intersection Cost	Signal	\$150,000	Intersection
	Stop	\$50,000	Intersection
	Railroad signal upgrade	\$300,000	For Bowes and Nesler
	Turn Lane Cost	\$7	Square-foot
	Total Turn Lane Cost	\$28,560	Turn lane
Misc. Cost	Bike/Ped Bridge	\$120	Square-foot
	Total Bike/Ped Bridge	\$1,600,000	Each
	Contingencies	20%	Total Cost of Construction
	Additional Railroad upgrades	\$300,000	Study Area



## Improvement Cost

Total cost of all projects included in the 2020 transportation improvement plan for the Elgin Far West Area would amount to approximately \$143 million at 2001 price levels. Table 10 presents a breakdown of the cost of construction and right-of-way as well as total cost for each type of improvement. A summary of the estimated project cost by location is presented in Table 11.

**TABLE 10**  
Summary of Estimated Cost of the Elgin Far West 2020 Transportation Plan by Type of Improvement

Type of Improvement	Estimated Cost (\$ million)		
	Construction	Right-of-Way	Total
Widening	30.7	12.0	42.7
New Roads	64.4	22.7	87.1
Intersections	9.6	0.0	9.6
<b>Subtotal</b>	<b>104.6</b>	<b>34.8</b>	<b>139.4</b>
Bike/Ped Xing	3.2		3.2
Railroad Safety	0.3		0.3
<b>Subtotal</b>	<b>3.5</b>		<b>3.5</b>
<b>Total (Rounded)</b>	<b>108</b>	<b>35</b>	<b>143</b>

**TABLE 11**

Estimated Cost by Location

**Widening Summary**

Imp	Location	TOTAL
Randall Road	Hopps Rd. to East/West 3	\$1.05
	East/West 3 to Bowes Road	\$0.83
	Bowes Rd. to College Green	\$1.34
	College Green to South St.	\$3.41
	South St. to Weld Rd.	\$2.41
	Weld Rd. to US20/Weld	\$0.49
	US 20/Weld to US20/Foothill	\$3.73
	US20/Foothill to Highland Ave.	\$4.52
Hopps Road	E. of Randall Rd.	\$0.65
Bowes Road	Nesler Road to Nolan Road	\$1.08
	Nolan Road to North/South Road	\$1.72
	North/South Road to 4-lane section	\$1.81
	3-lane section to Randall Backage	\$1.22
	Randall Backage to Randall Rd.	\$0.79
	E. of Randall Rd.	\$0.43
	W. of Randall Rd.	\$1.67
South Street	E. of Randall Rd.	\$0.13
	W. of Randall Rd.	\$1.53
Highland Avenue	E. of Randall Rd.	\$0.65
	W. of Randall Rd.	\$0.79
McDonald Rd.	E. of Randall Rd.	\$1.19
	2-lane section to Russell Ext.	\$1.31
US 20	Russell Ext to Coombs Rd.	\$0.69
	Coombs Rd. to 6-lane section	\$2.27
	4-lane section to Nesler Rd.	\$1.77
	Nesler Rd. to Weld Rd.	\$3.10
	Weld Rd. to Randall Rd.	\$2.14
	<b>Subtotal</b>	<b>\$42.71</b>

Notes:

- Used 500K per lane mile for widening.
- Used \$12/s.y. for resurfacing
- Used \$150/s.f. for widening structure
- Contingency 20% of construction cost

R.O.W.:

- Commercial \$20/s.f.
- Residential \$5/s.f.
- Open \$3/s.f.

Includes cost to widen structure on Randall over U.S. 20.

**New Roads Summary**

Imp	Location	TOTAL
Corron Extension	Bowes Rd. to Russell Rd.	\$17.26
	Russell Rd. to Plank Rd.	\$4.91
	Plank Rd. to US 20	\$2.69
	US 20 to Highland Ave.	\$4.02
Russell Extension	Plank Rd. to US 20	\$0.49
	US 20 to Coombs	\$1.29
Nesler Extension	US 20 to US 20 Backage Rd	\$0.92
	US 20 Backage Rd. to Highland Ave.	\$4.48
US 20 Backage	Coombs Rd. to Nesler Rd.	\$4.27
North/South Road	Bowes Rd. to South St.	\$5.27
	South St to East/West 1	\$1.84
	East/West 1 to US 20	\$2.81
East/West 1	Russell Rd. to Nesler Rd.	\$3.23
	Nesler Rd. to North/South Rd.	\$2.26
South Street Extension	Water to North/South St.	\$4.61
	North/South St. to Current South Rd.	\$3.74
East/West 3	Bowes Rd. to Randall Backage	\$7.26
	Randall Backage to Randall Rd.	\$0.96
Hopps Realigned	W. of Randall	\$4.57
	E. of Randall	\$0.92
Randall Backage	Hopps Rd. to East/West 3	\$1.90
	East/West 3 to Bowes Rd.	\$1.40
Bowes Road	Tie in to existing Bowes Rd. to Corron Extn.	\$3.38
	Corron Extn to Nesler Road	\$2.62
	<b>Subtotal</b>	<b>\$87.11</b>

Notes:

- Cost of new collector roads @ \$2.2M/mile consistent with Elgin's assessment of \$400/ft.
- All roadways in this group used the same unit cost.
- Corron Extension includes a \$10M Construction for a new RR structure.

R.O.W.:

- Approximately \$3/s.f.

**Intersection summary**

	TOTAL
Coombs Rd. & Highland Ave.	\$0.45
US 20 & Switzer Rd.	\$0.39
Randall Rd. & Highland Ave.	\$0.10
Plank Rd. & Switzer Rd.	\$0.25
Coombs Rd. & US 20	\$0.56
Russell Rd. & Plank Rd.	\$0.42
Nesler Rd. & US 20	\$0.56
Weld Dr. & US 20	\$0.35
Randall Rd./US 20/Foothill Rd.	\$0.27
Randall Rd./US 20/Weld Rd.	\$0.17
Randall Rd. & Weld Dr.	\$0.07
Muirhead Rd. & Russell Rd.	\$0.00
Randall Rd. & South St.	\$0.10
Nesler Rd. & Water Rd.	\$0.00
Randall Rd. & College Green Dr.	\$0.03
Crawford Rd. & Bowes Rd.	\$0.00
Corron Rd. & Bowes Rd.	\$0.39
Nesler Rd. & Bowes Rd.	\$0.64
Randall Rd. & Bowes Rd.	\$0.21
Nolan Rd. & Bowes Rd.	\$0.10
Randall Rd. & Hopps Rd.	\$0.21
Hopps Rd. & Stevens Rd.	\$0.00
Corron Rd. & McDonald Rd.	\$0.45
McDonald Rd. & Stevens Rd.	\$0.20
Randall Rd. & McDonald Rd.	\$0.00
North/South Rd. & Bowes Rd.	\$0.39
Randall Backage & Bowes Rd.	\$0.16
East/West 3 & Randall Rd.	\$0.28
Nesler Rd & East/West 1	\$0.45
Russell Ext & US 20	\$0.45
Nesler Ext & Highland	\$0.16
North/South Rd & East/West 1	\$0.16
Russell Rd & East/West 1	\$0.16
Russell Rd & Corron Ext	\$0.33
North/South Rd & South Street Ext.	\$0.33
Hopps Rd & Randall Backage	\$0.16
Coombs & Russell Ext	\$0.45
Nesler Ext & US 20 Backage	\$0.16
<b>Subtotal</b>	<b>\$9.60</b>

Notes:

- R.O.W. consider for the segments and is not a part of the intersections. The additional R.O.W. at the intersections should be included in the segment determination.

## Cost Allocation

A method was developed to allocate attributable project implementation costs to proposed land developments in the Elgin Far West area. The allocation was based on total estimated cost of proposed 2020 improvements at 2001 price levels.

The cost of upgrading intersection control and adding turning lanes for intersections operating at LOS F under existing conditions would not be allocated to new development projects. However, since the cost of adding basic lanes had been incorporated with segment widening, the attributable cost of adding through lanes and expanded right-of-way at these deficient intersections would be allocated to developments.

Costs were allocated by first determining the percentage of total traffic generated by each development at a particular location. This percentage was then applied to the total project improvement cost for that location in order to determine how much of the total cost would be attributable to each development. The costs attributable to each development were then summed for all locations to arrive at the total estimated cost by development. See Table 12. More detailed summaries of estimated cost by location and development are contained in Appendix B.

**TABLE 12**  
Estimated Cost by Development

Development Project	Estimated Cost (2001 Dollars)				Total
	Intersection	Segment (Construction)	Segment (ROW)	Miscellaneous*	
B&B	\$211,000	\$2,632,000	\$743,000	\$85,000	\$3,671,000
Bowes Creek	\$450,000	\$5,141,000	\$1,388,000	\$169,000	\$7,148,000
Kimball Hill	\$99,000	\$1,385,000	\$532,000	\$83,000	\$2,099,000
McKay Property	\$188,000	\$7,028,000	\$2,212,000	\$142,000	\$9,570,000
Pulte Homes (North)	\$53,000	\$560,000	\$177,000	\$229,000	\$1,019,000
Town & Country	\$311,000	\$4,547,000	\$1,784,000	\$248,000	\$6,890,000
Wyndham Deerpoint	\$149,000	\$1,323,000	\$390,000	\$77,000	\$1,939,000
C1	\$206,000	\$2,530,000	\$987,000	\$118,000	\$3,841,000
C2	\$217,000	\$1,944,000	\$773,000	\$133,000	\$3,067,000
C3	\$171,000	\$4,262,000	\$2,573,000	\$223,000	\$7,229,000
I1	\$279,000	\$2,170,000	\$1,107,000	\$327,000	\$3,883,000
I2	\$184,000	\$3,446,000	\$1,096,000	\$168,000	\$4,894,000
R1	\$332,000	\$1,465,000	\$640,000	\$225,000	\$2,662,000
R2	\$13,000	\$103,000	\$43,000	\$10,000	\$169,000
R3	\$24,000	\$326,000	\$153,000	\$42,000	\$545,000
R4	\$257,000	\$3,011,000	\$1,025,000	\$274,000	\$4,567,000

**TABLE 12**  
Estimated Cost by Development

Development Project	Estimated Cost (2001 Dollars)				Total
	Intersection	Segment (Construction)	Segment (ROW)	Miscellaneous*	
R5	\$116,000	\$1,357,000	\$389,000	\$55,000	\$1,917,000
R6	\$288,000	\$4,317,000	\$1,175,000	\$202,000	\$5,982,000
R8	\$188,000	\$1,454,000	\$614,000	\$109,000	\$2,365,000
R9 – 2020	\$168,000	\$2,861,000	\$1,021,000	\$112,000	\$4,162,000
R10	\$5,000	\$173,000	\$53,000	\$18,000	\$249,000
R11	\$212,000	\$2,477,000	\$687,000	\$82,000	\$3,458,000
R12	\$46,000	\$458,000	\$137,000	\$17,000	\$658,000
R13	\$96,000	\$944,000	\$266,000	\$30,000	\$1,336,000
R14	\$173,000	\$3,506,000	\$1,222,000	\$103,000	\$5,004,000
R15	\$8,000	\$193,000	\$82,000	\$22,000	\$305,000
R16	\$57,000	\$956,000	\$522,000	\$110,000	\$1,645,000
R17	\$154,000	\$2,770,000	\$990,000	\$88,000	\$4,002,000
Future Background Traffic	\$4,904,000	\$31,722,000	\$12,007,000	\$0	\$48,633,000
<b>Total</b>	<b>\$9,560,000</b>	<b>\$95,060,000</b>	<b>\$34,790,000</b>	<b>\$3,501,000</b>	<b>\$142,911,000</b>

\* Bike/Pedestrian Crossings and Railroad Safety Upgrades

The City, County, and State would be responsible for approximately thirty six percent of the improvement cost. This is directly proportional to the volume of background traffic on the future network. If all of the remaining cost were allocated to proposed land development as described above, the average cost per residential unit would be \$5,600, and the average cost per square-foot of commercial floor area would be \$6.40.

### Priority Projects

The planning process calls for incrementally improving the network to reach an acceptable level of service. The 2020 Plan was used to determine the appropriate allocation of costs to land developments. The 2010 Interim Plan helped to identify projects that should be completed first. Priority projects are shown in green in Figure 16.

Priority projects would be completed to the level needed to comply with the ultimate plan. Exceptions would be the intersections of Corron Road with Bowes and McDonald Roads. Each of these intersections would be first upgraded to all-way stop control, but full signalization would be required for the 2020 plan.

## Improvement Alternatives

Alternatives were considered at four locations in development of the 2020 ultimate plan.

1. In the vicinity of Bowes Road and the Railroad tracks (Chicago Central and Pacific Railroad). This alternative would realign Bowes Road north of the existing railroad tracks in order to eliminate the railroad crossing at Bowes Road and Nesler Road. It would also relocate the intersection of Bowes Road and Corron Road north of the railroad tracks. Bowes Road would continue west and cross the tracks between Crawford Road and Corron Road.
2. At the intersection of Randall Road at the proposed East/West 3 collector road a new full access point is indicated in the Plan. The provision of a new access point along Randall Road and other County roads would need to follow the policies and procedures set forth by the County prior to acceptance of a new access point. An alternative would be to phase the improvement by providing right-in/ right-out access until full access at this location would be needed, then the County would consider and grant full access if warranted.
3. The intersection of Randall Road and Hopps Road. One of the options considered here would realign Hopps Road to eliminate the intersection skew at Randall Road. Another option would be to align Hopps Road from the east to cross Randall Road at a perpendicular angle and then continue north parallel and west of Randall Road. The portion of Hopps Road from the west would then 'T' into the realigned Randall Backage Road/Hopps Road.
4. The junction of Coombs Road/US 20/Russell Road/Plank Road consists of several closely spaced intersections in a triangular arrangement. The alternatives considered here would either eliminate one of the intersections or move the existing intersections farther apart to create greater separation between them.

The cost of the realignment of Bowes Road north of the railroad track and simple realignment of Hopps Road to intersect Randall Road were included in the total project cost and cost allocation. The other options were not incorporated in the cost allocation process, but should still be considered when development occurs in these areas.

## Conclusion

The intent of the Far West Elgin planning effort was to determine and report on the proportion of traffic demand on new and existing transportation facilities that may be attributed directly to each of the proposed development projects in the study area. At the request of the City of Elgin and the Kane County Division of Transportation, CH2M HILL applied the proportional traffic demand on the transportation network to the cost estimates of the proposed improvements. The cost summaries by development were not intended to be used as impact fees as defined by the State of Illinois legislation. However, the summary cost matrices in Appendix B will serve the City and County as a useful guide to the relative impact of each land development on the roadway system in the Elgin Far West Planning Area. These costs represent general planning level estimates, to be used at the discretion of the City of Elgin and Kane County. In some cases, developers may opt to build some of the

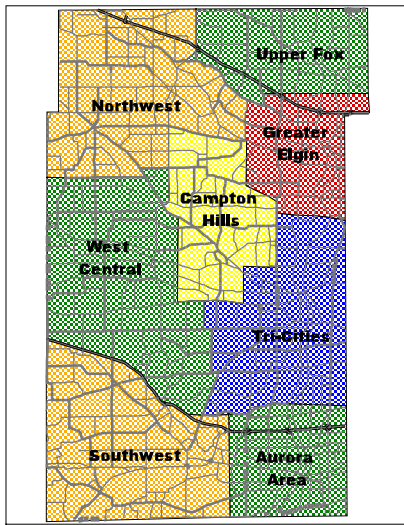
improvements as part of an annexation agreement. In these instances, adjustments should be made to the cost estimate summaries to reflect reductions for improvements that the developers have agreed to complete.

Approximately \$50 million of the improvement cost has been attributed to background traffic. It is assumed that public agencies would carry the burden of this cost to offset the impact of background traffic growth.

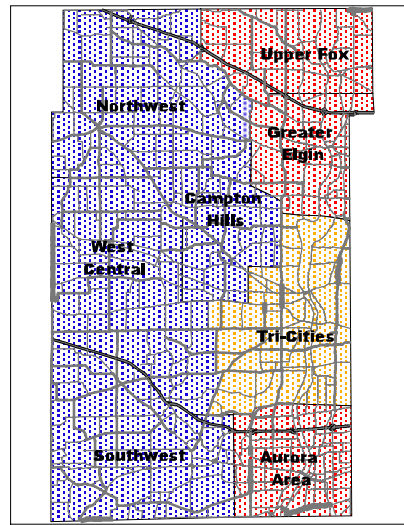
The intent of this planning process is to be responsive to projected development. Should the nature and/or character of the assumed development change, the results of this study would need to be reviewed and modified.

**Figures**

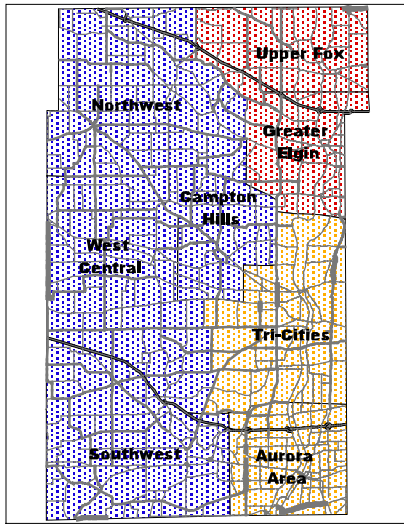
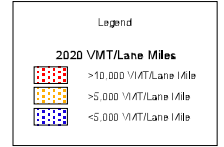
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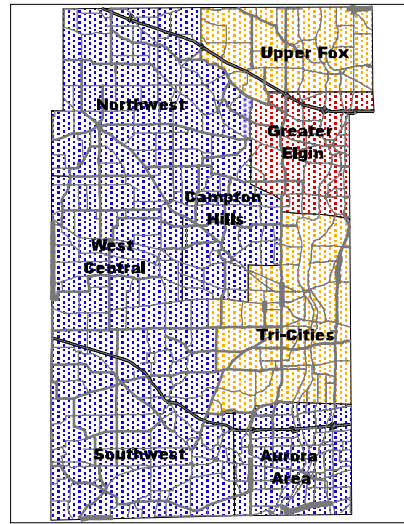
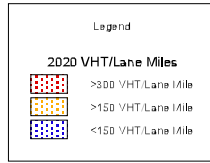
Planning Area Boundaries



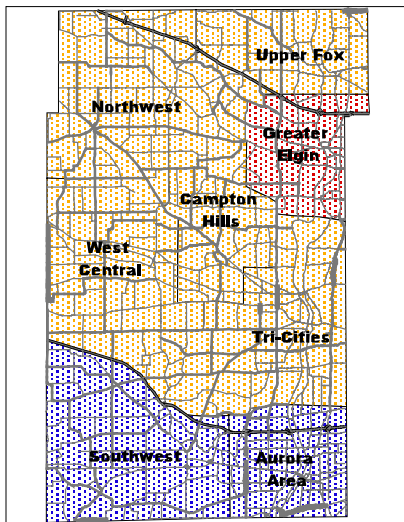
2020 VMT/Lane Mile



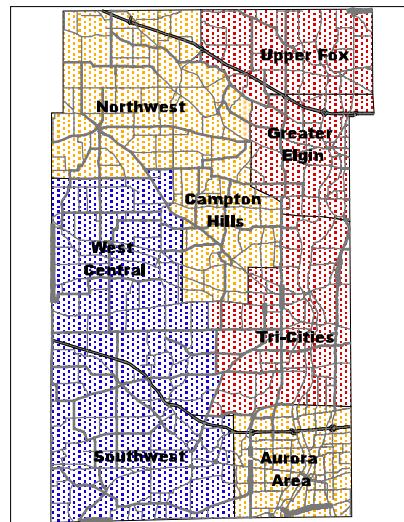
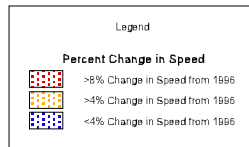
2020 VHT/Lane Mile



