Validation Study

Proposed Railroad Grade Separation
Algonquin Road at the Union Pacific – Milwaukee Railroad

May 15, 2008

Prepared for:

City of Des Plaines

Des Plaines Civic Center
1420 Miner Street
Des Plaines, IL 60016

Prepared by:

TranSystems

Table of Contents

I. Introduction

The goal of constructing a grade separation is to improve travel through the City, especially from the west and into the heart of the downtown area. The Validation Study was conducted to verify the work previously performed by the City and to confirm the focus of a full Feasibility Study for a proposed grade separation on Algonquin Road at the Union Pacific – Milwaukee Railroad crossing.

The Validation Study was conducted in two parts. The first was to review each of the four major rail lines to determine relatively which railroad impedes highway traffic flow into the City the most. The second was to determine which street crossing the railroad line determined in Step 1 is the most critical and feasible for a grade separation.

The City of Des Plaines has a total of 31 public at-grade railroad crossings throughout the City. The location and number of the crossings are as follows (see Figure 1):

- UP-Milwaukee line: 9 crossings
- UP-Seeger Wye: 2 crossings
- UP-Northwest (Metra): 5 crossings
- Canadian National – North Central (Metra): 15 crossings

These crossings delay vehicular traffic and impede emergency vehicle movement through the City. A combination of increasing roadway and rail traffic volumes in the future will only add to the travel delays caused by long and slow moving trains blocking the at-grade crossings. With this continuing trend, an increase in the potential for traffic accidents can also be expected.

II. Railroad Mainline Analysis

The four railroad mainlines were reviewed. The following is a summary of each. A location map is included as Figure 1.

A. Union Pacific-Milwaukee

The UP-Milwaukee line has nine at-grade crossings in the City of Des Plaines as shown in Figure 2. Only freight trains operate on this line. According to the Des Plaines – 2006 Deployment study and the data collected from the City of Des Plaines Fire Chief (Spring 2007), the UP-Milwaukee has the highest daily freight train traffic of all the lines in the City. Of the nine crossings, the UP-Milwaukee has 4 of the top 5 daily number of automobiles delayed and daily hours of automobile delay averaging over 2 minutes per automobile. Future projections also show that the UP-Milwaukee line will have the greatest increase in rail traffic and crossing disruptions. Along with UP freight rail, the Canadian Pacific also shares this set of tracks and shows to be an equal volume of freight operations as with the UP. Part of the operations along the line also includes switch movements to and from the local industry spurs and the small Des Plaines yard located just northeast of Wolf Road along the UP alignment. Typical freight trains are approximately 1 mile long and with all the stop and starts from the switch movements, the blockage of street crossings can encompass more than just one street crossing. The City's emergency incident workload is significantly high on both the west and east side of the UP-Milwaukee compared to the other railroad lines. The Fire Department has noted that crossing the UP-Milwaukee in the center of Des Plaines is first priority. The data reviewed and collected concludes that the UP-Milwaukee line, compared to the other railroad lines, is the most logical place to investigate a feasible grade separation crossing which would benefit the City of Des Plaines.

B. Union Pacific –Seeger Wye

Train traffic volumes were compiled by the City of Des Plaines Fire Chief (Spring 2007). Based on that data, ten freight trains travel along the UP-Seeger Wye spur. The major at-grade roadway crossing is at Golf Road. None of the freight trains crossed during the peak traffic hours between 7am -9am and 4pm- 8pm. This results in little delay to rush hour traffic. Golf Road has been marked as a continuous route for fire and EMS service to the hospital and carries high east-west traffic volumes through the City. Because the UP-Seeger Wye is not mainline service and has relatively with low train volumes, a grade separation at this crossing does not provide the most relief from train delays compared to other crossings as shown in Figure 2. In addition, with the elimination of the trauma center at Holy Family Medical Center on the corner of Golf Road and River Road, this east-west access becomes less crucial for the Medical Center. Therefore, the need for a grade separation along the UP -Seeger Wye is not the most feasible first option.

