

Color coding:  
Purple = Disagree  
Blue = Agree, already in report  
Green = Agree, will add to final report

## DISPOSITION OF COMMENTS

Willow Road, Illinois Route 43 (Waukegan Road) to Interstate 94 (Edens Expressway)  
Draft Alternative Analysis Summary Report, Volumes 1 & 2 (March 10, 2011)  
And Various Subjects

Comments Submitted by: Village of Northfield/KLOA, Inc (April 26 and June 2, 2011)  
Village of Northfield/Cooper Civil Engineering (May 9, 2011)

Responses Prepared by: IDOT/TranSystems  
July 20, 2011  
June 2, 2011 (draft distributed to TAC)

### **Disposition of KLOA, Inc, Comments** ***Alternatives Analysis Summary Report, Pages 1-12***

### **Disposition of Cooper Civil Engineer Comments** ***Various Subjects, Pages 13-31*** ***Alternatives Analysis Summary Report, Pages 32-35***

#### **Introduction:**

On behalf of the Village of Northfield, Kenig, Lindgren, O'Hara, Aboona, Inc. (KLOA, Inc.) has reviewed the *Alternatives Analysis Summary Report, Volumes 1 and 2, Willow Road Study, Illinois Route 43 (Waukegan Road) to Interstate 94 (Edens Expressway)* dated March 10, 2011. The following summarizes the findings of the review and are presented in the same outline as the study.

## **Section 2.1 - Evaluation Round #1: Purpose and Need Screening and Initial Flaw Analysis**

### ***Safety Performance***

#### **Comment:**

Why was only the section of Willow Road between Sunset Ridge and Wagner Road evaluated? Evaluating the entire two-lane section of Willow Road (Sunset Ridge to Old Willow Road/Northfield Road) is more appropriate considering (1) that the entire two-lane section will be the most sensitive to any changes along Willow Road and (2) the relatively short length of the two-lane section.

#### **Disposition:**

In general, NEPA (National Environmental Policy Act) studies that involve a large geographic area, or many alternatives, utilize an alternatives evaluation process that starts broadly and adds detail as the process advances. For the Willow Road study, we followed this approach which was also outlined at the November 2010 and January 2011 CAG meetings. For Round #1 of the alternatives evaluation, we used a travel demand model, which provided corridor traffic data specific to each alternative along the entire Willow Road study limits. This information was used to develop Design Hourly Volumes for the Willow Road at Sunset Ridge Road intersection. This intersection was selected for Round #1 analysis because it would be the most sensitive to changes in traffic volumes, given its relatively high existing traffic volumes and existing two lane configuration. The section of Willow Road, from Sunset Ridge Road to Wagner Road, was selected for the Round #1 HSM analysis because this section would undergo the most significant changes in cross section and traffic volumes across the suite of alternatives. As part of the Round #2 evaluation, all of the intersections and segments will be analyzed for the remaining alternatives.

### **Mobility Improvements/Effectiveness**

**Comment:**

Why weren't travel times through the corridor used as an evaluation criteria? Travel times provide a more comprehensive measure of mobility and effectiveness along the entire corridor rather than the operation of one isolated intersection.

**Disposition:**

As noted in our previous disposition to comments regarding the Traffic Analysis of Existing Conditions, travel time studies are not necessary to calibrate the HCS analysis, or to document the levels of congestion on Willow Road. We have used state of the practice data collection tools and analysis techniques to analyze existing conditions and evaluate alternatives. The analysis completed for Round #1 was sufficient to conclude that regional alternatives were not effective in addressing the transportation needs along Willow Road. Round #2 will include an expanded traffic and safety analysis for the remaining alternatives.

**Comment:**

How was it determined that the Willow Road/Sunset Road intersection was the "critical location and most sensitive to any changes along Willow Road?" Evaluating the intersections along the entire two-lane section of Willow Road is more appropriate considering (1) it only includes one more intersection and (2) both intersections will be the most sensitive to any changes along Willow Road.

**Disposition:**

As noted previously, the alternatives evaluation process adds detail as the process advances, and the range of alternatives narrows. The Willow Road/Sunset Ridge Road intersection is the most sensitive (and thus used for comparison purposes) since it handles the most traffic within the two lane section. Therefore, it is the intersection most influenced by changes in travel patterns resulting from the regional alternatives. Round #2 will investigate the performance of all the intersections and sections for the alternatives carried forward.

### **Section 3.2 -Features of Alternatives**

**Comment:**

The Other Parallel Route Alternatives (6 and 7) and the Interchange Alternatives (8 through 16) assume "no improvements on Willow Road." Why didn't the alternative analyses consider improvements similar to Alternative 1 (Willow Road No-Build Plus) or Alternative 2A (Willow Road 2-Lane with Median in Select Locations [2005 Plan]) in tandem with the Regional Alternatives? It has been clearly stated by IDOT and in the Phase I reports that no major improvements have been provided along the corridor in 60 years and that the road is in poor physical condition, many of its elements do not meet current design standards, the traffic signals are antiquated and not interconnected, and the pedestrian facilities are lacking. Given the existing conditions, it is hard to believe that no improvements will be implemented along Willow Road over the next 30 years (by 2040). As such, a more equitable alternative analysis would have considered the Regional Alternatives in tandem with some improvements along Willow Road.

Furthermore, why were the regional alternatives considered mutually exclusive and not in combination with one another? It is possible that more than one of the regional alternatives will be constructed within the next 30 years.

**Disposition:**

One of the objectives of the Round #1 evaluation was to determine how the regional alternatives would address the transportation needs along Willow Road. For the Other Parallel Route Alternatives (6 and 7) and the Interchange Alternatives (8 through 16), it was important to first know how they independently affect the performance along Willow Road and determine if they are an effective solution on their own merit to eliminate any need to do anything along Willow Road. If any of these alternatives showed any benefit, then further studies or combination of alternatives could be investigated in Round #2. However, the results showed no substantive benefits compared to the No-Build alternative. Investigating a Regional Alternative combined with a Local Willow Road Alternative would have essentially the same effect as the Local Willow Road Alternative by itself, at a higher cost and level of impacts. Therefore, combination alternatives of this type will not be pursued.

**Section 4.1.1-Safety**

**Assumptions**

**Comment:**

A review of the 2040 AADT projections has revealed many inconsistencies which are discussed in the next section.

**Disposition:**

The disposition will be provided in the next section.

**Comment:**

As stated previously, why was only the section of Willow Road between Sunset Ridge and Wagner Road evaluated?

**Disposition:**

As stated previously, the most sensitive section (and thus the best to be used for comparison purposes) was chosen. The section between Sunset Ridge Road and Wagner Road is the only section that is exclusively two lanes in the existing condition. Therefore, it is the segment that would be most influenced by changes in cross section. Round #2 will investigate the predicted crash frequency of all the intersections and sections for the alternatives carried forward.

**Comment:**

The predicted pedestrian crash frequency was only determined for one intersection and does not consider all of the other pedestrian improvements/enhancements proposed along the corridor which will have a profound impact on pedestrian safety.

**Disposition:**

As stated previously, the critical locations were analyzed during Round #1 with an expanded analysis of all intersections and segments to be undertaken in Round #2.

**Comment:**

The Regional Alternatives did not include any Willow Road improvements which is an unrealistic assumption given the road's existing condition.

**Disposition:**

As stated previously, one of the objectives of Round #1 was to determine if regional alternatives could substantively reduce traffic on Willow Road. Given that the regional alternatives were not effective, they are being dropped from further consideration, and therefore, a combination alternative of this type, which would include local improvements, is no longer a consideration.

**Comment:**

The Regional Alternatives were considered mutually exclusive and not in combination with one another.

**Disposition:**

As stated previously, one of the goals of Round #1 was to determine if the Regional Alternatives would eliminate the need for improvements along Willow Road. Given that the regional alternatives were not effective, a combination alternative is no longer a consideration.

**Findings**

**Comment:**

The report concludes that "the analysis shows that the Interchange Alternatives and the Other Parallel Route Alternatives do not provide any measurable safety improvements relative to the No-Build condition." The crash frequency for the Regional Alternatives should be higher as it is determined based on existing design deficiencies, including the Willow Road/Old Willow Road intersection, which were not assumed in the Local Alternatives (1 through 6). How do the crash frequencies for the Regional Alternatives compare if similar improvements to Alternatives 1 or 2A were assumed?

**Disposition:**

As noted previously, one of the objectives for Round #1 was to determine if the Regional Alternatives would be effective in addressing the transportation needs along Willow Road. A key input for the HSM analysis in Round #1 was traffic volumes. As shown on the AADT maps in the Alternatives Analysis report appendix, there was no substantive change in volumes, and therefore no substantive change in safety performance. As stated previously, combinations of regional and local alternatives are no longer a consideration, given the poor performance of the regional alternatives. A Regional Alternative combined with a Local Willow Road Alternative would have essentially the same effect as the Local Willow Road Alternative by itself, at a higher cost and level of impacts.

**Comment:**

The report concludes that "The 4-Lane with Curbed Median was the best performing (alternative) at 6.2 crashes per year." It should be noted that Alternative 2A (Willow Road 2-Lane with Median in Select Locations [2005 Plan]) had a projected crash frequencies (6.7) which is very similar to the lowest crash frequency of 6.2.

**Disposition:**

Agree. The 6.7 is similar to 6.2. HSM provides a relative comparison between alternatives including the No-Build, and should not be considered an absolute measure. Therefore, what can be understood is that the predicted crashes for the Regional Alternatives were similar to a No-Build condition. Alternatives on the lower end of the range had similar safety performance. The 6.2 to 13 crashes include all crash types.

**Section 4.1.1 -Mobility**

**Methodology**

**Comment:**

As stated previously, why weren't travel times through the corridor used as the evaluation criteria as opposed to the operation of one intersection? Further, evaluating the intersections along the entire two-lane section of Willow Road would be more appropriate considering (1) it only includes one more intersection and (2) both intersections will be most sensitive to any changes along Willow Road.

**Disposition:**

As noted previously, state of the practice tools and analysis techniques have been used for the Willow Road study. Travel time studies are not necessary to calibrate the HCS analysis or to document the levels of

congestion on Willow Road. Evaluation Round #2 will include an expanded traffic and safety analysis that includes each of the intersections and sections of Willow Road.

**Comment:** *(Individual dispositions provided for each check point below)*

A review of the 2040 AADT projections has revealed many inconsistencies between the various alternatives and the no-build conditions. The following outlines some of the inconsistencies along Willow Road.

- ✓ Alternatives 1 and 6 - All of the sections within the entire study area are projected to remain the same except for one section (Wagner Road to Somerset Lane) of Willow Road that is projected to have an increase of 2,000 vehicles. Why does this one section have any change and where is the traffic entering and exiting the corridor?

**Disposition:**

Alternative 6 considers improvements on Dundee Road with no improvements to the Willow Road Corridor. For Alternative 1 (No-Build Plus), the connection between Old Willow Road and Willow Road is closed, making the west end of Old Willow Road a completely local street. The change in traffic volumes between the alternatives is due to changes in network configurations and the associated redistribution of travel across the network. The key issue is that the changes in volumes were very minor for most of the alternatives, and therefore have no substantive effect upon the performance of Willow Road for those alternatives.

- ✓ Alternatives 2 and 2A - Two adjacent sections of Willow Road are projected to have an increase of 1,000 vehicles and the sections immediately east and west are projected to have a decrease of 1,000 vehicles. Why is there such a difference in the change in traffic from one section to another?

**Disposition:**

The change in traffic volumes between the alternatives is due to changes in network configurations and the associated redistribution of travel across the network. The key issue is that the changes in volumes were very minor for most of the alternatives and therefore have no substantive effect upon the performance of Willow Road for those alternatives.

- ✓ Alternative 3 - The increase along Willow Road varies between 2,000 and 12,000 vehicles while the volumes along the cross roads remain the same or have only a modest increase (1,000 to 3,000 vehicles). Further, only the westbound on-ramp is projected to have an increase in traffic (1,000 vehicles). Where is such an increase in traffic entering and exiting the corridor and how can the sections west of Old Willow Road/Northfield Road increase by 7,000 to 12,000 vehicles and the sections east of this road increase by only 2,000 to 5,000 vehicles?

**Disposition:**

As noted previously, a travel demand model was used to provide corridor traffic volumes which are being used to make relative comparisons. For Alternative 3, substantial additional capacity is being provided along the Willow Road corridor, which is the primary influence upon traffic volumes. The increase in traffic volumes on Willow Road are accounted by proportional increase in traffic both east and west of the study corridor. In addition, traffic analysis zones in the vicinity of the study corridor contribute to majority of trips utilizing additional capacity provided for this alternative.

- ✓ Alternatives 6 and 9 - The I-94 off-ramps to Willow Road are projected to have a 1,000 to 2,000 decrease in traffic. However, the traffic along all of the Willow Road sections and the two I-94 on-ramps from Willow Road are projected to remain the same. Why was the decrease at the ramps not carried through the corridor and why weren't similar decreases projected for the Willow Road on-ramps?

**Disposition:**

As noted earlier, the change in traffic volumes between the alternatives is due to changes in network configurations associated with each alternative and the corresponding redistribution of travel across the network, as trips seek the most efficient path. Hence, there were changes to the traffic volumes on Willow Road for the regional alternatives, but the key issue is that the changes in volumes were very minor, and therefore have no substantive effect upon the performance of Willow Road for those alternatives.

- ✓ Alternative 14 -The Willow Road westbound off-ramp and eastbound on-ramp are projected to have a total decrease of 8,000 vehicles. However, except for the section immediately west of the interchange, the maximum decrease in traffic along Willow Road is only 1,000 vehicles and some sections are projected to have an increase in traffic. Why is there such a difference in the change in traffic between the ramps and the rest of the corridor?

**Disposition:**

As noted earlier, the change in traffic volumes between alternatives is due to changes in network configurations and the corresponding redistribution of travel. In addition, the travel demand model uses Traffic Analysis Zones and centroid connectors to load traffic onto the network, which may have an influence on traffic demand changing between adjacent links along roadways.

- ✓ Alternatives 1 through 6 all assume the elimination of the Willow Road/Old Willow Road intersection. However, the change in traffic along Old Willow Road and Wagner Road north of Willow Road vary considerably between the alternatives. Why is the change in traffic along these roads not more consistent, particularly considering Alternatives 1 through 6 assume only Willow Road improvements?

**Disposition:**

As noted earlier, the change in traffic volumes between the alternatives is due to changes in network configurations associated with each alternative and the corresponding redistribution of travel across the network, as trips seek the most efficient path. Hence, changes in traffic volumes could be expected throughout the network, to varying degrees, depending upon the factors noted above. There were changes to the traffic volumes on Willow Road for the regional alternatives, but the key issue is that the changes in volumes were very minor, and therefore have no substantive effect upon the performance of Willow Road for those alternatives.

**Comment:** *(Individual dispositions provided for each check point below)*

In general, the regional improvements result in a very limited change in traffic along the corridor as outlined below.

- ✓ Alternatives 7 and 13 - How can the addition of lanes along Dundee Road or the addition of a full interchange at Dundee Road not reduce the volumes along Willow Road, particularly considering that the Willow Road off-ramps are projected to have a decrease in traffic under both alternatives?

