CHAPTER 1 - PURPOSE OF AND NEED FOR ACTION

1.1 Purpose of the Project

The purpose of the project is to provide an improved transportation system to address capacity, mobility, safety, and operational deficiencies along US Route 45 from IL Route 132 to IL Route 173 in Lake County, Illinois (See Exhibit 1-1 Project Location Map).

1.2 Project Location

The project location is 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. Both of these intersections are signalized. US Route 45 is an existing two lane roadway (one in each direction) within the project limits typically with shoulders and open ditch drainage (see Figure 1-1 below).

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). These are roadways one step below the expressway system that typically carry both local and long distance trips, and higher amounts of truck traffic by virtue of their relationship and connection to the regional transportation system. US Route 45 is a designated Class II Truck Route.

Figure 1-1
US Route 45 North of Sand Lake Road

There are five (5) signalized intersections within the project limits at IL Route 132, Sand Lake Road, Millburn Road, Grass Lake Road, and IL Route 173. Only the signalized intersections at Grass Lake Road and Millburn Road are coordinated where the signals are offset by approximately 330 feet.

With reference to Exhibit 1-1, Grass Lake Road, Millburn Road and Sand Lake Road are east-west Minor Arterials. Grass Lake Road and Millburn Road "tee" into US Route 45 within the Millburn Historic District and proceed west and east respectively. Millburn Historic District, a National Register Location, encompasses the intersections of US Route 45 at Millburn Road and Grass Lake Road. Grass Lake Road serves the Village of Lindenhurst and Antioch with existing land use along Grass Lake Road currently developed with residential and commercial areas. Millburn Road serves the Village of Old Mill Creek with existing land use along Millburn Road, largely farm land and open space. Millburn Road "tees" into Hunt Club Road on the east which disperses traffic north and south. Sand Lake Road connects with IL Route 132 on the west within the Village of Lindenhurst, and Stearns School Road on the east. Grass Lake Road (County Hwy A10), Millburn Road (County Hwy A14) and Sand Lake Road (County Hwy A74) are all under Lake County Division of Transportation (LCDOT) jurisdiction.

The project lies within the municipal boundaries of the Village of Lindenhurst predominantly on the west, and the Village of Old Mill Creek predominantly on the east. The project also lies within unincorporated areas of Lake County within Lake Villa, Newport, and Warren Townships. The US Route 45 corridor traverses the Millburn Historic District which is wholly contained within the Village of Old Mill Creek as shown on Exhibit 1-2. The Millburn Historic District (see Figure 1-2 below and Exhibit 1-2) is comprised of 18 historic buildings and was listed on the National Register of Historic Places (NRHP) in 1979. This area is locally known as the Central Millburn Historic District. There is an additional area to the south locally known as the Southern Millburn Historic District, which is not listed on the NRHP.

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. The Lake County Forest Preserve District (LCFPD) has several holdings along US Route 45 with Raven Glen and Ethel's Woods north of Miller Road to the west and east of US Route 45 respectively, and McDonald Woods south of Grass Lake Road to the west of US Route 45.

This project connects logical termini from IL Route 132 to IL Route 173 such that environmental issues can be evaluated on a broad scale. This project has independent utility and will function without any requirements for additional improvements elsewhere. The project will not restrict consideration of alternatives for other reasonably foreseeable transportation improvement initiatives to this facility or other adjacent facilities.

Figure 1-2
US Route 45 within Millburn Historic District

1.3 Project History

In the mid 1990s the Chicago Area Transportation Study (CATS) and the Northeastern Illinois Planning Commission (NIPC), now known collectively as the Chicago Metropolitan Agency for Planning (CMAP), adopted the 2010 Regional Transportation Plan (RTP), which was the first regional effort to identify a system of SRA roadways as essential components of the regional transportation system that operate one step below the expressway system. As a result of this designated system of SRA roadways, IDOT initiated a series of SRA feasibility studies to evaluate long term improvement needs and recommendations for these roadways. The US Route 45 corridor from IL 120 (Belvidere Road) to the Illinois/Wisconsin border was designated as an SRA roadway in the 2010 RTP and remains a designated SRA roadway as part of the CMAP Go To 2040 Comprehensive Regional Plan.

