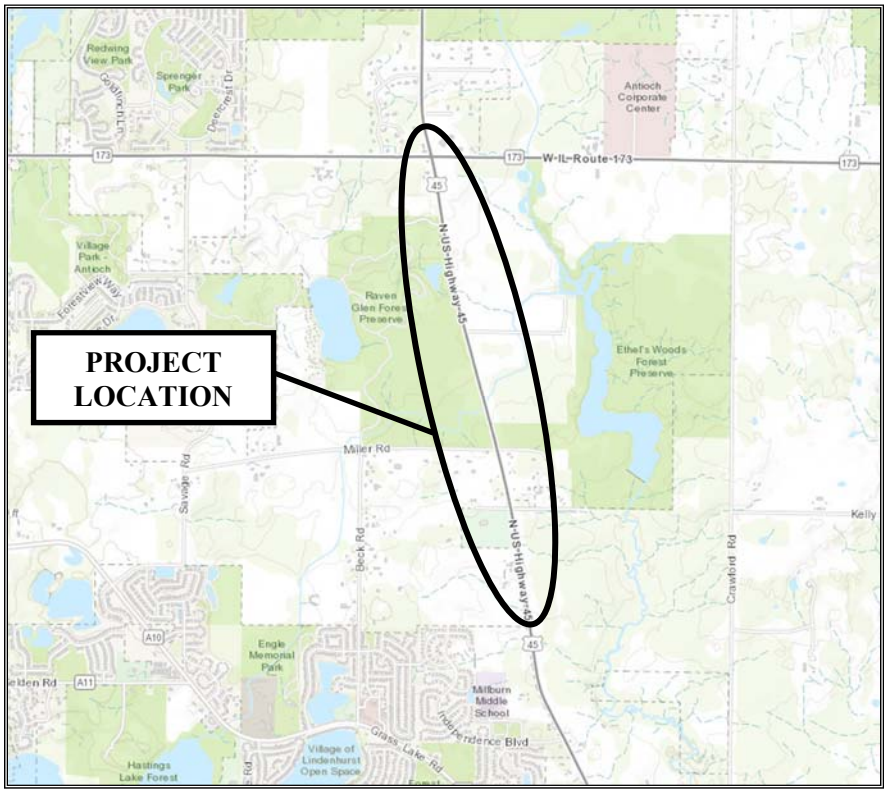
Illinois Department of Transportation

DESIGN REPORT

U.S. Route 45
Millburn Bypass to Illinois Route 173



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Lake County, Illinois

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Table of Contents (Volume III)

APPENDIX E – CRASH ANALYSIS

APPENDIX F – TREE SURVEY

APPENDIX G – PAVEMENT DESIGN

APPENDIX H – DESIGN EXCEPTIONS

APPENDIX E

CRASH ANALYSIS

CRASH ANALYSIS REPORT
FOR
U.S. ROUTE 45
MILLBURN BYPASS

Village of Old Mill Creek and the Village of Lindenhurst

County of Lake, Illinois

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March 1, 2013

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TABLE OF CONTENTS

A. INTRODUCTION

B. EXISTING CONDITIONS

C. CRASH ANALYSIS & RECOMMENDATIONS

D. CONCLUSIONS

E. EXHIBITS

1. Location Map
2. Crash Data Aerial

F. FIGURES

1. Collision Diagram for US 45 @ IL 132
2. Collision Diagram for US 45 @ Highfield Drive
3. Collision Diagram for US 45 @ Chatham Way
4. Collision Diagram for US 45 @ Deer Tail Drive
5. Collision Diagram for US 45 @ Deer Path Drive/ Falling Waters Boulevard
6. Collision Diagram for US 45 @ Falling Waters Drive
7. Collision Diagram for US 45 @ Sand Lake Road
8. Collision Diagram for US 45 @ Country Place
9. Collision Diagram for US 45 @ Haven Lane
10. Collision Diagram for US 45 @ West Millburn Road
11. Collision Diagram for US 45 @ West Grass Lake Road
12. Collision Diagram for US 45 @ Independence Boulevard
13. Collision Diagram for US 45 @ Kelly Road
14. Collision Diagram for US 45 @ Miller Road
15. Collision Diagram for US 45 @ IL 173
16. Collision Diagram for West Grass Lake Road @ Heritage Drive
17. Collision Diagram for West Millburn Road @ Crawford Road

APPENDIX A CRASH SUMMARY TABLES

APPENDIX B RAW CRASH DATA

A. INTRODUCTION

The purpose of this report is to provide an analysis of the automobile related crashes that have occurred within the study area and to present an effective method for preventing future crashes from occurring.

This study encompasses 5 years (2007-2011) of crash data, covering over 6 ½ miles of roadway and 17 intersections, located in the Village of Old Mill Creek, the Village of Lindenhurst, and unincorporated areas in north central Lake County, Illinois. The limits for this crash analysis report extend from the intersections of US 45 at IL 132 north to US 45 at IL 173 and one-half mile east and west of the intersection of US Route 45 at West Grass Lake Road. A location map of study limits and surrounding area has been provided in Exhibit 1.

The Illinois Department of Transportation's September, 2012, *Five Percent Report* for the Federal Highway Administration's Highway Safety Improvement Program states that:

> "As part of the Highway Safety Improvement Program (HSIP), states are required to submit an annual report to the Federal Highway Administration (FHWA) describing at least five percent of highway locations exhibiting the most pressing safety needs. This *Five Percent Report* will help Illinois to gain an understanding of the nature and extent of safety problems, to provide guidance on where safety investments are needed, and to provide a basis for tracking the progress toward improving safety in the state."

A search of the locations provided within that report determined that there are no 2012 5% locations within the study limits. However, IDOT's 2008 and 2009 Five Percent Reports identified several 5% segments along the section of IL 173 which runs from approximately 1.5 miles west of US 45 to 0.75 miles east of US 45; still, the intersection of IL 173 and US 45 is not listed as a 5% intersection in any of the reports.

B. EXISTING CONDITIONS

US Route 45 runs north-south and is generally a two-lane undivided roadway with no median. It widens to provide left-turn and right-turn channelization at select intersections within the study limits. To the east, the majority of land is undeveloped, although there are some pockets of residential and commercial development along the route. To the west, the land is mainly residential with several subdivisions of varying sizes. Dozens of private driveways to single family homes and commercial buildings line both sides of US 45.

Speed limits on US 45 vary from 55 mph at the north and south study area limits, to 40 mph between Independence Boulevard on the north and Country Drive on the south. The speed limits on both West Grass Lake Road and West Millburn Road are 45 mph.

No lighting is present on any segment throughout the study limits. Intersection lighting is provided in some locations as specified in the sections below.

Existing conditions in additional detail are profiled in the following sections for each intersection and segment within the study limits.

22.) <u>US 45 – Between West Grass Lake Road and Independence Boulevard (Approximately 1,600')</u>

Between West Grass Lake Road and Independence Boulevard, US 45 is generally a two-lane undivided roadway. A painted median does exist where the road widens for channelization at Independence Boulevard. Passing is not permitted anywhere within this segment.

There are two driveways on the west side of the road, located approximately 750' south of Independence Boulevard. An additional west side driveway is located 225' north of West Grass Lake Road. On the east side of US 45, four driveways exist immediately north of West Grass Lake Road and one driveway is located approximately 160' south of Independence Boulevard.

Curb and gutter is provided on both sides of US 45 for approximately 700' to the north of West Grass Lake Road, as is paved shoulder approximately 8' in width. Beyond that point, curb and gutter is no longer provided and the 8' of paved shoulder transitions to approximately 8' of gravel shoulder.

While the gravel shoulder is level, the elevation beyond it generally drops off quickly on most of the east side of US 45. This can also be said for some locations on the west side.

A "curve ahead" advanced warning sign is provided for southbound traffic, located approximately 750' south of Independence Boulevard.

23.) <u>US 45 @ Independence Boulevard</u>

US 45 at Independence Boulevard is a three-legged unsignalized intersection, consisting of US 45 on the north and south and Independence Boulevard on the west leg. The intersection is stop-controlled on the west leg, which provides the only direct access to US 45 for a very large residential subdivision. One street light is located within a small grassy median on Independence Boulevard.

On US 45, a northbound left-turn lane and a southbound right-turn lane are provided. Although no pavement markings exist on Independence Boulevard, the eastbound travel lane is wide enough to accommodate two vehicles side by side, essentially operating as if it had exclusive lanes for both the left and right turning movements.

Curb and gutter is present on the west leg. Gravel shoulders, approximately 8' in width, are provided on both sides of the south leg and on the east side of the north leg.

No advanced warning signs exist for this intersection.

24.) <u>US 45 – Between Independence Boulevard and Kelly Road (Approximately 5,300')</u>

Between Independence Boulevard and Kelly Road, US 45 is generally a two-lane undivided roadway. A painted median does exist where the road widens for channelization at Independence Boulevard. Pavement markings indicate passing is permitted for northbound vehicles within a passing zone beginning approximately 1,600' north of Independence Boulevard and continues for approximately 3700'. Passing is permitted for southbound vehicles within a passing zone approximately 1,320' in length, beginning approximately 1300' south of Kelly Road.

There is one driveway on the east side of US 45 and two on the west side that are clustered around a point approximately 315' north of Independence Boulevard. Two other driveways exist on the west side of the road, 3700' and 4000' north of Independence Boulevard which serve a farm and residence.

Gravel shoulder, approximately 8' in width is provided on both sides of US 45 throughout the entire segment.

Guardrails exist approximately 2,300' north of Independence Boulevard on both sides of US 45. Both guardrails are approximately 200' in length and all four guardrail ends have substandard end terminals installed.

A "curve ahead" advanced warning sign is provided for southbound traffic, located approximately 1,900' north of Independence Boulevard. A "curve ahead" advanced warning sign is also provided for northbound traffic, located approximately 450' north of Independence Boulevard.

25.) <u>US 45 @ Kelly Road</u>

US 45 at Kelly Road is a four-legged unsignalized intersection, consisting of US 45 on the north and south, Kelly Road on the east, and a private driveway at the west leg. The intersection is stop-controlled on the east leg, which provides the only direct access to US 45 for under ten residences located along Kelly Road. There is no street lighting located near the intersection or along Kelly Road.

On US 45 no turn lanes are provided. No pavement markings exist on Kelly Road, which appears to be a two lane roadway with no exclusive turn lanes.

There is no curb and gutter at the intersection. Gravel shoulders, approximately 8' in width, are provided on both sides of the south leg.

No advanced warning signs exist for this intersection.

26.) <u>US 45 – Between Kelly Road and Miller Road (Approximately 1,400')</u>

Between Kelly Road and Miller Road, US 45 is generally a two-lane undivided roadway. Passing is not permitted anywhere within this segment.

There is one driveway on the west side of US 45 and two on the east side that are clustered around a point approximately 475' north of Kelly Road. Other driveways exist on the east side of the road, 875', 1075', and 1250' and along the west side 725' north of Kelly Road which serve single family residences.

Gravel shoulder, approximately 8' in width is provided on both sides of US 45 throughout the entire segment.

There is no guardrail present along this segment of US 45.

An “intersection ahead” advanced warning sign is provided for northbound traffic, located approximately 700’ south of Miller Road.

27.) <u>US 45 @ Miller Road</u>

US 45 at Miller Road is a four-legged unsignalized intersection, consisting of US 45 on the north and south, and Miller Road on the east and west leg. The intersection is stop-controlled on the east and west legs. There is a street light located at the southwest quadrant of the intersection.

There are no turn lanes on US 45. Miller Road appears to be a two lane roadway with no exclusive turn lanes and no pavement markings.

There is no curb and gutter at the intersection. Gravel shoulders, approximately 8’ in width, are provided on both sides of the north and south legs.

An “intersection ahead” advanced warning sign is provided for both northbound and southbound traffic, located approximately 700’ south and 800’ north of Miller Road respectively.

28.) <u>US 45 – Between Miller Road and IL 173 (Approximately 6,700’)</u>

Between Miller Road and IL 173, US 45 is generally a two-lane undivided roadway. A concrete mountable median does exist where the road widens for channelization at IL 173. Pavement markings indicate passing is permitted for northbound vehicles from Miller Road to approximately 800’ north of Miller Road, and within a passing zone from approximately 1730’ to 4000’ north of Miller Road. Passing is permitted for southbound vehicles within passing zones from approximately 1,475’ to 4000’ south and 4650’ to 5750’ south of IL 173.

There are driveways located on the west side of US 45 at approximately 1850’ north of Miller Road which serves approximately five single family homes and an agricultural facility, and at 5600’ north of Miller Road which serves a forest preserve. There is one gravel driveway on the east side of US 45 at approximately 2800’ north of Miller Road which appears to serve as a field entrance for several local farms. Other minor field entrances exist located sporadically throughout this segment of US 45.

Gravel shoulder, approximately 8’ in width is provided on both sides of US 45 throughout the entire segment. There are sporadically located short sections of paved shoulders approximately 8’ in width throughout the length of this segment of US 45. There is concrete gutter at the approach to the IL 173 intersection.

Guardrails exist at locations approximately: 100’ north of Miller Road at lengths of 120’ on the east side and 200’ on the west side, 2650’ north of Miller Road a length of 375’ on the east side, and 3700’ north of Miller Road at lengths of 425’ along the east side and 225’ along the west side of the roadway. All guardrail ends have substandard end terminals installed.

29.) US 45 @ IL 173

US 45 at IL 173 is a four-legged signalized intersection, with US 45 running north to south and IL 173 running east and west. A gas station is located on the northwest corner of the intersection, a truck dealer on the northeast, and a restaurant and produce stand on the southwest. No lighting exists at this intersection, although ambient lighting from these surrounding developments is likely.

On the north and south legs, one exclusive left-turn lane is provided along with one shared thru/right-turn. The east and west legs consist of the same configuration.

Curb and gutter exists on all legs of the intersection. The curb and gutter runs along US 45 north for approximately 500' and to the south for approximately 200'. The curb and gutter runs along IL 173 for approximately 200' to the west and 150' to the east. Concrete medians separate opposing traffic movement on all legs of the intersections and runs for approximately 600' from the intersection in all directions. The medians typically vary from barrier at the intersection proper to mountable further from the intersection. Adjacent to the mountable portions of the median, there are several commercial driveways which serve the businesses noted above.

No advanced warning signs are provided at this intersection.

30.) West Grass Lake Road – Between US 45 and Heritage Drive (Approximately 1,600')

Between US 45 and Heritage Drive, West Grass Lake Road is generally a two-lane undivided roadway. A painted median does exist where the road widens for channelization at Heritage Drive. Passing is not permitted anywhere within the segment.

Three driveways, two on the north side and one on the south side of West Grass Lake Road, are clustered around a point located approximately 250' west of US 45. Two additional driveways are located on either side of the road about halfway between US 45 and Heritage Drive, and one driveway is located on the south side approximately 140' east of Heritage Drive.

A shoulder approximately 8' in width is provided throughout the segment, consisting of varying widths of pavement and gravel.

31.) West Grass Lake Road @ Heritage Drive

West Grass Lake Road at Heritage Drive is a three-legged unsignalized intersection, consisting of Heritage Drive on the north and West Grass Lake Road on the east and west legs. The intersection is stop-controlled on the north leg, which provides the only direct access to West Grass Lake Road for a large residential subdivision. Decorative street lamps exist on the northeast and northwest corners.

On West Grass Lake Road, an eastbound left-turn lane and a westbound right-turn lane are provided. Exclusive turn lanes for both left and right turning movements are provided on Heritage Drive.

C. CRASH ANALYSIS & RECOMMENDATIONS

The crash analysis was performed using crash data and collision diagrams provided by Lake County Division of Transportation. Police reports from the appropriate local law enforcement agencies were also referenced to spot check the crash data.

Note that the law regarding the crash reporting threshold for Property Damage Only (PDO) crashes was amended effective January 1, 2009, to the following: When all drivers involved in a crash are insured, the amount of damage to the property of any one person that must be reported increased from $500 to $1,500. If any driver does not have insurance, the threshold remains at $500. This change in law precludes comparison of 2009 and later PDO crashes and TOTAL crashes with such crashes for previous years. The change did not affect the reporting of injury or fatal crashes.

Based on the data available, a total of 539 crashes were reported within the study limits during the five-year study period (2007-2011). The data obtained indicates that rear end collisions were the most common type of crash, accounting for 232 crashes (43%). Turning collisions were the second most common at 98 crashes (18%), followed by fixed object with 55 crashes (10%). An aerial of the study limits illustrating the crash data at each intersection and segment can be found in Exhibit 2. Appendix A provides a summary of crash data for each location in tabular form.

A fatal crash is a motor vehicle crash (single or multiple) that results in the death of one or more persons. An injury crash is any motor vehicle crash that results in one or more non-fatal injuries. An injury crash is further classified by the severity of the injuries: A-injury being an incapacitating injury, B-injury being a non-incapacitating injury, and C-injury being any injury reported or claimed which is not evident to observers at the scene of the crash. If a crash does not result in an injury or fatality, it is classified as a Property Damage Only (PDO) crash.

There were no crashes that resulted in a fatality within the time period studied. A total of 7 crashes resulted in type A-injuries (1 rear end, 2 angle, 1 turning, 1 fixed object, 1 head on, and 1 overturned) and 52 resulted in type B-injuries (17 rear end, 4 angles, 14 turning, 14 fixed object, 1 other object, 1 overturned, and 1 head on).

Overall, 92 crashes (17%) occurred on wet pavement conditions, 57 (11%) on snow or ice, and 156 crashes (29%) occurred at night.

The available crash data was analyzed for each intersection and segment within the study limits to determine if crash patterns existed, identify their possible causes, and offer recommended countermeasures to address the problems. The results of this analysis are as follows:

1.) <u>US 45 @ IL 132</u>

A total of 143 crashes were reported at the signalized intersection of US 45 at IL 132 during the five-year study period (2007-2011).

- Rear End: 57 crashes (40%, 5 B, 6 C)
- Turning: 39 crashes (27%, 1 A, 6 B, 9 C)
- Sideswipe: 16 crashes (11%)

combined with the lack of severe injuries does not suggest that the segment is experiencing problems with crashes occurring under these conditions.

23.) <u>US 45 @ Independence Boulevard</u>

A total of 4 crashes were reported at the unsignalized intersection of US 45 @ Independence Boulevard during the five-year study period (2007-2011).

- Overturned: 1 crash (25%, 1 A)
- Rear end: 1 crash (25%, 1 C)
- Turning: 1 crash (25%)
- Fixed Object: 1 crash (25%)

Overturned, rear end. turning, and fixed object crash types each accounted for one crash. The overturned crash did result in A-type injuries. A collision diagram for this intersection is provided in Figure 12.

Channelization exists for all permitted movements at this intersection.

Overall at this intersection, no crashes on wet pavement and 1 crash (25%) occurred during nighttime hours. This data does not suggest that the segment is experiencing a recurring problem with crashes occurring under these conditions.

The low number of crashes does not suggest countermeasures are necessary at this time.

24.)<u>US 45 – Between Independence Boulevard and Kelly Road (Approximately 5,300')</u>

A total of 24 crashes were reported on US 45 between Independence Boulevard and the study limits during the five-year study period (2007-2011).

- Animal: 16 crashes (67%)
- Fixed Object: 6 crashes (25%, 1 B)
- Head on: 1 crash (4%, 1 B)
- Other non-collision: 1 crash (4%)

Animal and fixed object collisions were the most frequent crash types with 16 and 6 respectively. Fixed object collisions resulted in 1 B-injury incident. Although there was only one occurrence of the head on collision, it resulted in a B-injury.

Side slopes beyond the gravel shoulder of US 45 between Independence Boulevard and the study limits are generally not as steep as those discussed on US 45 between West Grass Lake Road and Independence Boulevard, yet, of the 24 crashes within this segment, 6 were fixed object collisions.

To address these run-off-road crashes it is recommended that a paved shoulder with a rumble strip should be constructed to replace the existing gravel shoulder in both directions. This will provide

motorists with warning prior to running off the road and give them a stable level surface on which to recover.

It is difficult to determine whether these crashes have anything in common, as there do not seem to be any fixed objects in the vicinity that seem more likely to be struck than others. However, there are two guardrails within this segment, located approximately 1,320' south of the study limits, which have substandard end terminal sections that could cause vehicles to roll over upon striking them. It is recommended that these end sections be removed and replaced with the current standard. Any missing or broken guardrail reflectors should also be replaced.

There are 3 driveways on the west side and 1 driveway on the east side of US 45 between Independence Boulevard and Kelly Road, none of which provide channelization for northbound or southbound vehicles.

The lack of channelization could cause rear end or sideswipe crashes when vehicles slowing or stopping to make a turn into these driveways are struck as vehicles behind them slow or stop too late or attempt to pass. Widening US 45 at the driveway clusters for the construction of left-turn lanes is an option to reduce the frequency of these types of crashes; however, since none of these crash types occurred within the time period studied, this countermeasure is not recommended at this time. Crash data should continue to be monitored for these types of crashes.

Overall within this segment, 4 crashes (17%) occurred on wet pavement and 17 crashes (71%) occurred during nighttime hours. Night crashes consisted of 11 animal collisions and 6 fixed objects. One of the nighttime fixed object collisions resulted in a B-injury. While the recommended rumble strips and shoulder improvement addresses roadway departure crashes, the fact that all fixed object crashes occurred in the dark suggests that nighttime visibility may be an issue. Therefore, segment lighting is recommended to reduce the frequency of these crashes.

Additionally, there is a dense growth of trees and other vegetation approaching the edge of the shoulder in many locations approximately halfway through the segment. Tree trimming or removal, as necessary, is recommended to provide additional area for motorists to identify and avoid animals near the roadway.

25.) <u>US 45 @ Kelly Road</u>

A total of 4 crashes were reported at the unsignalized intersection of US 45 at Kelly Road during the five-year study period (2007-2011).

- Fixed Object: 2 crashes (50%)
- Rear End: 1 crash (25%, 1 B)
- Other Object: 1 crash (25%)

Fixed object collisions was the most frequent crash type with 2 occurrences, however neither resulted in any reported injuries. The single rear end collision did result in a B-injury. A collision diagram for this intersection is provided in Figure 13.

There are no dedicated turn lanes or channelization at this intersection. The lack of channelization could cause rear end or sideswipe crashes when vehicles slowing or stopping to make a turn at this intersection are struck as vehicles behind them slow or stop too late or attempt to pass. Widening US 45 at this intersection for the construction of a southbound left-turn lane and northbound right-turn lane is recommended to reduce the frequency of these types of crashes.

Additionally, there is a dense growth of trees and other vegetation approaching the edge of the shoulder at the intersection. Tree trimming or removal, as necessary, is recommended to provide additional area for motorists to avoid fixed objects near the roadway.

Overall at this intersection, no crashes occurred on wet pavement and 1 crash (25%) occurred during nighttime hours. This data does not suggest that the segment is experiencing a recurring problem with crashes occurring under these conditions.

26.) <u>US 45 – Between Kelly Road and Miller Road (Approximately 1,400')</u>

A total of 1 crash was reported on US 45 between Kelly Road and Miller Road during the five-year study period (2007-2011).

- Fixed object: 1 crash (100%)

The sole crash did not result in injuries.

Overall in this segment, no crashes occurred on wet pavement and 1 crash (100%) occurred during nighttime hours. The relatively low number of crashes throughout the segment does not suggest that this segment is experiencing a problem with crashes occurring under these conditions.

No countermeasures are recommended at this time.

27.) <u>US 45 @ Miller Road</u>

A total of 9 crashes were reported at the unsignalized intersection of US 45 at Miller Road during the five-year study period (2007-2011).

- Rear End: 5 crashes (56%, 1 B)
- Turning: 1 crash (11%, 1 B)
- Fixed Object: 1 crash (11%, 1 B)
- Other Object: 1 crash (11%, 1 B)
- Sideswipe: 1 crash (11%)

The predominant crash type was the rear end, which accounted for over half of all reported crashes at the intersection, one of which resulted in a B-injury. B-injuries also resulted from the single turning, fixed object, and other object collisions. A collision diagram for this intersection is provided in Figure 14.

As illustrated on the intersection crash diagram, the majority of rear ends involved vehicles traveling northbound or southbound on US 45.

There are no dedicated turn lanes or channelization at this intersection. The lack of channelization could cause rear end, turning, or sideswipe crashes when vehicles slowing or stopping to make a turn from US 45 Road onto Miller Road are struck as vehicles behind them slow or stop too late or attempt to pass. Widening US 45 at this intersection for the construction of left-turn lanes is recommended to reduce the frequency of these types of crashes.

Overall at this intersection, none of the crashes occurred on wet pavement. This suggests that the intersection is not experiencing a problem with crashes occurring under these conditions. A total of 5 crashes (56%) occurred during nighttime hours and all of the injury crashes occurred during nighttime hours. Intersection lighting is recommended to reduce the frequency of crashes at night.

28.) <u>US 45 – Between Miller Road and IL 173 (Approximately 6,700')</u>

A total of 12 crashes were reported on US 45 between Miller Road and IL 173 during the five-year study period (2007-2011).

- Animal: 8 crashes (67%)
- Rear End: 2 crashes (17%)
- Angle: 1 crash (8%, 1 C)
- Head on: 1 crash (8%)

Animal and rear end collisions were the most frequent crash types with 8 and 2 respectively. An angle crash resulted in a C-injury.

There are several guardrails within this segment which have substandard end terminal sections that could cause vehicles to roll over upon striking them. It is recommended that these end sections be removed and replaced with the current standard. Any missing or broken guardrail reflectors should also be replaced.

Animal collisions represented two-thirds of the total collisions along this segment. There does not appear to be any dense growth of trees and other vegetation approaching the edge of the shoulder in this segment. There is, however, a forest preserve located at the north end of this segment. Tree trimming or removal, as necessary, is recommended to provide additional area for motorists to identify and avoid animals near the roadway.

Overall within this segment, 1 crash (8%) occurred on wet pavement and 6 crashes (50%) occurred during nighttime hours. While the ratio of night crashes is above the threshold required to consider implementing countermeasures for this condition, the predominance of animal collisions during night conditions (5 crashes – 83% of night crashes) combined with the lack of severe injuries does not suggest that roadway lighting would be an effective countermeasure along this segment.