**Disposition:**

As noted earlier, the change in traffic volumes between the alternatives is due to changes in network configurations associated with each alternative and the corresponding redistribution of travel across the network, as trips seek the most efficient path. The model shows that the major portion of the demand being serviced by Willow Road originates or is destined for an area south of Dundee Road. Therefore, there are not a significant number of drivers that will go out of their way to use Dundee Road as an alternative.

Hence, changes in traffic volumes could be expected throughout the network, to varying degrees, depending upon the factors noted above. There were changes to the traffic volumes on Willow Road for the regional alternatives, but the key issue is that due to redistribution of traffic, the changes in volumes were very minor, and therefore have no substantive effect upon the performance of Willow Road for those alternatives.

- ✓ Alternative 9 - How can a full interchange at Lake Avenue result in an increase in traffic along the western section of Willow Road?

**Disposition:**

Alternative 9 actually describes a full interchange at I-294 and Dundee Road. Nonetheless, the alternatives that included full interchanges at Lake Avenue/ I-294 or I-94/Lake Avenue both have minimal impact to travel along Willow Road. As noted earlier, the change in traffic volumes between the alternatives is due to changes in network configurations associated with each alternative and the corresponding redistribution of travel across the

network, as trips seek the most efficient path. Hence, changes in traffic volumes could be expected throughout the network, to varying degrees, depending upon the factors noted above. There were changes to the traffic volumes on Willow Road for the regional alternatives, but the key issue is that the changes in volumes were very minor, and therefore have no substantive effect upon the performance of Willow Road for those alternatives.

- ✓ Alternative 12 - How does the elimination of the eastbound lane drop on the Edens Spur result in an increase in traffic along Willow Road and the increase in the Willow Road westbound off-ramp?

**Disposition:**

As noted earlier, the change in traffic volumes between the alternatives is due to changes in network configurations associated with each alternative and the corresponding redistribution of travel across the network, as trips seek the most efficient path. Hence, changes in traffic volumes could be expected throughout the network, to varying degrees, depending upon the factors noted above. There were changes to the traffic volumes on Willow Road for the regional alternatives, but the key issue is that the changes in volumes were very minor, and therefore have no substantive effect upon the performance of Willow Road for those alternatives.

**Assumptions**

**Comment:**

The Regional Alternatives did not include any Willow Road improvements which is an unrealistic assumption given the road's existing condition.

**Disposition:**

A goal of Round #1 was to determine if the Regional Alternatives would eliminate the need for improvements along Willow Road.

**Comment:**

The Regional Alternatives were considered mutually exclusive and were not considered in combination to one another.

**Disposition:**

Agree. A goal of Round #1 was to determine if the Regional Alternatives would eliminate the need for improvements along Willow Road. The alternatives may have benefits as standalone projects, but they do not address the transportation needs along Willow Road between Waukegan Road and I-94. The purpose of this study is to address the needs along Willow Road and not problems along other roadways.

**Comment:**

The report indicates that the Willow Road/Sunset Ridge Road intersection was evaluated for each alternative based on 2040 projected traffic volumes. However, the identification page for the Alternative 4 (Willow Road 4-Lane with Median) capacity analyses in Appendix B indicates that the capacity analyses were based on year 2035 projected traffic volumes.

**Disposition:**

This comment is referencing Alternative 3, rather than Alternative 4. The capacity analyses for Alternative 3 were completed using both 2040 and 2035 traffic volumes. Both sets of analyses were included in the Alternatives Analysis Summary Report Appendices. Since 2040 was used as the design year for all of the alternatives, the divider sheets do not indicate 2040 on them. Only the divider sheet for the 2035 analysis has a year on it. The 2040 analysis for Alternative 3 begins on page 419 of the summary.

**Comment:** *(Individual dispositions provided for each check point below)*

A review of the capacity analyses worksheets in Appendix B has revealed the following inconsistencies in the assumptions and/or factors used in the capacity analyses.

- ✓ The existing peak hour factors observed along Willow Road, which ranged from 0.65 to 0.95, were used for the No-Build and Regional Alternatives whereas a peak hour factor of 0.95 was used uniformly for the Local Alternatives.

**Disposition:**

A peak hour factor of 0.95 was used for the No-Build and all of the Regional Alternatives in order to provide a consistent comparison. The No-Build analysis included in Appendix B was from the March 2011 Traffic Analysis report and was not the one used for the Evaluation Round #1 comparison. The results are correct, and the appropriate back up information for the No-Build analysis has been attached to this disposition and included in the final Alternatives Analysis Summary.

- ✓ An arrival type 3 was assumed for the No-Build and Regional Alternatives whereas an arrival type 4 was assumed along Willow Road for the Local Alternatives. Even if no major reconstruction occurs along Willow Road, it is hard to believe that by 2040 the traffic signals along Willow Road will not be upgraded and interconnected.

**Disposition:**

As noted earlier, one of the goals of the Round #1 evaluation was to determine if the Regional Alternatives would eliminate the need for improvements along Willow Road. Therefore, the arrival type was not changed in Round #1 for the alternatives where the local conditions do not change (No-Build and Regional Alternatives) since there would be no modifications to the signals. For alternatives where the local conditions do change, it was assumed the signals would be interconnected; therefore the arrival was changed to type 4.

In addition, without the addition of a center lane for turning vehicles along Willow Road, changing the traffic signals will have little effect. Under existing conditions there are multiple private roads and driveways in between traffic signals. Whenever a vehicle stops to make a left turn into one, a queue forms and breaks the platoon progression. Alternative 1 (No-Build Plus) consists of signal modernization, lengthening turn bays at those intersections and providing cul-de-sacs at several side streets. Its results were similar to the No-Build Alternative and the Regional Alternatives.

- ✓ The existing signal cycle of 145 seconds was used for the No-Build and Regional Alternatives where a signal cycle of 120 was used for the Local Alternatives. As previously indicated, it is hard to believe that by 2040 the traffic signals along Willow Road will not be upgraded or, at a minimum, optimized to improve traffic flows.

**Disposition:**

As noted earlier, one of the goals of the Round #1 evaluation was to determine if the Regional Alternatives would eliminate the need for improvements along Willow Road. Therefore, the existing cycle length was not changed for the alternatives where the local conditions do not change (No-Build, Parallel Route and Regional Alternatives). For alternatives where the local conditions do change, the cycle length was modified assuming this intersection would be interconnected to the system west of Sunset Ridge Road and a consistent value was used for relative comparison purposes.

- ✓ The Local Alternatives assume only five seconds of green time for the left-turn phases although IDOT requires a minimum of seven seconds of green time.

**Disposition:**

IDOT uses LOS and Queue lengths as the key parameters in applying the minimum green time for the left turn phases. Typical practice is to use a minimum of 6 seconds for the left turn arrow. However, exceptions apply based on the key parameters and the total phase time (arrow plus clearance time) provided for the movement. The total left turn phase movement that was used in the analysis was 8 seconds (5 second green left turn arrow with 3 seconds of yellow clearance) and is used by IDOT.

- ✓ It should be noted that each of the inconsistencies noted above enhance the intersection operations (average delay and queuing) of the Local Alternatives when compared to the No-Build and Regional Alternatives.

**Disposition:**

The assumptions made for No-Build and Regional Alternatives were consistent and based on the process that was outlined at the November 2010 and January 2011 CAG meetings. As noted earlier, one of the goals of the Round #1 evaluation was to determine if the Regional Alternatives would eliminate the need for improvements along Willow Road.

**Findings**

**Comment:** *(Individual dispositions provided for each check point below)*

The reports indicates that the Regional Alternatives "provide little to no improvement to the mobility along Willow Road." The following provides some points to consider regarding this conclusion.

- ✓ The poor operating conditions at the Willow Road/Sunset Road intersection is expected as the analyses did not assume any Willow Road improvements given the inconsistencies in the assumptions/factors used in capacity analyses.

**Disposition:**

The assumptions made for No-Build and Regional Alternatives were consistent and, as stated earlier, one of the key objectives for Round #1 was to determine whether Regional Alternatives could eliminate the need to do anything along Willow Road.

- ✓ The alternative analysis only examined the operation of one intersection as opposed to travel times which is a better indicator of the mobility through the entire corridor. As such, the conclusion should indicate that there is little or no improvement to the operation of the Willow Road/Sunset Road intersection as opposed to the mobility along Willow Road.

**Disposition:**

As noted previously, state of the practice tools and analysis techniques have been used for the Willow Road study. Travel time studies are not necessary to calibrate the HCS analysis or to document the levels of congestion on Willow Road. Evaluation Round #2 will include an expanded traffic and safety analysis that includes each of the intersections and sections of Willow Road. The conclusions will not be changed.

**Comment:** *(Individual dispositions provided for each check point below)*

The report indicates: "The Willow Road alternatives fare the same (as the No-Build and Regional Alternatives), with the exception of the 4-Lane with Median Alternative. It shows an intersection delay of 65 seconds, LOS E with the through movements along Willow Road at LOS D." The following provides some points to consider regarding this conclusion.

- ✓ The analysis for the 4-Lane with Median Alternative is based on year 2035 traffic volumes as opposed to year 2040 traffic volumes and on the enhanced assumptions/factors used in the capacity analyses.

**Disposition:**

Capacity analyses for Alternative 3 (4-Lane with Median) were based on 2040 projected traffic volumes and, as noted previously, were included in Appendix B. An analysis was also completed for 2035 to show that the intersection meets overall Level of Service D for the next 24 years.

- ✓ Even with all of the improvements, the intersection is projected to operate at capacity (LOS E) and will only be worse assuming year 2040 traffic volumes and modifications to some of the inconsistencies regarding the assumptions/factors used in the capacity analyses.

**Disposition:**

The capacity for 2040 is LOS E while all the other Local Alternatives have a LOS F. However, the delay for Alternative 3 is 65 seconds compared to approximately 150 seconds (more than twice as much) for the other Local Alternatives. While it is one letter grade different, the delay is substantially different.

### Section 4.1.3 -Facility Conditions

#### Findings

**Comment:**

The report concludes: "The regional build alternatives did not provide any improvements to the facility condition and the design of Willow Road which is 60 years old." This is expected as the analyses did not assume any Willow Road improvements although improvements are required. As stated previously, a more equitable alternative analysis would have considered the Regional Alternatives in tandem with similar improvements as proposed as part of Alternative 1 (Willow Road No-Build Plus) or 2A (Willow Road 2-Lane with Median in select locations (2005 Plan)).

**Disposition:**

As noted previously, one of the objectives of the Round #1 evaluation was to determine how the Regional Alternatives would address the transportation needs along Willow Road. For the Other Parallel Route Alternatives (6 and 7) and the Interchange Alternatives (8 through 16), it was important to first know how they independently affect the performance along Willow Road and determine if they are an effective solution on their own merit to eliminate any need to do anything along Willow Road. If any of these alternatives showed any benefit, then further studies or combination of alternatives could be investigated in Round #2. However, the results showed no substantive benefits compared to the No-Build alternative. Investigating a Regional Alternative combined with any Local Willow Road Alternative would have essentially the same effect as the Local Willow Road Alternative by itself, at a higher cost and level of impacts. Therefore, combination alternatives of this type will not be pursued.

### Section 4.2.1 -Impacts

**Comment:**

The report concludes: "Comparatively, the Interchange Alternatives involve the most impacts for displacements and property acquisitions. The Other Parallel Route Alternatives have more impacts than the Willow Road Alternatives." One would expect greater impacts from the Regional Alternatives as they are regional improvements as opposed to local improvements. To truly provide an equitable comparison of the impacts, the benefits the Regional Alternatives provide to other roadway facilities in the area and the region as a whole must be considered as the Local Alternatives are primarily benefiting Willow Road. The report does not acknowledge the additional benefits that the Regional Alternatives provide compared to the Local Alternatives.

**Disposition:**

The Regional Alternatives were studied based on how they would address transportation needs along Willow Road. The primary reason for eliminating them is that they do not meet those needs as well compared to the Local Alternatives. Spreading the costs for benefits realized elsewhere does not follow the NEPA process to assess how well the alternatives address the needs on Willow Road.

IDOT will revise text to clarify that the primary reason for eliminating Regional Alternatives is that they do not meet the transportation needs for Willow Road. Costs and impacts will continue to be noted, but order of the text may change.

### Section 4.2.2 -Conceptual Costs

**Comment:**

The report concludes: "Comparatively, the Interchange Alternatives have the highest costs primarily due to the additional costs for constructing ramps, bridges and retaining walls. The Other Parallel Route Alternatives are more costly than the Willow Road Alternatives ' primarily due to the costs for roadway and bridge construction." Once again, one would expect greater construction costs for the Regional Alternatives as they are regional improvements as opposed to local improvements. As such a direct comparison between the construction costs of the Regional Alternatives to the Local Alternatives is flawed as the Regional Alternatives are providing benefits to more than just Willow Road. To truly provide an equitable comparison of the construction costs, only a portion of the construction costs of the Regional Alternatives should have been assigned to Willow Road.

**Disposition:**

See previous response.

### Section 4.3 -Summary of Evaluation Round

**Comment:** *(Individual dispositions provided for each check point below)*

As outlined in this memorandum, the following provides some points to consider regarding the conclusions that the local Willow Road Alternatives were better able to address the projects needs and involved comparatively less impacts and overall constructions costs.

- ✓ The assumption that the Regional Alternatives did not include any Willow Road improvements is unrealistic. Given the existing conditions, it is hard to believe that no improvements will be implemented along Willow Road over the next 30 years (by 2040). A more equitable alternative analysis would have considered the Regional Alternatives in tandem with similar improvements as proposed as part of Alternative 1 or 2A.

**Disposition:**

As noted previously, one of the objectives of the Round #1 evaluation was to determine how the Regional Alternatives would address the transportation needs along Willow Road. For the Other Parallel Route Alternatives (6 and 7) and the Interchange Alternatives (8 through 16), it was important to first know how they independently affect the performance along Willow Road and determine if they are an effective solution on their own merit to eliminate any need to do anything along Willow Road. If any of these alternatives showed any benefit, then further studies or combination of alternatives could be investigated in Round #2. However, the results showed no substantive benefits compared to the No-Build alternative. Investigating a Regional Alternative combined with any Local Willow Road Alternative would have essentially the same effect as the Local Willow Road Alternative by itself, at a higher cost and level of impacts. Therefore, combination alternatives of this type will not be pursued.

- ✓ The criteria for evaluating mobility and effectiveness of improvements was based on the operation of one intersection as opposed to travel times which provide a more comprehensive measure of mobility and effectiveness along the entire corridor

**Disposition:**

As noted previously, travel time studies are not necessary to calibrate the HCS analysis, or to document the levels of congestion on Willow Road. We have used state of the practice data collection tools and analysis techniques to analyze existing conditions and evaluate alternatives. The analysis completed for Round #1 was sufficient to conclude that regional alternatives were not effective in addressing the transportation needs along Willow Road. Round #2 will include an expanded traffic and safety analysis for the remaining alternatives.

- ✓ The review of the 2040 AADT projections has revealed many inconsistencies.

**Disposition:**

The change in traffic volumes between the alternatives is due to changes in network configurations and the associated redistribution of travel across the network. The key issue is that the changes in volumes were very minor for most of the alternatives and therefore have no substantive effect upon the performance of Willow Road for those alternatives.

- ✓ A review of the capacity analyses worksheets in Appendix B has revealed some inconsistencies in the assumptions and/or factors used in the capacity analyses.