The IDOT SRA study for the US Route 45 corridor was completed in 1995 and recommended the following primary improvements within the current project limits:

- From IL 132 to Miller Road, two through lanes in each direction with an 18 foot wide raised median within 120 feet of right-of-way.
- From Miller Road to IL 173, two through lanes in each direction with a 30 foot raised median within 120 feet of right-of-way.
- A west bypass of US Route 45 to avoid the Millburn Historic District. IDOT subsequently recorded a west bypass alignment and purchased one parcel of property on Haven Lane.

In 1996, IDOT completed an Environmental Assessment (EA) and Combined Design Report (CDR) for US Route 45 just south of this project, from IL Route 132 to IL Route 176. The proposed action as part of this previous EA included reconstruction of US Route 45 to provide generally two lanes of traffic in each direction separated by a variable width median. This project is being implemented in stages with several sections completed and other sections under construction or anticipated for future construction.

Traffic volumes along US Route 45 have increased considerably over the past thirty-five (35) years due to regional growth in population and employment. This traffic growth history is shown in Table 1-1 below.

Table 1-1
US Route 45 Historical Average Daily Traffic (ADT) Volumes

Location	Year					
	1974	1983	1988	1992	1996	2009
US 45 - South of IL Route 173	3,200	4,500	5,600	6,700	7,000	8,900
US 45 - North of Grass Lake Road	3,200	4,250	6,000	6,900	7,900	10,100
US 45 - North of Sand Lake Road	5,200	6,500	8,600	10,700	11,500	16,000
US 45 - North of IL Route 132	5,000	6,500	8,100	10,000	11,000	16,000

On this basis, LCDOT initiated planning efforts that resulted in the Lake County "Year 2020 Transportation Priority Plan" which identifies a system of roadway, transit and bikeway facilities needed by the year 2020. One of the transportation improvement focus areas was elimination of roadway bottlenecks in the County which included the intersection of US Route 45 and Millburn Road/Grass Lake Road, locally known as the "Millburn Strangler". Since this project was identified through the Lake County long range planning process as a much needed project, the County initiated preliminary engineering and environmental studies (ie; Phase I Engineering) with the County's share of the Collar County Empowerment fund.

This project is included in the FY 2010-2015 Transportation Improvement Program (TIP) endorsed by the Policy Committee of the Chicago Metropolitan Agency for Planning (CMAP), the Metropolitan Planning Organization (MPO) for the region in which the project is located. The FY10-15 TIP number for this project is 10-06-0020. The US Route 45 at Millburn Road/Grass Lake Road section of the project is funded for construction as part of Lake County's 2010 to 2015 Highway Improvement Program. In addition, US Route 45 from IL Route 132 to South of the Millburn Bypass is included in the IDOT Fiscal Year 2012 to 2017 Multi Year Program as an Illinois Jobs Now Project for Phase II engineering. The current Environmental Assessment study process began in January 2009.

Regional Growth

CMAP, with data from the 2010 U.S. Census Bureau and regional land use development information, prepares population and employment projections for the northeastern Illinois region. Table 1-2 shows population and employment growth for Lake County and municipalities adjacent to or near the project study area by the year 2040. Lake County is projected to grow 35.6 percent in population and 22.6 percent in employment by the year 2040. With the exception of Village of Lindenhurst population growth projections, all municipalities adjacent to or near the project study area are projected to have a higher population growth than the Lake County average.

Table 1-2
Projected Population and Employment Growth

Location	Population Growth			Employment Growth		
	2010	2040	% growth	2010	2040	% growth
Lake County	703,462	953,673	35.57%	384,259	470,939	22.56%
Lindenhurst	14,264	17,239	20.86%	2,142	2,934	36.97%
Old Mill Creek	178	5,058	2741.57%	1,183	1,388	17.33%
Lake Villa	8,741	21,046	140.77%	3,613	4,354	20.51%
Antioch	14,430	26,624	84.50%	5,226	6,055	15.86%
Fox Lake	10,579	18,063	70.74%	4,432	5,175	16.76%
Gurnee	31,295	49,201	57.22%	20,156	28,130	39.56%

Note: Employment data are CMAP 2010 estimates.

Within the study area, The Village of Lindenhurst is projected to grow by 20.9 percent in population and 37.0 percent in employment from the year 2010 to the year 2040. The Village of Old Mill Creek, consistent with their comprehensive plans, is projected to grow by 2,741.6 percent in population and 17.3 percent in employment by 2040. The community northwest of the project area, the Village of Antioch, is anticipated to grow by 84.5 percent in population and 15.9 percent in employment by the year 2040. Based on these population/employment projections, travel demand is expected to increase in parallel by the year 2040.