29.) <u>US 45 @ IL 173</u>

A total of 71 crashes were reported at the signalized intersection of US 45 at IL 173 during the five-year study period (2007-2011).

- Rear End: 36 crashes (51%, 1 A, 2 B, 5 C)
- Turning: 17 crashes (24%, 3 B, 2 C)
- Angle: 8 crashes (11%, 3 C)
- Fixed Object: 6 crashes (8%, 1 B)
- Sideswipe: 2 crashes (3%)
- Other Object: 1 crashes (1%)
- Head On: 1 crash (1%)

The predominant crash type was the rear end, which accounted for half of all reported crashes at the intersection and resulted in 1 A, 2 B, and 5 C-injury incidents. Turning was the second most common at 24% and responsible for 3 B-injury and 2 C-injury incident. Angle collisions accounted for 11% of the crashes, including 3 C-injury incidents. One of the two sideswipe collisions accounted for 1 B-injury. A collision diagram for this intersection is provided in Figure 15.

As illustrated on the intersection crash diagram, the majority of rear end crashes involved vehicles traveling eastbound or westbound on IL 173. Exclusive left-turn lanes exist in all directions; however, just one lane is provided for the thru/right-turn movements. Construction of right turn lanes is recommended for the east and west legs and is an option for the north and south legs.

The existing signal is outdated, consisting of aluminum trombone-style mast arms that provide just one mast arm mounted signal head for the two approach lines in each direction. It is recommended that this signal be completely rebuilt to current standards, consisting of steel mast arms, one mast arm mounted signal head per approach lane in all directions, and LED signal heads.

Additionally, there currently are no "signal ahead" advanced warning signs at this intersection. It is recommended to install advanced warning signs with optional flashing amber beacons along all legs of the intersection.

Overall at this intersection, 18 crashes (25%) occurred on wet pavement and 15 crashes (21%) occurred during nighttime hours. This data does not suggest that the intersection is experiencing a problem with crashes occurring under nighttime conditions. Wet surface crashes consisted of 8 rear end, 6 turning, 2 angle, 1 fixed object, and 1 sideswipe collisions, which resulted in 1 B-injury and 3 C-injury incidents. Nearly all of these collisions involved eastbound or westbound vehicles; therefore, a skid resistant surface treatment is recommended for the east and west legs of IL 173.

30.) <u>West Grass Lake Road – Between US 45 and Heritage Drive (Approximately 1,600')</u>

A total of 9 crashes were reported on West Grass Lake Road between US 45 and Heritage Drive during the five-year study period (2007-2011).

- Rear End: 6 crashes (67%, 3 C)

D. CONCLUSIONS

As an overall corridor improvement, it is recommended that all substandard signage throughout the study limits should be modernized. Meeting the current standards for size and material of all signs will increase their visibility to motorists and their effectiveness.

Based on analysis of the crash data obtained relating to the US 45 Millburn Bypass, the following recommendations are offered for each location:

1.) <u>US 45 @ IL 132</u>

- Modernize existing traffic signal to upgrade existing signal heads to LEDs.
- Add advance warning signs for northbound and southbound traffic.
- Install amber flashing beacons on the existing advance warning signs for eastbound and westbound traffic.
- Northbound and southbound left turning traffic should be investigated for conversion to protected only left turns.
- The yellow and all red clearance intervals should be investigated further.

2.) <u>US 45 – Between IL 132 and Highfield Drive (Approximately 2,300')</u>

- Construct two-way left-turn channelization.
- Install appropriate transitional lighting.

3.) <u>US 45 @ Highfield Drive</u>

- No countermeasures are recommended at this time.

4.) <u>US 45 – Between Highfield Drive and Chatham Way (Approximately 925')</u>

- No countermeasures are recommended at this time.

5.) <u>US 45 @ Chatham Way</u>

- No countermeasures are recommended at this time.

6.) <u>US 45 – Between Chatham Way and Deer Trail Drive (Approximately 1,200')</u>

- No countermeasures are recommended at this time.

24.) <u>US 45 – Between Independence Boulevard and Kelly Road (Approximately 5,300')</u>

- Remove existing gravel shoulder on both sides of roadway and construct paved shoulder with rumble strips for both directions.
- Remove existing substandard guardrail end terminal sections and replace with current standard Traffic Barrier Terminal Type 1 (Special) sections.
- Replace missing or broken guardrail reflectors.
- Install appropriate segment lighting.
- Trim overgrown trees and remove those which are close to the roadway.

25.) <u>US 45 @ Kelly Road</u>

- Construct a southbound left-turn lane and a northbound right-turn lane.
- Trim overgrown trees and remove those which are close to the roadway.

26.) <u>US 45 – Between Kelly Road and Miller Road (Approximately 1,400')</u>

- No countermeasures are recommended at this time.

27.) <u>US 45 @ Miller Road</u>

- Construct northbound and southbound left-turn lanes.
- Install appropriate intersection lighting.

28.) <u>US 45 – Between Miller Road and IL 173 (Approximately 6,700')</u>

- Remove existing substandard guardrail end terminal sections and replace with current standard Traffic Barrier Terminal Type 1 (Special) sections.
- Replace missing or broken guardrail reflectors.
- Trim overgrown trees and remove those which are close to the roadway.

29.)<u>US 45 @ IL 173</u>

- Modernize existing traffic signal to provide steel mast arms, one mast arm mounted signal head per approach lane in all directions and upgrade all signal heads to LEDs.
- Construct right-turn lanes for the eastbound and westbound legs.
- Install advanced warning signs with optional flashing amber beacons for all directions.
- Provide skid-resistant surface treatment for east and west legs.

30.) <u>West Grass Lake Road – Between US 45 and Heritage Drive (Approximately 1,600')</u>

- Construct two-way left-turn channelization at driveway clusters.

E. EXHIBITS

ESI

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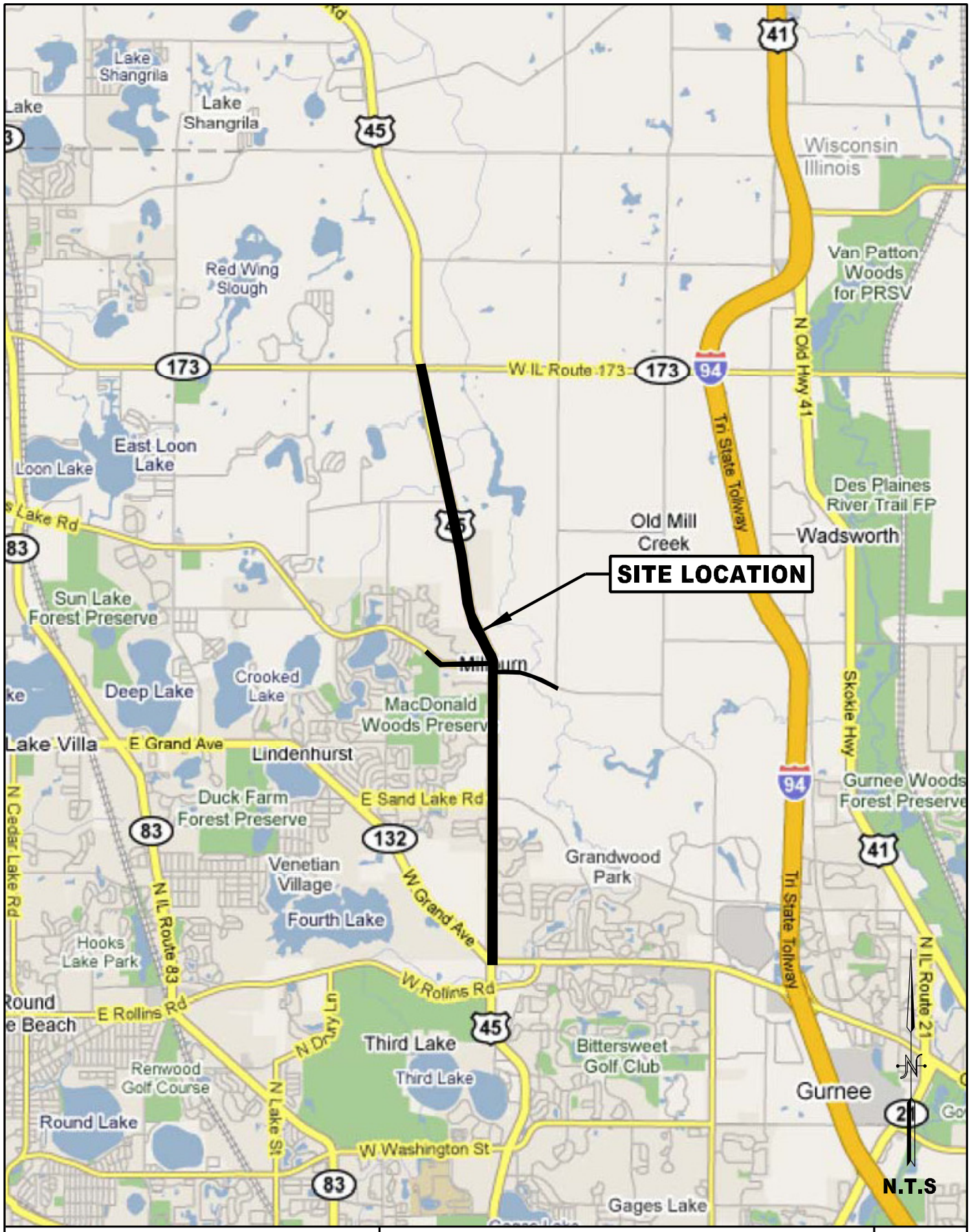
Excellence, Service, Integrity



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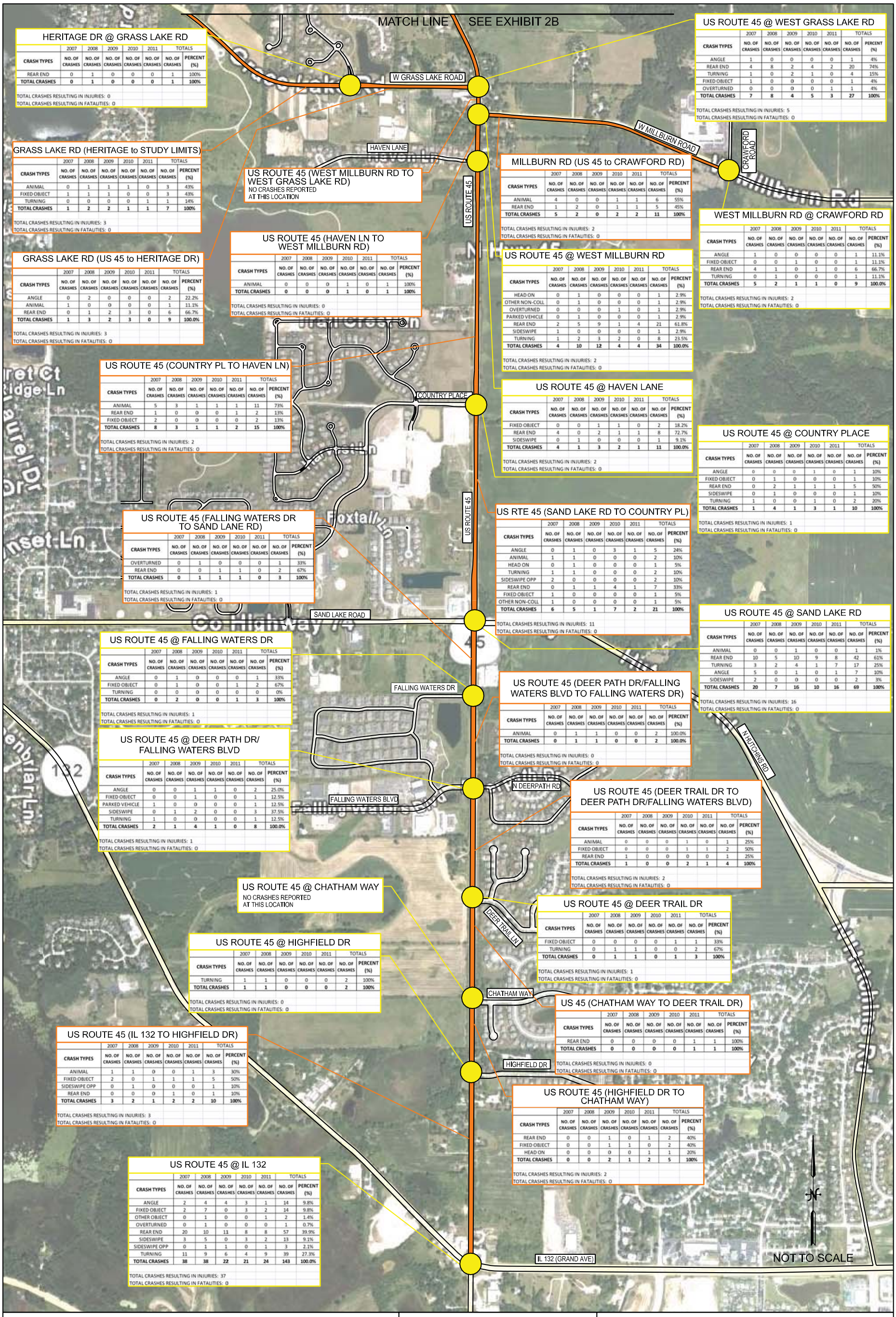
ILLINOIS DEPARTMENT OF PROFESSIONAL REGULATION REGISTRATION #184-003685

US 45 MILLBURN BYPASS
SITE LOCATION MAP

DATE: 10/20/2011
SHEET NO. 1

EXHIBIT 1



HERITAGE DR @ GRASS LAKE RD

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
REAR END	0	1	0	0	0	1	100%
TOTAL CRASHES	**0**	**1**	**0**	**0**	**0**	**1**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 0
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ WEST GRASS LAKE RD

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANGLE	1	0	0	0	0	1	4%
REAR END	4	8	2	4	2	20	74%
TURNING	1	0	2	1	0	4	15%
FIXED OBJECT	1	0	0	0	0	1	4%
OVERTURNED	0	0	0	0	1	1	4%
TOTAL CRASHES	**7**	**8**	**4**	**5**	**3**	**27**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 5
TOTAL CRASHES RESULTING IN FATALITIES: 0

GRASS LAKE RD (HERITAGE to STUDY LIMITS)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	0	1	1	1	0	3	43%
FIXED OBJECT	1	1	1	0	0	3	43%
TURNING	0	0	0	0	1	1	14%
TOTAL CRASHES	**1**	**2**	**2**	**1**	**1**	**7**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 3
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (WEST MILLBURN RD TO WEST GRASS LAKE RD)

NO CRASHES REPORTED
AT THIS LOCATION

MILLBURN RD (US 45 to CRAWFORD RD)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	4	0	0	1	1	6	55%
REAR END	1	2	0	1	1	5	45%
TOTAL CRASHES	**5**	**2**	**0**	**2**	**2**	**11**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 2
TOTAL CRASHES RESULTING IN FATALITIES: 0

WEST MILLBURN RD @ CRAWFORD RD

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANGLE	1	0	0	0	0	1	11.1%
FIXED OBJECT	0	0	1	0	0	1	11.1%
REAR END	4	1	0	1	0	6	66.7%
TURNING	0	1	0	0	0	1	11.1%
TOTAL CRASHES	**5**	**2**	**1**	**1**	**0**	**9**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 2
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (HAVEN LN TO WEST MILLBURN RD)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	0	0	0	1	0	1	100%
TOTAL CRASHES	**0**	**0**	**0**	**1**	**0**	**1**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 0
TOTAL CRASHES RESULTING IN FATALITIES: 0

GRASS LAKE RD (US 45 to HERITAGE DR)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANGLE	0	2	0	0	0	2	22.2%
ANIMAL	1	0	0	0	0	1	11.1%
REAR END	0	1	2	3	0	6	66.7%
TOTAL CRASHES	**1**	**3**	**2**	**3**	**0**	**9**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 3
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ WEST MILLBURN RD

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
HEAD ON	0	1	0	0	0	1	2.9%
OTHER NON-COLL	0	1	0	0	0	1	2.9%
OVERTURNED	0	0	0	1	0	1	2.9%
PARKED VEHICLE	0	1	0	0	0	1	2.9%
REAR END	2	5	9	1	4	21	61.8%
SIDESWIPE	1	0	0	0	0	1	2.9%
TURNING	1	2	3	2	0	8	23.5%
TOTAL CRASHES	**4**	**10**	**12**	**4**	**4**	**34**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 2
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (COUNTRY PL TO HAVEN LN)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	5	3	1	1	1	11	73%
REAR END	1	0	0	0	1	2	13%
FIXED OBJECT	2	0	0	0	0	2	13%
TOTAL CRASHES	**8**	**3**	**1**	**1**	**2**	**15**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 2
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ HAVEN LANE

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
FIXED OBJECT	0	0	1	1	0	2	18.2%
REAR END	4	0	2	1	1	8	72.7%
SIDESWIPE	0	1	0	0	0	1	9.1%
TOTAL CRASHES	**4**	**1**	**3**	**2**	**1**	**11**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 2
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ COUNTRY PLACE

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANGLE	0	0	0	1	0	1	10%
FIXED OBJECT	0	1	0	0	0	1	10%
REAR END	0	2	1	1	1	5	50%
SIDESWIPE	0	1	0	0	0	1	10%
TURNING	1	0	0	1	0	2	20%
TOTAL CRASHES	**1**	**4**	**1**	**3**	**1**	**10**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 1
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (FALLING WATERS DR TO SAND LANE RD)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
OVERTURNED	0	1	0	0	0	1	33%
REAR END	0	0	1	1	0	2	67%
TOTAL CRASHES	**0**	**1**	**1**	**1**	**0**	**3**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 1
TOTAL CRASHES RESULTING IN FATALITIES: 0

US RTE 45 (SAND LAKE RD TO COUNTRY PL)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANGLE	0	1	0	3	1	5	24%
ANIMAL	1	1	0	0	0	2	10%
HEAD ON	0	1	0	0	0	1	5%
TURNING	1	1	0	0	0	2	10%
SIDESWIPE OPP	2	0	0	0	0	2	10%
REAR END	0	1	1	4	1	7	33%
FIXED OBJECT	1	0	0	0	0	1	5%
OTHER NON-COLL	1	0	0	0	0	1	5%
TOTAL CRASHES	**6**	**5**	**1**	**7**	**2**	**21**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 11
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ SAND LAKE RD

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	0	0	1	0	0	1	1%
REAR END	10	5	10	9	8	42	61%
TURNING	3	2	4	1	7	17	25%
ANGLE	5	0	1	0	1	7	10%
SIDESWIPE	2	0	0	0	0	2	3%
TOTAL CRASHES	**20**	**7**	**16**	**10**	**16**	**69**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 16
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ FALLING WATERS DR

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANGLE	0	1	0	0	0	1	33%
FIXED OBJECT	0	1	0	0	1	2	67%
TURNING	0	0	0	0	0	0	0%
TOTAL CRASHES	**0**	**2**	**0**	**0**	**1**	**3**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 1
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (DEER PATH DR/FALLING WATERS BLVD TO FALLING WATERS DR)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	0	1	1	0	0	2	100.0%
TOTAL CRASHES	**0**	**1**	**1**	**0**	**0**	**2**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 0
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ DEER PATH DR/ FALLING WATERS BLVD

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANGLE	0	0	1	1	0	2	25.0%
FIXED OBJECT	0	0	1	0	0	1	12.5%
PARKED VEHICLE	1	0	0	0	0	1	12.5%
SIDESWIPE	0	1	2	0	0	3	37.5%
TURNING	1	0	0	0	0	1	12.5%
TOTAL CRASHES	**2**	**1**	**4**	**1**	**0**	**8**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 1
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (DEER TRAIL DR TO DEER PATH DR/FALLING WATERS BLVD)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	0	0	0	1	0	1	25%
FIXED OBJECT	0	0	0	1	1	2	50%
REAR END	1	0	0	0	0	1	25%
TOTAL CRASHES	**1**	**0**	**0**	**2**	**1**	**4**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 2
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ CHATHAM WAY

NO CRASHES REPORTED
AT THIS LOCATION

US ROUTE 45 @ DEER TRAIL DR

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
FIXED OBJECT	0	0	0	0	1	1	33%
TURNING	0	1	1	0	0	2	67%
TOTAL CRASHES	**0**	**1**	**1**	**0**	**1**	**3**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 1
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ HIGHFIELD DR

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
TURNING	1	1	0	0	0	2	100%
TOTAL CRASHES	**1**	**1**	**0**	**0**	**0**	**2**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 0
TOTAL CRASHES RESULTING IN FATALITIES: 0

US 45 (CHATHAM WAY TO DEER TRAIL DR)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
REAR END	0	0	0	0	1	1	100%
TOTAL CRASHES	**0**	**0**	**0**	**0**	**1**	**1**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 0
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (IL 132 TO HIGHFIELD DR)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	1	1	0	0	1	3	30%
FIXED OBJECT	2	0	1	1	1	5	50%
SIDESWIPE OPP	0	1	0	0	0	1	10%
REAR END	0	0	0	1	0	1	10%
TOTAL CRASHES	**3**	**2**	**1**	**2**	**2**	**10**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 3
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (HIGHFIELD DR TO CHATHAM WAY)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
REAR END	0	0	1	0	1	2	40%
FIXED OBJECT	0	0	1	1	0	2	40%
HEAD ON	0	0	0	0	1	1	20%
TOTAL CRASHES	**0**	**0**	**2**	**1**	**2**	**5**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 2
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ IL 132

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANGLE	2	4	4	3	1	14	9.8%
FIXED OBJECT	2	7	0	3	2	14	9.8%
OTHER OBJECT	0	1	0	0	1	2	1.4%
OVERTURNED	0	1	0	0	0	1	0.7%
REAR END	20	10	11	8	8	57	39.9%
SIDESWIPE	3	5	0	3	2	13	9.1%
SIDESWIPE OPP	0	1	1	0	1	3	2.1%
TURNING	11	9	6	4	9	39	27.3%
TOTAL CRASHES	**38**	**38**	**22**	**21**	**24**	**143**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 37
TOTAL CRASHES RESULTING IN FATALITIES: 0

Illinois Department of Transportation
DISTRICT 1
201 WEST CENTER COURT
SCHAUMBURG, IL 60196–1096
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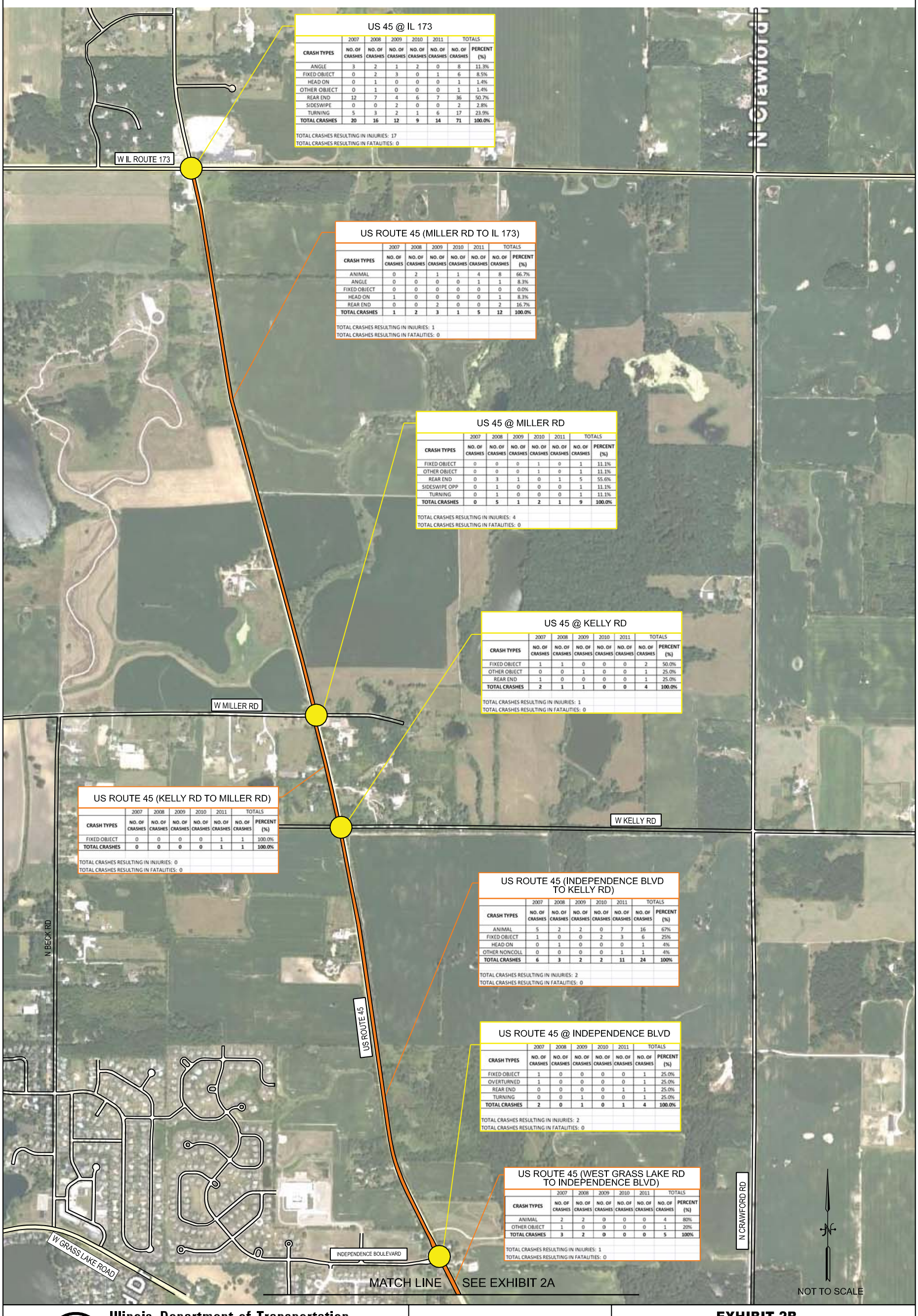
US ROUTE 45
MILLBURN BYPASS

