THE URBAN TRANSPORTATION CENTER AT
THE UNIVERSITY OF ILLINOIS AT CHICAGO

Freight Planning for the Dolton and Riverdale Gateway:

Grade Separation

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Prepared For
South Suburban Mayors and Managers Association
Hazel Crest, Illinois

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I. AREA DESCRIPTION

The Dolton and Riverdale areas are part of the industrial downtown of Cook County. Freight is moved by and transferred between three major modes, i.e., water, rail, and truck. Freight by water arrives and departs via Lake Calumet, Calumet River, and the Little Calumet River. Major rail centers in the area are Chicago Intermodal Terminal, Indiana Harbor Belt (IHB) Blue Island Yard, Union Pacific (UP) Yard Center, Chessie Seaboard X (CSX) Barr Yard, and Riverdale CSX Yard. Major highways provide truck access to the two areas such as I-94, I-57, I-294, I-80, I-90, IL-83, IL-1, US-6, and US-41.

Ten at-grade rail-highway crossings are situated in and near Dolton and Riverdale as shown in Figure 1. The Perry Ave. and 137th St. crossings completely reside in the Village of Riverdale. Crossings entirely residing in the Village of Dolton are Cottage Grove Ave., 144th St., 142nd St., Lincoln/Park Ave, and Lincoln Park Ave. near Forest Ave.

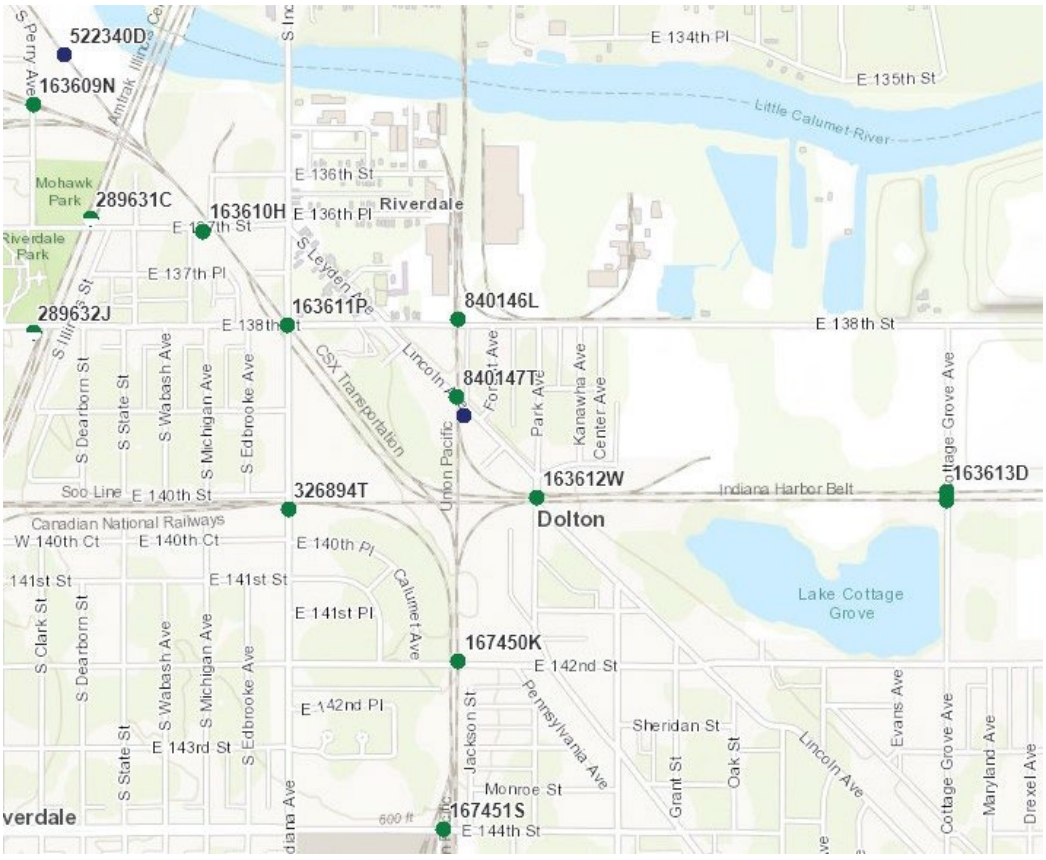

Figure 1. Ten At-Grade Rail-Highway Crossing as Solid Green Circles

Three sites are shared among the jurisdictions. For the Indiana Ave. and 138th St. crossing, half resides in Dolton, one fourth resides in Riverdale, and the remaining share in Chicago. Regarding the 138th St. site, half resides in Dolton and half in Chicago. For the third shared site, Indiana Ave. near 140th St., half is in Dolton and half resides in Riverdale. The movement of rail freight at the crossings in these two areas causes substantial vehicle delays for residents, truckers, PACE bus passengers, and local businesses. Further, residents delayed at the at-grade rail-highway crossings hinder access to Metra's Riverdale and Ivanhoe stations.

II. ASSOCIATION OF AMERICAN RAILROADS (AAR) SITE DESCRIPTIONS

A. AAR 326886B and AAR 163613D, Cottage Grove Avenue, Dolton, Illinois

A satellite view of the site is shown in Figure 2 [1]. The site is located latitude 41.640747° and longitude -87.597851° which is in Dolton, Illinois and in the County of Cook [1]. The north compass direction points to the top of Figure 2.

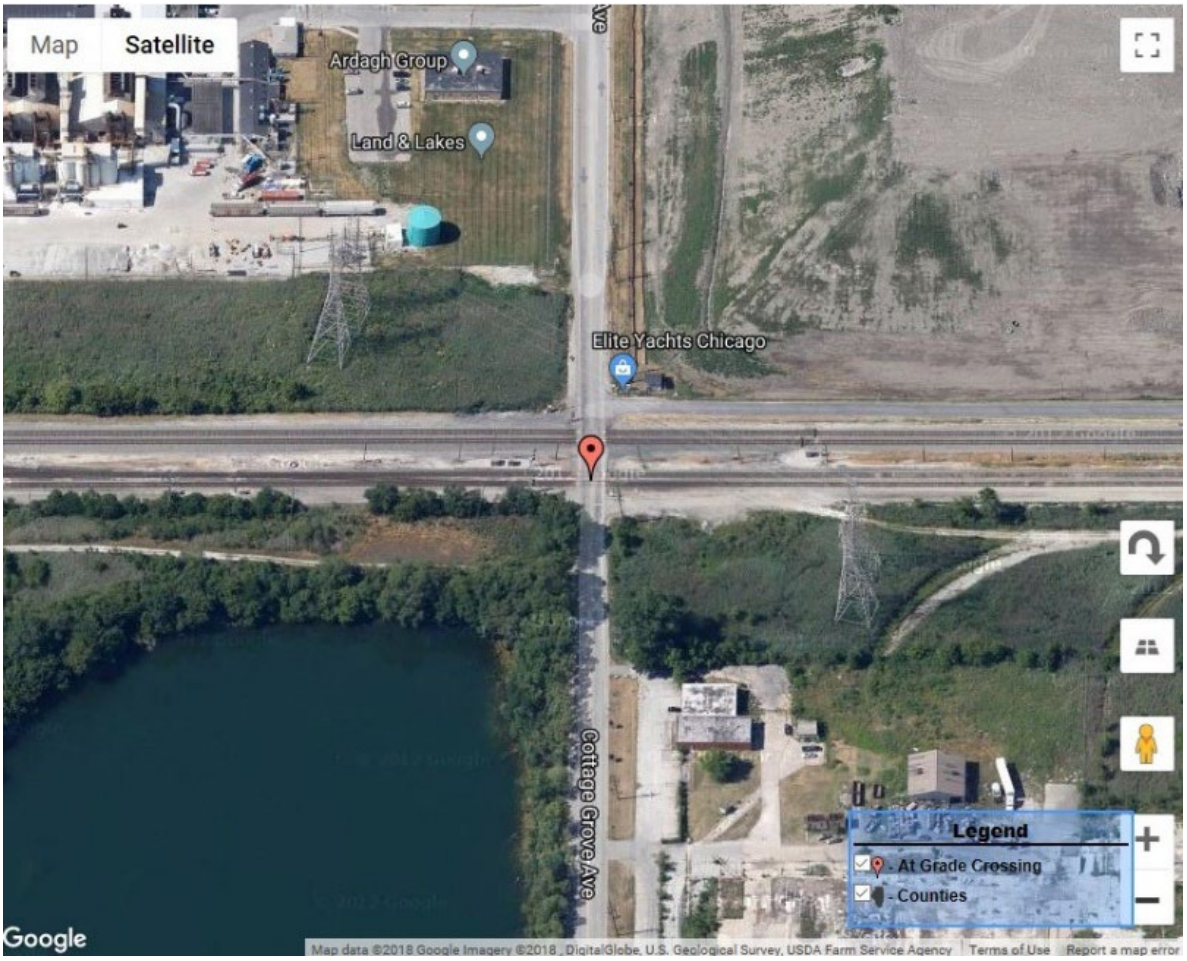

Figure 2. Satellite Image of Site AAR 326886B and AAR 163613D

The highway-rail, at-grade railroad crossing is formed by two, east-west pairs of tracks intersecting a two-lane, undivided Cotton Grove Avenue at ninety degrees. The southern pair of tracks, i.e., AAR 326886B, is the Indiana Harbor Belt line, and the northern pair of tracks, i.e., AAR 163613D, is the CSX Transportation line [1]. Physical description of the site is listed in Table 1.