1.4 Need for the Proposed Action

Capacity

Travel demand along US Route 45 was evaluated for existing 2009 and projected 2040 conditions to determine existing and future travel performance. The 2009 traffic was obtained by actual field traffic counts and the 2040 traffic projections were prepared by CMAP based on the projected population and employment growth in the project area. A summary of the 2009 ADT and the projected 2040 (No-Build) ADT is included below in Table 1-3. The ADT represents the total traffic in both directions over a 24 hour period at a given location. The 2040 No-Build traffic volumes are the projected traffic volumes for the year 2040 with no improvements made to US Route 45.

Another factor in travel performance is the mix of vehicles utilizing any given roadway. As noted above, the percentage of truck traffic is typically higher for SRA roadways by virtue of their relationship and connection to the regional transportation system. Based on IDOT Average Annual Daily Traffic (AADT) data, the percentage of truck traffic utilizing US Route 45 within the project area, as a combination of single unit (SU) and multi unit (MU) trucks, ranges from approximately 8.5% to 14.5% depending on the time of day and the location.

Table 1-3
US Route 45 Traffic Volumes (ADT)
Existing 2009 and Projected 2040 (No-Build)

Location	ADT	
	2009	2040 No-Build
US Route 45 at IL Route 173		
North Leg	6,200	14,000
South Leg	8,900	19,000
East Leg	15,400	21,000
West Leg	16,300	23,000
US Route 45 at Grass Lake Road		
North Leg	10,100	21,000
South Leg	16,000	27,000
East Leg	n/a	n/a
West Leg	9,700	18,000
US Route 45 at Millburn Road		
North Leg	16,000	27,000
South Leg	16,000	30,000
East Leg	9,200	14,000
West Leg	n/a	n/a
US Route 45 at Sand Lake Road		
North Leg	16,000	30,000
South Leg	16,000	30,000
East Leg	11,900	17,000
West Leg	11,800	15,000
US Route 45 at IL Route 132		
North Leg	16,000	30,000
South Leg	19,500	28,000
East Leg	34,600	39,000
West Leg	19,400	24,000

The Highway Capacity Software (HCS–Version 5.5) computer program was used to analyze travel performance at the five existing signalized intersections within the project limits for the peak one hour morning (AM) and evening (PM) travel periods. The HCS software provides a measure of congestion called Level of Service (LOS). LOS is a letter grade from A (best) through F (worst) that represents the average amount of delay a single vehicle experiences at an intersection as expressed in seconds per vehicle (see Table 1-4). The HCS analysis was prepared for both existing 2009 and projected 2040 (No-Build) traffic volumes and vehicle mix (passenger cars and trucks) as shown in Table 1-5.

Table 1-4
Level Of Service (LOS) Definition*

LOS	Average Delay (Sec/Vehicle)
A	≤ 10
B	> 10 - 20
C	> 20 - 35
D	> 35 - 55
E	> 55 - 80
F	> 80

** Source: Highway Capacity Manual*

The IDOT Bureau of Design and Environment (BDE) manual requires a LOS C or better for an SRA roadway such as US Route 45. In some circumstances, LOS D may be allowed in urban areas based on unavoidable design constraints, substantial potential adverse socio-economic or environmental impacts. Table 1-5 below provides the LOS for the five signalized intersections along US Route 45 for 2009 existing conditions and projected 2040 (No-Build) conditions for the AM and PM peak hour travel periods.

Table 1-5
Intersection Level Of Service (LOS)

	2009				2040 (No-Build)			
	LOS		DELAY (sec/vehicle)		LOS		DELAY (sec/vehicle)	
INTERSECTION	AM	PM	AM	PM	AM	PM	AM	PM
US 45 @ IL 173	E	D	57.4	49.2	F	F	141.9	139.4
US 45 @ Grass Lake Rd.	C	E	27.5	63.0	F	F	127.1	287.6
US 45 @ Millburn Rd.	F	C	86.9	34.1	F	F	403.0	216.5
US 45 @ Sand Lake Rd.	D	D	36.5	38.5	F	F	96.9	112.1
US 45 @ IL 132	C	C	32.6	31.9	D	F	42.3	92.1

As shown in Table 1-5 all of the intersections along US Route 45 operate below the required LOS C in either the AM or PM peak hours for the year 2009, with exception of: US Route 45 at Grass Lake Road(AM), US Route 45 at Millburn Road (PM), and US Route 45 at IL Route 132 (AM &PM). The LOS degrades to F based on 2040 (No-Build) conditions for all of the five intersections in both the AM and PM peak hours with exception of the AM peak hour at the intersection of US Route 45 with Illinois Route 132. The average delay more than quadruples in several instances. On this basis, if no capacity improvements are made to US Route 45, traffic congestion and motorist delay will continue to increase through the year 2040.

