Maple Avenue/Fairview Avenue Traffic Study

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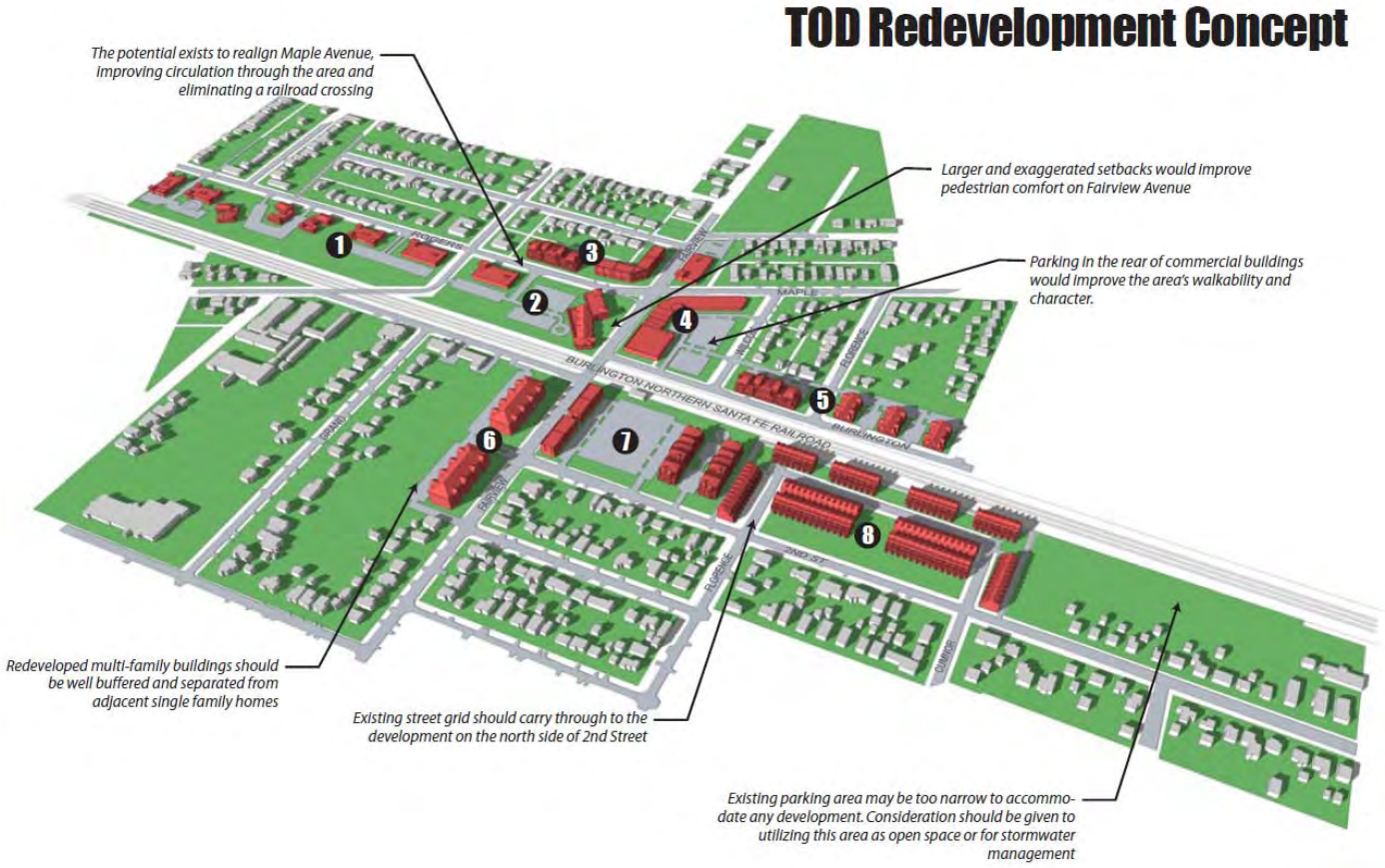
I. INTRODUCTION

The Village of Downers Grove (Village) has retained Civiltech Engineering, Inc. (Civiltech) to perform a traffic study for the area of the Village centered on the intersection of Maple Avenue and Fairview Avenue. The traffic study was commissioned by the Village in conjunction with two current Village initiatives. The first is the Village's near-term plan to reconstruct Maple Avenue between Fairview Avenue and Cumnor Road. This section of pavement is in very poor condition, and the reconstruction is targeted for 2014. This study includes a potential geometric plan for this reconstruction.

The second is a more long-term initiative for the study area, which is outlined in the 2011 Village of Downers Grove Comprehensive Plan. The Maple Avenue/Fairview Avenue area has been identified as a "Key Focus Area" in that plan. A goal in the Comprehensive Plan is to improve the form, function and appearance of this area consistent with principles of Transit-Oriented Development (TOD), centered on the Fairview Metra Station. The Comprehensive Plan suggested that the Village conduct a traffic study to assess traffic circulation options that would facilitate or complement the TOD concept. The plan identified the potential to realign Maple Avenue east of the Burlington-Northern/Santa Fe (BNSF)/Metra railroad crossing in the north-south direction where it would intersect Rogers Street opposite Douglas Road. The concept suggests that the Rogers Street/Maple Avenue path could become one-way southwest-bound, while Burlington Avenue (or a realigned Burlington Avenue) could become one-way northeast-bound. The intent would be to reduce east-west through traffic on Maple Avenue while providing better space for redevelopment. This study analyzes the feasibility of this concept in addition to two other traffic management options. Following is the TOD concept as shown in the Village Comprehensive Plan.



After meeting with Village Public Works/Traffic staff, Civiltech has identified that the 2013 Maple Avenue/Fairview Avenue Traffic Study Village should meet the following objectives:

- Determine the magnitude of southwest-bound through-traffic using Maple Avenue during peak hours and consider methods to reduce the through traffic volumes.
- Investigate improvements at the Maple Avenue/Fairview Avenue intersection in conjunction with the east leg reconstruction to correct any operational deficiencies.
- Evaluate current signal operations along Fairview Avenue to determine if any timing changes are needed to improve traffic flow.
- Investigate alternative conceptual changes to the area transportation network as presented in the 2011 Village Comprehensive Plan and Civiltech's proposal for traffic engineering services.
- In the development of the conceptual plan alternatives, consider elements to improve the pedestrian and bicyclist experience, consistent with TOD concepts. Specifically, develop a potential Complete Streets cross-section for Fairview Avenue between the BNSF RR and Maple Avenue.
- Review other improvements or modifications that have been conceptually discussed, including grade separations at the Maple Avenue or Fairview Avenue railroad crossings, and combining the Main Street and Fairview Avenue Metra stations into one station midway between the two.

In order to achieve these various objectives, the scope of work for this study included the following:

- Data collection and supplemental traffic counts.
- A license plate survey.
- A crash analysis.
- Intersection capacity and queuing analyses for existing conditions.
- Preparation of a conceptual improvement plan for the programmed Maple Avenue reconstruction.
- Development of three alternative roadway alignment, cross-section and geometric configuration concepts for the project area.
- Traffic projections and reassignments for the three future concepts.
- Intersection capacity and queuing analyses for the three future concepts.
- Evaluation of the feasibility of the three concepts.
- Preparation of a potential future Complete Streets typical section for Fairview Avenue.
- A qualitative review of other conceptual transportation changes within the study area that have been discussed at the Village.
- Exhibit, table and report preparation.

The following memorandum summarizes the findings and results obtained from performing the above scope of work.

II. EXISTING CONDITIONS

A. Study Area Characteristics

Exhibit A-1 in **Appendix A** is a location map showing the study area. The primary study area is along Fairview Avenue between 55th Street and Maple Avenue and Maple Avenue between Burlington Avenue and Cumnor Road. Land uses in this area include commercial, light industrial and both single and multi-family residential. The Burlington Northern-Santa Fe railroad runs in the east-west direction through the study area. This line is also used by Metra, and a commuter rail station is located at Fairview Avenue. At-grade railroad crossings are located on both Fairview Avenue and Maple Avenue within the study

area. Some traffic analyses, including a license plate survey, were also completed along Maple Avenue and Main Street to the west of the primary study area.

B. Roadway Network Characteristics

Exhibit A-2 shows existing lane configurations and intersection control types at each of the major roadway network intersections in the study area. Roadway classifications were obtained from the Village roadway classification system and from online Federal-aid functional classification maps. The primary roadways within the study area are described below.

Fairview Avenue is a north-south minor arterial that runs along the eastern boundary of the study area. It is under the maintenance and jurisdiction of the Village. It is also a minor arterial on the Federal-aid functional classification system.

At its intersection with 55th Street, Fairview Avenue has two lanes in each direction within an approximately 44-foot face-to-face (f-f) cross-section, with no median or left or right turn channelization in the southbound direction at 55th Street. Left and right turns to 55th Street are shared with the through movements. Approximately 300 feet to the north, Fairview becomes one through lane in each direction with a painted two-way left-turn lane median. This approximately 34-foot f-f cross-section extends to Second Street, approximately 1,950 feet to the north. In the approximately 500-foot long segment between Second Street and the BNSF Railroad, Fairview Avenue is "imbalanced". It has two southbound through lanes and one northbound through lane, and a painted median for left turns at both Second Street and Burlington Avenue. The two southbound through lanes taper quickly down to one southbound lane immediately past Second Street. It is likely that the "imbalanced" condition exists to provide extra through-lane capacity south of the BNSF tracks to reduce the occurrence of queues at Second Street backing onto the railroad. North of the BNSF Railroad through just north of Maple Avenue, Fairview Avenue has two through lanes in each direction with no median or turn channelization. However, on-street parking is permitted along the east side of Fairview Avenue between Burlington Avenue and Maple Avenue, which reduces the capacity to one northbound lane when parked cars are present. Between Second Street and north of Maple Avenue, Fairview Avenue is approximately 46 feet f-f. To the north, Fairview Avenue again becomes a three-lane cross-section.

Fairview Avenue intersects Maple Avenue at an approximately 66-degree skew.

There are four signalized intersections along Fairview Avenue within the study area: at 55th Street, Hill Street, Second Street, and Maple Avenue. An existing Village traffic signal system consisting of six signals runs from Hill Street north to Lincoln Avenue. It should be noted that the traffic signal at Maple Avenue is not fully integrated into the signal system and does not follow the same cycle length as the other signals. All other intersections along Fairview Avenue are two-way stop sign controlled.

The BNSF Railroad crosses Fairview Avenue at-grade just north of Burlington Avenue. There is approximately 400 feet between the north side of the tracks and the northbound stop bar at Maple Avenue. Likewise, there is approximately 400 feet between the south side of the tracks and the southbound stop bar for Second Street. These 400-foot stretches commonly fill with traffic when the gates are down for a passing train (or stopped commuter train) on the BNSF rail line.

The posted speed limit along Fairview Avenue is 30 mph.

Maple Avenue is an east-west collector roadway that runs from southwest to northeast along the northern boundary of the study area, and is under Village maintenance and jurisdiction. It is also a collector on the Federal-aid functional classification system.

Maple Avenue has one through lane in each direction throughout the study area, generally within a 28-foot f-f section and with no painted median. Between Main Street and Washington Street, Maple Avenue is a three-lane cross-section with a painted bi-directional left turn lane. Dedicated left turn lanes exist in both directions at Main Street and Fairview Avenue, and northeast-bound at Washington Street. There is also an existing southwest-bound right turn lane at Washington Street.

West of Fairview Avenue, Maple Avenue is generally has curb and gutter with an enclosed drainage system. To the east, Maple Avenue has shoulders and grassed parkways, often used for parking by adjacent residents.

Existing traffic signals are located at Main Street and Fairview Avenue, and an all-way stop sign controlled intersection is located at Washington Street. The Burlington Northern-Santa Fe Railroad crosses Maple Avenue at-grade at an approximately 25-degree skew, between Burlington Avenue and Rogers Street. Four-hour on-street parking is permitted along the north side of Maple Avenue between Elmwood Avenue and Mackie Place. The posted speed limit along Maple Avenue is 30 mph in this section.

Burlington Avenue is an east-west Village collector roadway that parallels the BNSF railway to its immediate south between Maple Avenue and Fairview Avenue, and to its immediate north to the east of Fairview Avenue. To enhance the operation of its intersection with Maple Avenue and to mitigate for sight-distance problems, Burlington Avenue was recently reconstructed as a one-way eastbound roadway for approximately 200 feet to the east of Maple Avenue. Thus no traffic turns onto Maple Avenue from the east on Burlington Avenue. Separate left and right turn channelization exists on the west leg at its "t" intersection with Fairview Avenue. Burlington Avenue has a 25 mph posted speed limit.

Rogers Street is a two-lane east-west roadway stretching from Main Street downtown to Maple Avenue, and is approximately 28 feet f-f with no painted medians or turn channelization. It is classified by the Village as a minor arterial and is under Village maintenance and jurisdiction. It intersects Maple Avenue approximately 200 feet southwest of Fairview Avenue, and at an approximately 25-degree skew. Rogers Street has a 25 mph posted speed limit.

55th Street is an east-west minor arterial that runs through primarily residential areas along the southern boundary of the study area. It is under the jurisdiction of the DuPage County Division of Transportation (DCDOT). It is also a minor arterial on the Federal-aid functional classification system. Although it is classified as a minor arterial, 55th Street provides access to Interstate 355 to the west of the Village, and IL Route 83 to the east of the Village, making it an important regional access route. Existing traffic signals are located at Main Street and Fairview Avenue. There is currently no left turn or right turn channelization along 55th Street within the study area. It should be noted DCDOT is currently performing a Phase I engineering study along this corridor, and left turn channelization is being proposed at both signalized intersections. The posted speed limit along 55th Street is 35 mph.

Main Street is a north-south major arterial under Village jurisdiction west of the study area, and is the primary arterial serving downtown Downers Grove. On the Federal-aid functional classification map, Main Street is a minor arterial. Main Street has two travel lanes in each direction between Maple Avenue and 55th Street. One of the northbound through lanes becomes a right turn lane at Maple Avenue. Main Street also provides regional access to Interstate 88 north of Ogden Avenue, and Interstate 55 south of 75th Street. The posted speed limit along Main Street is 35 mph.

C. Problems and Considerations

Discussions with Village staff, field observations, and reviews of other studies identified traffic operation issues and items to consider within the study area. **Exhibit A-3** illustrates these and other items on an aerial exhibit of the study area. A summary of the items discussed and observed are as follows:

- Poor existing pavement conditions on Maple Avenue east of Fairview Avenue, which has spurred the programmed reconstruction project.
- Congestion on Fairview Avenue caused by Metra train operations queues traffic through the Maple Avenue and Second Street intersections. Nearly 100 commuter trains cross Maple Avenue and Fairview Avenue each weekday, with a dozen crossings during each peak hour.
- A Metra train stopped at the Fairview Avenue Station blocks the Fairview Avenue at-grade crossing, but not the Maple Avenue crossing. This makes Maple Avenue more attractive to motorists traveling through to 55th Street.
- Large volume of south and westbound through traffic bypasses 55th Street and Fairview Avenue by using southwest-bound Maple Avenue through residential neighborhoods.
- Heavy traffic flows to/from the Village downtown area between Main Street and Washington Street via Maple Avenue.
- From an average daily traffic standpoint, and in general terms, Fairview Avenue in the primary study area is operating at approximately 85% of its capacity, while both Maple Avenue and 55th Street are at approximately 65% of their capacities.
- DCDOT is currently performing a Phase I Study for improvements to the 55th Street corridor between Maple Avenue and Fairview Avenue.
- Existing signed bike route along Rogers Street and Maple Avenue.
- Long-term goal to relocate light industrial uses within study area and redevelop area into a Transit-Oriented Development (TOD) consisting of dense residential and supporting commercial uses.
- Alternative roadway network modifications are proposed in the Village's 2011 Comprehensive Plan.
- Fairview Avenue is planned to undergo streetscaping in the future.
- Desire to create a "gateway" to the downtown area at the Maple Avenue/Fairview Avenue intersection.
- Interest in implementation of Complete Streets principles on Village roadways.
- Desire to maintain on-street parking in the short term north of the BNSF crossing on the east side of Fairview Avenue.
- Other conceptual ideas which have been discussed at high levels involve a grade separation at the Maple Avenue or Fairview Avenue railroad crossing and/or the combination of Main Street and Fairview Avenue stations at a point mid-way between the existing station locations.

D. Data Collection

1. 2010 Neighborhood Study

In 2010, the Village retained Kenig, Lindgren, O'Hara, Aboona, Inc. (KLOA) to examine the existing operations within the residential neighborhood bounded by Main Street, Fairview Avenue, Maple Avenue, and 55th Street. The study evaluated traffic operations within the neighborhood as well as on the bordering arterials. Much of the existing conditions data presented in the 2010 study remains valid for the current study, and the traffic count data collected as part of the study was used in the current study as a baseline for developing current year (2013) and design year (2030) volumes.

2. Traffic Counts

The traffic data collected in the *2010 Neighborhood Study* by KLOA was supplemented with additional machine and manual counts collected by Village staff. The additional traffic counts were collected at the following intersections:

- Maple Avenue and Blodgett Avenue
- Maple Avenue and Rogers Street
- Maple Avenue and Burlington Avenue
- Fairview Avenue and Second Street

The 2010 Neighborhood Study traffic counts were increased by a growth rate of 0.5% per year in order to develop 2013 existing peak hour volumes. The 2013 existing A.M. and P.M. peak hour traffic volumes shown in **Exhibit A-4** were the result of combining this traffic data.

3. License Plate Study

One of the goals of this study was to determine the magnitude of through traffic using southwest-bound Maple Avenue as an alternative to 55th Street and Fairview Avenue. In order to quantify the through traffic volume, a license plate study was conducted during the A.M. and P.M. peak hours. Civiltech staff recorded license plate data at the following intersection movements:

- Southbound right turns from Fairview Avenue to Maple Avenue.
- Southwest-bound through traffic on Maple Avenue at Fairview Avenue.
- Southbound through traffic on Main Street at 55th Street.
- Southbound Maple Avenue at 55th Street.

The results of the license plate study are shown on **Exhibit A-5**. The exhibit shows that approximately half of the traffic entering Maple Avenue at the Fairview Avenue intersection from the north or east during the A.M. peak hour is through traffic and exits the study area at one of the signals on 55th Street. During the P.M. peak hour, the proportion of through traffic increases to two-thirds or greater for these movements. For both peak hours, 60% of the through volume continues on Maple Avenue the entire distance to 55th Street, comprising about one-third of the total southwest-bound volume on the roadway. It can be assumed that non-through traffic is destined to either downtown Downers Grove or to the residential neighborhoods adjacent to Maple Avenue.

E. Crash Analyses

Crash information was obtained from the Village for Fairview Avenue between 55th Street and Sheldon Avenue and Maple Avenue between Cumnor Road and Burlington Avenue for the period from January 1, 2010 through April 30, 2013. A summary of the crash data analysis is provided in **Table B-1**. A total of 118 crashes occurred along these roadways during this period. Following is a breakdown on the crashes by type of collision:

Rear End	61%
Other	12%
Sideswipe	11%
Right Angle	8%
Left Turn	4%
Pedestrian/Bike	3%
Head-On	1%

There were 15 crashes involving an injury and no fatalities within these roadway sections during the study period. Injury crashes accounted for 13% of the total crashes. Of the 15 injury crashes, 1 (7%) included a Type A (incapacitating) injury, 8 (53%) involved a Type B (non-incapacitating) injuries, and 6 (40%) were classified as Type C (no injury apparent). The analysis revealed that 100 (85%) of all the crashes occurred on dry pavement, 13 (11%) occurred on wet pavement surface, and the remaining 5 (4%) occurred during snowy or icy conditions.

Night-to-day crash ratios were determined for each intersection and section studied. In each case, the night-to-day ratio is less than the critical ratio of 2:1, which indicates that additional roadway lighting along the project corridors is not warranted strictly based on crash experience. In addition, no locations were determined to be High Accident Locations based on crash frequency, rate and equivalent property damage only calculations.

The predominant type of collision along Fairview Avenue was rear-end collisions, which are indicative of roadway congestion. It is notable that the pattern of rear-end collisions ends abruptly in both the northbound and southbound direction past the BNSF railroad crossing in each direction. This indicates that congestion on Fairview Avenue is tied to railroad gate-down times may be caused by commuter and freight rail operations as opposed to intersection traffic deficiencies. Improvements may be warranted that increase storage capacity on at least the northbound approach to the railroad crossing. Maple Avenue crashes did not follow any specific pattern of note.

Crash summary tables and collision diagrams are contained in **Appendix D** of this document.

F. Traffic Analyses

Traffic Analyses were performed for both the existing roadway network and traffic conditions and the anticipated traffic conditions and roadway network geometrics for a design year of 2030. The 2030 roadway network includes improvements along 55th Street at the Main Street and Fairview Avenue intersections as proposed by DCDOT at this time. These improvements are currently in IDOT review.

1. Capacity Analyses

Signalized intersection capacity analyses were conducted at the following intersections:

- Main Street at Maple Avenue
- Main Street at 55th Street
- Fairview Avenue at Maple Avenue
- Fairview Avenue at Second Street
- Fairview Avenue at Hill Street
- Fairview Avenue at 55th Street

In addition, unsignalized intersection capacity analyses were conducted at the following intersections:

- Maple Avenue at Washington Street
- Maple Avenue at Blodgett Avenue
- Maple Avenue at Rogers Street
- Rogers Street and Douglas Road

Intersection capacity analyses are tools engineers use to rate the performance of intersections. These analyses can be conducted at both signalized and non-signalized intersections. *Synchro* traffic analysis software, version 8 was used for the intersection capacity analyses.

Signalized intersections are given a letter grade (similar to those found on school report cards) based on the amount of control delay the typical motorist could expect to experience during the hour analyzed. The letter grades are called Levels of Service (L.O.S.) and range from L.O.S. "A" (best performance/least delay) to L.O.S. "F" (worst performance/greatest delay). A L.O.S. "C" is considered desirable for signalized intersections. In the Chicago area, a L.O.S. "D" is typically considered the lowest satisfactory Level of Service.