**Disposition:**

The peak hour factor, arrival type, cycle length and green time for left turn phases were all addressed previously on pages 8 and 9. These were all applied consistently to the analysis of alternatives, depending on whether the alternative resulted in any changes along Willow Road or not.

- ✓ Regarding the impacts and the construction costs of the various alternatives, the study does not consider the fact that the Regional Alternatives are providing significant benefits to the regional transportation system beyond the Willow Road corridor. As such a direct comparison between the impacts and construction costs of the Regional Alternatives to the Local Alternatives is flawed. To truly provide an equitable comparison of the impacts and construction costs, the benefits the Regional Alternatives provide to other roadway facilities in the area and the region as a whole must be considered.

**Disposition:**

As previously noted, the Regional Alternatives were studied based on how they would address transportation needs along Willow Road. The primary reason for eliminating them is that they do not meet those needs as well compared to the Local Alternatives. Spreading the costs for benefits realized elsewhere does not follow the NEPA process to assess how well the alternatives address the needs on Willow Road.

**Village of Northfield  
Willow Road Project**

**Review Comments, Various Subjects  
Cooper Civil Engineering, Ltd.  
May 9, 2011**

**Introduction:**

Cooper Civil Engineering, Ltd. provides the comments below to the Illinois Department of Transportation on behalf of the Village of Northfield. Comments are organized by major subject headings in boldface and numbered consecutively for discussion purposes. Subheadings are used for comments to the Alternatives Analysis Summary Report.

**School Speed Zones - Districts 1 and 4**

**Comment 1:**

The Village is in receipt of school speed zone information for District 1 and select information on only two District 4 locations. It is our understanding that IDOT agreed to supply information from all nine districts during one of the CAG meetings and in response to a Village request. We await completion of this request for information from all districts.

**Disposition:**

In accordance with the schedule established between IDOT Central Office and Northfield's attorney Ed Gower, all available District school zone information has been collected and submitted to Northfield's attorney on the dates listed below. As of April 8, 2011 the FOIA request has been closed.

- District 1 delivered to Stacy Sigman on December 17, 2010
- District 2 sent to Ed Gower on March 11, 2011
- District 3 sent to Ed Gower on March 14, 2011
- District 4 sent to Ed Gower on March 14, 2011
- District 5 sent to Ed Gower on March 14, 2011
- District 6 sent to Ed Gower on April 8, 2011
- District 7 sent to Ed Gower on April 8, 2011
- District 8 sent to Ed Gower on April 1, 2011
- District 9 sent to Ed Gower on March 28, 2011

**Comment 2:**

Anomalies have been found in the uniform application of criteria (presence of a traffic signal, distance from road to sidewalk, presence of protective fencing, etc.) that establish school zones at several District 1 locations, with individual criteria at some schools being similar to the conditions found at the rejected Sunset Ridge and Middlefork Schools. Anomalies were identified at the following schools: Culver School (Niles), Golf School (Morton Grove), River Grove School (River Grove), and Walker School (Skokie). We recommend that the Village/ School District's rejected request for Willow Road school speed zones be reexamined in light of these anomalies at other schools. The common thread amongst all of the schools is the requestor's compelling desire and need for improved control of traffic for the benefit of school children who are negotiating the crossing of state roads. Denied requests for Sunset Ridge and Middlefork do not benefit or help protect students, unlike the protection afforded at other District 1 and 4 schools.

**Disposition:**

The locations identified adhere to IDOT's school zone policy as documented in materials previously sent to Northfield. Below is a brief explanation by location.

Color coding:  
Purple = Disagree  
Blue = Agree, already in report  
Green = Agree, will add to final report

- Culver School in Niles - This location for a 20 mph school speed zone limit was supported by the school building being located on Oakton St., there is no fencing, and the sidewalk is behind the curb in one location at the school.
- Golf School in Morton Grove - This location for a 20 mph school speed zone limit was supported by the school building being located on Waukegan Road, there is no fencing and the sidewalk is behind the curb.
- River Grove School in River Grove - This location for a 20 mph school speed zone limit was supported by the sidewalk being behind the curb on all legs.
- Walker School in Skokie - This location for a 20 mph school speed zone limit was supported by the sidewalk being within two feet of the curb.

**Comment 3:**

Further to Item 2 above, the profound relationship between increased vehicular speed and increased numbers of injury and fatal crashes has been researched thoroughly, and is the key finding of NCHRP Report 617. Quoting from Report 617, "what may appear to be a small change in mean speed has a large impact on accidents." For example, a 5 mph increase in speed (from 35 to 40 mph) will yield an AMF of about 1.90 for fatal crashes. We also note that the establishment of 20 mph speed limits within the school zones will have no impact on average travel time through the section of Willow through Northfield during peak traffic periods. Nor are school speed zones factored into HSM calculations. Speed has not been studied explicitly within the HSM, which is a serious flaw in the manual, known by the FHWA and state officials, yet the manual is applied to Willow without regard to this flaw. We question the validity of HSM results when speed is largely ignored. The wealth of FHWA study data is too broad at this time, with insufficient isolation of various parameters, speed being one of them. Current HSM calculations are not acceptable to the Village as the "the best available information". The HSM's incomplete (first generation) calculations and methodology leads to unreliable and unacceptable results for Willow Road, especially with respect to lack of rigor relative to speed. The HSM cautions users about the use of the manual in conjunction with the practice of engineering judgment. How is speed accounted for explicitly, within HSM?

**Disposition:**

The Highway Safety Manual is recognized by the FHWA, state agencies, and practitioners as the appropriate resource document to assist transportation professionals in conducting safety analyses in a technically sound and consistent manner, thereby improving decisions based on safety performance. The new techniques and knowledge in the HSM reflect the evolution in safety analysis from descriptive methods to quantitative, predictive analysis.

The HSM calculations used in the Round #1 analysis conform to the procedures in the HSM, which is an FHWA approved state of the practice. A tremendous amount of data was collected and analyzed, and held to the highest levels of statistical validity for the development of the HSM. Developers will issue errata as needed in future years. No errata were published with respect to change in the speed categories at this time. HSM computations apply two speed categories for the segment analysis of the *Urban and Suburban Arterials*. The two categorizes are less than 30 mph and equal to or greater than 30 mph. The predictive methodologies of the HSM computations provide the crash frequencies per year and do not provide a breakdown of the hourly and seasonal variations.

A few observations regarding the findings related to *Speed Change and Crashes* of the NCHRP Report 617 include:

- The results were not adopted by HSM.
- The AMFs are for estimating the effect of a treatment on mean speed, not changing the speed limit. This included "passive" treatments such as increased speed enforcement and "active" treatments such as speed tables.
- In the results section, page 27 of the Report states regarding the AMFs: "Their usefulness for urban street treatments is less certain."

We have provided a comprehensive review of safety with respect to existing conditions as well as a state of the practice alternatives analysis that is at the highest level of rigor.

**Comment 4:**

For the limited information from District 4, both the Alexis and Dunlap school zone locations exhibit anomalies with respect to statewide criteria. Both have much lower traffic and pedestrian crossing volumes when compared to Sunset Ridge and Middlefork Schools. Further, the Alexis site, on Rte 135, is not in front of the school, but 1-2 blocks away from the school. The Dunlap site borders Rte. 91, but the only access road to the school is many hundreds of feet away from the school zone, and a crosswalk exists but has no stop or yield or signal, and there aren't even sidewalks in the vicinity and students do not appear to cross Rte. 91 (per Dunlap village personnel). It appears from this limited information that District 4 applies state criteria with more deference to the local school district request for school zones than District 1. We agree with the District 4 application of state criteria and request establishment of school speed zones at both of the Willow Rd locations on this basis. Again, we look forward to receipt of similar information from other IDOT districts.

**Disposition:**

Both locations identified are rural areas where school children are not protected by a stop sign or other traffic control. Based on our review of the same reports, it appears that District 4 is in compliance with IDOT policy.

Following is a brief explanation by location:

- Dunlap Valley Middle School, Dunlap - According to the documentation provided by District 4, the 20 mph school speed zone was supported by information supplied by the school district. The district noted that some students were not riding the bus and were crossing Route 91 during congested traffic times. Therefore, IDOT established a 20 mph school speed zone and crosswalk at the IL 91 location "where children are crossing to get to school. Unlike Willow Road, children are walking to school in a rural location without sidewalks and crossing without the benefit of a signalized intersection or a stop or yield sign in a 55 mph zone.
- United Elementary North, Alexis - Currently there are no sidewalks, traffic control devices or stop signs in the vicinity of the 20 mph school zone located on Route 135. The 20 mph school speed zone in this area is consistent with IDOT's March 2011 Policy on Establishing School Speed Zones in that "...establishment of 20 mph speed limits on streets and highways passing schools or upon any street or highway where children pass going to and from school is allowed". Further, "the limits of school speed zones should be determined based upon where children are likely to be present and not based upon the limits of the school property". The Policy further explains that there are situations, primarily in rural areas like Alexis (and Dunlap), where the school-owned property line is some distance from the actual portion of the property occupied by the school and there are no children walking or present along that portion of the property. Establishing a 20 mph school speed limit based solely on the location of the property line, according to policy, would be inappropriate. Conversely, it might be appropriate to impose a 20 mph school speed limit some distance ahead of the property line where children walk close to the highway on their way to and from school and such path is part of a planned school walk route.

**Comment 5:**

The placement of school speed zones on Willow will send a consistent message to area motorists and pedestrians, who routinely encounter school zones established by the county or local units of government, whose policies seem to favor establishment of the zones on the basis of fewer criteria needing to be met. Deference to safety of pedestrians is how zones appear to be established on the county and local levels, and not in deference to the motoring public, as the state criteria are applied. We recommend revision to how the state

applies criteria to better match the more local decision making. Neither motorists nor pedestrians approach a road like Willow and know that it is a state road and that behavior must change accordingly!

**Disposition:**

Improving pedestrian safety is something that involves many more issues beyond installing 20 mph school zones. As noted in past meetings, an entire safety “toolbox” was presented in November 2010, and we look forward to your constructive input. With respect to IDOT’s 20 mph school zone policy, it has been provided, presented and discussed in detail at a number of past CAG meetings. In addition, a change in the statewide policy is beyond the scope of the Willow Road study.

**CMAP Population Estimates**

**Comment 6:**

The latest 2010 US Census data for individual communities has been published. There are startling overestimates of actual 2010 population in project area communities compared to CMAP's published population data for 2010 used within "Go to 2040". The four closest project area communities (Northfield, Glenview, Northbrook, and Winnetka) have been overestimated by 15.8 percent, and the City of Chicago has been overestimated by 7.5 percent. Northfield and Glenview have been overestimated by 10.1 and 24.3 percent, respectively. Our obvious question is how has the unrealized population been input into existing traffic and future traffic projections by CMAP in its project model? What population figures were used within the CMAP model for Willow Road for each of the project area communities, what is the source of these data, and how will these data be revised to actual 2010 population? Table is included after dispositions.

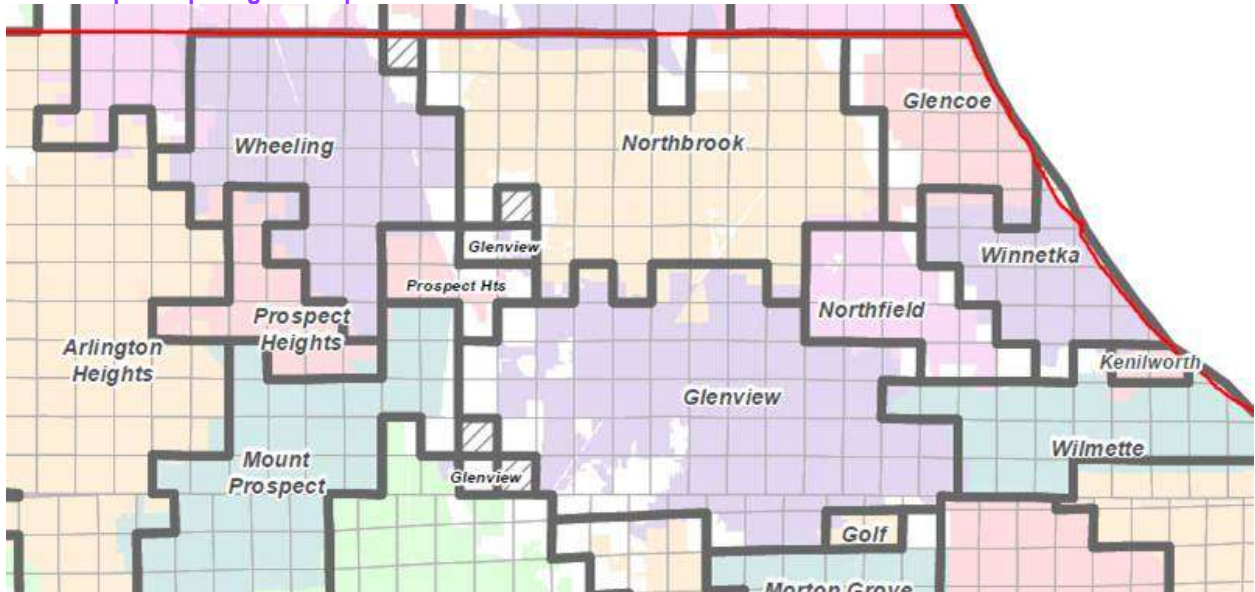
**Disposition:**

One key point to consider in any discussion about forecasts is the fact that Willow Road is severely congested under today's conditions, which is the main issue with respect to transportation needs. Regarding the current population household and employment figures, as well as the forecasts, note that only a modest increase in traffic volumes is projected over the next 30 years. The 2040 forecasts in CMAP's Go To 2040 plan utilized the latest data sets available at the time of development of the plan. In addition, CMAP published summaries of population, households and employment which approximated municipal boundaries but were based on survey quarter-sections. The totals differ from totals calculated based on actual municipal boundaries because the boundaries do not align. In most cases, quarter sections which overlapped municipal boundaries were included in their entirety in the summary, which meant that areas outside the community were included. A map for Northfield and the adjacent communities showing municipal boundaries and the quarter sections included is shown below. A table comparing the 2010 census data to the 2010 modeled totals by county is also included.

As noted in past meetings, CMAP updates their model each time major new sources of data become available. In addition, population data is only one of the inputs into the travel demand model that generates travel forecasts. There are a host of other data inputs and variables that are used in travel model, including existing traffic patterns, future transportation network characteristics, employment data and household composition. Complete documentation of the CMAP travel demand model documentation and population assessments can be found at <http://www.cmap.illinois.gov/modeling> and <http://www.cmap.illinois.gov/population-forecast>.

Color coding:  
 Purple = Disagree  
 Blue = Agree, already in report  
 Green = Agree, will add to final report

**CMAP Map Comparing Municipal Boundaries to Quarter-Section Boundaries**



**Comparison of Census Totals to CMAP Model Totals – By County**

County	2010 Census Totals	2010 Model Totals	Difference	Percent
Cook	5,194,675	5,267,992	73,317	1%
DuPage	916,924	935,102	18,178	2%
Kane	515,269	532,852	17,583	3%
Kendall	114,736	114,615	(121)	0%
Lake	703,462	728,908	25,446	4%
McHenry	308,760	332,766	24,006	8%
Will	677,560	726,238	48,678	7%
<b>Total</b>	<b>8,431,386</b>	<b>8,638,473</b>	<b>207,087</b>	<b>2%</b>

**Comment 7:**

Population is a major contributing factor to numbers of jobs and other travel, especially when over 40 percent of trips are from the subject project communities and a great travel pattern link exists to Chicago. These data must figure prominently in other CMAP modeling algorithms and analytical functions. None of the large increased population centers (2010 US Census) are located anywhere near the project area. Please indicate the variety of ways that population has figured into the modeling effort. How has local or more global CMAP 7-county area population been used within the model? How regularly (and when was the last time) that the CMAP model was updated for these parameters (jobs, income, travel trips) to reflect actual population?