C. Union Pacific –Northwest (Metra)

The UP Northwest line (NW) has five at-grade roadway crossings and carries a mix of low volume freight and high volume commuter (Metra) train traffic. Four of these crossings are within 2,000 feet of each other in the heart of the downtown area. The downtown area is very developed and there is very limited amount of adjacent land to make vertical and horizontal geometry changes needed for construction of a grade separation. Other obstacles are the close proximity of the Metra station, parking, adjacent streets, and the Des Plaines River. It would be very difficult to build and maintain the necessary access to the shops, offices, library, and other facilities in the downtown area. Commuter trains that do not stop in Des Plaines move very quickly and there is little down-gate time. Trains stopping for passengers do take longer; however, on average the delay is not as much as other railroads with more slower moving and longer freight trains (See Figure 2). The Des Plaines – 2006 Deployment Study shows that the UP NW does have the largest percent of total delay time for critical crossings. However, the individual crossing delay is short compared to the freight delay along the UP-Milwaukee. The fifth crossing, at Mount Prospect Road, is located in the northwest corner of the city limits and is a north-south route. A grade separation here would not be as beneficial in moving traffic into and through the City. The combination of difficult construction site conditions in the downtown area and the relatively quick grade crossing wait times, the crossings along the UP-NW are not recommended as the first grade separation option.

D. Canadian National – North Central (Metra)

The Canadian National Railroad (CN) has the most at-grade crossings in the City of Des Plaines and carries an even mix between freight and commuter rail traffic. It has approximately the same volume of train traffic as the UP-Milwaukee. The Metra commuter rail (North Central Service) has no stations in the City of Des Plaines, so there are minimal delays to motorists caused by Metra's operations. The CN has approximately half the volume of daily freight traffic as the UP-Milwaukee. Observing the data collected by the City of Des Plaines Fire Chief on Daily Automobile Delay due to train traffic through Des Plaines (Spring 2007), the average delay per vehicle was determined (see Figure 2). The CN has the second least amount of delay of the four major train lines in the City varying from 1.5 minutes to 2 minutes delay per automobile. In addition to the delay, none of the crossings in this area made the top 5 of FRA Safety Index, which reinforces that the CN line does not have the strongest need for a grade separation. In addition, the CN has indicated it would like to relocate most of their freight traffic from this line to the Elgin, Joliet & Eastern (EJ&E). While this is still speculative at this time, it could result in a large decrease in CN freight traffic through the City. All these factors and lack of available adjacent land at all the crossings due to the high residential density, the crossings along the CN do not have the greatest benefit to the City.

III. Street Crossing Analysis

With the Union Pacific – Milwaukee line chosen as the critical railroad to cross, the second part of the study was to determine which street is the most feasible and critical to grade separate. Of the nine streets that cross, three streets lead to the heart of the City and were the focus of the analysis. They were Thacker Street, Algonquin Road, and Oakton Street.

A. Emergency Response

As stated in the Des Plaines – 2006 Deployment study, Fire Station Two (which covers the area of the City between the UP-Milwaukee and the CN train lines) is not viable for continued long term use. For the future, the fire department and emergency services will rely heavily on Fire Station Three which is located just west of the UP-Milwaukee line on Thacker Street (see Figure 1). In order to minimize delay to this area, a grade separated intersection would be needed through the central part of the City. Thacker Street, Algonquin Road, and Oakton Street would be the most logical direct routes. The crossings to the north and south of these would not serve the greatest population density.