Unsignalized intersection movements are given a letter grade of "A" through "F" similar to signalized intersections, however the delay range represented by a given letter grade for an unsignalized intersection differs from that for signalized intersections. This is primarily because drivers expect that a signalized intersection is designed to carry higher traffic volumes, and thus involve higher delays, than a non-signalized intersection. Thus, a higher level of delay for the same L.O.S. is satisfactory at signalized intersections. For example, the average control delay range for a signalized intersection at L.O.S. "E" is 55 to 80 seconds per vehicle, while the delay range for a movement at an unsignalized intersection at L.O.S. "E" is 35 to 50 seconds per vehicle. In the Chicago area, Levels of Service below L.O.S. "D" for side-street movements at two-way stop sign controlled intersections are common during peak periods and accepted by most urban motorists, provided that the volume-to-capacity (v/c) ratio for any movement does not exceed 1.0. The v/c ratio is a measure of the number of acceptable gaps (the capacity) in the main street traffic stream relative to the volume of motorists wishing to make a turn from the cross-street. A v/c ratio less than 1 indicates a sufficient number of gaps exist, even though in some cases, the time between acceptable gaps (the delay) may be high.

Existing signal timing information was obtained from the Village and DCDOT and was input into *Synchro* software to replicate existing conditions. **Table B-1** in **Appendix B** contains intersection capacity analysis results for existing conditions within the study area. **Appendix D** contains summary printouts from Synchro for both signalized and unsignalized analyses under existing conditions.

As shown in **Table B-1**, the majority of the intersections operate satisfactorily overall during the peak hours under existing conditions. The four-way stop sign-controlled intersection at Maple Avenue and Washington Street has some movements that experience L.O.S. "E" during peak hours due to heavy traffic volumes, however, none of these movements are over capacity. The eastbound approach on 55th Street at Main Street also performs at a L.O.S. "E" under existing conditions.

2. Queuing Analyses

Queuing analyses were performed in concert with the capacity analyses in order to determine locations where excessive queuing may occur that can block turn lanes or spill back into adjacent intersections. These analyses also aid in determining if turn lanes provided at intersections are sufficient to store the traffic making the turning movement, or if spillback into through travel lanes is occurring. **Table B-2**

contains a summary of the queuing analysis results for existing traffic conditions. It should be noted that these queue lengths represent 95th-percentile conditions. This is a conservative value meaning that 95% of the time during the particular peak hour, the queue does not reach the stated length. It should be noted that these queue lengths do not consider the effects of trains on the BNSF line. Additional sophisticated network simulations would be necessary to model railroad effects.

The results contained in **Table B-2** indicate that there are several locations where 95th-percentile queued through traffic may be blocking access to existing turn lanes and delaying turning vehicles. In many locations, existing geometric constraints make it prohibitive to increase storage lengths enough to prevent any blockage of the turn lanes, however there may be opportunities to lessen the impacts of these queues.

The results of the queuing analyses also generally show that the existing turn lane lengths are sufficient for the existing amount of turning traffic in the absence of blockage from through lanes. One location where queue spillback may be an issue is the westbound left turn lane on Maple Avenue at Main Street during the P.M. peak hour. For this lane, the queue at times may exceed the available storage by 2 to 3 vehicles.

In the absence of train blockages, the queue lengths calculated by Synchro generally correlate well to the queue lengths observed in the field. When a train is present, the intersections closest to the railroad crossing on Fairview Avenue can experience significantly longer queues, as discussed in the following section.

3. Impacts of Train Operations

The existing queuing analyses in Synchro do not include the impact of commuter or freight trains during the peak periods. However, the effects of train operations are a significant consideration in the analysis of the feasibility of improvement scenarios later in this report. Modeling train operations in detail would require sophisticated models using software such as VISSIM or CORSIM, and this effort is beyond the scope of this study. When a Metra train arrives at the Fairview Avenue station, it can block through traffic on Fairview Avenue for several minutes as passengers board and alight. This creates queues on Fairview Avenue as far south as Second Street and as far north as Sheldon Avenue.

The Maple Avenue crossing gates do not stay down during a train stop at the Fairview station, and therefore some motorists turn right onto Maple Avenue from southbound Fairview Avenue or go through on Maple from the northeast in order to avoid delays created by the train at the Fairview Avenue crossing. Even when there is not a train present at the time a motorist is approaching the intersection, some likely choose to “not take the chance” of getting stopped and head southwest on Maple instead of south on Fairview. In addition, there are blank-out signs prohibiting turns onto southbound Fairview Avenue from Maple Avenue while the railroad crossing gates are in operation. This further deters through traffic from using Fairview Avenue instead Maple Avenue.

III. MAPLE AVENUE RECONSTRUCTION

One objective of the Maple Avenue/Fairview Avenue traffic study was to develop a conceptual plan for reconstructing the east leg of the Maple Avenue/Fairview Avenue intersection northeast to the Village limit near Cumnor Road. The following sections present a potential conceptual improvement plan and evaluate the proposed plan with design-year traffic volumes.

A. Conceptual Improvement Plan

A potential reconstruction concept plan for Maple Avenue is presented in **Exhibit A-7**. The plan contains three main components. The first component is the currently-programmed reconstruction of Maple Avenue between Fairview Avenue and Cumnor Avenue. The second component consists of potential additional geometric improvements to the Maple Avenue/Fairview Avenue intersection itself, and the final component consists of traffic operations and management improvements. Each of these components is discussed below.

1. Reconstruction of Maple Avenue between Fairview Avenue and Cumnor Road

The reconstruction concept plan recommends one 12-foot through lane in each direction, with 4' striped bike lanes (5 feet including gutter) to improve bicycle mobility along the marked bicycle route. The through lanes and turn lane narrow to 11 feet at the intersection. Curb and gutter is also recommended in this section due to the accelerated pavement deterioration observed along the existing edges of pavement, which suggests that the roadway may benefit from improved drainage. Re-established grassed parkways, new driveway aprons, and new sidewalk are also shown in the concept plan.

2. Maple Avenue/Fairview Avenue Intersection Improvements

At the Maple Avenue/Fairview Avenue intersection, it is proposed that the east leg be redesigned to provide extended storage for westbound to southbound left turns, in order to reduce the potential from spillback to block the through travel lane. The design for this leg on **Exhibit A-7** is based upon Figure 3B-7 in the 2009 Manual of Uniform Traffic Control Devices (MUTCD). This extension may help encourage some southwest-bound through motorists to use Fairview Avenue instead of Maple Avenue. In addition, it is recommended that the existing crosswalks be realigned to provide better pedestrian guidance, and that ADA sidewalk ramps be constructed as necessary.

Very tight turning radii exist at the Maple Avenue/Fairview Avenue intersection. During the license plate study, a tractor/semitrailer was observed making a two-point turn in the middle of the intersection to turn from northbound to westbound, blocking all traffic in the intersection for several minutes as it navigated the turn, and nearly encroaching into the sidewalk on the northwest corner of the intersection. It would be desirable to improve the intersection to better accommodate truck traffic, however, the desired future TOD-nature of the land uses in the area may diminish truck volumes, and may reduce the necessity for severe widening to provide "ideal" truck turning conditions (which could include substantial right-of-way acquisition) to accommodate trucks. Therefore, only minor widening of the curb radii on the northwest and southeast corners is proposed and shown on **Exhibit A-7** to lessen the probability of truck encroachment over curbs or into opposing through lanes. It should be noted that this concept has been drawn on aerial photography with property lines and right-of-way from the Village's GIS system. The necessity and extent of proposed right-of-way needs as shown on **Exhibit A-7** would need to be verified during the design phase of this project. It should be noted that the existing traffic signal controller on the southeast corner may need to be relocated due to the additional widening required by the proposed change in curb radius on that corner.

An AutoTurn analyses for this intersection for an SU-30 (a single-unit delivery-type truck) is shown on **Exhibit A-8**. It shows that a Single Unit truck can make the turns as redesigned. A WB-55 truck would still have difficulties making any of the turns without multiple-point turns or encroachment into adjacent lanes. The most difficult movements for a tractor/semi-trailer truck are the right turns from Maple to Fairview due to the acute angle. Correction of this encroachment would result in substantial radius widening on the SW and NE quadrants of the intersection. As shown on **Exhibit A-7**, some minor radius widening is proposed which will help, but not fully correct for tractor/semi-trailer turning movements.

Correction can be revisited if it is deemed necessary under future land development conditions, however at this time, the Village may consider prohibiting tractor/semi-trailer trucks from making these two turns.

In the existing conditions, the marked crosswalks on each leg intersect on the roadway pavement. The proposed concept plan corrects this condition by slightly moving crosswalks and stop bars back so that all crosswalk pavement markings extend to the curbs.

3. Traffic Management and Operations Improvements

Another component of the proposed concept plan consists of traffic management and operational improvements. From a traffic management perspective, wayfinding signage is recommended in order to encourage through traffic to use Fairview Avenue instead of Maple Avenue. Additionally, this could be combined with downtown gateway treatments on the west leg or at the intersection of Rogers and Maple in order to reinforce the message that Maple Avenue is desired to be more locally-oriented instead of regionally-oriented. Additional shrubbery or landscaping could be added to the parkways along Maple Avenue between the BNSF at-grade crossing and Fairview to improve the residential or local-road "feel" of the segment.

Traffic operations improvements would consist of fully integrating the Maple Avenue/Fairview Avenue signal into the existing Fairview Avenue signal system, and re-optimizing the signal timings in an effort to reduce congestion during times that trains are not active at the rail crossings. This signal re-optimization would include phasing adjustments to make the westbound left turn onto Fairview Avenue more attractive. It is also proposed that the existing pavement markings on Fairview Avenue be refreshed to aid motorists.

B. Traffic Evaluation of Conceptual Plan

In order to evaluate the proposed improvements from a traffic operations perspective, a design year of 2030 was selected as a basis for traffic analyses. The existing peak hour traffic counts were increased using a growth rate of 0.5% per year to develop 2030 "Base Condition" traffic volumes.

Pre-final Intersection Design Studies (IDS's) for the 55th Street/Main Street and 55th Street/Fairview Avenue intersections were obtained from DCDOT which include proposed geometrics and traffic signal timings for the future conditions at those intersections. These future conditions were included in the 2030 Base Conditions analyses.

The IDS at 55th Street and Washington Street indicate that the Washington Street leg is planned to be converted to right-in/right-out only. Under existing conditions, a significant number of motorists use Washington Street as an alternate route to Main Street, many in order to access the parking garage in downtown Downers Grove. Once the 55th Street improvements are in place, this traffic will likely use the proposed left turn phasing at 55th Street and Main Street, shifting traffic to Main Street and Maple Avenue instead of Washington Street. These traffic volume adjustments are incorporated into the DCDOT IDSs, and have also been incorporated into the 2030 Base Condition capacity analyses.

In addition to the proposed DCDOT improvements along 55th Street, the 2030 Base Conditions assume that the wayfinding signage is in place to re-direct southwest-bound through traffic along Fairview Avenue instead of Maple Avenue. Due to the delays or the threat of delays caused by train activity mentioned previously, it is unlikely that this improvement will divert significant amounts of traffic; therefore the amount of diverted traffic was assumed to be approximately 5%.

The 2030 Base Condition A.M. and P.M. peak hour traffic volumes are shown on **Exhibit A-8**. These volumes, the proposed Maple Avenue reconstruction concept plan, and the information obtained from DCDOT regarding the proposed 55th Street improvements were used in modifying the existing conditions *Synchro* model to reflect 2030 Base Traffic Conditions within the study area.

1. Capacity Analyses

For 2030 Base Conditions, it was assumed that the Maple Avenue intersection would be interconnected to the other signals along Fairview Avenue north of 55th Street, and that the timings would be re-optimized. In addition, it was assumed that the timing changes proposed on the IDS's for 55th Street would be implemented and then remain unchanged for the 2030 Base Conditions, as well as Options 1, 2, and 3 presented later in this report. **Table B-1** in **Appendix B** contains intersection capacity analysis results for the 2030 Base Conditions within the study area. **Appendix E** contains summary printouts from Synchro for 2030 Base Conditions.

As might be expected, the traffic operations at many of the intersections are slightly worse compared to existing conditions due to the normal growth in traffic. The intersection operations at 55th Street and Main Street are improved due to the proposed DCDOT changes. However the intersection at 55th Street and Fairview Avenue worsens due to the fact that north-south through capacity on Fairview Avenue is being removed by DCDOT in order to provide left turn channelization. The impacts of this capacity reduction were determined by comparing 2013 existing conditions to 2015 design year conditions shown on the DCDOT IDS, and are summarized below. The 2013 existing conditions counts for this study are lower but within 10% of the DCDOT 2015 projections.

- The amount of available capacity for southbound through traffic decreases from about 30% under existing conditions to about 10%.
- Delay for southbound through vehicles increases from 19 seconds per vehicle to 35 seconds per vehicle.

With such significant potential impacts, it is possible that motorists would be further deterred from using Fairview Avenue and instead divert to Maple Avenue, which is opposite of the goals that the Village is attempting to achieve.

The Fairview Avenue intersections north of 55th Street are improved through re-optimization of the signal system, full interconnection of the Maple Avenue signal, and some phasing adjustments at several intersections. The four-way stop-controlled intersection at Maple Avenue and Washington Street has some movements that experience L.O.S. "E" during peak hours due to the anticipated changes in traffic patterns resulting from the DCDOT 55th Street improvements, however, none of the movements at the intersection are over capacity.

2. Queuing Analyses

Queuing analyses were performed for 2030 Base Conditions in order to determine locations where excessive queuing may occur that can block turn lanes or spill back into adjacent intersections. **Table B-2** contains a summary of the queuing analysis results for existing traffic conditions.

As expected, the queues at many of the intersections generally lengthen due to the increase in traffic volumes. The queue lengths at the 55th Street/Main Street intersection decrease, which is to be expected given the improvements proposed by DCDOT at that intersection.

The queues on Fairview Avenue at 55th Street lengthen considerably due to the removal of southbound through lane capacity with the conversion of the through/left turn lane to an exclusive left turn lane. If southbound 95th percentile queue lengths for through traffic under 2013 existing conditions are compared to the 2015 design year conditions shown on the IDS, the result is a fivefold increase from 205 feet to 1,025 feet. Put another way, the back of queue would shift from 100 feet south of Eighth Street to 70 feet north of Sixth Street. It is therefore recommended that further discussions be undertaken with DCDOT to determine ways to reduce this potential impact.

The southbound right turn (P.M.) and eastbound left turn (A.M.) queues at the Maple Avenue/ Washington Street intersection exceed the existing turn lane length under 2030 Base Conditions.

IV. POTENTIAL FUTURE IMPROVEMENTS

Based on the 2011 Village of Downers Grove Comprehensive Plan and the information analyzed and collected while evaluating existing conditions, potential changes to the existing roadway network were developed and considered. Additional information and input was provided by Village staff. These improvements have the goals of improving current traffic operations, reducing through traffic on Maple Avenue, and providing a framework for future TOD redevelopment and traffic growth. Three conceptual alignment/cross-section/geometric configuration options were analyzed as part of this study as follows:

- Option 1 – Maple Avenue One-Way Eastbound Conversion
- Option 2 – Maple Avenue Two-Way Realignment
- Option 3 – Maple Avenue One-Way Westbound Conversion & Realignment

The following assumptions or features apply to all three Options:

- All are based upon estimated 2030 traffic forecasts.
- The primary consideration in the estimation of traffic diversion to Fairview Avenue is its theoretical capacity of 16,000 vehicles per day in the three-lane section.
- The improvements to 55th Street currently being studied by DCDOT are implemented.
- A southbound right turn lane is installed at Fairview Avenue and 55th Street. This will not be implemented in the near future due to the ongoing DCDOT improvement study, but would be constructed by the Village as part of a future project if the Village decides that such an improvement is needed.
- Burlington Avenue is realigned east of Grand Avenue to the south and east to terminate at the existing Fairview Avenue/Second Street intersection. This realignment opens larger parcels for TOD redevelopment near the rail line, as well as relocates the existing Fairview Avenue/Burlington Avenue intersection away from the rail crossing to consolidate intersections and improve traffic safety and operation.
- Realigned Burlington Avenue includes one lane in each direction, with a center painted two-way left turn lane for access purposes, especially with redevelopment of nearby properties being considered.
- The traffic signal at the intersection of Maple Avenue and Fairview Avenue is fully integrated into the existing Fairview Avenue signal system.
- The traffic signal timings for the Fairview Avenue signal system would be re-optimized to reflect changes in alignments, cross-sections, intersection configurations and traffic volumes as applicable.
- The future Complete Streets/Streetscape cross-section concept for Fairview Avenue as shown in **Exhibit A-16** is implemented between Second Street and Maple Avenue. Due to the increased building setback requirements, the Fairview improvements would need to be constructed in

conjunction with redevelopment toward implementation of the TOD concept as shown in the 2011 Village Comprehensive Plan.

- To correct the existing lane imbalance on Fairview south of the railroad tracks, and to improve traffic safety and operation in this section, each option includes widening Fairview to provide two through lanes in each direction between Third Street and the railroad tracks. Exclusive left turn lanes would also be installed on the north and south legs of Fairview at realigned Burlington Avenue/Second Street.
- Fairview Avenue remains a three-lane cross-section south of Third Street.
- The BNSF railroad crossings at Maple Avenue and Fairview Avenue remain at-grade.
- The Fairview Metra station remains in its current location and is not combined with the Main Street station and relocated mid-way between the two.

A. Maple Avenue One-Way Eastbound Conversion (Option 1)

1. Improvement Features

Alignment, cross-section and intersection geometric configurations for Option 1 are shown on **Exhibit A-10**. In addition to the assumptions and features listed in Section IV above, features generally unique to Option 1 are described below.

Maple Avenue would be converted to one-way eastbound between Burlington Avenue and Rogers Street. (Alternatively, Maple Avenue could be routed north on Douglas Road and east on Rogers Street.) The cross-section of the one-way segment of Maple could be narrowed and the parkway area between the back of curb and the sidewalk could be increased to provide a more appealing pedestrian environment. The resulting one-lane traveled way is proposed to have a width of 18 feet, which would allow a vehicle to pass another stopped vehicle if needed.

In addition, Burlington Avenue would be restored to two-way operation between Maple Avenue and Grand Avenue. This would provide a reasonable alternative route for motorists who used to travel southwest on Maple Avenue from the Fairview intersection. Historic concerns with sight distance at Burlington Avenue relating to motorists coming over the Maple Avenue crossing would not be an issue since Maple Avenue would be one-way in the northeast-bound direction. A typical cross-section for Burlington Avenue is shown on **Exhibit A-10**. At its intersection with Fairview Avenue, Burlington Avenue would include a single left turn lane and a shared through/right turn lane.

Exhibit A-10 also highlights parcels which would be affected by right-of-way needs in order to implement the alignment and cross-section changes.

2. Anticipated Traffic Reassignments

This option would have the most significant effect of all three options studied in diverting traffic to Fairview Avenue. Much of the impetus for motorists to use Maple Avenue under existing conditions results from the shorter railroad gate down times on Maple Avenue compared to Fairview Avenue, as discussed earlier. With Maple Avenue restricted to one-way traffic, all traffic destined to 55th Street from the north and east would be required to use the Fairview Avenue crossing, removing much of the incentive for through traffic to use Maple Avenue. After crossing the railroad, it is assumed that a significant portion of the previous Maple Avenue traffic would head west on the Burlington Avenue realignment, and the other portion would continue south on Fairview Avenue to 55th Street. The assumed amount of traffic diverted to Fairview considers the existing capacity constraints on this roadway.

The peak hour traffic pattern changes resulting from the Maple Avenue one-way conversion are shown in **Exhibit A-11** for a 2030 design year. The most significant turning movements include the southwest-bound Maple to southbound Fairview left turn movement (500 turns in the P.M. peak hour) and the southbound Fairview to westbound Burlington right turn movement (415 turns in the P.M. peak hour). The southbound Fairview to westbound 55th Street right turn movement in the P.M. peak hour would also increase from 100 to 255 vehicles.

3. Capacity Analyses

The adjusted 2030 traffic volumes for this option were analyzed using *Synchro* to determine the potential traffic impacts, and the reports from these analyses are provided in **Appendix F**. A summary of the capacity analysis and queuing analysis results for this alternative are contained in **Tables B-1** and **B-2**, respectively. The capacity analyses indicate that traffic operations along Fairview Avenue generally worsen, as would be expected given the assumed traffic diversion from Maple Avenue to Fairview Avenue. In concert, traffic operations along Maple Avenue generally improve due to the reduced traffic volumes. The realignment of Burlington Avenue into the Fairview Avenue/Second Street intersection was not found to significantly worsen operations.

4. Queuing Analyses

Queuing analyses for this option indicated that a longer left turn lane may be needed for westbound Maple Avenue at Fairview Avenue due to the diverted traffic volumes, and that a significantly longer westbound left turn lane would be needed at the intersection of Main Street with 55th Street. Also notable are the much longer potential southbound through queues on Fairview Avenue at Second Street and Hill Street due to the increased traffic volumes. These queues would have the potential to adversely impact traffic operations along Fairview Avenue, and would need to be monitored if this option were implemented.

5. Considerations Regarding Option 1

One of the potential concerns with implementing Option 1 is that it does add considerable traffic to Fairview Avenue between Second Street and Maple Avenue, which is already prone to congestion during train events. Reassignment of significant amounts of traffic to the Fairview corridor south of Second Street may not be possible due to the lack of extra capacity within the segment between Second Street and 55th Street, which could result in nearly stop-and-go conditions between Maple Avenue and 55th Street, especially in the southbound direction during the P.M. peak hour.

Option 1 may only be feasible if the railroad crossing at Fairview Avenue is grade-separated. Furthermore, the grade separation would likely be done in conjunction with a widening of Fairview Avenue to two travel lanes in each direction at least between Maple Avenue and 55th Street, and possibly further north to Ogden Avenue if enough traffic diverts from other routes to use the grade separation. With the close proximity of the Second Street/Burlington Avenue and Maple Avenue intersections to the existing crossing, the physical feasibility of a grade separation may be a concern, and would need to be evaluated further in another study.

B. Maple Avenue Two-Way Realignment (Option 2)

1. Improvement Features

Alignment, cross-section and intersection geometric configurations for Option 2 are shown on **Exhibit A-12**. In addition to the assumptions and features listed in Section IV above, features generally unique to Option 2 are described below.