Mobility

Whereas intersection capacity and LOS is a strict and important measure of traffic performance, mobility is a larger measure of the compatibility of a particular roadway link with overall travel desires (origins and destinations) in a given area.

In order to understand the general travel desires and travel patterns in the project area, and assess the effect that potential improvements to US Route 45 will have in this regard, a Select Link analysis was performed by CMAP for the overall project, and a separate Origin/Destination (O/D) study was performed by LCDOT for US Route 45 at Millburn Road/Grass Lake Road within the Millburn Historic District.

The Select Link analysis utilizes the CMAP regional travel demand model, and available regional origin/destination trip information, to identify the geographical origins of traffic that would desire to use US Route 45 within the project limits. The objective of this analysis is to identify possible mobility issues that may not be apparent by traffic counts and projections alone due to congested or constrained existing conditions that can cause motorists to seek alternate routes. The results of the CMAP 2040 Select Link analysis is included in Figure 1-3 below. This figure shows the volume of daily vehicle "trip origins" from adjacent geographical areas that would use this section of US Route 45 based on projected 2040 No-Build and Build (improve US Route 45) conditions. This information shows that under optimum travel conditions, a large portion of the vehicles that would use or desire to use this section of US Route 45 have a regional travel pattern that is aligned in a northwest to southeast direction, and vice versa.

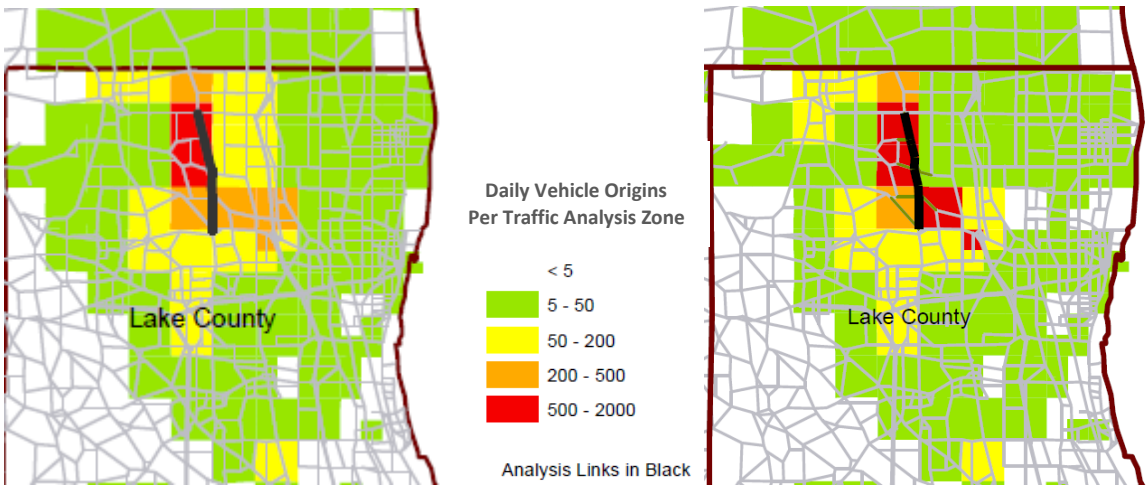

Figure 1-3
2040 No Build Trip Origins - US Route 45

2040 Build Trip Origins - US Route 45

The origin-destination (O/D) study was performed at the existing offset intersections of Grass Lake Road and Millburn Road with US Route 45 to compare this site specific information to the overall Select Link analysis performed, since this location experiences considerable congestion on a daily basis. An O/D study helps determine the "path" vehicles travel through unique or complex conditions that, when coupled with traffic volumes, can highlight the cause of existing traffic congestion, and be used to ensure proposed design configurations are effective. Figure 1-4 below shows on a percentage basis how vehicles are traveling through these intersections as they approach from each direction.