Of the three at-grade crossings along the UP-Milwaukee line, Oakton Street has the most existing and future Average Daily Traffic (ADT), followed by Algonquin Road and Thacker Street. With any east-west grade separated improvement across the UP-Milwaukee, automobile traffic will be drawn away from the other two streets due to the safer and faster crossing of the railroad. Thacker Street and Oakton Street have been defined as continuous east-west routes for emergency services and Thacker Street has been listed as a priority according to the Des Plaines – 2006 Deployment study. Because of its geographic location to Fire Station Three and high first calls, Thacker Street seems to be the best choice considering Fire & Rescue and emergency relief to the heart of the City. Algonquin Road would be the next logical choice from an emergency services standpoint because of its close proximity to the Fire Station Three. If Fire Station Two eventually goes out of service or moved south of its current location, both Thacker Street and Algonquin Road crossings would be high priority for access to the area between UP-Milwaukee and CN. Oakton Street is furthest from Fire Station Three, so it would be the least desirable location for a grade separation.

B. Residential Impacts

Adjacent land-use for each of the three locations varies from minimal impact to severe impacts. A grade separation at Thacker Street would have the greatest residential impact of the three streets, with 5 to 10 possible residential relocations being necessary. For Oakton Street, residential impacts would require the construction of a cul-de-sac for Oxford Road. For Algonquin Road, there would be no residential impacts.

C. Commercial Impacts

Oakton Street would have the most severe commercial impacts because of the 3 large light industrial/warehouse facilities that are located on the northwest, southwest and southeast corners of the railroad intersection with driveways to Oakton Street. Each business would require a relocation of three main entrances and three primary access drives to their shipping docks. Thacker Street would severely impact one business along Warrington Road because of entrance closures. Along Algonquin Road, the UOP and Park District entrances would need to be reconfigured, but would not need to be closed. From a residential and commercial impact analysis, it is clear that Algonquin Road is most feasible crossing since it has the least amount of property impacts.

D. Adjacent Streets

A few local streets would also have impacts due to a grade separation. Near Thacker Street, Warrington Road to the west would need a vertical profile adjustment to accommodate the proposed profile. On Oakton Street, access to Oxford Road would need to be closed and a cul-de-sac would need to be constructed. Unlike Thacker Street and Oakton Street, Algonquin Road would have no impacts to adjacent local streets.

E. Utilities

All three locations would have some utility conflicts and relocations. None appear to be greater from location to location at this time. However, all three areas have detention ponds in the project area and they will need to be avoided if possible.

F. Construction

Algonquin Road is the easiest location to construct a grade separation. Buildings and other property along Algonquin Road are set back a large enough distance and would not be directly impacted. Along the railroad, there is not a spur or industrial lead track to contend with during construction unlike Thacker Street and Oakton Street. There is an industrial lead track heading north from Thacker Street and the UP-Milwaukee starts curving to the northeast. This increases the size, complexity, and cost of the proposed bridge at Thacker Street. Thacker Street and Oakton Street would have direct impacts to buildings and railroad connections to deal with, which complicates construction and increases the project costs.