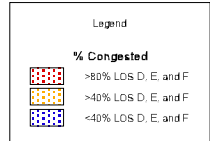
2020 VHD/Lane Mile



Change in Speed 1996 - 2020



2020 Percent Congested by Lane Mile LOS D, E, and F



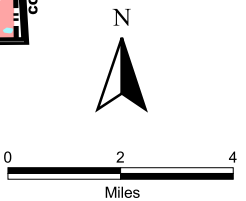
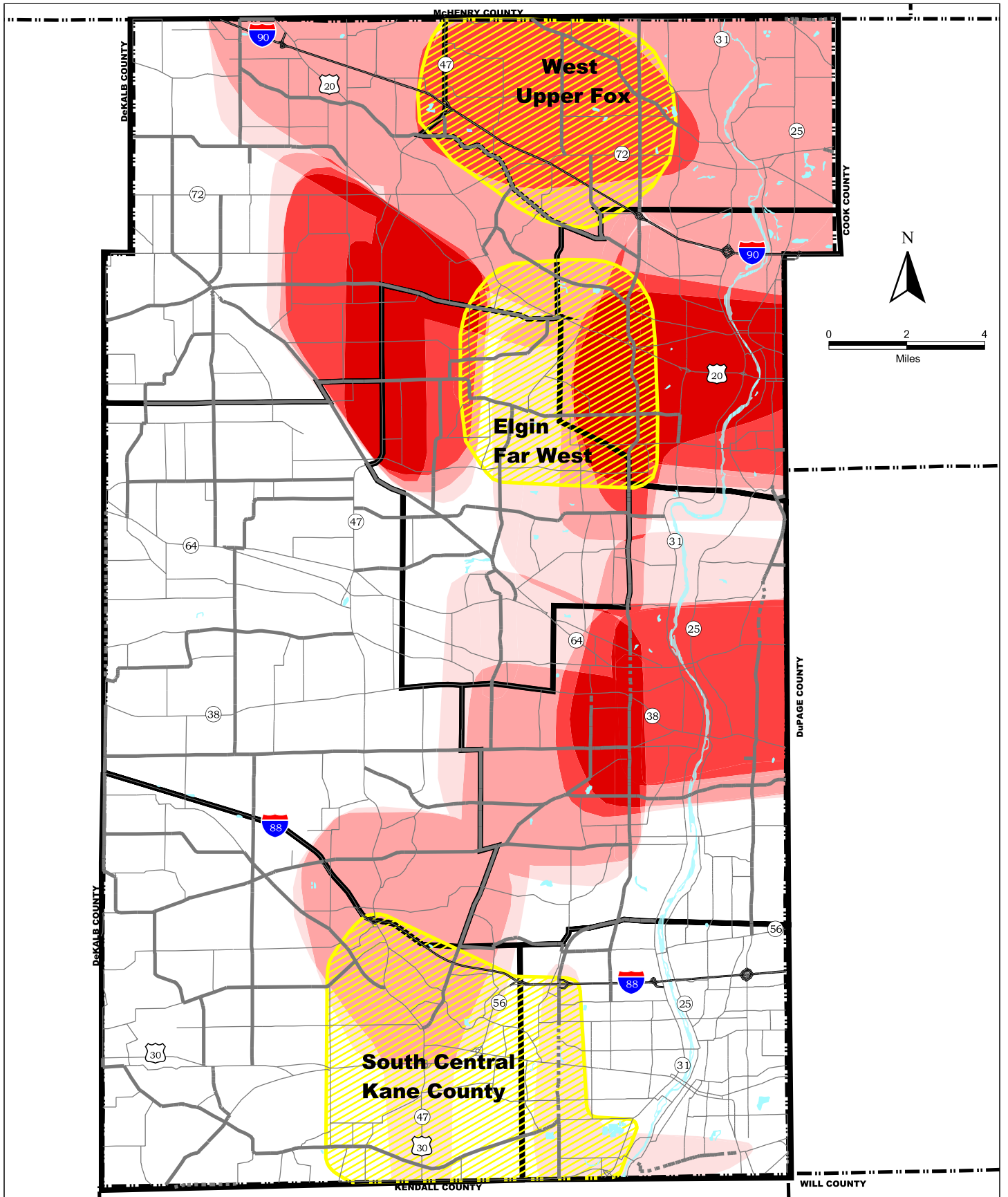
Legend

- Immediate Need
- Near-Term Need
- Long-Term Need

Planning Partnership Areas

Figure 1





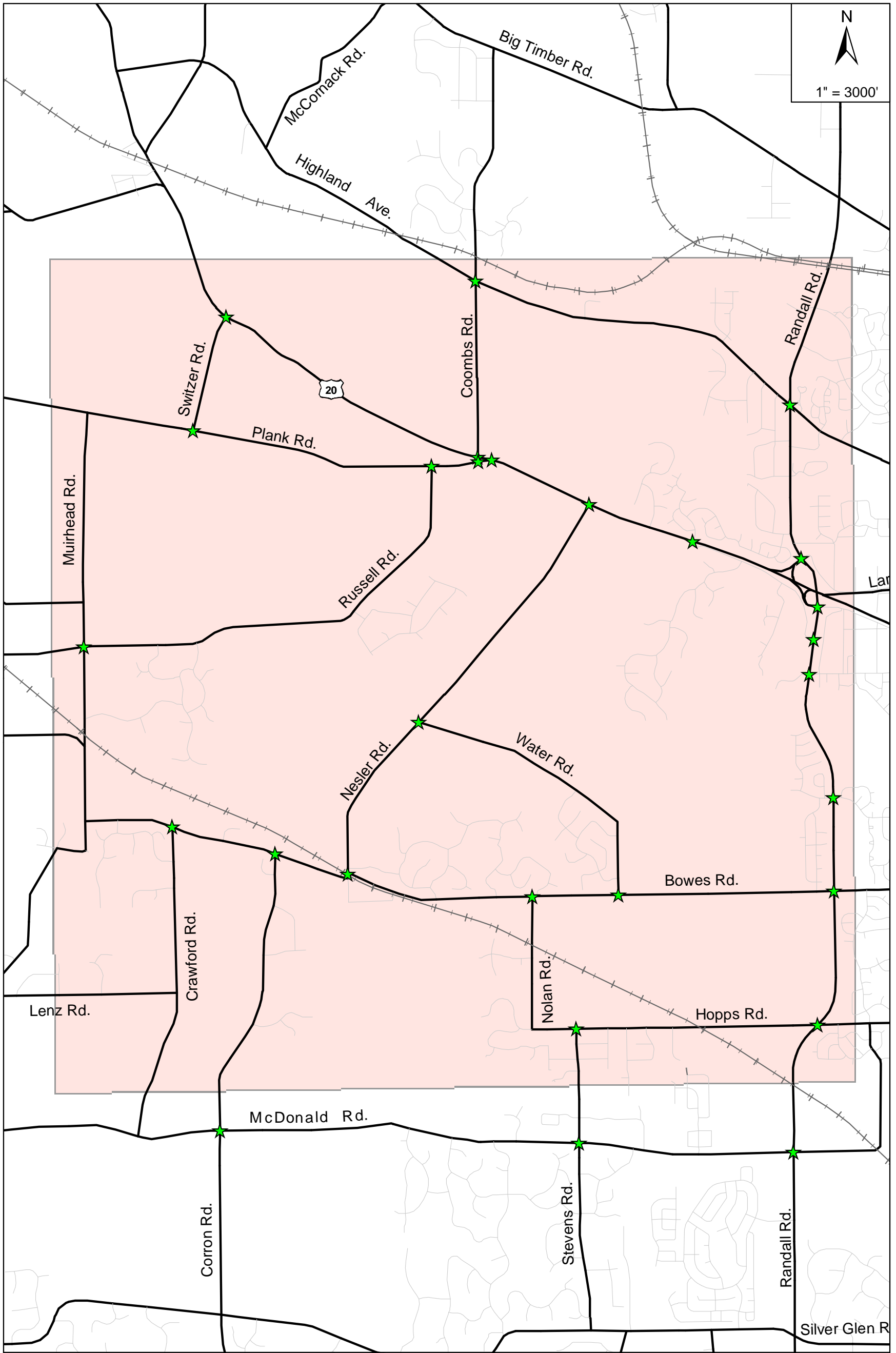
**Legend**

Number of Measures of Future Performance Rated Poor

	1 measure		PPA Boundary
	2 measures		Selected Planning Areas
	3 measures		
	4 measures		

**Planning Areas Selected for Immediate Study**

**Figure 2**  
Kane County Transportation Planning Area Study



N  
1" = 3000'

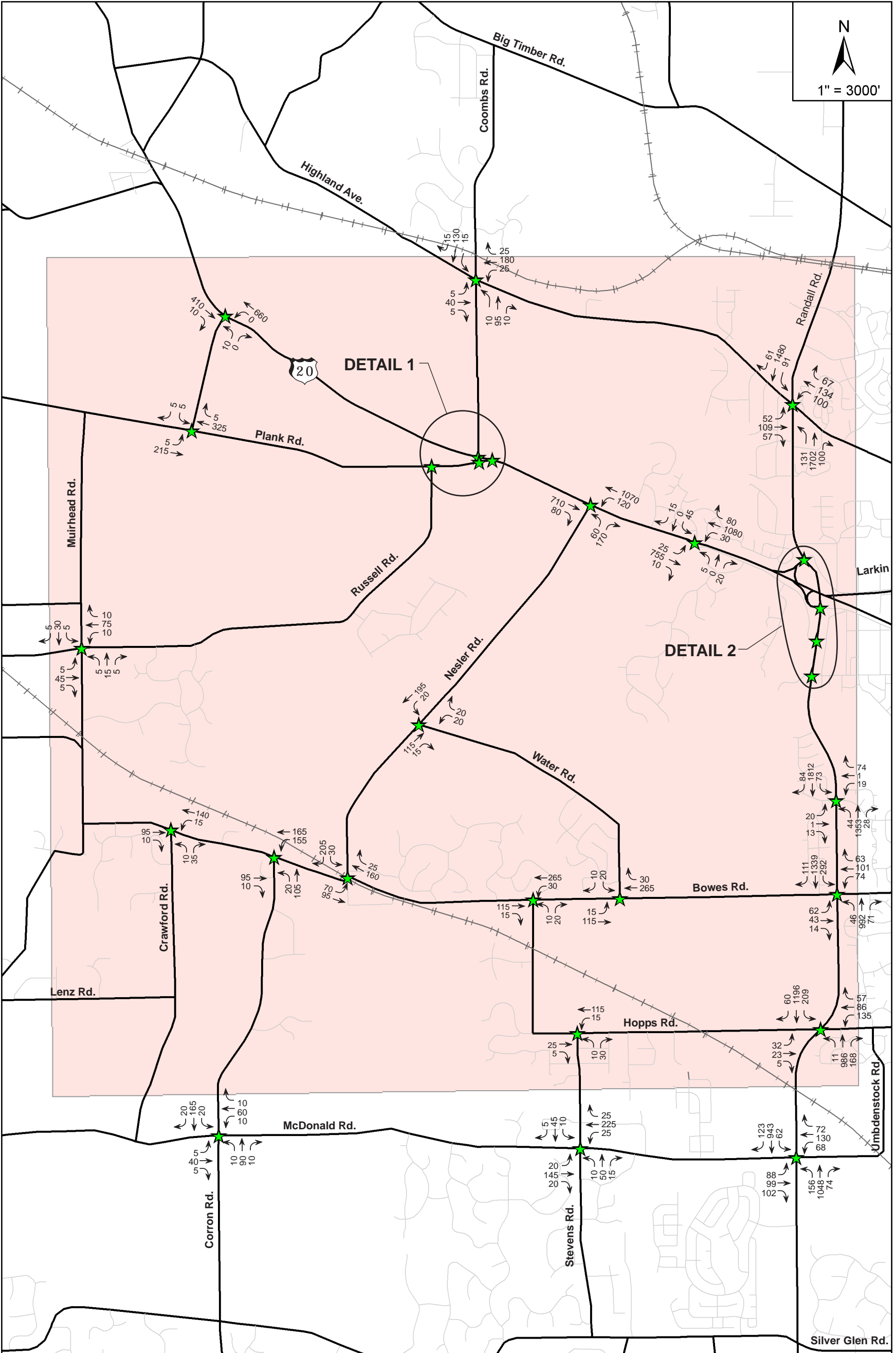
Elgin Far West Planning Area  
Study Area



Study Area

Study Intersections

Figure 3

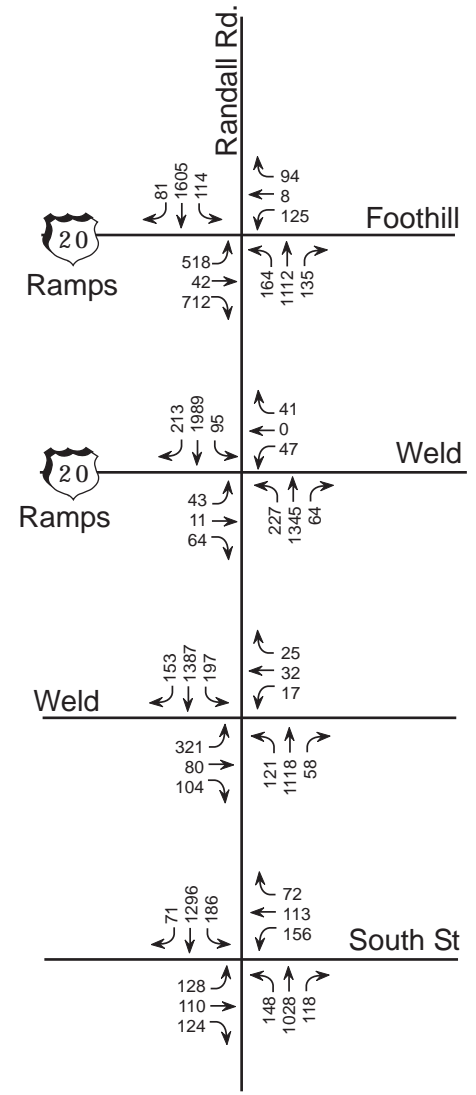
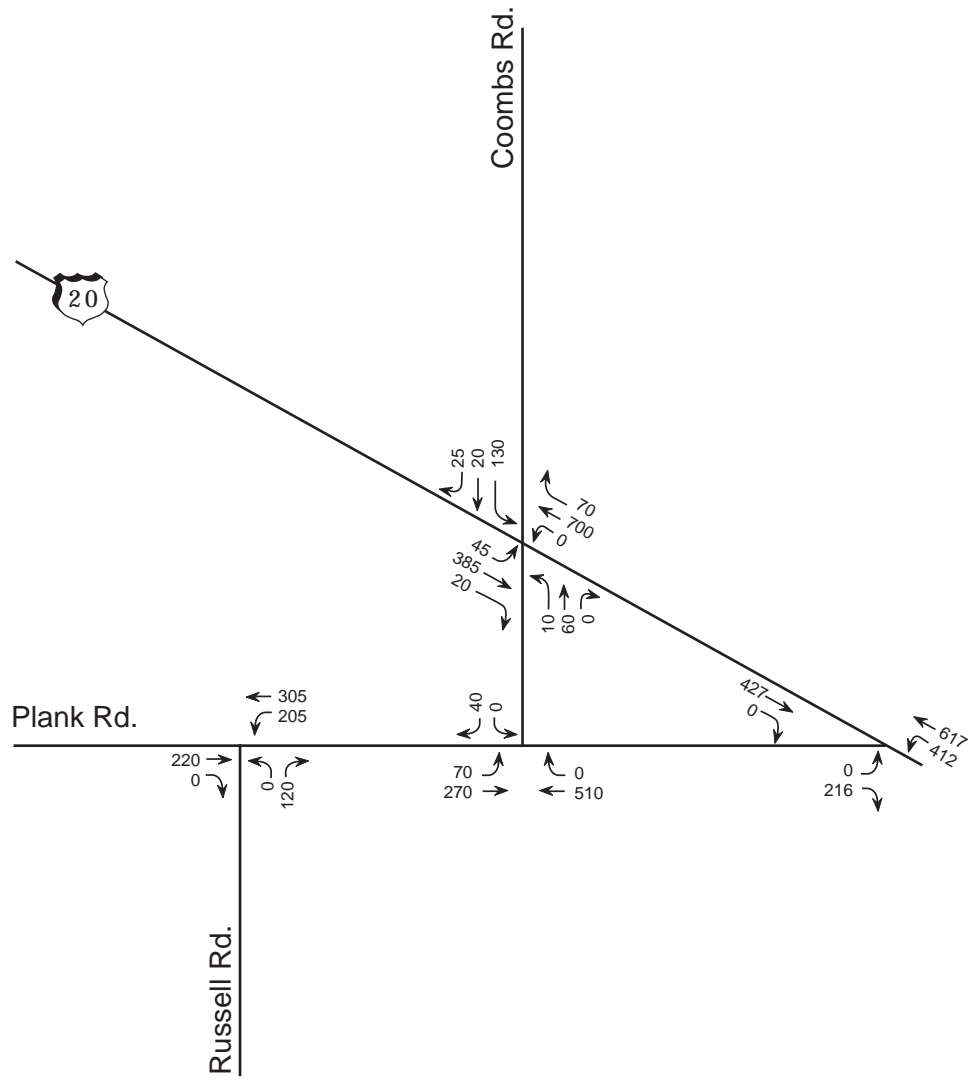


N  
1" = 3000'

- Study Area
- ★ Study Intersections
- xxx Peak Hour Volume (vph)

Elgin Far West Planning Area  
Existing Roadway System  
Existing PM Peak Hour Traffic  
Figure 4





**DETAIL 1**

**DETAIL 2**

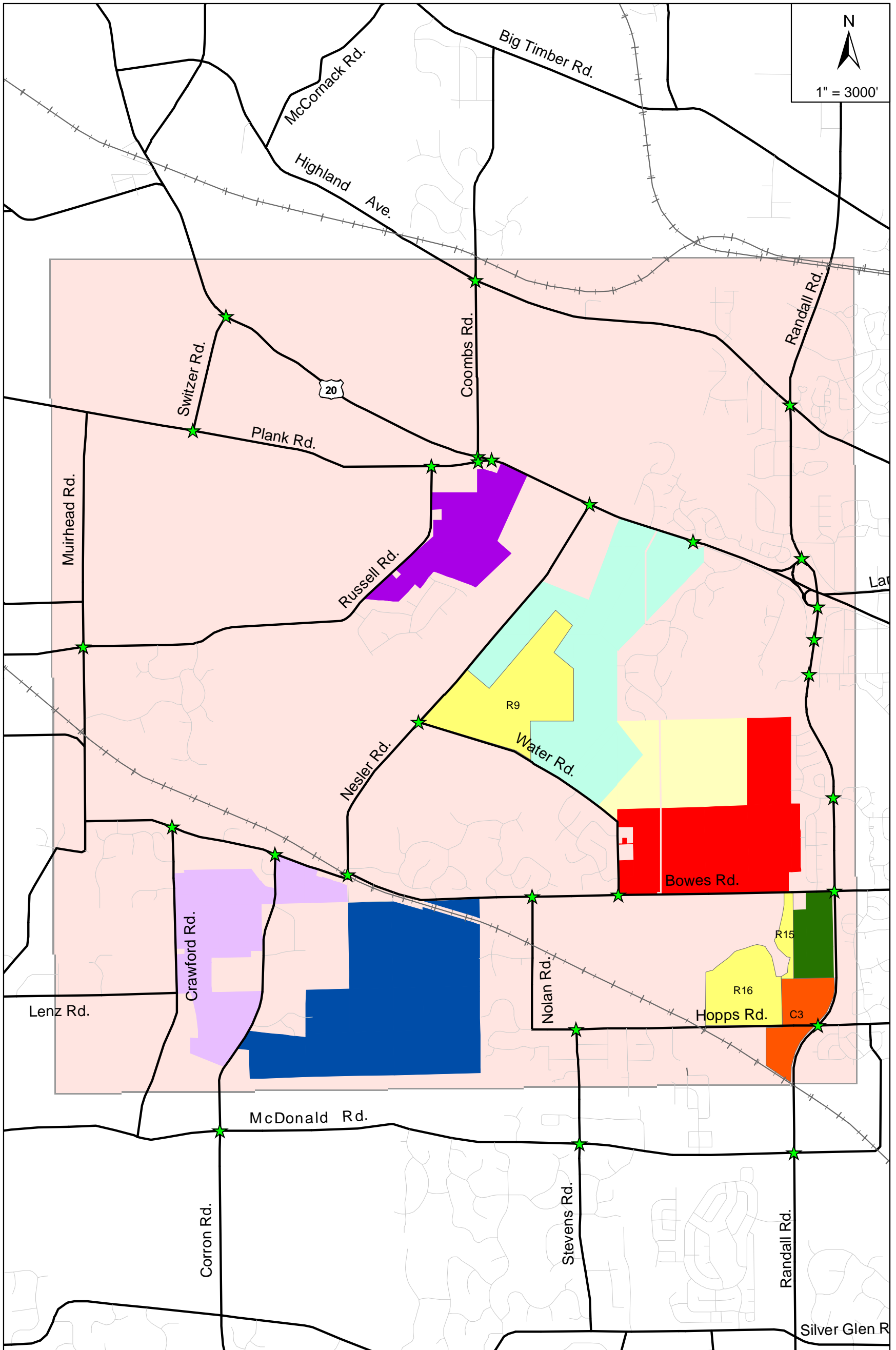
Elgin Far West Planning Area  
Existing Roadway System  
Existing PM Peak Hour Traffic  
Detail Sheet