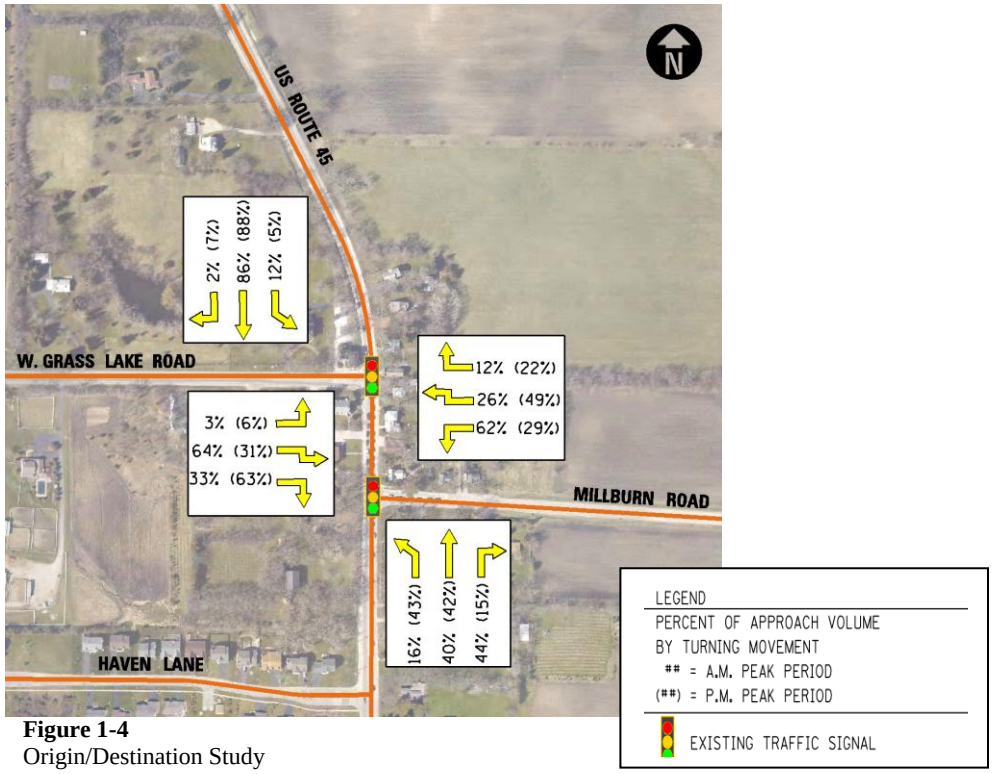

Figure 1-4
Origin/Destination Study

Based on the O/D study, the following general observations were made:

- The majority of vehicles approaching this location from the north on US Route 45 continue south on US Route 45 during both the AM and PM peak periods.
- The majority of vehicles approaching this location from the west on Grass Lake Road continue east on Millburn Road in the AM and turn south on US Route 45 in the PM.
- The majority of vehicles approaching this location from the east on Millburn Road turn south on US Route 45 in the AM and continue west on Grass Lake Road in the PM.
- Vehicles approaching this location from the south on US Route 45 either continue north on US Route 45 and/or turn east on Millburn Road in the AM. In the PM, vehicles either turn west onto Grass Lake Road or continue north on US Route 45. A minority of vehicles approaching this location turn west onto Grass Lake Road in the AM and turn east onto Milburn Road in the PM.

The results of the O/D study validate the Select Link analysis results showing a general regional northwest to southeast (and vice versa) travel pattern in the project area. Based on this regional travel pattern, it is likely that some of the east/west traffic crossing US Route 45 at the Millburn Road/Grass Lake Road location, and potentially other locations does so to utilize other area north/south roadways and avoid existing US Route 45 capacity constraints. If no improvements are made to US Route 45 by the year 2040, the amount of east/west traffic, including truck traffic, crossing US Route 45 will likely continue to increase on lower classification roadways such as Grass Lake Road, Millburn Road and Sand Lake Road. This is likely to be alleviated to some degree by improvements to US Route 45 that would be more compatible with regional travel patterns.

Safety

Crashes that occurred along US Route 45 within the project limits have been analyzed for the five year study period from 2005 to 2009. Crashes have been tabulated by year, crash type, fatal and severe injuries, and roadway conditions to ascertain overall trends and determine if any particular statistical overrepresentation exists that would warrant special countermeasure consideration.