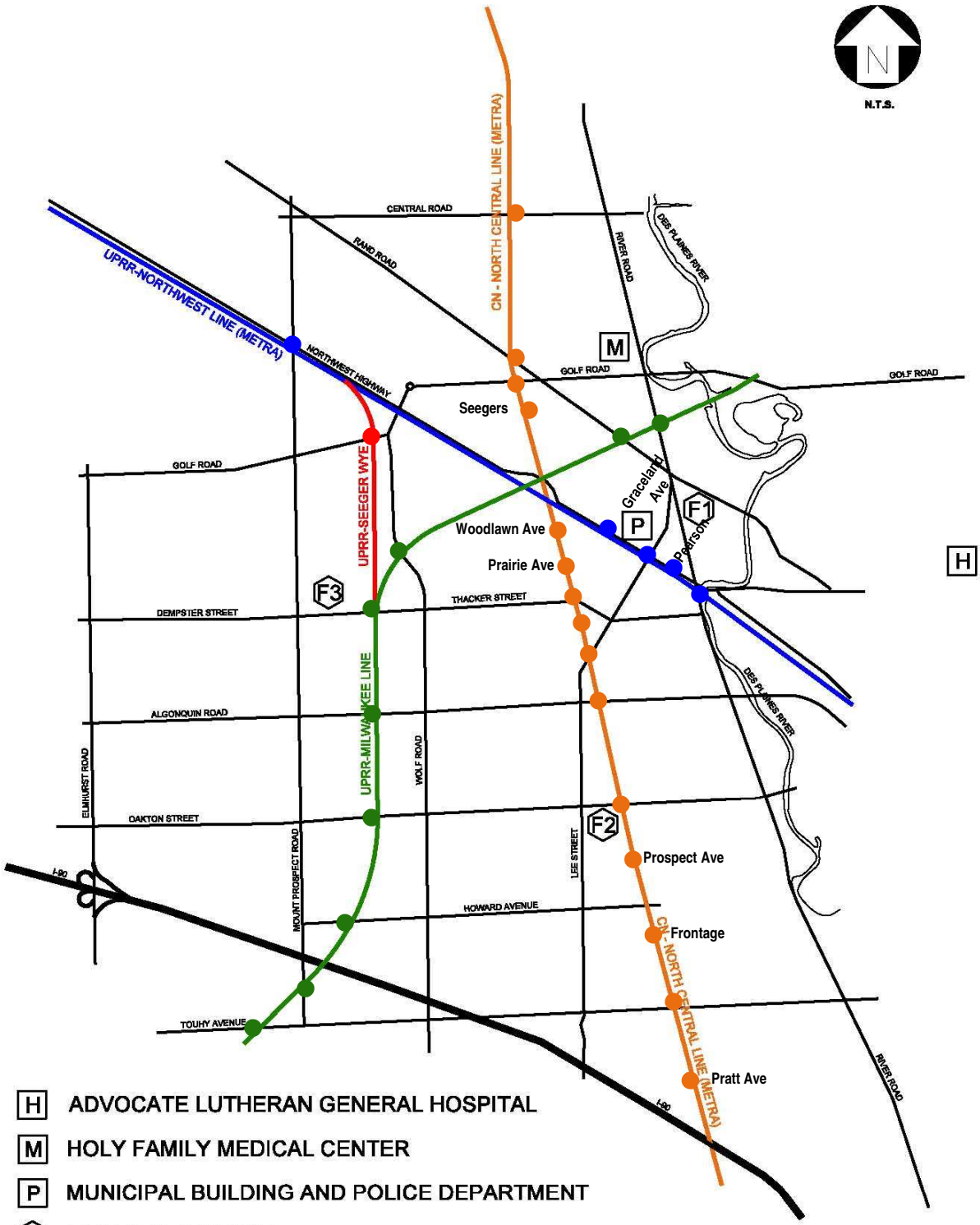
IV. Recommendations

In summary, we concur with the City's findings that the Algonquin Road at UP-Milwaukee is the most feasible location to provide a grade separation. It has the highest existing and projected future traffic delay due to freight trains, provides direct emergency service to the heart of Des Plaines, and has least amount of geometric constraints. Although Thacker Street would provide Fire Station Three the most direct access across the railroad, it poses many challenges from high residential and commercial impacts, difficult railroad geometry constraints, and roadway construction problems. Additionally, even though a grade separation at Oakton Street would relieve more congestion than the other two, there are large commercial property obstacles and difficult construction constraints. Algonquin Road would have no residential impacts, a small impact to relocate driveways, is surrounded by fairly open land for ease of construction, favorable railroad geometry for a shoofly, and centrally located for emergency services to the heart of the City. Based on these findings, it was validated that Algonquin Road at the UP-Milwaukee line would be the most feasible location to proceed with for a grade separation feasibility study.