EXHIBIT 2A

2007 - 2011 CRASH DATA
ROADWAY SEGMENTS & INTERSECTIONS



US 45 @ IL 173

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANGLE	3	2	1	2	0	8	11.3%
FIXED OBJECT	0	2	3	0	1	6	8.5%
HEAD ON	0	1	0	0	0	1	1.4%
OTHER OBJECT	0	1	0	0	0	1	1.4%
REAR END	12	7	4	6	7	36	50.7%
SIDESWIPE	0	0	2	0	0	2	2.8%
TURNING	5	3	2	1	6	17	23.9%
TOTAL CRASHES	**20**	**16**	**12**	**9**	**14**	**71**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 17
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (MILLER RD TO IL 173)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	0	2	1	1	4	8	66.7%
ANGLE	0	0	0	0	1	1	8.3%
FIXED OBJECT	0	0	0	0	0	0	0.0%
HEAD ON	1	0	0	0	0	1	8.3%
REAR END	0	0	2	0	0	2	16.7%
TOTAL CRASHES	**1**	**2**	**3**	**1**	**5**	**12**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 1
TOTAL CRASHES RESULTING IN FATALITIES: 0

US 45 @ MILLER RD

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
FIXED OBJECT	0	0	0	1	0	1	11.1%
OTHER OBJECT	0	0	0	1	0	1	11.1%
REAR END	0	3	1	0	1	5	55.6%
SIDESWIPE OPP	0	1	0	0	0	1	11.1%
TURNING	0	1	0	0	0	1	11.1%
TOTAL CRASHES	**0**	**5**	**1**	**2**	**1**	**9**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 4
TOTAL CRASHES RESULTING IN FATALITIES: 0

US 45 @ KELLY RD

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
FIXED OBJECT	1	1	0	0	0	2	50.0%
OTHER OBJECT	0	0	1	0	0	1	25.0%
REAR END	1	0	0	0	0	1	25.0%
TOTAL CRASHES	**2**	**1**	**1**	**0**	**0**	**4**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 1
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (KELLY RD TO MILLER RD)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
FIXED OBJECT	0	0	0	0	1	1	100.0%
TOTAL CRASHES	**0**	**0**	**0**	**0**	**1**	**1**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 0
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (INDEPENDENCE BLVD TO KELLY RD)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	5	2	2	0	7	16	67%
FIXED OBJECT	1	0	0	2	3	6	25%
HEAD ON	0	1	0	0	0	1	4%
OTHER NONCOLL	0	0	0	0	1	1	4%
TOTAL CRASHES	**6**	**3**	**2**	**2**	**11**	**24**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 2
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 @ INDEPENDENCE BLVD

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
FIXED OBJECT	1	0	0	0	0	1	25.0%
OVERTURNED	1	0	0	0	0	1	25.0%
REAR END	0	0	0	0	1	1	25.0%
TURNING	0	0	1	0	0	1	25.0%
TOTAL CRASHES	**2**	**0**	**1**	**0**	**1**	**4**	**100.0%**

TOTAL CRASHES RESULTING IN INJURIES: 2
TOTAL CRASHES RESULTING IN FATALITIES: 0

US ROUTE 45 (WEST GRASS LAKE RD TO INDEPENDENCE BLVD)

CRASH TYPES	2007 NO. OF CRASHES	2008 NO. OF CRASHES	2009 NO. OF CRASHES	2010 NO. OF CRASHES	2011 NO. OF CRASHES	TOTALS NO. OF CRASHES	TOTALS PERCENT (%)
ANIMAL	2	2	0	0	0	4	80%
OTHER OBJECT	1	0	0	0	0	1	20%
TOTAL CRASHES	**3**	**2**	**0**	**0**	**0**	**5**	**100%**

TOTAL CRASHES RESULTING IN INJURIES: 1
TOTAL CRASHES RESULTING IN FATALITIES: 0

Illinois Department of Transportation
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US ROUTE 45
MILLBURN BYPASS

EXHIBIT 2B

2007 - 2011 CRASH DATA
ROADWAY SEGMENTS & INTERSECTIONS

F. FIGURES

ESI

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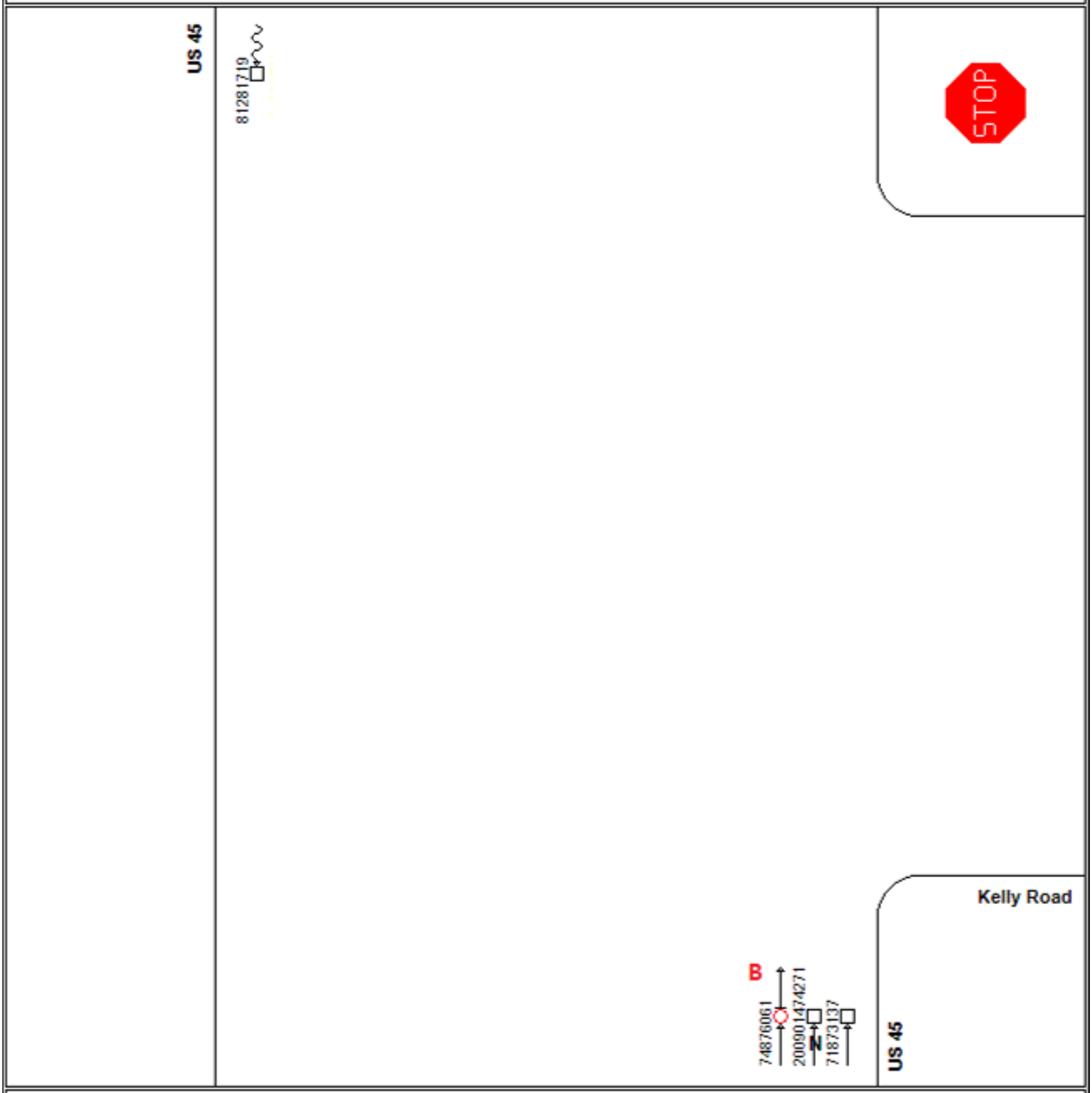
Excellence, Service, Integrity

Us Highway 45 & Kelly Rd
1/1/2007 - 12/31/2011

FIGURE 13

4 Crashes
(0 crash(es) not drawn)

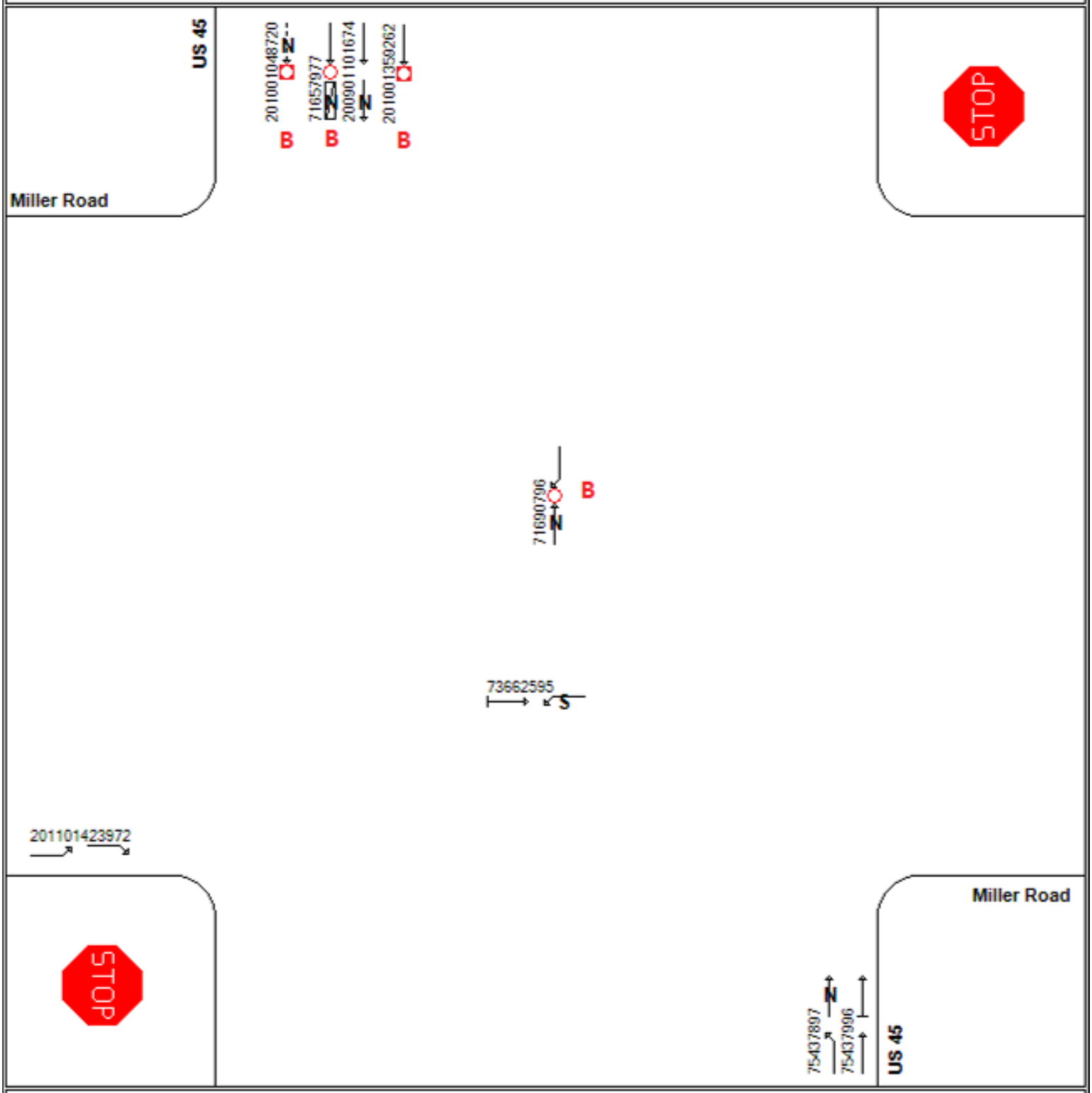


Straight	Backing	Erratic	Injury	S Sideswipe	
Right Turn	Passing	Out of Control	Fatality	N Nighttime	
Left Turn	U-Turn	Unknown	Pedestrian	D DUI	Not to Scale
Stopped	Parked	Fixed Object	Bicycle		Printed: 1/18/2013

Us Highway 45 & Miller Rd
1/1/2007 - 12/31/2011

FIGURE 14

9 Crashes
(0 crash(es) not drawn)



Straight	Backing	Erratic	Injury	S	Sideswipe				
Right Turn	Passing	Out of Control	Fatality	N	Nighttime				
Left Turn	U-Turn	Unknown	Pedestrian	D	DUI				
Stopped	Parked	Fixed Object	Bicycle						

N

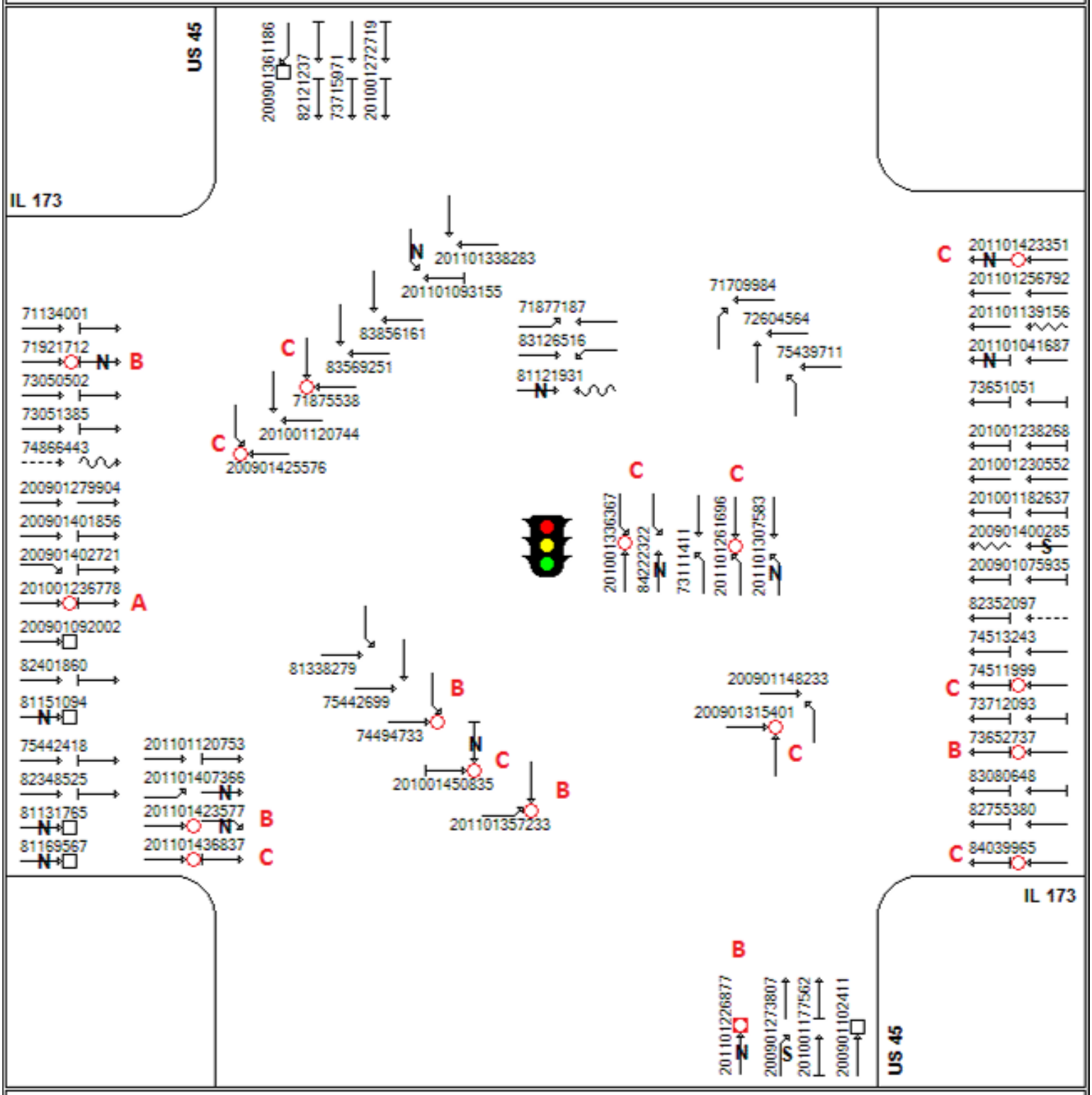
Not to Scale

Printed: 1/18/2013

Us Highway 45 & Il Route 173
1/1/2007 - 12/31/2011

FIGURE 15

71 Crashes
(0 crash(es) not drawn)



APPENDIX A

CRASH SUMMARY TABLES

ESI

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Project: US 45 Millburn Bypass

Location: US 45 (Independence Boulevard to Kelly Road)

Town: Millburn

County: Lake

YEAR	Rear End			Angle			Sideswipe			Turning Left/Right			Fixed Object			Over-turned			Head On			Other Object			Animal			Other Non-Collision			TOTAL
	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count
2007													1												5						6
2008																			1	1 - B	1 - BI				2						3
2009																									2						2
2010													2	1 - B	1 - BI																2
2011													3												7			1			11
TOTAL													**6**	**1 - B**	**1 - BI**				**1**	**1 - B**	**1 - BI**				**16**			**1**			**24**
%													**25.0%**						**4.2%**						**66.7%**			**4.2%**			

	INJURY TYPE											
YEAR	**K**	**A**	**B**	**C**	**PDO**	**WET**		**Snow/Ice**		**Night**		**TOTAL**
2007					6	1	17%	1	17%	4	67%	6
2008			1		2					1	33%	3
2009					2			1	50%	2	100%	2
2010			1		1	1	50%			2	100%	2
2011					11	2	18%	2	18%	8	73%	11
TOTAL			**2**		**22**	**4**	**16.7%**	**4**	**16.7%**	**17**	**70.8%**	**24**

Project: US 45 Millburn Bypass

Location: US 45 @ Kelly Road

Town: Millburn

County: Lake

YEAR	Rear End			Angle			Sideswipe			Turning Left/Right			Fixed Object			Over-turned			Head On			Other Object			Animal			Other Non-Collision			TOTAL
	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count
2007	1	1 - B	2 - BI										1																		2
2008													1																		1
2009																						1									1
2010																															
2011																															
TOTAL	**1**	**1 - B**	**2 - BI**										**2**									**1**									**4**
%	**25.0%**												**50.0%**									**25.0%**									

YEAR	INJURY TYPE K	A	B	C	PDO	WET		Snow/Ice		Night		TOTAL
2007			1		1			1	50%			2
2008					1			1	100%			1
2009					1			1	100%	1	100%	1
2010												
2011												
TOTAL			**1**		**3**			**3**	**75.0%**	**1**	**25.0%**	**4**

Project: US 45 Millburn Bypass

Location: US 45 (Kelly Road - Miller Road)

Town: Millburn

County: Lake

YEAR	Rear End			Angle			Sideswipe			Turning Left/Right			Fixed Object			Over-turned			Head On			Other Object			Animal			Other Non-Collision			TOTAL
	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	**Crash Count**
2007																															
2008																															
2009																															
2010																															
2011													1																		1
TOTAL													**1**																		**1**
%													**100.0%**																		

YEAR	INJURY TYPE K	A	B	C	PDO	WET		Snow/Ice		Night		TOTAL
2007												
2008												
2009												
2010												
2011					1			1	100%	1	100%	1
TOTAL					**1**			**1**	**100.0%**	**1**	**100.0%**	**1**

Project: US 45 Millburn Bypass

Location: US 45 @ Miller Road

Town: Millburn

County: Lake

YEAR	Rear End			Angle			Sideswipe			Turning Left/Right			Fixed Object			Over-turned			Head On			Other Object			Animal			Other Non-Collision			TOTAL
	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count
2007	3	1 - B	1 - BI				1			1	1 - B	2 - BI																			5
2008																															
2009	1																														1
2010													1	1 - B	1 - BI							1	1 - B	1 - BI							2
2011	1																														1
TOTAL	**5**	**1 - B**	**1 - BI**				**1**			**1**	**1 - B**	**2 - BI**	**1**	**1 - B**	**1 - BI**							**1**	**1 - B**	**1 - BI**							**9**
%	**55.6%**						**11.1%**			**11.1%**			**11.1%**									**11.1%**									

	INJURY TYPE											
YEAR	**K**	**A**	**B**	**C**	**PDO**	**WET**		**Snow/Ice**		**Night**		**TOTAL**
2007			2		3			2	40%	3	60%	5
2008												
2009					1			1		1		1
2010			2							1	50%	2
2011					1							1
TOTAL			**4**		**5**			**3**	**33.3%**	**5**	**55.6%**	**9**

Project: US 45 Millburn Bypass

Location: US 45 (Miller Road - IL 173)

Town: Millburn

County: Lake

YEAR	Rear End			Angle			Sideswipe			Turning Left/Right			Fixed Object			Over-turned			Head On			Other Object			Animal			Other Non-Collision			TOTAL
	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	**Crash Count**
2007																			1												1
2008																									2						2
2009	2																								1						3
2010																									1						1
2011				1	1 - C	1 - CI																			4						5
TOTAL	**2**			**1**	**1 - C**	**1 - CI**													**1**						**8**						**12**
%	**16.7%**			**8.3%**															**8.3%**						**66.7%**						

	INJURY TYPE											
YEAR	**K**	**A**	**B**	**C**	**PDO**	**WET**		**Snow/Ice**		**Night**		**TOTAL**
2007					1							1
2008					2					1	50%	2
2009					3			1	33%	1	33%	3
2010					1					1	100%	1
2011				1	4	1	20%	1	20%	3	60%	5
TOTAL				**1**	**11**	**1**	**8.3%**	**2**	**16.7%**	**6**	**50.0%**	**12**

Project: US 45 Millburn Bypass

Location: US 45 @ IL 173

Town: Millburn

County: Lake

YEAR	Rear End			Angle			Sideswipe			Turning Left/Right			Fixed Object			Over-turned			Head On			Other Object			Animal			Other Non-Collision			TOTAL
	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count
2007	12	2 - B 1 - C	6 - BI 1 - CI	3	1 - C	1 - CI				5	1 - B	2 - BI																			20
2008	7	1 - C	1 - CI	2						3			2						1			1									16
2009	4	1 - C	3 - CI	1	1 - C	1 - CI	2			2			3																		12
2010	6	1 - A	1 - AI 1 - BI	2	1 - C	2 - CI				1	1 - C	1 - CI																			9
2011	7	2 - C	3 - CI							6	2 - B 1 - C	2 - BI 1 - CI	1	1 - B	1 - BI																14
TOTAL	**36**	**1 - A 2 - B 5 - C**	**1 - AI 7 - BI 8 - CI**	**8**	**3 - C**	**4 - CI**	**2**			**17**	**3 - B 2 - C**	**4 - BI 2 - CI**	**6**	**1 - B**	**1 - BI**				**1**			**1**									**71**
%	**50.7%**			**11.3%**			**2.8%**			**23.9%**			**8.5%**						**1.4%**			**1.4%**									

YEAR	INJURY TYPE K	A	B	C	PDO	WET		Snow/Ice		Night		TOTAL
2007			3	2	15	4	20%	1	5%	2	10%	20
2008				1	15	3	19%	4	25%	5	31%	16
2009				2	10	4	33%	2	17%			12
2010		1		2	6	2	22%			1	11%	9
2011			3	3	8	5	36%			7	50%	14
TOTAL		**1**	**6**	**10**	**54**	**18**	**25.4%**	**7**	**9.9%**	**15**	**21.1%**	**71**

Project: US 45 Millburn Bypass

Location: West Grass Lake Road (Heritage Drive to Study Limits)

Town: Millburn

County: Lake

YEAR	Rear End			Angle			Sideswipe			Turning Left/Right			Fixed Object			Over-turned			Head On			Other Object			Animal			Other Non-Collision			TOTAL
	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count
2007													1																		1
2008													1	1 - B	1 - BI										1						2
2009													1												1						2
2010																									1	1 - C	2 - CI				1
2011										1	1 - B	1 - BI																			1
TOTAL										**1**	**1 - B**	**1 - BI**	**3**	**1 - B**	**1 - BI**										**3**	**1 - C**	**2 - CI**				**7**
%										**14.3%**			**42.9%**												**42.9%**						

YEAR	INJURY TYPE K	A	B	C	PDO	WET		Snow/Ice		Night		TOTAL
2007					1					1	100%	1
2008			1		1							2
2009					2					1	50%	2
2010				1		1	100%					1
2011			1									1
TOTAL			**2**	**1**	**4**	**1**	**14.3%**			**2**	**28.6%**	**7**

Project: US 45 Millburn Bypass

Location: West Millburn Road (US 45 to Crawford Road)

Town: Millburn

County: Lake

YEAR	Rear End			Angle			Sideswipe			Turning Left/Right			Fixed Object			Over-turned			Head On			Other Object			Animal			Other Non-Collision			TOTAL
	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count
2007	1																								4						5
2008	2																														2
2009																															
2010	1	1 - B	3 - BI																						1						2
2011	1	1 - B	1 - BI 1 - CI																						1						2
TOTAL	**5**	**2 - B**	**4 - BI** **1 - CI**																						**6**						**11**
%	**45.5%**																								**54.5%**						

YEAR	INJURY TYPE					WET		Snow/Ice		Night		TOTAL
	K	A	B	C	PDO							
2007					5	1	20%	1	20%	2	40%	5
2008					2							2
2009												
2010			1		1	1	50%			1	50%	2
2011			1		1					2	100%	2
TOTAL			**2**		**9**	**2**	**18.2%**	**1**	**9.1%**	**5**	**45.5%**	**11**

Project: US 45 Millburn Bypass

Location: West Millburn Road @ Crawford Road

Town: Millburn

County: Lake

YEAR	Rear End			Angle			Sideswipe			Turning Left/Right			Fixed Object			Over-turned			Head On			Other Object			Animal			Other Non-Collision			TOTAL
	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count	Injury Type	Injury Count	Crash Count
2007	4			1	1 - A	2 - AI																									5
2008	1									1																					2
2009													1	1 - B	1 - BI																1
2010	1																														1
2011																															
TOTAL	**6**			**1**	**1 - A**	**2 - AI**				**1**			**1**	**1 - B**	**1 - BI**																**9**
%	**66.7%**			**11.1%**						**11.1%**			**11.1%**																		