Maple Avenue would be realigned to intersect Rogers Street from the south, opposite Douglas Road and would remain two-way in this option. The vacated portion of Douglas Road south of Rogers Street would need to be re-acquired by the Village and the section of Rogers Street between Douglas Road and Fairview Avenue would be re-designated as Maple Avenue. The stretch of Maple Avenue between Douglas Road and Fairview Avenue would be vacated for redevelopment opportunities.

Burlington Avenue would be realigned as in Option 1, however it would remain one-way eastbound between Maple Avenue and Grand Avenue. The recommended cross-section of Burlington Avenue is the same as in Option 1, and is shown on **Exhibit A-12**. As with Option 1, at its intersection with Fairview Avenue, Burlington Avenue would include a single left turn lane and a shared through/right turn lane.

A recommended cross-section of realigned Maple Avenue is shown on **Exhibit A-12**. The traveled way is proposed to have one through lane in each direction, a painted center turn median (with optional landscaped barrier median if feasible), a bike lane in each direction, and parkway/sidewalks.

Exhibit A-10 also highlights parcels which would be affected by right-of-way needs in order to implement the alignment and cross-section changes.

2. Anticipated Traffic Reassignments

The realignment of Maple Avenue is likely to have some effect in diverting traffic to Fairview Avenue due to the introduction of the turn at Rogers Street, but considerably less than the one-way conversion in Option 1. With this improvement, it is anticipated that as much as one-third of the existing southwest-bound through traffic along Maple Avenue may divert to Fairview Avenue and 55th Street. As with the other options, this estimate considers the capacity constraints on Fairview Avenue.

The resulting peak hour traffic pattern changes resulting from the Maple Avenue two-way realignment are shown in **Exhibit A-13** for a 2030 design year. The most significant turning movements in this option occur at the new intersection of realigned Maple Avenue with Rogers Street, where 500 vehicles would make the northbound to eastbound right turn in the A.M .peak hour, and nearly the same amount would make the westbound to southbound movement in the P.M. peak hour.

3. Capacity Analyses

The adjusted 2030 traffic volumes for this option were analyzed using *Synchro* to determine the potential traffic impacts, and the reports from these analyses are provided in **Appendix G**. A summary of the capacity analysis and queuing analysis results for this alternative are contained in **Tables B-1** and **B-2**, respectively. The capacity analyses indicate that traffic operations along Fairview Avenue generally worsen, as would be expected given the assumed traffic diversion from Maple Avenue to Fairview Avenue, but not as much as with Option 1. In general, the roadway network operation under this option is very similar to the 2030 Base conditions.

4. Queuing Analyses

Queuing analyses for this option indicated that a significantly longer westbound left turn lane would again be needed at the intersection of Main Street with 55th Street. The southbound through queues on Fairview Avenue at Second Street and Hill Street are significantly less than with Option 1due to the reduced amount of diverted traffic from Maple Avenue.

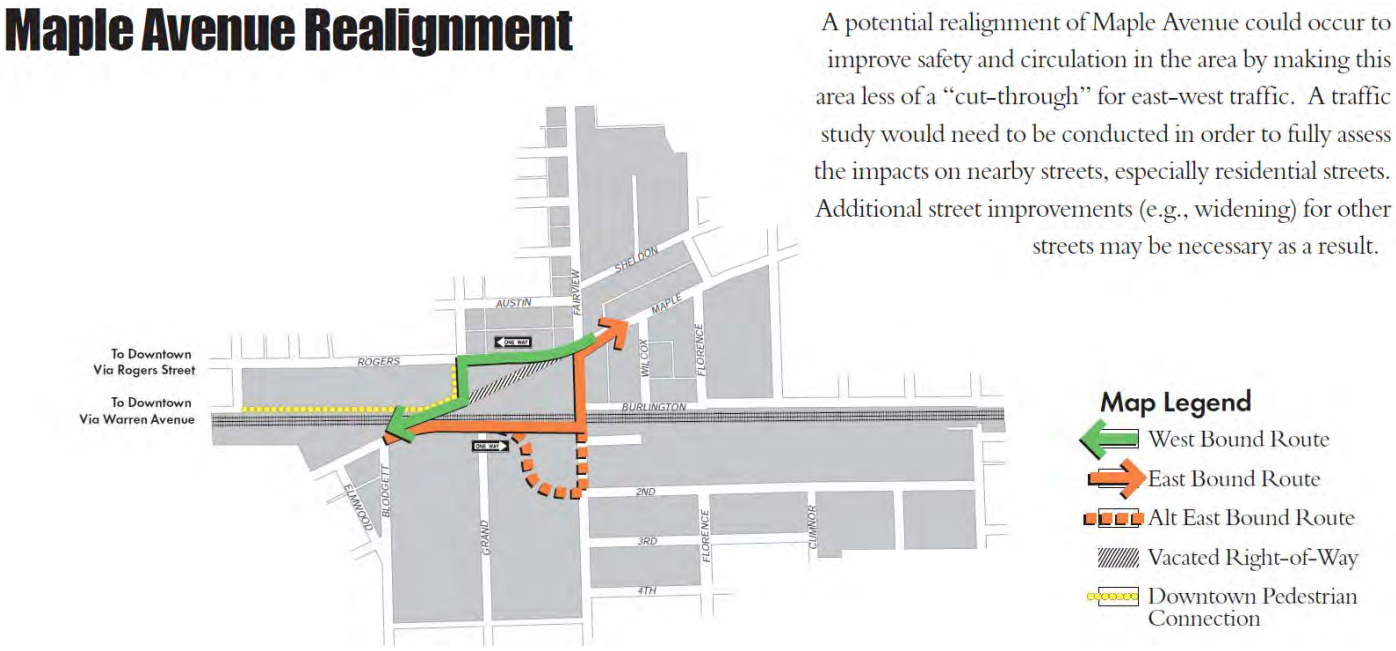
5. Considerations Regarding Option 2

Option 2 adds the least amount of additional traffic across the Fairview Avenue rail crossing of all the proposed improvement options. It also has the lowest probability of making the congestion created by train events worse, as it adds minimal traffic to the section between Second Street and Maple Avenue. However, it should be noted that this option does not achieve the Village's goal of significantly reducing the amount of non-local traffic on Maple Avenue. Preliminary traffic signal warrant analyses do not indicate that a traffic signal will be warranted at the Rogers Street/Maple Avenue/Douglas Road intersection at the 2030 design year, however, the intersection would need to be reevaluated after implementation to ensure that is the case.

C. Maple Ave. One-Way Westbound Conversion & Realignment (Option 3)

1. Improvement Features

Alignment, cross-section and intersection geometric configurations for Option 3 are shown on **Exhibit A-14**. Option 3 is essentially the Maple Avenue Realignment Concept that is proposed in the 2011 Village Comprehensive Plan on Page 135, as reproduced below.



In addition to the assumptions and features listed in Section IV above, features generally unique to Option 3 are described below.

In Option 3, a large "island" would essentially be formed in Maple Avenue, bordered by Burlington Avenue on the south, Fairview Avenue on the east, Rogers Street on the north and Maple Avenue/Douglas Road on the west. A theoretical benefit of this option is making both the northeast-bound and southwest-bound Maple Avenue travel paths more circuitous, thereby decreasing the attractiveness to through traffic. As in Option 2, another benefit is that a stretch of existing Maple Avenue would be vacated for redevelopment opportunities.

Burlington Avenue would be realigned as in Options 1 and 2, and it would remain one-way eastbound between Maple Avenue and Grand Avenue. The recommended cross-section of Burlington Avenue is the same as in Options 1 and 2, and is shown on **Exhibit A-14**. The primary difference is that a dual left turn lane would be required for the eastbound Burlington to northbound Fairview turn movement. This is due to the significant re-routing of northeast-bound Maple Avenue traffic to eastbound Burlington Avenue.

A recommended cross-section of realigned Maple Avenue/Rogers Street is shown on **Exhibit A-14**, and is the same as in Option 2. The traveled way is proposed to have one through lane in each direction, a painted center turn median (with optional landscaped barrier median if feasible), a bike lane in each direction, and parkway/sidewalks.

Exhibit A-10 also highlights parcels which would be affected by right-of-way needs in order to implement the alignment and cross-section changes.

2. Anticipated Traffic Reassignments

Option 3 will have some effect in diverting southwest-bound Maple Avenue traffic to Fairview Avenue due to the introduction of the turn at Rogers Street. The southwest-bound diversion would be similar to Option 2, and again considerably less than the one-way conversion in Option 1. As in Option 2, it is anticipated that as much as one-third of the existing through traffic along Maple Avenue may divert to Fairview Avenue and 55th Street. This estimate considers the capacity constraints on Fairview Avenue.

Unlike Option 2, however, there will be a considerable diversion of northeast-bound Maple Avenue traffic to northbound Fairview Avenue via realigned Burlington Avenue. This option would increase the traffic on Fairview between Second and Maple to an extent that is less than in Option 1, but greater than in Option 2.

The resulting peak hour traffic pattern changes resulting from Option 3 are shown in **Exhibit A-15** for a 2030 design year. One significant turning movement in this option occurs at the new intersection of realigned Maple Avenue with Rogers Street, where nearly 500 vehicles would make the westbound to southbound movement in the P.M. peak hour. Another significant turning movement is at the new intersection of realigned Burlington Avenue with Fairview Avenue, where 535 left turns are anticipated in the A.M. peak hour and 330 are anticipated in the P.M. peak hour, thus the need for the dual left turn lane. These are reflected downstream, at the northbound Fairview to northeast-bound Maple right turn movement, where nearly 400 and 250 right turns are anticipated in the A.M. and P.M. peak hours, respectively. A northbound right turn lane is proposed at this location in this option.

3. Capacity Analyses

The adjusted 2030 traffic volumes for this option were analyzed using *Synchro* to determine the potential traffic impacts, and the reports from these analyses are provided in **Appendix H**. A summary of the capacity analysis and queuing analysis results for this alternative are contained in **Tables B-1** and **B-2**, respectively. The capacity analyses again indicate that traffic operations along Fairview Avenue generally worsen, as would be expected given the assumed traffic diversion from Maple Avenue to

Fairview Avenue. The results generally fall between Options 1 and 2 in terms of roadway network operations.

4. Queuing Analyses

Queuing analyses for this option indicated that a long eastbound dual left turn lane would be needed at the Second Street/Burlington Avenue/Fairview Avenue intersection to manage the heavy eastbound-to-northbound traffic volumes. This option results in the shortest southbound queues on Fairview Avenue at Second Street, Hill Street, and 55th Street compared to the other two options, however, northbound queues at the Maple Avenue/Fairview Avenue intersection would need to be monitored to ensure that through traffic does not queue into the rail crossing.

5. Considerations Regarding Option 3

Option 3 adds a significant amount of additional traffic across the Fairview Avenue rail crossing. Unlike Option 1, it is in the northbound direction which has a lower peak volume than the southbound direction. It has less probability of making the congestion created by train events worse, as the additional traffic is in the less-heavily traveled northbound to eastbound direction, but queue lengths would need to be monitored to ensure that the rail crossing does not become blocked. In addition, both the northbound through and eastbound left turn movements at the Second Street/Burlington Avenue/Fairview Avenue intersection are likely to be affected by train operations, which would cause congestion on both roadways. Also, like Option 2, this option does not achieve the Village's goal of significantly reducing the amount of non-local traffic on Maple Avenue.

D. Additional Study Area Considerations

In addition to the three options presented previously, there are several other proposed, planned, or considered improvements to the transportation network within the study area that merit discussion. Some of these options are not studied in detail in this study due to added traffic complexities beyond the intended scope, but the implications of installing these modifications are qualitatively discussed below for future consideration. Additional considerations include:

- Roadway/Railroad Grade Separations
- Consolidation of the Main Street and Fairview Avenue Metra Stations
- Traffic Signal Installation at Fairview Avenue and Washington Street

A brief description of each of these possibilities, along with some advantage and disadvantage considerations for each, is presented in the following sections.

1. Roadway/Railway Grade Separations

For many years, there has been consideration of a grade separation improvement at the Maple Avenue at-grade railroad crossing to relieve traffic congestion and provide a route for emergency response. A grade separation at the Fairview crossing has also been discussed in concept due to the delay that train operations create within that corridor, and the desirability to shift non-local traffic from Maple to the Fairview Avenue and 55th Street corridors.

Advantages:

- Greatly reduces delays and improves mobility, especially if implemented at Fairview Avenue.
- Improves safety by eliminating the potential for vehicle/train crashes.
- If implemented at Fairview Avenue, could greatly reduce through traffic on Maple Avenue.

Disadvantages:

- Very high capital costs.
- Significant area disruption during construction.
- If implemented on Maple Avenue and not Fairview, non-local traffic would likely increase significantly.
- Implementation on Fairview would likely only be reasonable if the stretch of Fairview between 55th and Maple, or even north to Ogden, was widened to two lanes in each direction.

2. Consolidation of Main Street and Fairview Avenue Metra Stations

Village Staff has indicated that Metra has conceptually considered merging the Main Street and Fairview Avenue Metra stations into a single station, likely located west of the existing at-grade crossing at Maple Avenue. The exact location is not known.

Advantages:

- Gate-down time would likely be reduced at both the Main Street and Fairview Avenue crossings because stopped Metra trains would potentially not extend across these crossings. Thus, disruptions to traffic flow on both Main and Fairview would be reduced.
- Station-generated traffic and parking consolidated at one location.
- Can become a focus for development or redevelopment.
- Lower operating and maintenance costs.

Disadvantages:

- Potential negative impact on the Main Street central business district.
- Could significantly change redevelopment plans around the current Fairview Avenue station.
- Depending on location, rail station may not fit with surrounding land uses and could negatively impact them.
- Could significantly increase Maple Avenue non-local traffic depending on station location and access to it.

A potential alternative to this consolidation would be to shift the Fairview Avenue station farther east, possibly as part of redevelopment of the Pepperidge Farm property, in order to prevent stopped Metra trains from blocking the Fairview Avenue crossing.

3. Traffic Signal Installation at Maple Avenue and Washington Street

Due to the high traffic volumes entering and leaving the nearby parking structure, the installation of a traffic signal may need to be considered at Maple Avenue and Washington Street where there is currently all-way stop control. As noted earlier, the DCDOT improvement on 55th Street will affect turn movement patterns at this location. Prior to installation, a traffic signal warrant study would need to be conducted to determine if a signal is truly warranted at this location.

Advantages:

- Improves traffic flow into and out of Village parking structure.
- Could reduce delay by providing priority to higher volume movements.
- Could improve safety depending on crash history at this location.

Disadvantages:

- May encourage more non-local traffic to use Maple Avenue by reducing delays along that route.
- Construction and maintenance costs for a traffic signal.

V. CONCLUSIONS

The Village of Downers Grove initiated the Maple Avenue/Fairview Avenue traffic study in conjunction with two current Village initiatives. The first is the Village's near-term plan to reconstruct Maple Avenue between Fairview Avenue and Cumnor Road, and the second is the planned long-term transformation into a Transit-Oriented Development area as identified in the 2011 Village Comprehensive Plan. In addition to these primary objectives, the study had these additional objectives as outlined in the Introduction to this report. The traffic study accomplished these objectives, and the findings are as follows:

- Approximately one-half of the traffic traveling to the south and west on Maple Avenue during the A.M. peak hour and two-thirds of the traffic during the P.M. peak hour between Fairview Avenue and Main Street is through traffic.

- In conjunction with the programmed reconstruction of Maple Avenue between Fairview and Cumnor Road, potential improvements shown on **Exhibit A-7** include:
    - Installation of 4-foot bike lanes along the existing bike route (as a Complete Street element).
    - An extended left turn lane on the east leg (to reduce queue spillback and possibly encourage more traffic to head south).
    - Installation of Village Downtown gateway features and additional landscaping to increase the "local roadway feel" of Maple Avenue and to discourage through traffic.
    - Slightly widened turn radii and relocated stop bars (to improve truck turning movements).
    - Slightly relocated crosswalk markings (to prevent the intersection of them within the roadway pavement).

- To improve signal operations along Fairview Avenue, the Maple Avenue signal should be fully integrated into the existing traffic signal system between Lincoln Avenue and Hill Street, and the system should be re-optimized. Interconnection with the railroad is also a possibility at Maple and Fairview. It is notable that the much of the congestion that occurs along Fairview Avenue between Second Street and Maple Avenue south of Maple is related to commuter train operations and not intersection deficiencies, while south of Second Street, capacity is limited by the three-lane cross-section.

- Further coordination with DCDOT should occur regarding the changes in capacity on the Fairview Avenue legs of the 55th Street intersection as proposed in the current IDS.

- Conceptual alignments, roadway typical cross-sections and intersection lane configurations were developed for three potential roadway network modifications to meet some of the objectives of the Village.

- Option 1 is the conversion of Maple Avenue to one-way eastbound operation between Burlington Avenue and Rogers Street.
- Option 2 is the realignment of Maple Avenue as a two-lane roadway north to Rogers Street, then east to Fairview Avenue
- Option 3 is the realignment of Maple Avenue combined with creation of a one-way pair of Maple Avenue and Burlington Avenue.

Of the proposed options, Option 2 was found to have the least adverse impacts from a traffic standpoint. Option 2 diverts some traffic from Maple Avenue to Fairview Avenue, but keeps traffic on Fairview Avenue within the capacity of the arterial. Option 2 also makes Maple Avenue a less direct route, and may help make the roadway more residential in character. Finally, Option 2 accommodates the Village's long-term redevelopment plans for the area. It is therefore recommended that Option 2 be carried forward as part of the Village's long-term planning processes.

- A Complete Streets cross-section was developed for Fairview Avenue between Second Street and Maple Avenue, which includes 11-foot vehicle lanes, 5-foot bicycle lanes, parking lanes, and wider sidewalks for streetscape elements such as planter boxes, benches, and lighting. Complete Streets elements have also been shown on the Concept Alignment exhibits for each of the three roadway network modification options.

- Additional possibilities for future roadway network improvements, such as grade separations and Metra station locations were presented, and the advantages and disadvantages of each were discussed. Further studies would be required to refine these possibilities and ensure that they fit within the Village's long-term plans.