The FHWA 2010 Illinois Five Percent Severe Crash Report was prepared based on statewide crash data from 2004 to 2008. This report identifies the most severe 5% crash locations throughout the State of Illinois in terms of roadway intersections and roadway sections. As part of this report, there were no intersections along US Route 45 within the project limits identified within the top 5 percent of intersections with the most severe safety needs in the State of Illinois. An approximate 4.5 mile roadway section of IL Route 173, that spans US Route 45, was identified within the top 5 percent of roadway sections with the most severe safety needs in the State of Illinois indentified in the 2008 and 2009 Five Percent Reports, but not the 2010 Five Percent Report.

Crash data for this project was obtained through the Lake County Traffic Crash Location System (TCLS), which is a compilation of all crash statistics and crash events within Lake County. As seen below in Table 1-6, there were 622 total crashes along US Route 45 from IL Route 132 to IL Route 173 during the five year study period. The most predominant crash types were Rear End (42%), Turning (20%), and Animal (10%). During the study period there was one (1) Type K (fatality) crash which involved a pedestrian at the IL Route 132 intersection, and twelve (12) Type A (severe injury) crashes resulting in nineteen (19) severe injuries.

Table 1-6
US Route 45; IL Route 132 to IL Route 173
Crash Summary

Year	Crash Type									Total Crashes	Severe Crashes	
	Rear End	Angle	Sideswipe	Turning	Over Turned	Head On	Animal	Fixed Object	Other		Type K	Type A
2005	61	7	6	36	2	2	13	9	6	142	1	5
2006	45	8	7	25	2	1	12	15	5	120	0	2
2007	63	12	9	26	1	1	19	12	3	146	0	3
2008	43	10	10	20	2	4	13	13	4	119	0	1
2009	47	7	5	19	0	0	7	9	1	95	0	1
Total	259	44	37	126	7	8	64	58	19	622	1	12
%	0.42	0.07	0.06	0.20	0.01	0.01	0.10	0.09	0.03	1.00		

Of the total 622 crashes during the study period, 423 crashes (68%) occurred at the five signalized intersections within the project limits, with 64 crashes (10%) occurring at non-signalized intersections and 135 crashes (22%) occurring along sections of US Route 45 in between intersections. The intersections with the most crashes were at IL Route 132 (185 crashes), IL Route 173 (85 crashes), and Sand Lake Road (76 crashes). These three signalized intersections had a total of 293 crashes during the study period which accounted for 47% of all crashes. There were 77 crashes (12%) at the Millburn Road and Grass Lake Road signalized intersections.

Approximately 21% of the crashes occurred when the pavement was wet and 31% of the crashes occurred during night/dark conditions. In addition, approximately 3.8% of the crashes involved trucks (SU and MU) with none of these crashes being Type K or Type A crashes. These percentages are not considered to be an overrepresentation of these types of crash occurrence conditions such that specific countermeasures are warranted.

The high incidence of rear-end and turning crashes (42% of all crashes) is an indication of general congestion, particularly at the major signalized intersections where 68% of all crashes in the study area have occurred. If no improvements are made to US Route 45, the overall crash incidents and severity is expected to increase over time based on the projected growth and development within the project area, and the resulting increase in travel demand.

Operational Deficiencies

The existing roadway geometry was examined using current IDOT policies and standards. Areas where the need for improvement is greatest along US Route 45 were identified in order to provide a basis for defining future roadway requirements capable of meeting future transportation demand. US Route 45 north of Grass Lake Road is a transition area for posted speed limits from 55 mph to the north to 40 mph at the north end of the Millburn Historic District due to geometric constraints. The existing horizontal curve just north of Grass Lake Road has a radius of 1,130 feet with approximately 5.1% of super-elevation (ie; banking) which exceeds normal 4% maximum super-elevation for open suburban arterials (shoulders) likely to become closed suburban (curb and gutter) within the next 10 years. This geometry is sufficient for a speed of 45 mph whereas IDOT BDE design criteria for SRA roadways stipulates a 50 mph design speed.

Intersection sight distance is restricted for eastbound vehicles on Grass Lake Road approaching US Route 45 due to the historic building in the northwest corner of this intersection. Sight distance to the north at this

intersection is limited for vehicles making right turns onto US Route 45 where there is a permitted right turn on red.

Pavement condition information for US Route 45 was obtained from IDOT. Based on IDOT's Condition Rating Survey (CRS) for 2009, US Route 45 within the project limits has a CRS rating of 5.2, which is indicative of pavement in "fair" condition that will likely necessitate improvement over the short term.