Table 1. AAR 326886B and AAR 163613D Physical Description

Railroad	outside-rail to outside-rail width, ft	84
	number of tracks	4
	approx. ROW width, ft	120
	line	IHB, CSX
Highway	travel pavement width at crossing, ft	24
	total lanes, ln	2
	fence-to-fence ROW width, ft	70
	stop line to stop line distance, ft	145
	FHWA classification	urban, collector-major

As for utilities, high-voltage lines cross Cottage Grove at the railroad tracks from towers. Low-voltage lines and poles are along the eastside of Cottage Grove Avenue; low-voltage lines string across Cottage Grove Avenue near the Land & Lakes and Ardagh Group facilities. The low-voltage lines string across Cottage Grove Avenue to power the railroad gates on the west side. Underground water pipes are along the west side of Cottage Grove Avenue. Table 2 summarizes train and vehicle operational information at the at-grade crossing [1] [2].

Table 2. AAR 326886B and AAR 163613D Operational Information

Railroad	Average Number of Daily Freight Trains	77
	Average Number of Daily Passenger Trains	0
	Train Speed - Timetable, mi/h	30
	Train Speed - Minimum Likely, mi/h	15
	Train Speed - Maximum Likely, mi/h	30
	Freight Train Speed, mi/h	10
	Freight Train Length, ft	7000
	Freight Gate Down Time, min	613
	Freight Yard Factor	1.65
	Total Freight Gate Down Time, min	1010.6
	Average Gate Down Time, min/train	13.1
Highway	AADT, veh/d	2150
	Truck Percent, %	19
	Posted Highway Speed, mi/h	35
	Vehicles Delayed, veh/d	1509
	Average Vehicle Delay, min/veh	7.2
	Aggregate Delay, veh-hour/d	181.5

Traffic control devices used at the site are listed in Table 3 [1].

Table 3. AAR 326886B and AAR 163613D Traffic Control Devices

Railroad	Maximum Warning Devices	AFLS/gates
	Crossbucks	2
	Bells	1
	Wigwags	0
	Flashing Light Pairs	4
	Cantilever	0
	Gates	2
	Pedestrian Gates	0
	Masts	2
Highway	Pavement Markings	stop lines, symbols
	Advanced Warning Signs?	yes
	Advanced RR Crossing Sign, W10-1	2

For safety information concerning the site, Table 4 presents accident prediction as well as a 62-year crash history [1] [2] [3].

Table 4. AAR 326886B and AAR 163613D Safety Information

1955 through 2017	PDO Traffic Crashes	1, morning, truck, trn-veh, clear
	Fatalities	0
	Injuries	0
USDOT Accident Prediction Formula	Collisions per year	0.00

B. AAR 163612W, Lincoln Avenue/Park Avenue, Dolton, Illinois

A satellite view of the site is shown in Figure 3 [1]. The site is located latitude 41.640801° and longitude -87.609913° which is in Dolton, Illinois and in the County of Cook [1]. The north compass direction points to the top of Figure 3.

Figure 3. Satellite Image of Site AAR 163612W

The highway-rail, at-grade railroad crossing is formed by two, east-west pairs of tracks intersecting a four-lane, undivided Lincoln Avenue/Park Avenue at 90°. The southern pair involving two tracks is the Indiana Harbor Belt line, and the northern pair of three tracks belonging to CSX Transportation, Inc. [1]. Physical description of the site is listed in Table 5.

Table 5. AAR 163612W Physical Description

Railroad	outside-rail to outside-rail width, ft	77
	number of tracks	5
	approx. ROW width, ft	118
	line	CSX
Highway	travel pavement width at crossing, ft	60
	total lanes, ln	4
	approximate ROW width, ft	96
	stop line to stop line distance, ft	140
	FHWA classification	urban, collector-major

As for utilities, low-voltage lines and poles are along the western side of Lincoln Avenue/Park Avenue; low-voltage lines string across the crossing. Streetlights are along the the western side of the street. Underground water pipes are along the western side of Lincoln Avenue and Park Avenue. Table 6 summarizes train and vehicle operational information at the at-grade crossing [1] [2].

Table 6. AAR 163612W Operational Information

Railroad	Average Number of Daily Freight Trains	51
	Average Number of Daily Passenger Trains	0
	Train Speed - Timetable, mi/h	20
	Train Speed - Minimum Likely, mi/h	15
	Train Speed - Maximum Likely, mi/h	20
	Freight Train Speed, mi/h	20
	Freight Train Length, ft	7000
	Freight Gate Down Time, min	147
	Freight Yard Factor	1.65
	Total Freight Gate Down Time, min	242.8
	Average Gate Down Time, min/train	6.6
Highway	AADT, veh/d	7450
	Truck Percent, %	10
	Posted Highway Speed, mi/h	25
	Vehicles Delayed, veh/d	1256
	Average Vehicle Delay, min/veh	3.6
	Aggregate Delay, veh-hour/d	75.6

Traffic control devices used at the site are listed in Table 7 [1].

Table 7. AAR 163612W Traffic Control Devices

Railroad	Maximum Warning Devices	Cantilever AFLS/gates/sidelights
	Crossbucks	3
	Bells	2
	Wigwags	0
	Flashing Light Pairs	11
	Cantilever	3
	Gates	2
	Pedestrian Gates	3
	Masts	7
Highway	Pavement Markings	stop lines, symbols
	Advanced Warning Signs?	yes
	Advanced RR Crossing Sign, W10-1	2

For safety information concerning the site,
Table 8 presents accident prediction as well as a 62-year crash history [1] [2] [3].

Table 8. AAR 163612W Safety Information

1955 through 2017	PDO Traffic Crashes	25
	Fatalities	1
	Injuries	4
	Time of Day	6 morning
		2 afternoon
		8 evening
		14 night
	User Involvement	25 automobile
		1 bicycle
		1 other
		1 pedestrian
		2 truck
	Collision Type	1 pedestrian
		19 train-vehicle
		10 vehicle-train
	Weather	19 clear
		1 cloudy
		4 rain
		2 snow
		4 unknown
USDOT Accident Prediction Formula	Collisions per year	0.08

C. AAR 840147T, Lincoln Avenue, Dolton, Illinois

A satellite view of the site is shown in Figure 4 [1]. The site is located latitude 41.643009° and longitude -87.612263° on Park Avenue near Forest Avenue which is in Dolton, Illinois and in the County of Cook [1]. The north compass direction points to the top of Figure 4.

Figure 4. Satellite Image of Site AAR 840147T

The highway-rail, at-grade railroad crossing is formed by two, north-south tracks intersecting a two-lane, undivided Lincoln Avenue, excluding parking lanes on both sides, at approximately 45°. Both tracks belong to the Union Pacific Railroad Company [1]. Physical description of the site is listed in Table 9.

Table 9. AAR 840147T Physical Description

Railroad	outside-rail to outside-rail width, ft	20
	number of tracks	2
	approx. ROW width, ft	84
	line	UP
Highway	travel pavement width at crossing, ft	42
	total travel lanes, ln	2
	approximate ROW width, ft	54
	stop line to stop line distance, ft	87
	FHWA classification	urban, collector-major

As for utilities, low-voltage lines and poles are along the northeastern side of Lincoln Avenue; low-voltage lines string across Lincoln Avenue at the railroad crossing. Underground water pipes are along the southwestern side of Lincoln Avenue. Light poles are on both sides of Lincoln Avenue. High voltage wires string across the crossing from high masts. Other utility poles run along the southeaster side of Lincoln Avenue.

Table 10 summarizes train and vehicle operational information at the at-grade crossing [1] [2].