**Figure 4A**

Kane County Transportation Planning Area Study



xxx → Peak Hour Volume (vph)



N  
1" = 3000'

**Known Developments**

- B\_B
- Bowes Creek
- Kimball Hill
- McKay Property
- Pulte Homes (North)
- Town & Country
- Wyndham Deerpoint

**Added Developments**

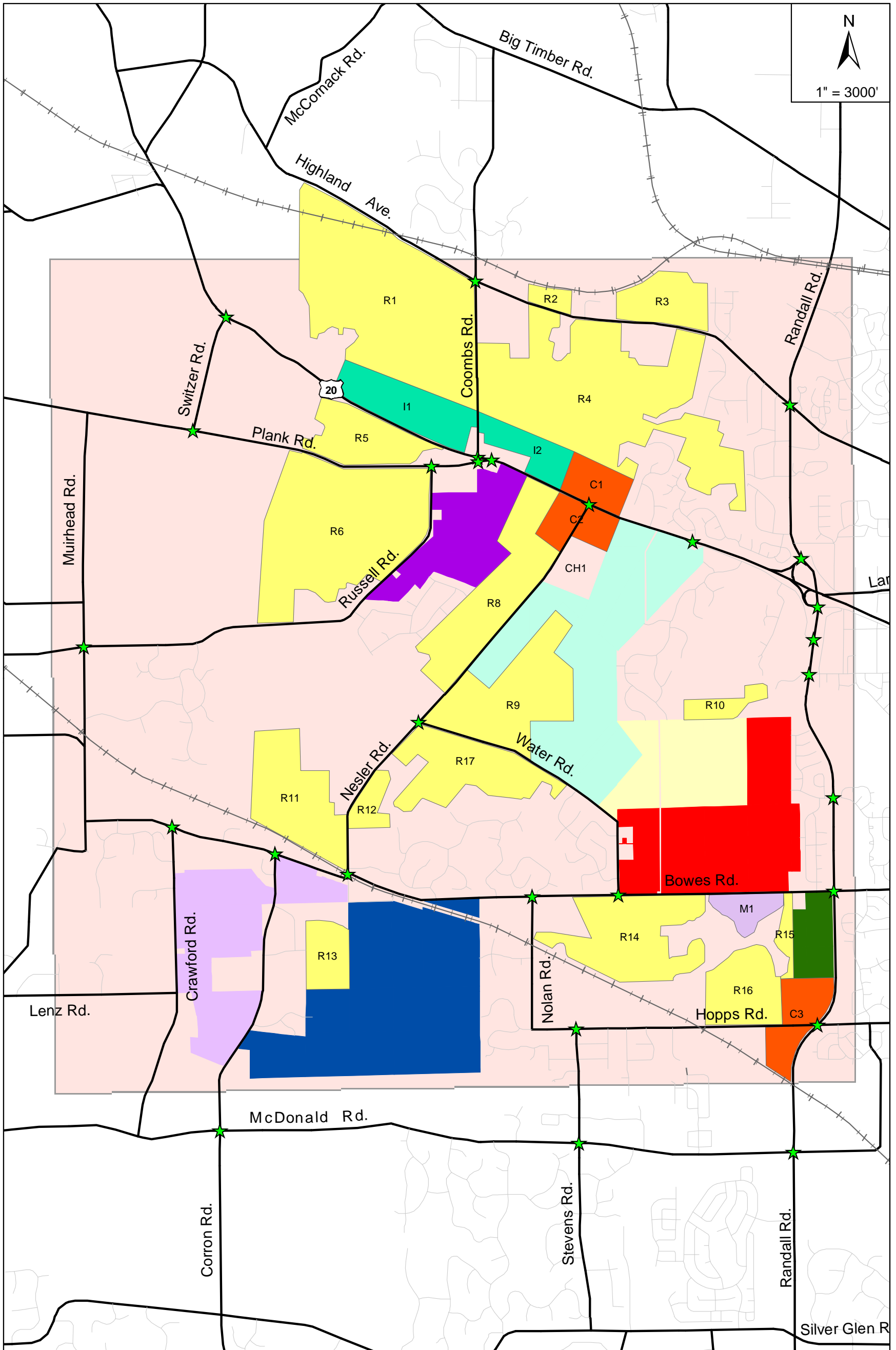
- Commercial
- Industrial
- Residential

- Study Area
- Study Intersections
- Development ID

**Elgin Far West Planning Area  
2010 Developments**

**Figure 5**





N  
1" = 3000'

**Known Developments**

- B\_B
- Bows Creek
- Kimball Hill
- McKay Property
- Pulte Homes (North)
- Town & Country
- Wyndham Deerpoint

**Added Developments**

- Commercial
- Industrial
- Residential

- Study Area
- Study Intersections
- Development ID

**Elgin Far West Planning Area  
2020 Developments**

**Figure 6**



Existing Network

Original Distribution of Traffic



Future Network  
(Existing Network + New Roadways)

Redistribution of Traffic

+

Intersection Control Improvements

+

Geometric Improvements

+

Roadway Widening



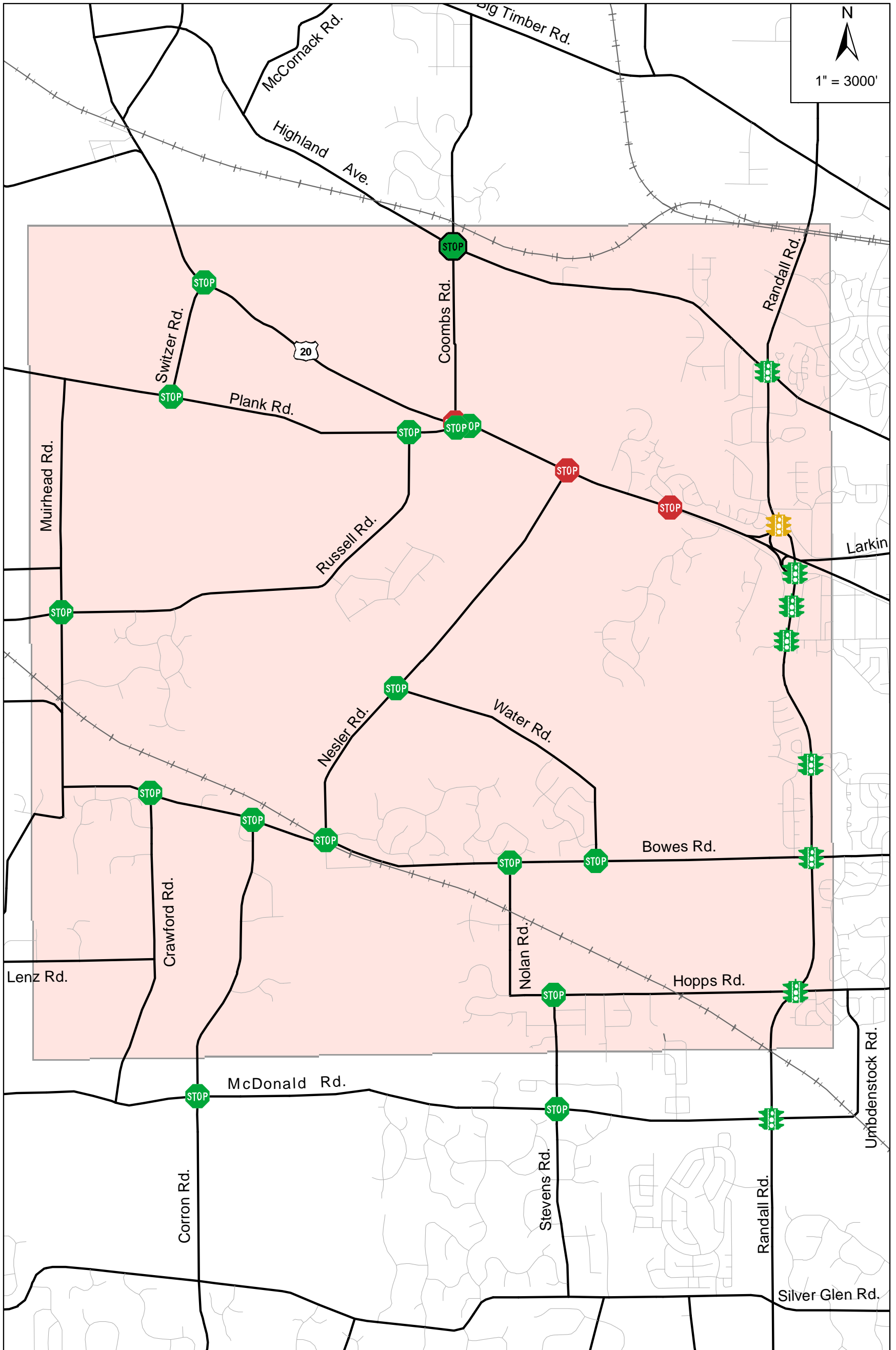
Area Plan



Elgin Far West Planning Area  
Plan Development Process

Figure 7

Kane County Transportation Planning Area Study



N  
1" = 3000'

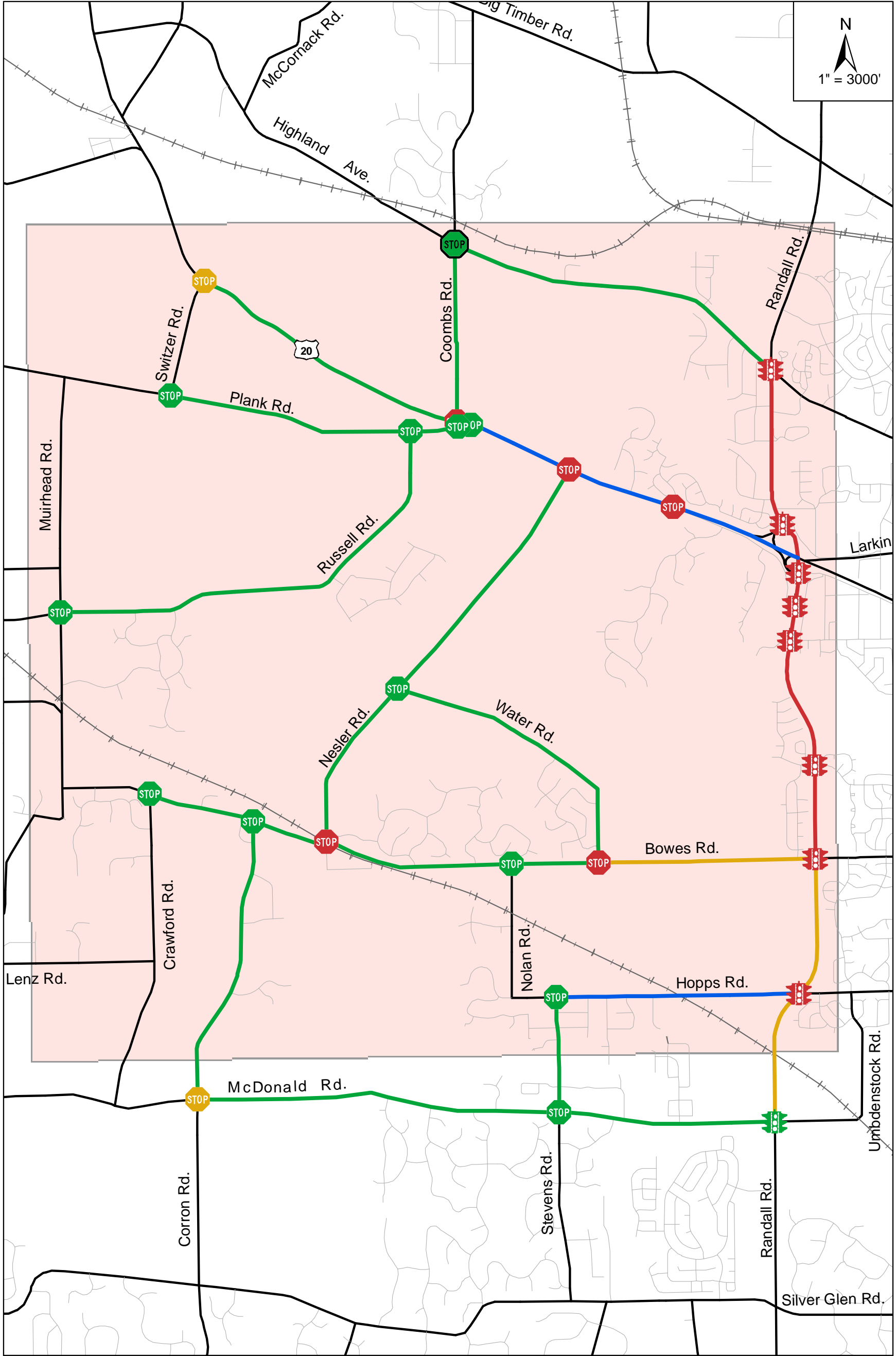
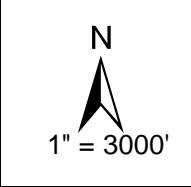


Two-Way Stop Controlled	All-way Stop Controlled	Signalized	LOS
			A, B, C
			D
			E
			F

Study Area

**Elgin Far West Planning Area**  
**Existing Roadway System**  
**Existing PM Peak Hour Traffic**  
**System Performance**  
**Figure 8**  
 Kane County Transportation Planning Area Study



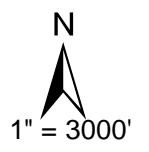
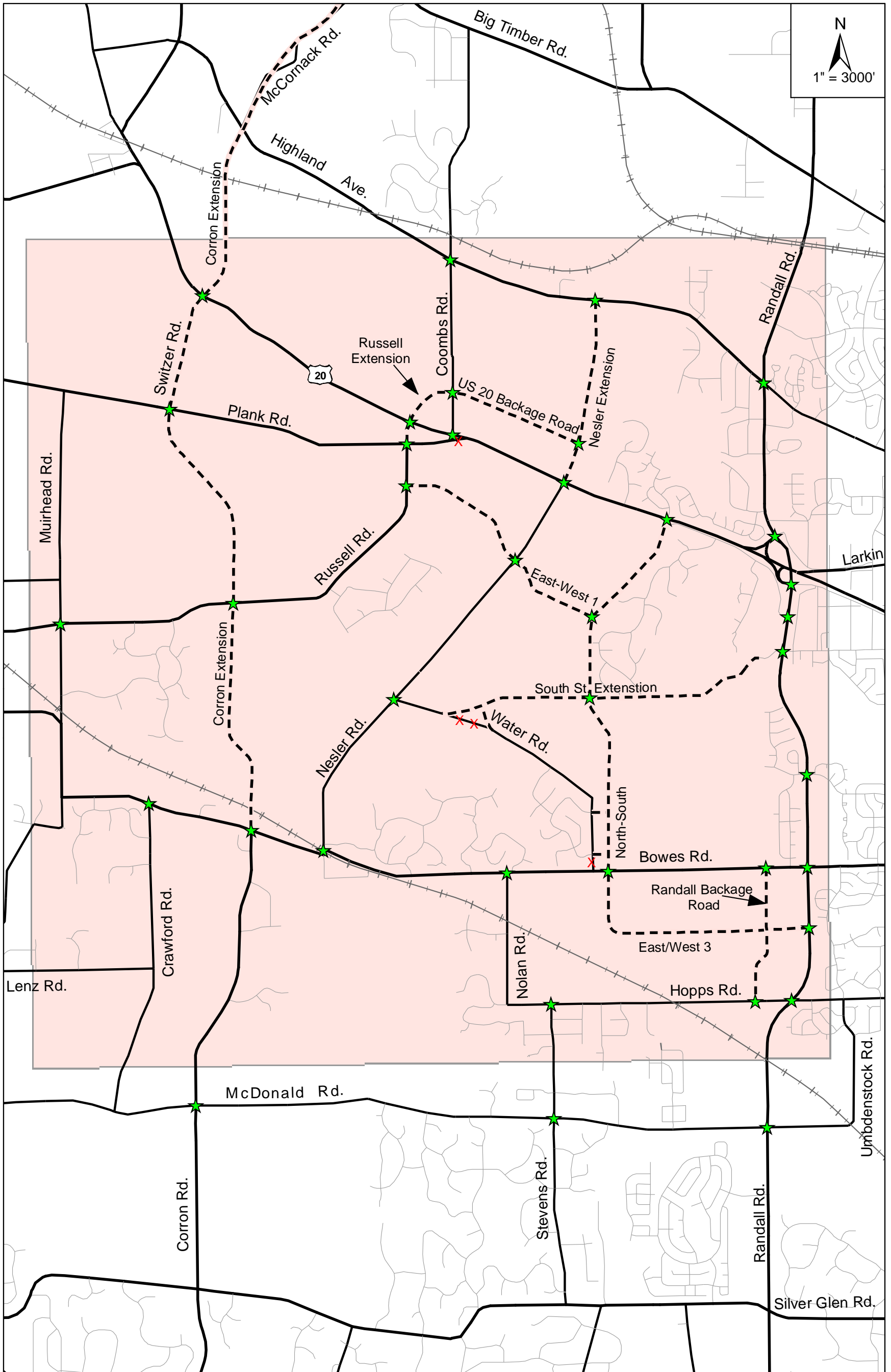


Two-Way Stop Controlled	All-way Stop Controlled	Signalized	LOS
			A, B, C
			D
			E
			F

Number of Lanes for LOS E	
	2
	4
	6
	6+
	Study Area

**Elgin Far West Planning Area  
Existing Roadway System  
2010 PM Peak Hour Traffic  
System Performance  
Figure 9**  
Kane County Transportation Planning Area Study

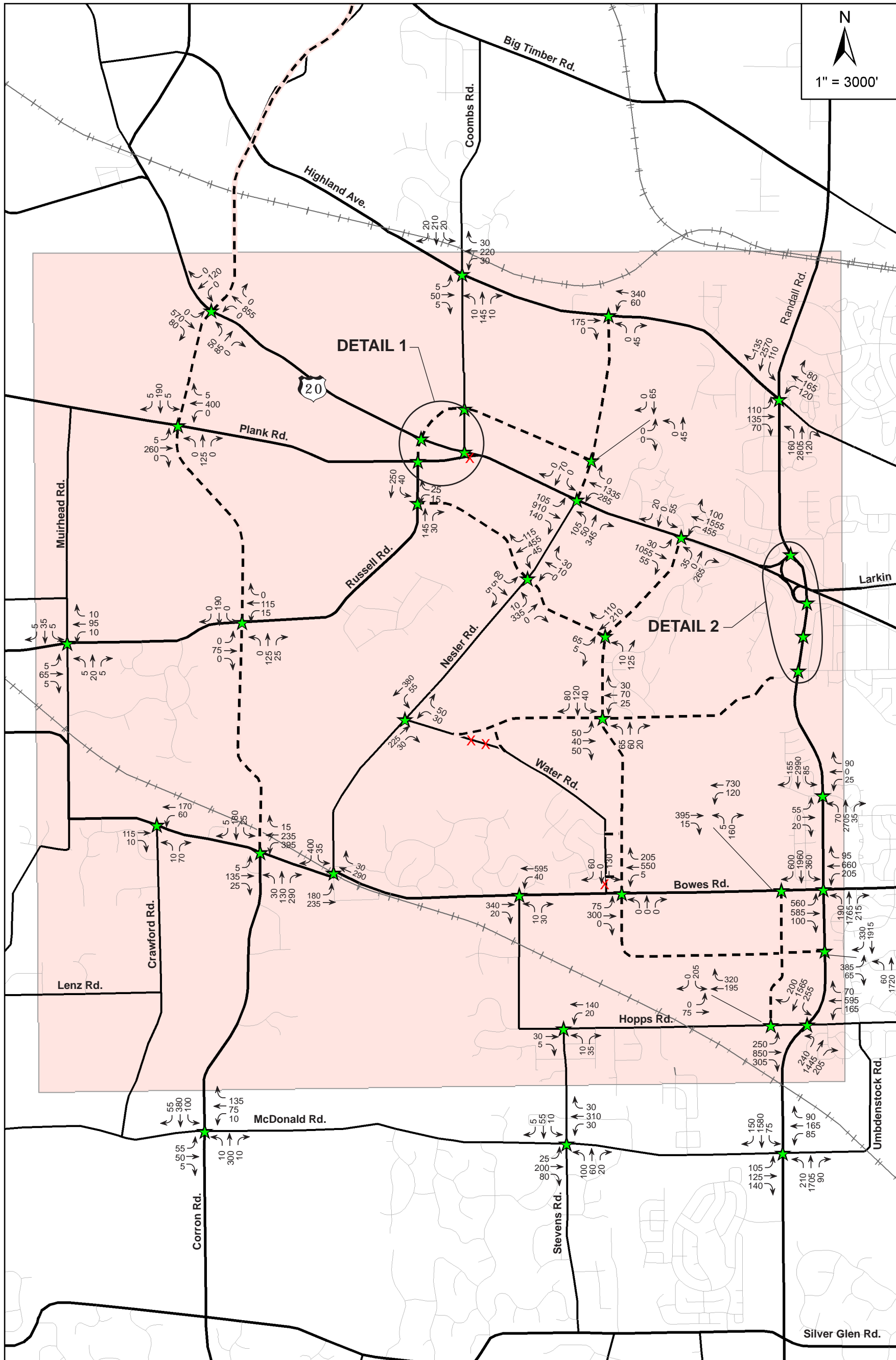
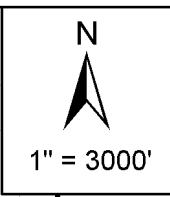