	INJURY TYPE											
YEAR	**K**	**A**	**B**	**C**	**PDO**	**WET**		**Snow/Ice**		**Night**		**TOTAL**
2007		1			4	2	40%	1	20%			5
2008					2							2
2009			1									1
2010					1							1
2011												
TOTAL		**1**	**1**		**7**	**2**	**22.2%**	**1**	**11.1%**			**9**

APPENDIX B

RAW CRASH DATA

ESI

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US 45 (Independence Boulevard to Kelly Road)

2007 - 2011

CRASH ID	CRASH DATE	CRASH TIME	COLLISION TYPE	WEATHER	ROAD SURFACE	LIGHTING	VEHICLES INVOLVED	TOTAL INJURIES	INJURY LEVEL
201001048728	1/30/2010	6:06	Fixed object	Snow	Snow and slush	Darkness	1	1	B
83569392	9/21/2008	6:30	Head on	Fog	Dry	Daylight	1	1	B
201101435886	12/21/2011	20:10	Fixed object	Clear	Dry	Darkness	1	0	PDO
201101423215	10/27/2011	16:20	Animal	Clear	Wet	Daylight	1	0	PDO
201101423516	10/18/2011	18:30	Animal	Clear	Dry	Darkness	1	0	PDO
201101309862	9/2/2011	0:30	Fixed object	Clear	Dry	Darkness	1	0	PDO
201101123261	4/6/2011	5:35	Animal	Clear	Dry	Dawn	1	0	PDO
201101121319	3/23/2011	17:10	Other noncollision	Rain	Wet	Daylight	1	0	PDO
201101077212	2/21/2011	4:45	Fixed object	Clear	Ice	Darkness	1	0	PDO
201101085734	1/30/2011	0:03	Animal	Clear	Dry	Darkness	1	0	PDO
201101085719	1/30/2011	0:03	Animal	Clear	Dry	Darkness	1	0	PDO
201101079015	1/14/2011	20:30	Animal	Snow	Snow and slush	Darkness	1	0	PDO
201101079189	1/13/2011	5:09	Animal	Clear	Dry	Darkness	1	0	PDO
201001259197	6/29/2010	21:34	Fixed object	Clear	Dry	Darkness	1	0	PDO
200901465612	12/24/2009	17:18	Animal	Rain	Snow and slush	Darkness	1	0	PDO
200901463946	12/20/2009	17:15	Animal	Clear	Dry	Darkness	1	0	PDO
81536963	4/3/2008	6:00	Animal	Clear	Dry	Dawn	1	0	PDO
81570657	1/26/2008	17:52	Animal	Clear	Dry	Darkness	1	0	PDO
75419754	11/28/2007	17:28	Animal	Clear	Dry	Darkness	1	0	PDO
75416933	11/19/2007	4:25	Animal	Clear	Wet	Darkness	1	0	PDO
74856030	10/30/2007	20:39	Animal	Clear	Dry	Darkness	1	0	PDO
72604622	4/2/2007	6:00	Animal	Clear	Dry	Daylight	1	0	PDO
71876569	3/29/2007	10:00	Animal	Clear	Dry	Daylight	1	0	PDO
71871297	3/2/2007	19:56	Fixed object	Snow	Snow and slush	Darkness	1	0	PDO

TOTAL CRASHES: **24**

TOTAL INJURIES: **2**

US 45 @ Kelly Road

2007 - 2011

CRASH ID	CRASH DATE	CRASH TIME	COLLISION TYPE	WEATHER	ROAD SURFACE	LIGHTING	VEHICLES INVOLVED	TOTAL INJURIES	INJURY LEVEL
74876061	10/4/2007	15:57	Rear end	Clear	Dry	Daylight	2	2	B
200901474271	12/3/2009	21:45	Other Object	Snow	Ice	Darkness	1	0	PDO
81281719	3/21/2008	1:30	Fixed Object	Snow	Snow and slush	Daylight	1	0	PDO
71873137	3/2/2007	16:29	Fixed Object	Snow	Ice	Daylight	1	0	PDO

TOTAL CRASHES: **4**

TOTAL INJURIES: **2**

US 45 (Kelly Road to Miller Road)

2007 - 2011

CRASH ID	CRASH DATE	CRASH TIME	COLLISION TYPE	WEATHER	ROAD SURFACE	LIGHTING	VEHICLES INVOLVED	TOTAL INJURIES	INJURY LEVEL
201101079110	1/11/2011	16:40	Fixed object	Snow	Snow and slush	Dusk	1	0	PDO

TOTAL CRASHES: **1**

TOTAL INJURIES: **0**

US 45 @ Miller Road

2007 - 2011

CRASH ID	CRASH DATE	CRASH TIME	COLLISION TYPE	WEATHER	ROAD SURFACE	LIGHTING	VEHICLES INVOLVED	TOTAL INJURIES	INJURY LEVEL
201001359262	10/7/2010	10:15	Other object	Clear	Dry	Daylight	1	1	B
201001048720	1/30/2010	4:10	Fixed object	Other	Other	Darkness, lighted road	1	1	B
71690796	2/12/2007	4:00	Turning	Snow	Snow and slush	Darkness	2	2	B
71657977	2/12/2007	16:05	Rear end	Snow	Snow and slush	Darkness	2	1	B
201101423972	11/17/2011	10:00	Rear end	Clear	Dry	Daylight	2	0	PDO
200901101674	2/18/2009	19:21	Rear end	Snow	Ice	Darkness	3	0	PDO
75437897	12/13/2007	17:30	Rear end	Clear	Dry	Darkness	2	0	PDO
75437996	12/12/2007	15:27	Rear end	Clear	Unknown	Daylight	2	0	PDO
73662595	6/5/2007	13:50	Sideswip opposite	Rain	Wet	Daylight	2	0	PDO

TOTAL CRASHES: **9**

TOTAL INJURIES: **5**

US 45 (Miller Road to IL 173)

2007 - 2011

CRASH ID	CRASH DATE	CRASH TIME	COLLISION TYPE	WEATHER	ROAD SURFACE	LIGHTING	VEHICLES INVOLVED	TOTAL INJURIES	INJURY LEVEL
201101079626	2/21/2011	9:20	Angle	Unknown	Ice	Daylight	2	1	C
201101424239	11/18/2011	2:23	Animal	Clear	Dry	darkness, lighted road	1	0	PDO
201101357859	10/12/2011	3:20	Animal	Clear	Dry	Darkness	1	0	PDO
201101239524	6/25/2011	0:45	Animal	Clear	Dry	Darkness	1	0	PDO
201101215090	6/10/2011	19:00	Animal	Rain	Wet	Daylight	1	0	PDO
201001273017	7/23/2010	23:30	Animal	Clear	Dry	Darkness	1	0	PDO
200901481886	12/28/2009	9:54	Animal	Clear	Dry	Daylight	1	0	PDO
200901474227	12/9/2009	21:15	Rear end	Other	Ice	Darkness	2	0	PDO
200901361368	9/24/2009	16:00	Rear end	Clear	Dry	Daylight	2	0	PDO
82892944	7/30/2008	1:00	Animal	Clear	Dry	Daylight	1	0	PDO
81607541	1/2/2008	5:30	Animal	Clear	Dry	Darkness	1	0	PDO
74552902	9/14/2007	10:15	Head on	Clear	Dry	Daylight	2	0	PDO

TOTAL CRASHES: 12

TOTAL INJURIES: 1

US 45 @ IL 173

2007 - 2011

CRASH ID	CRASH DATE	CRASH TIME	COLLISION TYPE	WEATHER	ROAD SURFACE	LIGHTING	VEHICLES INVOLVED	TOTAL INJURIES	INJURY LEVEL
201001236778	6/6/2010	18:17	Rear end	Clear	Dry	Daylight	3	2	A
201101423577	10/28/2011	21:40	Turning	Rain	Wet	Darkness, lighted road	2	1	B
201101357233	10/6/2011	7:00	Turning	Clear	Dry	Daylight	2	1	B
201101226877	6/26/2011	3:53	Fixed object	Clear	Dry	Darkness	1	1	B
74494733	9/11/2007	14:05	Turning	Clear	Dry	Daylight	3	2	B
73652737	6/2/2007	17:02	Rear end	Clear	Dry	Daylight	3	5	B
71921712	3/26/2007	0:00	Rear end	Clear	Dry	Darkness	3	1	B
201101436837	12/15/2011	8:10	Rear end	Clear	Wet	Daylight	2	1	C
201101423351	12/8/2011	17:31	Rear end	Clear	Dry	Darkness	3	2	C
201101261696	8/1/2011	17:47	Turning	Clear	Dry	Daylight	2	1	C
201001450835	12/28/2010	19:47	Angle	Clear	Wet	Darkness, lighted road	2	2	C
201001336367	7/23/2010	12:53	Turning	Clear	Dry	Daylight	2	1	C
200901425576	11/28/2009	13:25	Rear end	Clear	Dry	Daylight	2	3	C
200901315401	8/18/2009	15:50	Angle	Clear	Dry	Daylight	4	1	C
84039965	10/13/2008	1:35	Rear end	Clear	Dry	Daylight	3	1	C
74511999	9/10/2007	15:05	Rear end	Rain	Wet	Daylight	2	1	C
71875538	3/31/2007	15:33	Angle	Clear	Dry	Daylight	2	1	C
201101407366	12/24/2011	17:27	Rear end	Clear	Dry	Darkness	2	0	PDO
201101338283	9/24/2011	15:25	Turning	Clear	Wet	Daylight	2	0	PDO
201101307583	8/28/2011	19:38	Turning	Clear	Dry	Darkness	2	0	PDO
201101256792	7/9/2011	15:20	Rear end	Clear	Dry	Daylight	3	0	PDO
201101139156	4/13/2011	13:33	Rear end	Clear	Dry	Daylight	2	0	PDO
201101120753	3/22/2011	6:50	Rear end	Rain	Wet	Daylight	3	0	PDO
201101093155	2/3/2011	21:15	Turning	Clear	Snow and slush	Darkness	2	0	PDO
201101041687	1/5/2011	17:06	Rear end	Snow	Wet	Darkness	4	0	PDO
201001272719	7/18/2010	14:30	Rear end	Clear	Dry	Daylight	2	0	PDO
201001230552	6/13/2010	17:36	Rear end	Rain	Wet	Daylight	2	0	PDO
201001238268	6/1/2010	15:51	Rear end	Clear	Dry	Daylight	2	0	PDO
201001177562	5/10/2010	9:35	Rear end	Clear	Dry	Daylight	2	0	PDO
201001182637	5/3/2010	15:27	Rear end	Clear	Dry	Daylight	2	0	PDO
201001120744	2/28/2010	11:03	Angle	Clear	Dry	Daylight	2	0	PDO
200901402721	10/14/2009	1:02	Turning	Rain	Wet	Daylight	2	0	PDO
200901401856	10/4/2009	17:09	Rear end	Clear	Dry	Daylight	2	0	PDO
200901400285	10/2/2009	18:20	Sideswipe	Snow	Wet	Dusk	2	0	PDO
200901361186	9/22/2009	1:20	Fixed object	Clear	Dry	Daylight	1	0	PDO
200901279904	7/21/2009	8:35	Rear end	Clear	Dry	Daylight	2	0	PDO
200901273807	7/8/2009	7:25	Sideswipe	Clear	Dry	Daylight	2	0	PDO
200901148233	4/4/2009	1:48	Turning	Clear	Wet	Daylight	2	0	PDO
200901102411	3/29/2009	16:00	Fixed object	Clear	Snow and slush	Daylight	1	0	PDO
200901092002	2/7/2009	1:20	Fixed object	Clear	Wet	Daylight	1	0	PDO
200901075935	1/9/2009	7:18	Rear end	Snow	Snow and slush	Daylight	2	0	PDO
84222322	10/24/2008	20:05	Turning	Clear	Wet	Darkness	2	0	PDO
83856161	10/1/2008	1:00	Angle	Clear	Dry	Daylight	2	0	PDO
83569251	9/16/2008	9:10	Angle	Clear	Dry	Daylight	2	0	PDO
83126516	8/11/2008	17:42	Turning	Clear	Dry	Daylight	2	0	PDO
83080648	8/4/2008	14:40	Rear end	Clear	Dry	Daylight	2	0	PDO
82755380	7/10/2008	1:15	Rear end	Clear	Dry	Daylight	2	0	PDO

US 45 @ IL 173

2007 - 2011

CRASH ID	CRASH DATE	CRASH TIME	COLLISION TYPE	WEATHER	ROAD SURFACE	LIGHTING	VEHICLES INVOLVED	TOTAL INJURIES	INJURY LEVEL
82401860	6/18/2008	1:05	Rear end	Clear	Dry	Daylight	2	0	PDO
82348525	6/18/2008	8:00	Rear end	Clear	Wet	Daylight	2	0	PDO
82352097	6/17/2008	17:02	Rear end	Clear	Dry	Daylight	2	0	PDO
82121237	5/30/2008	7:55	Rear end	Rain	Wet	Daylight	2	0	PDO
81338279	4/2/2008	8:14	Turning	Clear	Dry	Daylight	2	0	PDO
81151094	2/13/2008	1:47	Other object	Snow	Snow and slush	Darkness	1	0	PDO
81169567	2/13/2008	5:26	Fixed object	Snow	Snow and slush	Darkness	1	0	PDO
81131765	2/13/2008	5:26	Fixed object	Snow	Snow and slush	Darkness	1	0	PDO
81121931	2/6/2008	5:00	Head on	Snow	Snow and slush	Darkness	2	0	PDO
75442418	12/22/2007	12:40	Rear end	Fog	Wet	Daylight	2	0	PDO
75442699	12/21/2007	12:42	Angle	Clear	Wet	Daylight	2	0	PDO
75439711	12/20/2007	13:36	Turning	Clear	Dry	Daylight	2	0	PDO
74866443	10/8/2007	6:40	Rear end	Clear	Dry	Daylight	2	0	PDO
74513243	9/19/2007	17:00	Rear end	Clear	Dry	Daylight	2	0	PDO
73050502	8/22/2007	8:10	Rear end	Clear	Dry	Daylight	2	0	PDO
73715971	7/16/2007	7:30	Rear end	Clear	Dry	Daylight	2	0	PDO
73712093	7/11/2007	16:25	Rear end	Clear	Dry	Daylight	2	0	PDO
73651051	6/12/2007	6:30	Rear end	Clear	Dry	Daylight	2	0	PDO
73111411	5/11/2007	11:28	Turning	Clear	Dry	Daylight	2	0	PDO
73051385	5/11/2007	16:37	Rear end	Clear	Dry	Daylight	2	0	PDO
72604564	4/11/2007	9:30	Angle	Snow	Snow and slush	Daylight	2	0	PDO
71877187	3/27/2007	12:55	Turning	Clear	Dry	Daylight	2	0	PDO
71709984	2/14/2007	12:45	Turning	Clear	Wet	Daylight	2	0	PDO
71134001	1/16/2007	17:23	Rear end	Clear	Dry	Dusk	2	0	PDO

TOTAL CRASHES: **71**

TOTAL INJURIES: **27**

APPENDIX F

TREE SURVEY

ROUTE 45 FOREST PRESERVE AND PROPOSED BYPASS TREES
MILBURN, ILLINOIS
(CBBEL PROJECT NUMBER 10-63)

NOTE:
1. INVENTORY INCLUDES TREES LOCATED WITH A HANDHELD GPS UNIT WITHIN FOREST PRESERVE AND THE PROPOSED BYPASS ROUTE.
2. TREES IDENTIFIED WERE 1" DBH AND GREATER
3. VALUES ASSIGNED FOR CONDITION AND FORM OF TREES ARE SHOWN IN RIGHT COLUMN BELOW . RATINGS ARE BASED ON GENERAL OBSERVATIONS.

TAG NO.	BOTANICAL CODE	COMMON NAME	SIZE (inches)	Condition	Form	Comments	GEOPAK #	POINT_X	POINT_Y	STATION	OFFSET	Impact North Section
1 T	ACNE	BOX ELDER	5	3	3		TRT1	1069742.251	2111336.833	284+16.15	-68.1111	Y
2 T	PRSE	BLACK CHERRY	2	3	3		TRT2	1069745.26	2111327.82	284+06.80	-66.5524	Y
3 T	ACNE	BOX ELDER	4	3	3			1069688.68	2111318.95			
4 T	ACNE	BOX ELDER	5	3	3			1069677.63	2111316.17			
5 T	PRSE	BLACK CHERRY	5	4	3			1069684.68	2111300.34			
6 T	QUMA	BUR OAK	4	3	3		TRT6	1069749.635	2111292.118	283+70.83	-67.8636	Y
7 T	ULAM	AMERICAN ELM	3	1	1			1069700.27	2111235.25			
8 T	QURU	RED OAK	1	2	2			1069708.27	2111060.71			
9 T	QURU	RED OAK	3	1	1			1069718.07	2111025.58			
10 T	PIPU	BLUE SPRUCE	4	1	1			1069746.85	2110978.22			
11 T	PIPU	BLUE SPRUCE	5	1	1			1069770.43	2110966.50			
12 T	PIPU	BLUE SPRUCE	4	1	3			1069740.60	2110958.27			
13 T	ULAM	AMERICAN ELM	1	1	1			1069838.03	2110551.00			
14 T	QURU	RED OAK	3	1	1			1069808.60	2110540.13			
15 T	QURU	RED OAK	2	1	1			1069801.94	2110509.02			
16 T	PODE	COTTONWOOD	1	1	1			1069843.76	2110499.95			
17 T	ACNE	BOX ELDER	1	3	4			1069811.30	2110443.17			
18 T	ACNE	BOX ELDER	3	4	4		TRT18	1069877.054	2110440.64	275+09.91	-76.1755	
19 T	QUMA	BUR OAK	2	3	3			1069843.20	2110440.58			
20 T	QUMA	BUR OAK	4	4	4			1069804.17	2110440.03			
21 T	QUMA	BUR OAK	5	3	3		TRT21	1069863.069	2110439.80	275+11.28	-90.1185	
22 T	QUAL	WHITE OAK	5	2	3			1069805.72	2110437.39			
23 T	QUAL	WHITE OAK	3	3	3			1069794.01	2110435.75			
24 T	ACNE	BOX ELDER	6	3	3		TRT24	1069874.782	2110432.662	275+02.39	-79.6760	
25 T	QUMA	BUR OAK	4	3	3			1069846.17	2110432.04			
26 T	QUMA	BUR OAK	2	3	3			1069829.39	2110431.40			
27 T	QUMA	BUR OAK	1	3	3			1069830.16	2110427.07			
28 T	QUAL	WHITE OAK	1	2	2			1069797.97	2110426.56			
29 T	QUMA	BUR OAK	5	3	3			1069835.87	2110421.71			
30 T	QUMA	BUR OAK	3	3	3			1069856.15	2110416.31			
31 T	QUMA	BUR OAK	5	4	5		TRT31	1069880.766	2110408.886	274+77.97	-77.5124	
32 T	ACNE	BOX ELDER	3	2	3			1069814.98	2110404.07			
33 T	ACNE	BOX ELDER	3	4	5			1069798.35	2110400.82			
34 T	ACNE	BOX ELDER	2	3	3			1069832.94	2110400.27			
35 T	ACNE	BOX ELDER	3	3	3			1069828.25	2110398.43			
36 T	ACNE	BOX ELDER	2	2	3			1069820.39	2110396.29			
37 T	QUMA	BUR OAK	5	3	3			1069841.28	2110392.03			
38 T	ACNE	BOX ELDER	3	3	3			1069820.80	2110391.15			
39 T	ULAM	AMERICAN ELM	2	1	1		TRT39	1069881.84	2110389.941	274+59.09	-79.4363	
40 T	QUMA	BUR OAK	2	5	4		TRT40	1069878.925	2110388.71	274+58.34	-82.5089	
41 T	ACNE	BOX ELDER	5	3	3		TRT41	1069882.00	2110384.952	274+54.14	-80.0692	
42 T	ULAM	AMERICAN ELM	1	2	3		TRT42	1069893.637	2110381.108	274+48.51	-69.1782	Y
43 T	ACNE	BOX ELDER	1	3	3			1069825.73	2110376.64			
44 T	ULAM	AMERICAN ELM	1	1	1		TRT44	1069877.463	2110369.448	274+39.54	-86.9871	
45 T	ULAM	AMERICAN ELM	2	2	2		TRT45	1069901.98	2110366.913	274+33.18	-63.1756	Y
46 T	ULAM	AMERICAN ELM	3	1	2		TRT46	1069876.01	2110358.74	274+29.20	-90.1089	
47 T	QUMA	BUR OAK	4	4	4			1069819.95	2110347.93			
48 T	QUMA	BUR OAK	5	3	3			1069850.81	2110346.25			
49 T	QUMA	BUR OAK	5	4	4			1069815.04	2110343.87			
50 T	QUMA	BUR OAK	5	4	3			1069800.25	2110342.95			
51 T	CRMO	DOWNY HAWTHORN	4	3	3			1069840.50	2110340.74			
52 T	CRMO	DOWNY HAWTHORN	4	4	3			1069788.60	2110339.25			
53 T	ACNE	BOX ELDER	5	2	3			1069867.97	2110336.61			
54 T	CRMO	DOWNY HAWTHORN	2	3	3			1069786.42	2110336.13			
55 T	QUMA	BUR OAK	2	5	4			1069808.89	2110335.62			
56 T	QUMA	BUR OAK	3	4	4			1069802.94	2110335.28			
57 T	QUMA	BUR OAK	5	4	4			1069804.70	2110335.23			
58 T	ACNE	BOX ELDER	3	3	3			1069858.49	2110334.47			
59 T	ACNE	BOX ELDER	1	1	2			1069817.19	2110322.78			
60 T	ACNE	BOX ELDER	5	2	3			1069779.98	2110322.48			
61 T	ACNE	BOX ELDER	2	2	3			1069865.21	2110320.90			
62 T	QUMA	BUR OAK	2	4	3			1069844.08	2110320.61			
63 T	QUMA	BUR OAK	4	4	4			1069836.33	2110318.83			
64 T	QUMA	BUR OAK	4	4	4		TRT64	1069893.866	2110317.988	273+86.14	-78.8958	
65 T	QUMA	BUR OAK	3	2	3		TRT65	1069893.866	2110317.988	273+86.14	-78.8958	Y
66 T	QUMA	BUR OAK	5	3	3			1069837.30	2110316.06			
67 T	QUMA	BUR OAK	4	4	4			1069849.09	2110314.19			
68 T	QUMA	BUR OAK	4	4	5		TRT68	1069894.286	2110313.913	273+82.05	-79.1236	
69 T	QUMA	BUR OAK	5	3	3			1069851.72	2110309.90			
70 T	ACNE	BOX ELDER	2	2	3			1069860.80	2110309.03			
71 T	ACNE	BOX ELDER	3	2	3			1069833.82	2110305.40			
72 T	ACNE	BOX ELDER	1	3	3			1069844.17	2110304.74			
73 T	QUMA	BUR OAK	5	3	3			1069851.63	2110302.88			
74 T	ACNE	BOX ELDER	3	2	2			1069833.52	2110302.38			
75 T	ACNE	BOX ELDER	2	3	3			1069831.97	2110300.92			
76 T	ACNE	BOX ELDER	1	2	2			1069842.33	2110300.22			
77 T	ACNE	BOX ELDER	2	2	2			1069784.47	2110299.62			
78 T	ACNE	BOX ELDER	1	2	2			1069857.09	2110299.49			
79 T	ACNE	BOX ELDER	3	3	3			1069866.15	2110298.83			
80 T	QUMA	BUR OAK	5	4	3			1069806.12	2110298.32			
81 T	ACNE	BOX ELDER	2	2	3			1069790.76	2110295.82			
82 T	ACNE	BOX ELDER	2	3	2			1069831.28	2110295.34			
83 T	QUMA	BUR OAK	5	4	3			1069806.63	2110294.28			
84 T	QUMA	BUR OAK	5	3	3			1069865.34	2110293.83			
85 T	ACNE	BOX ELDER	2	2	3			1069842.87	2110293.41			
86 T	QUMA	BUR OAK	5	4	4			1069864.10	2110292.93			
87 T	QUMA	BUR OAK	5	4	4			1069827.79	2110287.79			
88 T	QUMA	BUR OAK	1	1	1			1069814.23	2110287.18			
89 T	QUMA	BUR OAK	4	3	3			1069786.05	2110286.33			
90 T	QUMA	BUR OAK	5	4	3			1069810.17	2110285.59			