Table 10. AAR 840147T Operational Information

Railroad	Average Number of Daily Freight Trains	12
	Average Number of Daily Passenger Trains	2
	Train Speed - Timetable, mi/h	20
	Train Speed - Minimum Likely, mi/h	10
	Train Speed - Maximum Likely, mi/h	20
	Freight Train Speed, mi/h	20
	Freight Train Length, ft	7000
	Freight Gate Down Time, min	48
	Freight Yard Factor	1.65
	Total Freight Gate Down Time, min	78.8
	Passenger Train Speed, mi/h	20
	Passenger Gate Down Time, min	3
	Total Gate Down Time, min	81.8
	Average Gate Down Time, min/train	5.8
Highway	AADT, veh/d	7450
	Truck Percent, %	10
	Posted Highway Speed, mi/h	25
	Vehicles Delayed, veh/d	423
	Average Vehicle Delay, min/veh	3.2
	Aggregate Delay, veh-hour/d	22.6

Traffic control devices used at the site are listed in

Table 11 [1].

Table 11. AAR 840147T Traffic Control Devices

Railroad	Maximum Warning Devices	Cantilever AFLS/gates/sidelights
	Crossbucks	2
	Bells	2
	Wigwags	0
	Flashing Light Pairs	9
	Cantilever	1
	Gates	2
	Pedestrian Gates	2
	Masts	6
Highway	Pavement Markings	stop lines, symbols
	Advanced Warning Signs?	yes
	Advanced RR Crossing Sign, W10-1	2

For safety information concerning the site, Table 12 presents accident prediction as well as a 62-year crash history [1] [2] [3].

Table 12. AAR 840147T Safety Information

1955 through 2017	PDO Traffic Crashes	2
	Fatalities	1
	Injuries	4
	Time of Day	3 evening
		4 night
	User Involvement	5 automobiles
		1 other
		1 pedestrian
	Collision Type	1 pedestrian
		5 train-vehicle
		1 vehicle-train
	Weather	3 clear
		1 rain
		1 snow
		2 unknown
USDOT Accident Prediction Formula	Collisions per year	0.02

D. AAR 840146L, 138th Street, Chicago, Illinois

A satellite view of the site is shown in Figure 5 [1]. The site is located latitude 41.64472° and longitude -87.61222° which is on the border between Dolton and Chicago, Illinois and in the County of Cook [1]. The north compass direction points to the top of Figure 5.

Figure 5. Satellite Image of Site AAR 840146L

The highway-rail, at-grade railroad crossing is formed by two, north-south tracks intersecting a two-lane, undivided 138th Street at 90°. Union Pacific Railroad Company and CSX Transportation, Inc. use the tracks [1]. Physical description of the site is listed in Table 13.

Table 13. AAR 840146L Physical Description

Railroad	outside-rail to outside-rail width, ft	19
	number of tracks	2
	approx. ROW width, ft	124
	line	UP
Highway	travel pavement width at crossing, ft	24
	total lanes, ln	2
	approximate ROW width, ft	64
	stop line to stop line distance, ft	60
	FHWA classification	urban, collector-major

As for utilities, low-voltage lines and poles run along the southern side of 138th Street approaching the at-grade, railroad crossing from the west. Near the crossing, the power line traverse 138th Street and then continue along the north side of 138th Street. Streetlights are along both sides of 138th Street west of the crossing. Underground water pipes are along the northern side of 138th Street.

Table 14 summarizes train and vehicle operational information at the at-grade crossing [1] [2].

Table 14. AAR 840146L Operational Information

Railroad	Average Number of Daily Freight Trains	12
	Average Number of Daily Passenger Trains	2
	Train Speed - Timetable, mi/h	30
	Train Speed - Minimum Likely, mi/h	15
	Train Speed - Maximum Likely, mi/h	30
	Freight Train Speed, mi/h	20
	Freight Train Length, ft	7000
	Freight Gate Down Time, min	48
	Freight Yard Factor	1.65
	Total Freight Gate Down Time, min	78.8
	Passenger Train Speed, mi/h	20
	Passenger Gate Down Time, min	3
	Total Gate Down Time, min	81.8
	Average Gate Down Time, min/train	5.8
Highway	AADT, veh/d	1800
	Truck Percent, %	14
	Posted Highway Speed, mi/h	40
	Vehicles Delayed, veh/d	102
	Average Vehicle Delay, min/veh	3.2
	Aggregate Delay, veh-hour/d	5.5

Traffic control devices used at the site are listed in Table 15 [1].

Table 15. AAR 840146L Traffic Control Devices

Railroad	Maximum Warning Devices	AFLS/gatess
	Crossbucks	2
	Bells	2
	Wigwags	0
	Flashing Light Pairs	4
	Cantilever	0
	Gates	2
	Pedestrian Gates	0
	Masts	2
Highway	Pavement Markings	stop lines, symbols
	Advanced Warning Signs?	yes
	Do Not Stop On Tracks, R8-8	1
	Advanced RR Crossing Sign, W10-1	2

For safety information concerning the site, Table 16 presents accident prediction as well as a 62-year crash history [1] [2] [3].

Table 16. AAR 840146L Safety Information

1955 through 2017	PDO Traffic Crashes	26
	Fatalities	1
	Injuries	18
	Time of Day	5 morning
		7 afternoon
		12 evening
		21 night
	User Involvement	35 automobile
		1 bicycle
		0 other
		4 pedestrian
		4 truck
		1 unknown
	Collision Type	4 pedestrian
		31 train-vehicle
		10 vehicle-train
	Weather	20 clear
		3 cloudy
		3 rain
		2 snow
		17 unknown
USDOT Accident Prediction Formula	Collisions per year	0.02

E. AAR 163611P, Indiana Ave. and 138th Street Intersection, Riverdale, Illinois

A satellite view of the site is shown in Figure 6 [1]. The site is located latitude 41.644589° and longitude -87.61725° which half resides in Dolton and a fourth in Riverdale and Chicago, Illinois, and in the County of Cook [1]. The north compass direction points to the top of Figure 6.

Figure 6. Satellite Image of Site AAR 163611P

The highway-rail, at-grade railroad crossing is formed by three tracks intersecting crossing a signalized Indiana Avenue and 138th Street intersection. The three railroad tracks traverse in a northwest and southeast direction at approximately 38° counterclockwise from Indiana Avenue. The southwestern most railroad track is used by IHB. The remaining two tracks involve CSX Transportation [1]. Physical description of the site is listed in
Table 17.

Table 17. AAR 163611P Physical Description

Railroad	outside-rail to outside-rail width, ft	96
	number of tracks	3
	approx. ROW width, ft	172
	line	IHB, CSX
Highway	travel pavement width, Indiana Ave, ft	42
	total lanes, Indiana Ave, ln	4
	approx. ROW width, Indiana Ave, ft	68
	stop line to stop line distance, Indiana Ave, ft	134
	FHWA classification, Indiana Ave	urban, arterial-minor
	travel pavement width, 138th St, ft	43
	total lanes, 138th St, ln	4
	approx. ROW width,138th St, ft	64
	stop line to stop line distance, 138th St, ft	102
	FHWA classification, Indiana Ave	urban, collector-major

As for utilities, high-voltage lines cross 138th Street at the railroad tracks and across Indiana Avenue from high masts. Low-voltage lines and poles are along the south side of 138th Street; low-voltage lines string across the intersection along the south side of 138th Street. Streetlights are along the north side of 138th Street. Streetlights are on the west side of Indiana Avenue south of 138th Street and on the east side of Indiana Avenue north of 138th Street. Underground water pipes are along the west side of Indiana Avenue and the south side of 138th Street. Table 18 summarizes train and vehicle operational information at the at-grade crossing [1] [2].

Table 18. AAR 163611P Operational Information

Railroad	Average Number of Daily Freight Trains	45
	Average Number of Daily Passenger Trains	0
	Train Speed - Timetable, mi/h	20
	Train Speed - Minimum Likely, mi/h	1
	Train Speed - Maximum Likely, mi/h	20
	Freight Train Speed, mi/h	15
	Freight Train Length, ft	7000
	Freight Gate Down Time, min	196
	Freight Yard Factor	1.65
	Total Freight Gate Down Time, min	323.8
	Average Gate Down Time, min/train	8.8
Highway	AADT, veh/d	6850
	Truck Percent, %	8
	Posted Highway Speed, mi/h	30
	Vehicles Delayed, veh/d	1540
	Average Vehicle Delay, min/veh	4.8
	Aggregate Delay, veh-hour/d	123.5

Traffic control devices used at the site are listed in Table 19 [1].

Table 19. AAR 163611P Traffic Control Devices

Railroad	Maximum Warning Devices	AFLS/gates
	Crossbucks	4
	Bells	4
	Wigwags	0
	Flashing Light Pairs	8
	Cantilever	0
	Gates	4
	Pedestrian Gates	0
	Masts	4
Highway	Pavement Markings	stop lines, symbols, crosswalks
	Advanced Warning Signs?	yes
	Advanced RR Crossing Sign, W10-1	4
	Traffic Signal	intersection

For safety information concerning the site, Table 20 presents accident prediction as well as a 62-year crash history [1] [2] [3].