**Disposition:**

Population, households and household composition are used to estimate how many trips each household will make in an average weekday. The locations of the households are used to identify where the trips will be coming from. The modeling procedures and datasets are updated on a continuous basis.

**Comment 7a:**

Further to above, we believe that massive unrealized population (about 219,000) in the subject area (including Chicago) *must* yield reduced traffic volumes or trips in 2010 and in 2040. The actual 2010 population figures also support our earlier finding that existing AADT and peak hourly traffic within the project area have been overstated significantly. We cannot concur with the accuracy of the IDOT AADT and peak hourly traffic findings due to our earlier findings and the latest population figures.

**Disposition:**

As noted earlier, state of the practice tools and techniques were used to document severe congestion under existing conditions, with modest increases in travel expected by the year 2040. For further information about IDOT's traffic analysis, please refer to our Traffic Report that is posted on the project website.

**Comment 8:**

The basic premise behind most forecasting models is that the model is run with assumed parameters, and compared to actual present data. The parameters are adjusted, and the model rerun until the model results reflect existing conditions. At this point, the model is calibrated, and then, and only then, are present assumptions about the future input into the model to derive the forecast results. Regardless of whether the FHWA has approved the CMAP model, the CMAP model is assumed, in all likelihood by FHWA, to have the best available existing input that confirms existing conditions before proceeding to the forecast. This appears not to have been done for Willow Road, and perhaps this is not done for any of the District's projects. We believe that the FHWA would have some difficulty accepting flawed/outdated population input and no apparent model calibration, especially since the traffic data is used to estimate crash rates or frequencies. FHWA would have profound difficulties accepting unusually low crash rates and/or frequencies (existing and proposed) if based on overstated traffic data or inaccurate population input into a forecast model. The Village, therefore, requests IDOT to make major revisions to the CMAP model to reflect latest actual population data. We are fortunate that actual 2010 data is available to begin with, so its use is most advantageous in developing much better forecasting.

**Disposition:**

As noted earlier, one key point to consider in any discussion about forecasts is the fact that Willow Road is severely congested under today's conditions, which is the main issue with respect to transportation needs. Regarding the forecasts, it is important to note that only a modest increase in traffic volumes is projected over the next 30 years. The 2040 forecasts in CMAP's Go To 2040 plan utilized the latest data sets available at the time of development of the plan. As noted in past meetings, CMAP updates their model each time major new sources of data become available. In addition, population data is only one of the inputs into the travel demand model that generates travel forecasts. The response to Comment 6 provides both a map of the comparison of municipal boundaries to the actual CMAP quarter-section boundaries and a table which compares the 2010 census data by County to the CMAP model population totals by County. There are a host of other data inputs and variables that are used in the travel model, including existing traffic patterns, future transportation network characteristics, employment data and household composition. Complete documentation of the CMAP travel demand model documentation and population assessments can be found at <http://www.cmap.illinois.gov/modeling> and <http://www.cmap.illinois.gov/population-forecast>.

**IDOT Speed Study**

**Comment 9:**

The Village is in receipt of a speed study for Willow Road, as transmitted by cover letter on February 22, 2011. The actual field work was conducted in December 2010. Please indicate the year of the crash data that was used in the speed study. It appears to differ from the project 2006-2008 crash data, since a fatality was reported within the speed study area. Where was this fatality?

**Disposition:**

The crash data used for the speed study was 2009 data. The fatality was at the Illinois Route 43 intersection.

**Comment 10:**

The transmittal letter states that the study was conducted "to determine the appropriateness of the existing speed limit along the section of highway." Study findings "indicate the presently posted speed limit on this section of Willow Road to be proper but showed violation rate of 62.3% and 64.2%." The Village understands this finding, but believes that the posted speed limit should be reduced to 30 mph along the entire project section. This project represents an opportunity to design for a desirable speed limit to (1) better protect pedestrians from speeding vehicles, (2) acknowledge variable motorist types and behaviors in the Northfield downtown, parks, and schools contextual sections, (3) is consistent with Northfield's Comprehensive Downtown Plan, and (4) would reflect NCHRP 617's relationship between speed and crashes. The appropriateness of the present speed regimes is only telling the Village about the speed of vehicles relative to the posted speed limit and does not include any measure or consideration of the desirability of a particular speed limit. As stated earlier in these comments, there is a very strong correlation between speed and injury and fatal crashes (and total number of crashes as well), and the Village proposes a 30 mph speed limit as highly desirable for the project section. A further reduction to 20 mph is proposed within the school zones. A 30 mph speed limit can be incorporated easily into detailed design features, improve safety, and not impact mobility. Further, we do not concur with the "appropriateness" of the 35 mph posted speed because it does not consider Village and School District context at all.

**Disposition:**

As mentioned previously, pedestrian safety encompasses a much wider range of issues. With respect to speed, IDOT has completed a detailed review of the current speed limits based upon the context of Willow Road as part of the larger transportation system, as well as the adjoining land uses. This speed study considered prevailing speed, access conflicts and other reduction factors such as pedestrian volumes and crash experience. As noted previously, NCHRP 617 does not represent the state of the practice, and in fact includes a disclaimer (page 27) regarding the "usefulness" of the data in the report for urban situations.

**Comment 11:**

The speed study counts 200 vehicles traveling at free flow speeds at 5 locations, 2 within the 40 mph section and 3 within the 35 mph section. It generally took only 30-45 minutes to count 200 vehicles, even though the counting period coincided, in part, with the peak hourly traffic period in two cases and was within an hour or so of the peak at the other three locations. Accounting for the Monday count, it is surprising how many vehicles were traveling at free flow, in contrast with the massive delays and queuing calculated by IDOT for peak period travel. It raises some question about the accuracy of the delay calculations, especially if overestimated traffic is input into HCS (see earlier comment above). From a realistic standpoint, there are many motorists who actually flow through the existing project section without experiencing the calculated massive delays -during the peak period. Because of the relative ease of travel by many motorists (no delay) during part of the peak period, one raises additional direct question about the accuracy of traffic data, a major input in the delay calculation. The need for reconstruction of this roadway for additional lanes is lessened by the observations during the speed study. This valuable component of how traffic flows through the Northfield section has been overlooked in other project calculations/studies to date.

**Disposition:**

The basic purpose of a speed study is to spot measure speeds in free flowing situations, which are generally off-peak times and between intersections. It is not intended to supplement, verify or replace an analysis of congestion using traffic counts and HCS software. The majority (78%) of the data for the speed studies was collected outside of the peak hours. In addition, the speed studies in the 35 mph zone included data from both directions therefore conclusions that the delay and queue calculations from HCS are overestimated or that the traffic data is inaccurate cannot be made from the speed study data.

**Comment 12:**

Further to the comment above, earlier comments by the Village identified that there have been no field verification work conducted - specifically field measurements of travel time through the project section or field

estimated delay time at any intersection. Such efforts are crucial in verifying calculated results in this very contentious project section, and we reiterate the need for these field verifications at this time.

**Disposition:**

As noted previously, state of the practice tools and analysis techniques have been used for the Willow Road study. Travel time studies are not necessary to calibrate the HCS analysis or to document the levels of congestion on Willow Road.

**Comment 13:**

A short summary table of speed study results is attached herein. Measured speed and speed limits are higher at the 4-lane spot check locations (near Three Lakes) than at the 2-lane sections (in and adjacent to the S-curve). The crash rates are higher in the 4-lane locations than in the 2 lane locations. This coincides with the important finding that speed is a major contributor to crashes and that less intensive alternatives (alternatives with fewer lanes and slower speeds) perform better with respect to safety. IDOT must emphasize this relationship in the project work products, such as within the Alternatives Analysis Summary Report. Later comments on this IDOT work will point out the need to correct and revise the table in Volume 2 to include observed existing crash rates within the HSM calculations. Existing crash data have been excluded from the HSM, in favor of less meaningful default nationwide values. Table is included after dispositions.

**Disposition:**

The posted speed limit at Three Lakes is 40 mph so a higher measured speed would be expected at that location. The conclusion that speed is a major contributor to crashes cannot be reached on the basis of the speed study, which is not the appropriate tool for an analysis of safety or congestion. IDOT has thoroughly analyzed and documented the existing safety deficiencies, and the final report is available on the project website. As noted in IDOT's crash analysis, the number crashes in the 2-lane sections is similar to the number of crashes in the 4-lane sections. Please also refer to our previous comments regarding NCHRP 617 and, as stated previously, the HSM analysis for alternatives is being conducted according to professional standards.

**Comment 14:**

Further to the comment above, the AADT traffic data figures prominently in the crash rate calculation. As we have contended for Willow Road, AADTs have been overstated, which results in lower calculated crash rates. It is dangerous to calculate lower crash rates because of the possible overstated traffic figures. Please identify the source and year of the traffic data used in the speed study so that we can assess whether traffic data and calculated crash rates are appropriate and accurate.

**Disposition:**

The AADT traffic data used for the speed study was obtained from the IDOT website dated December 9, 2010.

**Comparison of Crash Indices at Intersections**

**Comment 15:**

A recent article in the local internet-based newspaper, The Patch, provides interesting and valuable information about the top ten crash rates at Glenview signalized intersections. Northfield village CAG members have been requesting that IDOT provide comparative performance information for the major regional roadways near Willow Road for some time. Such requests have been denied because the Willow Rd project does not go beyond the stated limits of Waukegan Rd to I-94. The Village re-requests IDOT to provide comparative performance information in order to place the existing and proposed Willow Road project into proper perspective and to aid CAG members to provide meaningful discussion of topics such as traffic and crashes relative to the area for which all CAG members are familiar. Again, it is the context within which Willow resides that is being overlooked. If IDOT contends that neighboring villages are part of the context of Willow, then it is in all communities' interest to accurately portray comparative information, such as nearby crash rates at locations that might be similar to a future improved Willow Road. This is not being done at present.

**Disposition:**

A comparison to nearby roadways will not yield more accurate or meaningful results. As stated previously, our crash analysis of existing conditions, as well as our analysis of alternatives utilizes a robust data set that provides statistically valid results. In addition, regardless of the safety issues on other roadways, there are safety concerns along Willow Road as documented in the Crash Report, including the fact that there is an average of three injury crashes per month along Willow Road.

**Comment 16:**

We have tabulated and attached comparative crash index data for Glenview's top ten intersections and eight intersections along Willow through Northfield. We observe that 3 of the top 10 Glenview intersections are along Willow Road (at Patriot, Pfingsten, and I-294). We applaud Glenview for reviewing crash data regularly, in an effort to improve road and pedestrian safety. Table is included after dispositions.

**Disposition:**

See previous response.

**Comment 17:**

The Willow/Waukegan Rd intersection would rank second in total crash rate if included on Glenview's list. It is clearly the most dangerous intersection along Willow through Northfield. Willow Rd at I-94 would rank eighth on the Glenview list, while it is the second most dangerous along Willow through Northfield. Both Northfield intersections are at the extreme ends of the project. The Village had identified that the extreme ends of the project section had greater crash occurrence and, now, greater crash rates, but IDOT incorrectly dismissed this fact in its findings and conclusions in its Traffic Report. We reiterate our earlier finding that the extreme ends (4 lanes) are more dangerous than the middle (2-lane) sections. The Traffic Report should be amended accordingly. We question, then, the choice of the use of Sunset Ridge Rd as critical or representative of true safety concerns (i.e. large crash rates) for the project Alternative Analysis because it exhibits a very low crash frequency and crash rate. The Waukegan intersection is far worse, and so a much better candidate to test for safety countermeasures and initial HSM work. This is an example of why a focus on just one location along a 1.8-mile roadway can be misleading. Sunset Ridge is not representative.

**Disposition:**

In accordance with NEPA practice, IDOT will be adding additional details through each round of analysis. It would be unrealistic to expect all intersections and segments along Willow Road to be analyzed for 18 alternatives as part of the Round #1 analysis. The Sunset Ridge Road intersection and two lane segment between Sunset Ridge and Wagner Roads were analyzed because they were the most sensitive to change. As the process moves forward, IDOT will add this level of detail for the local alternatives.

As noted in our previous disposition, the number of crashes in the 4-lane sections is nearly identical to the number of crashes in the 2-lane sections. Therefore, there are clearly crash concerns on both the 2-lane sections as well as the 4-lane sections, regardless of the crashes occurring at IL 43 or I-94. In addition, we are examining potential improvements to the IL 43 intersection and the I-94 interchange as part of the Willow Road study. Please see our previous responses regarding the methodology for the Round #1 alternatives evaluation.

**Comment 18:**

The Willow intersection at Patriot Blvd ranks as Glenview's third worst. This is one of the newest improved intersections in Glenview, and its safety performance is a poor reflection on the design of new intersections that are supposed to be safe. The Village seriously questions whether safer performing new improved intersections are possible through Northfield, especially if additional lanes are provided. While the new HSM was developed using extensive amounts of data, it is not proven in widespread application. It would be most interesting to apply HSM to an intersection like Willow/Patriot (or Willow/Waukegan) under existing conditions to ascertain whether such poor-performing locations could be effectively replicated. Note that the alternative analysis screening process does not consider a poor performing location (Sunset Ridge has a crash rate less than half that of Waukegan Rd, and therefore a poor choice during the initial screening).

**Disposition:**

A comparison to nearby roadways will not yield more accurate or meaningful results. As stated previously, our crash analysis of existing conditions, as well as our analysis of alternatives utilizes a robust dataset that provides statistically valid results. In addition, regardless of the safety issues on other roadways, there are safety concerns along Willow Road as documented in the Crash Report, including the fact that there is an average of three injury crashes per month along Willow Road.

**Comment 19:**

The tabulated data suggests a strong correlation between higher speed limits and higher crash rates, in Glenview and in Northfield (Three Lakes being an anomaly because it really is a minor intersection that serves Kraft) with respect to the worst performing locations. It is also interesting that the Willow/I-294 and Willow/ I-94 interchanges exhibit similar crash rates, possibly attributable to ramps, geometry, and driver behavior/decision making, rather than speed alone. The top 3 worst intersections in Glenview and the worst Northfield intersection all do have 40-45 mph speed limits. The Village believes that a uniform 30 mph speed limit should be implemented for the proposed Willow alternatives under study.

**Disposition:**

The conclusion that speed is a major contributor to crashes cannot be reached on the basis of the speed study, which is not the appropriate tool for an analysis of safety or congestion. IDOT has thoroughly analyzed and documented the existing safety deficiencies, and the final report is available on the project website. As noted in IDOT's crash analysis, the number of crashes in the 2-lane sections is similar to the number of crashes in the 4-lane sections. Please also refer to our previous comments regarding NCHRP 617 and, as stated previously, the HSM analysis for alternatives is being conducted according to professional standards.