- X Eliminated Roadway Segments
- ★ Study Intersections
- New Roadways

Elgin Far West Planning Area  
Proposed Roadway System

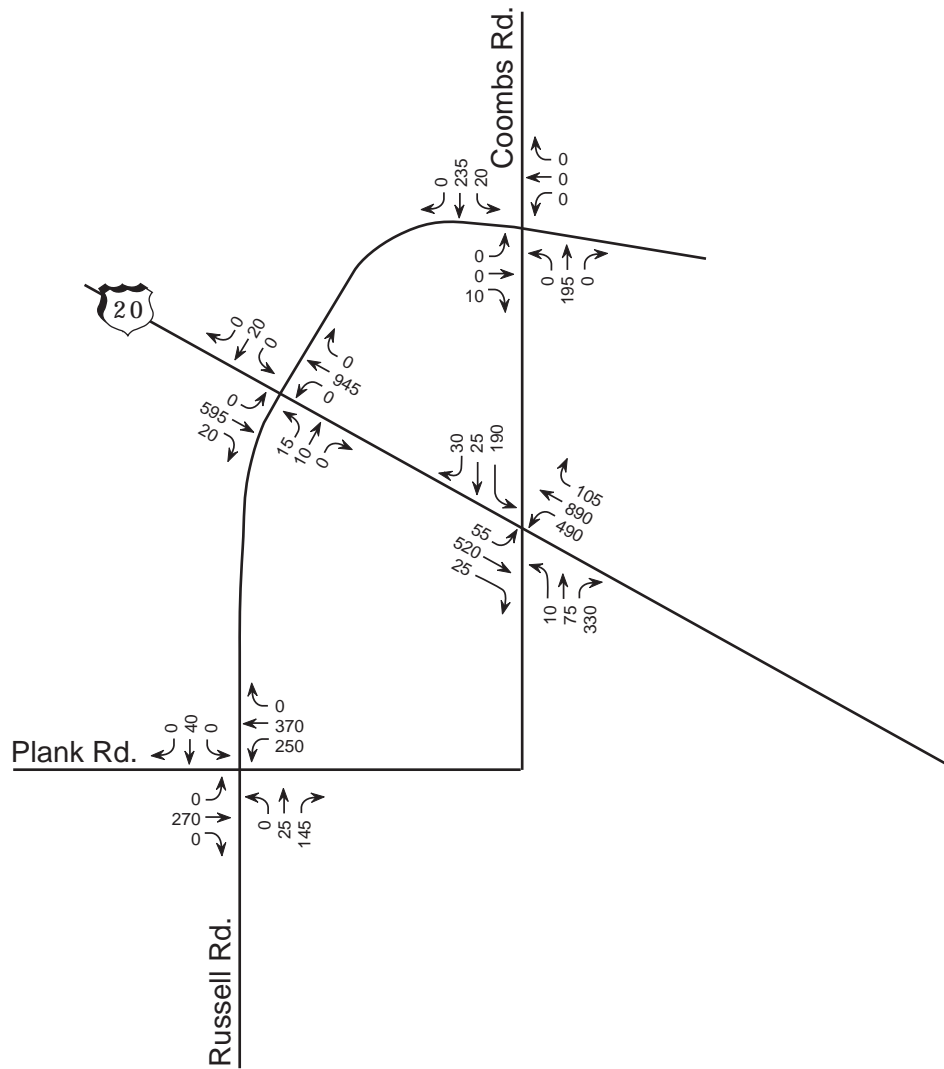
Figure 10



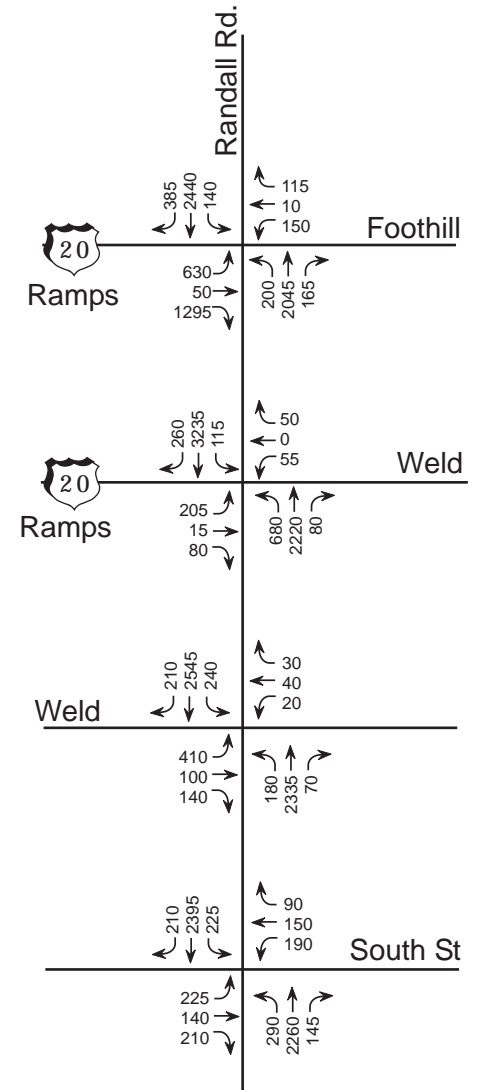
- Study Area
- Study Intersections
- New Roadways
- Eliminated Roadway Segments
- xxx → Peak Hour Volume (vph)

Elgin Far West Planning Area  
 Proposed Roadway System  
 2010 PM Peak Hour Traffic  
 Figure 11





**DETAIL 1**



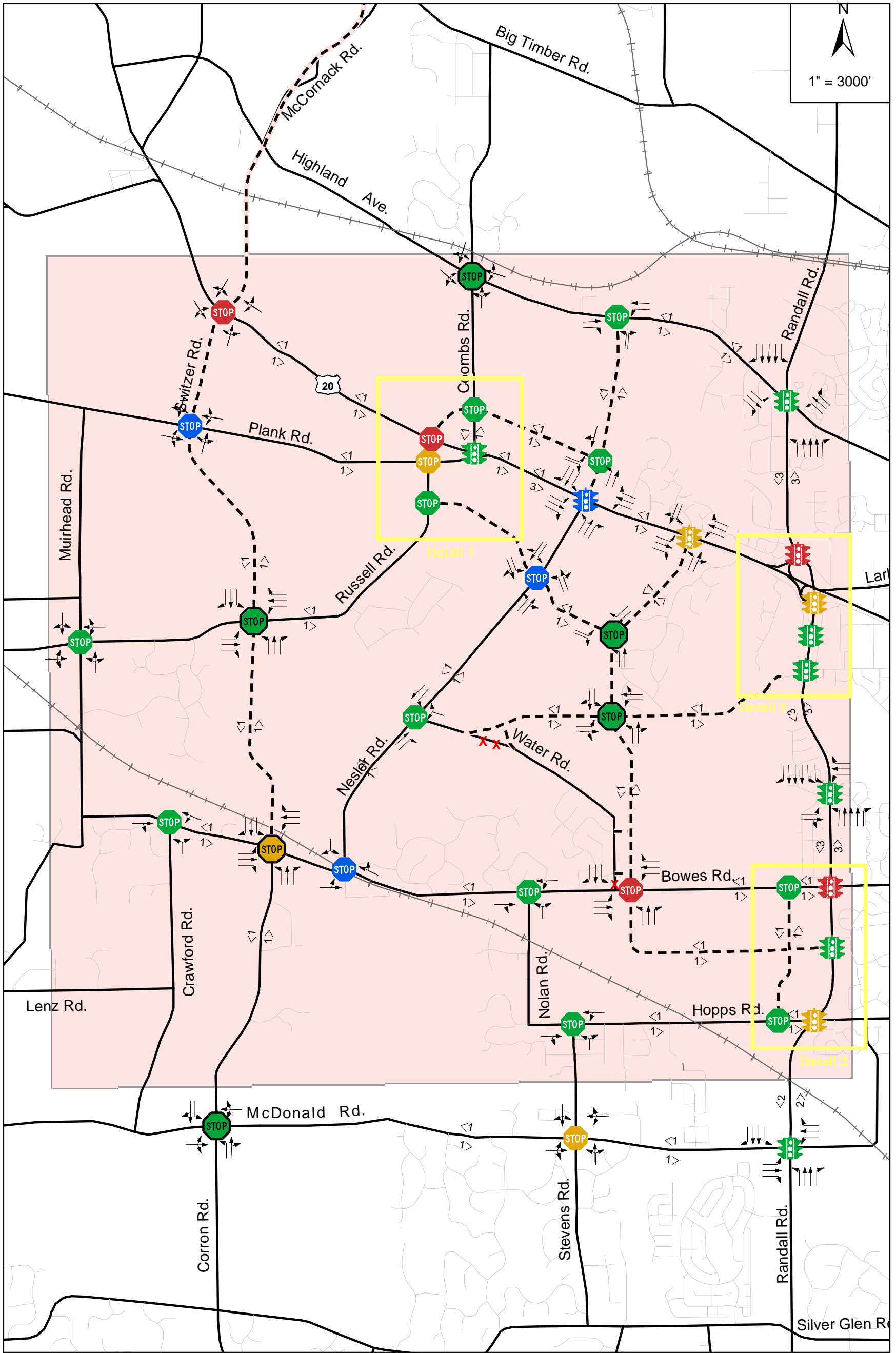
**DETAIL 2**

Elgin Far West Planning Area  
 Proposed Roadway System  
 2010 PM Peak Hour Traffic  
 Detail Sheet  
 Figure 11A

Kane County Transportation Planning Area Study



xxx → Peak Hour Volume (vph)



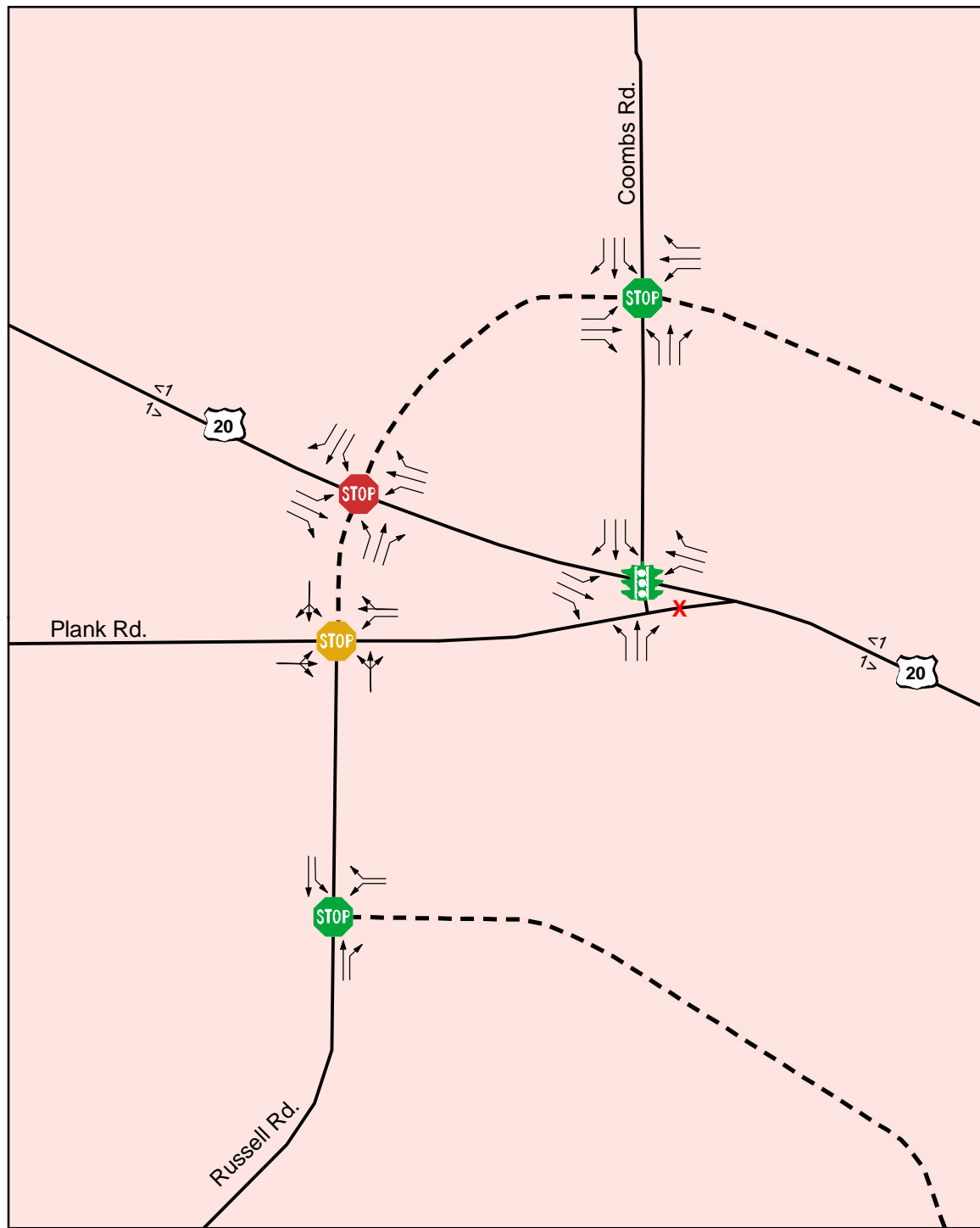
N  
1" = 3000'

Two-Way Stop Controlled	All-way Stop Controlled	Signalized	LOS
			A, B, C
			D
			E
			F

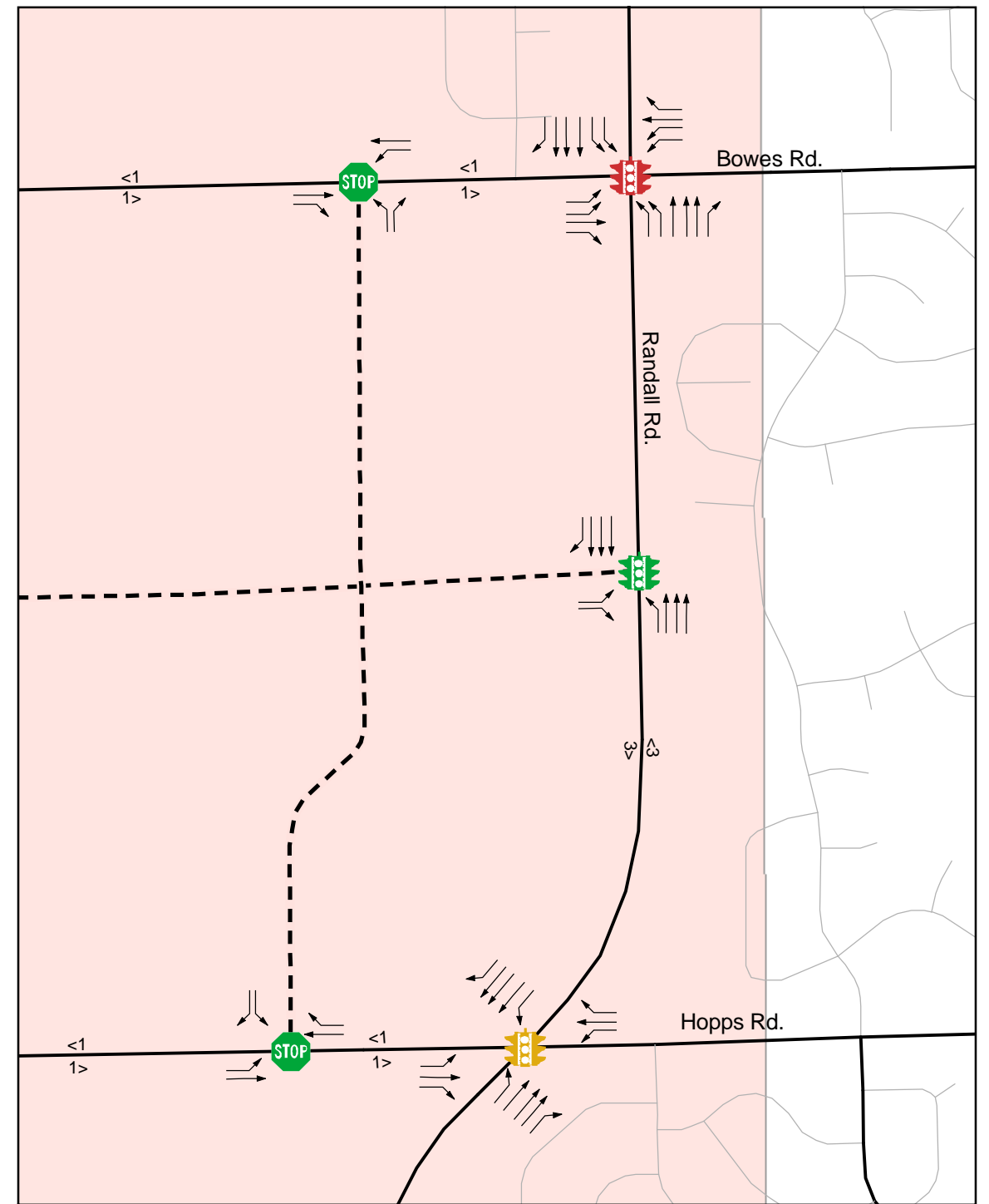
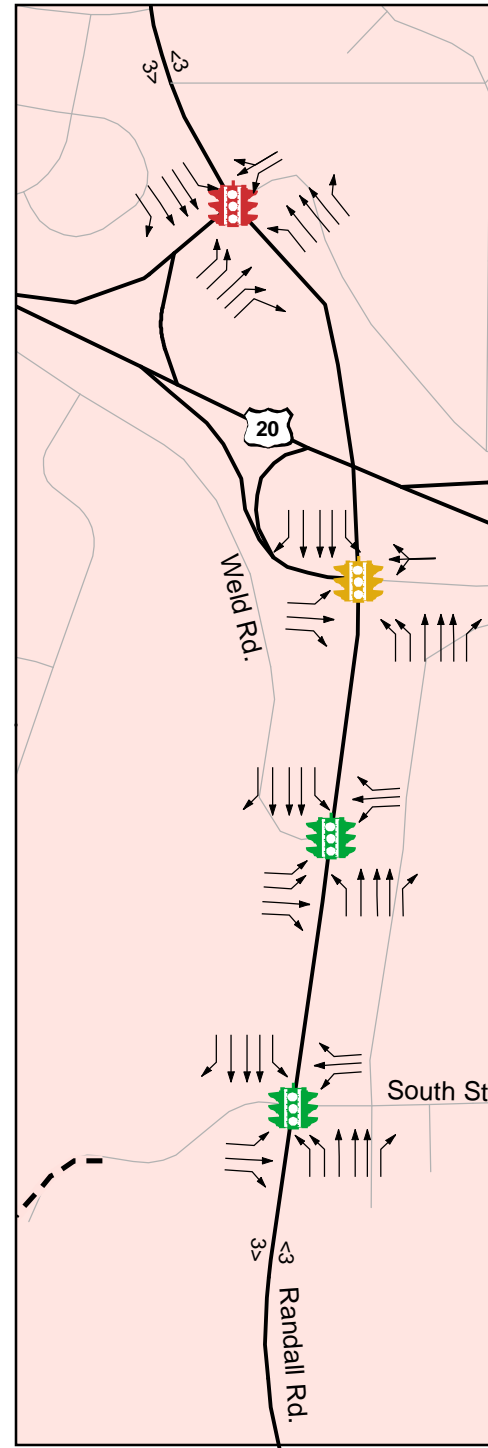
- Study Area
- New Roadway
- Eliminated Roadway Segments
- Intersection Approach Geometry
- Number of Lanes on Segment by Direction