Table 20. AAR 163611P Safety Information

1955 through 2017	PDO Traffic Crashes	26
	Fatalities	1
	Injuries	18
	Time of Day	6 morning
		8 afternoon
		13 evening
		18 night
	User Involvement	35 automobile
		1 bicycle
		0 other
		4 pedestrian
		4 truck
		1 unknown
	Collision Type	4 pedestrian
		31 train-vehicle
		10 vehicle-train
	Weather	20 clear
		3 cloudy
		3 rain
		2 snow
		17 unknown
USDOT Accident Prediction Formula	Collisions per year	0.12

F. AAR 163610H, 137th Street, Riverdale, Illinois

A satellite view of the site is shown in Figure 7 [1]. The site is located latitude 41.64666° and longitude -87.61972° which is in Riverdale, Illinois, and in the County of Cook [1]. The north compass direction points to the top of Figure 7.

Figure 7. Satellite Image of Site AAR 163610H

The highway-rail, at-grade railroad crossing is formed by three tracks crossing 137th. The three railroad tracks traverse in a northwest and southeast direction at approximately 53° clockwise from 137th Street. The northeastern most railroad track is a spur to service the business on Michigan Avenue. The remaining two tracks involve IHB and CSX Transportation with the southwestern most track used by IHB [1]. Physical description of the site is listed in Table 21.

Table 21. AAR 163610H Physical Description

Railroad	approx. outside-rail to outside-rail width, ft	50
	number of tracks	3
	approx. ROW width, ft	132
	line	IHB, CSX
Highway	travel pavement width, 137th St, ft	26
	total lanes, 137th St, ln	2
	approx. ROW width, 137th St, ft	62
	stop line to stop line distance, 137th St, ft	134
	FHWA classification, 138th St	urban, local

As for utilities, high-voltage lines cross 137th Street parallel to the railroad tracks from towers. Low-voltage lines and poles are along the southside of 137th Street; low-voltage lines string across the railroad tracks along the south side of 137th Street. Streetlights are along the north side of 137th Street. Underground water pipes are along the north side of 137th Street. Table 22 summarizes train and vehicle operational information at the at-grade crossing [1] [2].

Table 22. AAR 163610H Operational Information

Railroad	Average Number of Daily Freight Trains	37
	Average Number of Daily Passenger Trains	0
	Train Speed - Timetable, mi/h	20
	Train Speed - Minimum Likely, mi/h	5
	Train Speed - Maximum Likely, mi/h	20
	Freight Train Speed, mi/h	20
	Freight Train Length, ft	7000
	Freight Gate Down Time, min	147
	Freight Yard Factor	1.65
	Total Freight Gate Down Time, min	242.8
	Average Gate Down Time, min/train	6.6
Highway	AADT, veh/d	900
	Truck Percent, %	6
	Posted Highway Speed, mi/h	20
	Vehicles Delayed, veh/d	152
	Average Vehicle Delay, min/veh	3.6
	Aggregate Delay, veh-hour/d	9.1

Traffic control devices used at the site are listed in Table 23 [1].

Table 23. AAR 163610H Traffic Control Devices

Railroad	Maximum Warning Devices	AFLS/gates
	Crossbucks	3
	Bells	2
	Wigwags	0
	Flashing Light Pairs	6
	Cantilever	0
	Gates	3
	Pedestrian Gates	0
	Masts	3
Highway	Pavement Markings	none
	Advanced Warning Signs?	yes
	Advanced RR Crossing Sign, W10-1	1

For safety information concerning the site,

Table 24 presents accident prediction as well as a 62-year crash history [1] [2] [3].

Table 24. AAR 163610H Safety Information

1955 through 2017	PDO Traffic Crashes	20
	Fatalities	1
	Injuries	7
	Time of Day	4 morning
		0 afternoon
		8 evening
		16 night
	User Involvement	24 automobile
		1 bicycle
		0 other
		1 pedestrian
		2 truck
		0 unknown
	Collision Type	1 pedestrian
		18 train-vehicle
		9 vehicle-train
	Weather	13 clear
		11 cloudy
		1 rain
		0 snow
		3 unknown
USDOT Accident Prediction Formula	Collisions per year	0.06

G. AAR 326894T, Indiana Avenue near 140th Street, Dolton, Illinois

A satellite view of the site is shown in Figure 8 [1]. The site is located latitude 41.64055° and longitude -87.61722° which half resides in Riverdale and the other half in Dolton, Illinois, and in the County of Cook [1]. The north compass direction points to the top of Figure 8.

Figure 8. Satellite Image of Site AAR 326894T

The highway-rail, at-grade railroad crossing has three tracks intersecting a four-lane, undivided Indiana Avenue at 90°. Indiana Harbor Belt and CSX Transportation primarily use the three tracks [1]. Physical description of the site is listed in Table 25.

Table 25. AAR 326894T Physical Description

Railroad	outside-rail to outside-rail width, ft	33
	number of tracks	3
	approx. ROW width, ft	166
	line	IHB, CSX
Highway	travel pavement width at crossing, ft	44
	total lanes, ln	4
	approx. ROW width, ft	62
	stop line to stop line distance, ft	79
	FHWA classification	urban, arterial-minor

As for utilities, low-voltage lines and poles run parallel of the railroad tracks on the south side, and their wires string across Indiana Avenue south of the tracks. Low-voltage lines and poles are along the west side of Indiana Avenue, and their wires string across the three tracks. Other lines and poles run parallel of the tracks on the north side, the lines cross Indiana Avenue north of the crossing. Streetlights are along the west side of Indiana Avenue. Underground water pipes are along the west side of Indiana Avenue.

Table 26 summarizes train and vehicle operational information at the at-grade crossing [1] [2].

Table 26. AAR 326894T Operational Information

Railroad	Average Number of Daily Freight Trains	77
	Average Number of Daily Passenger Trains	0
	Train Speed - Timetable, mi/h	25
	Train Speed - Minimum Likely, mi/h	20
	Train Speed - Maximum Likely, mi/h	25
	Freight Train Speed, mi/h	25
	Freight Train Length, ft	7000
	Freight Gate Down Time, min	245
	Freight Yard Factor	1.65
	Total Freight Gate Down Time, min	404.3
	Average Gate Down Time, min/train	5.3
Highway	AADT, veh/d	4950
	Truck Percent, %	4
	Posted Highway Speed, mi/h	30
	Vehicles Delayed, veh/d	1390
	Average Vehicle Delay, min/veh	2.9
	Aggregate Delay, veh-hour/d	66.9

Traffic control devices used at the site are listed in Table 27 [1].

Table 27. AAR 326894T Traffic Control Devices

Railroad	Maximum Warning Devices	Cantilever AFLS/gates
	Crossbucks	2
	Bells	1
	Wigwags	0
	Flashing Light Pairs	8
	Cantilever	2
	Gates	2
	Pedestrian Gates	0
	Masts	2
Highway	Pavement Markings	stop lines, symbols
	Advanced Warning Signs?	yes
	Advanced RR Crossing Sign, W10-1	2

For safety information concerning the site, Table 28 presents accident prediction as well as a 62-year crash history [1] [2] [3].

Table 28. AAR 326894T Safety Information

1955 through 2017	PDO Traffic Crashes	28
	Fatalities	0
	Injuries	7
	Time of Day	0 morning
		0 afternoon
		14 evening
		21 night
	User Involvement	33 automobile
		1 bicycle
		0 other
		1 pedestrian
		0 truck
		0 unknown
	Collision Type	1 pedestrian
		23 train-vehicle
		11 vehicle-train
	Weather	14 clear
		5 cloudy
		3 rain
		2 snow
		11 unknown
USDOT Accident Prediction Formula	Collisions per year	0.04

H. AAR 167450K, 142nd Street, Dolton, Illinois

A satellite view of the site is shown in Figure 9 [1]. The site is located latitude 41.63722° and longitude -87.61222° which is in Dolton, Illinois, and in the County of Cook [1]. The north compass direction points to the top of Figure 9.

Figure 9. Satellite Image of Site AAR 167450K

The highway-rail, at-grade railroad crossing is formed by four, north-south tracks intersecting a four-lane, undivided 142nd Street, including parking lanes on both sides but not in the crossing, at approximately 90°. CSX Transportation uses the western most track [1]. The remaining three tracks primarily are used by the Union Pacific Railroad Company [1]. Physical description of the site is listed in Table 29.

Table 29. AAR 167450K Physical Description

Railroad	outside-rail to outside-rail width, ft	60
	number of tracks	4
	approx. ROW width, ft	182
	line	UP, CSX
Highway	travel pavement width at crossing, ft	42
	total travel lanes, ln	4
	approximate ROW width, ft	68
	stop line to stop line distance, ft	120
	FHWA classification	urban, arterial-minor

As for utilities, low-voltage lines and poles are along the south side of 142nd Street and hang across the four railroad tracks. Low-voltage lines and poles run parallel on both sides of the tracks, and their lines string across 142nd Street at the railroad crossing. Streetlight poles stand on the north side of 142nd Street west of the crossing and on the south side east of the crossing. Underground water pipes are along the north side of 142nd Street east of the crossing and on the south side west of the crossing.