APPENDIX A

EXHIBITS

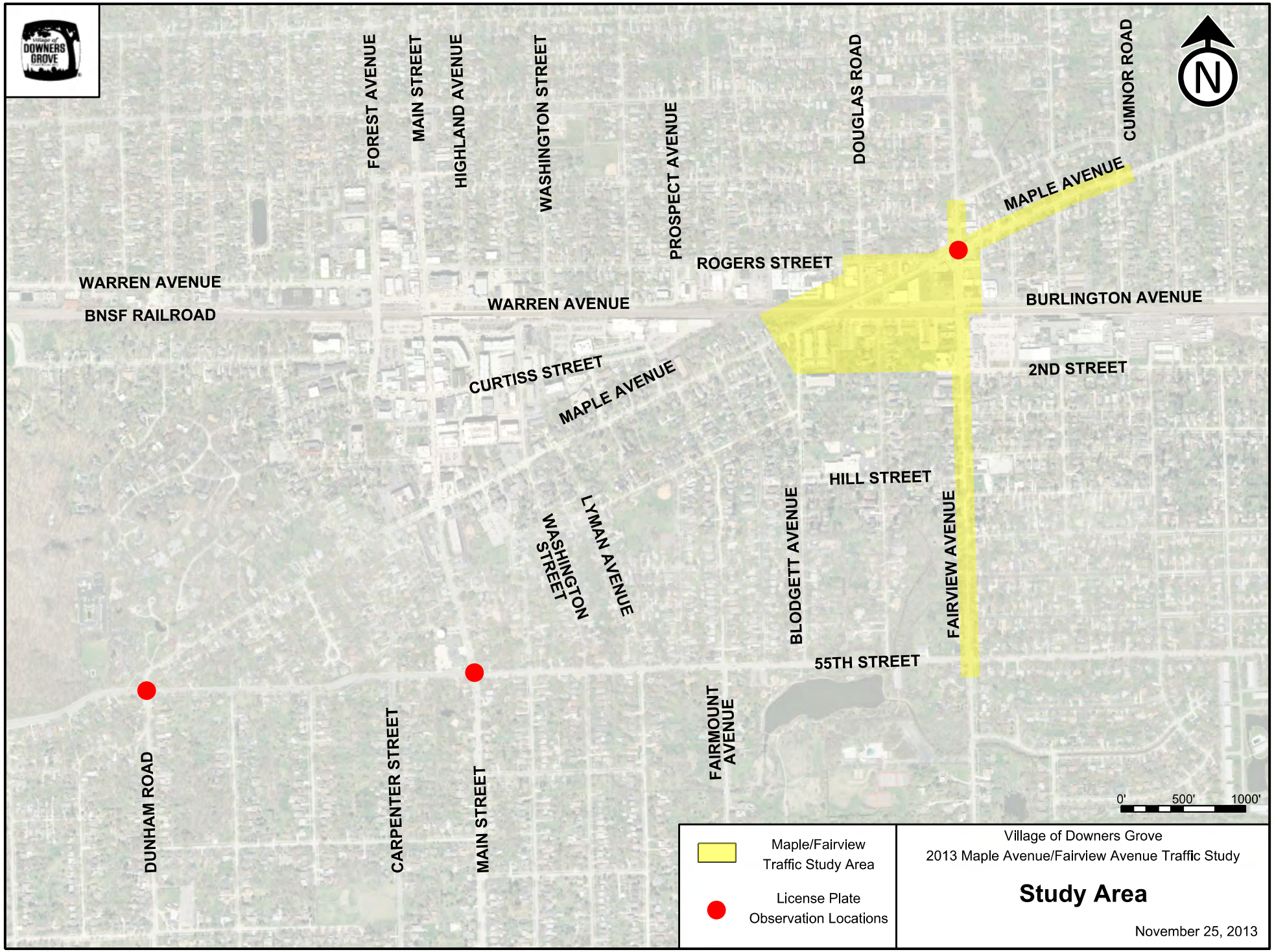


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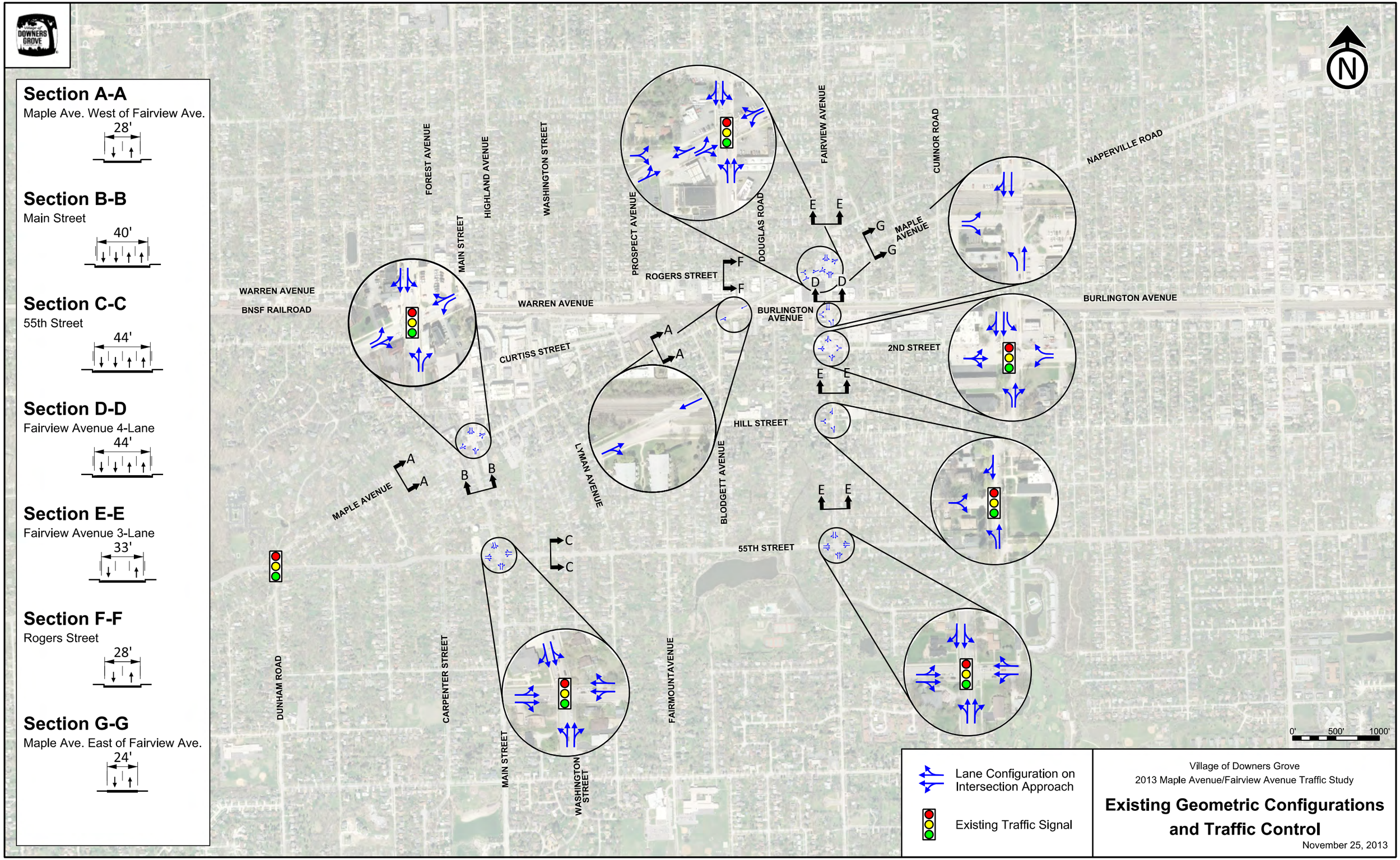
Exhibit A-1



Village of Downers Grove
2013 Maple Avenue/Fairview Avenue Traffic Study

Existing Geometric Configurations and Traffic Control

November 25, 2013

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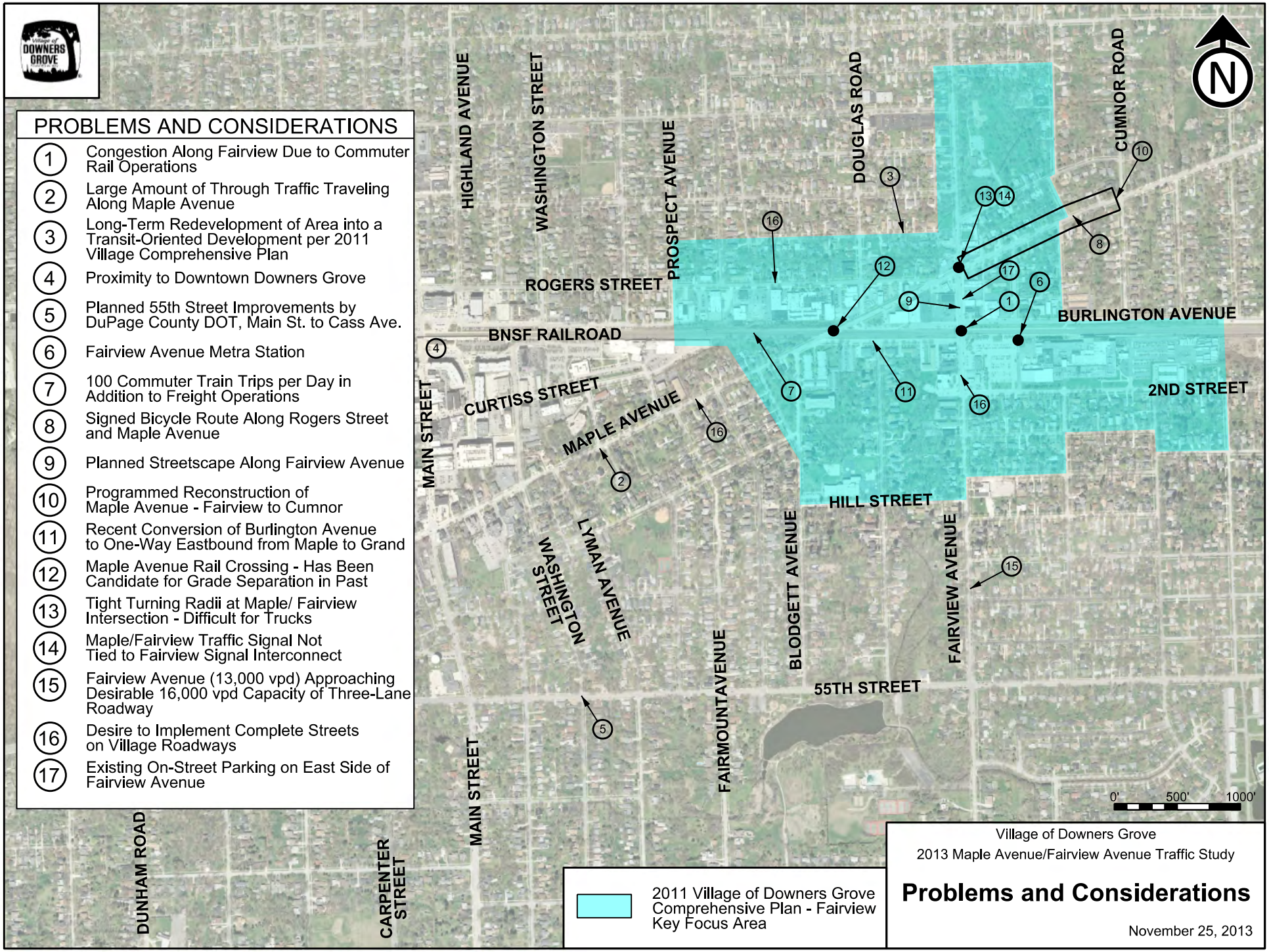
Exhibit A-2



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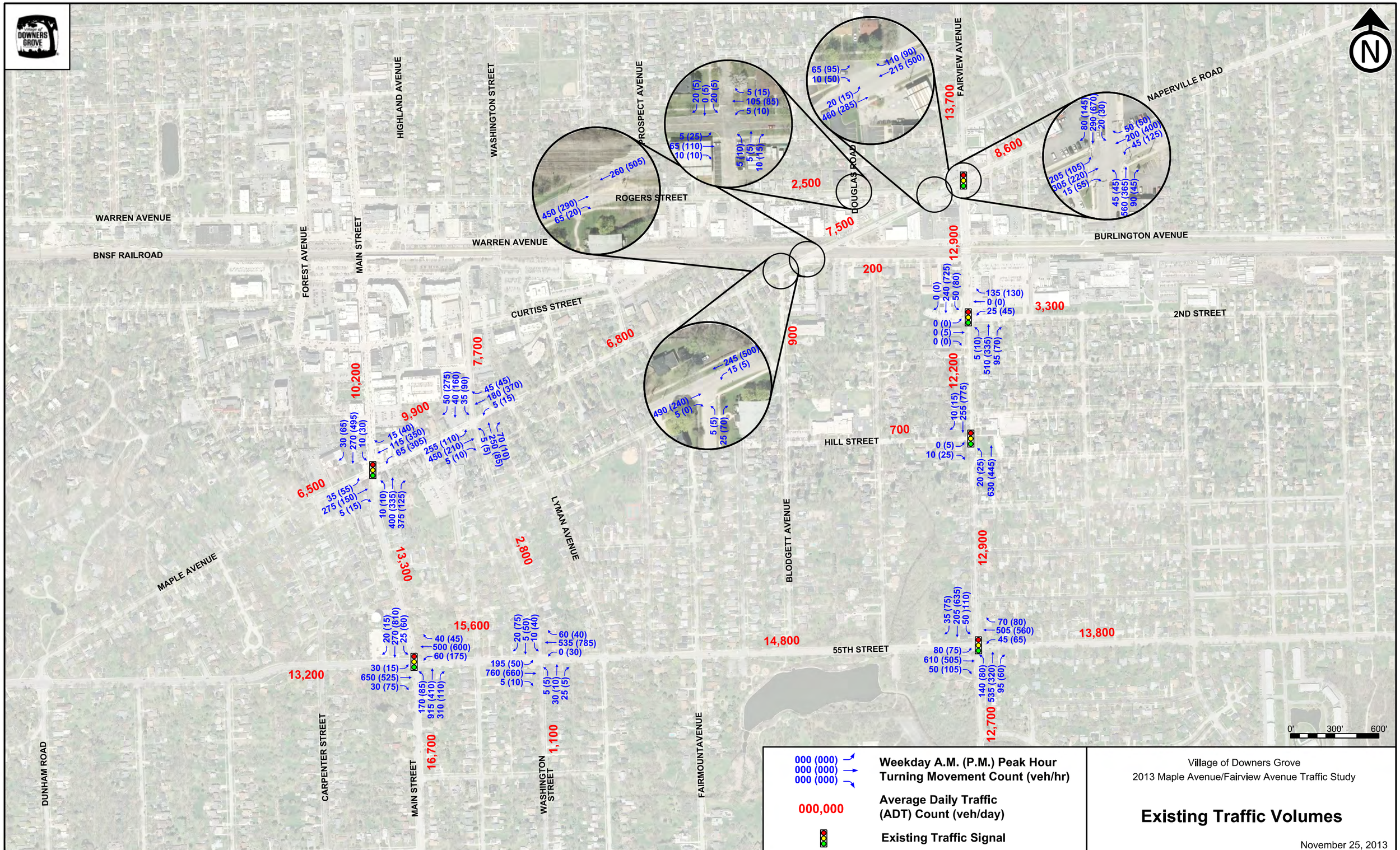

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Exhibit A-4

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Exhibit A-5

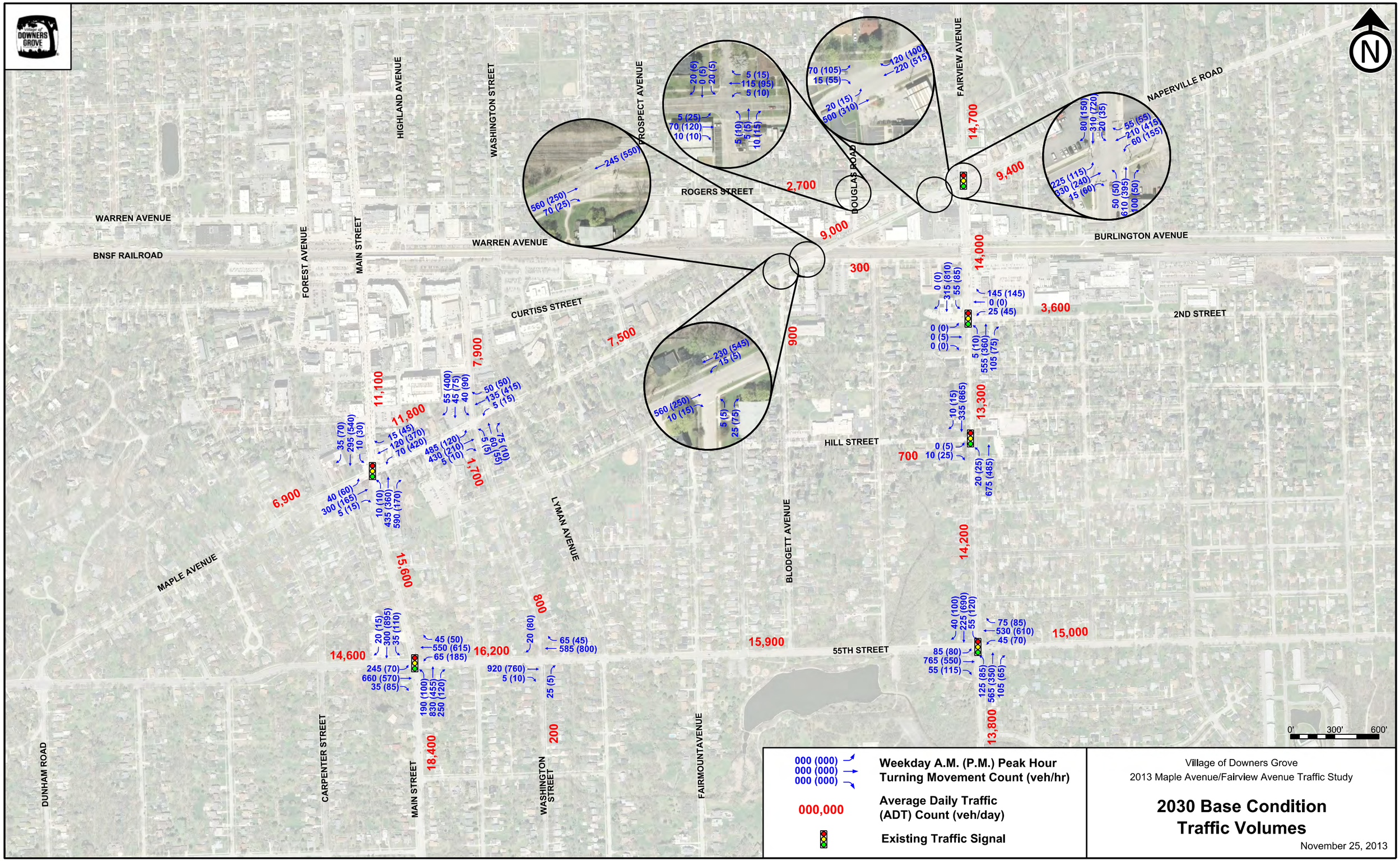

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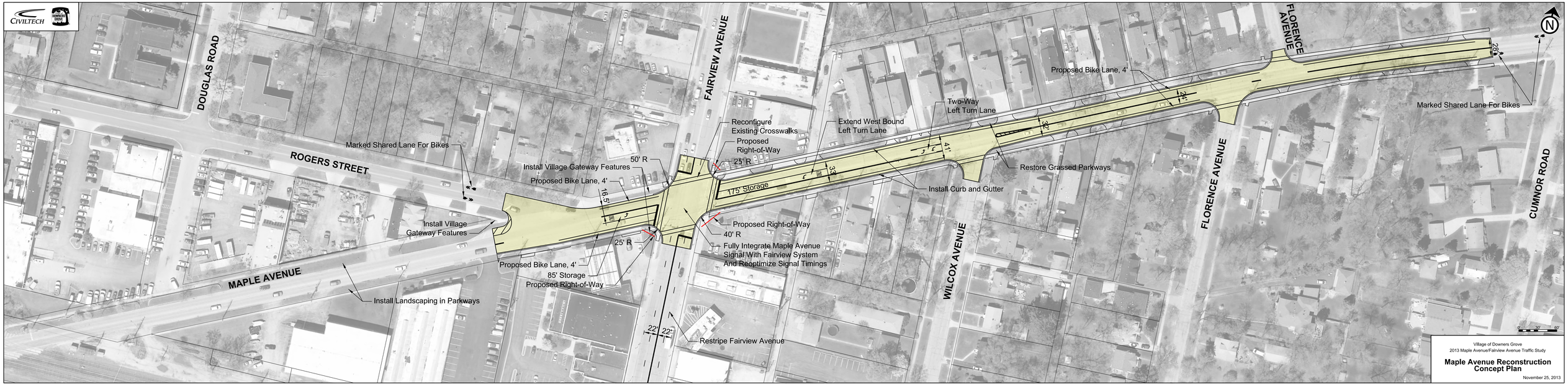
Exhibit A-6



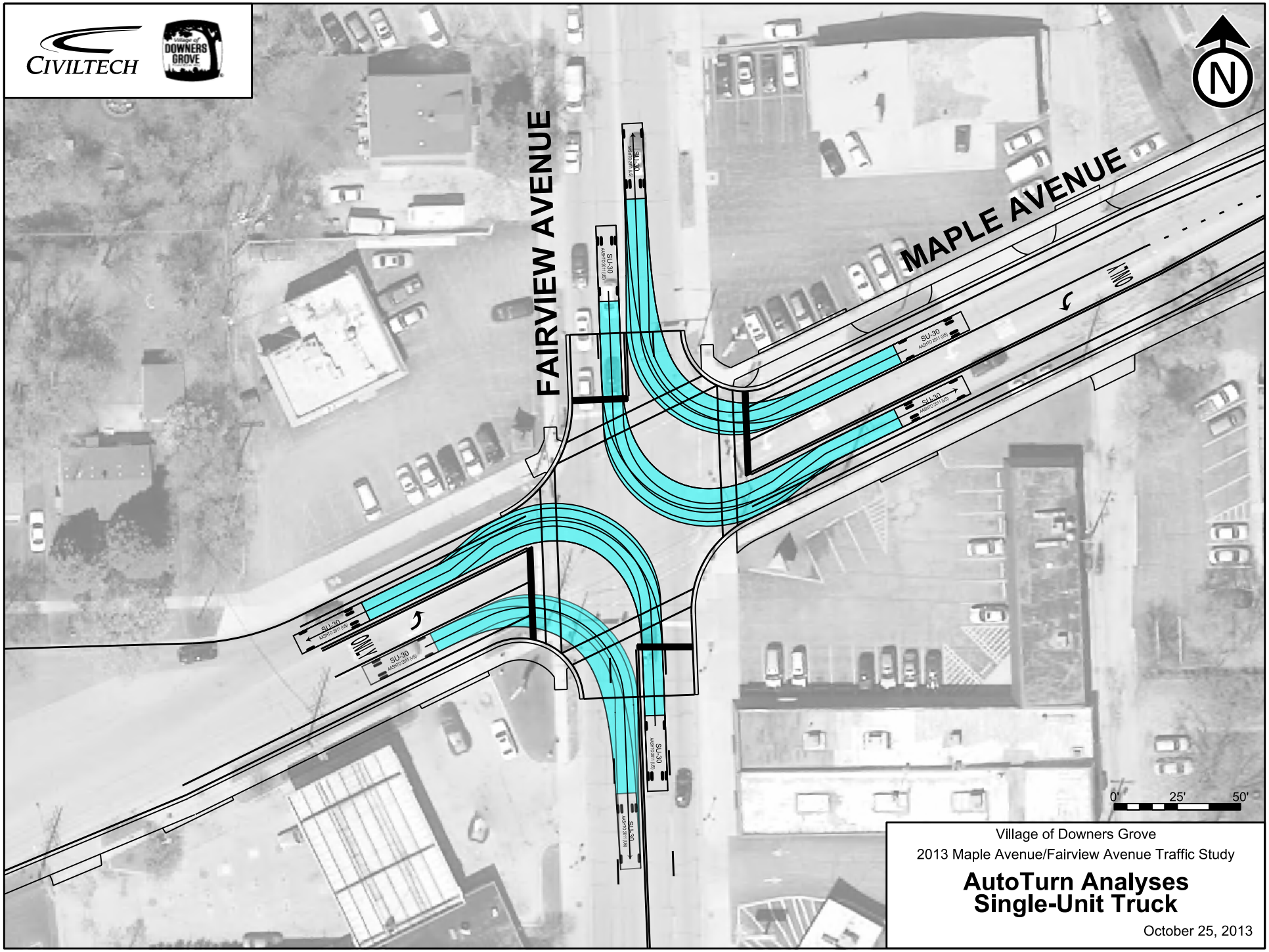
Village of Downers Grove
2013 Maple Avenue/Fairview Avenue Traffic Study

Maple Avenue Reconstruction Concept Plan

November 25, 2013

J:\2738\cad\exhibits\2013-11-27-Submittal\A-7_Maple Avenue Reconstruction Concept Plan.dgn