Elgin Far West Planning Area  
2010 Interim Transportation Plan

Figure 12  
Kane County Transportation Planning Area Study



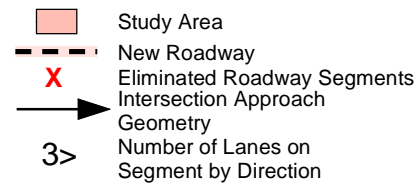
Detail 1



Detail 3

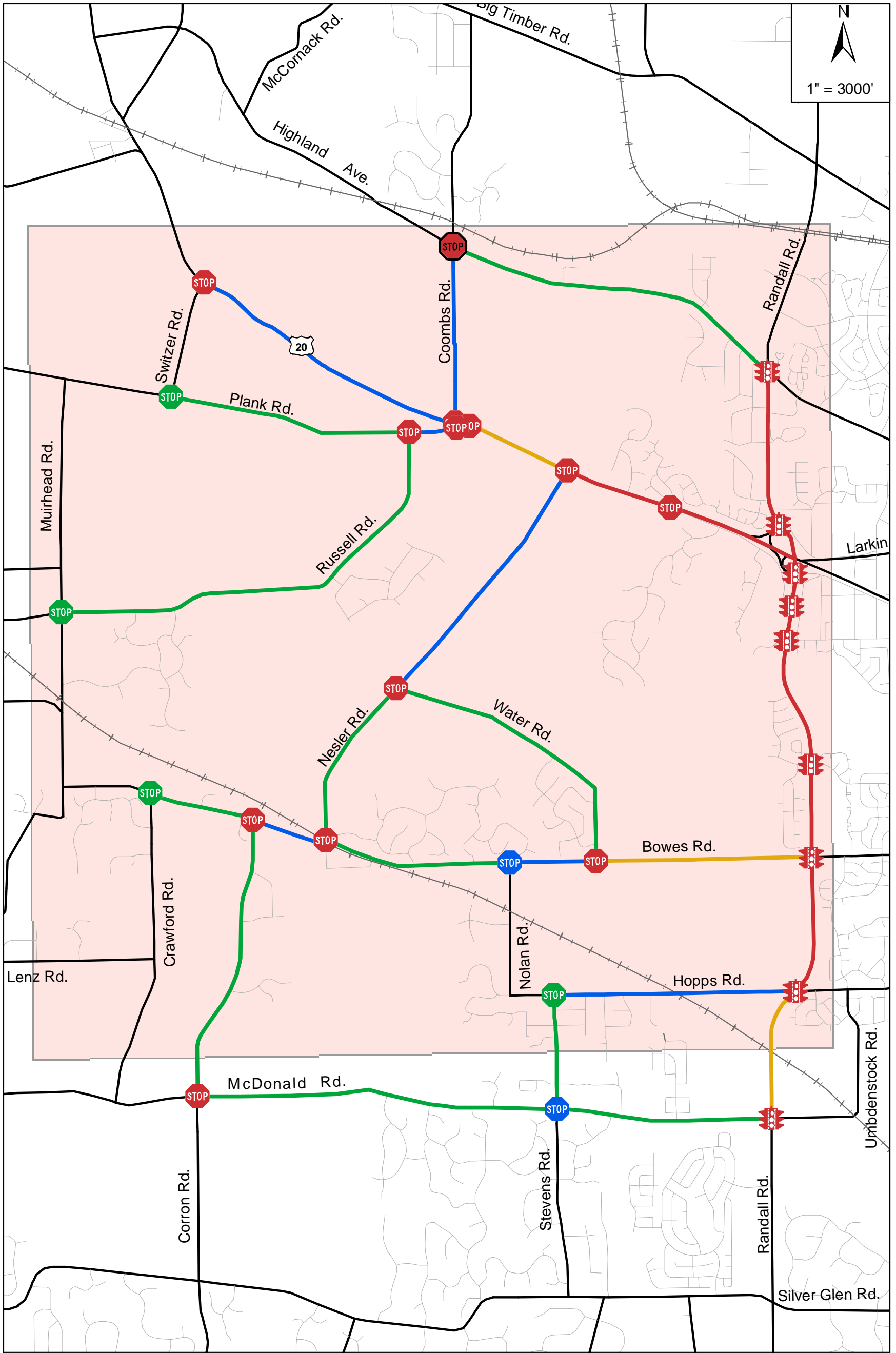


Two-Way Stop Controlled	All-way Stop Controlled	Signalized	LOS
			A, B, C
			D
			E
			F



Elgin Far West Planning Area  
2010 Interim Transportation  
Detail Sheet

Figure 12A



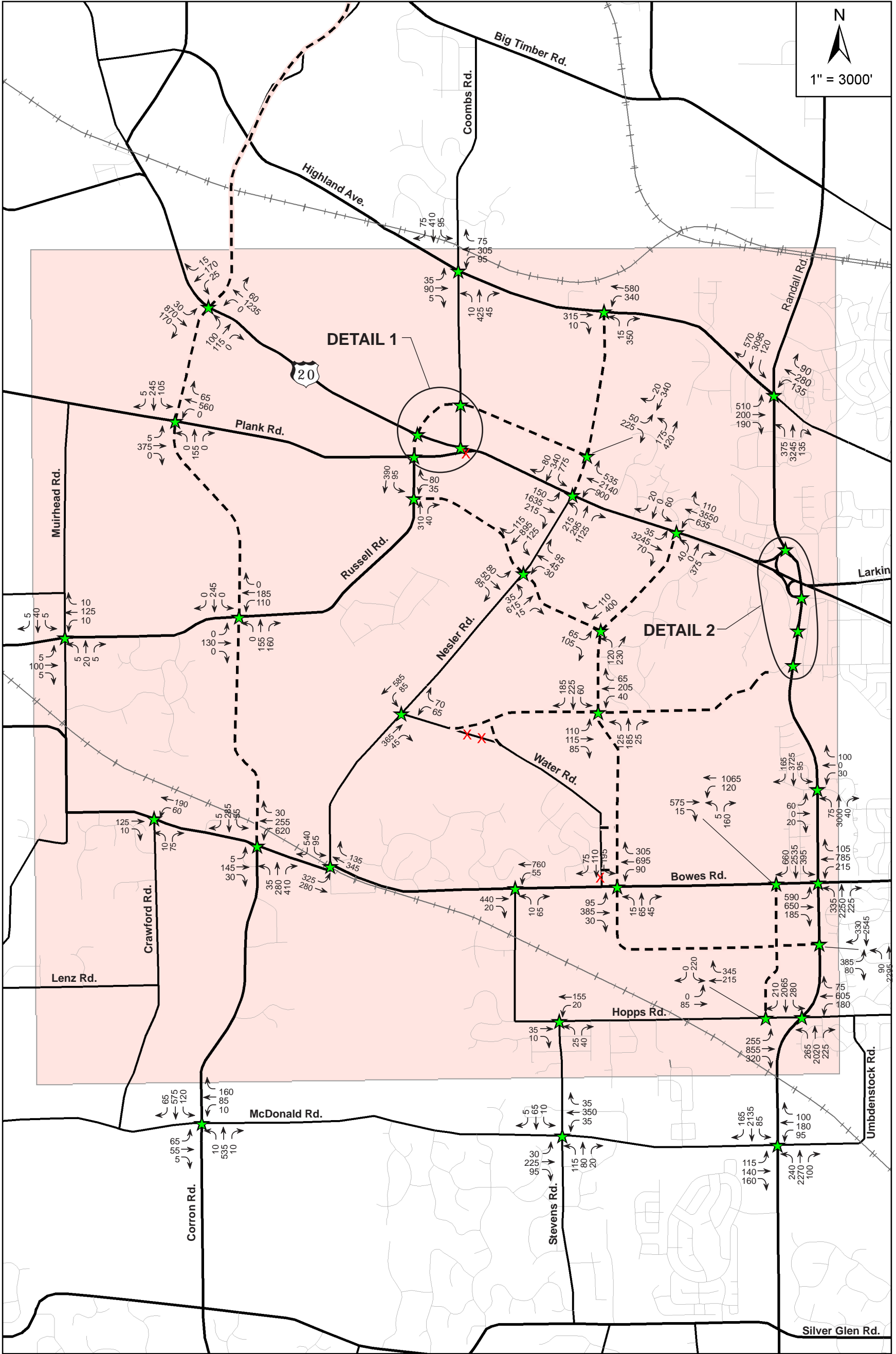
N  
1" = 3000'

Two-Way Stop Controlled	All-way Stop Controlled	Signalized	LOS
			A, B, C
			D
			E
			F

Number of Lanes for LOS E	
	2
	4
	6
	6+
	Study Area

**Elgin Far West Planning Area  
Existing Roadway System  
2020 PM Peak Hour Traffic  
System Performance**  
Figure 13  
Kane County Transportation Planning Area Study





N  
1" = 3000'

DETAIL 1

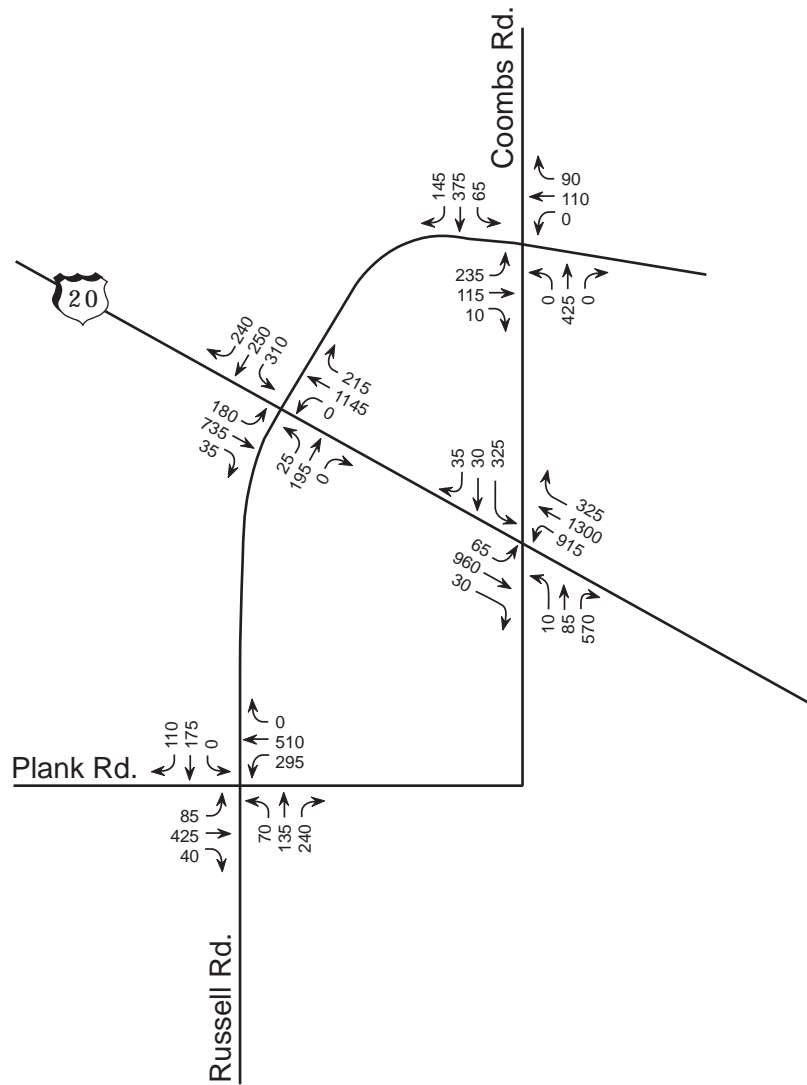
DETAIL 2

- Study Area
- Study Intersections
- New Roadways
- Eliminated Roadway Segments
- xxx → Peak Hour Volume (vph)

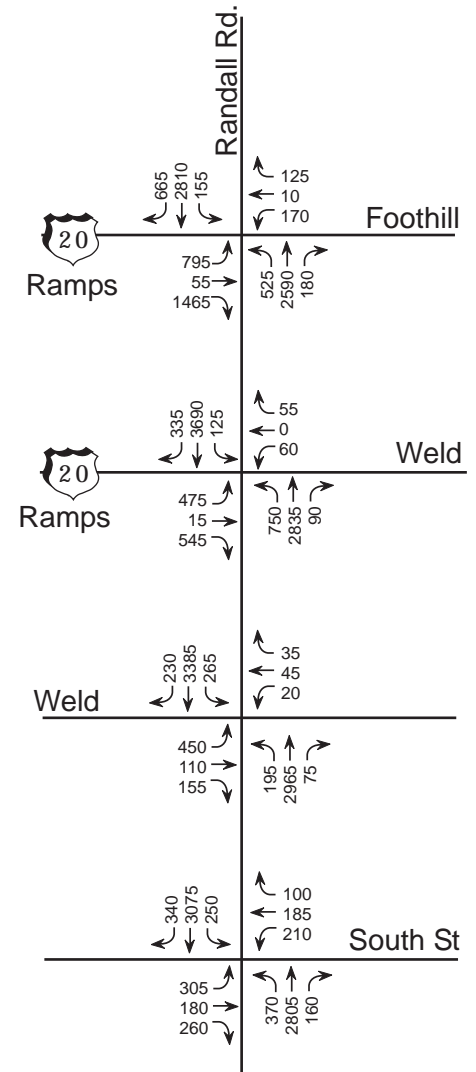
Elgin Far West Planning Area  
Proposed Roadway System  
2020 PM Peak Hour Traffic  
Figure 14







**DETAIL 1**



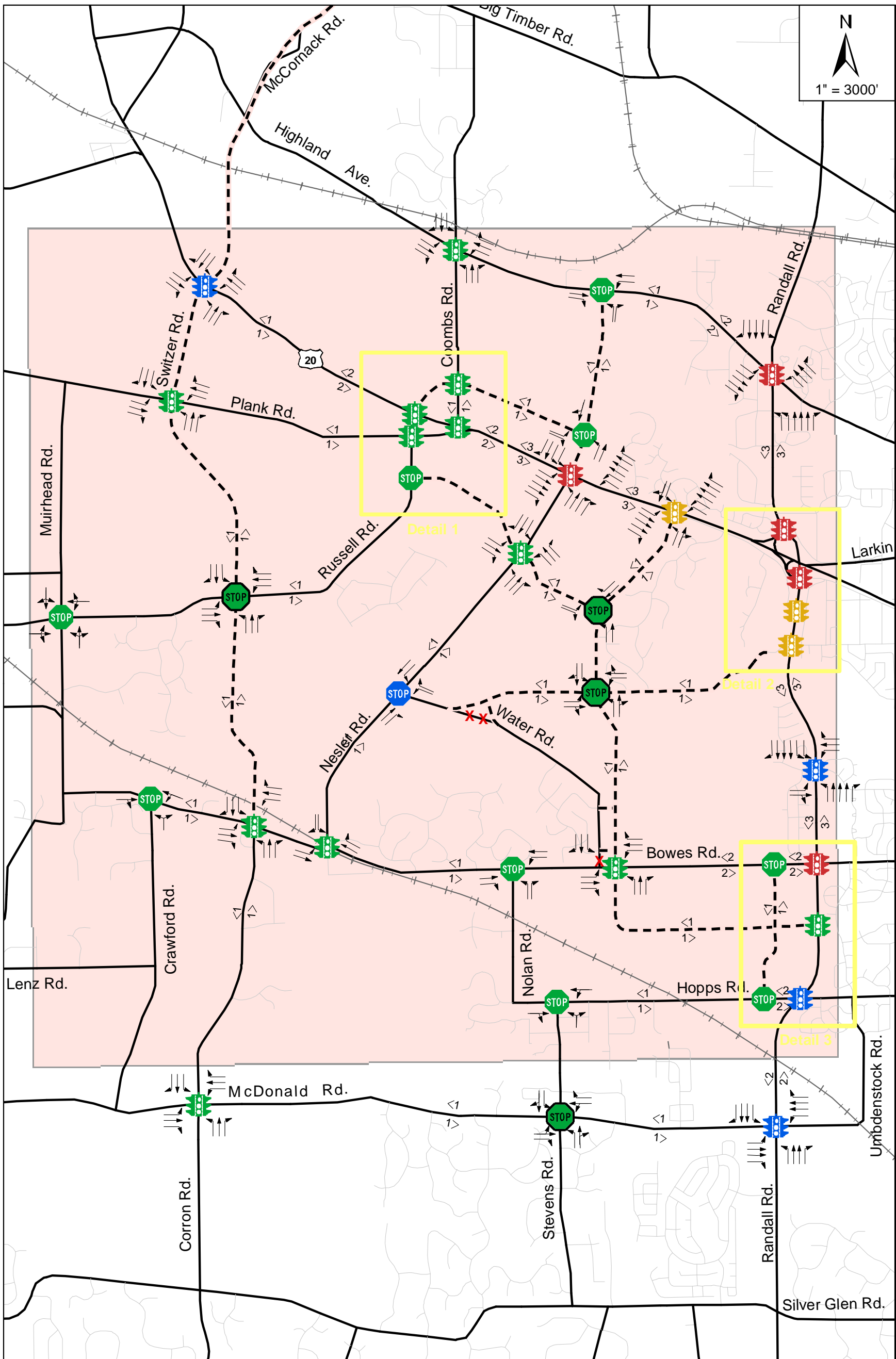
**DETAIL 2**



xxx → Peak Hour Volume (vph)

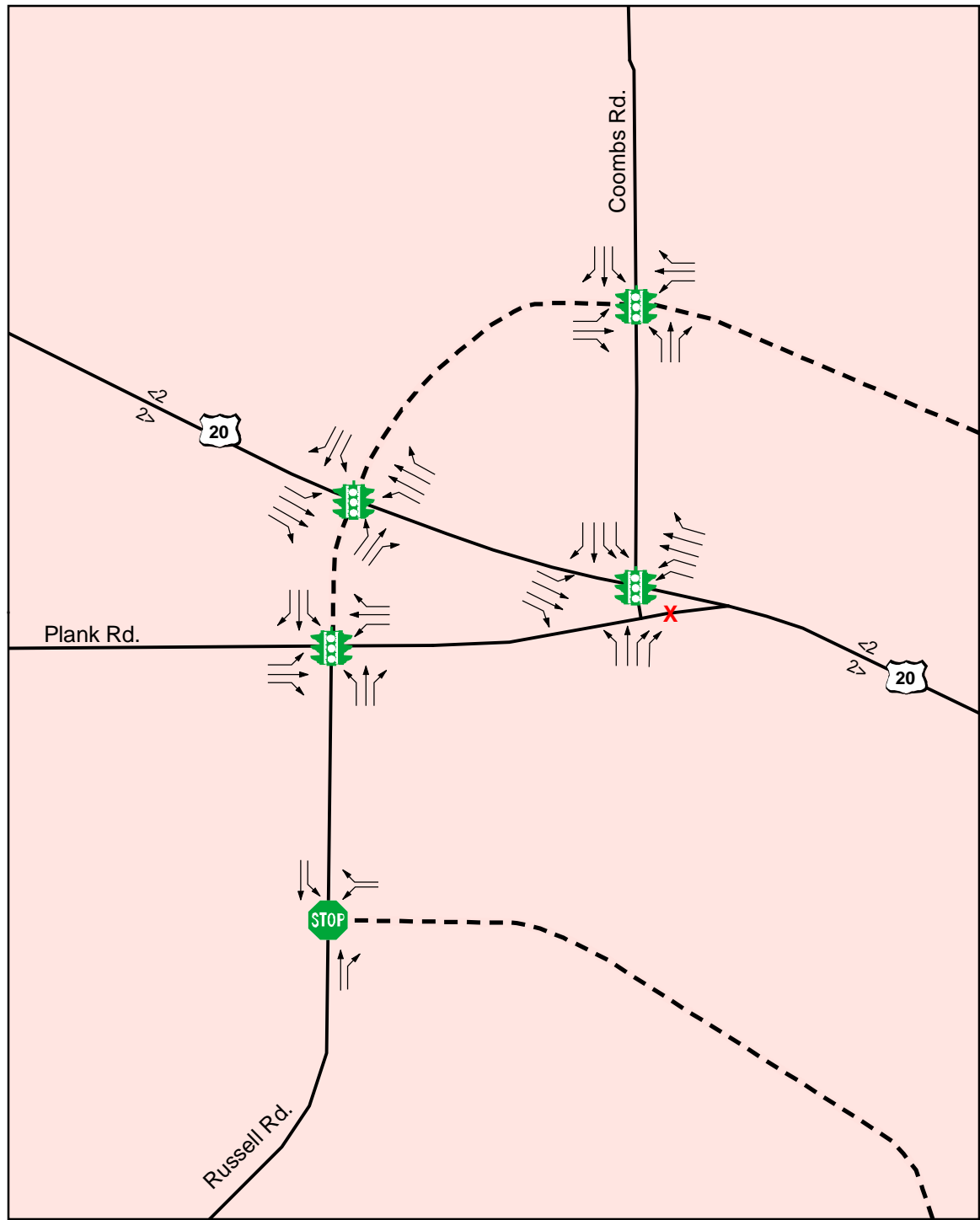
Elgin Far West Planning Area  
 Proposed Roadway System  
 2020 PM Peak Hour Traffic  
 Detail Sheet  
**Figure 14A**