The intersections of US Route 45 at Millburn Road (east) and Grass Lake Road (west) lie within the Millburn Historic District and are offset by approximately 330 feet. In addition to the results from the O/D study as noted above, the configuration with Millburn Road being located south of Grass Lake Road causes considerable conflict with opposing left turn vehicles on US Route 45. Due to the limited right-of-way in this area, separate northbound and southbound left turn lanes cannot be provided. Although these separate signalized intersections operate as a "coordinated" signal system, there is substantially more traffic congestion than would otherwise occur under normal signal operations due to the need to "clear" the northbound and southbound left turn vehicles in between the intersections with each signal phase.

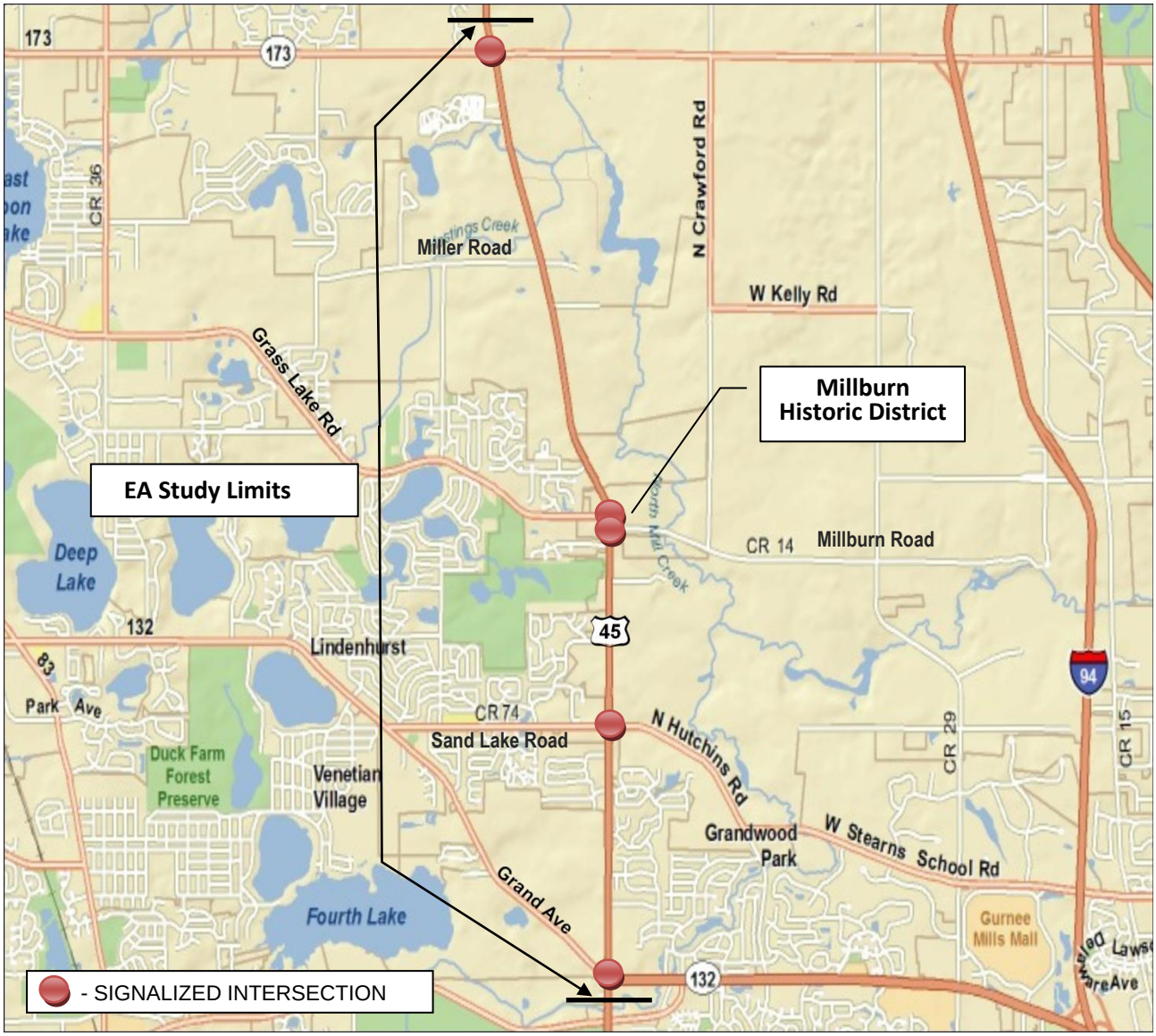

EXHIBIT 1-1
PROJECT LOCATION MAP
US ROUTE 45; IL ROUTE 132 TO IL ROUTE 173

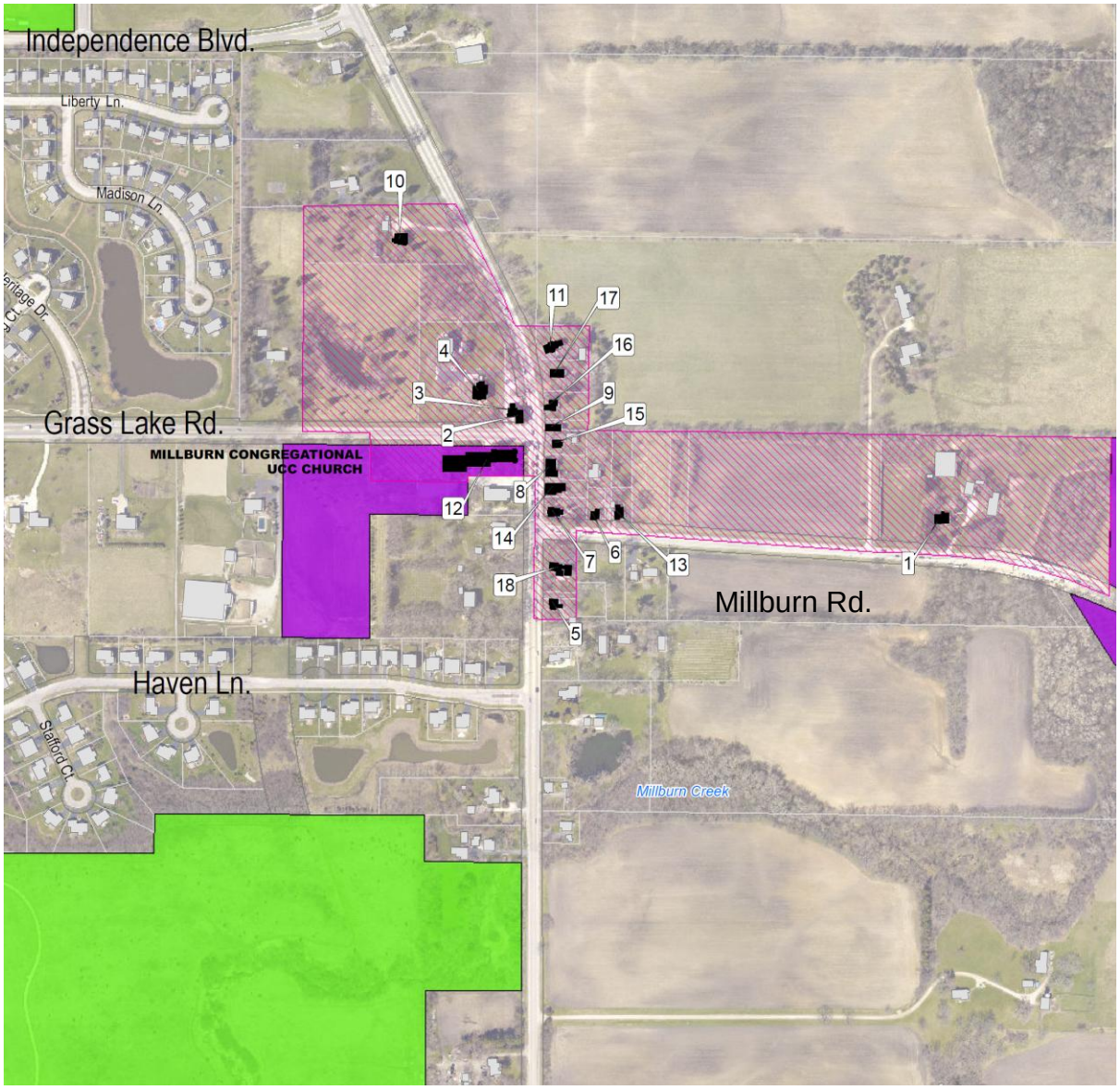

EXHIBIT 1-2

MILLBURN HISTORIC DISTRICT
VILLAGE OF OLD MILL CREEK