Table 30 summarizes train and vehicle operational information at the at-grade crossing [1] [2].

Table 30. AAR 167450K Operational Information

Railroad	Average Number of Daily Freight Trains	56
	Average Number of Daily Passenger Trains	2
	Train Speed - Timetable, mi/h	60
	Train Speed - Minimum Likely, mi/h	20
	Train Speed - Maximum Likely, mi/h	60
	Freight Train Speed, mi/h	20
	Freight Train Length, ft	7000
	Freight Gate Down Time, min	223
	Freight Yard Factor	1.65
	Total Freight Gate Down Time, min	367.5
	Passenger Train Speed, mi/h	20
	Passenger Gate Down Time, min	3
	Total Gate Down Time, min	370.5
	Average Gate Down Time, min/train	6.4
Highway	AADT, veh/d	5700
	Truck Percent, %	7
	Posted Highway Speed, mi/h	30
	Vehicles Delayed, veh/d	1467
	Average Vehicle Delay, min/veh	3.5
	Aggregate Delay, veh-hour/d	85.9

Traffic control devices used at the site are listed in Table 31 [1].

Table 31. AAR 167450K Traffic Control Devices

Railroad	Maximum Warning Devices	Cantilever AFLS/gates
	Crossbucks	2
	Bells	2
	Wigwags	0
	Flashing Light Pairs	8
	Cantilever	2
	Gates	2
	Pedestrian Gates	1
	Masts	5
Highway	Pavement Markings	stop lines, symbols
	Advanced Warning Signs?	yes
	Do Not Block Intersection, R10-7	2
	School Crosswalk Warning, S1-1	2
	Supplemental Plaque, W16-7p	2
	Advanced RR Crossing Sign, W10-1	2

For safety information concerning the site, Table 32 presents accident prediction as well as a 62-year crash history [1] [2] [3].

Table 32. AAR 167450K Safety Information

1955 through 2017	PDO Traffic Crashes	2
	Fatalities	0
	Injuries	5
	Time of Day	1 morning
		1 afternoon
		2 evening
		3 night
	User Involvement	7 automobiles
		0 other
		0 pedestrian
	Collision Type	1 pedestrian
		4 train-vehicle
		3 vehicle-train
	Weather	6 clear
		0 rain
		0 snow
		1 unknown
USDOT Accident Prediction Formula	Collisions per year	0.04

I. AAR 167451S, 144th Street, Dolton, Illinois

A satellite view of the site is shown in Figure 10 [1]. The site is located latitude 41.633526° and longitude -87.61263° which is in Dolton, Illinois and in the County of Cook [1]. The north compass direction points to the top of Figure 10.

Figure 10. Satellite Image of Site AAR 167451S

The highway-rail, at-grade railroad crossing is formed by six, generally north-south tracks intersecting a two-lane, undivided 144th Street at approximately 90°. CSX Transportation primarily uses the two, western most tracks [1]. Union Pacific Railroad Company primarily uses the remaining four tracks [1]. Physical description of the site is listed in Table 33.

Table 33. AAR 167451S Physical Description

Railroad	outside-rail to outside-rail width at crossing, ft	228
	number of tracks	6
	approx. ROW width, ft	395
	line	UP, CSX
Highway	travel pavement width at crossing, ft	30
	total travel lanes at crossing, ln	2
	approximate ROW width, ft	62
	stop line to stop line distance, ft	262
	FHWA classification	urban, collector-major

As for utilities, low-voltage lines and poles are along the north side of 144th Street and hang across the six railroad tracks. Low-voltage lines and poles run parallel on the western side of the tracks, and their lines string across 144th Street at the railroad crossing. Streetlights are on both sides of 144th Street. Underground water pipes appear to be on both sides of 144th Street as indicated by fire hydrants.

Table 34 summarizes train and vehicle operational information at the at-grade crossing [1] [2].

Table 34. AAR 167451S Operational Information

Railroad	Average Number of Daily Freight Trains	86
	Average Number of Daily Passenger Trains	2
	Train Speed - Timetable, mi/h	20
	Train Speed - Minimum Likely, mi/h	10
	Train Speed - Maximum Likely, mi/h	20
	Freight Train Speed, mi/h	20
	Freight Train Length, ft	7000
	Freight Gate Down Time, min	342
	Freight Yard Factor	1.65
	Total Freight Gate Down Time, min	564.4
	Passenger Train Speed, mi/h	20
	Passenger Gate Down Time, min	3
	Total Gate Down Time, min	567.4
	Average Gate Down Time, min/train	6.4
Highway	AADT, veh/d	3600
	Truck Percent, %	5
	Posted Highway Speed, mi/h	30
	Vehicles Delayed, veh/d	1418
	Average Vehicle Delay, min/veh	3.5
	Aggregate Delay, veh-hour/d	83.8

Traffic control devices used at the site are listed in Table 35 [1].

Table 35. AAR 167451S Traffic Control Devices

Railroad	Maximum Warning Devices	AFLS/gates
	Crossbucks	4
	Bells	4
	Wigwags	0
	Flashing Light Pairs	8
	Cantilever	0
	Gates	2
	Pedestrian Gates	0
	Masts	4
Highway	Pavement Markings	stop lines, symbols
	Advanced Warning Signs?	no
	Advanced RR Crossing Sign, W10-1	0

For safety information concerning the site, Table 36 presents accident prediction as well as a 62-year crash history [1] [2] [3].

Table 36. AAR 167451S Safety Information

1955 through 2017	PDO Traffic Crashes	20
	Fatalities	0
	Injuries	4
	Time of Day	1 morning
		1 afternoon
		2 evening
		3 night
	User Involvement	21 automobiles
		2 other
		0 pedestrian
		1 truck
	Collision Type	0 pedestrian
		12 train-vehicle
		12 vehicle-train
	Weather	16 clear
		5 cloudy
		1 rain
		1 snow
		1 unknown
USDOT Accident Prediction Formula	Collisions per year	0.12

J. AAR 163609N, Perry Avenue, Riverdale, Illinois

A satellite view of the site is shown in Figure 11 [1]. The site is located latitude 41.64944° and longitude - 87.62472° which is in Riverdale, Illinois, and in the County of Cook [1]. The north compass direction points to the top of Figure 11.