Kane County Transportation Planning Area Study

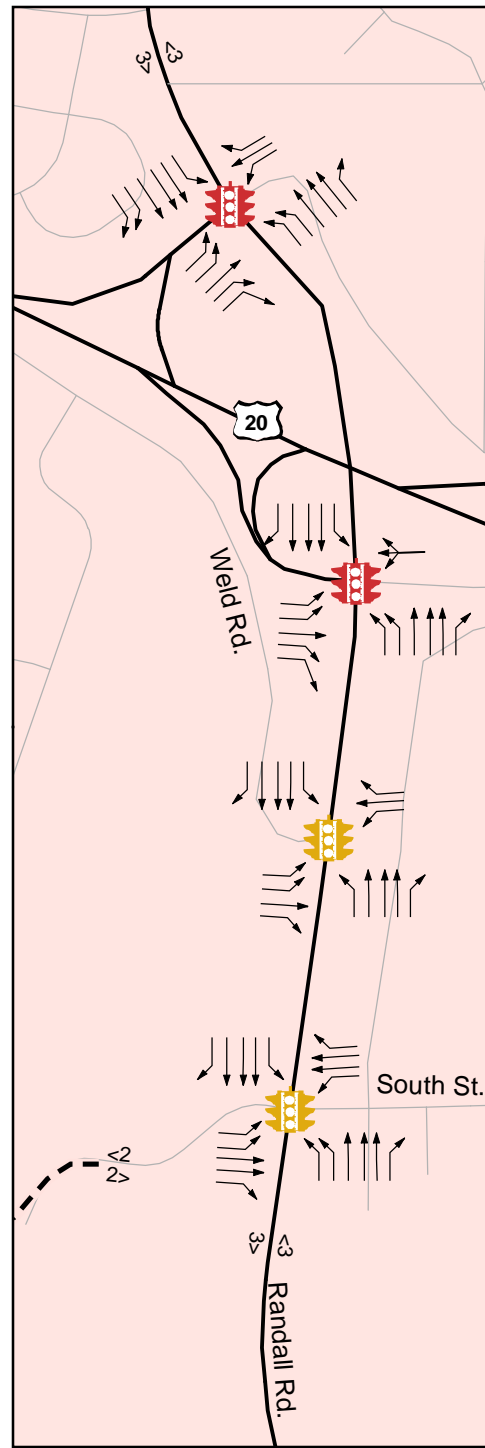


	Two-Way	All-way	Signalized	LOS	
	Stop Controlled	Stop Controlled		A, B, C	
				D	
				E	
				F	

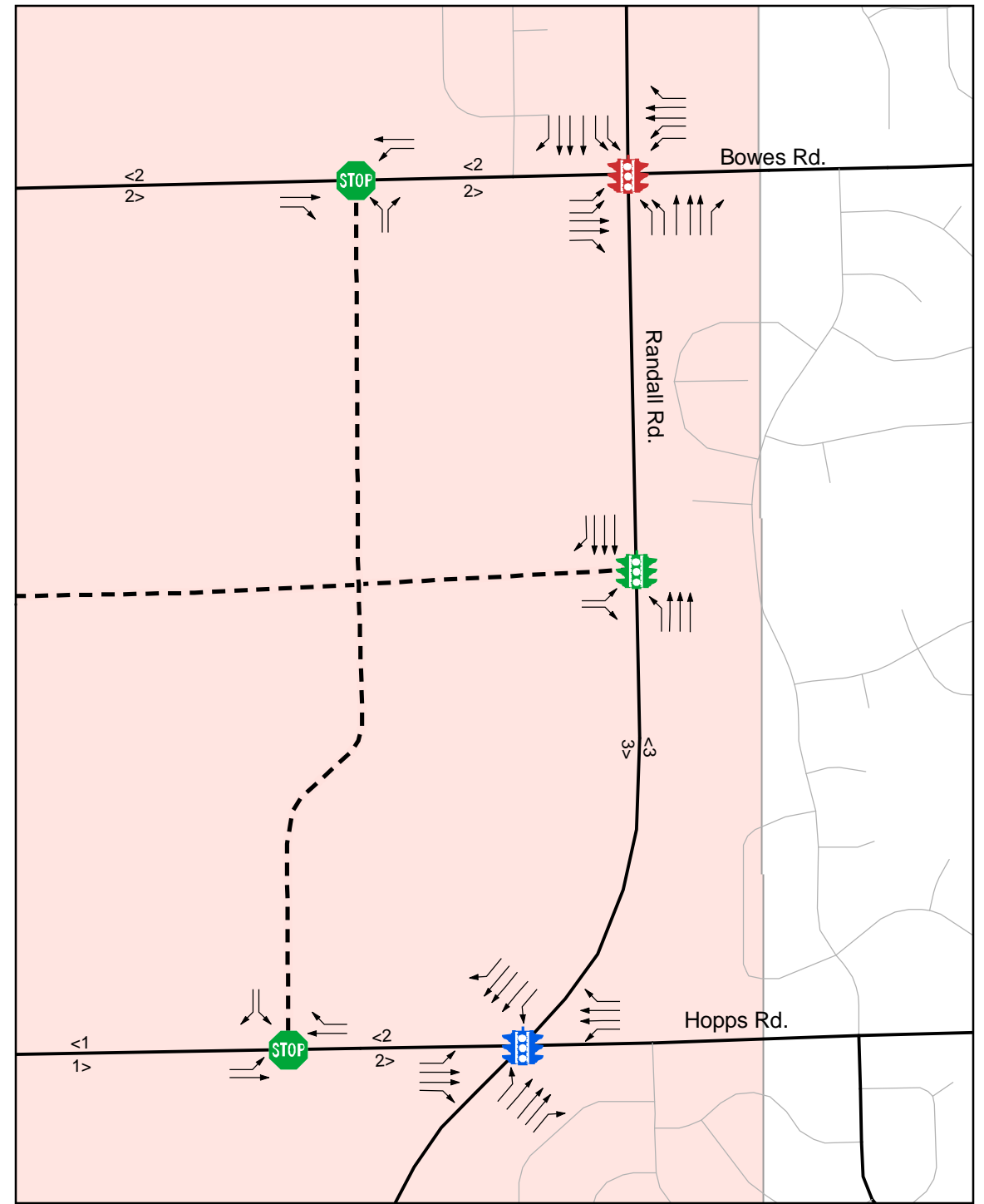
**Elgin Far West Planning Area**  
**2020 Ultimate Transportation Plan**  
**Figure 15**  
 Kane County Transportation Planning Area Study



Detail 1



Detail 2



Detail 3

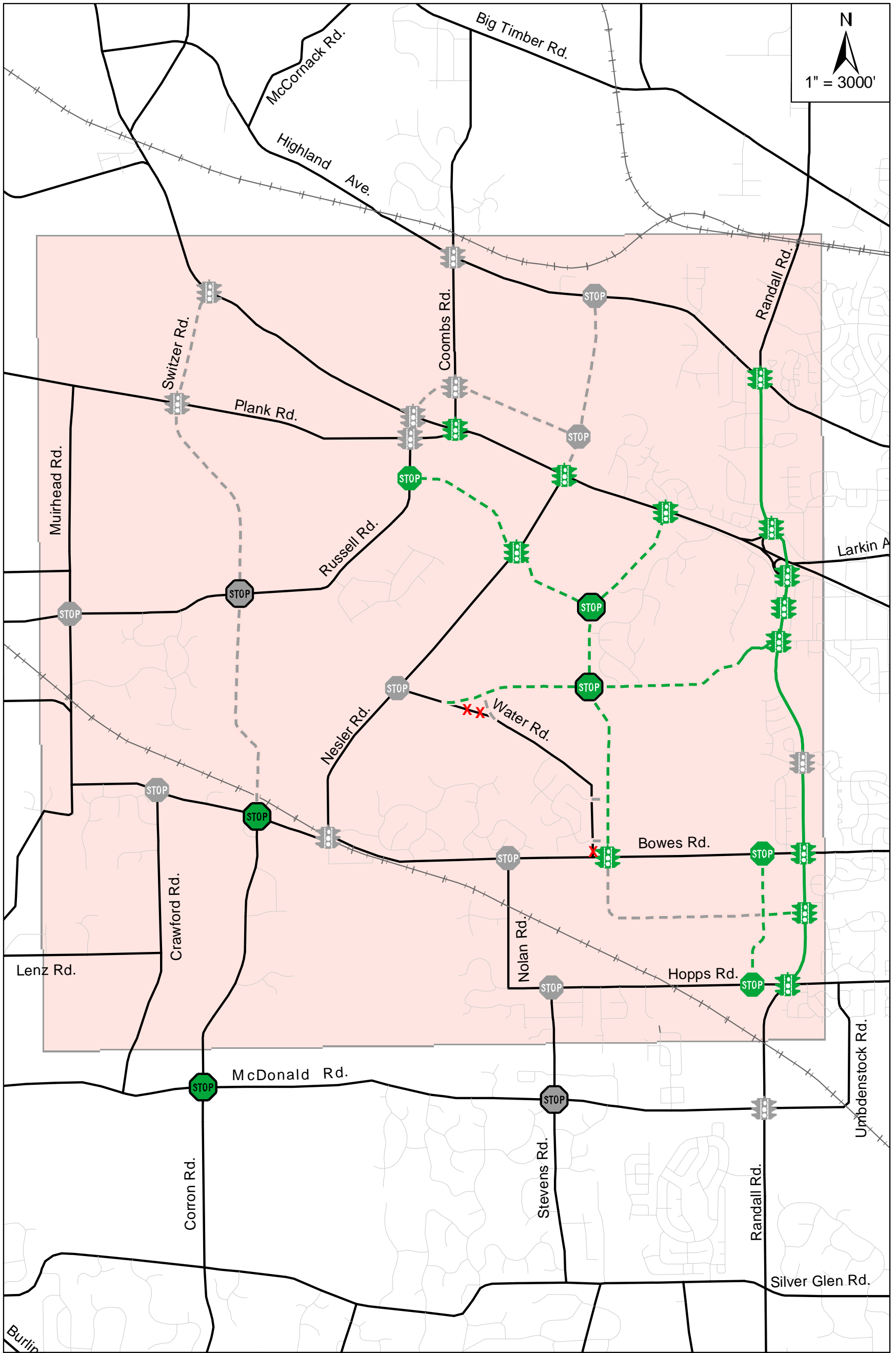


1" = 750'

Two-Way Stop Controlled	All-way Stop Controlled	Signalized	LOS
			A, B, C
			D
			E
			F

- Study Area
- New Roadway
- Eliminated Roadway Segments
- Intersection Approach
- Geometry
- Number of Lanes on Segment by Direction

Elgin Far West Planning Area  
2020 Ultimate Transportation Plan  
Detail Sheet



N  
1" = 3000'

**Elgin Far West Planning Area  
Priority Projects**

Two-Way Stop Controlled	All-way Stop Controlled	Signalized	Priority Project
			Yes
			No

- Study Area
- New Roadway - Not Priority
- New Roadway - Priority Project
- Eliminated Roadway Segments

**Figure 16**  
Kane County Transportation Planning Area Study



Appendix A  
**Assumptions and Parameters Utilized in Traffic  
Operational Analyses**

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# Assumptions and Parameters Utilized in Traffic Operational Analyses

---

Guidelines followed in manually adjusting signal phasing.

- Pre-timed signals only (no actuated signals)
- No pedestrian phasing
- Protected-only left-turn phases required for dual left-turn lanes
- Protected left-turn phases incorporated for all left-turn movements with a dedicated left turn lane
- Protected-permitted left-turn phasing with leading left-turns only
- Provided for right-turn overlapping with left-turn when left-turn has protected phase and the right-turn has a dedicated lane.
- Allowed right-turns on red except for dual right-turn lanes

Synchro's cycle length optimization tools were used to select the cycle length for each intersection. The cycle length optimization routine was restricted to the range of 70 seconds to 130 seconds in 10-second increments only. Other parameter assumptions were:

- Approach grade close to zero (0) percent
- Ideal saturation flow rate = 1900 pcphpl
- PHF = 0.92
- Yellow change interval = 4 sec
- All-red change interval = 2 sec
- No yellow change interval between protected left-turn phase and subsequent through movement.
- Synchro default values were accepted for the remaining parameters.

Isolated signals were treated separately from coordinated signal groups. Coordinated signals were identified and grouped together by using the ZONE identifier in Synchro. All signalized intersections associated with the same master controller were assigned to the same ZONE. Synchro's Network Cycle Length Optimization routine was run for each zone separately to determine a constant cycle length for all signalized intersection within the zone.

Tables A1, A2, and A3 define the criteria used for LOS of signalized intersections, LOS of stop controlled intersections and the requirements for number of lanes for LOS E by functional class on segments.

**TABLE A1**  
Level of Service Criteria for Signalized Intersections

<b>LOS</b>	<b>Control Delay Per Vehicle</b>
A	≤ 10
B	>10 and ≤ 20
C	>20 and ≤ 35
D	>35 and ≤ 55
E	>55 and ≤ 80
F	>80

**TABLE A2**  
Level of Service Criteria for Stop Controlled Intersections

<b>LOS</b>	<b>Control Delay Per Vehicle</b>
A	≤ 10
B	>10 and ≤ 15
C	>15 and ≤ 25
D	>25 and ≤ 35
E	>35 and ≤ 50
F	>50

**TABLE A3**  
Maximum Volumes for LOS E on Urban Streets (vph)

<b>Lanes</b>	<b>Class I</b>	<b>Class II</b>	<b>Class III</b>
1	≤ 1140	≤ 890	≤ 850
2	≤ 2280	≤ 1780	≤ 1690
3	≤ 3430	≤ 2670	≤ 2540
3+	> 3430	> 2670	> 2540

Source: Highway Capacity Manual 2000, Exhibit 10-7

Appendix B  
**Estimated Cost Matrices**

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Intersection Estimated Cost Matrix

Intersection Name	B&B	Bowes Creek	Kimball Hill	McKay Property	Pulte Homes (North)	Town & Country	Wyndham Deerpoint	C1	C2	C3	I1	I2	R1	R2	R3	R4
Coombs & Russell Ext			\$2,900			\$11,500	\$8,600	\$18,600	\$18,600		\$37,300	\$44,400	\$124,700	\$1,400		\$40,100
Coombs Rd. & Highland Ave.			\$2,700			\$10,800	\$8,100	\$17,600	\$17,600		\$35,100	\$18,900	\$83,800	\$4,100	\$1,400	\$29,700
Corron Rd. & Bowes Rd.	\$43,600	\$50,300	\$900		\$1,900	\$5,700	\$8,500		\$7,600		\$2,800	\$1,900	\$2,800			\$4,700
Corron Rd. & McDonald Rd.	\$25,200	\$66,400	\$1,300		\$2,700	\$8,000	\$11,900	\$9,300	\$10,600		\$4,000	\$2,700	\$4,000			\$5,300
Crawford Rd. & Bowes Rd.	\$0															
East/West 3 & Randall Rd.		\$2,000	\$3,900	\$39,600	\$2,000	\$10,800	\$200	\$6,400	\$6,800	\$15,200	\$6,600	\$3,200	\$4,200	\$500		\$3,400
Hopps Rd & Randall Backage				\$22,200						\$37,900						
Hopps Rd. & Stevens Rd.																
McDonald Rd. & Stevens Rd.	\$6,600	\$31,900														
Muirhead Rd. & Russell Rd.							\$0									
Nesler Ext & Highland	\$900	\$3,700				\$4,100		\$11,500	\$12,400			\$6,500	\$16,100	\$3,700	\$11,500	\$24,000
Nesler Ext & US 20 Backage	\$2,000	\$5,200				\$5,900		\$24,700	\$17,600			\$38,400		\$1,300	\$5,200	\$38,400
Nesler Rd & East/West 1	\$16,400	\$24,600	\$2,100		\$2,100	\$22,600	\$42,000	\$13,300	\$28,700			\$9,200			\$2,100	\$12,300
Nesler Rd. & Bowes Rd.	\$62,300	\$75,200	\$5,500		\$7,300	\$11,000	\$5,500	\$12,800	\$14,700							
Nesler Rd. & Water Rd.	\$0	\$0	\$0		\$0	\$0	\$0	\$0	\$0			\$0				
Nolan Rd. & Bowes Rd.	\$5,600	\$24,400	\$1,100		\$1,500	\$2,200										
North/South Rd & East/West 1			\$17,100		\$1,600	\$54,400	\$2,300	\$4,700	\$4,700			\$3,100				\$4,700
North/South Rd & East/West 2	\$2,300	\$10,400	\$27,800		\$4,600	\$61,400	\$3,500	\$6,900				\$4,600				\$6,900
North/South Rd. & Bowes Rd.	\$13,000	\$61,300	\$15,800		\$3,700	\$39,000						\$3,700				\$5,600
Plank Rd. & Switzer Rd.	\$5,000	\$13,200						\$5,000	\$6,600		\$6,600	\$3,300	\$6,600			\$5,000
Randall Backage & Bowes Rd.	\$6,100	\$23,300			\$7,800	\$14,700				\$16,700		\$1,600				\$1,600
Randall Rd. & Bowes Rd.	\$1,500	\$6,700	\$2,700	\$48,400	\$2,700	\$7,600	\$100	\$4,500	\$3,300	\$12,100	\$3,200	\$1,500	\$3,100	\$100	\$500	\$1,600
Randall Rd. & College Green Dr.	\$100	\$700	\$200	\$4,100	\$600	\$600	\$0	\$700	\$800	\$2,000	\$500	\$200	\$500	\$0	\$100	\$300
Randall Rd. & Highland Ave.	\$400	\$1,400	\$1,500	\$5,100	\$1,000	\$4,400	\$500	\$2,800	\$2,100	\$4,600		\$800	\$2,000	\$300	\$1,700	\$5,500
Randall Rd. & Hopps Rd.		\$1,000	\$2,300	\$6,700	\$1,100	\$6,300	\$100	\$3,700	\$2,400	\$52,800	\$2,400	\$1,900	\$2,400	\$300	\$100	\$1,700
Randall Rd. & McDonald Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Randall Rd. & South St.	\$500	\$2,000	\$2,100	\$12,600	\$1,600	\$1,900	\$100	\$2,300	\$2,500	\$6,200	\$1,600	\$500	\$2,100	\$100	\$200	\$1,300
Randall Rd. & Weld Dr.	\$400	\$1,500	\$1,100	\$9,100	\$1,200	\$1,000		\$1,700	\$1,800	\$3,600	\$1,500	\$400	\$1,500	\$0	\$200	\$1,000
Randall Rd./US 20/Foothill Rd.	\$1,000	\$3,800	\$3,500	\$20,400	\$3,400	\$10,500	\$1,300	\$5,500	\$3,400	\$5,900	\$10,500	\$1,400	\$5,200	\$100	\$700	\$5,100
Randall Rd./US 20/Weld Rd.	\$400	\$3,100	\$1,200	\$19,600	\$2,600	\$3,300	\$300	\$5,100	\$5,500	\$7,800	\$3,300	\$900	\$3,500		\$500	\$2,700
Russell Ext & US 20			\$1,400		\$2,700	\$6,800	\$8,800	\$8,800	\$9,500		\$112,200	\$11,500	\$23,000	\$700		\$18,900
Russell Rd & Corron Ext	\$13,400	\$26,800					\$15,100	\$10,100	\$10,100		\$6,700	\$6,700	\$5,000			\$8,400
Russell Rd & East/West 1							\$14,300	\$8,500	\$9,100		\$5,900	\$3,300	\$5,900			\$5,200
Russell Rd. & Plank Rd.							\$13,100	\$12,100	\$8,100		\$17,100	\$9,100	\$17,100			\$14,100
US 20 & Switzer Rd.	\$4,200	\$11,200	\$1,400		\$1,400	\$7,000	\$4,900	\$9,100	\$9,800		\$30,800	\$5,600	\$18,200	\$700		\$9,800
Weld Dr. & US 20																
Nesler Dr. & US 20																
Coombs & US 20																
<b>Total By Development</b>	<b>\$210,900</b>	<b>\$450,000</b>	<b>\$98,500</b>	<b>\$187,800</b>	<b>\$53,400</b>	<b>\$311,300</b>	<b>\$149,300</b>	<b>\$205,600</b>	<b>\$216,700</b>	<b>\$170,600</b>	<b>\$279,100</b>	<b>\$184,200</b>	<b>\$331,600</b>	<b>\$13,300</b>	<b>\$24,100</b>	<b>\$257,300</b>

Intersection Estimated Cost Matrix (Continued)