Exhibit A-7



Village of Downers Grove

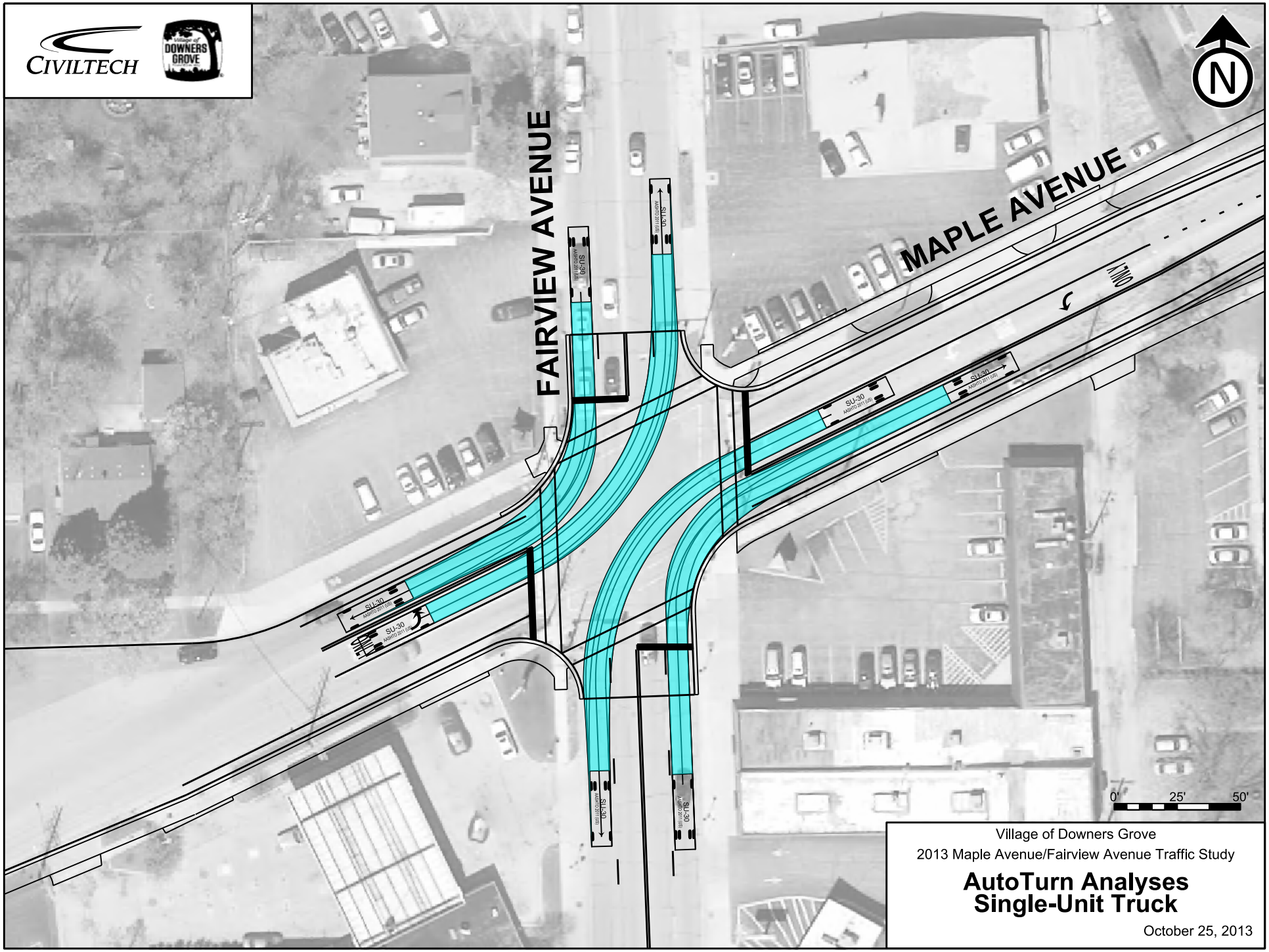
2013 Maple Avenue/Fairview Avenue Traffic Study

AutoTurn Analyses
Single-Unit Truck

October 25, 2013

J:\2738\cad\exhibits\2013-10-25-Submittal\A-8a_AutoTurn.dgn

Exhibit A-8a



Village of Downers Grove

2013 Maple Avenue/Fairview Avenue Traffic Study

AutoTurn Analyses
Single-Unit Truck

October 25, 2013

J:\2738\cad\exhibits\2013-10-25-Submittal\A-8b_AutoTurn.dgn

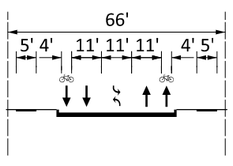
Exhibit A-8b

Notes

1. Restore Two-Way Operation on Burlington Avenue
2. Convert Maple Avenue to One-Way Northeast-Bound
3. Vacate Stretch of Burlington Avenue For Development
4. Relocate Burlington Avenue to Provide Separation From Railroad
5. See Exhibit A-16 for Fairview Avenue Complete Street Cross-Section
6. Assume Small Diversion of Maple Avenue Traffic to Southbound Fairview Avenue/ 55th Street. Fairview Avenue is Approaching Capacity in Base Conditions.
7. One-Way Eastbound Maple Avenue Could Be Realigned Onto Douglas Road and Rogers Street
8. Southbound Fairview Avenue Tapers to One Lane South of Second Street. Northbound Fairview Avenue is Two Lanes North of Third Street.
9. Modification of Existing Traffic Signal

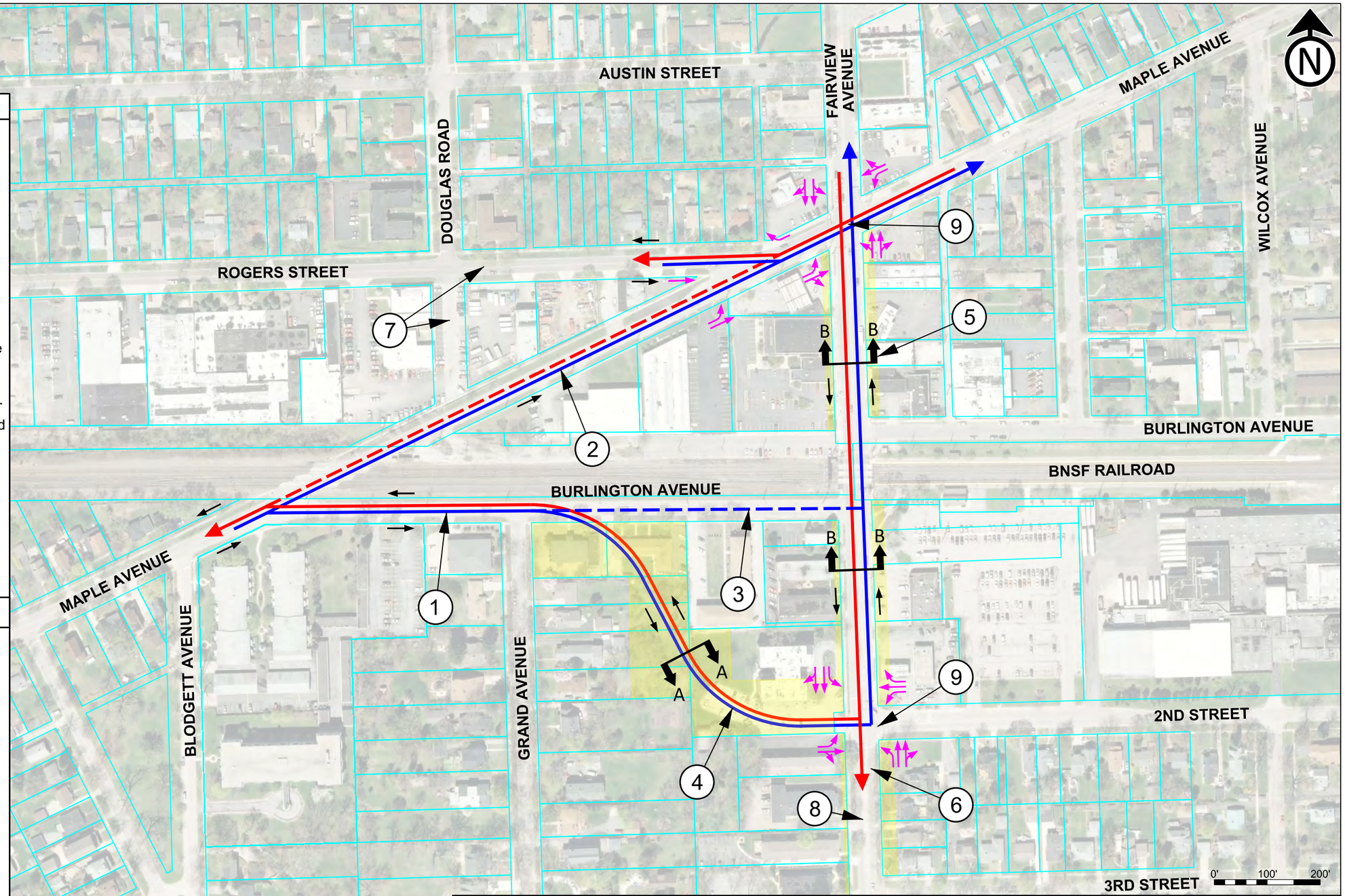
Typical Sections

A-A



B-B

See Exhibit A-16 for Fairview Avenue Complete Street Cross-Section



Removed NE to SW Travel Path
Relocated NE to SW Travel Path
Removed SW to NE Travel Path
Relocated SW to NE Travel Path
ROW/Property Lines

Modification to Intersection Lane Configuration
Right-of-Way Impacts
One-Way
Two-Way

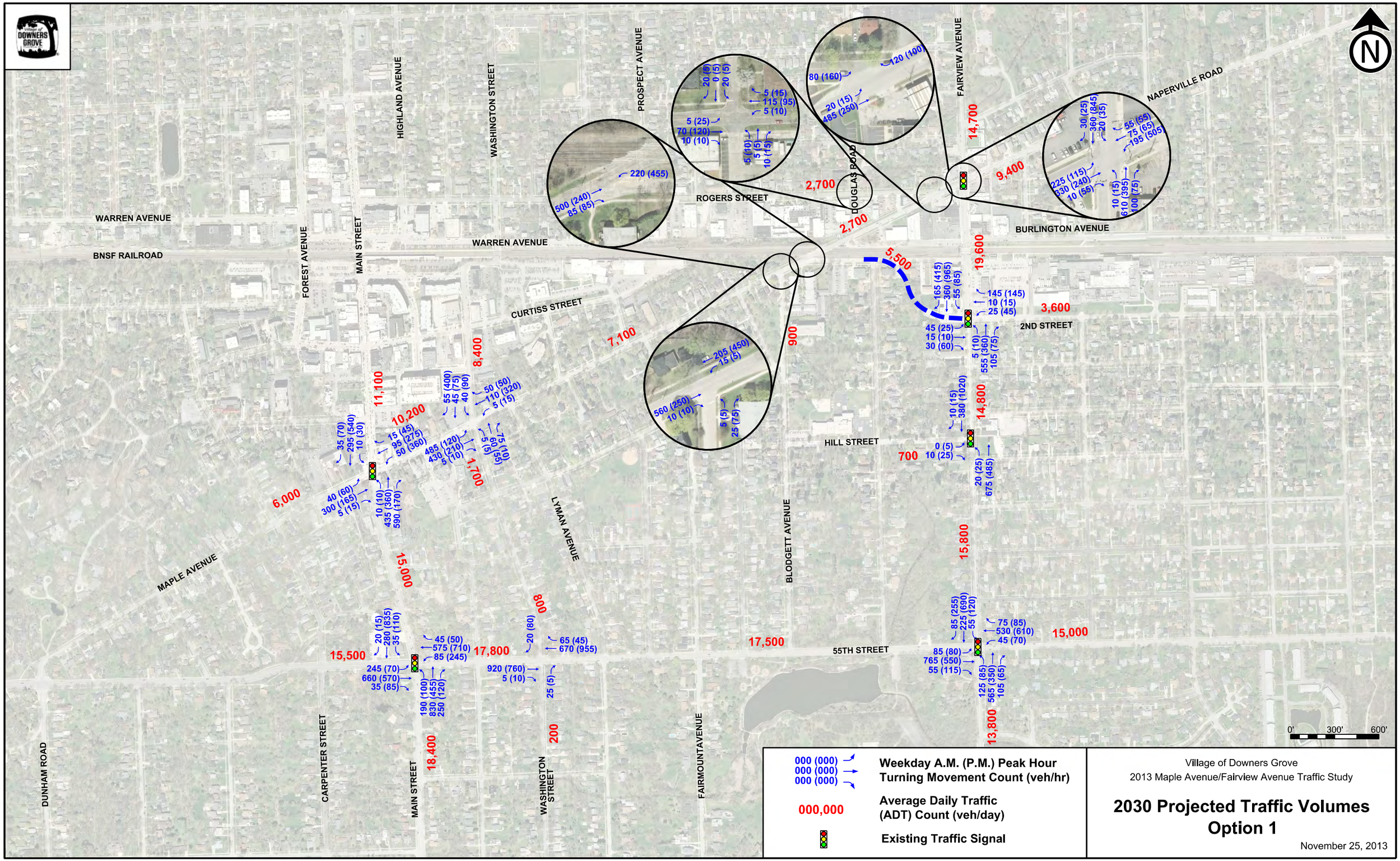
Village of Downers Grove
2013 Maple Avenue/Fairview Avenue Traffic Study

Concept Alignment and Geometric Configuration
Option 1- Maple Avenue One-Way Eastbound

November 25, 2013

$FILEL$

Exhibit A-10



$FILEL$

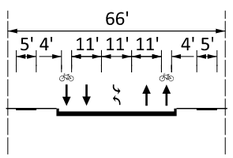
Exhibit A-11

Notes

1. Relocate Maple Avenue and Keep Two-Way
2. Maintain One-Way Segment of Burlington Avenue
3. Vacate Stretch of Maple Avenue For Development
4. Vacate Stretch of Burlington Avenue For Development
5. Relocate Burlington Avenue to Provide Separtation From Railroad. Two-Way From West of Grand Avenue to Fairview Avenue Only.
6. See Exhibit A-16 For Furutre Fairview Avenue Complete Street Cross-Section
7. Southbound Fairview Avenue Tapers to One Lane South of Second Street. Northbound Fairview Avenue is Two Lanes North of Third Street.
8. Modification of Existing Traffic Signal
9. Construction of Two-Way Stop Controlled Intersection

Typical Sections

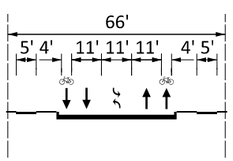
A-A



B-B

See Exhibit A-16 for Fairview Avenue Complete Street Cross-Section

C-C



AUSTIN STREET
FAIRVIEW AVENUE
MAPLE AVENUE
WILCOX AVENUE
DOUGLAS ROAD
ROGERS STREET
BURLINGTON AVENUE
BNSF RAILROAD
MAPLE AVENUE
BLODGETT AVENUE
GRAND AVENUE
2ND STREET
3RD STREET

0' 100' 200'

- Removed NE to SW Travel Path
- Relocated NE to SW Travel Path
- Removed SW to NE Travel Path
- Relocated SW to NE Travel Path
- ROW/Property Lines
- Modification to Intersection Lane Configuration
- Right-of-Way Impacts
- One-Way
- Two-Way

Village of Downers Grove
2013 Maple Avenue/Fairview Avenue Traffic Study

Concept Alignment and Geometric Configuration
Option 2- Maple Avenue Two-Way Realignment

November 25, 2013

$FILE1$

Exhibit A-12

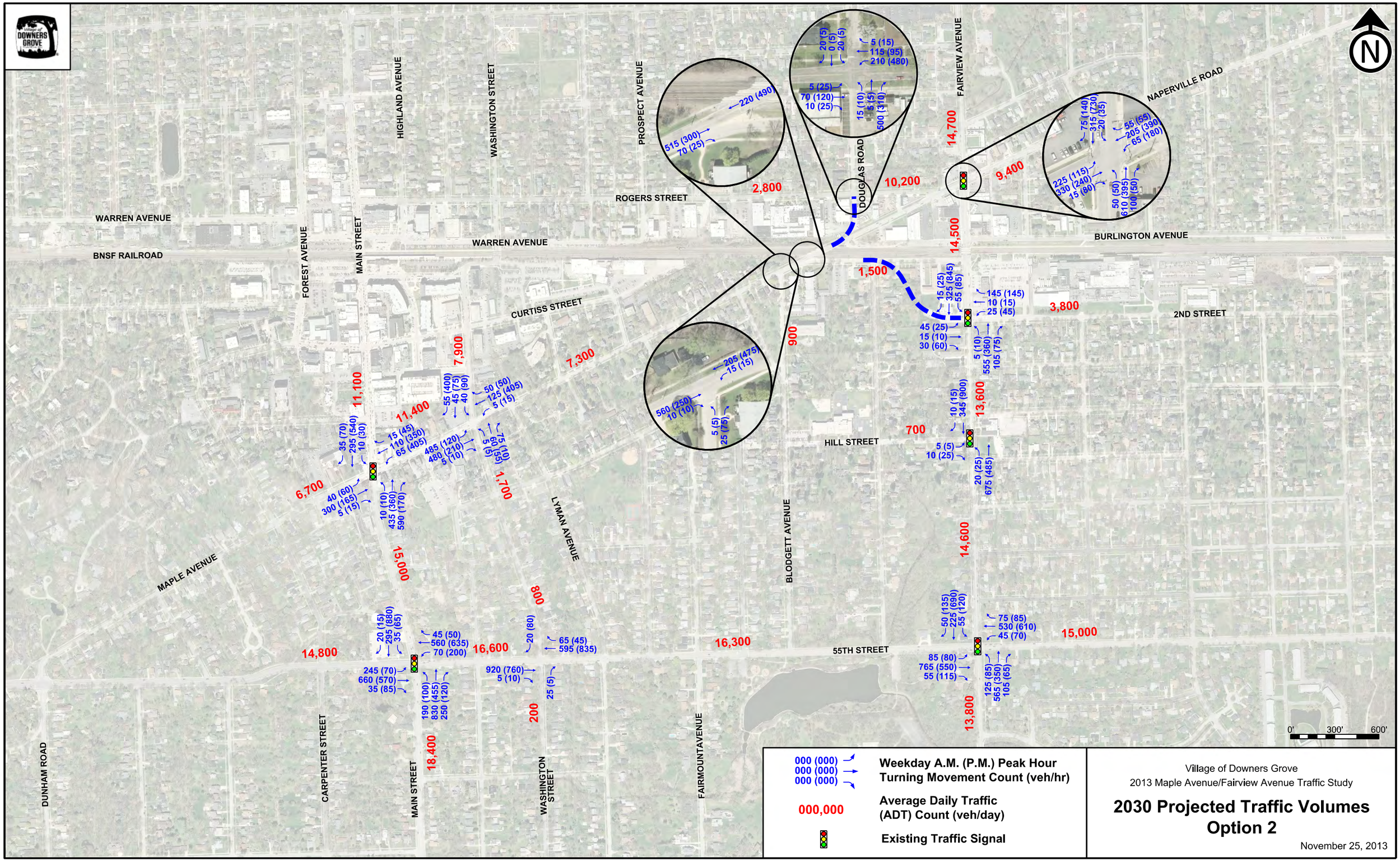

WARREN AVENUE
BNSF RAILROAD
FOREST AVENUE
MAIN STREET
HIGHLAND AVENUE
WASHINGTON STREET
PROSPECT AVENUE
ROGERS STREET
CURTISS STREET
HILL STREET
LYMAN AVENUE
BLODGETT AVENUE
FAIRMOUNTAVENUE
55TH STREET
MAPLE AVENUE
DUNHAM ROAD
CARPENTER STREET
DOUGLAS ROAD
FAIRVIEW AVENUE
NAPERVILLE ROAD
BURLINGTON AVENUE
2ND STREET
2,800
10,200
14,700
9,400
14,500
1,500
3,800
900
7,900
7,300
11,100
11,400
700
13,600
6,700
1,700
15,000
14,600
800
14,800
16,600
16,300
15,000
200
18,400
13,800
0' 300' 600'
000 (000)
000 (000)
000 (000)
Weekday A.M. (P.M.) Peak Hour Turning Movement Count (veh/hr)
000,000
Average Daily Traffic (ADT) Count (veh/day)
Existing Traffic Signal
Village of Downers Grove
2013 Maple Avenue/Fairview Avenue Traffic Study
2030 Projected Traffic Volumes
Option 2
November 25, 2013

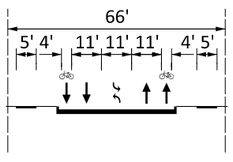
Exhibit A-13

Notes

1. Relocate Maple Avenue, One-Way South and Southwest-Bound
2. Maintain One-Way Eastbound Segment of Burlington Avenue
3. Vacate Stretch of Maple Avenue For Development
4. Vacate Stretch of Burlington Avenue For Development
5. Relocate Burlington Avenue to Provide Separtation From Railroad. Two-Way From Grand Avenue to Fairview Avenue Only.
6. See Exhibit A-16 For Furutre Fairview Avenue Complete Street Cross-Section
7. Southbound Fairview Avenue Tapers to One Lane South of Second Street. Northbound Fairview Avenue is Two Lanes North of Third Street.
8. Dual Left Turn Lane Required
9. Modification of Existing Traffic Signal Installation

Typical Sections

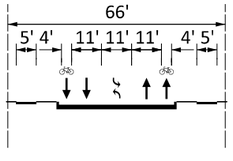
A-A

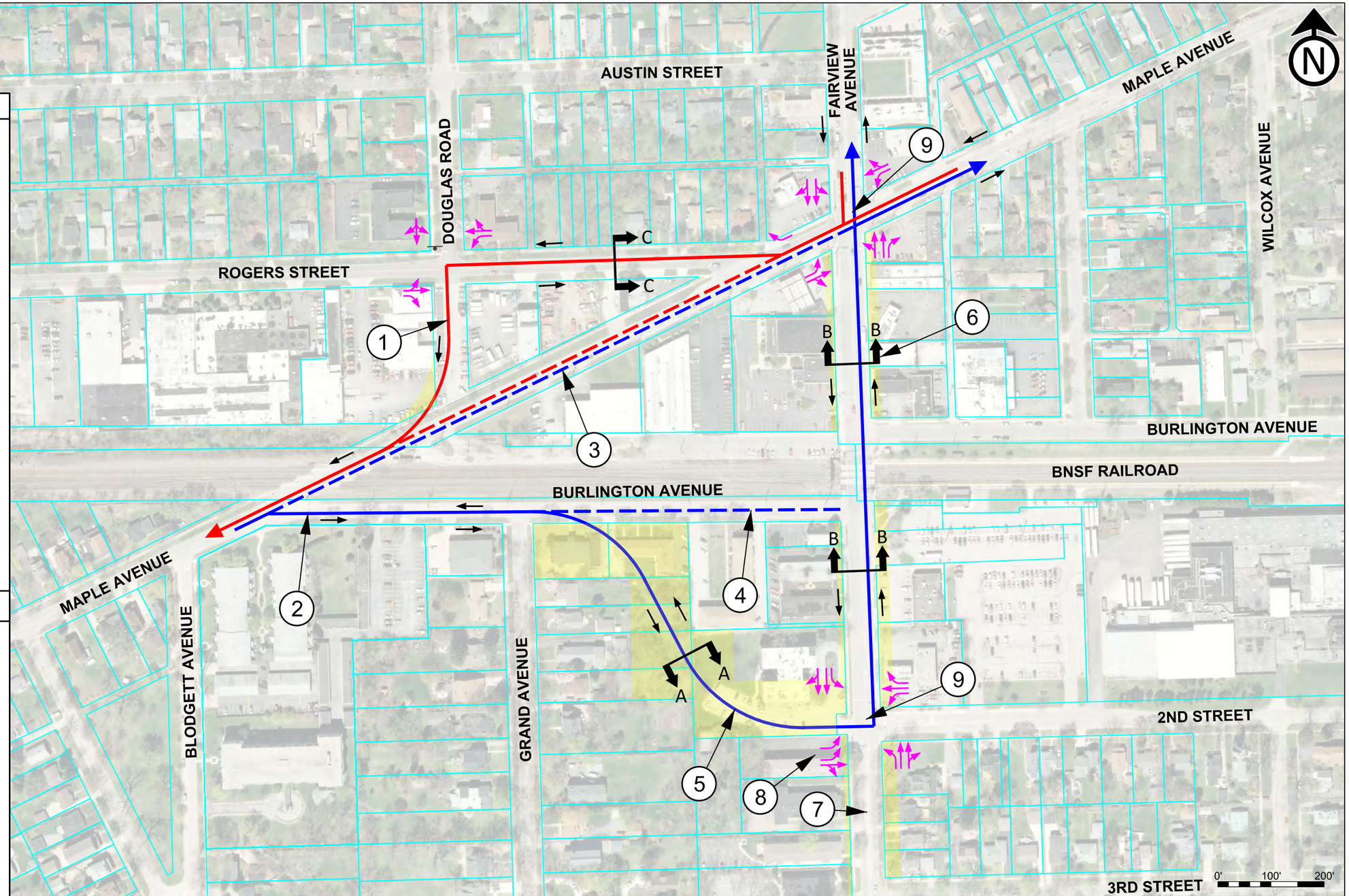


B-B

See Exhibit A-16 for Fairview Avenue Complete Street Cross-Section

C-C





Removed NE to SW Travel Path
Relocated NE to SW Travel Path
Removed SW to NE Travel Path
Relocated SW to NE Travel Path
ROW/Property Lines