APPENDIX A

Figures

City of Des Plaines



H ADVOCATE LUTHERAN GENERAL HOSPITAL

M HOLY FAMILY MEDICAL CENTER

P MUNICIPAL BUILDING AND POLICE DEPARTMENT

F1 FIRE STATION ONE

F2 FIRE STATION TWO

F3 FIRE STATION THREE

Figure 1
Location Map

Validation Study
Proposed Railroad Grade Separation
Algonquin Road at the Union Pacific - Milwaukee Railroad

Crossing Road	Train Line	Daily Delay Vehicles	Daily Delay (hr)	Delay Min/Vehicle
Touhy	(UP-Milw)	4516	165	2.19
Mt. Prospect	(UP-Milw)	1395	51	2.19
Howard	(UP-Milw)	359	13	2.17
Oakton	(UP-Milw)	2744	100	2.19
Algonquin	(UP-Milw)	1269	46	2.17
Thacker/Dempster	(UP-Milw)	1378	50	2.18
Wolf	(UP-Milw)	1463	53	2.17
Rand	(UP-Milw)	2595	95	2.20
River Road	(UP-Milw)	2927	107	2.19
Mt. Prospect	(UP-NW)	1995	35	1.05
Graceland	(UP-NW)	2551	45	1.06
Lee/Mannheim	(UP-NW)	1112	20	1.08
Pearson	(UP-NW)	661	12	1.09
River Road	(UP-NW)	2715	48	1.06
Golf	(UP-Seeger)	647	22	2.04
Pratt	(CN)	129	4	1.86
Touhy	(CN)	2113	60	1.70
Frontage	(CN)	187	5	1.60
Prospect	(CN)	153	4	1.57
Oakton	(CN)	1661	47	1.70
Algonquin	(CN)	633	18	1.71
Lee	(CN)	579	16	1.66
Graceland	(CN)	1327	38	1.72
Thacker	(CN)	803	23	1.72
Prairie	(CN)	140	4	1.71
Woodlawn	(CN)	31	1	1.94
Seegers	(CN)	88	3	2.05
Golf	(CN)	1954	56	1.72
Rand	(CN)	1668	47	1.69
Central	(CN)	1273	36	1.70

Source: Data analysis collected by the City of Des Plaines Fire Chief, Spring 2007

FIGURE 2: Average Delay Per Vehicle

APPENDIX B

List of References

List of References

1. 2004 Train Schedules.pdf
   Timetables from the UP and CN City of Des Plaines acquired at a 2004 meeting

2. Evaluation of Railroad Crossings for grade separation.xls
   City of Des Plaines internal analysis of the 32 grade crossings.

3. UPM - Algonquin w utilities.pdf, aerial photograph with utilities.

4. UPM - Oakton w utilities.pdf, aerial photograph with utilities.

5. UPM - Thacker w utilities.pdf, aerial photograph with utilities.

6. 5FireStationsScenario.pdf, City of Des Plaines current prevailing future scenarios regarding City fire stations.

7. 4FireStationsScenario.pdf, City of Des Plaines current prevailing future scenarios regarding City fire stations.

8. FireStationStudy.pdf
   The study that was commissioned by the City of Des Plaines

9. 2008_Road Jurisdiction_24x36.pdf
   City map of the various road jurisdictions

10. Motorist delay at Public Highway- Rail Grade Crossings in Northeastern Illinois, Research & Analysis Section Transportation Division, Illinois Commerce Commission, July 2002

11. City of Des Plaines STAC meeting minutes memorandum, August 1, 2006

12. City of Des Plaines STAC meeting minutes memorandum, August 8, 2006

13. 2006 Deployment Study, Des Plaines, Illinois, by Emergency Services Consulting Inc.