TAG NO.	BOTANICAL CODE	COMMON NAME	SIZE (inches)	Condition	Form	Comments	GEOPAK #	POINT_X	POINT_Y	STATION	OFFSET	Impact North Section
91 T	ACNE	BOX ELDER	3	2	1			1069808.65	2110285.52			
92 T	ACNE	BOX ELDER	3	2	3			1069787.15	2110285.07			
93 T	ACNE	BOX ELDER	2	2	2			1069843.37	2110283.80			
94 T	QUMA	BUR OAK	5	5	5			1069803.30	2110283.75			
95 T	ACNE	BOX ELDER	2	3	2			1069835.90	2110283.68			
96 T	ACNE	BOX ELDER	3	2	2			1069830.35	2110283.04			
97 T	QUMA	BUR OAK	4	3	3			1069792.17	2110281.24			
98 T	ACNE	BOX ELDER	4	2	3			1069812.89	2110278.30			
99 T	ACNE	BOX ELDER	1	2	2			1069844.20	2110277.80			
100 T	ACNE	BOX ELDER	1	1	1			1069856.84	2110276.77			
101 T	ACNE	BOX ELDER	2	2	1			1069848.57	2110276.72			
102 T	QUMA	BUR OAK	5	4	4			1069851.76	2110275.82			
103 T	CRMO	DOWNY HAWTHORN	2	3	3			1069797.48	2110274.81			
104 T	ACNE	BOX ELDER	1	3	3			1069796.27	2110269.20			
105 T	ACNE	BOX ELDER	1	1	2			1069805.81	2110269.08			
106 T	ACNE	BOX ELDER	2	1	1			1069851.78	2110268.24			
107 T	ACNE	BOX ELDER	1	2	3			1069809.73	2110267.82			
108 T	ACNE	BOX ELDER	2	2	2			1069799.40	2110267.40			
109 T	ACNE	BOX ELDER	2	3	3			1069795.48	2110261.18			
110 T	QUMA	BUR OAK	4	2	2			1069860.24	2110249.77			
111 T	ACNE	BOX ELDER	2	2	3			1069835.48	2110230.35			
112 T	ACNE	BOX ELDER	2	2	3			1069841.89	2110221.42			
113 T	ACNE	BOX ELDER	1	5	5			1069866.71	2110220.32			
114 T	QUMA	BUR OAK	5	3	3			1069864.97	2110216.76			
115 T	ACNE	BOX ELDER	1	1	1			1069858.96	2110213.26			
116 T	ACNE	BOX ELDER	5	5	5		TRT116	1069906.622	2110209.42	272+76.92	-83.4027	
117 T	ACNE	BOX ELDER	5	5	4		TRT117	1069908.309	2110195.20	272+62.62	-83.9762	
118 T	QUAL	WHITE OAK	4	3	3		TRT118	1069918.51	2110170.765	272+36.88	-77.7528	
119 T	ACNE	BOX ELDER	5	4	5		TRT119	1069923.907	2110146.145	272+11.71	-76.3018	
120 T	QUAL	WHITE OAK	4	3	3		TRT120	1069923.926	2110123.786	271+89.82	-79.8225	
121 T	ULAM	AMERICAN ELM	1	1	1		TRT121	1069911.93	2110098.475	271+67.14	-95.7580	
122 T	ACNE	BOX ELDER	1	1	1			1069896.52	2110096.86			
123 T	ACNE	BOX ELDER	1	1	1			1069897.61	2110090.26			
124 T	ACNE	BOX ELDER	1	1	1			1069896.80	2110070.36			
125 T	ACNE	BOX ELDER	1	1	1			1069897.65	2110067.98			
126 T	FRPE	GREEN ASH	2	1	1			1069896.42	2110066.82			
127 T	ACNE	BOX ELDER	2	1	1			1069894.54	2110066.17			
128 T	ACNE	BOX ELDER	1	1	1			1069895.27	2110061.18			
129 T	ACNE	BOX ELDER	1	1	1			1069907.59	2110045.06			
130 T	ACNE	BOX ELDER	1	1	1			1069908.00	2110042.77			
131 T	ACNE	BOX ELDER	1	1	1			1069931.51	2109883.83			
132 T	ACNE	BOX ELDER	1	1	1			1069936.90	2109873.57			
133 T	ACNE	BOX ELDER	1	1	1			1069941.42	2109865.68			
134 T	CRMO	DOWNY HAWTHORN	5	3	3		TRT134	1069971.99	2109856.64	269+22.15	-81.4595	Y
135 T	ACNE	BOX ELDER	5	3	3		TRT135	1069981.088	2109851.71	269+15.53	-73.5778	Y
136 T	ACNE	BOX ELDER	3	3	3		TRT136	1069982.778	2109841.60	269+05.43	-74.0258	Y
137 T	ACNE	BOX ELDER	3	3	3		TRT137	1069982.668	2109840.90	269+04.77	-74.2805	Y
138 T	ACNE	BOX ELDER	1	1	1			1069944.65	2109838.54			
139 T	ACNE	BOX ELDER	1	1	1			1069941.71	2109818.44			
140 T	ACNE	BOX ELDER	2	2	2		TRT140	1069992.963	2109793.008	268+56.41	-74.4273	Y
141 T	QUAL	WHITE OAK	1	2	2		TRT141	1069995.181	2109762.017	268+26.10	-79.0758	Y
142 T	ACNE	BOX ELDER	1	1	1			1069967.41	2109753.91			
143 T	ULAM	AMERICAN ELM	5	1	1		TRT143	1070001.494	2109743.224	268+06.64	-77.1346	Y
144 T	QURU	RED OAK	1	2	2			1069945.21	2109740.40			
145 T	ACNE	BOX ELDER	1	1	1			1069944.89	2109728.59			
146 T	ULAM	AMERICAN ELM	2	2	1			1069952.99	2109727.19			
147 T	ACNE	BOX ELDER	1	1	1			1069944.60	2109726.49			
148 T	ACNE	BOX ELDER	1	1	1			1069957.42	2109725.97			
149 T	ACNE	BOX ELDER	2	1	1			1069946.76	2109725.32			
150 T	ACNE	BOX ELDER	1	2	2			1069952.45	2109723.47			
151 T	ACNE	BOX ELDER	3	2	2			1069948.97	2109722.19			
152 T	ACNE	BOX ELDER	1	2	2			1069949.70	2109715.46			
153 T	ACNE	BOX ELDER	1	2	2			1069961.94	2109714.95			
154 T	ACNE	BOX ELDER	2	1	1			1069960.61	2109714.54			
155 T	ACNE	BOX ELDER	2	1	1			1069951.50	2109713.86			
156 T	ACNE	BOX ELDER	1	2	2			1069953.59	2109710.89			
157 T	ACNE	BOX ELDER	2	2	2			1069950.66	2109710.67			
158 T	ACNE	BOX ELDER	1	2	2			1069953.64	2109706.38			
159 T	ACNE	BOX ELDER	5	1	2			1069952.86	2109703.35			
160 T	ACNE	BOX ELDER	3	2	2			1069951.82	2109702.56			
161 T	ACNE	BOX ELDER	1	2	2			1069950.75	2109702.11			
162 T	ACNE	BOX ELDER	1	3	3			1069956.80	2109700.28			
163 T	ACNE	BOX ELDER	1	3	3			1069953.84	2109696.77			
164 T	ACNE	BOX ELDER	1	2	2			1069952.27	2109694.84			
165 T	ACNE	BOX ELDER	1	3	3			1069954.70	2109694.34			
166 T	ACNE	BOX ELDER	2	1	2			1069956.64	2109694.04			
167 T	ACNE	BOX ELDER	2	3	2			1069954.76	2109692.13			
168 T	ACNE	BOX ELDER	2	3	3			1069955.91	2109690.88			
169 T	ACNE	BOX ELDER	1	2	2			1069953.01	2109685.74			
170 T	ACNE	BOX ELDER	2	2	2			1069967.67	2109685.11			
171 T	ACNE	BOX ELDER	3	3	3			1069950.43	2109675.09			
172 T	ACNE	BOX ELDER	1	1	1			1069960.35	2109674.06			
173 T	ACNE	BOX ELDER	3	3	3			1069959.34	2109672.61			
174 T	ACNE	BOX ELDER	3	3	3			1069969.37	2109671.87			
175 T	ACNE	BOX ELDER	5	3	3			1069961.69	2109663.56			
176 T	ACNE	BOX ELDER	1	3	3			1069971.33	2109662.88			
177 T	ACNE	BOX ELDER	5	3	3			1069962.89	2109662.46			
178 T	ACNE	BOX ELDER	5	3	2			1069977.27	2109661.61			
179 T	ACNE	BOX ELDER	5	3	3		TRT179	1070019.578	2109659.681	267+22.33	-79.0045	
180 T	ACNE	BOX ELDER	5	2	2			1069970.55	2109659.30			
181 T	ACNE	BOX ELDER	2	3	3			1069975.58	2109659.22			
182 T	ACNE	BOX ELDER	5	3	3			1069964.07	2109658.45			
183 T	ACNE	BOX ELDER	2	3	3			1069979.29	2109658.44			
184 T	ACNE	BOX ELDER	5	2	2			1069979.39	2109656.25			
185 T	ACNE	BOX ELDER	5	2	2			1069980.79	2109655.46			
186 T	ACNE	BOX ELDER	1	2	3			1069979.84	2109651.76			
187 T	ACNE	BOX ELDER	2	3	3			1069970.49	2109649.08			
188 T	ACNE	BOX ELDER	1	3	3			1069977.87	2109649.04			
189 T	ACNE	BOX ELDER	1	1	1			1069982.28	2109640.27			
190 T	ACNE	BOX ELDER	5	1	1			1069987.62	2109632.63			
191 T	ACNE	BOX ELDER	1	3	3			1069987.36	2109630.09			

TAG NO.	BOTANICAL CODE	COMMON NAME	SIZE (inches)	Condition	Form	Comments	GEOPAK #	POINT_X	POINT_Y	STATION	OFFSET	Impact North Section
192 T	ACNE	BOX ELDER	3	2	2		TRT192	1070020.817	2109617.955	266+82.14	-87.9622	
193 T	CRMO	DOWNY HAWTHORN	1	3	3			1070028.92	2109566.56			Y
194 T	ACNE	BOX ELDER	1	3	3			1070018.57	2109565.22			
195 T	ACNE	BOX ELDER	1	3	3		TRT195	1070049.722	2109556.541	266+16.36	-75.4980	Y
196 T	ACNE	BOX ELDER	2	3	4		TRT196	1070035.055	2109556.349	266+19.91	-89.7190	
197 T	ACNE	BOX ELDER	2	3	3			1070014.48	2109555.10			
198 T	ACNE	BOX ELDER	4	3	2			1070012.72	2109552.03			
199 T	ACNE	BOX ELDER	2	3	3		TRT199	1070052.778	2109548.02	266+07.46	-74.7511	Y
200 T	ACNE	BOX ELDER	1	3	3			1070012.72	2109540.05			
201 T	ACNE	BOX ELDER	1	3	3			1070006.41	2109539.36			
202 T	ACNE	BOX ELDER	1	2	2			1070007.28	2109537.25			
203 T	ACNE	BOX ELDER	5	3	3			1069998.54	2109536.30			
204 T	CRMO	DOWNY HAWTHORN	4	4	3			1070034.56	2109535.27			
205 T	PRSE	BLACK CHERRY	4	3	3			1070026.21	2109534.36			
206 T	ACNE	BOX ELDER	5	3	3			1070012.76	2109531.47			
207 T	ACNE	BOX ELDER	2	3	3			1070007.50	2109527.16			
208 T	ACNE	BOX ELDER	1	2	2			1070013.11	2109526.97			
209 T	ACNE	BOX ELDER	2	3	3		TRT209	1070081.01	2109414.39	264+71.42	-82.6778	
210 T	ACNE	BOX ELDER	1	3	3		TRT210	1070081.06	2109413.85	264+70.88	-82.7706	
211 T	ACNE	BOX ELDER	4	3	3		TRT211	1070084.57	2109412.91	264+69.05	-79.6316	
212 T	ACNE	BOX ELDER	5	3	3		TRT212	1070081.07	2109408.66	264+65.87	-84.1212	
213 T	ACNE	BOX ELDER	5	3	3		TRT213	1070085.17	2109406.54	264+62.75	-80.7299	
214 T	ULAM	AMERICAN ELM	6	3	3		TRT214	1070149.50	2109176.96	262+24.33	-79.1533	
215 T	ACNE	BOX ELDER	5	3	3		TRT215	1070157.08	2109161.96	262+07.86	-75.7971	
216 T	CEOC	HACKBERRY	4	2	3		TRT216	1070319.51	2108540.21	255+65.28	-82.8939	
217 T	CEOC	HACKBERRY	4	2	2		TRT217	1070329.79	2108535.18	255+57.72	-74.3093	Y
218 T	CEOC	HACKBERRY	4	1	2		TRT218	1070328.14	2108529.26	255+52.45	-77.4509	
219 T	CEOC	HACKBERRY	4	2	2		TRT219	1070332.40	2108529.45	255+51.51	-73.2942	Y
220 T	CEOC	HACKBERRY	1	1	1		TRT220	1070328.31	2108530.25	255+53.36	-77.0340	
221 T	CEOC	HACKBERRY	4	2	3		TRT221	1070323.55	2108527.92	255+52.37	-82.2388	Y
222 T	CEOC	HACKBERRY	4	2	2		TRT222	1070336.37	2108497.37	255+19.52	-77.9209	Y
223 T	CEOC	HACKBERRY	2	2	3		TRT223	1070332.21	2108494.71	255+18.04	-82.6314	Y
224 T	CEOC	HACKBERRY	1	3	3		TRT224	1070335.67	2108493.81	255+16.27	-79.5263	Y
225 T	SANI	BLACK WILLOW	4	2	2		TRT225	1070443.84	2108086.29	250+94.64	-82.5454	
226 T	ULAM	AMERICAN ELM	4	3	3		TRT226	1070444.86	2108081.82	250+90.06	-82.7390	
227 T	QUAL	WHITE OAK	3	2	3		TRT227	1070450.75	2108079.29	250+86.07	-77.7206	
228 T	QUAL	WHITE OAK	1	3	3		TRT228	1070445.64	2108082.57	250+90.59	-81.7881	
229 T	QURU	RED OAK	1	2	2		TRT229	1070449.22	2108081.13	250+88.25	-78.7100	
230 T	QURU	RED OAK	4	2	2		TRT230	1070452.96	2108074.32	250+80.70	-76.9014	
231 T	SANI	BLACK WILLOW	2	2	3		TRT231	1070455.43	2108071.22	250+77.05	-75.3310	
232 T	CEOC	HACKBERRY	5	3	3		TRT232	1070486.50	2107993.79	249+94.18	-65.7524	Y
233 T	CEOC	HACKBERRY	1	1	1		TRT233	1070483.28	2107977.74	249+79.54	-73.0910	
234 T	SANI	BLACK WILLOW	5	2	2		TRT234	1070475.97	2107974.81	249+78.64	-80.9183	
235 T	CEOC	HACKBERRY	1	1	2		TRT235	1070493.40	2107973.38	249+72.67	-64.4762	
236 T	CEOC	HACKBERRY	1	1	1		TRT236	1070481.88	2107973.15	249+75.48	-75.6462	
237 T	SANI	BLACK WILLOW	5	2	3		TRT237	1070477.39	2107969.34	249+72.99	-80.9860	Y
238 T	CEOC	HACKBERRY	1	3	3		TRT238	1070490.82	2107968.26	249+68.41	-68.3163	
239 T	CEOC	HACKBERRY	1	2	2		TRT239	1070491.08	2107967.16	249+67.28	-68.3509	Y
240 T	CEOC	HACKBERRY	4	2	3		TRT240	1070489.18	2107964.95	249+65.65	-70.7694	Y
241 T	CEOC	HACKBERRY	2	4	4		TRT241	1070488.49	2107962.92	249+63.87	-71.9652	Y
242 T	SANI	BLACK WILLOW	3	3	3		TRT242	1070490.72	2107955.24	249+55.87	-71.8441	Y
243 T	SANI	BLACK WILLOW	1	2	2		TRT243	1070490.30	2107954.87	249+55.63	-72.3400	Y
244 T	SANI	BLACK WILLOW	4	1	1		TRT244	1070491.97	2107949.34	249+49.85	-72.1861	Y
245 T	SANI	BLACK WILLOW	4	1	1		TRT245	1070492.29	2107948.47	249+48.93	-72.1095	Y
246 T	SANI	BLACK WILLOW	3	2	3		TRT246	1070486.59	2107947.20	249+49.21	-77.9419	Y
247 T	SANI	BLACK WILLOW	3	2	2		TRT247	1070492.44	2107946.57	249+47.06	-72.4686	Y
248 T	SANI	BLACK WILLOW	5	1	1		TRT248	1070488.30	2107944.33	249+45.98	-77.0526	Y
249 T	SANI	BLACK WILLOW	2	3	3		TRT249	1070496.02	2107937.09	249+36.97	-71.5094	Y
250 T	SANI	BLACK WILLOW	1	2	2		TRT250	1070485.97	2107936.83	249+39.37	-81.2777	
251 T	SANI	BLACK WILLOW	1	3	3		TRT251	1070486.79	2107929.79	249+32.35	-82.3349	
252 T	SANI	BLACK WILLOW	5	4	3		TRT252	1070491.62	2107921.07	249+22.68	-79.9748	
253 T	SANI	BLACK WILLOW	3	1	1		TRT253	1070506.71	2107896.98	248+95.46	-71.7629	Y
254 T	SANI	BLACK WILLOW	2	3	3		TRT254	1070498.25	2107895.90	248+96.65	-80.2085	
255 T	SANI	BLACK WILLOW	2	1	1		TRT255	1070498.53	2107892.94	248+93.71	-80.7227	
256 T	SANI	BLACK WILLOW	1	1	1		TRT256	1070497.01	2107888.67	248+90.00	-83.3080	
257 T	SANI	BLACK WILLOW	5	2	2		TRT257	1070510.63	2107887.53	248+85.31	-70.4718	Y
258 T	SANI	BLACK WILLOW	3	2	2		TRT258	1070517.04	2107885.00	248+81.18	-64.9553	Y
259 T	SANI	BLACK WILLOW	1	2	2		TRT259	1070498.34	2107882.63	248+83.82	-83.6227	
260 T	SANI	BLACK WILLOW	3	1	1		TRT260	1070500.92	2107881.96	248+82.49	-81.3039	
261 T	QUAL	WHITE OAK	5	2	2		TRT261	1070503.65	2107881.03	248+80.88	-78.9211	
262 T	SANI	BLACK WILLOW	1	1	1		TRT262	1070504.05	2107867.44	248+67.66	-82.1174	
263 T	SANI	BLACK WILLOW	2	1	1		TRT263	1070503.28	2107865.09	248+65.60	-83.4733	
264 T	SANI	BLACK WILLOW	1	1	1		TRT264	1070507.17	2107860.79	248+60.43	-80.8502	
265 T	SANI	BLACK WILLOW	5	1	1		TRT265	1070514.79	2107844.26	248+42.48	-77.8553	
266 T	SANI	BLACK WILLOW	2	1	1		TRT266	1070529.95	2107820.87	248+15.92	-69.3976	Y
267 T	SANI	BLACK WILLOW	2	1	2		TRT267	1070526.60	2107817.67	248+13.71	-73.4684	Y
268 T	SANI	BLACK WILLOW	4	1	1		TRT268	1070526.18	2107813.41	248+09.71	-75.0008	Y
269 T												

APPENDIX G

PAVEMENT DESIGN

PAVEMENT DESIGN

US ROUTE 45- IL 132 TO IL 173
MILLBURN BYPASS

LAKE COUNTY, ILLINOIS

March 5, 2013

PREPARED FOR:
Christopher B. Burke Engineering, LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018

PREPARED BY:
ESI Consultants, Ltd.
1979 North Mill Street
Suite 100
Naperville, Illinois 60563

ESI
ESI CONSULTANTS, LTD
Excellence, Service, Integrity

Table of Contents

1. Project Location and Proposed Improvement
2. Location Map
3. Typical Sections
   A. US Route 45
   B. IL Route 173
   C. Grass Lake Road and Sand Lake Road
4. Design Calculations
   A. US Route 45
   B. IL Route 173
   C. Grass Lake Road
   D. Sand Lake Road
5. Other Information
   A. Mechanistic Pavement Design Cost Analysis
   B. ADT Exhibits
   C. Traffic Counts
   D. Email from LDOT
   E. IDOT Pavement Design Form
6. Recommendations

1. Project Location and Proposed Improvement

Project Location

The project is located along US Route 45 with a northern terminus at IL Route 173 and a southern terminus at IL Route 132, a distance of approximately 5.5 miles. There are five (5) signalized intersections within the project limits at IL 132, Sand Lake Road, Millburn Road, Grass Lake Road, and IL Route 173. Within the project limits, US Route 45 is typically a two lane roadway (one in each direction) with aggregate shoulders and open ditch drainage.

US Route 45 as well as IL Route 173 and Il Route 132 are classified as Other Principal Arterials and are all under the jurisdiction of the Illinois Department of Transportation (IDOT). All three roadways are also classified as Strategic Regional Arterial (SRA) roadways and are on the National Highway System (NHS). US Route 45 is a designated Class II Truck Route. Lake County Division of Transportation (LCDOT) has jurisdiction of Grass Lake Road (County Hwy A10), Millburn Road (County Hwy A14) and Sand Lake Road (County Hwy A74).

Existing land use along US Route 45 within the project limits is a combination of agricultural, residential, light commercial, and recreational. The area west of US Route 45 is predominantly residential subdivisions while the areas east of US Route 45 are predominantly agricultural with some forested natural habitats along North Mill Creek.

Proposed Improvement

Pavement designs were prepared for US 45, IL 173, Grass Lake Road and Sand Lake Road. Proposed improvements to each of these roadways follows:

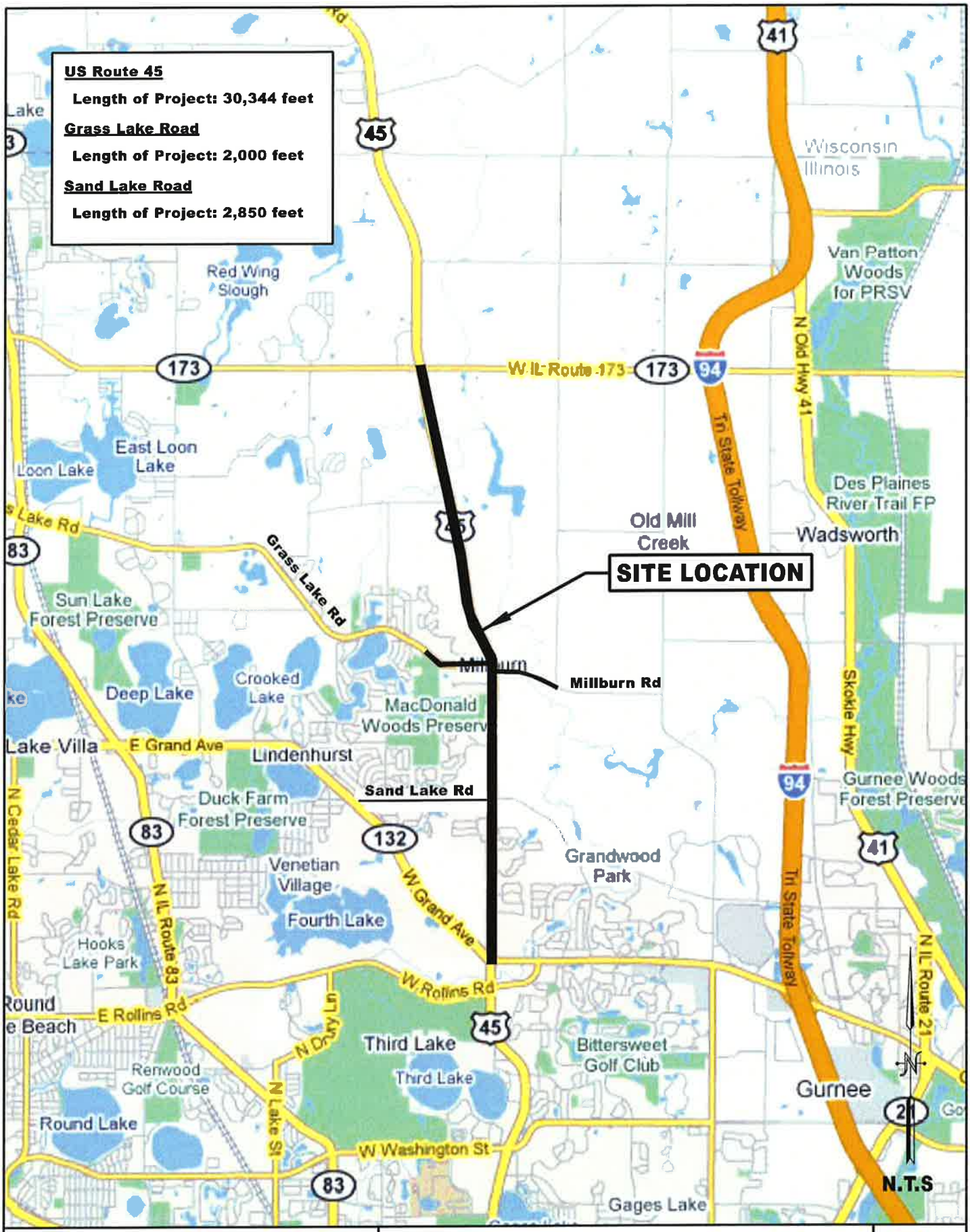
US Route 45 from IL 173 to IL 132 will be reconstructed to a four lane cross section (2 lanes in each direction) with a 22' grass median, curb and gutter. Left and right turn channelization will be provided where needed. US Route 45 will be realigned from north of Independence Boulevard to Country Place which will bypass the Millburn Historic District.

IL Route 173 from west of Pedersen Drive to east of US Route 45 will be reconstructed to a four lane cross section (two lanes in each direction) with a left turn lane at the intersection of US Route 45.

Grass Lake Road from west of Heritage Drive to existing US Route 45 will be reconstructed to a three lane cross section (one lane eastbound and 2 lanes westbound) with left turn lanes at each intersection. Grass Lake Road will be realigned to match the intersection of Millburn Road.

Sand Lake Road from west of Cross Creek Lane to east of US Route 45 will be reconstructed to a four lane cross section (two lanes in each direction) with a left and right turn lane at the intersection of US Route 45.