Modification to Intersection Lane Configuration
Right-of-Way Impacts
One-Way
Two-Way

Village of Downers Grove
2013 Maple Avenue/Fairview Avenue Traffic Study

Concept Alignment and Geometric Configuration
Option 3- Maple Avenue One-Way Westbound

November 25, 2013

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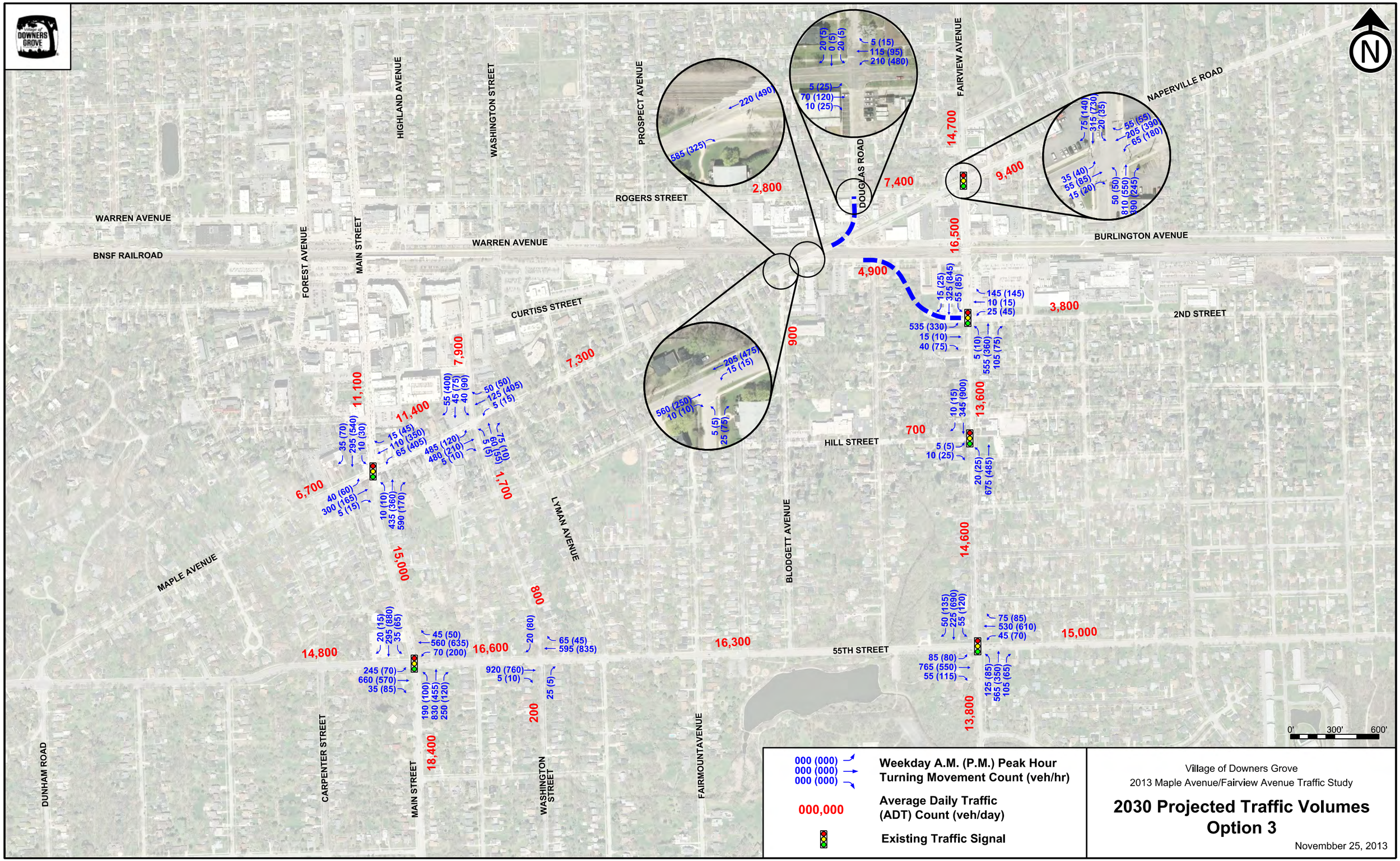
Exhibit A-14

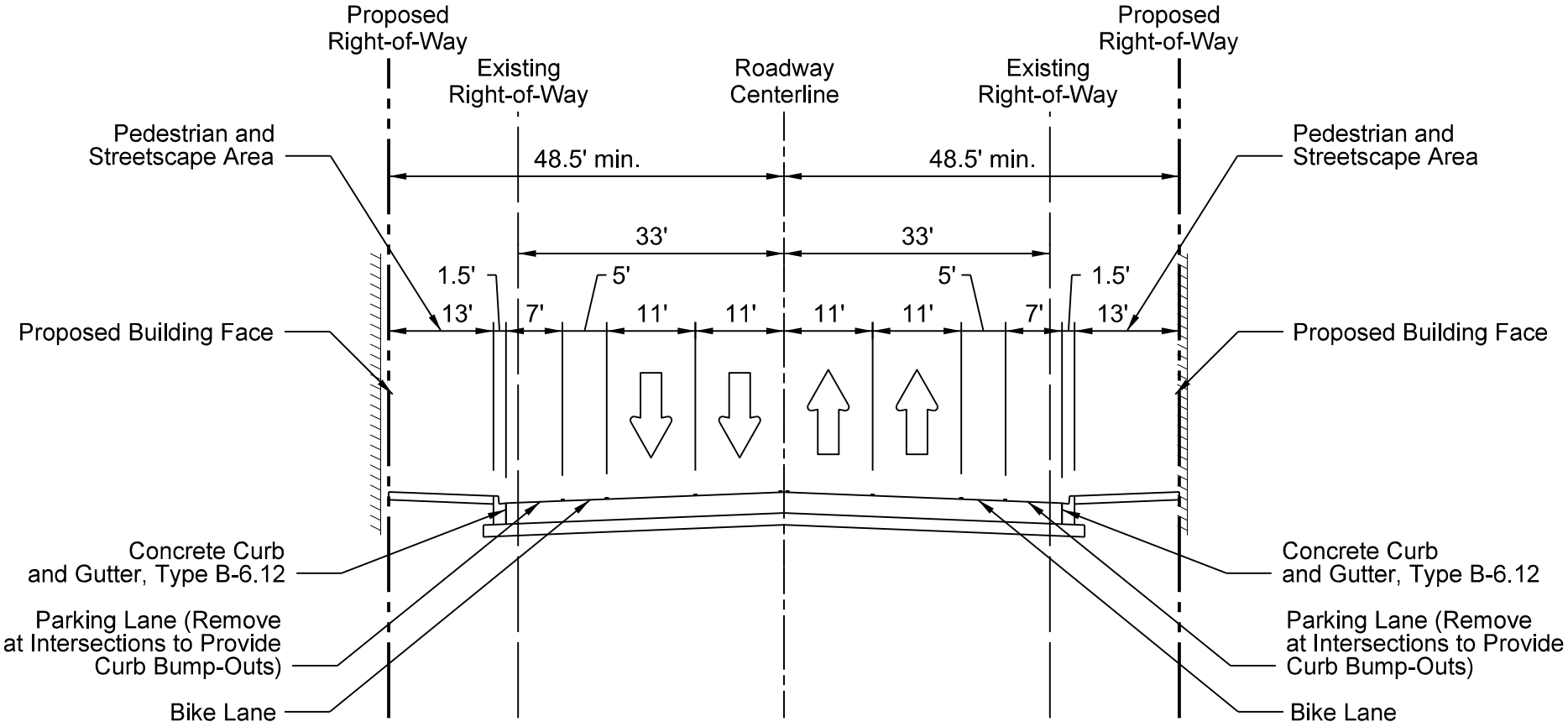


Village of Downers Grove
2013 Maple Avenue/Fairview Avenue Traffic Study

2030 Projected Traffic Volumes
Option 3

Novembber 25, 2013

Exhibit A-15



Not to Scale

Village of Downers Grove

2013 Maple Avenue/Fairview Avenue Traffic Study

Fairview Avenue
Complete Street Concept

November 25, 2013

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Exhibit A-16

APPENDIX B

TABLES

CAPACITY ANALYSIS SUMMARY

Intersection	Synchro Level of Service and Delay (seconds/vehicle)									
	Existing		2030 Base		2030 Option 1		2030 Option 2		2030 Option 3	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Fairview Avenue and Maple Avenue	C 21.7 sec	C 32.1 sec	B 19.2 sec	C 29.2 sec	C 20.1 sec	D 35.3 sec	B 19.9 sec	C 29.8 sec	B 11.2 sec	C 23.8 sec
Fairview Avenue and Burlington Avenue (South)*	A 0.5 sec	A 0.3 sec	A 0.5 sec	A 0.6 sec						
Fairview Avenue and Second Street (Burlington Avenue Realignment in Opts. 1-3)	A 8.6 sec	A 9.0 sec	A 9.3 sec	A 5.4 sec	A 8.0 sec	A 6.2 sec	A 9.1 sec	A 8.3 sec	C 22.3 sec	B 15.7 sec
Fairview Avenue and Hill Street	A 4.0 sec	A 7.8 sec	A 5.7 sec	A 5.9 sec	A 4.3 sec	A 7.9 sec	A 6.6 sec	A 4.5 sec	A 7.1 sec	A 4.3 sec
Fairview Avenue and 55th Street	C 29.9 sec	C 31.3 sec	D 35.6 sec	C 32.2 sec	C 32.0 sec	C 32.5 sec	C 32.1 sec	C 29.6 sec	C 32.1 sec	C 29.4 sec
Maple Avenue and Washington Street**	D 28.8 sec	C 22.9 sec	D 27.3 sec	D 32.3 sec						
Maple Avenue and Blodgett Avenue*	A 0.6 sec	A 1.0 sec	A 0.6 sec	A 1.0 sec	A 0.6 sec	A 1.1 sec	A 0.6 sec	A 1.1 sec	A 0.6 sec	A 1.1 sec
Maple Avenue and Rogers Street* (Realigned to Douglas Road in Opts. 2-3)	A 1.6 sec	A 3.3 sec	A 1.8 sec	A 4.0 sec	A 0.0 sec	A 0.0 sec	A 8.4 sec	A 8.3 sec	A 4.8 sec	A 6.2 sec
Main Street and Maple Avenue	B 16.8 sec	C 25.5 sec	B 17.0 sec	C 30.2 sec						
Main Street and 55th Street	D 37.9 sec	D 40.4 sec	C 33.4 sec	C 30.9 sec						

*Intersection is two-way stop-controlled.

**Intersection is all-way stop-controlled.

QUEUE ANALYSIS SUMMARY

Fairview Avenue at Maple Avenue

Approach and Movement		Storage Provided		Synchro 95th Percentile Queue Length									
		Existing	2030	Existing		2030 Base		2030 Option 1		2030 Option 2		2030 Option 3	
				A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Eastbound Maple Avenue	Left	90 ft	175 ft[1]	**120 ft**	90 ft	115 ft	85 ft	100 ft	45 ft	100 ft	75 ft	25 ft	35 ft
	Through/Right	-	-	245 ft	260 ft	220 ft	255 ft	240 ft	240 ft	205 ft	285 ft	50 ft	95 ft
Westbound Maple Avenue	Left	120 ft	350 ft	35 ft	105 ft	35 ft	110 ft	85 ft	315 ft	35 ft	115 ft	40 ft	120 ft
	Through/Right	-	-	185 ft	480 ft	185 ft	435 ft	70 ft	50 ft	170 ft	390 ft	170 ft	385 ft
Northbound Fairview Avenue	Left/Through	-	-	140 ft	125 ft	160 ft	120 ft	70 ft	185 ft	105 ft	150 ft	145 ft	265 ft
	Right	*	175 ft[2]	*	*	*	*	*	*	*	*	25 ft	85 ft
Southbound Fairview Avenue	Left/Through/ Right	-	-	110 ft	365 ft	110 ft	355 ft	125 ft	465 ft	120 ft	380 ft	105 ft	370 ft

Bold Text indicates that the queue exceeds the storage provided.

An "*" indicates that the movement is shared with the adjacent through movement.

A "-" indicates that separate storage is not provided for this movement.

[1] Due to geometric constraints, these storage lengths can only be provided in Options 2 and 3.

[2] This storage length applies to Option 3 only.

QUEUE ANALYSIS SUMMARY

Fairview Avenue at Second Street

Approach and Movement		Storage Length		Synchro 95th Percentile Queue Length									
		Existing	2030 Options	Existing		2030 Base		2030 Option 1		2030 Option 2		2030 Option 3	
				A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Eastbound Private Driveway (Realigned Burlington Avenue in Options 1 and 2)	Left	*	175 ft[1]	*	*	*	*	35 ft	30 ft	40 ft	45 ft	**230 ft**	165 ft
	Through/Right	-	-	0 ft	20 ft	0 ft	20 ft	30 ft	40 ft	35 ft	55 ft	30 ft	50 ft
Westbound Second Street	Left	105 ft	115 ft[2]	40 ft	80 ft	35 ft	70 ft	25 ft	45 ft	25 ft	65 ft	40 ft	70 ft
	Through	N/A	-	N/A	N/A	N/A	N/A	20 ft	25 ft	20 ft	35 ft	20 ft	35 ft
	Right	-	115 ft[2]	55 ft	65 ft	50 ft	55 ft	35 ft	40 ft	35 ft	55 ft	40 ft	50 ft
Northbound Fairview Avenue	Left	65 ft	115 ft[2]	5 ft	10 ft	0 ft	5 ft	5 ft	10 ft	5 ft	5 ft	5 ft	15 ft
	Through/Right	-	-	280 ft	230 ft	55 ft	75 ft	100 ft	75 ft	105 ft	70 ft	225 ft	145 ft
Southbound Fairview Avenue	Left	65 ft	115 ft[2]	10 ft	20 ft	20 ft	15 ft	45 ft	10 ft	55 ft	15 ft	50 ft	25 ft
	Through/Right	-	-	60 ft	185 ft	205 ft	95 ft	130 ft	90 ft	130 ft	145 ft	115 ft	105 ft

Bold Text indicates that the queue exceeds the storage provided.

An "*" indicates that the movement is shared with the adjacent through movement.

A "-" indicates that separate storage is not provided for this movement.

[1] Single left-turn lane in Options 1 and 2. Dual left turn lane in Option 3.

[2] Lanes added or lengthened in Options 1-3.

QUEUE ANALYSIS SUMMARY

Fairview Avenue at Hill Street

Approach and Movement		Storage Length		Synchro 95th Percentile Queue Length									
		Existing	2030	Existing		2030 Base		2030 Option 1		2030 Option 2		2030 Option 3	
				A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Eastbound Hill Street	Left/Right	-	-	0 ft	30 ft	0 ft	35 ft	20 ft	25 ft	20 ft	35 ft	20 ft	35 ft
Northbound Fairview Avenue	Left	50 ft	50 ft	15 ft	15 ft	15 ft	0 ft	10 ft	15 ft	10 ft	0 ft	10 ft	0 ft
	Through/Right	-	-	300 ft	185 ft	380 ft	10 ft	300 ft	180 ft	300 ft	5 ft	300 ft	5 ft
Southbound Fairview Avenue	Left/Through/ Right	-	-	135 ft	585 ft	85 ft	225 ft	70 ft	920 ft	205 ft	330 ft	260 ft	160 ft

Bold Text indicates that the queue exceeds the storage provided.

An "*" indicates that the movement is shared with the adjacent through movement.

A "-" indicates that separate storage is not provided for this movement.

QUEUE ANALYSIS SUMMARY

Fairview Avenue at 55th Street

Approach and Movement		Storage Length		Synchro 95th Percentile Queue Length									
		Existing	2030	Existing		2030 Base		2030 Option 1		2030 Option 2		2030 Option 3	
				A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
Eastbound 55th Street	Left	-	125 ft[2]	*	*	85 ft	85 ft	70 ft	75 ft	70 ft	75 ft	70 ft	75 ft
	Through/Right	-	-	225 ft	190 ft	400 ft	300 ft	385 ft	290 ft	385 ft	290 ft	385 ft	290 ft
Westbound 55th Street	Left	-	125 ft[2]	*	*	45 ft	65 ft	45 ft	65 ft	45 ft	65 ft	45 ft	65 ft
	Through/Right	-	-	220 ft	295 ft	245 ft	305 ft	245 ft	305 ft	245 ft	305 ft	245 ft	305 ft
Northbound Fairview Avenue	Left	-	130 ft[2]	*	*	70 ft	70 ft	70 ft	65 ft	70 ft	55 ft	70 ft	55 ft
	Through/Right[1]	-	-	270 ft	165 ft	600 ft	305 ft	600 ft	310 ft	600 ft	305 ft	600 ft	305 ft
Southbound Fairview Avenue	Left	-	115 ft[2]	*	*	35 ft	45 ft	35 ft	75 ft	35 ft	50 ft	35 ft	40 ft
	Through[1]	-	-	65 ft	205 ft	165 ft	825 ft	145 ft	615 ft	145 ft	600 ft	145 ft	575 ft
	Right	-	175 ft[3]	*	*	*	*	25 ft	110 ft	20 ft	55 ft	20 ft	20 ft

Bold Text indicates that the queue exceeds the storage provided.

An "*" indicates that the movement is shared with the adjacent through movement.

A "-" indicates that separate storage is not provided for this movement.

[1]The 55th Street improvements proposed by DCDOT reduce Fairview Avenue to one through lane in each direction at the 55th Street intersection.

[2]These turn lanes are proposed by DCDOT as part of the 55th Street improvement project.

[3]This turn lane is proposed in Options 1-3 in order to reduce extensive southbound through queuing.

QUEUE ANALYSIS SUMMARY

Maple Avenue at Rogers Street & Douglas Road

Approach and Movement		Storage Length		Synchro 95th Percentile Queue Length			
				2030 Option 2		2030 Option 3	
		Existing[1]	2030	A.M.	P.M.	A.M.	P.M.
Eastbound Rogers Street	Left/Through/ Right		-	-	-	-	-
Westbound Maple Avenue	Left		115 ft	15 ft	45 ft	15 ft	40 ft
	Through/Right		-	-		-	-
Northbound Maple Avenue	Left/Through		-	25 ft	30 ft	N/A	N/A
	Right		175 ft	45 ft	25 ft	N/A	N/A
Southbound Douglas Road	Left/Through/ Right		-	15 ft	15 ft	10 ft	10 ft

Bold Text indicates that the queue exceeds the storage provided.

An "*" indicates that the movement is shared with the adjacent through movement.

A "-" indicates that separate storage is not provided for this movement.

[1]Intersection does not currently exist in this configuration.

QUEUE ANALYSIS SUMMARY

Maple Avenue at Washington Street

Approach and Movement		Storage Length		Synchro 95th Percentile Queue Length			
				Existing		2030 Base	
		Existing	2030	A.M.	P.M.	A.M.	P.M.
Eastbound Maple Avenue	Left	150 ft	150 ft	**275 ft**	30 ft		
	Through/Right	-	-	170 ft	70 ft		
Westbound Maple Avenue	Left/Through	-	-	30 ft	290 ft		
	Right	50 ft	50 ft	10 ft	10 ft		
Northbound Washington Street	Left/Through/ Right	-	-	30 ft	20 ft		
Southbound Washington Street	Left/Through	-	-	20 ft	45 ft		
	Right	80 ft	80 ft	10 ft	195 ft		

Bold Text indicates that the queue exceeds the storage provided.

An "*" indicates that the movement is shared with the adjacent through movement.

Note: Intersection not analyzed for Options 1-3.

QUEUE ANALYSIS SUMMARY

Main Street at Maple Avenue

Approach and Movement		Storage Length		Synchro 95th Percentile Queue Length			
				Existing		2030 Base	
		Existing	2030	A.M.	P.M.	A.M.	P.M.
Eastbound Maple Avenue	Left	50 ft	50 ft	35 ft	50 ft		
	Through/Right	-	-	235 ft	170 ft		
Westbound Maple Avenue	Left	150 ft	150 ft	50 ft	**390 ft**		
	Through/Right	-	-	105 ft	420 ft		
Northbound Main Street	Left/Through	-	-	295 ft	240 ft		
	Right	260 ft	260 ft	170 ft	20 ft		
Southbound Main Street	Left/Through/ Right	-	-	95 ft	190 ft		

Bold Text indicates that the queue exceeds the storage provided.