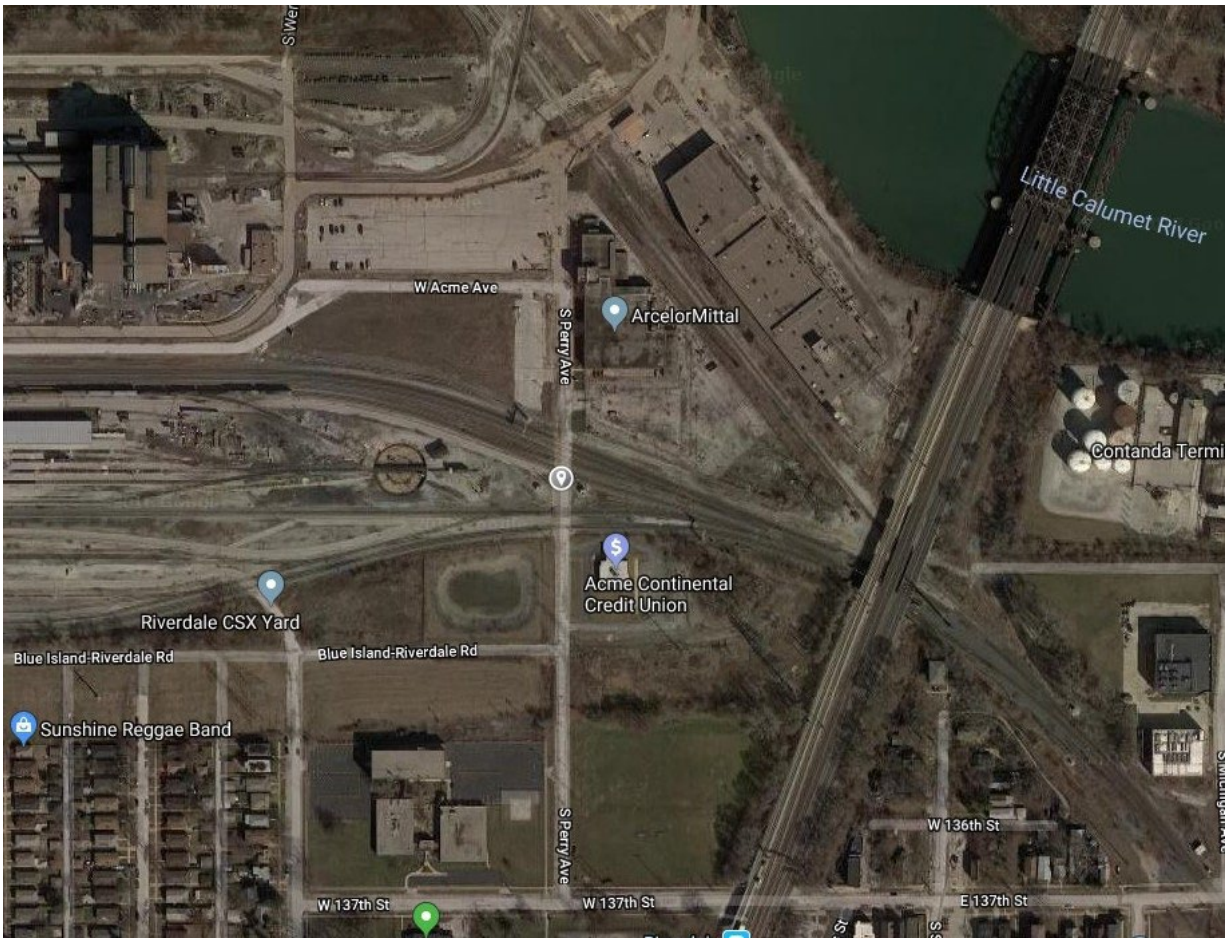

Figure 11. Satellite Image of Site AAR 163609N

The highway-rail, at-grade railroad crossing is formed by seven tracks intersecting Perry Avenue. Perry Avenue is a two-lane, local street at the crossing. Two, southern railroad tracks traverse at approximately 89° clockwise from Perry Avenue. The five, northern tracks cross at approximately 31° clockwise from Perry Avenue. Physical description of the site is listed in Table 37.

Table 37. AAR 163609N Physical Description

Railroad	outside-rail to outside-rail width, ft	200
	number of tracks	7
	approx. ROW width, ft	235
	line	IHB, CSX
Highway	travel pavement width, Perry Ave, ft	24
	total lanes, Perry Ave, ln	2
	approx. ROW width, Perry, ft	59
	stop line to stop line distance, Perry Ave, ft	246
	FHWA classification, Perry Ave	urban, local

Low-voltage lines and poles are along the western side of Perry Avenue; a low-voltage line strings across Perry Avenue at the railroad crossing. Streetlights are along the north side of 138th Street. High voltage lines string across Perry Avenue south of the railroad crossing from high towers. Streetlights are along the western side of Perry Avenue. Underground water pipes are along the eastern side of Perry Avenue. Table 38 summarizes train and vehicle operational information at the at-grade crossing [1] [2].

Table 38. AAR 163609N Operational Information

Railroad	Average Number of Daily Freight Trains	37
	Average Number of Daily Passenger Trains	0
	Train Speed - Timetable, mi/h	20
	Train Speed - Minimum Likely, mi/h	15
	Train Speed - Maximum Likely, mi/h	20
	Freight Train Speed, mi/h	20
	Freight Train Length, ft	7000
	Freight Gate Down Time, min	147
	Freight Yard Factor	1.65
	Total Freight Gate Down Time, min	242.8
	Average Gate Down Time, min/train	6.6
Highway	AADT, veh/d	500
	Truck Percent, %	6
	Posted Highway Speed, mi/h	20
	Vehicles Delayed, veh/d	84
	Average Vehicle Delay, min/veh	3.6
	Aggregate Delay, veh-hour/d	5.1

Traffic control devices used at the site are listed in Table 39 [1].

Table 39. AAR 163609N Traffic Control Devices

Railroad	Maximum Warning Devices	AFLS
	Crossbucks	4
	Bells	0
	Wigwags	0
	Flashing Light Pairs	8
	Cantilever	0
	Gates	0
	Pedestrian Gates	0
	Masts	4
Highway	Pavement Markings	none
	Advanced Warning Signs?	yes
	Advanced RR Crossing Sign, W10-1	2

For safety information concerning the site, Table 40 presents accident prediction as well as a 62-year crash history [1] [2] [3].

Table 40. AAR 163609N Safety Information

1955 through 2017	PDO Traffic Crashes	18
	Fatalities	1
	Injuries	28
	Time of Day	4 morning
		7 afternoon
		22 evening
		14 night
	User Involvement	38 automobile
		0 bicycle
		0 other
		1 pedestrian
		8 truck
		0 unknown
	Collision Type	1 pedestrian
		22 train-vehicle
		24 vehicle-train
	Weather	8 clear
		5 cloudy
		2 rain
		1 snow
		31 unknown
USDOT Accident Prediction Formula	Collisions per year	0.05

II. POTENTIAL FOR GRADE SEPARATION

A. Criteria

In the latest edition of the Federal Highway Administration's (FHWA) "Federal Railroad-Highway Grade Crossing Handbook," criteria are presented on when to consider separating at-grade, highway-rail crossings [4]. If at least one criterion is met or exceeded, the FHWA Guide recommends that one should consider the highway-railroad grade crossing for separation:

> 6. Grade Separation
> a. Highway-rail grade crossings should be considered for grade separation or otherwise eliminated across the railroad right of way whenever one or more of the following conditions exist:
> i. The highway is a part of the designated Interstate Highway System.
> ii. The highway is otherwise designed to have full controlled access.
> iii. The posted highway speed equals or exceeds 113 km/hr. (70 mph).
> iv. AADT exceeds 100,000 in urban areas or 50,000 in rural areas.
> v. Maximum authorized train speed exceeds 177 km/hr. (110 mph).
> vi. An average of 150 or more trains per day or 300 million gross tons per year.
> vii. An average of 75 or more passenger trains per day in urban areas or 30 or more passenger trains per day in rural areas.
> viii. Crossing exposure (the product of the number of trains per day and AADT) exceeds 1 million in urban areas or 250,000 in rural areas; or
> ix. Passenger train crossing exposure (the product of the number of passenger trains per day and AADT) exceeds 800,000 in urban areas or 200,000 in rural areas.
> x. The expected accident frequency for active devices with gates, as calculated by the U.S. DOT Accident Prediction Formula including five-year accident history, exceeds 0.5.
> xi. Vehicle delay exceeds 40 vehicle hours per day.

B. Evaluation of Criteria

Based on data from the ten, at-grade, highway-rail, crossing sites, Table 41 lists whether the FHWA's first four criteria are satisfied or not. None of the ten, at-grade highway-rail crossings met the first four FHWA criteria.

Table 41. Check of FHWA's First Four Criteria

DOT/AAR Number	Street, city	Part of Interstate Highway System?	Full access control?	Posted speed limit > 70 mi/h?	AADT > 50,000 veh/d?
163612W	Lincoln Ave/	no	no	25, no	7450, no
	Park Ave, Dolton	no	no	20, no	
326894T	Indiana Ave near 140th St, Dolton/Riverdale	no	no	30, no	4950, no
163611P	Indiana Ave/	no	no	30, no	6850, no
	WB 138th St	no	no	35, no	
	EB 138th St, Dolton/Riverdale/Chicago	no	no	30, no	
167450K	142nd St, Dolton	no	no	30, no	6600, no
167451S	144th St, Dolton	no	no	20, no	3600, no
840147T	Lincoln Ave near Forest Ave, Dolton	no	no	25, no	7450, no
163610H	137th St, Riverdale	no	no	20, no	900, no
326886B/163613D	Cottage Grove Ave, Dolton	no	no	35, no	2150, no
163609N	Perry Ave, Riverdale	no	no	20, no	500, no
840146L	138th St, Dolton/Chicago	no	no	35, no	1800, no

None of the ten sites involved maximum train speeds more than 110 mi/h (177 km.h), i.e., Criterion 5 [4]. Criterion 7 and Criterion 9 involved passenger trains; no sites met the FHWA thresholds as shown in Table 42 [4].