2. Location Map



ESI CONSULTANTS, LTD
1979 N. MILL STREET, SUITE 100
NAPERVILLE, IL 60563
(630) 420-1700
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ILLINOIS DEPARTMENT OF PROFESSIONAL REGULATION REGISTRATION #184-003885

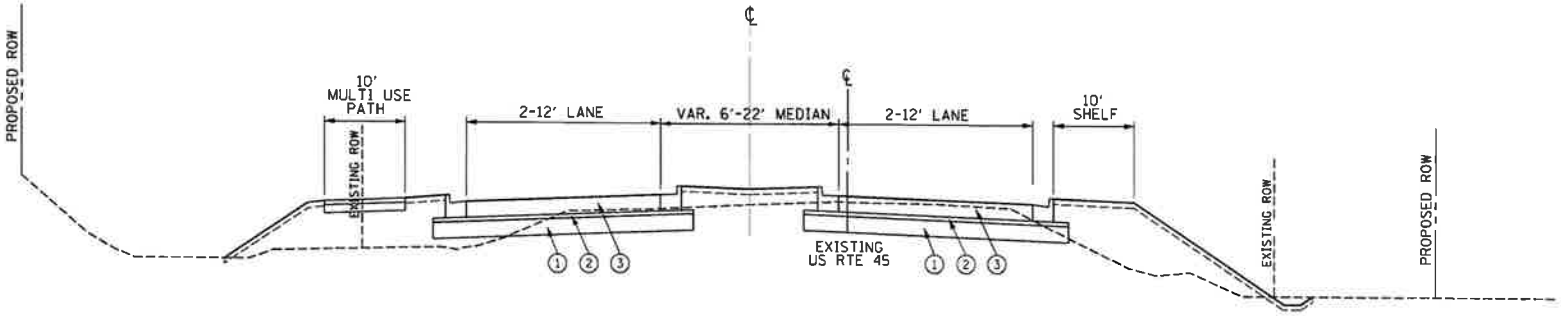
US 45 MILLBURN BYPASS
SITE LOCATION MAP

DATE: 6/4/2012
SHEET NO. 1

EXHIBIT 1

3. Typical Sections

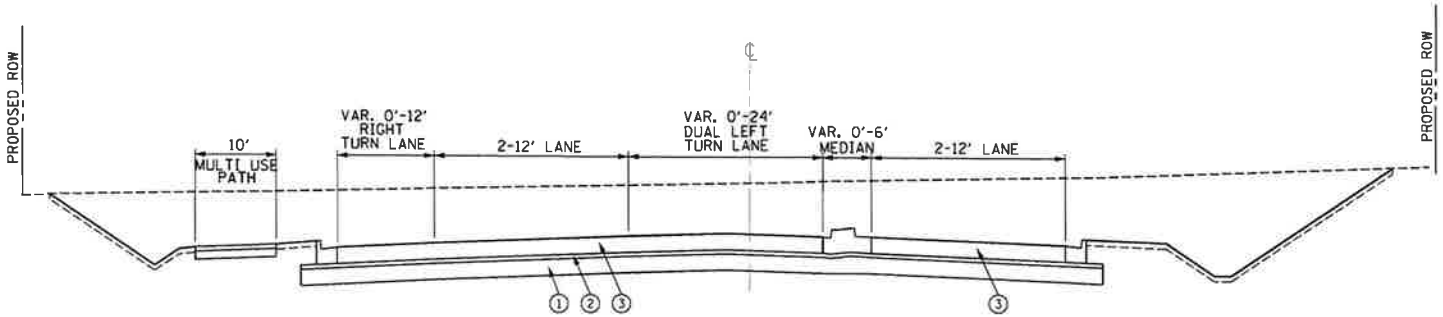
A. US Route 45
B. IL Route 173
C. Grass Lake Road and Sand Lake Road



LEGEND

1. AGGREGATE SUB-GRADE IMPROVEMENT, 12" (TYP.)
2. HMA STABILIZED SUB-BASE, 4.5" (TYP.)
3. P.C.C. PAVEMENT, 10"

TYPICAL SECTION
US ROUTE 45 AT GRASS MEDIAN



LEGEND

1. AGGREGATE SUB-GRADE IMPROVEMENT, 12" (TYP.)
2. HMA STABILIZED SUB-BASE, 4.5" (TYP.)
3. P.C.C. PAVEMENT, 10"

TYPICAL SECTION
US ROUTE 45 AT INTERSECTION

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CHRISTOPHER B. BURKE ENGINEERING, LTD
9575 W. Higgins Road, Suite 400
Rosemont, Illinois 60018
(847) 823-0500

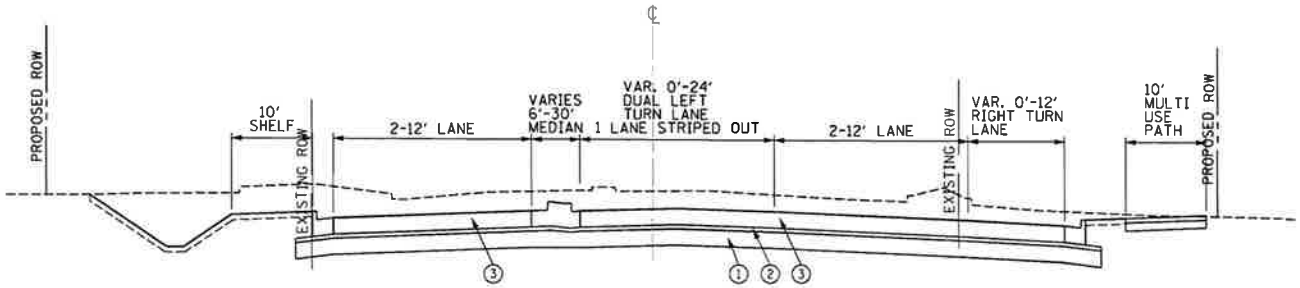
NO.	DATE	DESCRIPTION OF REVISIONS	NO.	DATE	DESCRIPTION OF REVISIONS

ESI PROJECT NO. XX.XXXX
FILE: US 45 Typical
DATE: XX.XX.XXXX
ENGR:
TECH:
DADC:

US ROUTE 45- MILBURN BYPASS
PAVEMENT DESIGN

TYPICAL SECTIONS
US ROUTE 45- IL 132 TO IL 173

DRAWING NO.



LEGEND

1. AGGREGATE SUB-GRADE IMPROVEMENT, 12" (TYP.)
2. HMA STABILIZED SUB-BASE, 4.5" (TYP.)
3. P.C.C. PAVEMENT, 10"

TYPICAL SECTION

IL ROUTE 173 AT INTERSECTION

ESI CONSULTANTS, LTD

CHRISTOPHER B. BURKE

NO.	DATE	DESCRIPTION OF REVISIONS	NO.	DATE	DESCRIPTION OF REVISIONS

ESI PROJECT NO. XX-XXX

FILE: IL 173_Grass Lake Typical

DATE: XX-XX-XXXX

ENGR:

TECH:

DADC:

US ROUTE 45- MILBURN BYPASS

PAVEMENT DESIGN

TYPICAL SECTION

IL ROUTE 173

DRAWING NO.

4. Design Calculations

A. US Route 45
B. IL Route 173
C. Grass Lake Road
D. Sand Lake Road

4. Design Calculations

A. US Route 45- IL Route 173 to IL 132

- Project Description
  - IL 173 to IL 132
    - Existing 1 lane in each direction, aggregate shoulder, urban
    - Proposed Asphalt or Concrete pavement with curb and gutter
    - Existing subgrade soil is assumed to have Poor Subgrade Support Rating according to the IDOT Subgrade Stability Rating (SSR)
    - Target construction in 2015
- Traffic Forecasts
  - 2009 ADT = 16,600
  - 2020 ADT = 22,771
  - **2030 ADT= 28,381**
  - 2040 ADT= 34,000
- General Assumptions:
  - Referencing IDOT's BDE Pavement Design Policy, Chapter 54
  - Design Period – For Class I use 30 year for Rigid or Flexible for pavement areas over 25,000 sq ft
  - Traffic Percentage from RWA Traffic Count Spreadsheet
    - PV = 91.5%
    - SU = 5%
    - MU = 3.5%
  - Pavement Design will focus on urban segment only.

PCC Pavement Design

- Class I, 4 Lane Pavement
- Design Period: 30 years
- Design Traffic
  - 2030 ADT: 28,381
  - 91.5% PV (25969), 5% SU (1419), 3.5% MU (993)
  - Subgrade Support Rating: Poor
  - Shoulders: tied curb and gutter
  - 4-1/2" HMA Stabilized Sub-base needed when area is over 25,000 sq yd

- Traffic Factor: 12.13
- Dowel Bar diameter (figure 54-4A): 1.5 inches
- Final Slab Thickness = 9.85 inches, round to 10.0 inches with 15 foot Transverse Joint Spacing

Full Depth HMA Pavement Design

- Class I, 4 Lane Pavement
- Design Period: 30 years
- Design Traffic
    - ADT: 28,381
    - 91.5% PV (25969), 5% SU (1419), 3.5% MU (993)
    - Subgrade Support Rating: Poor
- Traffic Factor: 9.05
- HMA Mixture Temperature (Figure 54-5C): 73 Degrees F
- E (HMA) (Figure 54-5D): 760
- Design HMA Strain (Figure 54-5G): 65
- Final HMA thickness from Figure 54-5F (Poor Subgrade Design Chart) is 11.35 inches rounded to 11.50 inches

MILLBURN BYPASS

US ROUTE 45- IL ROUTE 173 TO IL ROUTE 132

ADT USED: 28,381 ADT YEAR: 2030 CLASS OF ROADWAY : CLASS I

SOIL CONDITIONS : POOR

% TOTAL ADT (Actual or Figure 54-2.A)

			VEH
PV	91.5	% =	25969
SU	5	% =	1419
MU	3.5	% =	993

% TOTAL VEH. CLASS VOLUME (Figure 54-2.B)

PV	32	%
SU	45	%
MU	45	%

DESIGN PERIOD (DP) 30 YEARS

MIN. VEH. CLASS VOL. (Actual or Figure 54-2.C)

			VEH
SU		% =	250
MU		% =	750

MECHANISITIC DESIGN - RIGID PAVEMENT

TRAFFIC FACTOR (Figure 54-4.C)

$$TF\ (actual) = 30 * \frac{[\ 0.15 * 25969 * 0.32\ ] + [\ 143.81 * 1419 * 0.45\ ] + [\ 696.42 * 993 * 0.45\ ]}{1{,}000{,}000}$$

TF (actual) = 12.13

$$TF\ (minimum) = 30 * \frac{[\ 143.81 * 250 * 0.45\ ] + [\ 696.42 * 750 * 0.45\ ]}{1{,}000{,}000}$$

TF (minimum) = 7.54

TIED SHOULDERS = YES

PAVEMENT THICKNESS = 9.95 inches ROUNDED : 10.00 inches
(Figure 54-4.F)

MECHANISITIC DESIGN - FLEXIBLE PAVEMENT

TRAFFIC FACTOR (Figure 54-5.B)

$$\text{TF (actual)} = 30 * \frac{[\ 0.15 * 25969 * 0.32\ ] + [\ 132.5 * 1419 * 0.45\ ] + [\ 482.53 * 993 * 0.45\ ]}{1{,}000{,}000}$$

TF (actual) = 9.05

$$\text{TF (minimum)} = 30 * \frac{[\ 132.5 * 250 * 0.45\ ] + [\ 482.53 * 750 * 0.45\ ]}{1{,}000{,}000}$$

TF (minimum) = 5.33

HMA MIXTURE TEMP (Figure 54-5.C) = 73 Degrees F

E (HMA) (Figure 54-5.D) = 760

DESIGN HMA STRAIN (Figure 54-5.G) = 65

PAVEMENT THICKNESS (Figure 54-5.G) = 11.35 inches ROUNDED : 11.50 inches

B. IL Route 173 @ US Route 45

- Project Description
  - IL Route 173
    - Existing 1 lane in each direction, aggregate shoulders, urban
    - Proposed Asphalt or Concrete pavement with curb and gutter
    - Existing subgrade soil is assumed to have Poor Subgrade Support Rating according to the IDOT Subgrade Stability Rating (SSR)
    - Target construction in 2015
- Traffic Forecasts
  - 2009 ADT = 16,300
  - 2020 ADT = 18,676
  - **2030 ADT= 20,836**
  - 2040 ADT= 23,000

Assumptions:

- Referencing IDOT's BDE Pavement Design Policy, Chapter 54
- Design Period – For Class I use 30 year for Rigid or Flexible for pavement areas over 25,000 sq ft
- Traffic Percentage from Figure 54-2.A
  - PV = 96%
  - SU = 2.5%
  - MU = 1.5%
- Pavement Design will focus on urban segment only.

PCC Pavement Design

- Class I, 4 Lane Pavement
- Design Period: 30 years
- Design Traffic
  - 2030 ADT: 20,836
  - 96% PV (20003), 2.5% SU (521), 1.5% MU (313)
  - Subgrade Support Rating: Poor
  - Shoulders: tied curb and gutter
  - 4-1/2" HMA Stabilized Sub-base needed when area is over 25,000 sq yd
- Traffic Factor: 7.40

- Dowel Bar diameter (figure 54-4A): 1.5 inches
- Final Slab Thickness = 9.35 inches, round to 9.5 inches with 15 foot Transverse Joint Spacing

Full Depth HMA Pavement Design

- Class I, 4 Lane Pavement
- Design Period: 30 years
- Design Traffic
    - 2030 ADT: 20,836
    - 96% PV (20003), 2.5% SU (521), 1.5% MU (313)
    - Subgrade Support Rating: Poor
- Traffic Factor: 5.33
- HMA Mixture Temperature (Figure 54-5C): 73 Degrees F
- E (HMA) (Figure 54-5D): 760
- Design HMA Strain (Figure 54-5G): 75
- Final HMA thickness from Figure 54-5F (Poor Subgrade Design Chart) is 10.4 inch and rounded to 10.5 inches

MILLBURN BYPASS

IL ROUTE 173 @ US ROUTE 45

ADT USED: 20,836 ADT YEAR: 2030 CLASS OF ROADWAY : CLASS I

SOIL CONDITIONS : POOR

% TOTAL ADT (Actual or Figure 54-2.A)

			VEH
PV	96	% =	20003
SU	2.5	% =	521
MU	1.5	% =	313

% TOTAL VEH. CLASS VOLUME (Figure 54-2.B)

PV	32	%
SU	45	%
MU	45	%

DESIGN PERIOD (DP) 30 YEARS

MIN. VEH. CLASS VOL. (Actual or Figure 54-2.C)

			VEH
SU		% =	250
MU		% =	750

MECHANISITIC DESIGN - RIGID PAVEMENT

TRAFFIC FACTOR (Figure 54-4.C)

$$TF\ (actual) = 30 * \frac{[\ 0.15 * 20003 * 0.32\ ] + [\ 143.81 * 521 * 0.45\ ] + [\ 696.42 * 313 * 0.45\ ]}{1{,}000{,}000}$$

TF (actual) = 3.98

$$TF\ (minimum) = 30 * \frac{[\ 143.8 * 250 * 0.32\ ] + [\ 696.42 * 750 * 0.45\ ]}{1{,}000{,}000}$$

TF (minimum) = 7.40

TIED SHOULDERS = YES

PAVEMENT THICKNESS = 9.35 inches ROUNDED : 9.5 inches

(Figure 54-4.F)

MECHANISITIC DESIGN - FLEXIBLE PAVEMENT

TRAFFIC FACTOR (Figure 54-5.B)

$$TF\ (actual) = 30 * \frac{[\ 0.15\ * 20003 * 0.32\ ] + [\ 132.5\ * 521 * 0.45\ ] + [\ 482.53\ * 313 * 0.45\ ]}{1{,}000{,}000}$$

TF (actual) = 3.00

$$TF\ (minimum) = 30 * \frac{[\ 132.5 * 250 * 0.45\ ] + [\ 482.53 * 750 * 0.45\ ]}{1{,}000{,}000}$$

TF (minimum) = 5.33

HMA MIXTURE TEMP (Figure 54-5.C) = 73 Degrees F

E (HMA) (Figure 54-5.D) = 760

DESIGN HMA STRAIN (Figure 54-5.G) = 75

PAVEMENT THICKNESS (Figure 54-5.G) = 10.40 inches ROUNDED : 10.5 inches

5. Other Information

A. Mechanistic Pavement Design
   Life Cycle Cost Analysis
B. ADT Exhibits
C. Traffic Counts
D. Email from LDOT
E. IDOT Pavement Design Form

Mechanistic Pavement Design

Date: 4/20/2012 | US Route 45
Calculations By: Don Naughton | Section:
Checked By: Mark Reznicek | Lake County
Class I Roads and Streets | Location: IL 132 to IL 173
Urban X Rural
Limits of Analysis Station 9+37.2 To Station 312+81.6
Length 30,344.4 Feet 5.75 Miles

Structural Design Traffic

PV = 25969
SU= 1419
MU= 993

Percent of S.D.T. in Design Lane

P= 32 %
S= 45 %
U= 45 %

Minimum Subgrade Support Rating - POOR

Rigid Pavement Design

Actual TF (F)= 12.13 | Minimum TF (F)= 7.54

Extended Lane= --- Inch

15 ft Panel PCC Thickness for:

Tied Shoulder= 10.00 Inch | Untied Shoulder= ---- Inch

Total Present Worth= $ 11,731,221.33 | Annual Cost/ Year= $ 83,263.05

Flexible Pavement Design

Actual TF (F)= 9.05 | Minimum TF (F)= 5.33

Selected Design AC type= 64-22

Design AC Mixture Temp.= 73 ° F | Design E (AC)= 760 KSI

Design AC Microstrain= 65 | AC Thickness= 11.5 Inch

Total Present Worth= $ 12,950,416.57 | Annual Cost/ Year= $ 91,916.36

Rigid Pavement

Date: 4/20/2012

Quantities By: Don Naughton

Checked By:

Unit Prices By: Don Naughton

Checked By: Mark Reznicek

US Route 45

Section:

Lake County

Net Length= 30,344.40 Lin. Ft. 5.75 Miles

Number Lanes= 4 Urban= X Rural=

Itemized Construction Cost:

Quantity	Unit	Item		Unit Cost	Total Cost
161,837	Sq Yd	10.00 -Inch	Jointed PCC	@ $ 40.00	= $ 6,473,472.00
182,066	Sq Yd	4.5- Inch	(HMA Stabilized Subbase)	@ $ 15.00	= $ 2,730,996.00
1,371	Sq Yd	8.00 -Inch	PCC Shoulders	@ $ 50.00	= $ 68,550.00
	Lin Ft	Pipe Underdrains		@ $	= $ 0.00
	Sq Yd	Subbase Granular Material		@ $	= $ 0.00
121,378	Lin Ft	100% Shoulder/ Curb & Gutter Joint Seal		@ $ 2.00	= $ 242,756.00
60,690	Lin Ft	100% Centerline Joint Seal		@ $ 1.00	= $ 60,690.00
				@ $	= $ 0.00
				@ $	= $ 0.00

Total Cost of Original Pavement Construction= $ 9,576,464.00

Itemized Maintenance And Rehabilitation Activity Cost

Rehabilitation Activity 1- Year 10

161,837	Sq Yd	0.1% Full-Depth PCC Pavement Patching	@ $ 130.00	= $ 21,038.78

Total Cost of Rehabilitation Activity 1 = $ 21,038.78

Rehabilitation Activity 2- Year 15

161,837	Sq Yd	0.2% Full-Depth PCC Pavement Patching	@ $ 130.00	= $ 42,077.57

Total Cost of Rehabilitation Activity 2 = $ 42,077.57

Rehabilitation Activity 3- Year 20

161,837	Sq Yd	2.0% Full-Depth PCC Pavement Patching	@ $	130.00	= $	420,775.68
1,371	Sq Yd	0.5% Full-Depth PCC Shoulder Patching	@ $	85.00	= $	582.68
121,378	Lin. Ft.	100% Longitudinal/Shoulder Joint Routing & Sealing	@ $	1.00	= $	121,378.00
60,690	Lin. Ft.	100% Centerline Joint Routing & Sealing	@ $	1.00	= $	60,690.00

Total Cost of Rehabilitation Activity 3 = $ 603,426.36

Rehabilitation Activity 4- Year 25

161,837	Sq Yd	3.0% Full-Depth PCC Pavement Patching	@ $	130.00	= $	631,163.52
1,371	Sq Yd	1.0% Full-Depth PCC Shoulder Patching	@ $	85.00	= $	1,165.35

Total Cost of Rehabilitation Activity 4 = $ 632,328.87

Rehabilitation Activity 5- Year 30

161,837	Sq Yd	4.0% Full-Depth PCC Pavement Patching	@ $	130.00	= $	841,551.36
1,371	Sq Yd	1.5% Full-Depth PCC Shoulder Patching	@ $	85.00	= $	1,748.03
161,837	Sq Yd	Policy HMA Overlay- Pavement	@ $	13.30	= $	2,152,429.44
1,371	Sq Yd	Policy HMA Overlay- Shoulder	@ $	13.30	= $	18,234.30

Total Cost of Rehabilitation Activity 5 = $ 3,013,963.13

Rehabilitation Activity 6- Year 35

121,378	Lin. Ft.	100% Longitudinal/Shoulder Joint Routing & Sealing	@ $	1.00	= $	121,378.00
60,690	Lin. Ft.	100% Centerline Joint Routing & Sealing	@ $	1.00	= $	60,690.00
30,344	Lin. Ft.	50% Random Crack Routing and Sealing Assume 100ft/Station	@ $	1.00	= $	15,172.00
97,104	Lin. Ft.	40% Reflective Transverse Crack Routing & Sealing	@ $	1.00	= $	38,841.60
161,837	Sq Yd	0.1% Partial-Depth Pavement Patching (Mill & Fill Surface-Interstates; Mill and Fill 2.5 inches- Non-Interstates)	@ $	130.00	= $	21,038.78

Total Cost of Rehabilitation Activity 6 = $ 257,120.38

Rehabilitation Activity 7- Year 40

161,837	Sq Yd	0.5% Full-Depth PCC Pavement Patching	@ $	130.00	= $	105,193.92
161,837	Sq Yd	0.5% Partial-Depth Pavement Patching (Mill & Fill Surface-Interstates; Mill and Fill 2.5 inches- Non-Interstates)	@ $	130.00	= $	105,193.92
97,104	Lin. Ft.	60% Reflective Transverse Crack Routing & Sealing	@ $	1.00	= $	58,262.40
30,344	Lin. Ft.	50% Random Crack Routing and Sealing Assume 100ft/Station	@ $	1.00	= $	15,172.00
121,378	Lin. Ft.	100% Longitudinal/Shoulder Joint Routing & Sealing	@ $	1.00	= $	121,378.00
60,690	Lin. Ft.	100% Centerline Joint Routing & Sealing	@ $	1.00	= $	60,690.00

Total Cost of Rehabilitation Activity 7 = $ 465,890.24

Annual Cost Determination

Present Worth Calculations:

Total Cost of Orignial Pavement Construction = $ 9,576,464.00

Present Worth of Rehabilitation Activity 1 = $	21,038.78	x	0.7441	= $	15,654.96
Present Worth of Rehabilitation Activity 2 = $	42,077.57	x	0.6419	= $	27,009.59
Present Worth of Rehabilitation Activity 3 = $	603,426.36	x	0.5537	= $	334,117.17
Present Worth of Rehabilitation Activity 4 = $	632,328.87	x	0.4776	= $	302,000.27
Present Worth of Rehabilitation Activity 5 = $	3,013,963.13	x	0.412	= $	1,241,752.81
Present Worth of Rehabilitation Activity 6 = $	257,120.38	x	0.3554	= $	91,380.58
Present Worth of Rehabilitation Activity 7 = $	465,890.24	x	0.3066	= $	142,841.95
			Total	= $	2,154,757.33

Total Life Cycle Cost (Present Worth)= $ 11,731,221.33

Annual Cost Per Mile Calculation

Total Present Worth X CRF (n) / Length = Annual Cost/ Year- Mile

($ 11,731,221.33 X 0.04079/ 5.75 Miles) = $ 83,263.05 Year-Mile

Flexible Pavement

Date: 4/20/2012

Quantities By: Don Naughton

Checked By:

Unit Prices By: Don Naughton

Checked By: Mark Reznicek

US Route 45

Section:

Lake County

Net Length= 30,344.40 Lin. Ft. 5.75 Miles

Number Lanes= 4 Urban= X Rural=

Single Lane Paving= Dual Lane Paving=

Itemized Construction Cost:

Quantity	Unit	Item		Unit Cost	Total Cost
161,837	Sq Yd	2	-Inch Class I Surface Course	@ $ 12.32	= $ 1,993,829.38
161,837	Sq Yd	9.5	-Inch Class I Binder Course	@ $ 45.22	= $ 7,318,260.10
1,371	Sq Yd	8	-Inch Stabilized Shoulders	@ $ 45.00	= $ 61,695.00
	Lin Ft	Pipe Underdrains		@ $	= $ 0.00
	Sq Yd	Subbase Granular Material		@ $	= $ 0.00
121,376	Foot	Additional Depth Cost for C&G, B-6.24 (1.5")		@ $ 1.19	= $ 144,437.44
				@ $	= $ 0.00
				@ $	= $ 0.00
				@ $	= $ 0.00

Total Cost of Original Pavement Construction= $ 9,518,221.91

Itemized Maintenance And Rehabilitation Activity Cost

Rehabilitation Activity 1- Year 5

33,379	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/ Station)	@ $ 1.00	= $ 16,689.50
121,378	Lin. Ft.	100% Longitudinal Shoulder/ Curb & Gutter Joint Routing & Sealing	@ $ 1.00	= $ 121,378.00
60,690	Lin. Ft.	100% Centerline Joint Routing & Sealing	@ $ 1.00	= $ 60,690.00
161,837	Sq Yd	0.1% Partial-Depth Pavement Patching Mill & Fill Surface	@ $ 90.00	= $ 14,565.31

Total Cost of Rehabilitation Activity 1 = $ 213,322.81

Rehabilitation Activity 2- Year 10

33,379	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/ Station)	@ $ 1.00	= $	16,689.50
121,378	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@ $ 1.00	= $	121,378.00
60,690	Lin. Ft.	100% Centerline Joint Routing & Sealing	@ $ 1.00	= $	60,690.00
161,837	Sq Yd	0.5% Partial-Depth Pavement Patching Mill & Fill Surface	@ $ 90.00	= $	72,826.56

Total Cost of Rehabilitation Activity 2 = $ 271,584.06

Rehabilitation Activity 3- Year 15

163,208	Sq Yd	2.0-Inch Milling- Pavement & Shoulder	@ $ 1.75	= $	285,613.65
161,837	Sq Yd	1.0% Partial-Depth Pavement Patching (Mill & Fill Additional 2.0-Inch)	@ $ 90.00	= $	145,653.12
163,208	Sq Yd	2.0-Inch HMA Overlay Pavement & Shoulder	@ $ 12.32	= $	2,010,720.10

Total Cost of Rehabilitation Activity 3 = $ 2,441,986.87

Rehabilitation Activity 4- Year 20

33,379	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/ Station)	@ $ 1.00	= $	16,689.50
121,378	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@ $ 1.00	= $	121,378.00
60,690	Lin. Ft.	100% Centerline Joint Routing & Sealing	@ $ 1.00	= $	60,690.00
161,837	Sq Yd	0.1% Partial-Depth Pavement Patching Mill & Fill Surface	@ $ 90.00	= $	14,565.31