An "*" indicates that the movement is shared with the adjacent through movement.

Note: Intersection not analyzed for Options 1-3.

QUEUE ANALYSIS SUMMARY

Main Street at 55th Street

Approach and Movement		Storage Length		Synchro 95th Percentile Queue Length			
				Existing		2030 Base	
		Existing	2030	A.M.	P.M.	A.M.	P.M.
Eastbound 55th Street	Left	-	185 ft[1]	170 ft	55 ft		
	Through/Right	-	-	275 ft	290 ft		
Westbound 55th Street	Left	-	175 ft[1]	70 ft	45 ft		
	Through/Right	-	-	260 ft	250 ft		
Northbound Main Street	Left	-	140 ft[1]	115 ft	75 ft		
	Through/Right	-	-	405 ft	225 ft		
Southbound Main Street	Left	-	125 ft[1]	30 ft	85 ft		
	Through/Right	-	-	115 ft	400 ft		

Bold Text indicates that the queue exceeds the storage provided.

An "*" indicates that the movement is shared with the adjacent through movement.

Note: Intersection not analyzed for Options 1-3.

[1]These turn bays are proposed by DCDOT as part of their 55th Street improvements.

APPENDIX C

CRASH SUMAMRY TABLE AND DIAGRAMS

2013 Maple Avenue/Fairview Avenue
Traffic Study

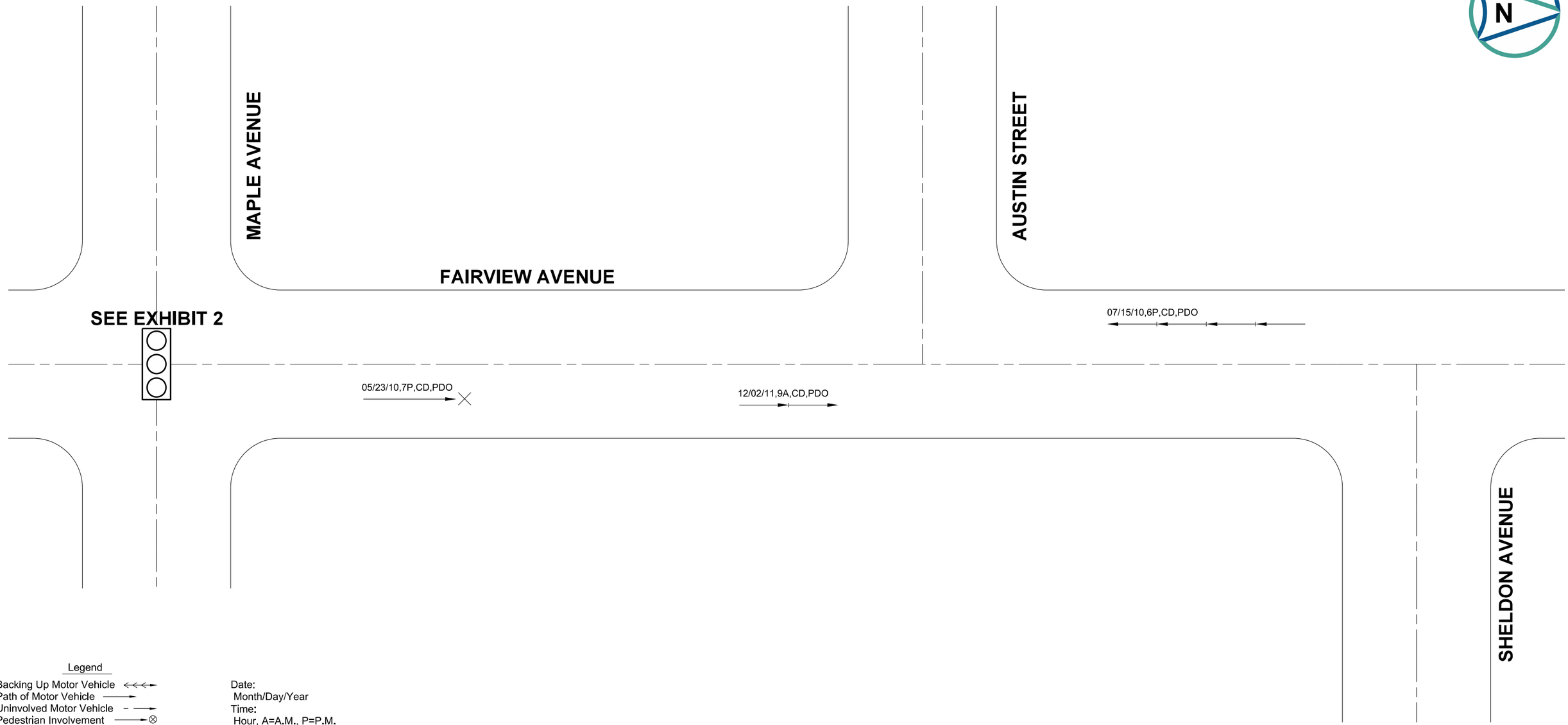
CRASH DATA SUMMARY TABLE

January 1, 2010 to April 31, 2013

INTERSECTION OR SEGMENT	YEAR	COLLISION TYPE							INJURY TYPE *					ROADWAY SURFACE			TIME		TOTAL
		Right Angle	Left Turn	Rear End	Side Swipe	Head-On	Backing Up	Other	K	A	B	C	PDO	Dry	Wet	Icy	Day	Night	
Fairview Avenue: Maple Avenue to Sheldon Avenue	2010	0	0	1	0	0	0	1	0	0	0	0	2	2	0	0	2	0	2
	2011	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	1	0	1
	2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	2	0	0	0	1	0	0	0	0	3	3	0	0	3	0	3
Maple Avenue and Fairview Avenue	2010	0	1	4	0	0	0	2	0	0	1	0	6	6	1	0	5	2	7
	2011	0	0	7	1	0	0	0	0	0	0	1	7	4	2	2	6	2	8
	2012	0	2	5	4	0	0	0	0	0	0	1	10	11	0	0	9	2	11
	2013	1	0	2	1	0	0	0	0	1	0	0	3	3	1	0	2	2	4
		1	3	18	6	0	0	2	0	1	1	2	26	24	4	2	22	8	30
Fairview Avenue: Second Street to Maple Avenue	2010	3	0	3	0	0	0	3	0	0	3	0	6	9	0	0	7	2	9
	2011	0	1	6	0	0	0	1	0	0	0	0	8	8	0	0	8	0	8
	2012	0	0	5	3	0	0	3	0	0	0	0	11	10	1	0	10	1	11
	2013	0	0	3	0	0	0	0	0	0	0	0	3	2	1	0	3	0	3
		3	1	17	3	0	0	7	0	0	3	0	28	29	2	0	28	3	31
Second Street and Fairveiw Avenue	2010	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	1	0	1
	2011	0	1	6	0	1	0	1	0	0	0	1	8	7	2	0	7	2	9
	2012	0	0	2	1	0	0	0	0	0	0	0	3	3	0	0	3	0	3
	2013	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	1	0	1
		0	1	10	1	1	0	1	0	0	0	1	13	12	2	0	12	2	14
Fairview Avenue: 55th Street to Second Street	2010	0	0	9	2	0	0	1	0	0	0	3	9	8	2	2	10	2	12
	2011	1	0	7	0	0	0	2	0	0	1	0	9	9	1	0	10	0	10
	2012	0	0	5	0	0	0	0	0	0	0	0	5	4	1	0	4	1	5
	2013	0	0	2	1	0	0	0	0	0	0	0	3	2	1	0	2	1	3
		1	0	23	3	0	0	3	0	0	1	3	26	23	5	2	26	4	30
Maple Avenue: Burlington Avenue to Fairview Avenue	2010	1	0	0	0	0	0	1	0	0	0	0	2	2	0	0	2	0	2
	2011	1	0	2	0	0	0	0	0	0	0	0	3	2	0	1	3	0	3
	2012	1	0	0	0	0	0	1	0	0	1	0	1	2	0	0	1	1	2
	2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3	0	2	0	0	0	2	0	0	1	0	6	6	0	1	6	1	7
Maple Avenue: Fairview Avenue to Cumnor Drive	2010	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	1
	2011	2	0	0	0	0	0	0	0	0	1	0	1	2	0	0	2	0	2
	2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		2	0	0	0	0	0	1	0	0	2	0	1	3	0	0	3	0	3

* K = Most severe injury was a fatality.
A = Most severe injury was a serious or incapacitating injury.
B = Most severe injury was a minor or non-incapacitating injury.
C = Most severe injury was a probable or not apparent injury.
PDO = No injuries - Property Damage Only.

CRASH DATA SUMMARY TABLE
TABLE C-1



Legend

Backing Up Motor Vehicle
Path of Motor Vehicle
Uninvolved Motor Vehicle
Pedestrian Involvement
Collision with Animal
Collision with Bicycle
Rear-End Collision
Sideswipe Collision
Right Angle Collision
Left Turn Collision
Head-On Collision
Out of Control
Overturned Vehicle
Parked Vehicle
Fixed Object
Other/Non-Specified

Date:
Month/Day/Year
Time:
Hour, A=A.M., P=P.M.
Weather: C=Clear, R=Rain,
F=Fog, S=Snow
Pavement:
D=Dry,
W=Wet,
I=Icy
Injury:
K=Fatal,
A=Incapacitated,
B=Non-Incapacitating,
C=Not Evident,
PDO=Property
Damage Only

Completed By: JSH

Collision Type	K	A	B	C	PDO	Total		
Right Angle	0	0	0	0	0	0		
Left Turn	0	0	0	0	0	0		
Rear End	0	0	0	0	2	2	Details	
Sideswipe	0	0	0	0	0	0	Dry	3
Ped/Bike	0	0	0	0	0	0	Wet	0
Off Rd. Fixed Obj.	0	0	0	0	0	0	Icy	0
Other	0	0	0	0	1	1	Day	3
Total	0	0	0	0	3	3	Night	0

Village of Downers Grove

2013 Maple Avenue/Fairview Avenue
Traffic Study

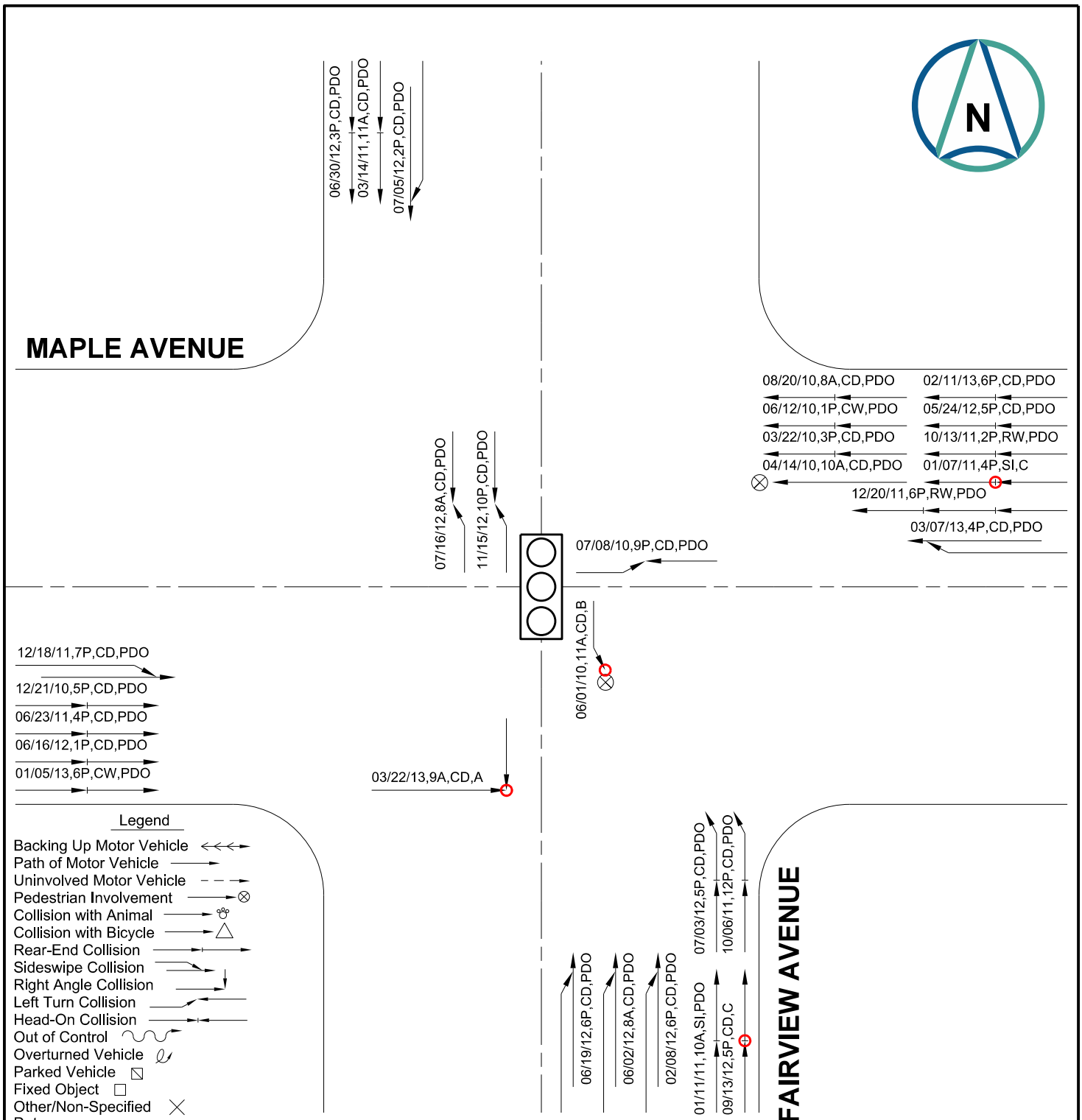
COLLISION DIAGRAM (2010-2013)
MAPLE AVE. TO SHELDON AVE.

CIVILTECH

Date: 10/12/13
Not to Scale

J:\2738\crash analysis\Collision Diagrams.dgn

EXHIBIT C-1



Legend

- Backing Up Motor Vehicle
- Path of Motor Vehicle
- Uninvolved Motor Vehicle
- Pedestrian Involvement
- Collision with Animal
- Collision with Bicycle
- Rear-End Collision
- Sideswipe Collision
- Right Angle Collision
- Left Turn Collision
- Head-On Collision
- Out of Control
- Overturned Vehicle
- Parked Vehicle
- Fixed Object
- Other/Non-Specified

Date:
Month/Day/Year
Time:
Hour, A=A.M., P=P.M.
Weather: C=Clear, R=Rain, F=Fog, S=Snow
Pavement:
D=Dry, W=Wet, I=Icy
Injury:
K=Fatal, A=Incapacitated, B=Non-Incapacitating, C=Not Evident, PDO=Property Damage Only

Completed By: JSH

Collision Type	K	A	B	C	PDO	Total
Right Angle	0	1	0	0	0	1
Left Turn	0	0	0	0	3	3
Rear End	0	0	0	2	16	18
Sideswipe	0	0	0	0	6	6
Ped/Bike	0	0	1	0	1	2
Off Rd. Fixed Obj.	0	0	0	0	0	0
Other	0	0	0	0	0	0
Total	0	1	1	2	26	30

Details	
Dry	24
Wet	4
Icy	2
Day	22
Night	8

Village of Downers Grove

2013 Maple Avenue/Fairview Avenue Traffic Study

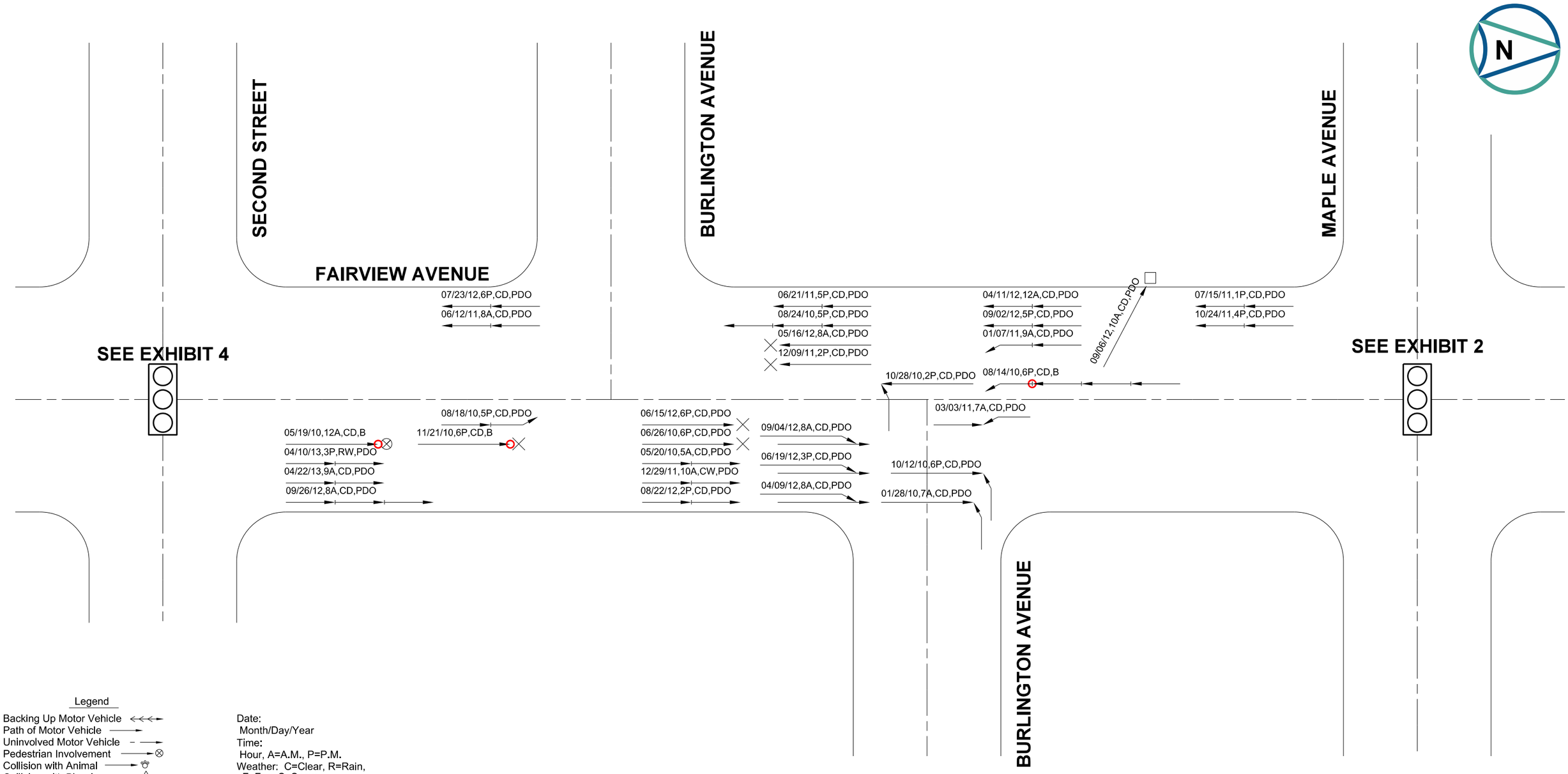
COLLISION DIAGRAM (2010-2013)
MAPLE AVENUE/FAIRVIEW AVENUE

CIVILTECH

Date: 10/12/13
Not to Scale

J:\2738\crash analysis\Collision Diagrams.dgn

EXHIBIT C-2



Legend

- Backing Up Motor Vehicle
- Path of Motor Vehicle
- Uninvolved Motor Vehicle
- Pedestrian Involvement
- Collision with Animal
- Collision with Bicycle
- Rear-End Collision
- Sideswipe Collision
- Right Angle Collision
- Left Turn Collision
- Head-On Collision
- Out of Control
- Overturned Vehicle
- Parked Vehicle
- Fixed Object
- Other/Non-Specified

Date:
Month/Day/Year
Time:
Hour, A=A.M., P=P.M.
Weather: C=Clear, R=Rain, F=Fog, S=Snow
Pavement:
D=Dry,
W=Wet,
I=Icy
Injury:
K=Fatal,
A=Incapacitated,
B=Non-Incapacitating,
C=Not Evident,
PDO=Property Damage Only

Completed By: JSH

Collision Type	K	A	B	C	PDO	Total
Right Angle	0	0	0	0	3	3
Left Turn	0	0	0	0	1	1
Rear End	0	0	1	0	16	17
Sideswipe	0	0	0	0	3	3
Ped/Bike	0	0	1	0	0	1
Off Rd. Fixed Obj.	0	0	0	0	1	1
Other	0	0	1	0	4	5
Total	0	0	3	0	28	31