14. Union Pacific Railroad

City of Des Plaines
Railroad Crossing Grade Separation Projects- Priority List

Priority No.	Fire Study Priority?	Feasibility[1]	Street Name	RR	Line	FRA Number	Street Jurisdiction	Fire Study: Fire Station	Fire Study: Percent Calls[2]	Train Volumes[3]: Freight Existing	Freight Projected	Commuter Existing	Commuter Projected	Traffic Data: ADT	# of crashes	FRA Safety Index	Notes
	Y	1	River Rd	UP	NW	173908X	IDOT	1	11.5		7	64	73	37,700	2	119,894	floodplain, surrounding uses
	Y	1	Pearson St	UP	NW	173910Y	Des Plaines	1	8.6		7	64	73	5,050	1	97,036	surroundng uses
	Y	1	Lee St	UP	NW	173911F	IDOT	1			7	64	73	8,600		41,370	surroundng uses
	Y	1	Graceland Av	UP	NW	173912M	IDOT	1	3.8		7	64	73	16,500		45,515	surroundng uses
	Y	1	Mount Prospect Rd	UP	NW	176909P	CCHD	1			7	64	73	17,700		172,268	NW Hwy adjacent
	Y	2	Touhy Av	UP	Milwaukee	174087Y	IDOT	2		40	40			44,900	3	186,616	No adjacent driveways, creek runs under crossing
1	Y	2/3	Oakton St	UP	Milwaukee	174096X	IDOT	2		40	40			26,100	2	160,542	Industrial truck docks and Oxford
1	Y	3	Algonquin Rd	UP	Milwaukee	174098L	IDOT	1,2,3		40	40			13,700		36,698	UOP Entrance - could be moved at expense
1	Y	3	Thacker St	UP	Milwaukee	174099T	CCHD	3	16	40	40			12,700		34,155	Meyer driveway and Warrington
	Y	2	Wolf Rd	UP	Milwaukee	174103F	IDOT	3	1.3	40	40			14,900		35,901	Meyer driveway and Wieboldt
	Y	2	Rand Rd	UP	Milwaukee	174106B	IDOT	1	18	40	40			28,300		48,063	Mobile home park, commercial drive, Graceland
	Y	2	River Rd	UP	Milwaukee	174107H	IDOT	1	6.5	40	40			15,300		43,881	Commercial drives
	Y	2	Golf Rd	UP	Milwaukee	174108P	IDOT	3	1	40	40			31,500		11,586	On Seeger Wye; commuter lot entrance, Wolf Rd, Warrington
	Y	1	Touhy Av	CN	---	689651T	IDOT	2	5	21	65	20	52	26,100	2	88,862	Mannheim Road adjacent, expensive
	Y	2	Oakton St	CN	---	689654N	Des Plaines	2	20	21	65	20	52	23,300		83,006	commercial drives, Chestnut, Bittersweet
	Y	2	Lee St	CN	---	689656C	IDOT	1		21	65	20	52	16,500		26,946	commercial drives, Oakwood
	Y	2	Thacker St	CN	---	689658R	Des Plaines	1,3		21	65	20	52	12,700		26,480	First, Jeanette, Laurel
	Y	3/4	Central Rd	CN	---	689678C	IDOT	1		21	65	20	52	21,800		84,589	Carlow Dr, however a lot of open space in this area
	N	2	Rand Rd	CN	---	689677V	IDOT	1	9	21	65	20	52	26,900		44,565	commerical drives on west leg, east leg open
	N	2/3	Golf Rd	CN	---	689676N	IDOT	1	8	21	65	20	52	23,400		43,617	close to Rand intersection

1 Feasibility of constructing a grade separation, Rating of 1 to 5 with 5 being feasible. Take into account surrounding land uses, floodplain, etc.
2 Percent of first-due calls from relevant fire station that must use this crossing
3 Existing train volumes from schedules supplied by RR's at 2003 meeting with Senator/Representative. Projected volumes from S-Curve Feasibility Study. These values differ from the Fire Station Study Values
Total of 33 public at-grade rail crossings within the City of Des Plaines.
Criteria for choosing crossings includes: feasibility, fire routes-new stations?, ADT, safety, etc…

Our computations suggest that there is currently an experience of travel disruption due to railroad traffic in the City of Des Plaines at least 28.3% of the time. When this "probability of delay" is applied to the total number of incidents requiring use of a grade crossing by the first-due response unit, we can project that the City's fire department experiences a total of 2,476 minutes of response delay annually, a figure equivalent to over **forty-one hours of annual delay**.