Intersection Name	R5	R6	R8	R9 - 2020	R10	R11	R12	R13	R14	R15	R16	R17	Future Background Traffic	Total by Intersection
Coombs & Russell Ext	\$4,300	\$11,500	\$5,700										\$120,400	\$450,000
Coombs Rd. & Highland Ave.	\$4,100	\$10,800	\$5,400										\$200,000	\$450,000
Corron Rd. & Bowes Rd.	\$6,600	\$21,800	\$2,800	\$2,800		\$15,200	\$2,800	\$17,100	\$2,800			\$2,800	\$184,100	\$390,000
Corron Rd. & McDonald Rd.	\$9,300	\$30,500	\$4,000	\$4,000		\$10,600	\$2,700	\$13,300	\$2,700			\$4,000	\$217,700	\$450,000
Crawford Rd. & Bowes Rd.													\$0	\$0
East/West 3 & Randall Rd.	\$200	\$700	\$2,200	\$3,400	\$500	\$3,400	\$700		\$2,200	\$500	\$2,200	\$3,700	\$155,500	\$280,000
Hopps Rd & Randall Backage									\$7,400	\$1,800	\$35,100		\$55,500	\$160,000
Hopps Rd. & Stevens Rd.									\$0				\$0	\$0
McDonald Rd. & Stevens Rd.								\$7,500	\$3,800				\$150,200	\$200,000
Muirhead Rd. & Russell Rd.	\$0	\$0											\$0	\$0
Nesler Ext & Highland			\$4,100	\$1,800		\$5,100	\$1,400	\$500					\$52,600	\$160,000
Nesler Ext & US 20 Backage			\$5,900	\$2,600		\$7,200	\$2,000	\$700				\$3,300		\$160,000
Nesler Rd & East/West 1	\$3,100	\$8,200	\$89,200	\$20,500		\$25,600	\$7,200	\$5,100				\$8,200	\$107,600	\$450,000
Nesler Rd. & Bowes Rd.			\$5,500	\$9,200		\$78,900	\$16,500	\$25,700	\$9,200			\$5,500	\$295,200	\$640,000
Nesler Rd. & Water Rd.			\$0	\$0		\$0	\$0	\$0				\$0	\$0	\$0
Nolan Rd. & Bowes Rd.				\$1,100		\$9,300	\$1,900	\$3,000	\$3,300			\$1,100	\$45,600	\$100,000
North/South Rd & East/West 1	\$2,300	\$6,200	\$7,000	\$11,700					\$20,200			\$20,200		\$160,000
North/South Rd & East/West 2	\$3,500	\$9,300	\$10,400	\$75,300					\$28,900			\$74,100		\$330,000
North/South Rd. & Bowes Rd.			\$8,400	\$13,000		\$20,400	\$4,600	\$7,400	\$65,000	\$900	\$2,800	\$11,100	\$114,200	\$390,000
Plank Rd. & Switzer Rd.	\$6,600	\$19,800	\$1,700			\$6,600	\$800	\$2,500					\$160,900	\$250,000
Randall Backage & Bowes Rd.			\$3,700	\$3,700		\$9,000	\$2,000	\$3,300	\$11,800	\$2,900	\$4,900	\$3,300	\$43,700	\$160,000
Randall Rd. & Bowes Rd.		\$400	\$1,100	\$1,600	\$400	\$2,600	\$600	\$900	\$3,400	\$700	\$2,400	\$1,500	\$94,800	\$210,000
Randall Rd. & College Green Dr.	\$0	\$100		\$200	\$100			\$100	\$200	\$100	\$300	\$100	\$17,500	\$30,000
Randall Rd. & Highland Ave.	\$400	\$1,300	\$800	\$1,000	\$200	\$600	\$200	\$400	\$400		\$400	\$900	\$59,100	\$100,000
Randall Rd. & Hopps Rd.	\$100	\$400	\$1,300	\$2,000	\$300	\$2,000	\$400		\$2,400	\$600	\$5,400	\$1,600	\$108,100	\$210,000
Randall Rd. & McDonald Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Randall Rd. & South St.	\$100	\$300		\$2,000	\$1,000			\$300	\$500	\$200	\$700	\$1,700	\$55,500	\$100,000
Randall Rd. & Weld Dr.				\$800	\$500			\$200	\$400	\$100	\$200	\$700	\$41,000	\$70,000
Randall Rd./US 20/Foothill Rd.	\$1,100	\$3,400	\$1,300	\$2,800	\$1,300			\$700	\$1,600	\$300	\$1,400	\$3,000	\$173,300	\$270,000
Randall Rd./US 20/Weld Rd.	\$300	\$900	\$300	\$2,000	\$1,000			\$500	\$900	\$200	\$1,000	\$1,800	\$101,500	\$170,000
Russell Ext & US 20	\$3,400	\$11,500	\$6,100	\$3,400					\$2,700			\$2,700	\$216,200	\$450,000
Russell Rd & Corron Ext	\$15,100	\$51,900				\$13,400	\$1,700	\$5,000					\$140,700	\$330,000
Russell Rd & East/West 1	\$7,800	\$36,400	\$7,200										\$56,600	\$160,000
Russell Rd. & Plank Rd.	\$42,300	\$45,300	\$11,100										\$230,600	\$420,000
US 20 & Switzer Rd.	\$5,600	\$16,800	\$3,500	\$3,500		\$2,100	\$700	\$2,100	\$2,800			\$2,800	\$236,200	\$390,000
Weld Dr. & US 20													\$350,000	\$350,000
Nesler Dr. & US 20													\$560,000	\$560,000
Coombs & US 20													\$560,000	\$560,000
<b>Total By Development</b>	<b>\$116,300</b>	<b>\$287,500</b>	<b>\$188,400</b>	<b>\$168,400</b>	<b>\$5,300</b>	<b>\$211,900</b>	<b>\$46,200</b>	<b>\$96,200</b>	<b>\$172,500</b>	<b>\$8,200</b>	<b>\$56,900</b>	<b>\$154,100</b>	<b>\$4,904,500</b>	<b>\$9,560,000</b>

Segment Estimated Construction Cost Matrix

Segment Name	Segment Location	B&B	Bowes Creek	Kimball Hill	McKay Property	Pulte Homes (North)	Town & Country	Wyndham Deerpoint	C1	C2	C3	I1	I2	R1	R2	R3	R4	
Bowes Road	Corron Rd. to Nesler Road	\$220,900	\$258,800	\$12,600		\$18,900	\$37,900	\$18,900	\$18,900	\$50,500		\$0	\$0	\$0			\$0	
Bowes Road	Crawford Rd. to Corron Rd.	\$362,800	\$83,700	\$0		\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0			\$0	
Bowes Road	E. of Randall Rd.	\$2,900	\$9,400	\$4,100	\$122,600	\$2,400	\$12,400	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Bowes Road	Nesler Road to Nolan Road	\$76,300	\$162,100	\$14,300		\$19,100	\$28,600	\$0	\$0	\$0								
Bowes Road	Nolan Road to North/South Road	\$92,000	\$405,000	\$18,400		\$18,400	\$36,800						\$0				\$0	
Bowes Road	North/South St. to Randall Backage	\$92,900	\$378,300	\$59,700		\$46,500	\$238,900				\$0		\$26,500				\$33,200	
Bowes Road	Randall Backage to Randall Rd.	\$9,600	\$39,100	\$3,400	\$93,300	\$13,000	\$24,700	\$0	\$0	\$0	\$28,100	\$0	\$2,700	\$0	\$0	\$0	\$2,700	
Corron Extension	Bowes Rd. to Russell Rd.	\$1,060,900	\$1,886,100	\$0		\$0	\$0	\$707,300	\$0	\$0		\$353,600	\$235,800	\$353,600			\$589,400	
Corron Extension	Plank Rd. to US 20	\$95,800	\$255,400	\$0		\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0	\$0		\$0	
Corron Extension	Russell Rd. to Plank Rd.	\$249,000	\$664,000					\$0	\$0	\$0		\$0	\$0	\$0			\$0	
Corron Extension	US 20 to Highland Ave.	\$0	\$0	\$0		\$0	\$0	\$0	\$0	\$0		\$557,100	\$0	\$294,900	\$0		\$0	
East/West 1	Nesler Rd. to North/South Rd.	\$0	\$0	\$0		\$0	\$427,500	\$67,500	\$135,000	\$135,000			\$90,000			\$0	\$225,000	
East/West 1	Russell Rd. to Nesler Rd.	\$94,500	\$128,800	\$8,600		\$8,600	\$111,600	\$266,200	\$68,700	\$120,200		\$0	\$51,500	\$0		\$8,600	\$34,400	
East/West 3	Bowes Rd. to Randall Backage	\$0	\$0	\$0	\$4,728,100	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Highland Avenue	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$15,900	\$1,800	\$8,900	\$26,600	
Highland Avenue	W. of Randall Rd.	\$3,800	\$15,000	\$0	\$0	\$0	\$16,900	\$0	\$47,000	\$50,800			\$26,300	\$65,800	\$9,400	\$56,400	\$126,000	
Hopps Road	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$581,800	\$0	\$0	\$0	\$0	\$0	\$0	
Hopps Road	W. of Randall Rd.	\$0	\$0	\$0	\$141,700	\$0	\$0	\$0	\$0	\$0	\$1,570,600	\$0	\$0	\$0	\$0	\$0	\$0	
McDonald Road	E. of Randall Rd.	\$9,700	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
McDonald Road	W. of Randall Rd.	\$8,900	\$15,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Nesler Extension	US 20 Backage Rd. to Highland Ave.	\$68,400	\$182,400				\$205,200		\$570,000	\$615,600			\$319,200	\$0	\$68,400	\$182,400	\$524,400	
Nesler Extension	US 20 to US 20 Backage Rd	\$5,300	\$14,100	\$0		\$0	\$14,100	\$3,500	\$279,800	\$47,500		\$0	\$79,200	\$0	\$3,500	\$14,100	\$103,800	
North/South Road	Bowes Rd. to South St.	\$0	\$248,600	\$303,800		\$82,900	\$828,700	\$0	\$55,200				\$110,500				\$165,700	
North/South Road	East/West 1 to US 20	\$0	\$0	\$225,900		\$20,500	\$893,500	\$0	\$0	\$0		\$0	\$0	\$0	\$0	\$0	\$0	
North/South Road	South St to East/West 1	\$0	\$0	\$167,700		\$15,200	\$304,900	\$22,900	\$45,700	\$15,200			\$30,500				\$45,700	
Randall Backage	Hopps Rd. to East/West 3	\$0	\$0		\$378,200	\$0	\$0				\$1,192,700		\$0				\$0	
Randall Road	Bowes Rd. to College Green	\$4,900	\$20,000	\$5,500	\$125,600	\$8,500	\$17,600	\$600	\$23,100	\$20,000	\$62,500	\$16,400	\$5,500	\$15,800	\$600	\$2,400	\$7,900	
Randall Road	College Green to South St.	\$14,300	\$67,600	\$18,400	\$423,900	\$55,300	\$59,400	\$2,000	\$77,800	\$84,000	\$210,900	\$55,300	\$18,400	\$63,500	\$2,000	\$8,200	\$38,900	
Randall Road	East/West 3 to Bowes Road	\$0	\$3,900	\$7,900	\$74,400	\$3,900	\$21,700	\$500	\$14,800	\$13,800	\$30,500	\$13,300	\$6,400	\$11,300	\$1,000	\$1,500	\$6,900	
Randall Road	Hopps Rd. to East/West 3	\$0	\$5,800	\$11,700	\$16,800	\$5,800	\$32,100	\$700	\$18,900	\$10,200	\$45,200	\$14,600	\$9,500	\$12,400	\$1,500	\$0	\$9,500	
Randall Road	South St. to Weld Rd.	\$12,300	\$50,700	\$39,900	\$318,000	\$41,500	\$20,000	\$0	\$58,400	\$63,000	\$136,700	\$44,600	\$13,800	\$52,200	\$1,500	\$6,100	\$33,800	
Randall Road	US 20/Weld to US20/Foothill	\$10,000	\$67,600	\$0	\$360,700	\$60,100	\$82,700	\$7,500	\$75,200	\$80,200	\$205,400	\$25,100	\$7,500	\$77,700	\$0	\$12,500	\$62,600	
Randall Road	US20/Foothill to Highland Ave.	\$11,000	\$37,400	\$59,400	\$202,400	\$39,600	\$156,200	\$19,800	\$55,000	\$22,000	\$180,400	\$0	\$0	\$57,200	\$2,200	\$8,800	\$63,800	
Randall Road	Weld Rd. to US20/Weld	\$1,400	\$6,800	\$5,300	\$42,500	\$5,500	\$2,500	\$0	\$7,800	\$8,400	\$16,800	\$7,200	\$1,800	\$7,000	\$0	\$800	\$4,500	
Russell Extension	Plank Rd. to US 20	\$0	\$0	\$0		\$0	\$0	\$42,500	\$0	\$0		\$55,500	\$29,400	\$55,500	\$0		\$45,700	
Russell Extension	US 20 to Coombs	\$0	\$0	\$0		\$0	\$0	\$22,500	\$0	\$0		\$465,000	\$63,800	\$127,500	\$3,800		\$105,000	
South Street	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
South Street Extension	North/South St. to Current South Rd.	\$18,600	\$93,100	\$298,000	\$0	\$0	\$149,000	\$37,300	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
South Street Extension	Water to North/South St.	\$78,900	\$0	\$78,900		\$78,900	\$591,600	\$0	\$0	\$0			\$0				\$0	
US 20	2-lane section to Russell Ext.	\$0	\$0	\$3,700		\$5,500	\$14,800	\$12,900	\$24,000	\$25,900		\$81,300	\$14,800	\$31,400	\$1,800		\$25,900	
US 20	Coombs Rd. to 6-lane section	\$0	\$0	\$6,500		\$4,900	\$29,100	\$34,000	\$40,500	\$43,700		\$170,000	\$0	\$85,800	\$0	\$0	\$0	
US 20	Nesler Rd. to Weld Rd.	\$13,800	\$20,100	\$2,500		\$2,500	\$26,400	\$13,800	\$221,100	\$242,500		\$124,400	\$45,200	\$66,600	\$2,500	\$7,500	\$52,800	
US 20	Russell Ext to Coombs Rd.	\$0	\$0	\$1,600		\$2,400	\$9,400	\$0	\$10,200	\$11,000		\$82,600	\$0	\$0	\$800		\$0	
US 20	Weld Rd. to Randall Rd.	\$13,300	\$21,300	\$26,600		\$0	\$152,900	\$42,500	\$233,900	\$284,400		\$103,700	\$47,800	\$70,400	\$2,700	\$8,000	\$55,800	
US 20 Backage	Coombs Rd. to Nesler Rd.	\$0	\$0	\$0		\$0	\$0	\$0	\$448,800	\$0		\$0	\$2,209,700	\$0	\$0	\$0	\$621,500	
Total by Development		0	\$2,632,200	\$5,140,700	\$1,384,500	\$7,028,100	\$559,900	\$4,546,900	\$1,323,000	\$2,530,000	\$1,943,900	\$4,261,700	\$2,169,600	\$3,445,900	\$1,464,700	\$103,500	\$326,200	\$3,011,500

Segment Estimated Construction Cost Matrix (Continued)

Segment Name	Segment Location	R5	R6	R8	R9 - 2020	R10	R11	R12	R13	R14	R15	R16	R17	Future Background Traffic	Total by Segment	
Bowes Road	Corron Rd. to Nesler Road	\$0	\$0	\$18,900	\$25,200		\$113,600	\$18,900	\$88,400	\$25,200			\$18,900	\$833,200	\$1,780,000	
Bowes Road	Crawford Rd. to Corron Rd.	\$0	\$0	\$0	\$0		\$0	\$27,900	\$0				\$0	\$1,925,600	\$2,400,000	
Bowes Road	E. of Randall Rd.		\$0	\$0	\$0	\$0	\$4,700	\$1,200	\$1,800	\$12,400	\$1,800	\$3,500	\$0	\$100,800	\$280,000	
Bowes Road	Nesler Road to Nolan Road			\$0	\$0		\$119,200	\$28,600	\$38,100	\$23,800			\$0	\$409,900	\$920,000	
Bowes Road	Nolan Road to North/South Road			\$0	\$24,500		\$147,300	\$30,700	\$49,100	\$55,200	\$6,100	\$12,300	\$18,400	\$705,700	\$1,620,000	
Bowes Road	North/South St. to Randall Backage			\$59,700	\$59,700		\$146,000	\$33,200	\$53,100	\$172,600	\$6,600	\$19,900	\$53,100	\$750,000	\$2,230,000	
Bowes Road	Randall Backage to Randall Rd.		\$0	\$6,200	\$5,500	\$0	\$15,100	\$3,400	\$5,500	\$19,900	\$4,100	\$6,200	\$5,500	\$72,000	\$360,000	
Corron Extension	Bowes Rd. to Russell Rd.	\$825,200	\$2,711,200	\$0	\$0		\$943,000	\$117,900	\$353,600	\$0			\$0	\$5,422,400	\$15,560,000	
Corron Extension	Plank Rd. to US 20	\$127,700	\$383,200	\$0	\$0		\$95,800	\$16,000	\$47,900	\$0			\$0	\$798,200	\$1,820,000	
Corron Extension	Russell Rd. to Plank Rd.	\$0	\$0	\$0	\$0		\$332,000	\$41,500	\$124,500					\$1,909,000	\$3,320,000	
Corron Extension	US 20 to Highland Ave.	\$98,300	\$262,200	\$0	\$0		\$0	\$0	\$0	\$0			\$0	\$1,507,500	\$2,720,000	
East/West 1	Nesler Rd. to North/South Rd.	\$67,500	\$180,000	\$202,500	\$0		\$0	\$0	\$0	\$0			\$0	\$0	\$1,530,000	
East/West 1	Russell Rd. to Nesler Rd.	\$17,200	\$42,900	\$386,500	\$120,200		\$137,400	\$34,400	\$25,800				\$42,900	\$480,900	\$2,190,000	
East/West 3	Bowes Rd. to Randall Backage	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,504,400	\$53,700	\$53,700	\$0	\$0	\$6,340,000	
Highland Avenue	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$286,900	\$340,000	
Highland Avenue	W. of Randall Rd.	\$0	\$0	\$15,000	\$7,500	\$0	\$20,700	\$5,600	\$1,900	\$0		\$0	\$0	\$251,900	\$720,000	
Hopps Road	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$37,800	\$0	\$430,400	\$1,050,000	
Hopps Road	W. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$47,200	\$11,800	\$224,400	\$0	\$354,300	\$2,350,000	
McDonald Road	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$670,300	\$680,000	
McDonald Road	W. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,600	\$0	\$0	\$0	\$0	\$339,000	\$370,000	
Nesler Extension	US 20 Backage Rd. to Highland Ave.			\$205,200	\$91,200		\$250,800	\$68,400	\$22,800				\$45,600	\$0	\$3,420,000	
Nesler Extension	US 20 to US 20 Backage Rd	\$0	\$0	\$21,100	\$7,000		\$19,400	\$5,300	\$1,800	\$0			\$10,600	\$0	\$630,000	
North/South Road	Bowes Rd. to South St.	\$0	\$0	\$248,600	\$386,700		\$0	\$0	\$0	\$966,800	\$0	\$0	\$331,500	\$221,000	\$3,950,000	
North/South Road	East/West 1 to US 20	\$0	\$0	\$0	\$154,100		\$0	\$0	\$0	\$267,000			\$267,000	\$71,900	\$1,900,000	
North/South Road	South St to East/West 1	\$22,900	\$61,000	\$68,600	\$114,300					\$137,200			\$198,200		\$1,250,000	
Randall Backage	Hopps Rd. to East/West 3			\$0	\$0		\$0	\$0	\$87,300	\$87,300	\$494,500	\$0	\$0	\$0	\$2,240,000	
Randall Road	Bowes Rd. to College Green	\$600	\$1,800	\$0	\$5,500	\$1,800	\$0	\$0	\$3,000	\$4,900	\$1,800	\$8,500	\$3,000	\$482,300	\$850,000	
Randall Road	College Green to South St.	\$2,000	\$6,100		\$18,400	\$6,100			\$10,200	\$16,400	\$6,100	\$26,600	\$14,300	\$1,693,500	\$3,000,000	
Randall Road	East/West 3 to Bowes Road	\$0	\$1,500	\$4,400	\$6,900	\$1,500	\$6,900	\$1,500	\$0	\$0	\$0	\$4,400	\$7,400	\$313,700	\$560,000	
Randall Road	Hopps Rd. to East/West 3	\$700	\$2,200	\$6,600	\$10,200	\$1,500	\$10,200	\$2,200		\$6,600	\$1,500	\$3,600	\$10,200	\$470,000	\$720,000	
Randall Road	South St. to Weld Rd.	\$0	\$0		\$29,200	\$18,400			\$7,700	\$12,300	\$4,600	\$16,900	\$24,600	\$1,113,800	\$2,120,000	
Randall Road	US 20/Weld to US20/Foothill	\$7,500	\$22,500	\$7,500	\$42,600	\$20,000			\$12,500	\$20,000	\$5,000	\$25,100	\$40,100	\$2,392,300	\$3,730,000	
Randall Road	US20/Foothill to Highland Ave.	\$17,600	\$52,800	\$19,800	\$30,800	\$8,800	\$0	\$0	\$11,000	\$17,600	\$2,200	\$17,600	\$35,200	\$2,121,200	\$3,250,000	
Randall Road	Weld Rd. to US20/Weld	\$0	\$0	\$0	\$3,900	\$2,500			\$1,000	\$1,600	\$400	\$1,000	\$3,300	\$177,900	\$310,000	
Russell Extension	Plank Rd. to US 20	\$16,300	\$55,500	\$29,400	\$0					\$0			\$0	\$0	\$330,000	
Russell Extension	US 20 to Coombs	\$15,000	\$52,500	\$15,000	\$0					\$0			\$0	\$0	\$870,000	
South Street	E. of Randall Rd.	\$0	\$0		\$2,100	\$800			\$0	\$0	\$0	\$0	\$2,100	\$85,000	\$90,000	
South Street Extension	North/South St. to Current South Rd.	\$37,300	\$149,000	\$0	\$651,900	\$111,800			\$0	\$55,900	\$0	\$0	\$521,500	\$1,806,700	\$3,930,000	
South Street Extension	Water to North/South St.	\$0	\$0	\$0	\$986,000		\$78,900	\$39,400	\$39,400	\$0			\$1,064,800	\$473,300	\$3,510,000	
US 20	2-lane section to Russell Ext.	\$0	\$0	\$9,200	\$9,200		\$0	\$0	\$0	\$7,400			\$7,400	\$554,600	\$830,000	
US 20	Coombs Rd. to 6-lane section	\$50,200	\$127,900	\$0	\$8,100		\$0	\$0	\$0	\$6,500			\$6,500	\$856,400	\$1,470,000	
US 20	Nesler Rd. to Weld Rd.	\$17,600	\$99,200	\$62,800	\$17,600		\$17,600	\$5,000	\$5,000	\$5,000			\$0	\$668,400	\$1,740,000	
US 20	Russell Ext to Coombs Rd.	\$0	\$0	\$0	\$3,900					\$3,100			\$3,100	\$251,800	\$380,000	
US 20	Weld Rd. to Randall Rd.	\$33,200	\$105,000	\$66,500	\$38,500		\$18,600	\$5,300	\$5,300	\$29,200			\$34,600	\$720,400	\$2,120,000	
US 20 Backage	Coombs Rd. to Nesler Rd.	\$0	\$0	\$0	\$0		\$0	\$0	\$0	\$0			\$0	\$0	\$3,280,000	
<b>Total by Development</b>		<b>0</b>	<b>\$1,356,800</b>	<b>\$4,316,600</b>	<b>\$1,453,600</b>	<b>\$2,860,900</b>	<b>\$173,200</b>	<b>\$2,477,100</b>	<b>\$458,500</b>	<b>\$944,000</b>	<b>\$3,505,600</b>	<b>\$193,100</b>	<b>\$956,100</b>	<b>\$2,769,800</b>	<b>\$31,722,100</b>	<b>\$95,060,000</b>