Details	
Dry	29
Wet	2
Icy	0
Day	28
Night	3

Village of Downers Grove

2013 Maple Avenue/Fairview Avenue Traffic Study

COLLISION DIAGRAM (2010-2013)
SECOND STREET TO MAPLE AVENUE

CIVILTECH

Date: 10/12/13
Not to Scale

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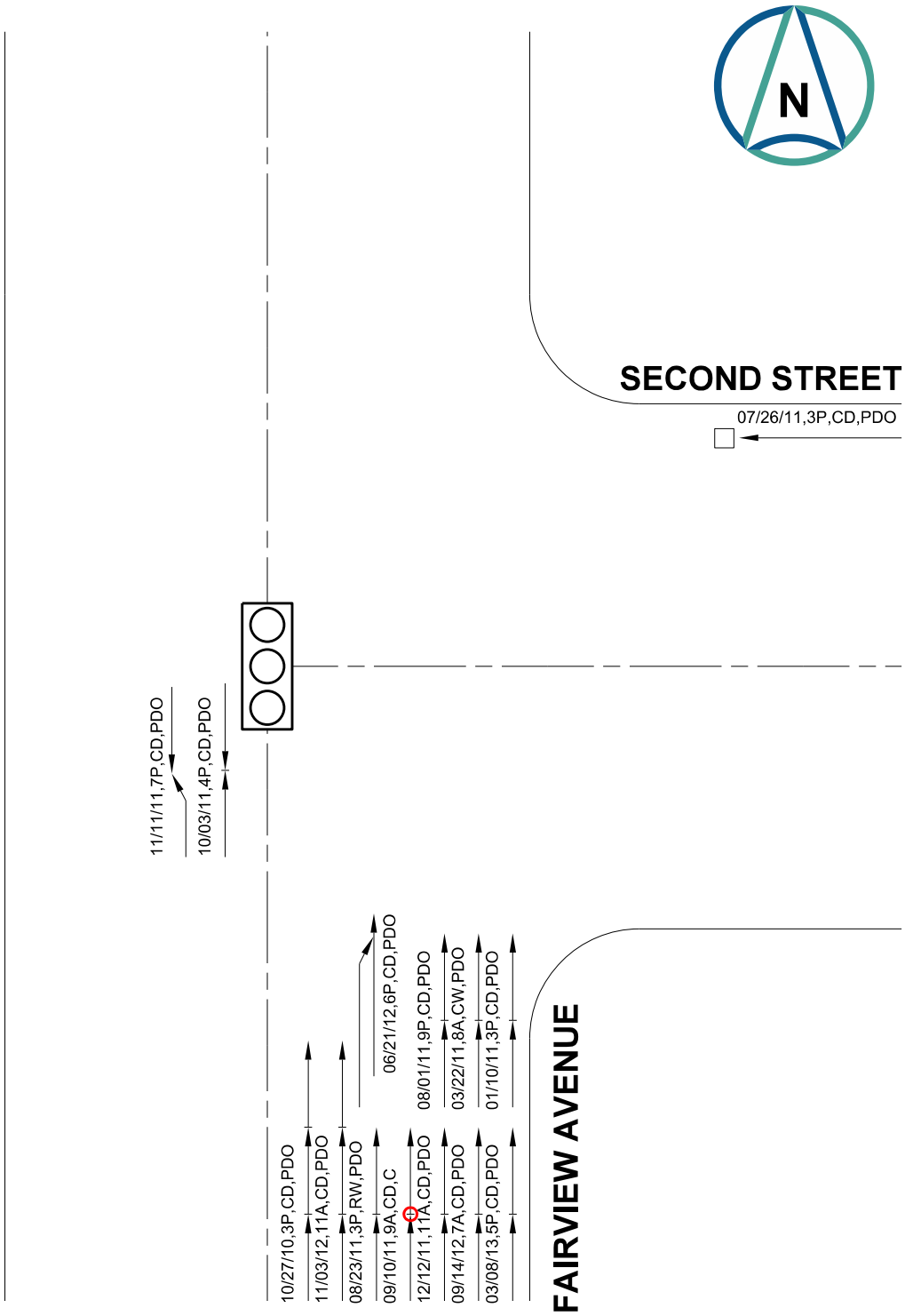
EXHIBIT C-3



Legend

- Backing Up Motor Vehicle
- Path of Motor Vehicle
- Uninvolved Motor Vehicle
- Pedestrian Involvement
- Collision with Animal
- Collision with Bicycle
- Rear-End Collision
- Sideswipe Collision
- Right Angle Collision
- Left Turn Collision
- Head-On Collision
- Out of Control
- Overturned Vehicle
- Parked Vehicle
- Fixed Object
- Other/Non-Specified

Date:
Month/Day/Year
Time:
Hour, A=A.M., P=P.M.
Weather: C=Clear, R=Rain, F=Fog, S=Snow
Pavement:
D=Dry, W=Wet, I=Icy
Injury:
K=Fatal, A=Incapacitated, B=Non-Incapacitating, C=Not Evident, PDO=Property Damage Only

Completed By: JSH

Collision Type	K	A	B	C	PDO	Total
Right Angle	0	0	0	0	0	0
Left Turn	0	0	0	0	1	1
Rear End	0	0	0	1	9	10
Sideswipe	0	0	0	0	1	1
Ped/Bike	0	0	0	0	0	0
Off Rd. Fixed Obj.	0	0	0	0	1	1
Other	0	0	0	0	1	1
Total	0	0	0	1	13	14

Details	
Dry	12
Wet	2
Icy	0
Day	12
Night	2

Village of Downers Grove

2013 Maple Avenue/Fairview Avenue Traffic Study

COLLISION DIAGRAM (2010-2013)
SECOND STREET/FAIRVIEW AVENUE

CIVILTECH

Date: 10/12/13
Not to Scale

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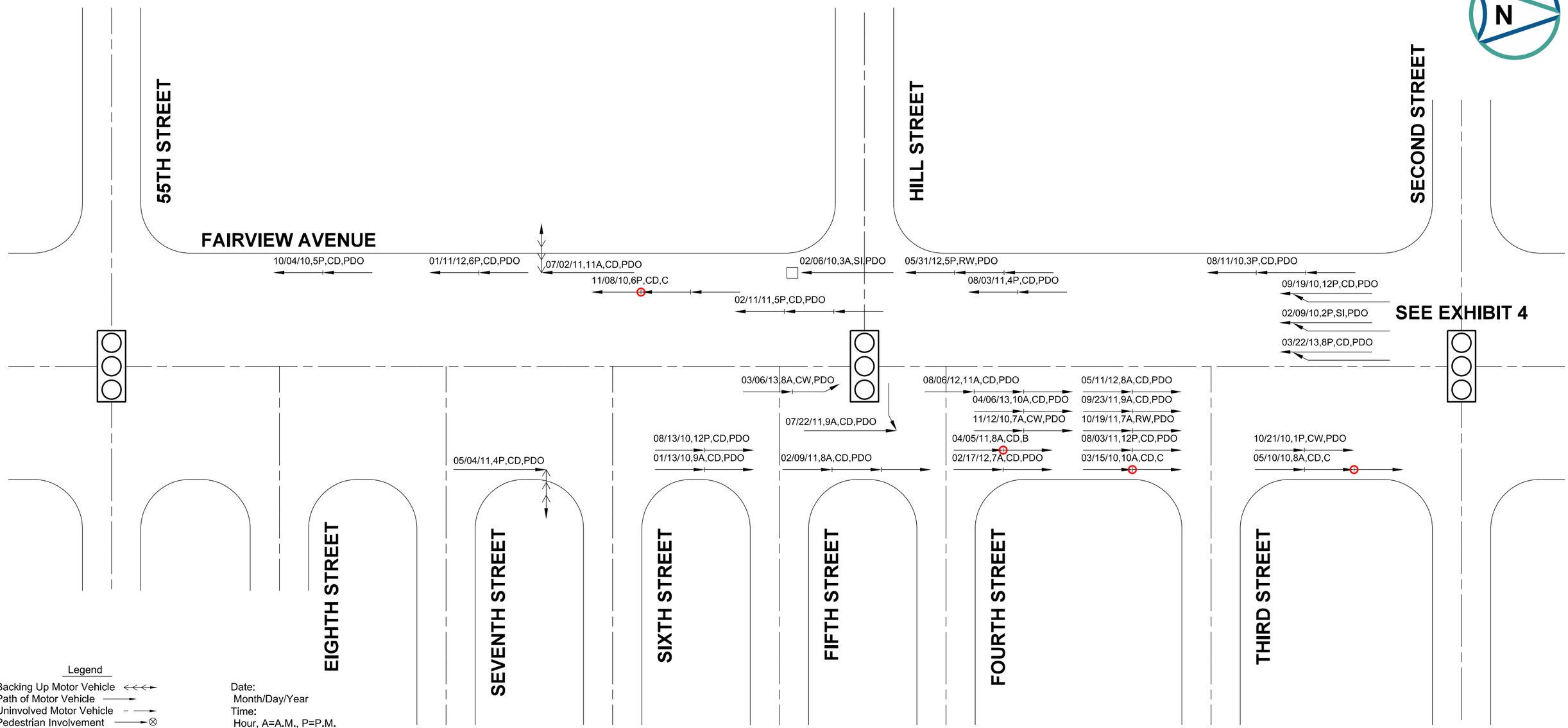
EXHIBIT C-4



Legend

- Backing Up Motor Vehicle
- Path of Motor Vehicle
- Uninvolved Motor Vehicle
- Pedestrian Involvement
- Collision with Animal
- Collision with Bicycle
- Rear-End Collision
- Sideswipe Collision
- Right Angle Collision
- Left Turn Collision
- Head-On Collision
- Out of Control
- Overturned Vehicle
- Parked Vehicle
- Fixed Object
- Other/Non-Specified

Date:
Month/Day/Year
Time:
Hour, A=A.M., P=P.M.
Weather: C=Clear, R=Rain, F=Fog, S=Snow
Pavement:
D=Dry,
W=Wet,
I=Icy
Injury:
K=Fatal,
A=Incapacitated,
B=Non-Incapacitating,
C=Not Evident,
PDO=Property Damage Only

Completed By: JSH

Collision Type	K	A	B	C	PDO	Total		
Right Angle	0	0	0	0	1	1		
Left Turn	0	0	0	0	0	0		
Rear End	0	0	1	3	19	23	Details	
Sideswipe	0	0	0	0	3	3	Dry	23
Ped/Bike	0	0	0	0	0	0	Wet	5
Off Rd. Fixed Obj.	0	0	0	0	1	1	Icy	2
Other	0	0	0	0	2	2	Day	26
Total	0	0	1	3	26	30	Night	4

Village of Downers Grove

2013 Maple Avenue/Fairview Avenue Traffic Study

COLLISION DIAGRAM (2010-2013)
55TH STREET TO SECOND STREET

CIVILTECH

Date: 10/12/13
Not to Scale

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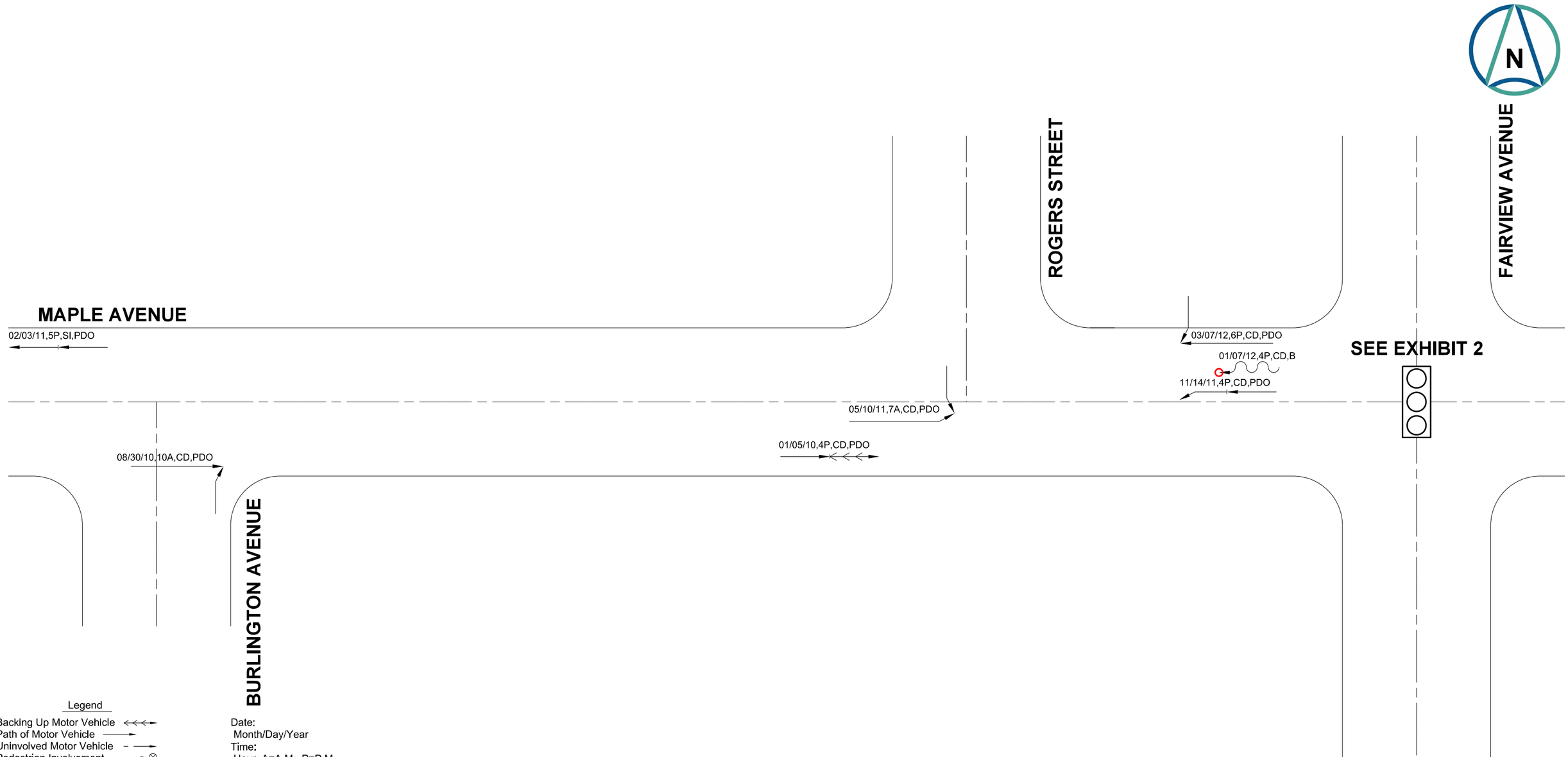
EXHIBIT C-5



Legend

- Backing Up Motor Vehicle
- Path of Motor Vehicle
- Uninvolved Motor Vehicle
- Pedestrian Involvement
- Collision with Animal
- Collision with Bicycle
- Rear-End Collision
- Sideswipe Collision
- Right Angle Collision
- Left Turn Collision
- Head-On Collision
- Out of Control
- Overturned Vehicle
- Parked Vehicle
- Fixed Object
- Other/Non-Specified

Date:
Month/Day/Year
Time:
Hour, A=A.M., P=P.M.
Weather: C=Clear, R=Rain, F=Fog, S=Snow
Pavement:
D=Dry,
W=Wet,
I=Icy
Injury:
K=Fatal,
A=Incapacitated,
B=Non-Incapacitating,
C=Not Evident,
PDO=Property Damage Only

Completed By: JSH

Collision Type	K	A	B	C	PDO	Total
Right Angle	0	0	0	0	3	3
Left Turn	0	0	0	0	0	0
Rear End	0	0	0	0	2	2
Sideswipe	0	0	0	0	0	0
Ped/Bike	0	0	0	0	0	0
Off Rd. Fixed Obj.	0	0	0	0	0	0
Other	0	0	1	0	1	2
Total	0	0	1	0	6	7

Details	
Dry	6
Wet	0
Icy	1
Day	6
Night	1

Village of Downers Grove

2013 Maple Avenue/Fairview Avenue Traffic Study

COLLISION DIAGRAM (2010-2013)
BURLINGTON AVE. TO FAIRVIEW AVE.

CIVILTECH

Date: 10/12/13
Not to Scale

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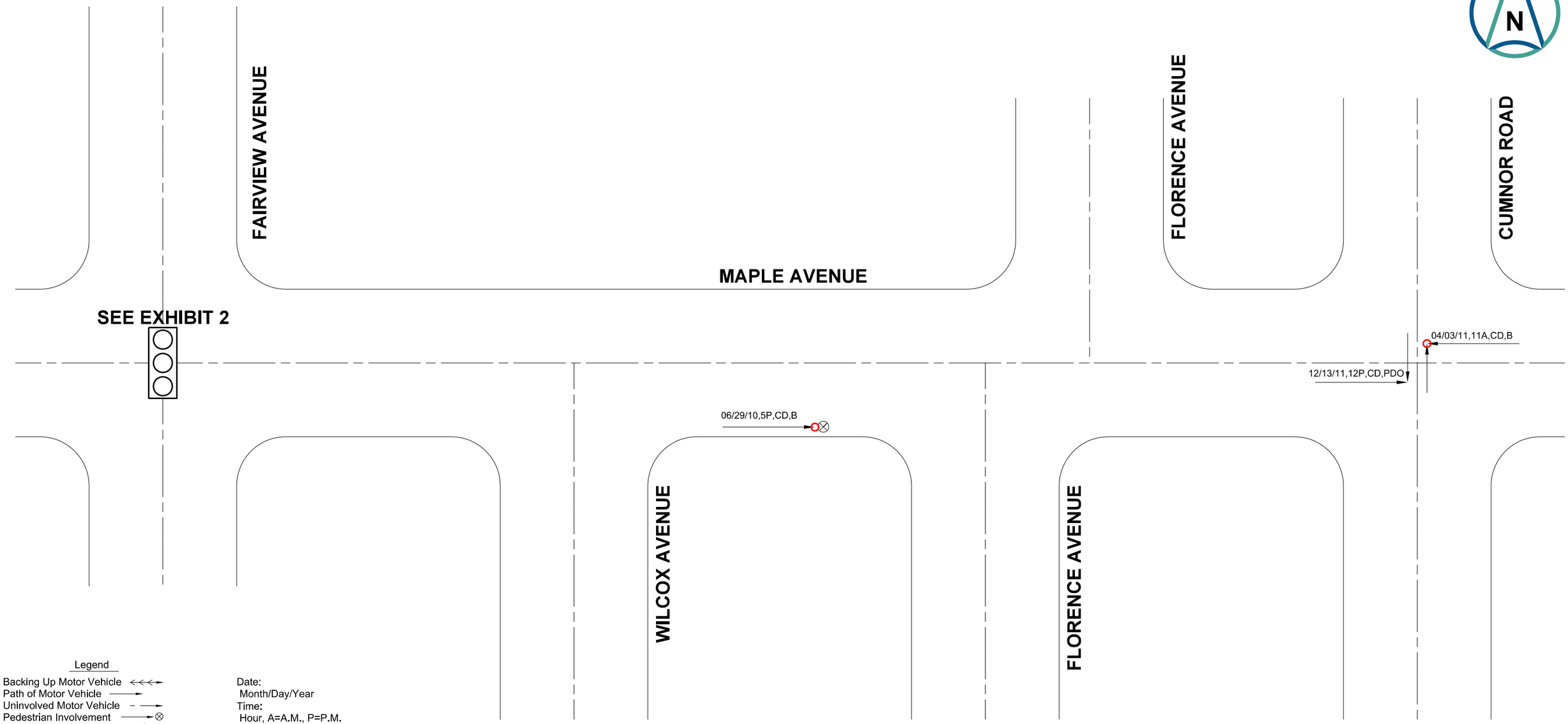
EXHIBIT C-6



Legend

Backing Up Motor Vehicle
Path of Motor Vehicle
Uninvolved Motor Vehicle
Pedestrian Involvement
Collision with Animal
Collision with Bicycle
Rear-End Collision
Sideswipe Collision
Right Angle Collision
Left Turn Collision
Head-On Collision
Out of Control
Overturned Vehicle
Parked Vehicle
Fixed Object
Other/Non-Specified

Date:
Month/Day/Year
Time:
Hour, A=A.M., P=P.M.
Weather: C=Clear, R=Rain, F=Fog, S=Snow
Pavement:
D=Dry,
W=Wet,
I=Icy
Injury:
K=Fatal,
A=Incapacitated,
B=Non-Incapacitating,
C=Not Evident,
PDO=Property Damage Only

Completed By: JSH

Collision Type	K	A	B	C	PDO	Total
Right Angle	0	0	1	0	1	2
Left Turn	0	0	0	0	0	0
Rear End	0	0	0	0	0	0
Sideswipe	0	0	0	0	0	0
Ped/Bike	0	0	1	0	0	1
Off Rd. Fixed Obj.	0	0	0	0	0	0
Other	0	0	0	0	0	0
Total	0	0	2	0	1	3

Details	
Dry	3
Wet	0
Icy	0
Day	3
Night	0

Village of Downers Grove

2013 Maple Avenue/Fairview Avenue Traffic Study

COLLISION DIAGRAM (2010-2013)
FAIRVIEW AVE. TO CUMNOR DR.

CIVILTECH

Date: 10/12/13
Not to Scale

J:\2738\crash analysis\Collision Diagrams.dgn

EXHIBIT C-7

APPENDIX D

SYNCHRO CAPACITY ANALYSES

EXISTING TRAFFIC

Contents:

Main Street at Maple Avenue
Main Street at 55th Street
Washington Street at Maple Avenue
Blodgett Avenue at Maple Avenue
Burlington Avenue at Maple Avenue
Rogers Street at Maple Avenue
Fairview Avenue at Maple Avenue
Fairview Avenue at Burlington Avenue (South)
Fairview Avenue at Second Street
Fairview Avenue at Hill Street
Fairview Avenue at 55th Street

A.M. and P.M. Peak Hours were evaluated for each intersection.

APPENDIX E

SYNCHRO CAPACITY ANALYSES

2030 BASE TRAFFIC

Contents:

Main Street at Maple Avenue
Main Street at 55th Street
Washington Street at Maple Avenue
Blodgett Avenue at Maple Avenue
Rogers Street at Maple Avenue
Fairview Avenue at Maple Avenue
Fairview Avenue at Burlington Avenue (South)
Fairview Avenue at Second Street
Fairview Avenue at Hill Street
Fairview Avenue at 55th Street

A.M. and P.M. Peak Hours were evaluated for each intersection.

APPENDIX F

SYNCHRO CAPACITY ANALYSES

2030 OPTION 1

Contents:

Blodgett Avenue at Maple Avenue
Rogers Street at Maple Avenue
Fairview Avenue at Maple Avenue
Fairview Avenue at Second Street/Burlington Avenue
Fairview Avenue at Hill Street
Fairview Avenue at 55th Street

A.M. and P.M. Peak Hours were evaluated for each intersection.

APPENDIX G

SYNCHRO CAPACITY ANALYSES

2030 OPTION 2

Contents:

Blodgett Avenue at Maple Avenue
Rogers Street/Douglas Road at Maple Avenue
Fairview Avenue at Maple Avenue
Fairview Avenue at Second Street/Burlington Avenue
Fairview Avenue at Hill Street
Fairview Avenue at 55th Street

A.M. and P.M. Peak Hours were evaluated for each intersection.

APPENDIX H

SYNCHRO CAPACITY ANALYSES

2030 OPTION 3

Contents:

Blodgett Avenue at Maple Avenue
Rogers Street/Douglas Road at Maple Avenue
Fairview Avenue at Maple Avenue
Fairview Avenue at Second Street/Burlington Avenue
Fairview Avenue at Hill Street
Fairview Avenue at 55th Street

A.M. and P.M. Peak Hours were evaluated for each intersection.