The current disruption to the City of Des Plaines is a critical factor in the deployment of Fire and EMS assets, but even more critical when combined with the railroad industry's own estimates of a 30% increase in freight rail traffic in the next 3 to 5 years and an 80% increase anticipated in the next 10 to 15 years. The percentage of disruptions can be seen in the following table and do not assume any increase in METRA Commuter traffic.

Figure 43: Future Rail Crossing Disruption Time Projections

	Crossings Disrupted		
	Current	2008-10	2015-20
Union Pacific Milwaukee	8.7%	11.3%	15.6%
Union Pacific NW	5.1%	6.6%	9.2%
Combined Canadian National / Metra (non-stop)	4.2%	5.2%	8.4%
Combined UP NW / Metra	15.4%	16.9%	19.5%
**assuming no increase in Metra*			

Our computations suggest that, in the year 2020, the travel disruption due to railroad traffic in the City of Des Plaines will increase to about 43.5% of the time. When this forecasted "probability of delay" is applied to the projected number of incidents requiring use of a grade crossing by the first-due response unit in the year 2020, we can project that the City's fire department will experience a total of 5,519 minutes of response delay annually, a figure equivalent to over **ninety-two hours of annual delay**.

Any specific railroad crossing disruption is extremely difficult to predict, but we do believe that our collection and computation of this data has allowed us to quantify how railroad traffic impacts the response time of emergency apparatus and to quantify how increases in rail traffic will exacerbate the emergency response performance of the department in the future.

#2 Identify Continuous Routes

Note: These routes are identified primarily with ambulance transport to the hospitals in mind.

North/South

- River Road from Devon to Golf Road
- Lee Street from Touhy Avenue to Rand Road
- Wolf Road from Touhy Avenue to Central Road

East/West

- Oakton Street from Elmhurst Road to River Road
- Thacker Street from Elmhurst Road to River Road
- Golf Road from Elmhurst Road to River Road

	In order of ADT		In order of FRA Safety Index		In order of "Percent Calls"	
1	Touhy Av	44,900	Touhy Av	186,616	Oakton St	20
2	River Rd	37,700	Mount Prospect Rd	172,268	Rand Rd	18
3	Golf Rd	31,500	Oakton St	160,542	Thacker St	16
4	Rand Rd	28,300	River Rd	119,894	River Rd	11.5
5	Rand Rd	26,900	Pearson St	97,036	Rand Rd	9
6	Oakton St	26,100	Touhy Av	88,862	Pearson St	8.6
7	Touhy Av	26,100	Central Rd	84,589	Golf Rd	8
8	Golf Rd	23,400	Oakton St	83,006	River Rd	6.5
9	Oakton St	23,300	Rand Rd	48,063	Touhy Av	5
10	Central Rd	21,800	Graceland Av	45,515	Graceland Av	3.8
11	Mount Prospect Rd	17,700	Rand Rd	44,565	Wolf Rd	1.3
12	Graceland Av	16,500	River Rd	43,881	Golf Rd	1
13	Lee St	16,500	Golf Rd	43,617	Touhy Av	
14	River Rd	15,300	Lee St	41,370	Mount Prospect Rd	
15	Wolf Rd	14,900	Algonquin Rd	36,698	Oakton St	
16	Algonquin Rd	13,700	Wolf Rd	35,901	Central Rd	
17	Thacker St	12,700	Thacker St	34,155	Lee St	
18	Thacker St	12,700	Lee St	26,946	Algonquin Rd	
19	Lee St	8,600	Thacker St	26,480	Lee St	
20	Pearson St	5,050	Golf Rd	11,586	Thacker St	