Table 42. FHWA Criterion 5, 7, and 9 Checks

DOT/AAR Number	Street, city	Maximum train speed > 110 mi/h?	Passenger trains > 30 trains/d?	AADT, veh/d	Passenger train exposure > 200,000?
163612W	Lincoln Ave/ Park Ave, Dolton	20, no	0, no	7450	0, no
326894T	Indiana Ave near 140th St, Dolton/Riverdale	25, no	0, no	4950	0, no
163611P	Indiana Ave and 138th St, Dolton/Riverdale/Chicago	20, no	0, no	6850	0, no
167450K	142nd St, Dolton	20, no	2, no	6600	13,200, no
167451S	144th St, Dolton	20, no	2, no	3600	7,200, no
840147T	Lincoln Ave near Forest Ave, Dolton	20, no	2, no	7450	14,900, no
163610H	137th St, Riverdale	20, no	0, no	900	0, no
326886B/163613D	Cottage Grove Ave, Dolton	30, no	0, no	2150	0, no
163609N	Perry Ave, Riverdale	20, no	0, no	500	0, no
840146L	138th St, Dolton/Chicago	20, no	2, no	1800	3,600, no

According to FHWA Criterion 8, highway-rail grade crossings should be considered when the product of the number of trains per day and annual average daily traffic (AADT) exceeds one million in urban areas our 250,000 in rural areas [4]. The American Association of State Highway and Transportation Officials (AASHTO) define "urban areas" as "those places within boundaries set by responsible state and local officials having a population of 5,000 or more [5]." The crossing exposure index is an important indicator on the degree of disruption to highway traffic by train traffic. Three important exposure indices exist; one involves crossing exposure to vehicles and is the most common index; the second involves the exposure to freight tonnage. Vehicle delay is the third index. One uses the index in estimating delay costs and in predicting safety parameters. The product of highway traffic and train traffic defines one crossing exposure index. When one applies the crossing exposure index to the ten at-grade railroad crossings, a prioritization of the crossings occurs and indicates which crossings where limited resources need to be emphasized. Table 43 lists the prioritization of the ten crossings based on train by AADT product [1]. Three sites exceed the FHWA criterion of 250,000 for rural areas. None of the ten crossing sites exceeds the one million threshold for urban areas.

Table 43. Prioritization of Ten At-Grade Highway-Rail Crossings Based on Trains by AADT Product

DOT/AAR Number	Street, city	Railroad	Mean trains per day	AADT veh/d	Product > 1,000,000?
167450K	142nd St, Dolton	UP	58	6600	382,800, no
326894T	Indiana Ave near 140th St, Dolton/Riverdale	IHB	77	4950	381,150, no
163612W	Lincoln/Park Ave, Dolton	CSX	51	7450	379,950, no
167451S	144th St, Dolton	UP	88	3600	316,800, no
163611P	Indiana Ave and 138th St, Dolton/Riverdale/Chicago	CSX	45	6850	308,250, no
326886B/163613D	Cottage Grove Ave, Dolton	IHB	77	2150	165,500, no
840147T	Lincoln Ave near Forest Ave, Dolton	UP	14	7450	104,300, no
163610H	137th St, Riverdale	CSX	50	900	45,000, no
840146L	138th St, Dolton/Chicago	UP	14	1800	25,200, no
163609N	Perry Ave, Riverdale	CSX	37	500	18,500, no

According to the FHWA Criterion 6, highway-rail grade crossings should be considered for grade separation when the crossing has an average of 150 or more trains per day or 300 million gross tons per year [4]. For the mean number of trains per day, Illinois Commerce Commission (ICC) [1] and Chicago Metropolitan Agency for Planning (CMAP) [2] data may conflict. In those conflicting cases, the higher number is selected in order to produce worse case results. CMAP data assumes a mean train length of 7,000 feet (2,134 m) [2]. CSX data indicate that a typical boxcar length is 50 feet (15 m), and a typical, loaded, 50-foot (15-m) boxcar weighs between 70 to 100 tons (64 to 91 metric tons) [6]. Thus, an average weight of 85 tons (77 metric tons) is assumed for each boxcar. Assuming a five-foot (1.5 m) gap between boxcars, the approximate number of train cars is derived.

None of the ten, at-grade, railroad-crossing sites exceed FHWA's 150 trains per day threshold as shown in Table 44 [4]. However, three sites do exceed FHWA's 300 million gross tons per year threshold [4].

Table 44. Prioritization of Ten At-Grade Railroad Crossings Based on Freight

DOT/AAR Number	Street, city	Railroad	Mean freight trains > 150 trains/d?	Mean freight train length per day, ft	Approx. train cars per day	Freight gross tons > $300x10^6$ gross tons/yr?
167451S	144th St, Dolton	UP	86, no	602,000	10,945	340, yes
326886B/163613D	Cottage Grove Ave, Dolton	IHB	77, no	539,000	9,800	304, yes
326894T	Indiana Ave near 140th St, Dolton/Riverdale	IHB	77, no	539,000	9,800	304, yes
167450K	142nd St, Dolton	UP	56, no	392,000	7,127	221, no
163612W	Lincoln/Park Ave, Dolton	CSX	51, no	357,000	6,491	201, no
163610H	137th St, Riverdale	CSX	50, no	350,000	6,364	197, no
163611P	Indiana Ave and 138th St, Dolton/Riverdale/Chicago	CSX	45, no	315,000	5,727	178, no
163609N	Perry Ave, Riverdale	CSX	37, no	259,000	4,709	146, no
840147T	Lincoln Ave near Forest Ave, Dolton	UP	12, no	84,000	1,527	47, no
840146L	138th St, Dolton/Chicago	UP	12, no	84,000	1,527	47, no

The highest priority one is the 144th Street crossing; at this crossing, trains enter and exit the busy Union Pacific Dolton railroad yard. The other two, high-priority crossings are both along the Indiana Harbor Belt tracks that serve the busy IHB Blue Island Yard as shown in Figure 12.

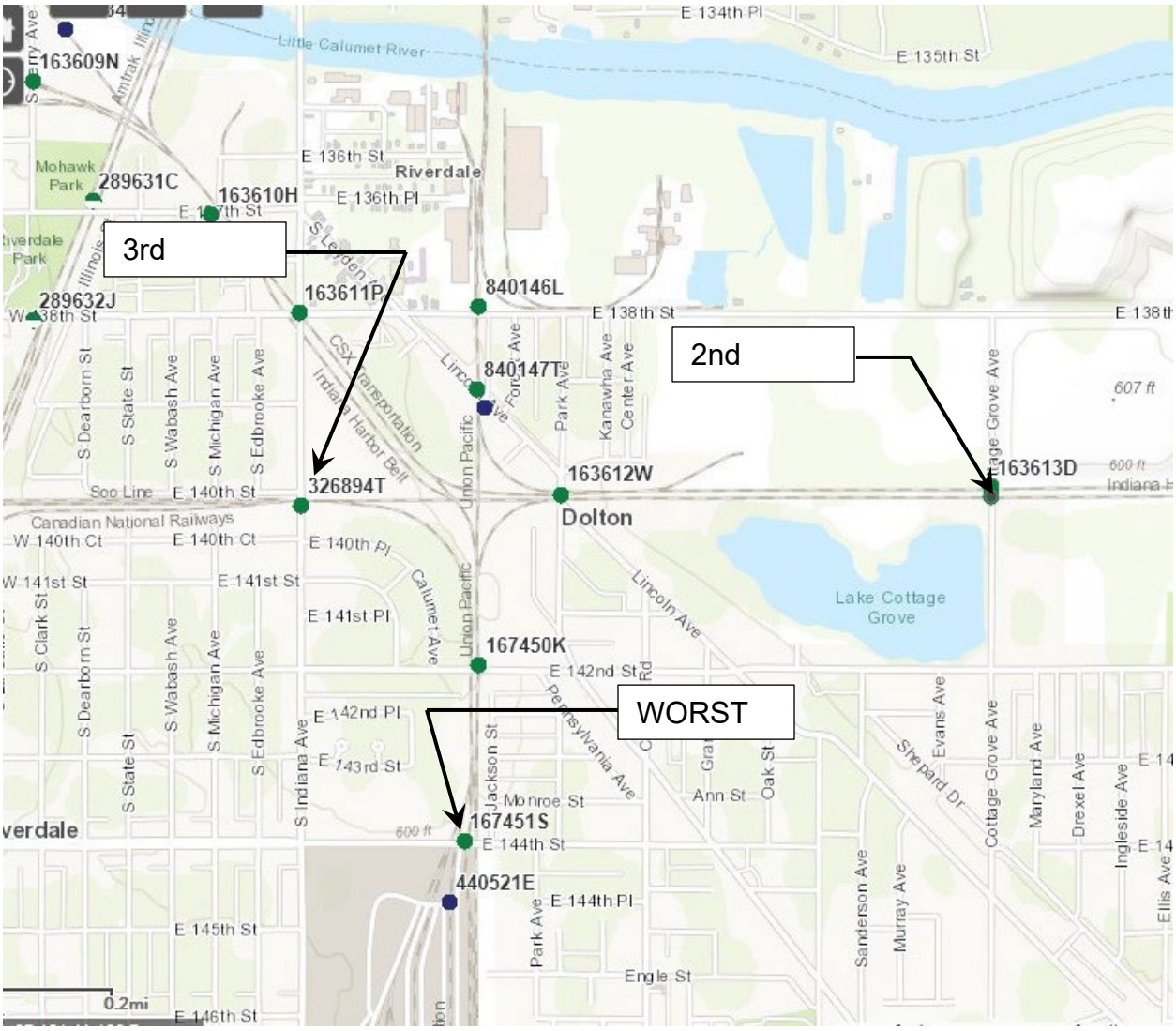

Figure 12. Top Three Traffic Disruptive At-Grade Railroad Crossings Based on Freight

Criterion 11 that the FHWA states when considering grade separation of highway-rail grade crossing is vehicle delay exceeds 40 vehicle hours per day [4]. Table 45 lists the priorities of the ten crossing sites based on motorist grade crossing delay provided by CMAP [2]. Six of the ten sites exceed the FHWA threshold of 40 vehicle-hours per day [4].