## Alternatives Analysis Summary Report

### General

**Comment 20:**

The Village maintains that traffic volumes used in the analysis are overstated, and it is clear that traffic figures prominently in safety and delay calculations, along with other physical and behavioral factors. Overstated traffic yields significant inaccuracies throughout the screening results. We do not agree with the traffic volumes or any calculations that are based on these traffic data. The remaining comments on the Alternatives Analysis Summary Report are made with this underlying disagreement, and we do not concur with any numerical results that are presented therein.

**Disposition:**

Please see responses to Comments 6 through 9.

**Comment 21:**

It is sound engineering practice to evaluate a linear feature by metrics that examine (even in a screening process) the effect on the whole linear feature. A single point or intersection, such as Sunset Ridge, cannot represent the performance of a 1.8-mile roadway section. Likewise, floodplain impacts are measured by the volume displaced, not the area impacted as reported in the summary report.

**Disposition:**

In general, NEPA (National Environmental Policy Act) studies that involve a large geographic area, or many alternatives, utilize an alternatives evaluation process that starts broadly and adds detail as the process advances. For the Willow Road study, we followed this approach, which was also outlined at the November 2010 and January 2011 CAG meetings. For Round #1 of the alternatives evaluation, we used a travel demand model, which provided corridor traffic data specific to each alternative along the entire Willow Road study limits. This information was used to develop Design Hourly Volumes for the Willow Road at Sunset Ridge Road intersection. This intersection was selected for Round #1 analysis because it would be the most sensitive to

changes in traffic volumes, given its relatively high existing traffic volumes and existing two lane configuration. The section of Willow Road from Sunset Ridge Road to Wagner Road was select for the Round #1 HSM analysis because this section would undergo the most significant changes in cross section and traffic volumes across the suite of alternatives. As part of the Round #2 evaluation, all of the intersections and segments will be analyzed for the remaining alternatives.

For flood plains, the level of detail for Round #1 was not sufficient to calculate the volume displaced for all alternatives where flood plains were impacted. Therefore, for the local Willow Road alternatives, flood plain impacts were assumed to be from right-of-way to right-of-way for Alternatives 2 through 5 as a relative comparison. As the level of detail is increased for the alternatives, the level of detail for the analysis will also increase.

**Comment 22:**

Similar to our calls for field verification of travel time through the whole section, we have also requested origin-destination studies that will definitively estimate true traffic patterns that validate the bypass traffic from the expressway, the cut-through traffic observed by many residents, and numbers of motorists who lack appropriate access to the expressways. The summary report does not address these considerations, nor have any origin-destination studies been performed. CMAP travel patterns are inadequate, since the travel patterns it predicts are not based on actual choices people have made under the adverse conditions that exist along Willow and the other regional roadways and expressways. It is irrelevant that the FHWA has approved the CMAP model in this respect. A comprehensive origin-destination study will address these important concerns.

**Disposition:**

One key point to consider in any discussion about modeling is the fact that Willow Road is severely congested under today's conditions, which is the main issue with respect to transportation needs. Regarding the modeling process, information has been provided and presented over the course of multiple CAG meetings and, as stated previously, the CMAP data and model represent the state of the practice. The CMAP model provides a level of analysis capability far beyond a single origin-destination study along Willow Road. The model is based on socioeconomic data for the region including information on number of households, household characteristics and employment. The roadway network used in the model includes expressways, tollways, arterials, collectors and some local streets. Roadway characteristics such as distance, number of lanes, capacity and posted speed are included for each roadway. This results in the ability to quantify demand on roadways within the network for both existing and proposed future conditions. This is a critical capability and something an origin-destination study would not provide.

**Comment 23:**

Sketches showing the outline of each alternative do not permit easy comparison of the relative impacts between alternatives. For example, crossing distances at each intersection, placed appropriately where crosswalks would be located, will enable CAG members to assess whether pedestrians can cross comfortably, or whether the crossing represents a significant barrier (physical or psychological) to pedestrians and walking. Barriers to crossing easily and safely do not promote mobility or multi-modal transportation or livability, which is in direct conflict with "Go to 2040" objectives.

**Disposition:**

The level of detail provided on the exhibits for the alternatives are appropriate for the Round #1 analysis, which included a review of 18 alternatives spread over a broad geographic area. The assumptions used for each alternative are listed in the report and on the exhibits, as well as the basic dimensions of each typical roadway cross section along Willow Road. With respect to whether any alternative represents a barrier, an analysis of safety performance is a key indicator at this stage of the analysis. Accordingly, an analysis of pedestrian safety was included in the Round #1 analysis. Additional detail will be considered for the alternatives which are carried forward to the next round of analysis.

**Comment 24:**

Further to the previous comment, typical sections are requested for each Willow alternative at this time. These sections should depict the proposed roadway overlaid upon the existing roadway, so that CAG members can assess the difference in width and in elevation. This would also enable members to assess whether, perhaps, a shift in alignment would be beneficial in avoiding floodplain impacts. Such shifts, if possible, would elevate the standing of the less intensive alternatives over the lane addition alternatives, and would reduce construction costs because staging the embankment, paving, floodplain, and drainage work would be (1) easier, (2) more environmentally sensitive, (3) improve traffic flow during construction, and (4) reduce crashes and injuries in the work zone. These can easily be included within the preliminary screening process, and the Village requests this be done at this time.

**Disposition:**

The level of detail provided on the exhibits for the alternatives are appropriate for the Round #1 analysis, which included a review of 18 alternatives spread over a broad geographic area. The assumptions used for each alternative are listed in the report and on the exhibits, as well as the basic dimensions of each typical roadway cross section along Willow Road. Additional detail will be considered for the alternatives which are carried forward to the next round of analysis.

**Alternatives**

**Comment 25:**

Please see the attached list of additional/revised alternatives (presented to IDOT during the last CAG meeting) that should be included in the screening process. Note that this list (and elements considered within each alternative) should also incorporate alignment shifts identified in the comment above. The attached list should also be augmented to include alternative combinations and features identified by KLOA separately, especially tandem alternatives that would include local Willow improvements teamed with regional improvements.

**Disposition:**

As noted previously, a goal of the Round #1 evaluation was to determine how the alternatives would impact safety, mobility, and conditions along Willow Road. For the Other Parallel Route Alternatives (6 and 7) and the Interchange Alternatives (8 through 16), it was important to first know how they independently affect the performance along Willow Road and determine if they are an effective solution on their own merit to eliminate any need to do anything along Willow Road. If any of these alternatives showed any benefit, then further studies or combination of alternatives could be investigated in Round #2. However, the results showed very little, if any, change to traffic and safety compared to the No-Build alternative. Investigating a Regional Alternative combined with a Local Willow Road Alternative would have essentially the same effect as a Local Willow Road Alternative at a higher cost and level of impacts. Therefore, these types of combination alternatives will not be studied.

**Comment 26:**

It is our understanding that the ISTHA may be studying some of the toll road system improvements that are identified within ours or IDOT's alternatives identified for the Willow Rd Project. Please identify the role that the ISTHA has had in the execution of the regional improvements that are being considered by IDOT. Also, ISTHA study of their system deficiencies is timely, since their current multi-year program is about to be completed.

**Disposition:**

The "Go To 2040" plan includes a list of "fiscally constrained" major projects, including improvements to the Tollway system that are expected by the year 2040. Therefore, the effects of those improvements are incorporated into the modeling and forecasting process. Please note that on the basis of the Round #1 analysis, the regional alternatives are being dropped from further consideration.

In general, IDOT and the Tollway have partnered on a number of projects, including the I-355 South Extension, the I-57/I-294 interchange, and the Elgin O'Hare West Bypass project. Typically, IDOT has taken the lead role in the NEPA (planning) process, while the Tollway has taken a lead role in final design and construction.

## Safety

### Comment 27:

Although we disagree with the use of just one intersection or segment for a safety comparison because it is not adequate for assessing the safety along the 1.8-mile roadway, to make this very limited safety comparison complete (still not acceptable on the whole), the Sunset Ridge intersection should be checked for predicted vehicular crashes, and not just pedestrian crashes. It appears that HSM spreadsheet calculations have been completed in this regard, so we recommend that the summary table in Volume 2 be expanded to include these comparative calculations. Far more vehicular crashes occur at intersections than within the segments between intersections. Crashes at intersections should not be ignored in any comparative evaluation.

### Disposition:

The addition of this data, which shows a difference of 2 predicted crashes across the suite of 18 alternatives, would not change the conclusions for Round #1, which is to drop the regional alternatives from further consideration. As noted earlier, the alternatives evaluation process will add detail as the process advances. Round #2 will investigate the predicted crash frequency of all the intersections and sections for the alternatives carried forward.

### Comment 28:

HSM spreadsheet calculations by the IDOT project team do not include any evidence that the existing known safety performance of Willow Rd has been incorporated into the safety analysis. HSM indicates that local performance data (crash history data, as compiled for the project crash analysis) should be input into the spreadsheets whenever available, when the alternative is similar in lane configuration to the existing condition, so that the most meaningful local representation of existing safety performance is made. Rather, only nationwide default values have been used, which are appropriate only when local performance for an existing road are not available or not physically comparable. A proper HSM analysis would compare existing performance to the various proposed alternatives. If, for instance, spreadsheet input data for the No-Build, No-Build Plus, or other less intensive alternatives can utilize the actual crash history (which it would appear that it could because of similar proposed lane configurations), these data should be input. In so doing, the intended usefulness of HSM will be realized and the proposed expected crashes can be compared to the actual existing performance. We stress that one way to look at the use of existing crash history within the prediction calculation (the EB part of the spreadsheet) is that it is a much better way to localize and temper a prediction than to use default values. HCM encourages the use of EB to "improve results".

### Disposition:

As noted previously, IDOT has completed a comprehensive review of existing safety. The use of the Empirical Bayes (EB) Method is discussed in Appendix A, Section A.2. of the Highway Safety Manual. The first step in applying the EB Method is to determine if it is applicable. Section A.2.1. states that the EB method is applicable for "projects in which the roadway cross section is modified but the basic number of through lanes remains the same" (second bullet point). Since two of the alternatives being compared include the addition of through lanes (Alternatives 3, 4A and 4B), the EB Method is not applicable as it would result in an "apples-to-oranges" comparison of alternatives. The Manual further notes that "the reason that the EB Method is not used for these project types is that the observed crash data for a previous time period is not necessarily indicative of the crash experience that is likely to occur in the future after such a major geometric improvement."

### Comment 29:

There has been no use of HSM to identify existing troublesome intersections or segments, which would provide valuable and consistent findings that would help steer the project safety analysis towards a ranking of crash performance of the existing roadway. For example, HSM provides several tools to assess existing safety, one of which is their "excess" calculation, which we recommend at this time. The excess calculation blends existing observed crashes with the best available predictive calculations, yielding a ranking of segment and/or

intersection performance. The choice not to use this valuable tool may very well result in missing poor performing locations.

**Disposition:**

As noted above, the use of the HSM procedures is applicable to the comparison of proposed alternatives to each other and is not being used to evaluate existing conditions. The identification of locations with a concentration of crash types or which have significant numbers of crashes were identified in the Crash Analysis for existing conditions. Countermeasures to those crashes will be identified in conjunction with the refinement of the alternatives.

**Comment 30:**

The previous comment reflects how HSM should be used to approach roadway safety performance in a consistent procedure, complementing an HSM-based existing assessment with an HSM-based proposed (or predictive) procedure. This has not been done for this project. In essence, there is no comparison possible when procedures differ between existing and proposed. Either use HSM throughout, or else use some other like comparative analysis throughout.

**Disposition:**

As noted above, the use of the HSM procedures is applicable to the comparison of proposed alternatives to each other and is not being used to evaluate existing conditions. The identification of locations with a concentration of crash types or which have significant numbers of crashes were identified in the Crash Analysis for existing conditions. Countermeasures to those crashes will be identified in conjunction with the refinement of the alternatives.

**Comment 31:**

The summary table indicates that a pedestrian refuge and/or median will improve pedestrian safety for Alternative 3 (4-lane with median left turn lane). The presentation at the last CAG meeting indicated similar results for the Village's 3-lane alternative, but this result was not included in the summary table. We recommend that the summary table be revised to include refuge islands in all 3-lane, unbalanced 3-lane, and 4-lane alternatives. We also recommend refuge to be included within the other alternatives that we have identified and attached to these comments.

**Disposition:**

Refuge islands have been considered for both Alternatives 2 and 3 and are included in updated versions of the Alternatives Analysis Summary Table that was presented at CAG #9. Refuge islands have also been added to Alternative 2A at the Sunset Ridge and Wagner Road intersections. This updated table will be expanded as Round #2 analyses are completed and will be included in the final report.

**Comment 32:**

We note that there are no alcoholic beverage sales at the convenience store on the southeast corner of Willow/Sunset Ridge. Revise calculations accordingly.

**Disposition:**

We have checked the calculations for the intersection analyses which were included in the Alternatives Analysis and the CMF used for all of the Round #1 calculation is 1.00.

**Comment 33:**

We note that although there is only an accommodation of speed within the spreadsheet calculations in general terms (over or below 30 mph), that this is only corresponding to the segment calculation, and that the input results in very tiny differences in pedestrian and/or fatal crashes. In fact, the calculation is counterintuitive -the faster speed input yields lower expected crashes for pedestrians. The FHWA Resource Center indicates that this finding is erroneous because there is little or no data on pedestrian crashes on higher speed roads, because people do not cross faster moving roadways! This actually confirms the barrier effect that wider, faster moving roadways have on pedestrian traffic. As such, a wider Willow is representative of such roadways, and therefore the roadway will be a greater barrier to CMAP livability and will tend to divide Village populations and result in a

real loss of Village character, while making it much more difficult or impossible to realize the goals of the Village's Comprehensive Downtown Plan.

**Disposition:**

We are unaware of any written or published materials that suggest the findings of the HSM are erroneous – especially given that the FHWA was involved in the development of the HSM. In addition, IDOT has completed an extensive, state of the practice evaluation of safety for existing conditions, as well as the initial alternatives. The conclusions offered by the village are not supported by any technical analysis.

**Comment 34:**

Just as the previous comment suggests that speed is not truly addressed explicitly within HSM and that findings of speed actually reducing crashes are absolutely false, the present HSM does not include a number of CMFs for the built or a proposed condition, nor have all roadway lane configurations have been included within the base conditions. Further, the HSM's internet based questions and answers suggest that users are not adept in applying HSM calculations at this time, and that inaccuracy and major errors may result. We caution that for Willow Road, that by taking a conservative approach (say, that one accept that set of input data that results in higher crash predictions when in doubt, especially where there has been insufficient data collection or evaluation) can result in poor decisions.

**Disposition:**

Please see our previous comment regarding conclusions being drawn about speed and the validity of the HSM. As noted earlier, IDOT has completed a comprehensive, state of the practice review of safety for existing conditions. The HSM calculations used for the alternatives analysis have been peer reviewed for consistency with the intent of the HSM. In addition, the spreadsheets have been consistently applied to all alternatives, and therefore are appropriate for the comparison relative to each other. For this project, the HSM analyses are not being used to develop an actual prediction of crashes to be expected from any one alternative but are strictly for the purpose of evaluating the relative safety of each one. If the Village is aware of any errors in the HSM worksheets, please provide specific examples.