Segment Estimated ROW Cost Matrix

Segment Name	Segment Location	B&B	Bowes Creek	Kimball Hill	McKay Property	Pulte Homes (North)	Town & Country	Wyndham Deerpoint	C1	C2	C3	I1	I2	R1	R2	R3	R4	R5
Bowes Road	Corron Rd. to Nesler Road	\$105,500	\$123,600	\$6,000		\$9,000	\$18,100	\$9,000	\$9,000	\$24,100		\$0	\$0	\$0			\$0	\$0
Bowes Road	Crawford Rd. to Corron Rd.	\$146,600	\$33,800	\$0		\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0			\$0	\$0
Bowes Road	E. of Randall Rd.	\$1,600	\$5,100	\$2,200	\$65,700	\$1,300	\$6,600	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bowes Road	Nesler Road to Nolan Road	\$13,300	\$28,200	\$2,500		\$3,300	\$5,000	\$0	\$0	\$0								
Bowes Road	Nolan Road to North/South Road	\$5,700	\$25,000	\$1,100		\$1,100	\$2,300						\$0					\$0
Bowes Road	North/South St. to Randall Backage	\$33,300	\$135,700	\$21,400		\$16,700	\$85,700				\$0		\$9,500				\$11,900	
Bowes Road	Randall Backage to Randall Rd.	\$11,500	\$46,700	\$4,100	\$111,400	\$15,600	\$29,500	\$0	\$0	\$0	\$33,600	\$0	\$3,300	\$0	\$0	\$0	\$3,300	
Corron Extension	Bowes Rd. to Russell Rd.	\$115,900	\$206,100	\$0		\$0	\$0	\$77,300	\$0	\$0	\$0	\$38,600	\$25,800	\$38,600			\$64,400	\$90,200
Corron Extension	Plank Rd. to US 20	\$45,800	\$122,100	\$0		\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$0	\$0		\$0	\$61,100
Corron Extension	Russell Rd. to Plank Rd.	\$119,300	\$318,000					\$0	\$0	\$0		\$0	\$0	\$0			\$0	\$0
Corron Extension	US 20 to Highland Ave.	\$0	\$0	\$0		\$0	\$0	\$0	\$0	\$0	\$266,300	\$0	\$141,000	\$0			\$0	\$47,000
East/West 1	Nesler Rd. to North/South Rd.	\$0	\$0	\$0		\$0	\$204,000	\$32,200	\$64,400	\$64,400			\$42,900			\$0	\$107,400	\$32,200
East/West 1	Russell Rd. to Nesler Rd.	\$44,900	\$61,200	\$4,100		\$4,100	\$53,000	\$126,400	\$32,600	\$57,100		\$0	\$24,500	\$0		\$4,100	\$16,300	\$8,200
East/West 3	Bowes Rd. to Randall Backage	\$0	\$0	\$0	\$1,402,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0
Highland Avenue	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,500	\$1,600	\$8,100	\$24,200	\$0	\$0
Highland Avenue	W. of Randall Rd.	\$4,200	\$16,900	\$0	\$0	\$0	\$19,000	\$0	\$52,900	\$57,100	\$0	\$29,600	\$74,000	\$10,600	\$63,400	\$141,700	\$0	\$0
Hopps Road	E. of Randall Rd.		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$288,100	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Hopps Road	W. of Randall Rd.		\$0	\$0	\$133,900	\$0	\$0	\$0	\$0	\$0	\$1,483,700	\$0	\$0	\$0	\$0	\$0	\$0	\$0
McDonald Road	E. of Randall Rd.	\$7,300	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
McDonald Road	W. of Randall Rd.	\$10,100	\$17,600	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Nesler Extension	US 20 Backage Rd. to Highland Ave.	\$21,200	\$56,500			\$63,600		\$176,700	\$190,800			\$98,900	\$0	\$21,200	\$56,500	\$162,500		
Nesler Extension	US 20 to US 20 Backage Rd	\$2,500	\$6,700	\$0		\$0	\$6,700	\$1,700	\$133,200	\$22,600		\$0	\$37,700	\$0	\$1,700	\$6,700	\$49,400	\$0
North/South Road	Bowes Rd. to South St.	\$0	\$83,100	\$101,500		\$27,700	\$276,900	\$0	\$18,500			\$36,900				\$55,400	\$0	\$0
North/South Road	East/West 1 to US 20	\$0	\$0	\$108,200		\$9,800	\$427,900	\$0	\$0	\$0		\$0	\$0	\$0	\$0	\$0	\$0	\$0
North/South Road	South St to East/West 1	\$0	\$0	\$80,500		\$7,300	\$146,300	\$11,000	\$22,000	\$7,300		\$14,600				\$22,000	\$11,000	
Randall Backage	Hopps Rd. to East/West 3	\$0	\$0		\$180,600	\$0	\$0			\$569,700		\$0				\$0		
Randall Road	Bowes Rd. to College Green	\$2,800	\$11,500	\$3,100	\$72,400	\$4,900	\$10,100	\$300	\$13,300	\$11,500	\$36,000	\$9,400	\$3,100	\$9,100	\$300	\$1,400	\$4,500	\$300
Randall Road	College Green to South St.	\$1,900	\$9,000	\$2,500	\$56,500	\$7,400	\$7,900	\$300	\$10,400	\$11,200	\$28,100	\$7,400	\$2,500	\$8,500	\$300	\$1,100	\$5,200	\$300
Randall Road	East/West 3 to Bowes Road	\$0	\$1,800	\$3,700	\$34,500	\$1,800	\$10,100	\$200	\$6,900	\$6,400	\$14,200	\$6,200	\$3,000	\$5,300	\$500	\$700	\$3,200	\$0
Randall Road	Hopps Rd. to East/West 3		\$2,700	\$5,300	\$7,700	\$2,700	\$14,700	\$300	\$8,700	\$4,700	\$20,700	\$6,700	\$4,300	\$5,700	\$700	\$0	\$4,300	\$300
Randall Road	South St. to Weld Rd.	\$1,700	\$6,900	\$5,500	\$43,500	\$5,700	\$2,700	\$0	\$8,000	\$8,600	\$18,700	\$6,100	\$1,900	\$7,100	\$200	\$800	\$4,600	\$0
Randall Road	US 20/Weld to US20/Foothill	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Randall Road	US20/Foothill to Highland Ave.	\$4,300	\$14,600	\$23,200	\$79,100	\$15,500	\$61,000	\$7,700	\$21,500	\$8,600	\$70,500	\$0	\$22,400	\$900	\$3,400	\$24,900	\$6,900	
Randall Road	Weld Rd. to US20/Weld	\$800	\$3,900	\$3,100	\$24,700	\$3,200	\$1,400	\$0	\$4,500	\$4,900	\$9,800	\$4,200	\$1,100	\$4,100	\$0	\$500	\$2,600	\$0
Russell Extension	Plank Rd. to US 20			\$0		\$0	\$0	\$20,600	\$0	\$0		\$26,900	\$14,300	\$26,900	\$0		\$22,200	\$7,900
Russell Extension	US 20 to Coombs			\$0		\$0	\$0	\$10,900	\$0	\$0		\$224,500	\$30,800	\$61,600	\$1,800		\$50,700	\$7,200
South Street	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
South Street Extension	North/South St. to Current South Rd.	\$7,000	\$35,100	\$112,200	\$0	\$0	\$56,100	\$14,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,000
South Street Extension	Water to North/South St.	\$24,700	\$0	\$24,700		\$24,700	\$185,400	\$0	\$0	\$0		\$0					\$0	\$0
US 20	2-lane section to Russell Ext.	\$0	\$0	\$2,100		\$3,200	\$8,600	\$7,500	\$13,900	\$15,000	\$8,600	\$47,000	\$8,600	\$18,200	\$1,100		\$15,000	\$0
US 20	Coombs Rd. to 6-lane section	\$0	\$0	\$11,300		\$8,500	\$50,900	\$59,400	\$70,800	\$76,400		\$297,200	\$0	\$150,000	\$0	\$0	\$0	\$87,700
US 20	Nesler Rd. to Weld Rd.	\$10,800	\$15,700	\$2,000		\$2,000	\$20,600	\$10,800	\$172,800	\$189,500		\$97,200	\$35,400	\$52,000	\$2,000	\$5,900	\$41,200	\$13,700
US 20	Russell Ext to Coombs Rd.			\$1,300		\$1,900	\$7,700	\$0	\$8,300	\$9,000		\$67,400	\$0	\$0	\$600		\$0	\$0
US 20	Weld Rd. to Randall Rd.	\$200	\$300	\$400		\$0	\$2,200	\$600	\$3,300	\$4,000		\$1,500	\$700	\$1,000	\$0	\$100	\$800	\$500
US 20 Backage	Coombs Rd. to Nesler Rd.	\$0	\$0	\$0			\$0	\$0	\$135,500	\$0		\$0	\$666,900	\$0	\$0	\$0	\$187,600	\$0
Total by Development		\$742,800	\$1,387,900	\$532,100	\$2,212,000	\$177,400	\$1,784,200	\$390,300	\$987,100	\$773,300	\$2,573,200	\$1,106,500	\$1,096,200	\$639,900	\$43,400	\$152,800	\$1,025,400	\$388,500

Segment Estimated ROW Cost Matrix (Continued)

Segment Name	Segment Location	R6	R8	R9 - 2020	R10	R11	R12	R13	R14	R15	R16	R17	Future Background Traffic	Total by Segment
Bowes Road	Corron Rd. to Nesler Road	\$0	\$9,000	\$12,100		\$54,300	\$9,000	\$42,200	\$12,100			\$9,000	\$397,900	\$850,000
Bowes Road	Crawford Rd. to Corron Rd.	\$0	\$0	\$0		\$0	\$0	\$11,300	\$0			\$0	\$778,300	\$970,000
Bowes Road	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$2,500	\$600	\$900	\$6,600	\$900	\$1,900	\$0	\$54,000	\$150,000
Bowes Road	Nesler Road to Nolan Road		\$0	\$0		\$20,700	\$5,000	\$6,600	\$4,100			\$0	\$71,300	\$160,000
Bowes Road	Nolan Road to North/South Road		\$0	\$1,500		\$9,100	\$1,900	\$3,000	\$3,400	\$400	\$800	\$1,100	\$43,600	\$100,000
Bowes Road	North/South St. to Randall Backage		\$21,400	\$21,400		\$52,400	\$11,900	\$19,000	\$61,900	\$2,400	\$7,100	\$19,000	\$269,000	\$800,000
Bowes Road	Randall Backage to Randall Rd.	\$0	\$7,400	\$6,600	\$0	\$18,000	\$4,100	\$6,600	\$23,800	\$4,900	\$7,400	\$6,600	\$86,000	\$430,000
Corron Extension	Bowes Rd. to Russell Rd.	\$296,200	\$0	\$0		\$103,000	\$12,900	\$38,600	\$0			\$0	\$592,400	\$1,700,000
Corron Extension	Plank Rd. to US 20	\$183,200	\$0	\$0		\$45,800	\$7,600	\$22,900	\$0			\$0	\$381,600	\$870,000
Corron Extension	Russell Rd. to Plank Rd.	\$0	\$0			\$159,000	\$19,900	\$59,600					\$914,300	\$1,590,000
Corron Extension	US 20 to Highland Ave.	\$125,300	\$0	\$0		\$0	\$0	\$0	\$0			\$0	\$720,500	\$1,300,000
East/West 1	Nesler Rd. to North/South Rd.	\$85,900	\$96,600	\$0		\$0	\$0	\$0	\$0			\$0	\$0	\$730,000
East/West 1	Russell Rd. to Nesler Rd.	\$20,400	\$183,500	\$57,100		\$65,300	\$16,300	\$12,200				\$20,400	\$228,400	\$1,040,000
East/West 3	Bowes Rd. to Randall Backage	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$446,100	\$15,900	\$15,900	\$0	\$0	\$1,880,000
Highland Avenue	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0			\$0	\$261,600	\$310,000
Highland Avenue	W. of Randall Rd.	\$0	\$16,900	\$8,500	\$0	\$23,300	\$6,300	\$2,100	\$0			\$0	\$283,400	\$810,000
Hopps Road	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0	\$18,700	\$0	\$213,200	\$520,000
Hopps Road	W. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0		\$44,600	\$11,200	\$212,000	\$0	\$334,700	\$2,220,000
McDonald Road	E. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$502,700	\$510,000
McDonald Road	W. of Randall Rd.	\$0	\$0	\$0	\$0	\$0	\$0	\$7,500	\$0	\$0	\$0	\$0	\$384,800	\$420,000
Nesler Extension	US 20 Backage Rd. to Highland Ave.		\$63,600	\$28,300		\$77,700	\$21,200	\$7,100				\$14,100	\$0	\$1,060,000
Nesler Extension	US 20 to US 20 Backage Rd	\$0	\$10,100	\$3,400		\$9,200	\$2,500	\$800	\$0			\$5,000	\$0	\$300,000
North/South Road	Bowes Rd. to South St.	\$0	\$83,100	\$129,200		\$0	\$0	\$0	\$323,100	\$0	\$0	\$110,800	\$73,800	\$1,320,000
North/South Road	East/West 1 to US 20	\$0	\$0	\$73,800		\$0	\$0	\$0	\$127,900			\$127,900	\$34,400	\$910,000
North/South Road	South St to East/West 1	\$29,300	\$32,900	\$54,900					\$65,900			\$95,100		\$600,000
Randall Backage	Hopps Rd. to East/West 3		\$0	\$0		\$0	\$0	\$0	\$41,700	\$41,700	\$236,200	\$0	\$0	\$1,070,000
Randall Road	Bowes Rd. to College Green	\$1,000	\$0	\$3,100	\$1,000	\$0	\$0	\$1,700	\$2,800	\$1,000	\$4,900	\$1,700	\$278,100	\$490,000
Randall Road	College Green to South St.	\$800		\$2,500	\$800			\$1,400	\$2,200	\$800	\$3,500	\$1,900	\$225,800	\$400,000
Randall Road	East/West 3 to Bowes Road	\$700	\$2,100	\$3,200	\$700	\$3,200	\$700	\$0	\$0	\$0	\$2,100	\$3,400	\$145,700	\$260,000
Randall Road	Hopps Rd. to East/West 3	\$1,000	\$3,000	\$4,700	\$700	\$4,700	\$1,000		\$3,000	\$700	\$1,700	\$4,700	\$215,400	\$330,000
Randall Road	South St. to Weld Rd.	\$0		\$4,000	\$2,500			\$1,100	\$1,700	\$600	\$2,300	\$3,400	\$152,400	\$290,000
Randall Road	US 20/Weld to US20/Foothill	\$0	\$0	\$0	\$0			\$0	\$0	\$0	\$0	\$0	\$0	\$0
Randall Road	US20/Foothill to Highland Ave.	\$20,600	\$7,700	\$12,000	\$3,400	\$0	\$0	\$4,300	\$6,900	\$900	\$6,900	\$13,800	\$828,900	\$1,270,000
Randall Road	Weld Rd. to US20/Weld	\$0	\$0	\$2,300	\$1,400			\$600	\$1,000	\$200	\$600	\$1,900	\$103,300	\$180,000
Russell Extension	Plank Rd. to US 20	\$26,900	\$14,300	\$0					\$0			\$0	\$0	\$160,000
Russell Extension	US 20 to Coombs	\$25,300	\$7,200	\$0					\$0			\$0	\$0	\$420,000
South Street	E. of Randall Rd.	\$0		\$1,200	\$500			\$0	\$0	\$0	\$0	\$1,200	\$47,200	\$50,000
South Street Extension	North/South St. to Current South Rd.	\$56,100	\$0	\$245,500	\$42,100			\$0	\$21,000	\$0	\$0	\$196,400	\$680,400	\$1,480,000
South Street Extension	Water to North/South St.	\$0	\$0	\$309,000		\$24,700	\$12,400	\$12,400	\$0			\$333,700	\$148,300	\$1,100,000
US 20	2-lane section to Russell Ext.	\$0	\$5,300	\$5,300		\$0	\$0	\$0	\$4,300			\$4,300	\$320,700	\$480,000
US 20	Coombs Rd. to 6-lane section	\$223,600	\$0	\$14,200		\$0	\$0	\$0	\$11,300			\$11,300	\$1,497,300	\$2,570,000
US 20	Nesler Rd. to Weld Rd.	\$77,600	\$49,100	\$13,700		\$13,700	\$3,900	\$3,900	\$3,900			\$0	\$522,400	\$1,360,000
US 20	Russell Ext to Coombs Rd.	\$0	\$0	\$3,200					\$2,600			\$2,600	\$205,400	\$310,000
US 20	Weld Rd. to Randall Rd.	\$1,500	\$900	\$500		\$300	\$100	\$100	\$400			\$500	\$10,200	\$30,000
US 20 Backage	Coombs Rd. to Nesler Rd.	\$0	\$0	\$0		\$0	\$0	\$0				\$0	\$0	\$990,000
<b>Total by Development</b>		<b>\$1,175,500</b>	<b>\$614,300</b>	<b>\$1,021,000</b>	<b>\$53,200</b>	<b>\$686,900</b>	<b>\$137,400</b>	<b>\$266,100</b>	<b>\$1,222,200</b>	<b>\$81,700</b>	<b>\$522,000</b>	<b>\$989,800</b>	<b>\$12,007,100</b>	<b>\$34,790,000</b>