Table 45. Prioritization of Ten At-Grade Railroad Crossings Based on Vehicle Delay

DOT/AAR Number	Street, city	Gate down time, min/day	Mean gate down time, min/train	Number of vehicle delayed, veh/d	Mean delay, min/veh	Vehicle delay > 40 veh-h/d?
326886B/163613D	Cottage Grove Ave, Dolton	1,010.6	13.1	1,509	7.2	181.5, yes
163611P	Indiana Ave and 138th St, Dolton/Riverdale/Chicago	323.8	8.8	1,540	4.8	123.5, yes
167450K	142nd St, Dolton	370.5	6.4	1,467	3.5	85.9, yes
167451S	144th St, Dolton	567.4	6.4	1,418	3.5	83.8, yes
163612W	Lincoln/Park Ave, Dolton	242.8	6.6	1,256	3.6	75.6, yes
326894T	Indiana Ave near 140th St, Dolton/Riverdale	404.3	5.3	1,390	2.9	66.9, yes
840147T	Lincoln Ave near Forest Ave, Dolton	81.8	5.8	423	3.2	22.6, no
163610H	137th St, Riverdale	242.8	6.6	152	3.6	9.1, no
840146L	138th St, Dolton/Chicago	81.8	5.8	102	3.2	5.5, no
163609N	Perry Ave, Riverdale	242.8	6.6	84	3.6	5.1, no

The worst cause of total vehicle delay occurs at the Cottage Grove Avenue railroad crossing. The second worse is the crossing at the Indiana Avenue and 138th Street intersection. The third and fourth worse crossings are the ones at 142nd Street and 144th Street, respectively. Figure 13 shows the map indicating those sites whose vehicle delay exceeds 40 vehicle-hours per day [4].

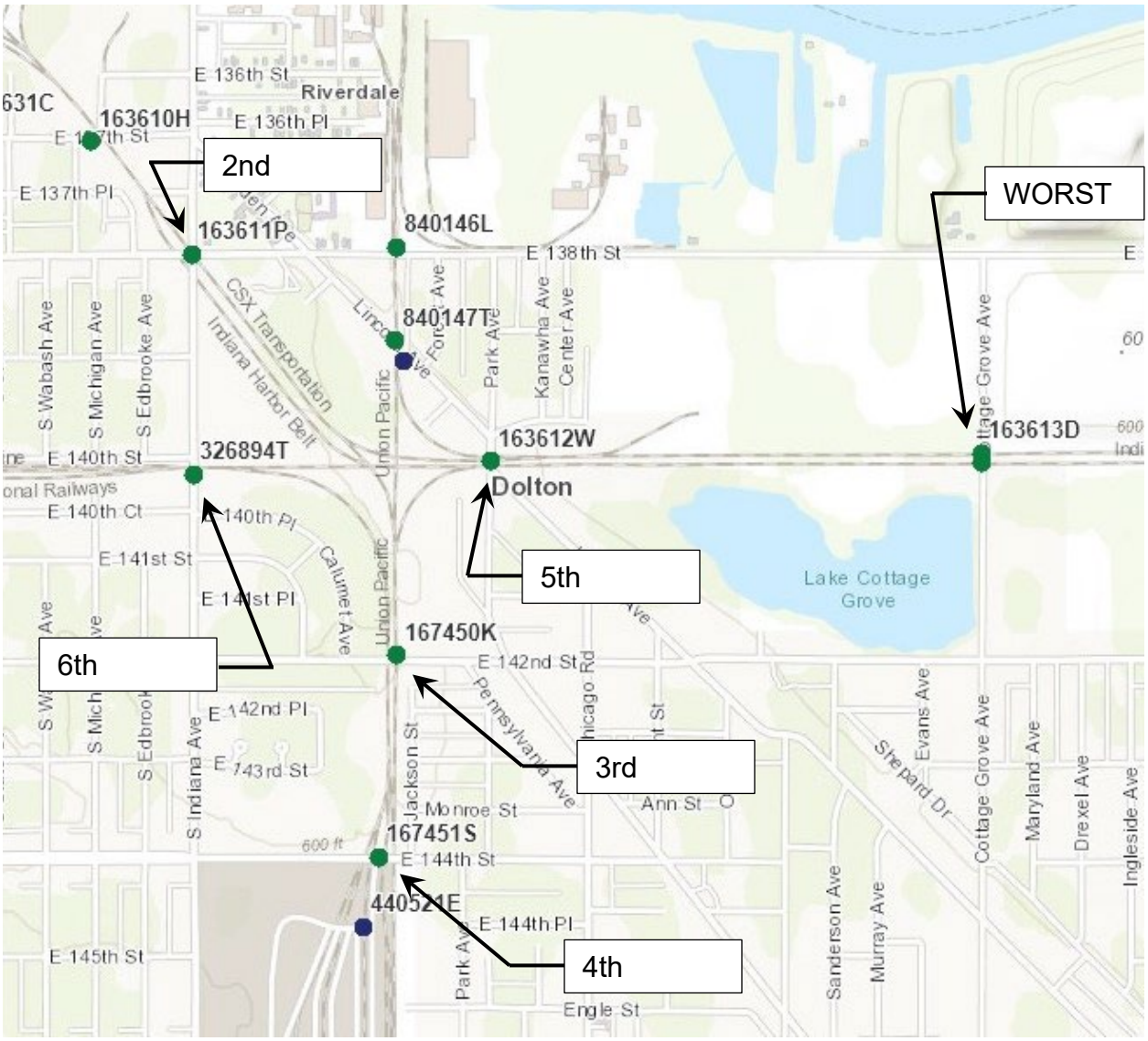

Figure 13. Top Six Traffic Disruptive At-Grade Railroad Crossings Based on Vehicle Delay

FHWA Criterion 10 is expected accident frequency for active devices with gates, as calculated by the U.S.DOT Accident Prediction Formula including five-year accident history, exceeds 0.5 collisions per year [4]. Expected accident frequencies for the ten sites are listed in Table 46 [3]. None of the ten predicted accident frequencies exceeds the 0.5 collisions per year threshold.

Table 46. Prioritization of Ten At-Grade Railroad Crossings Based on Expected Accident Frequency

DOT/AAR Number	Street, city	Railroad	Expected accident frequency > 0.5 collision/year?
163611P	Indiana Ave and 138th St, Dolton/Riverdale/Chicago	CSX	0.12, no
167451S	144th St, Dolton	UP	0.12, no
163612W	Lincoln/Park Ave, Dolton	CSX	0.08, no
163610H	137th St, Riverdale	CSX	0.06, no
163609N	Perry Ave, Riverdale	CSX	0.05, no
326894T	Indiana Ave near 140th St, Riverdale/Dolton	IHB	0.04, no
167450K	142nd St, Dolton	UP	0.04, no
840147T	Lincoln Ave near Forest Ave, Dolton	UP	0.02, no
840146L	138th St, Dolton/Chicago	UP	0.02, no
326886B/163613D	Cottage Grove Ave, Dolton	IHB	0.00, no

References

[1] Illinois Commerce Commission, "Grade Crossing Search," 23 March 2018. [Online]. Available: https://www.icc.illinois.gov/railroad/map.aspx. [Accessed 5 October 2018].

[2] Chicago Metropolitan Agency for Planning, "CMAP Mobility," Chicago Metropolitan Agency for Planning, [Online]. Available: https://www.cmap.illinois.gov/mobility/explore#/topic/freight/crossing-delay. [Accessed 5 November 2018].

[3] Federal Railroad Administration, "FRA Web Accident Prediction System (WBAPS)," [Online]. Available: https://safetydata.fra.dot.gov/webaps/default.aspx. [Accessed 17 October 2018].

[4] Federal Highway Administration, "Railroad-Highway Grade Crossing Handbook - Revised Second Edition 2007, FHWA-SA-07-010," Federal Highway Administration, Washington, D.C., 2007.

[5] American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, 6th Edition, Washington, D.C.: American Association of State Highway and Transportation Officials, 2011.

[6] CSX Corporation, "Railroad Equipment," CSX Corporation, 2016. [Online]. Available: https://www.csx.com/index.cfm/customers/resources/equipment/railroad-equipment/. [Accessed 15 October 2018].