**Comment 35:**

The HSM calculations are very basic at this point, and, as such, we believe that reasonable countermeasures be incorporated into the more local Willow alternatives at this time. The value of incorporating them at this time is evident by the results that have incorporated refuge islands.

**Disposition:**

Further detail will be added to the alternatives and the technical analysis will be expanded in Round #2.

**Mobility**

**Comment 36:**

We note that our safety comments include one in which faster speed yields erroneous, counterintuitive crash values, and that the actual result will be a barrier to pedestrian traffic. This is a direct contradiction with respect to the CMAP strategic goal to enhance the pedestrian mode choice. Therefore, mobility is not served.

**Disposition:**

Please see our previous comment regarding conclusions being drawn about speed and the validity of the HSM. As noted earlier, IDOT has completed a comprehensive, state of the practice review of safety for existing conditions. The HSM calculations used for the alternatives analysis have been peer reviewed for consistency with the intent of the HSM.

The mobility component of the project needs that is currently being measured is vehicular mobility on Willow Road itself. We also envision that the project will include sidewalks and/or bikeways along with appropriate pedestrian crosswalks and signals at the signalized intersections. Other pedestrian features will be incorporated as feasible to promote safe pedestrian travel.

**Comment 37:**

Similar to our disagreement that with the safety analysis as not being representative because of the single intersection being considered, we believe that looking at one location for delay, LOS, and queue length is not acceptable for the whole project length.

**Disposition:**

Please see our previous comments regarding this issue.

**Comment 38:**

Repeating the comment made at the last CAG meeting, the delays and queue lengths demonstrate that we cannot build our way out of congestion. Far better (economical, efficient, sustainable, more respectful of the Village context and needs) ways than the present add-lane standards and policies need to be implemented for this project to positively influence people to walk, bike, take transit, avoid the peak periods, and support innovative ways (congestion pricing, adaptive traffic control, etc.) to reduce the perceived need for lane additions as the only solution for this project. What innovative strategies are being included within the alternatives analysis?

**Disposition:**

It is important to recognize that the mobility needs along Willow Road are being driven by existing conditions. We are examining a range of alternatives to address the safety, mobility and facility condition needs along Willow Road. Thus far, the analysis has indicated that these needs can be addressed via improvements to Willow Road. Further, as indicated in previous responses, a range of safety and design options have been presented for the CAG's consideration.

**Comment 39:**

The queue length on Sunset Ridge SB is unusually long for the roundabout alternative and should be checked. Intuitively, it should not be much different from the other less intensive alternatives, since the Sunset Ridge right turn movement makes up a large fraction of the total volume, and this movement is easy in a roundabout. Please explain why this result is so large.

**Disposition:**

The analysis for the roundabout alternative is correct. Because roundabouts operate with a "yield on entry" protocol, all southbound traffic, including the right turns, must yield to the westbound Willow Road traffic. Due to the high volume on Willow Road, the southbound traffic will back up almost one mile.

**Comment 40:**

The delays on Willow due to the interchange alternatives were questioned at the last CAG meeting, and the response was that traffic actually increased. Please explain why this occurred? Usually, interchange improvements reduce travel distances, suggesting that people will travel shorter distances on the local roads or arterials. One might believe, then, that people will avoid Willow when Tower interchange is improved, and the heavy turning movements in downtown Northfield will reduce. Both reactions suggest improvements in delay and queue lengths, especially in downtown Northfield. However, downtown Northfield intersections are not being investigated in this analysis, so the positive effects of improving Tower Rd is not being identified or quantified, which paints an inaccurate picture of this alternative. In fact, one might say that Sunset Ridge is a very poor comparative location for the screening of regional improvements.

**Disposition:**

Please refer to previous responses regarding the travel demand modeling process.

The needs of the Willow Road project are to improve safety, mobility and facility condition and design along Willow Road from Illinois Route 43 to the Interstate 94 interchange. While Alternative 14 (completion of the Tower Road interchange) did provide some traffic benefit on Willow Road east of the Central/Happ intersection, the traffic on a majority of Willow Road remained unchanged and, as a result, improvement to safety and mobility would remain unchanged from the No-Build condition for that alternative. As noted in our technical analysis, a

majority of the travel on Willow Road is not destined to or originating from the Edens; therefore, additional access points along the Edens would not be expected to significantly reduce traffic along Willow Road.

**Comment 41:**

Queue lengths and delays are about the same or less for the No-Build alternative as many of the other alternatives. This seems counterintuitive. However, it also demonstrates the inability to build one's way out of congestion. Why?

**Disposition:**

As noted in our analysis of travel patterns, about 40% of the travel using Willow Road is more local in nature; the other 60% of the travel is oriented in a northwest-southeast direction. As a result, the Regional Alternatives did not substantively reduce traffic on Willow Road, as they did not accommodate predominant travel flows. As stated earlier, one of the goals of Round #1 was to determine if regional alternatives could address the needs along Willow Road without improvements to Willow Road; therefore Alternatives 6 through 16 did not include improvements to Willow Road. As a result, there was little change in queue lengths or delay for the Regional Alternatives.

**Comment 42:**

The table provides westbound queue lengths for Willow. Please provide eastbound queue lengths. Are we saying EB and WB are the same or so similar that there is no material difference at this level or in the future shortlisting comparison?

**Disposition:**

The westbound queue length was chosen for the Round #1 analysis since it represented the "worst case". For queue lengths for other legs of the intersection, please refer to the HCS output for the 95<sup>th</sup> Percentile Output listed on the last page of each of the capacity analyses and multiply BOQ (Back of Queue) by 25 to convert to a queue length.

**Comment 43:**

LOS results are extremely low across the board. Is it due to through traffic, a particularly troublesome direction, or large turning movement? Do the reasons vary from one alternative to another, or are reasons consistent? Is there a pattern for poor performance based on alternative? Please explain the tabulated results more specifically.

**Disposition:**

The poor Level of Service is primarily attributable to the through traffic volumes on Willow Road. For Alternatives 1, 2 and 2A, with no additional capacity being provided for the Willow Road through movements, those movements operate at LOS F whereas they operate at LOS D for Alternative 3 where an additional through lane in each direction is being provided.

**Comment 44:**

The delays associated with the regional alternatives do not vary or are worse because Sunset Ridge is a poor location for comparison and because these alternatives have not been grouped effectively. For example, the Edens Spur completion would mean inclusion of improvements at both junctions and the Waukegan and Lake-Cook interchange improvements. For a meaningful assessment of these alternatives, please augment the alternatives to include those attached herein and those suggested by KLOA. And assess impacts at the more meaningful locations -other than Sunset Ridge.

**Disposition:**

Please refer to our previous dispositions regarding the alternatives evaluation process and the level of detail for Round #1. The Willow Road/Sunset Ridge Road intersection is the most sensitive (and thus used for comparison purposes) since it handles the most traffic within the two lane section. Therefore, it is the intersection most influenced by changes in travel patterns resulting from the regional alternatives. Round #2 will investigate the performance of all the intersections and sections for the alternatives carried forward. If any of the regional alternatives showed any benefit, then further studies or combination of alternatives could be

investigated in Round #2. However, the results showed very little, if any, change to traffic compared to the No-Build alternative. Investigating a Regional Alternative combined with a Local Willow Road Alternative or a combination of regional alternatives would also result in little change to traffic.

## Flaw Analysis/Impacts

### Comment 45:

The land acquisition figures for the regional improvements seem high, and these should be revised to assume reasonable accommodation for fitting these improvements into the various locations. Ramps can be optimized better, even at this level of assessment.

### Disposition:

Even if the interchanges were redesigned, their travel performance and costs would be relatively the same. The interchange designs developed for the Alternatives Analysis meet current IDOT and ISTHA design standards and impacts to adjacent properties were considered and minimized. If any of these regional improvements had resulted in safety and mobility benefits on Willow Road, they would be carried into Round #2 and evaluated in further detail to refine impacts.

### Comment 46:

Similar to above, the high acquisition costs do not have any corresponding benefit figures associated with the regional improvement, such as reduced cost for Willow improvements, the fact that costs would be user-based tolls for ISTHA facilities, rather than state taxpayer costs, and the considerable spinoff economic value of development along US 41 and to the southwest.

### Disposition:

In general, NEPA (National Environmental Policy Act) studies that involve a large geographic area, or many alternatives, utilize an alternatives evaluation process that starts broadly and adds detail as the process advances. For the Willow Road study, we followed this approach which was also outlined at the November 2010 and January 2011 CAG meetings. In addition, NEPA evaluations begin with an assessment of how well the alternatives address the basic transportation needs. In subsequent rounds, the alternatives carried forward will be refined which will allow for more detailed evaluations. Basic construction costs were developed as part of the Round #1 evaluation for the purposes of making relative comparisons and identifying potential flaws.

### Comment 47:

It would appear that land acquisition costs are similar and less important for the various direct Willow Rd alternatives. This may not be accurate when one considers floodplain mitigation for the wider alternatives, especially if open detention is being contemplated. Please comment on the comparative cost for this mitigation, as it would seem to vary considerable amongst alternatives.

### Disposition:

This type of analysis will be completed in subsequent rounds of evaluation.

### Comment 48:

The flaw analysis does not include any summary of environmental impacts or any socioeconomic impacts. We are told that this was completed years ago. Please identify and quantify the corresponding impacts for the various alternatives.

### Disposition:

In general, NEPA (National Environmental Policy Act) studies that involve a large geographic area, or many alternatives, utilize an alternatives evaluation process that starts broadly and adds detail as the process advances. For the Willow Road study, we followed this approach which was also outlined at the November 2010 and January 2011 CAG meetings. In addition, NEPA evaluations begin with an assessment of how well the alternatives address the basic transportation needs. In subsequent rounds, the alternatives carried forward will be refined, which will allow for more detailed evaluations. We are not aware of any recent

Color coding: Purple = Disagree Blue = Agree, already in report Green = Agree, will add to final report
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environmental/socioeconomic impact studies; further, if they were completed years ago, we would not utilize them for this current study, as they would be outdated.

**Comment 49:**

As stated in the General comments, floodplain impacts are generally quantified on the basis of volume filled within the floodplain, and floodway impacts would be quantified on the basis of area and volume filled and potential changes to the base flood elevations upstream and downstream of the improvement (especially abridge). Please identify and tabulate these findings for these various alternatives.

**Disposition:**

Please see response to Comment 22.

**Comment 50:**

Community character is a necessary part of the initial screening and evaluation work, yet this part is largely ignored in the analysis, especially since virtually all physical impacts (and impacts to character) appear to reside in the Village of Northfield. While safety is part of the analysis, it does not fully represent community concerns. The analysis must report out in several areas, including (a) livability, (b) walkability (across and along the road), (c) character, (d) barrier creation (and physical division of N and S parts of the Village), (e) conflicts with the goals and objectives of the Go to 2040 Plan, (f) conflicts with the goals and objectives of the Village's Comprehensive Downtown Plan, and (g) adverse impact to property values.

**Disposition:**

In general, NEPA (National Environmental Policy Act) studies that involve a large geographic area, or many alternatives, utilize an alternatives evaluation process that starts broadly, and adds detail as the process advances. For the Willow Road study, we followed this approach which was also outlined at the November 2010 and January 2011 CAG meetings. In addition, NEPA evaluations begin with an assessment of how well the alternatives address the basic transportation needs. In subsequent rounds, the alternatives carried forward will be refined, which will allow for more detailed evaluations.

Village of Northfield  
Willow Road Project

Alternatives Analysis Summary Report, March 10, 2011  
Additional Alternatives and Combined Alternatives

The additional alternatives below are either new or existing ones with feature updates. The combined alternatives include two or more alternatives that are combined in one constructed project. Whether new, updated, or in combinations, they are all to be treated as separate alternatives or sub-alternatives, reported out separately in the summary table. Alternatives were compiled by Cooper Civil Engineering, Ltd. on behalf of the Village of Northfield.

Please note that flush medians may be painted or grassed or mountable. Raised medians could be curbed, barrier, planter boxes, etc.

**Comment 51:**

**Alternative 1a. Willow Rd No-Build Plus.** Upgrade turn lane storage lengths and tapers. Relocate EB merge to just west of Waukegan Rd (1,900 ft of uninterrupted roadway length available to merge hundreds of fewer vehicles at new merge). Create a second EB turn lane from Willow to NB Waukegan. Use adaptive traffic control system throughout the project signalized intersections.

**Disposition:**

While upgrading turn lanes and storage would not affect the Round #1 results, please note that turn lane storage lengths and tapers are already included in Alternative 1. A relocation of the EB merge to just west of Waukegan Road would be in direct conflict with the goal to improve mobility since it would remove a full EB through lane from the Waukegan Road intersection, resulting in a substantial degradation of the intersection level of service. The addition of a second EB left turn lane onto NB Waukegan Road is included in Option 19 (Willow Road at IL 43 Intersection Improvements). Adaptive traffic control system technology is becoming more widely used in other parts of the United States. IDOT currently does not approve its installation on state maintained routes. However, as with any newer technology, they will evaluate studies of these installations in order to review the effectiveness and applicability to IDOT systems.

**Comment 52:**

**Alternative 2a. Willow Rd 2-Lane w/Continuous Median.** Same add-on/modifying features as Alternative 1a. It seems that Alt. 2 only looks at flush median. Need to also assume median is raised in a separate sub-alternative to both Alt. 2 and 2a, as IDOT has done for its Alternative 3.

**Disposition:**

Upgrading turn lanes would not affect performance and therefore, the results of Round #1. In addition, the relocation of the EB merge would result in degraded performance and turn lanes are being considered at IL 43. Also, Predicted Crash Frequencies for the barrier median alternate were calculated and provided at CAG Meeting #9 and will be included in final Alternatives Analysis Summary Report.

**Comment 53:**

**Alternative 2Aa. Willow Rd 2-Lane w/ Medians in Select Locations (2005 Plan).** Same add-on/modifying features as Alternative 1a.

**Disposition:**

This alternative was analyzed as proposed by the Village. In addition, upgrading turn lanes would not affect performance or the results of the Round #1 evaluation. The relocation of the EB merge would result in degraded performance and turn lanes are being considered at IL 43. Also, Predicted Crash Frequencies for a two lane

Color coding:  
Purple = Disagree  
Blue = Agree, already in report  
Green = Agree, will add to final report

barrier median alternate were calculated and provided at CAG Meeting #9 and will be included in final Alternatives Analysis Summary Report.

**Comment 54:**

**Alternative 4Aa and 4Ba. Willow Rd 3-Lane Unbalanced w/ Median.** Same add-on features as Alternative 1a, but also adds pedestrian refuge, just as IDOT has done for its Alternative 3.

**Disposition:**

Upgrading turn lanes would not affect performance and therefore the results of Round #1. The relocation of the EB merge would result in degraded performance and turn lanes are being considered at IL 43. Also, Predicted Crash Frequencies for a similar barrier median alternate were calculated and provided at CAG Meeting #9 and will be included in final Alternatives Analysis Summary Report.

**Comment 55:**

**Alternative 5a. Willow Rd 2-Lane w/ Roundabouts.** Same add-on features as Alternative 1a.

**Disposition:**

Upgrading turn lanes would not affect performance and therefore the results of Round #1. The relocation of the EB merge would result in degraded performance and turn lanes are being considered at IL 43. Also, Predicted Crash Frequencies for a similar barrier median alternate were calculated and provided at CAG Meeting #9 and will be included in final Alternatives Analysis Summary Report.