Total Cost of Rehabilitation Activity 4 = $ 213,322.81

Rehabilitation Activity 5- Year 25

33,379	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/ Station)	@ $	1.00	= $	16,689.50
121,378	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@ $	1.00	= $	121,378.00
60,690	Lin. Ft.	100% Centerline Joint Routing & Sealing	@ $	1.00	= $	60,690.00
161,837	Sq Yd	0.5% Partial-Depth Pavement Patching Mill & Fill Surface	@ $	90.00	= $	72,826.65

Total Cost of Rehabilitation Activity 5 = $ 271,584.15

Rehabilitation Activity 6- Year 30

163,208	Sq Yd	2.0-Inch Milling- Pavement & Shoulder	@ $	1.75	= $	285,613.65
161,837	Sq Yd	2.0% Partial-Depth HMA Pavement Patching (Mill & Fill Additional 2.0-inch All Designs)	@ $	90.00	= $	291,306.60
1,371	Sq Yd	1.0% Full-depth HMA Shoulder Patching (Mill & Fill Surface- Standard Design- Mill & Fill Additional 2.0-inch- Limiting Strain Criterion Design)	@ $	90.00	= $	1,233.90
163,208	Sq Yd	HMA Overlay Pavement	@ $	12.32	= $	2,010,720.10
1,371	Sq Yd	HMA Overlay- Shoulder	@ $	8.96	= $	12,284.16

Total Cost of Rehabilitation Activity 6 = $ 2,601,158.41

Rehabilitation Activity 7- Year 35

33,379	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/ Station)	@ $	1.00	= $	16,689.50
121,378	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@ $	1.00	= $	121,378.00
60,690	Lin. Ft.	100% Centerline Joint Routing & Sealing	@ $	1.00	= $	60,690.00
161,837	Sq Yd	0.1% Partial-Depth Pavement Patching (Mill & Fill Surface)	@ $	90.00	= $	14,565.33

Total Cost of Rehabilitation Activity 7 = $ 213,322.83

Rehabilitation Activity 8- Year 40

33,379	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/ Station)	@ $ 1.00	= $	16,689.50
121,378	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@ $ 1.00	= $	121,378.00
60,690	Lin. Ft.	100% Centerline Joint Routing & Sealing	@ $ 1.00	= $	60,690.00
161,837	Sq Yd	0.5% Partial-Depth Pavement Patching (Mill & Fill Surface)	@ $ 90.00	= $	72,826.65

Total Cost of Rehabilitation Activity 8 = $ 271,584.15

Annual Cost Determination

Present Worth Calculations:

Total Cost of Orignial Pavement Construction = $ 9,518,221.91

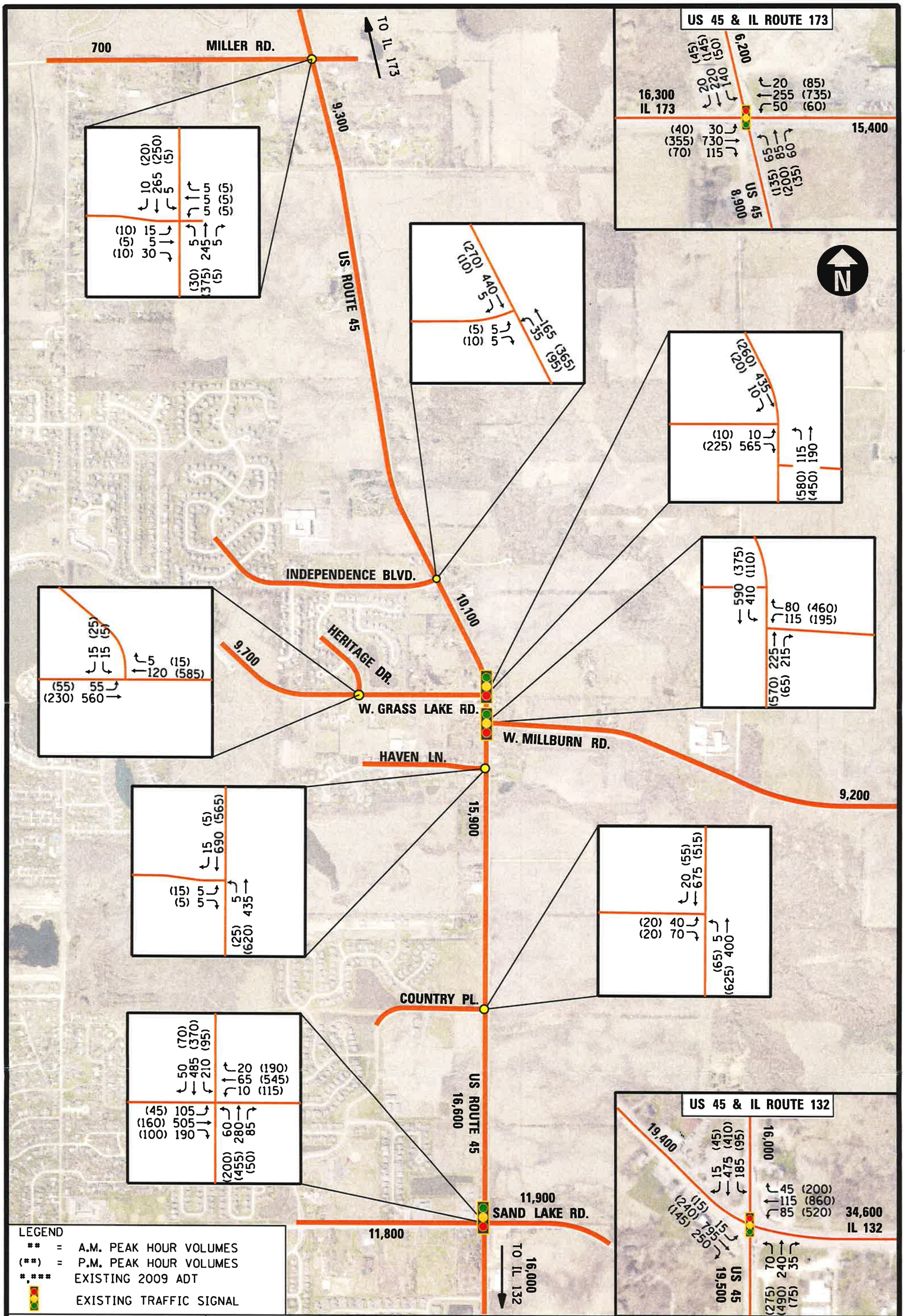
Present Worth of Rehabilitation Activity 1 = $	213,322.81	x	0.8626	= $	184,012.26
Present Worth of Rehabilitation Activity 2 = $	271,584.06	x	0.7441	= $	202,085.70
Present Worth of Rehabilitation Activity 3 = $	2,441,986.87	x	0.6419	= $	1,567,511.37
Present Worth of Rehabilitation Activity 4 = $	213,322.81	x	0.5537	= $	118,116.84
Present Worth of Rehabilitation Activity 5 = $	271,584.15	x	0.4776	= $	129,708.59
Present Worth of Rehabilitation Activity 6 = $	2,601,158.41	x	0.412	= $	1,071,677.26
Present Worth of Rehabilitation Activity 7 = $	213,322.83	x	0.3554	= $	75,814.93
Present Worth of Rehabilitation Activity 8 = $	271,584.15	x	0.3066	= $	83,267.70
			Total	= $	3,432,194.65

Total Life Cycle Cost (Present Worth)= $ 12,950,416.57

Annual Cost Per Mile Calculation

Total Present Worth X CRF (n) / Length = Annual Cost/ Year- Mile

($ 12,950,416.57 X 0.04079/ 5.75 Miles) = $ 91,916.36 Year-Mile



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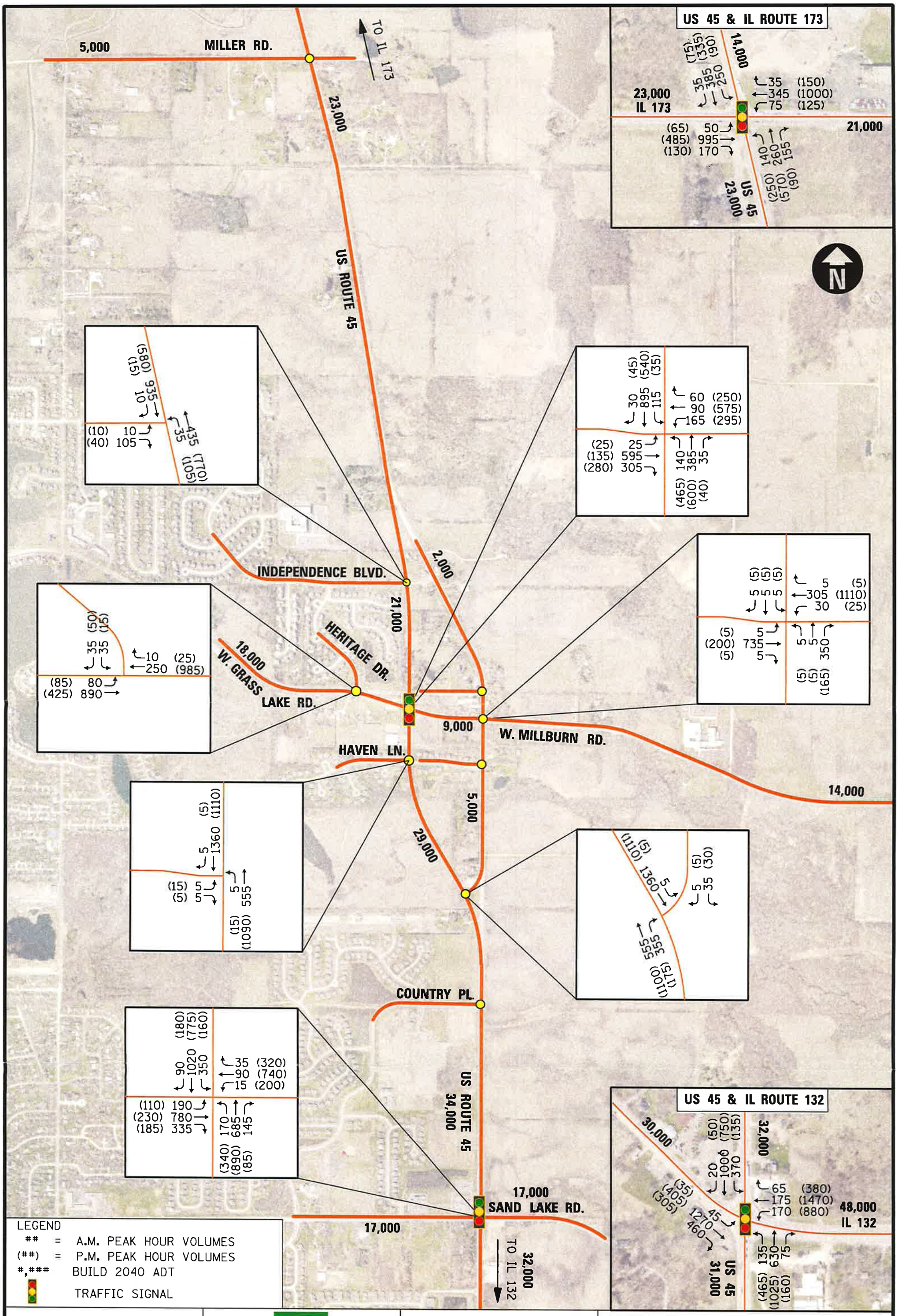
LakeCounty Division of Transportation

US ROUTE 45 – MILLBURN BYPASS

2009 PEAK HOUR VOLUMES

2/22/2011 N:\LCDOT\080677\PHASE1\Traffic\Exhibits\080677_2009 Existing DHV.dgn



3/9/2011 N:\LCDOT\080677\PHASE1\Traffic\Exhibits\080677_2040 A4 Build DHV.dgn

CIVIL ENGINEERING CONSULTANTS
RWA
Regina Webster & Associates, Inc.
6160 North Cicero Avenue, Suite 500 * Chicago, Illinois 60646-4333
773 283 2600 * FAX 773 283 2602
www.RWAengineers.com

Machine Count Summary			
Street	**Location**	**City**	**Start Date**
US 45	South of Milburn Road	Milburn	1/22/2009

Start Time	SOUTHBOUND			Total SB	NORTHBOUND			Total NB	**Grand Total**
	PC	SU	MU		PC	SU	MU		
0:00	38	2	1	41	42	1	1	44	85
1:00	14	1	1	16	23	1	1	25	41
2:00	8	2	1	11	22	0	2	24	35
3:00	20	0	8	28	17	0	1	18	46
4:00	55	5	4	64	36	0	3	39	103
5:00	176	9	10	195	82	6	10	98	293
6:00	421	28	11	460	190	10	15	215	675
7:00	519	28	14	561	407	13	11	431	992
8:00	571	44	19	634	346	32	14	392	1026
9:00	528	23	23	574	262	16	24	302	876
10:00	326	18	22	366	293	27	20	340	706
11:00	339	19	25	383	341	29	25	395	778
12:00	404	14	28	446	334	37	22	393	839
13:00	341	19	19	379	358	22	15	395	774
14:00	328	14	20	362	450	36	16	502	864
15:00	389	38	12	439	485	52	13	550	989
16:00	472	22	9	503	528	22	9	559	1062
17:00	548	16	3	567	532	23	10	565	1132
18:00	495	6	2	503	475	13	9	497	1000
19:00	321	11	4	336	443	6	4	453	789
20:00	270	7	1	278	329	2	7	338	616
21:00	179	4	2	185	327	2	0	329	514
22:00	159	5	1	165	207	5	0	212	377
23:00	48	2	0	50	83	1	0	84	134
	Total SB Traffic			7546	Total NB Traffic			7200	**14746**

	% SU + MU	Southbound SU AM	Southbound MU AM	Northbound SU PM	Northbound MU PM
	5.88%	4.88%	2.44%	2.27%	2.27%
	9.76%	6.25%	6.25%	4.00%	4.00%
	14.29%	18.18%	9.09%	0.00%	8.33%
	19.57%	0.00%	28.57%	0.00%	5.56%
	11.65%	7.81%	6.25%	0.00%	7.69%
	11.95%	4.62%	5.13%	6.12%	10.20%
	9.48%	6.09%	2.39%	4.65%	6.98%
	6.65%	**4.99%**	**2.50%**	**3.02%**	**2.55%**
	10.62%	6.94%	3.00%	8.16%	3.57%
	9.82%	4.01%	4.01%	5.30%	7.95%
	12.32%	4.92%	6.01%	7.94%	5.88%
	12.60%	4.96%	6.53%	7.34%	6.33%
	12.04%	3.14%	6.28%	9.41%	5.60%
	9.69%	5.01%	5.01%	5.57%	3.80%
	9.95%	3.87%	5.52%	7.17%	3.19%
	11.63%	8.66%	2.73%	9.45%	2.36%
	5.84%	4.37%	1.79%	3.94%	1.61%
	4.59%	**2.82%**	**0.53%**	**4.07%**	**1.77%**
	3.00%	1.19%	0.40%	2.62%	1.81%
	3.17%	3.27%	1.19%	1.32%	0.88%
	2.76%	2.52%	0.36%	0.59%	2.07%
	1.56%	2.16%	1.08%	0.61%	0.00%
	2.92%	3.03%	0.61%	2.36%	0.00%
	2.24%	4.00%	0.00%	1.19%	0.00%
24hour		**4.47%**	**3.18%**	**4.94%**	**3.22%**

PV = 91.5%
SU = 5%
MU = 3.5%

VT2

Illinois Department of Transportation - Bureau of Programming - Data Bank

Summary Classification Sheet For Vehicle Traffic

			US45 and IL173		Page:	2
District:	1	County	Lake	City: Antioch	No. of Legs:	4
		Muni/Non-Mun	Muni			
Rural/Urban	Urban					
Date Of Count:	2/18/2010					

IL173 E of US45

E Leg of Intersection

Date	Hour	4-Tire	SU	MU	Total	Pct. Comm.
2/18/2010	6:00	1,066	17	17	1,100	3.1%
	7:00	1,276	32	17	1,325	3.7%
	8:00	938	36	27	1,001	6.3%
	9:00	615	35	23	673	8.6%
	10:00	605	39	19	663	8.7%
	11:00	603	33	30	666	9.5%
	6 hr. Total	**5,103**	**192**	**133**	**5,428**	6.0%
2/17/2010	12:00	616	23	16	655	6.0%
	13:00	618	29	16	663	6.8%
	14:00	757	36	20	813	6.9%
	15:00	1,122	30	19	1,171	4.2%
	16:00	1,261	25	7	1,293	2.5%
	17:00	1,443	11	6	1,460	1.2%
	6 hr. Total	**5,817**	**154**	**84**	**6,055**	3.9%
	12-hr. Total	**10,920**	**346**	**217**	**11,483**	4.9%
***24-hr	**AADT*** **	**14,806**	**356**	**187**	**15,349**	
	PCT	**96.5%**	**2.3%**	**1.2%**		**100.0%**

ROUND SU = 2.5%, MU = 1.5%

IL173 W of US45

W Leg of Intersection

Date	Hour	4-Tire	SU	MU	Total	Pct. Comm.
2/18/2010	6:00	1,011	18	26	1,055	4.2%
	7:00	1,216	39	15	1,270	4.3%
	8:00	942	39	28	1,009	6.6%
	9:00	661	40	20	721	8.3%
	10:00	631	35	20	686	8.0%
	11:00	637	36	22	695	8.3%
	6 hr. Total	**5,098**	**207**	**131**	**5,436**	**6.2%**
2/17/2010	12:00	670	31	20	721	7.1%
	13:00	687	37	17	741	7.3%
	14:00	811	37	16	864	6.1%
	15:00	1,161	34	16	1,211	4.1%
	16:00	1,323	28	7	1,358	2.6%
	17:00	1,455	12	5	1,472	1.2%
	6 hr. Total	**6,107**	**179**	**81**	**6,367**	**4.1%**
	12-hr. Total	**11,205**	**386**	**212**	**11,803**	**5.1%**
***24-hr	**AADT*** **	**15,196**	**398**	**182**	**15,776**	
	PCT	**96.3%**	**2.5%**	**1.2%**		**100.0%**

Property of Illinois Department of Transportation

Traffic Report 4 leg Version 3.0a

***This AADT is a 12 hour FACTORED value, it is not an official published AADT.
For further information, contact IDOT Data Bank (847) 705-4446***

REQUIREMENTS FOR PAVEMENT ANALYSIS

A. Location Information

- [X] Location Map
- [X] Scope of Requested Work (from Project Report)
- [X] Existing and Proposed Typical Cross Sections
- [ ] Existing and Proposed Intersection Geometry Including Turn Bay and Taper Lengths, Widths (IDS-OK), All Plan Sheets for Reconstruction
- [X] Highway Type (FAI, FAP, FAU, FAS)
- [ ] IBR _____ (Source) _____

Soil Profile Done (Y/N) _____

Pavement Cores (Y/N) _____

Route: US Route 45 - IL Rte 132 to IL Rte 173

Target Letting: _____

Designer: _____

Section: _____

Contract #: _____

Job #: _____

B. Pavement History (State Maintenance Pavements)

Roadway Limits	Original Pavement				Widening				1st Resurfacing		2nd Resurfacing		CRS	Year
	Year	Thickness/Type		Width	Year	Thickness/Type		Width	Year	Thickness	Year	Thickness		
US Route 45														
IL Route 173														
Grass Lake Rd														
Sand Lake Rd														

C. Project Description

Roadway Limits	Resurfacing			Widening			Reconstruction			Shoulders			
	Width	Length	Type*	Width	Length	SM(SY)	Width	Length	SM (SY)	C&G Type	R/L	Type	Width
US Route 45							48'	30,330		B-6.24	R & L		
IL Route 173							48'	3,950		B-6.24	R & L		
Grass Lake Rd							48'	2,835			R & L	HMA & Agg	4' each
Sand Lake Rd							48'	1890		B-6.24 (L)	R & L	HMA & Agg	4' each

*Structural/Cosmetic

D. Mainline Traffic Considerations

Mainline	Limits	Roadway Class	Proposed	Existing				Projected	
		I, II, III, IV	JT (Y/N)	Year	ADT	% MU	% SU	Year	ADT
IL Route 45	IL 173 to IL 132	Class I	N	2009	16,600	3.5	5	2040	34,000
Crossroad									
IL 173	w/o Pederson Drive to e/o US Route 45	Class I	N	2009	16,300	1.5	2.5	2040	23,000
Grass Lake Road	w/o Heritage Drive to existing US 45	Class I	N	2009	9,700	0.5	2.5	2040	18,000
Sand Lake Road	w/o Cross Creek Ln to e/o US Route 45	Class I	N	2009	11,900	0.5	4	2040	17,000

E. Intersection Characteristics

Crossroad	Roadway Class	Hwy Type	Juris. *	Pavt. Type Req.	Exist. Pav't Thickness	ADT	Signals	All Way Stop	Skidproof Prop. (Y/N)	High Stress (Y/N)
IL 173	Class I		IDOT			16,300	Yes	No	N	
Grass Lake Road	Class I		LCDOT			9,700	Yes	No	N	
Sand Lake Road	Class I		LCDOT			11,900	Yes	No	N	

***Note:** **For roads which are or will be under local jusisidiciton, information from the local agency specifying any pavement requirements is required in writing with this pavement design request.**

F. Restriction/Considerations (i.e. shallow utilities, vertical clearances, club restraints, location of grades exceeding 3.5%, etc.)

6. Recommendations

The recommended pavement design and the basis for the selection for each roadway follows:

US Route 45 from IL Route 173 to IL Route 132: Mechanistic Design

A summary of the results from the mechanistic design and the life-cycle cost analysis for rigid and flexible pavements follows:

Rigid (Recommended Alternative)

- 10 Inch PCC Pavement with 15 Foot Transverse Joint Spacing
- Shoulders: Curb and gutter tied with 1.5 inch Dowel Bars
- 4 ½ inch HMA Stabilized Sub-base
- 12 inch Aggregate Subgrade
- Total Life Cycle Cost (Present Worth)=$11.731M

Flexible

- 2 inch Polymerized HMA Surface Course, Mix "F", N90
- 9.5 inch Polymerized HMA Binder Course, IL-19.0, N90
- 12 inch Aggregate Subgrade
- Total Life Cycle Cost (Present Worth)=$12.950M

The life-cycle cost of the rigid alternative is 9.6% less than the flexible alternative. **With the difference in life-cycle costs being almost 10%, the rigid pavement design noted above is recommended for construction.**

IL Route 173 @ US Route 45: Mechanistic Design

The calculated thickness of the PCC alternative for IL Route 173 is 9.5 inches which is one half inch (0.5) less than the recommended thickness along US Route 45. As the area of new pavement along US Route 45 is significantly more than the new pavement along IL Route 173, one can expect a considerable discount in the unit price of the 10 inch PCC pavement. **To simplify construction operations and take advantage of the economy of large quantities, it is recommended to construct IL Route 173 of the same thickness as US Route 45 (10 inch PCC pavement).**

Rigid (Recommended Alternative)

- 10 Inch PCC Pavement with 15 Foot Transverse Joint Spacing
- Shoulders: Curb and gutter tied with 1.5 inch Dowel Bars
- 4 ½ inch HMA Stabilized Sub-base
- 12 inch Aggregate Subgrade

Flexible

- 2 inch Polymerized HMA Surface Course, Mix "D", N70
- 8.5 inch Polymerized HMA Binder Course, IL-19.0, N70
- 12 inch Aggregate Subgrade

A life-cycle cost analysis was not performed for the IL Route 173 alternatives. However, one can expect similar results to the US Route 45 analysis (favoring rigid).

Grass Lake Road @ US Route 45: Mechanistic Design

A summary of the results from the mechanistic design for rigid and flexible pavements follows:

Rigid

- 9.0 Inch PCC Pavement with 15 Foot Transverse Joint Spacing
- 12 inch Aggregate Subgrade

Flexible (Recommended Alternative)

HMA thickness from mechanistic design calculations:

- 2 inch HMA Surface Course, Mix "D", N70
- 7.75 inch HMA Binder Course, IL-19.0, N70
- 12 inch Aggregate Subgrade

Selection of pavement composition and thickness on Grass Lake Road was deferred to Lake County for their preference. Per email correspondence with LDOT in January 2013 (see Other Information, Section D), flexible pavement was preferred as the adjoining pavement is also flexible and future maintenance would be less disruptive to traffic.

The County is open to reevaluating the pavement composition once the geotechnical information is available during Phase II.

APPENDIX H

DESIGN EXCEPTIONS

Design Exception Requests
U.S. Route 45 from Millburn Bypass to Illinois Route 173
Lake County

	BDE Standard	Proposed Design	Location of Exception	JUSTIFICATION
1	Minimum LOS D per BDE Figure 46-3.E	LOS E	Eastbound Left Turn movement (AM & PM); at the intersection of U.S. Route 45 at Illinois Route 173.	Due to the known crash patterns and identified safety issues at this intersection, all left turn movements are phased as protected only movements, affecting the capacity and delay. To optimize the signal timings, near minimum green time is utilized for the eastbound left turn movement with priority given to through movements on U.S. Route 45 and Illinois Route 173 to obtain the required LOS/delay. Additionally, the queue is contained within the required minimum storage bay length per stopping sight distance requirements.
2	Minimum LOS D per BDE Figure 46-3.E	LOS E	Westbound Left Turn movement (AM & PM); at the intersection of U.S. Route 45 at Illinois Route 173.	Due to the known crash patterns and identified safety issues at this intersection, all left turn movements are phased as protected only movements, affecting the capacity and delay. To optimize the signal timings, near minimum green time is utilized for the westbound left turn movement with priority given to through movements on U.S. Route 45 and Illinois Route 173 to obtain the required LOS/delay. Additionally, the queue is contained within the required minimum storage bay length per stopping sight distance requirements.
3	600' minimum Lane Drop Taper per BDE Figure 36-5.A	540' Lane Drop Taper	North leg of intersection of U.S. Route 45 and Illinois Route 173 – northbound U.S. Route 45.	The proposed lane drop terminates south of the first residential street (Burr Hollow Drive).
4	585' Acceleration Length from stop bar for lane drop per BDE Figure 36-5.A	516' Acceleration Length	North leg of intersection of U.S. Route 45 and Illinois Route 173 – northbound U.S. Route 45.	The proposed lane drop terminates south of the first residential street (Burr Hollow Drive).