**Comment 56:**

**Alternative 5b. Willow Rd 2-Lane w/ Roundabouts.** Same add-on features as Alternative 1a, but without a roundabout at Sunset Ridge.

**Disposition:**

See previous comments regarding add-on features. The Wagner Road intersection roundabout will be analyzed as part of the Round #2 evaluations. If the intersection operates at an acceptable level of service, inclusion of a roundabout only at Wagner Road may be considered.

**Comment 57:**

**Alternative 9a. Full Dundee Interchanges at I-94 Edens and I-294 Tri-State.** This combines Alternatives 9 and 13 into one improvement.

**Disposition:**

Each of the regional alternatives by themselves showed very little, if any, change to traffic and safety compared to the No-Build alternative. Combining the two alternatives would have essentially the same effect at a higher cost and level of impacts. This type of combination alternative will not be pursued.

**Comment 58:**

**Alternative 9b. Full Dundee Interchanges at I-94 and I-294, and Add Third lane (each direction) to Dundee, from I-94 to Waukegan.** This combines Alternatives 6, 9, and 13 into one improvement.

**Disposition:**

Each of the regional alternatives by themselves showed very little, if any, change to traffic and safety compared to the No-Build alternative. Combining the two alternatives would have essentially the same effect at a higher cost and level of impacts. This type of combination alternative will not be pursued.

**Comment 59:**

**Alternative 9c. Full Dundee Interchange at I-94 and Add Third Lane.** This combines Alternatives 6 and 13 into one improvement.

**Disposition:**

Each of the regional alternatives by themselves showed very little, if any, change to traffic and safety compared to the No-Build alternative. Combining the two alternatives would have essentially the same effect at a higher cost and level of impacts. This type of combination alternative will not be pursued.

**Comment 60:**

**Alternative 9d. Full Dundee Interchange at I-294 and Add Third Lane.** This combines Alternatives 9 and 13 into one improvement.

**Disposition:**

Each of the regional alternatives by themselves showed very little, if any, change to traffic and safety compared to the No-Build alternative. Combining the two alternatives would have essentially the same effect at a higher cost and level of impacts. This type of combination alternative will not be pursued.

**Comment 61:**

**Alternative 17. New. Full Interchange I-94 (Edens Spur) at I-94(Edens)/US 41 (Skokie Hwy).** New ramps from EB Spur to NB US 41 and from SB US 41 to WB Spur. This would complete the east junction.

**Disposition:**

Similar Regional Alternatives, which proposed improvements in access along the Edens Spur, did not address the transportation needs along Willow Road. Based on results of the Existing Travel Pattern Analysis, about 40% of the travel using Willow Road is more local in nature; the other 60% of the travel is oriented in a northwest-southeast direction. As a result, the addition of the ramps between the Edens Spur and US 41 would not serve to substantially reduce traffic on Willow Road or to improve safety and mobility. Therefore, this alternative will not be pursued.

**Comment 62:**

**Alternative 10a. Complete Both East and West Junctions Between Spur and I-94, I-294, and US 41.** This combines Alternatives 10 and 17. This makes full length of Spur accessible to and from all directions.

**Disposition:**

Similar Regional Alternatives, which proposed improvements in access along the Edens Spur, did not address the transportation needs along Willow Road. Based on results of the Existing Travel Pattern Analysis, about 40% of the travel using Willow Road is more local in nature; the other 60% of the travel is oriented in a northwest-southeast direction. As a result, the addition of the ramps between the Edens Spur and US 41 would not serve to substantially reduce traffic on Willow Road or to improve safety and mobility. Therefore, this alternative will not be pursued.

**Comment 63:**

**Alternative 10b. Complete Spur, per Alternative 10a, and Add 1 Lane on Spur Mainline.** This is similar to Alternative 10a, but also addresses congestion on Spur with the added lanes.

**Disposition:**

Similar Regional Alternatives, which proposed improvements in access along the Edens Spur, did not address the transportation needs along Willow Road. Based on results of the Existing Travel Pattern Analysis, about 40% of the travel using Willow Road is more local in nature; the other 60% of the travel is oriented in a northwest-southeast direction. As a result, the addition of the ramps between the Edens Spur and US 41 would not serve to substantially reduce traffic on Willow Road or to improve safety and mobility. Therefore, this alternative will not be pursued.

**Comment 64:**

**Alternative 18. New. Full Interchange Lake-Cook Rd at I-94 (Edens Spur).** This is a new access to/from Edens Spur from/to Lake-Cook Rd, at west end of the Spur.

**Disposition:**

Similar Regional Alternatives, which proposed improvements in access along the Edens Spur, did not address the transportation needs along Willow Road. Based on results of the Existing Travel Pattern Analysis, about 40% of the travel using Willow Road is more local in nature; the other 60% of the travel is oriented in a northwest-southeast direction. As a result, the addition of the ramps between the Edens Spur and US 41 would not serve to substantially reduce traffic on Willow Road or to improve safety and mobility. Therefore, this alternative will not be pursued.

**Comment 65:**

**Alternative 10c. Cadillac Edens Spur. Combines Alternatives 10b, 11, and 18.** This completes both junction ends of the Spur, adds a lane in each direction to the mainline Spur, and Spur interchanges at Lake-Cook Rd and at Waukegan Rd.

**Disposition:**

Similar Regional Alternatives, which proposed improvements in access along the Edens Spur, did not address the transportation needs along Willow Road. Based on results of the Existing Travel Pattern Analysis, about 40% of the travel using Willow Road is more local in nature; the other 60% of the travel is oriented in a northwest-southeast direction. As a result, the addition of the ramps between the Edens Spur and US 41 would not serve to substantially reduce traffic on Willow Road or to improve safety and mobility. Therefore, this alternative will not be pursued.

**Comment 66:**

**Alternative 14a. Complete Tower Interchange at I-94, w/ Extension to Happ Rd.** This provides new Tower ramps (SB exit ramp and SB entrance ramp), while providing very direct access to I-94 from the west (avoids travel south on Happ and Central, reduces congestion on Willow/Happ and Willow/Central intersections and Willow segment at downtown Northfield).

**Disposition:**

Since this alternative represented a relatively unique concept, as compared to the other alternatives suggested in the Village's comments, IDOT has modeled this configuration. By making a connection to Happ Road, this alternative provides another method for those trips that are accessing the Edens, thereby providing a reduction in traffic at the east end of the project limits, but not an overall reduction that would eliminate the need for improvements to Willow Road. As noted in our technical analysis, a majority of the trips using Willow Road are not simply trying to access the Edens. Therefore, this alternative will not be carried into Round #2. Traffic data is attached to this disposition.

**Comment 67:**

**Alternative 14b. Complete Willow and Tower Interchanges w/Tower Extension.** This combines Alternative 14a and 15 in one improvement. This eliminates all unnecessary trips between these presently incomplete interchanges. Completion of both interchanges complies with standard interchange spacing, since they are about 1.14 miles apart. Present incomplete pair is not optimal or desired.

**Disposition:**

See previous comment regarding Alternative 14a and combinations of regional alternatives.

Village of Northfield  
Willow Road Project

Comparison of Population Data to CMAP Estimates  
1-Apr-11

Community	US Census		Change 2000 to 2010	CMAP Estimate		Change 2010 to 2040	2010 CMAP vs 2010 Census Difference	
	2000	2010		2010	2040		Number	% CMAP Overestimate
	Northfield	5,389	5,420	31	5,966	7,290	1,324	546
Winnetka	12,419	12,187	(232)	13,178	19,238	6,060	991	8.1
Glennview	41,847	44,692	2,845	55,530	73,550	18,020	10,838	24.3
Northbrook	33,435	33,170	(265)	35,902	43,671	7,769	2,732	8.2
Glencoe	8,762	8,723	(39)	8,894	11,081	2,187	171	2.0
Highland Park	31,365	29,763	(1,602)	31,089	46,854	15,765	1,326	4.5
Buffalo Grove	42,909	41,496	(1,413)	45,493	53,998	8,505	3,997	9.6
Deerfield	18,420	18,225	(195)	21,294	30,457	9,163	3,069	16.8
<b>Total, all</b>	<b>194,546</b>	<b>193,676</b>	<b>(870)</b>	<b>217,346</b>	<b>286,139</b>	<b>68,793</b>	<b>23,670</b>	<b>12.2</b>
<b>Total, 4 Adjacent*</b>	<b>93,090</b>	<b>95,469</b>	<b>2,379</b>	<b>110,576</b>	<b>143,749</b>	<b>33,173</b>	<b>15,107</b>	<b>15.8</b>
<b>City of Chicago</b>	<b>2,896,016</b>	<b>2,695,598</b>	<b>(200,418)</b>	<b>2,899,597</b>	<b>3,303,768</b>	<b>404,171</b>	<b>203,999</b>	<b>7.6</b>

\* Northfield, Winnetka, Glennview, Northbrook

Village of Northfield  
Willow Road Project

Comparison of Crash Indices at Intersections  
Willow Northfield and Glenview  
27-Apr-11

RANK	INTERSECTION LOCATION	VILLAGE	NO. CRASHES*	TRAFFIC AADT**	CRASH INDEX***	SPEED LIMIT	REMARKS
1	W. Lake Ave/ Pfingsten	Glenview	27		3.13	45	4-lane (W.Lake), 3-lane (Pfingsten)
2	E. Lake Ave/ Shermer	Glenview	38		2.81	40	4-lane (E.Lake), 2-lane (Shermer)
3	Willow/ Patriot	Glenview	47		2.61	45	4-lane (both rds)
4	E. Lake Ave/ Waukegan	Glenview	50		2.44	35	4-lane (both rds)
5	Glenview Rd/ Greenwood Rd	Glenview	21		2.21	35	2-lane (both rds)
6	Willow/ Pfingsten	Glenview	34		1.99	40	4-lane (both rds)
7	W. Lake Ave/ N. Milw. Ave	Glenview	43		1.96	35	4-lane (both rds)
8	Willow/ I-294	Glenview	38		1.82	45	6-lane
9	Chestnut/ Lehigh	Glenview	12		1.78	35	2-lane (both rds); near RR
10	Chestnut/ Waukegan	Glenview	23		1.62	35	4-lane (Waukegan), 3-lane (Chestnut); 3 legs
1N	Willow/ Waukegan	Northfield	65	62,550	2.85	40	4-lane (both rds); WORST, Willow thru Northfield
8N	Willow/ Three Lakes	Northfield	3	32,750	0.25	40	4-lane (Willow), 2-lane (Three Lakes). Minor intersection.
4N	Willow/ Sunset Ridge	Northfield	15	37,050	1.11	35	2-lane (4-lane to W) (Willow), 2-lane (Sunset Ridge)
7N	Willow/ Old Willow	Northfield	6	28,650	0.57	35	2-lane (both rds); 3 legs
6N	Willow/Wagner	Northfield	8.33	27,950	0.82	35	2-lane (both rds)
5N	Willow/ Old Willow/Northfield	Northfield	13	32,300	1.10	35	4-lane (Willow), 2-lane (Old Willow/Northfield)
3N	Willow/ Central/Happ	Northfield	17.67	41,700	1.16	35	4-lane (Willow), 3-lane (Central), 2-lane (Happ)
2N	Willow/ I-94	Northfield	22.67	33,500	1.85	35	4-lane; about same crash rate as Willow/I-294

\* Total number of crashes per year, in calendar year 2010 for Glenview. Total number of crashes per year, a 3-year average of all crashes in 2006-2008 in Northfield.

\*\* AADT not stated for Glenview, but data is from IDOT. AADT is existing traffic volume for Willow Rd Project, counted in 2009-2010. Note that AADT is sum of both roads.

\*\*\* Crash Index = (# crashes x 1 million vehicles)/(AADT x 365) = crashes per yr per million motorists.

Village of Northfield  
Willow Road Project

IDOT Speed Study Results  
Cooper Civil Engineering, Ltd.  
2-Mar-11

STUDY ZONE	SPOT LOCATION	LOCATION REMARKS	NO. LANES	TRAFFIC DIR. CHECKED	TIMES OF CHECK*	POSTED SPEED LIMIT (mph)	SPOT DATA AND RESULTS			AM PEAK HOUR	PM PEAK HOUR	PERCENT MOTORISTS WITHIN 10 MPH PACE****
							85th PERCENTILE SPEED** (%)	10 MPH PACE*** (mph)	PERCENTILE SPEED** (%)			
1	Three Lakes	Signalized intersection. EB merges several hundred ft E.	4	EB WB	9:58-10:33 AM 9:15-9:52 AM	40 40	46 46	36-45 37-46	7:45-8:45 AM near Three Lakes intersection	5:00-6:00 PM	159/200= 79.5 % 161/200= 80.5 %	
2	Whittier	T-intersection S of Willow only. About 50 ft W of curve.	2	EB & WB	8:22-9:05 AM	35	40	30-39	7:45-8:45 AM nr New Willow/Old Willow int.	5:00-6:00 PM	161/200= 80.5%	
2	Chapel Hill	T-intersection N of Willow only. Within curve.	2	EB & WB	3:15-4:03 PM	35	43	34-43	7:45-8:45 AM near Bracken intersection	5:00-6:00 PM	165/200= 82.5%	
2	Dickens	T-intersection S of Willow only. Several hundred ft E of curve.	2	EB & WB	7:15-8:11 AM	35	40	32-41	7:45-8:45 AM near Dickens intersection	5:00-6:00 PM	174/200= 87.0%	

\* All checks performed on Mondays.

\*\* Speed at which 85 % of motorists are travelling at or below.

\*\*\* The 10 mph range of speeds within which the most motorists are traveling.

\*\*\*\* The number of motorists observed to be traveling at the pace speeds divided by the number counted (200).

HCS+: Signalized Intersections Release 5.4

Analyst: WRM  
 Agency: TranSystems  
 Date: 02/14/11  
 Period: PM Peak Hour  
 Project ID: Willow Rd - IL Rte 43 to I-94 - No Build  
 E/W St: Willow Road  
 Inter.: Willow Road & Sunset Ridge  
 Area Type: All other areas  
 Jurisd: IDOT  
 Year : 2040 No Build  
 N/S St: Sunset Ridge Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	0	1	1	1
LGConfig	L	TR		L	TR		L	TR		L	T	R
Volume	260	1290	175	30	1165	40	115	125	25	105	345	345
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	12.0
RTOR Vol			0			0			0			0

Duration	0.25	Area Type:	All other areas									
Signal Operations												
Phase Combination	1	2	3	4	5	6	7	8				
EB Left		A	A	A	NB Left	A	A					
Thru			A	A	Thru		A					
Right			A	A	Right		A					
Peds				X	Peds		X					
WB Left		A		A	SB Left	A	A					
Thru				A	Thru		A					
Right				A	Right		A					
Peds				X	Peds		X					
NB Right					EB Right							
SB Right		A			WB Right							
Green		5.0	5.0	66.0	0.0	5.0	18.0	0.0				
Yellow		3.0	3.0	4.5		3.0	4.5					
All Red		0.0	0.0	1.5		0.0	1.5					

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	257	1787	1.07	0.71	117.6	F		
TR	1124	1822	1.37	0.62	196.1	F	184.2	F
Westbound								
L	78	1805	0.41	0.56	31.7	C		
TR	997	1813	1.27	0.55	157.2	F	154.2	F
Northbound								
L	133	1736	0.91	0.24	95.0	F		
TR	270	1802	0.59	0.15	51.4	D	70.3	E
Southbound								
L	199	1613	0.56	0.24	45.8	D		
T	297	1980	1.22	0.15	177.4	F	130.4	F
R	344	1425	1.06	0.24	109.3	F		
Intersection Delay = 156.8 (sec/veh)					Intersection LOS = F			

HCS+: Signalized Intersections Release 5.4

JG  
Willow Road - IL43 to I-94  
Existing Conditions

Phone: Fax:  
E-Mail:

OPERATIONAL ANALYSIS

Analyst: WRM  
Agency/Co.: TranSystems  
Date Performed: 02/14/11  
Analysis Time Period: PM Peak Hour  
Intersection: Willow Road & Sunset Ridge  
Area Type: All other areas  
Jurisdiction: IDOT  
Analysis Year: 2040 No Build  
Project ID: Willow Rd - IL Rte 43 to I-94 - No Build  
E/W St: Willow Road N/S St: Sunset Ridge Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	260	1290	175	30	1165	40	115	125	25	105	345	345
% Heavy Veh	1	2	1	0	4	7	4	0	0	1	1	2
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PK 15 Vol	68	339	46	8	307	11	30	33	7	28	91	91
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900		1900	1900		1900	1900		1900	2000	1900
ParkExist												
NumPark												
No. Lanes	1	1	0	1	1	0	1	1	0	1	1	1
LGConfig	L	TR		L	TR		L	TR		L	T	R
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	12.0
RTOR Vol			0			0			0			0
Adj Flow	274	1542		32	1268		121	158		111	363	363
%InSharedLn												
Prop LTs	1.000	0.000		1.000	0.000		1.000	0.000		1.000	0.000	
Prop RTs		0.119			0.033			0.165			0.000	1.000
Peds Bikes		50	0		50	0		50	0		50	0
Buses	0	0		0	0		0	0		0	0	0
%InProtPhase	0.0		0.0	0.0			0.0			0.0		0.0
Duration	0.25											

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Arriv. Type	3	3		3	3		3	3		3	3	3
Unit Ext.	3.0	7.0		3.0	7.0		4.0	4.0		4.0	4.0	4.0
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Ext of g	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Ped Min g		3.7			3.7			3.7			3.7	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A	A	A					
Thru		A	A		NB Left	A	A	
Right		A	A		Thru		A	
Peds			X		Right		A	
					Peds		X	
WB Left	A		A		SB Left	A	A	
Thru			A		Thru		A	
Right			A		Right		A	
Peds			X		Peds		X	
NB Right					EB Right			
SB Right	A				WB Right			
Green	5.0	5.0	66.0	0.0		5.0	18.0	0.0
Yellow	3.0	3.0	4.5			3.0	4.5	
All Red	0.0	0.0	1.5			0.0	1.5	

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	260	1290	175	30	1165	40	115	125	25	105	345	345
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj flow	274	1358	184	32	1226	42	121	132	26	111	363	363
No. Lanes	1	1	0	1	1	0	1	1	0	1	1	1
Lane group	L	TR		L	TR		L	TR		L	T	R
Adj flow	274	1542		32	1268		121	158		111	363	363
Prop LTs	1.000	0.000		1.000	0.000		1.000	0.000		1.000	0.000	
Prop RTs		0.119			0.033			0.165			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

LG	Eastbound			Westbound			Northbound			Southbound		
	L	TR		L	TR		L	TR		L	T	R
So	1900	1900		1900	1900		1900	1900		1900	2000	1900
Lanes	1	1	0	1	1	0	1	1	0	1	1	1
fW	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	1.000
fHV	0.990	0.982		1.000	0.961		0.962	1.000		0.990	0.990	0.980
fG	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	1.000
fP	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	1.000
fBB	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	1.000
fA	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	1.000
fLU	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	1.000
fRT		0.982			0.995			0.975			1.000	0.850
fLT	0.950	1.000		0.950	1.000		0.950	1.000		0.950	1.000	
Sec.	0.056			0.061			0.167			0.388		
fLpb	1.000	1.000		1.000	1.000		1.000	1.000		0.903	1.000	
fRpb		0.995			0.999			0.973			1.000	0.900
S	1787	1822		1805	1813		1736	1802		1613	1980	1425
Sec.	105			115			304			659		

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
<b>Eastbound</b>							
	Prot	194	1787	0.11	0.108	194	1.00
	Perm	80	105	0.76	0.600	63	1.27
	Left L	274			0.71	257	1.07
	Prot						
	Perm						
	Thru TR	1542	1822	# 0.85	0.62	1124	1.37
	Right						
<b>Westbound</b>							
	Prot	15	1805	0.01	0.008	15	1.00
	Perm	17	115	0.15	0.550	63	0.27
	Left L	32			0.56	78	0.41
	Prot						
	Perm						
	Thru TR	1268	1813	0.70	0.55	997	1.27
	Right						
<b>Northbound</b>							
	Prot	72	1736	0.04	0.042	72	1.00
	Perm	49	304	0.16	0.200	61	0.80
	Left L	121			0.24	133	0.91
	Prot						
	Perm						
	Thru TR	158	1802	0.09	0.15	270	0.59
	Right						
<b>Southbound</b>							
	Prot	67	1613	# 0.04	0.042	67	1.00
	Perm	44	659	0.07	0.200	132	0.33
	Left L	111			0.24	199	0.56
	Prot						
	Perm						
	Thru T	363	1980	0.18	0.15	297	1.22
	Right R	363	1425	# 0.25	0.24	344	1.06

Sum of flow ratios for critical lane groups,  $Y_c = \text{Sum (v/s)} = 1.14$

Total lost time per cycle,  $L = 15.00 \text{ sec}$

Critical flow rate to capacity ratio,  $X_c = (Y_c)(C)/(C-L) = 1.31$

**Control Delay and LOS Determination**

Appr/ Lane Grp	Ratios v/c g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Res Del d2	Res Del d3	Lane Group Delay LOS	Approach Delay LOS
<b>Eastbound</b>									
L	1.07 0.71	42.8	1.000	257	0.50	74.7	0.0	117.6 F	
TR	1.37 0.62	23.0	1.000	1124	0.50	173.1	0.0	196.1 F	184.2 F
<b>Westbound</b>									
L	0.41 0.56	28.2	1.000	78	0.11	3.5	0.0	31.7 C	
TR	1.27 0.55	27.0	1.000	997	0.50	130.2	0.0	157.2 F	154.2 F
<b>Northbound</b>									
L	0.91 0.24	42.8	1.000	133	0.44	52.2	0.0	95.0 F	
TR	0.59 0.15	47.5	1.000	270	0.21	3.9	0.0	51.4 D	70.3 E
<b>Southbound</b>									
L	0.56 0.24	41.5	1.000	199	0.19	4.3	0.0	45.8 D	
T	1.22 0.15	51.0	1.000	297	0.50	126.4	0.0	177.4 F	130.4 F

R 1.06 0.24 45.5 1.000 344 0.50 63.8 0.0 109.3 F

Intersection delay = 156.8 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET

for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	120.0	sec		
Total actual green time for LT lane group, G (s)	82.0	71.0	26.0	26.0
Effective permitted green time for LT lane group, g(s)	72.0	66.0	24.0	24.0
Opposing effective green time, go (s)	66.0	74.0	18.0	18.0
Number of lanes in LT lane group, N	1	1	1	1
Number of lanes in opposing approach, No	1	1	1	1
Adjusted LT flow rate, VLT (veh/h)	274	32	121	111
Proportion of LT in LT lane group, PLT	1.000	1.000	1.000	1.000
Proportion of LT in opposing flow, PLTo	0.00	0.00	0.00	0.00
Adjusted opposing flow rate, Vo (veh/h)	1268	1542	363	158
Lost time for LT lane group, tL	6.00	6.00	6.00	6.00
Computation				
LT volume per cycle, LTC=VLTC/3600	9.13	1.07	4.03	3.70
Opposing lane util. factor, fLUo	1.000	1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)	42.27	51.40	12.10	5.27
gf=G[exp(- a * (LTC ** b))]-tL, gf<=g	0.0	0.0	0.0	0.0
Opposing platoon ratio, Rpo (refer Exhibit 16-11)	1.00	1.00	1.00	1.00
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]	0.45	0.38	0.85	0.85
gq, (see Exhibit C16-4,5,6,7,8)	72.00	66.00	24.00	9.81
gu=g-gq if gq>=gf, or = g-gf if gq<gf	0.00	0.00	0.00	14.19
n=Max(gq-gf)/2,0)	36.00	33.00	12.00	4.91
PTHo=1-PLTo	1.00	1.00	1.00	1.00
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]	1.00	1.00	1.00	1.00
EL1 (refer to Exhibit C16-3)	4.28	5.57	1.84	1.52
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g	0.06	0.06	0.17	0.17
gdiff=max(gq-gf,0)	0.00	0.00	0.00	0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)	0.06	0.06	0.17	0.39
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)], (fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT	0.056	0.061	0.167	0.388

For special case of single-lane approach opposed by multilane approach, see text.

\* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto

left-turn lane and redo calculations.

\*\* For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET

for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	120.0	sec		
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				

Number of lanes in opposing approach, No  
Adjusted LT flow rate, VLT (veh/h)  
Proportion of LT in LT lane group, PLT 0.000 0.000 0.000 0.000  
Proportion of LT in opposing flow, PLTo  
Adjusted opposing flow rate, Vo (veh/h)  
Lost time for LT lane group, tL  
Computation  
LT volume per cycle, LTC=VLTC/3600  
Opposing lane util. factor, fLUo 1.000 1.000 1.000 1.000  
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)  
 $gf=G[\exp(-a * (LTC ** b))]-tL$ ,  $gf \leq g$   
Opposing platoon ratio, Rpo (refer Exhibit 16-11)  
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]  
gq, (see Exhibit C16-4,5,6,7,8)  
 $gu=g-gq$  if  $gq \geq gf$ , or  $= g-gf$  if  $gq < gf$   
 $n=Max(gq-gf)/2,0$   
 $PTHo=1-PLTo$   
 $PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]$   
EL1 (refer to Exhibit C16-3)  
 $EL2=Max((1-Ptho*n)/Plto, 1.0)$   
 $fmin=2(1+PL)/g$  or  $fmin=2(1+Pl)/g$   
 $gdiff=max(gq-gf,0)$   
 $fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]$ , (min=fmin;max=1.00)  
 $flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)]$ , (fmin<=fm<=1.00)  
or  $flt=[fm+0.91(N-1)]/N**$   
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,  
see text.

\* If  $PL \geq 1$  for shared left-turn lanes with  $N > 1$ , then assume de-facto  
left-turn lane and redo calculations.

\*\* For permitted left-turns with multiple exclusive left-turn lanes,  $flt=fm$ .  
For special case of multilane approach opposed by single-lane approach  
or when  $gf > gq$ , see text.

-----SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET-----

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)	66.0	66.0	18.0	18.0
Conflicting pedestrian volume, Vped (p/h)	50	50	50	50
Pedestrian flow rate, Vpedg (p/h)	90	90	333	333
OCCpedg	0.045	0.045	0.167	0.167
Opposing queue clearing green, gq (s)	72.00	66.00	24.00	9.81
Eff. ped. green consumed by opp. veh. queue, gq/gp	1.091	1.000	1.333	0.545
OCCpedu	0.020	0.023	0.055	0.121
Opposing flow rate, Vo (veh/h)	1268	1542	363	158
OCCr	0.004	0.003	0.034	0.097
Number of cross-street receiving lanes, Nrec	1	1	2	1
Number of turning lanes, Nturn	1	1	1	1
ApbT	0.996	0.997	0.980	0.903
Proportion of left turns, PLT	1.000	1.000	1.000	1.000
Proportion of left turns using protected phase, PLTA	0.000	0.000	0.000	0.000
Left-turn adjustment, fLpb	1.000	1.000	1.000	0.903
Permitted Right Turns				
Effective pedestrian green time, gp (s)	66.0	66.0	18.0	18.0
Conflicting pedestrian volume, Vped (p/h)	50	50	50	50
Conflicting bicycle volume, Vbic (bicycles/h)	0	0	0	0
Vpedg	90	90	333	333
OCCpedg	0.045	0.045	0.167	0.167
Effective green, g (s)	72.0	66.0	18.0	24.0
Vbicg	0	0	0	0

OCCbicg	0.020	0.020	0.020	0.020
OCCr	0.045	0.045	0.167	0.167
Number of cross-street receiving lanes, Nrec	1	1	1	2
Number of turning lanes, Nturn	1	1	1	1
ApbT	0.955	0.955	0.834	0.900
Proportion right-turns, PRT	0.119	0.033	0.165	1.000
Proportion right-turns using protected phase, PRTA	0.000	0.000	0.000	0.000
Right turn adjustment, fRpb	0.995	0.999	0.973	1.000

----- SUPPLEMENTAL UNIFORM DELAY WORKSHEET -----

	EBLT	WBLT	NBLT	SBLT
Cycle length, C				
Adj. LT vol from Vol Adjustment Worksheet, v	274	32	121	111
v/c ratio from Capacity Worksheet, X	1.07	0.41	0.91	0.56
Protected phase effective green interval, g (s)	13.0	1.0	5.0	5.0
Opposing queue effective green interval, gq	68.00	62.00	20.00	9.81
Unopposed green interval, gu	4.00	4.00	4.00	14.19
Red time $r=(C-g-gq-gu)$	35.0	53.0	91.0	91.0
Arrival rate, $qa=v/(3600(\max[X,1.0]))$	0.07	0.01	0.03	0.03
Protected ph. departure rate, $Sp=s/3600$	0.496	0.501	0.482	0.448
Permitted ph. departure rate, $Ss=s(gq+gu)/(gu*3600)$	0.53	0.53	0.51	0.31
XPerm	2.45	0.28	0.40	0.17
XProt	0.53	0.96	1.34	1.32
Case	3	1	2	2
Queue at beginning of green arrow, Qa	5.54	0.47	3.06	2.81
Queue at beginning of unsaturated green, Qu	4.85	0.55	1.37	1.71
Residual queue, Qr	3.04	0.00	0.82	0.72
Uniform Delay, dl	42.8	28.2	42.8	41.5

----- DELAY/LOS WORKSHEET WITH INITIAL QUEUE -----

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay		Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
			Unadj. ds	Adj. dl sec				
Eastbound								
L	0.0	0.00		42.8	0.00	4.2	0.0	117.6
TR	0.0	0.00	23.0	23.0	0.00	104.5	0.0	196.1
	0.0						0.0	
Westbound								
L	0.0	0.00		28.2	0.00	0.0	0.0	31.7
TR	0.0	0.00	27.0	27.0	0.00	67.7	0.0	157.2
	0.0						0.0	
Northbound								
L	0.0	0.00		42.8	0.00	0.0	0.0	95.0
TR	0.0	0.00	51.0	47.5	0.00	0.0	0.0	51.4
	0.0						0.0	
Southbound								
L	0.0	0.00		41.5	0.00	0.0	0.0	45.8
T	0.0	0.00	51.0	51.0	0.00	16.5	0.0	177.4
R	0.0	0.00	45.5	45.5	0.00	4.7	0.0	109.3
Intersection Delay			156.8	sec/veh	Intersection LOS		F	

----- BACK OF QUEUE WORKSHEET -----