	BDE Standard	Proposed Design	Location of Exception	JUSTIFICATION
5	215' Left-U-Turn Auxiliary Lane Storage Length per BDE Figure 36-3.I 50 MPH Design Speed	115' Left-U-Turn Auxiliary Lane Storage Length	South leg of intersection of U.S. Route 45 and Burr Hollow Drive – northbound U.S. Route 45 U-Turn lane.	The northbound taper and storage for the Left U-Turn lane is within the 540' lane drop for northbound U.S. Route 45. The Left U-Turn taper and storage next to the long lane drop can create confusion and be used as a through lane. The northbound Left U-Turn lane meets the minimum storage length for 3R criteria.
6	220' Left-U-Turn Auxiliary Lane Taper Length per BDE Figure 36-3.I 50 MPH Design Speed	150' Left-U-Turn Auxiliary Taper Length	South leg of intersection of U.S. Route 45 and Burr Hollow Drive – northbound U.S. Route 45 U-Turn lane.	The northbound taper and storage for the Left U-Turn lane is within the 540' lane drop for northbound U.S. Route 45. The Left U-Turn taper and storage next to the long lane drop can create confusion and can be used as a through lane. The northbound Left U-Turn lane meets the minimum taper length for 3R criteria.
7	215' Left-Turn Auxiliary Lane Storage Length per BDE Figure 36-3.I 50 MPH Design Speed	130' Left-Turn Auxiliary Lane Storage Length	North leg of intersection of U.S. Route 45 and Burr Hollow Drive - southbound U.S. Route 45 left turn lane	Extension of the southbound left turn lane to meet the minimum storage length would impact properties on both sides of U.S. Route 45 north of Burr Hollow Drive.
8	400' (50:1) Approach Taper BDE Figure 36-3.J	Unshadowed Turn Lane (80' Taper)	Southbound US Route 45 at Burr Hollow Drive left turn lane	Providing 400' Approach Taper would impact properties and require additional right-of-way acquisition from what was identified in the Environmental Assessment (EA) on both sides of U.S. Route 45 north of Burr Hollow Drive and would extend the north project limit. Burr Hollow Drive is a "dead end" local road which serves one residential property.
9	K = 103 for Design Speed = 50 mph with 3% grade BDE Figure 33-4.F	K = 72	Sag vertical curve at U.S. Route 45 PVI Station 310+50	The location of this design exception is at the northern project limit, and therefore the proposed profile is dictated by the existing roadway profile, which maintains existing drainage patterns. Additionally, maintaining the existing profile at this location is compatible with the proposed drainage plan, which includes replacing an existing cross road culvert and new detention basin (west side).

	BDE Standard	Proposed Design	Location of Exception	JUSTIFICATION
10	125' storage for 35mph Design Speed per BDE Figure 36-3I	115' storage	Westbound Miller Road (East) at U.S. Route 45	Miller Road is a designated local road east of U.S. Route 45, has no connectivity, and serves two residential properties. BLRS Figure 34-3.D with justification of Miller Road (East Leg) as a low volume (2040 Peak AM (PM) = 15 (15)) residential local roadway was utilized as the design standard.
11	6.7' offset per BDE 36-1.05(c) (30mph Design Speed)	Intersection maximum offset between opposing approaches 8.6' offset	Miller Road East Leg at U.S. Route 45	Maintain existing north edge of pavement with widening to the south to avoid right-of-way acquisition from Lake County Forest Preserve District Property on the north side of Miller Road (East). East leg is a low volume (ADT = 900) residential local roadway serving two residential properties. The existing east leg of Miller Road under existing conditions is offset approximately 5.5'.
12	215' Left-Turn Storage Length per BDE Figure 36-3.I 50 MPH Design Speed	115' Left-Turn Storage Length	Miller Road West Leg at U.S. Route 45	Miller Road is a designated local road west of U.S. Route 45 providing connectivity to Savage Road to the west and U.S. Route 45 to the east with a low volume ADT varying from 700 to 900. Providing 215' storage length would require additional right-of-way acquisition from the residential property on the south side of Miller Road and extend the west project limit beyond the Environmental Survey study area identified in the EA. BLRS Figure 34-3.D was utilized as the design standard.
13	220' Left-Turn Taper Length per BDE Figure 36-3.I 50 MPH Design Speed	99' Left-Turn Taper Length	Miller Road West Leg at U.S. Route 45	Miller Road is a designated local road west of U.S. Route 45 providing connectivity to Savage Road to the west and U.S. Route 45 to the east with a low volume ADT varying from 700 to 900. Providing 220' taper length would require additional right-of-way acquisition from the residential property on the south side of Miller Road and extend the west project limit beyond the Environmental Survey study area identified in the EA. BLRS Figure 34-3.D was utilized as the design standard.
14	40:1 median approach taper rate per BDE Figure 36-3.J 50 MPH Design Speed	30:1 median approach taper rate	Miller Road West Leg at U.S. Route 45	Providing 40:1 median approach taper rate would require additional right-of-way acquisition from the residential properties on the south side of Miller Road and extend the west project limit beyond the Environmental Survey study area identified in the EA.

	BDE Standard	Proposed Design	Location of Exception	JUSTIFICATION
15	6% Access to State Highways Chapter V, Section D	11.6%	Commercial Entrance on U.S. Route 45 at Station 294+11.96 LT, between Miller Road and Illinois Route 173, and Commercial Entrance at Station 300+00.00 LT, between Illinois Route 173 and Burr Hollow Drive.	Extending the driveway using a 6% grade would impact the use of the existing commercial parking lots and possibly the structures.
16	6% Access to State Highways Chapter V, Section D	10%	Commercial Entrance on Illinois Route 173 at Station 1204+44.03 LT, east of U.S. Route 45.	Extending the driveway using a 6% grade would impact the use of the existing commercial parking lot.
17	8% Access to State Highways Chapter IV, Section C	8.8% and 11.0%	Residential Entrance on U.S. Route 45 at Station 222+67.92 LT, between Kelly Road and Miller Road.	Extending the driveway using an 8% grade would not meet the existing topography adjacent to the roadway within a reasonable distance and impact an existing structure.
18	3:1 Front Slope BDE Figure 34-4.B BDE Figure 17-2.Y	2.5:1	U.S. Route 45-Station 236+00 LT to 237+00 LT	A 2.5:1 front slope is needed to minimize proposed right-of-way acquisition from the adjacent Lake County Forest Preserve District property.

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	50 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Level of Service

Design Element Policy Value

LOS D (BDE Figure 46-3.E)

Proposed Design Element Value

LOS E

Location(s) of Exception

Eastbound (AM & PM) Illinois Route 173 left turn movement at the U.S. Route 45 intersection

Crash History and Potential of Exception Location(s)

Total of 71 crashes during the 2007-2011 time period; 3 crashes related to EB left turn movement. Intersection is not a 5% Location. Proposed scope of work is intended to improve safety and operations, and this exception location is anticipated to have improved safety and operations as compared to existing conditions.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$400,000.00	$250,000.00

Impacts Other Than Cost of Using Policy Value

None

Proposed Mitigation to Address Exception

Reference IDS

Geometric Compatibility with Adjacent Sections

Compatible

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Due to the known crash patterns and identified safety issues at this intersection, all left turn movements are phased as protected only movements, affecting the capacity and delay. To optimize the signal timings, near minimum green time is utilized for the eastbound left turn movement with priority given to through movements on U.S. Route 45 and Illinois Route 173 to obtain the required LOS/delay. Additionally, the queue is contained within the required minimum storage bay length per stopping sight distance requirements.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	50 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Level of Service

Design Element Policy Value

LOS D (BDE Figure 46-3.E)

Proposed Design Element Value

LOS E

Location(s) of Exception

Westbound Illinois Route 173 left turn movement at the U.S. Route 45 intersection

Crash History and Potential of Exception Location(s)

Total of 71 crashes during the 2007-2011 time period; 1 crash related to WB left turn movement. Intersection is not a 5% Location. Proposed scope of work is intended to improve safety and operations, and this exception location is anticipated to have improved safety and operations as compared to existing conditions.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$400,000.00	$250,000.00

Impacts Other Than Cost of Using Policy Value

None

Proposed Mitigation to Address Exception

None

Geometric Compatibility with Adjacent Sections

Compatible

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Due to the known crash patterns and identified safety issues at this intersection, all left turn movements are phased as protected only movements, affecting the capacity and delay. To optimize the signal timings, near minimum green time is utilized for the westbound left turn movement with priority given to through movements on U.S. Route 45 and Illinois Route 173 to obtain the required LOS/delay. Additionally, the queue is contained within the required minimum storage bay length per stopping sight distance requirements.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 872	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 MPH

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Lane Drop Taper

Design Element Policy Value

50:1 (600') minimum Lane Drop Taper (BDE FIG. 36-5.A)

Proposed Design Element Value

45:1 (540') Lane Drop Taper

Location(s) of Exception

North leg of the intersection of Illinois Route 173 and U.S. Route 45

Crash History and Potential of Exception Location(s)

71 total crashes occurred at the intersection of U.S. Route 45 and Illinois Route 173 between 2007 and 2011. 17 of the crashes resulted in injuries. This location was not a 5% location for 2007 to 2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$185,350.00	$166,815.00

Impacts Other Than Cost of Using Policy Value

Impacts to commerical properties on the east side of U.S. Route 45.

Proposed Mitigation to Address Exception

Enhanced lane delineation; enhanced advanced warning signs

Geometric Compatibility with Adjacent Sections

Compatible. The horizontal alignment ties into the existing horizontal alignment and does not bring a lane drop taper through an intersection (Burr Hollow Drive).

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

The proposed lane drop terminates south of the first residential street (Burr Hollow Drive), with deficient distance from the south leg stop bar.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phil Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 872	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 MPH

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Deceleration Length

Design Element Policy Value

585' minimum Acceleration Length from stop bar for lane drop (BDE FIG. 36-5.A)

Proposed Design Element Value

516' Acceleration Length

Location(s) of Exception

North leg of the intersection of Illinois Route 173 and U.S. Route 45

Crash History and Potential of Exception Location(s)

71 total crashes occurred at the intersection of U.S. Route 45 and Illinois Route 173 between 2007 and 2011. 17 of the crashes resulted in injuries. This location was not a 5% location for 2007 to 2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$180,714.00	$159,400.00

Impacts Other Than Cost of Using Policy Value

Impacts to commerical properties on the east side of U.S. Route 45.

Proposed Mitigation to Address Exception

Enhanced lane delineation; enhanced advanced warning signs

Geometric Compatibility with Adjacent Sections

Compatible. The horizontal alignment ties into the existing horizontal alignment and does not bring a lane drop taper through an intersection (Burr Hollow Drive).

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

The proposed lane drop terminates south of the first residential street (Burr Hollow Drive), with deficient distance from the south leg stop bar.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phil Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 872	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 MPH

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Auxiliary left-U-turn lane storage

Design Element Policy Value

215' (BDE FIG. 36-3.I)

Proposed Design Element Value

115' Storage Length

Location(s) of Exception

Northbound U.S. Route 45 U-Turn Lane at the Burr Hollow Road intersection

Crash History and Potential of Exception Location(s)

71 total crashes occurred at the nearby intersection of U.S. Route 45 and Illinois Route 173. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$66,420.00	$35,525.00

Impacts Other Than Cost of Using Policy Value

None

Proposed Mitigation to Address Exception

Enhanced lane delineation

Geometric Compatibility with Adjacent Sections

Compatible

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

The northbound taper and storage for the Left U-Turn lane is within the 540' lane drop for northbound U.S. Route 45. The Left U-Turn taper and storage next to the long lane drop can create confusion and be used as a through lane. The northbound Left U-Turn lane meets the minimum storage length for 3R criteria.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phil Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 872	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 MPH

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Auxiliary left-U-turn lane taper

Design Element Policy Value

220' (BDE FIG. 36-3.I)

Proposed Design Element Value

150'

Location(s) of Exception

Northbound U.S. Route 45 U-Turn Lane at the Burr Hollow Road intersection

Crash History and Potential of Exception Location(s)

71 total crashes occurred at the nearby intersection of U.S. Route 45 and Illinois Route 173. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$67,960.00	$48,340.00

Impacts Other Than Cost of Using Policy Value

None

Proposed Mitigation to Address Exception

Enhanced lane delineation

Geometric Compatibility with Adjacent Sections

Compatible

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

The northbound taper and storage for the Left U-Turn lane is within the 540' lane drop for northbound U.S. Route 45. The Left U-Turn taper and storage next to the long lane drop can create confusion and be used as a through lane. The northbound Left U-Turn lane meets the minimum taper length for 3R criteria.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phil Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 872	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 MPH

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Auxiliary Left Turn Lane Storage Length

Design Element Policy Value

215' (BDE FIG. 36-3.I)

Proposed Design Element Value

130'

Location(s) of Exception

Southbound U.S. Route 45 left turn lane at the Burr Hollow Road intersection

Crash History and Potential of Exception Location(s)

71 total crashes occurred at the nearby intersection of U.S. Route 45 and Illinois Route 173. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$66,420.00	$40,160.00

Impacts Other Than Cost of Using Policy Value

Impacts to the properties on both sides of U.S. Route 45 north of Burr Hollow Road.

Proposed Mitigation to Address Exception

Enhanced lane delineation

Geometric Compatibility with Adjacent Sections

Compatible. The horizontal alignment ties into the existing horizontal alignment north of Burr Hollow Road.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Extension of the southbound left turn lane to meet the minimum storage length would impact properties on both sides of U.S. Route 45 north of Burr Hollow Road.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phil Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 872	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 MPH

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Approach Taper

Design Element Policy Value

400' (50:1) Taper (BDE FIG. 36-3.J)

Proposed Design Element Value

Unshadowed Turn Lane (80' Taper)

Location(s) of Exception

SB US Route 45 at Burr Hollow Drive

Crash History and Potential of Exception Location(s)

71 total crashes occurred at the nearby intersection of U.S. Route 45 and Illinois Route 173. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$123,565.00	$24,715.00

Impacts Other Than Cost of Using Policy Value

Impact properties and require additional right-of-way acquisition from what was identified in the Environmental Assessment (EA) on both sides of U.S. Route 45 north of Burr Hollow Drive and would extend the north project limit.

Proposed Mitigation to Address Exception

Enhanced lane delineation

Geometric Compatibility with Adjacent Sections

Compatible. The proposed five lane section transitions to the existing two lane section at the north project limit.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Providing 400' Approach Taper would impact properties and require additional right-of-way acquistion from what was identified in the Environmental Assessment (EA) on both sides of U.S. Route 45 north of Burr Hollow Drive and would extend the north project limit. Burr Hollow Drive is a "dead end" local road which serves one residential property.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phil Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincoporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

K value for Sag Vertical Curve

Design Element Policy Value

K = 103 for Design Speed = 50 mph with 3% grade
BDE Figure 33-4.F

Proposed Design Element Value

K = 72

Location(s) of Exception

Sag vertical curve at U.S. Route 45 PVI Station 310+50

Crash History and Potential of Exception Location(s)

71 total crashes occurred at the nearby intersection of U.S. Route 45 and Illinois Route 173. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$69,525.00	$52,145.00

Impacts Other Than Cost of Using Policy Value

Additional impacts and right-of-way impacts to properties on both sides of U.S. Route 45.

Proposed Mitigation to Address Exception

Enhanced pavement markings.

Geometric Compatibility with Adjacent Sections

Compatible. The proposed profile follows the existing sag vertical curve.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

The location of this design exception is at the northern project limit, and therefore the proposed profile is dictated by the existing roadway profile, which maintains existing drainage patterns. Additionally, maintaining the existing profile at this location is compatible with the proposed drainage plan, which includes replacing an existing cross road culvert and new detention basin (west side).

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Auxiliary lane storage

Design Element Policy Value

125' storage for 35mph design speed (BDE Figure 36-3I)

Proposed Design Element Value

115' Storage Length

Location(s) of Exception

Westbound Miller Road (East Leg) left turn lane at the U.S. Route 45 intersection

Crash History and Potential of Exception Location(s)

9 total crashes occurred during the 2007-2011 time period; 1 crash related to WB left turn movement (sideswipe opposite direction). This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$31,045.00	$28,560.00

Impacts Other Than Cost of Using Policy Value

None

Proposed Mitigation to Address Exception

Enhanced lane delineation

Geometric Compatibility with Adjacent Sections

Compatible. The three lane section transitions to the existing two lane section at the east project limit.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Miller Road is a designated local road east of U.S. Route 45, has no connectivity, and serves two residential properties. BLRS Figure 34-3.D with justification of Miller Road (East Leg) as a low volume (2040 Peak AM (PM) = 15 (15)) residential local roadway was utilized as the design standard.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☐ Yes ☒ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Intersection offset

Design Element Policy Value

6.7’ offset per BLRS 34-1.01 (c)

Proposed Design Element Value

8.6’ offset

Location(s) of Exception

Miller Road East Leg at U.S. Route 45

Crash History and Potential of Exception Location(s)

Total of 9 crashes during the 2007-2011 time period; 1 crash related to WB movement (sidewswipe). Intersection is not a 5% Location. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$300,000.00	$150,000.00

Impacts Other Than Cost of Using Policy Value

Providing required offset would result in right-of-way impacts to surrounding properties.

Proposed Mitigation to Address Exception

None

Geometric Compatibility with Adjacent Sections

Compatible. Maintain existing north edge of pavement with widening to the south to avoid right-of-way acquisition from Lake County Forest Preserve District Property on the north side of Miller Road (East) and ties into existing horizontal alignment.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Maintain existing north edge of pavement with widening to the south to avoid right-of-way acquisition from Lake County Forest Preserve District Property on the north side of Miller Road (East). East leg is a low volume (ADT = 900) residential local roadway.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Auxiliary lane storage

Design Element Policy Value

215' left turn storage (BDE Figure 36-3I)

Proposed Design Element Value

115' left turn storage length

Location(s) of Exception

Eastbound Miller Road (West Leg) left turn lane at the U.S. Route 45 intersection

Crash History and Potential of Exception Location(s)

9 total crashes occurred during the 2007-2011 time period; No crashes related to EB left turn movement. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$53,395.00	$28,560.00

Impacts Other Than Cost of Using Policy Value

Impacts to residential property on the south side of Miller Road

Proposed Mitigation to Address Exception

Enhanced lane delineation

Geometric Compatibility with Adjacent Sections

Compatible. The three lane section transitions to the existing two lane section at the west project limit.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Miller Road is a designated local road west of U.S. Route 45 providing connectivity to Savage Road to the west and U.S. Route 45 to the east with a low volume ADT varying from 700 to 900. Providing 215' storage length would require additional right-of-way acquisition from the residential property on the south side of Miller Road and extend the west project limit beyond the Environmental Survey study area identified in the EA. BLRS Figure 34-3.D was utilized as the design standard.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Auxiliary lane taper

Design Element Policy Value

220' left turn storage (BDE Figure 36-3I)

Proposed Design Element Value

99' left turn storage length

Location(s) of Exception

Eastbound Miller Road (West Leg) left turn lane at the U.S. Route 45 intersection

Crash History and Potential of Exception Location(s)

9 total crashes occurred during the 2007-2011 time period; No crashes related to EB left turn movement. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$54,640.00	$24,590.00

Impacts Other Than Cost of Using Policy Value

Impacts to residential property on the south side of Miller Road

Proposed Mitigation to Address Exception

Enhanced lane delineation

Geometric Compatibility with Adjacent Sections

Compatible. The three lane section transitions to the existing two lane section at the west project limit.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Miller Road is a designated local road west of U.S. Route 45 providing connectivity to Savage Road to the west and U.S. Route 45 to the east with a low volume ADT varying from 700 to 900. Providing 220' taper length would require additional right-of-way acquisition from the residential property on the south side of Miller Road and extend the west project limit beyond the Environmental Survey study area identified in the Environmental Assessment. BLRS Figure 34-3.D was utilized as the design standard.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Median approach taper

Design Element Policy Value

40:1 (BDE Figure 36-3J)

Proposed Design Element Value

30:1

Location(s) of Exception

Miller Road West Leg at U.S. Route 45

Crash History and Potential of Exception Location(s)

9 total crashes occurred during the 2007-2011 time period; No crashes related to EB movement. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$54,640.00	$24,590.00

Impacts Other Than Cost of Using Policy Value

Impacts to residential properties on the south side of Miller Road

Proposed Mitigation to Address Exception

Enhanced lane delineation

Geometric Compatibility with Adjacent Sections

Compatible. The three lane section transitions to the existing two lane section at the west project limit.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Providing 40:1 median approach taper rate would require additional right-of-way acquisition from the residential properties on the south side of Miller Road and extend the west project limit beyond the Environmental Survey study area identified in the EA.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Old Mill Creek

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Commercial Entrance Grade

Design Element Policy Value

6% (Access to State Highways Chapter V, Section D)

Proposed Design Element Value

11.6%

Location(s) of Exception

Commercial Entrance on U.S. Route 45 at Station 294+11.96 LT, between Miller Road and Illinois Route 173, and Commercial Entrance at Station 300+00.00 LT, between Illinois Route 173 and Big Hollow Drive.

Crash History and Potential of Exception Location(s)

71 total crashes occurred at the nearby intersection of U.S. Route 45 and Illinois Route 173. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$80,000.00	$40,000.00

Impacts Other Than Cost of Using Policy Value

Impacts to commercial property on the west side of U.S. Route 45.

Proposed Mitigation to Address Exception

Increase width of commercial entrance to compensate the steep grade.

Geometric Compatibility with Adjacent Sections

Compatible. The driveway ties into the existing commercial entrance and the multi-use path is not affected.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Extending the driveway using a 6% grade would impact the use of the existing commercial parking lots and possibly the structures.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Old Mill Creek

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,855	PM 1,940

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Commercial Entrance Grade

Design Element Policy Value

6% (Access to State Highways Chapter V, Section D)

Proposed Design Element Value

10%

Location(s) of Exception

Commercial Entrance on Illinois Route 173 at Station 1204+44.03 LT, east of U.S. Route 45.

Crash History and Potential of Exception Location(s)

71 total crashes occurred at the nearby intersection of U.S. Route 45 and Illinois Route 173. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$40,000.00	$20,000.00

Impacts Other Than Cost of Using Policy Value

Impacts to commercial property on the north side of Illinois Route 173.

Proposed Mitigation to Address Exception

Increase width of entrance

Geometric Compatibility with Adjacent Sections

Compatible. The driveway ties into the existing commercial entrance and the multi-use path is not affected.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Extending the driveway using a 6% grade would impact the use of the existing commercial parking lot.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ New Pavement ☐ Pavement Widening ☐ Resurfacing

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Residential Entrance Grade

Design Element Policy Value

8% (Access to State Highways Chapter IV, Section C)

Proposed Design Element Value

8.8% and 11.0%

Location(s) of Exception

Residential Entrance on U.S. Route 45 at Station 222+67.92 LT, between Kelly Road and Miller Road.

Crash History and Potential of Exception Location(s)

1 total crash occurred at the segment of U.S. Route 45 between Kelly Road and Miller Road. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$75,000.00	$20,000.00

Impacts Other Than Cost of Using Policy Value

Impacts to residential property on the west side of U.S. Route 45.

Proposed Mitigation to Address Exception

None

Geometric Compatibility with Adjacent Sections

Compatible. The driveway ties into the existing residential entrance and the multi-use path is not affected.

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

Extending the driveway using an 8% grade would not meet the existing topography adjacent to the roadway within a reasonable distance and impact an existing structure.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ **New Pavement** ☐ **Pavement Widening** ☐ **Resurfacing**

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)

Illinois Department of Transportation

Design Exception Request Project Identification

Key Route	Marked Route/Road Name	Contract #	State Job #
FAP 344	U.S. Route 45		P-91-388-10

Section	County(ies)	Municipality
	Lake	Unincorporated

Local Agency	LRS Section #	Permit Applicant	Permit #

Project Limits

Millburn Bypass to Illinois Route 173

Project Length	Current Posted Speed
2.55 miles (13,469 feet)	45 mph

Estimate of Cost	Functional Classification	Design Yr	Design Traffic ADT	Design Traffic DHV	
26,265,000	Other Principal Arterial	2040	23,000	AM 1,185	PM 1,500

On the NHS System?	Structure Numbers	Type of Project (Construction, Reconstruction, 3R, 3P, SMART, HSIP, etc.)
☒ Yes ☐ No		Reconstruction

Brief Project Description

Reconstruction and widening of U.S. Route 45 from the Millburn Bypass northern limit to Illinois Route 173.

EXCEPTION DOCUMENTATION

Level of Exception ☐ **Level One** ☒ **Level Two**

Design Element for Which an Exception is Requested

Front Slope

Design Element Policy Value

3:1 (BDE Figure 34-4.B)

Proposed Design Element Value

2.5:1

Location(s) of Exception

U.S. Route 45-Station 236+00 LT through 237+00 LT

Crash History and Potential of Exception Location(s)

12 total crashes occurred at the segment of U.S. Route 45 between Miller Road and Illinois Route 173. This location was not a 5% location for 2007-2011. Proposed scope of work will not have an effect on the safety and operations related to this exception request.

Cost of Using Policy Value	Cost of Using Proposed Exception Value
$25,000.00	$10,000.00

Impacts Other Than Cost of Using Policy Value

Additional right-of-way acquisition from Lake County Forest Preserve District property on the west side of U.S. Route 45

Proposed Mitigation to Address Exception

None

Geometric Compatibility with Adjacent Sections

Compatible

Potential Effects on Other Design Elements

None

Potential Impacts on Mobility or Traffic Operations

None

Summary of Justification for Exception

A 2.5:1 back slope is needed to keep the proposed swale within the proposed right-of-way.

Coordination Meeting Date	Prepared By	Date
05/14/2019	Phillip Santos (CBBEL)	05/14/2019

PAVEMENT/RESURFACING EXCEPTIONS

☐ New Pavement ☐ Pavement Widening ☐ Resurfacing

Design Period/ Expected Service Life	Design Year	Structural Design Traffic	%PV	%SU	%MU

Design Element Policy Value	Proposed Design Element Value

Location(s) of Exception

Cost of Using Policy Value	Cost of Using Proposed Element Value

Summary of Justification

Prepared By	Date

APPROVAL/DISAPPROVAL

BDE Approval Date

05/14/2019

FHWA Approval Date (Level One)