

t10

Crash Data Summary

APPENDIX T10 – CRASH DATA SUMMARY

Introduction

Since 2016, MnDOT has been working with neighborhoods, community groups, district councils, local governments and others interested in the future of I-94 between Saint Paul and Minneapolis in an effort to plan for transportation changes on and along the freeway. This effort is known as Rethinking I-94. The work described in this technical memorandum was conducted as part of the initial phase of Rethinking I-94 conducted between 2016 and 2018.

This memorandum documents a summary of available crash data for the 15-mile Rethinking I-94 study corridor between the Broadway Avenue interchange in Minneapolis and the TH 61 interchange in Saint Paul. The findings of this data review are intended to inform development of the purpose and need for continued work on the Rethinking I-94 project corridor.

Data Collection

Historical segment and interchange crash data (2011-2015) was obtained from MnDOT's 2015 Crash Toolkit. The Toolkit computes crash costs for all highway segment and interchanges in Minnesota by using a standard set of economic values for different crash severities. Crash costs give an indication of the potential safety benefits that can result from transportation improvements by reducing the number and severity of crashes. In addition, crash rates from the Toolkit were also reported to understand how these segments compare when factoring the amount of traffic that uses the facility.

A comparison of the number, severity, crash cost and crash rates for the segments and interchanges within the Rethinking I-94 study area were compared to all Minnesota state highways (interstate, state and trunk). A more detailed crash analysis that includes a review of the crash types and potential for crash reduction should be completed when evaluating alternatives in the upcoming environmental phase of the project.

Segment Analysis

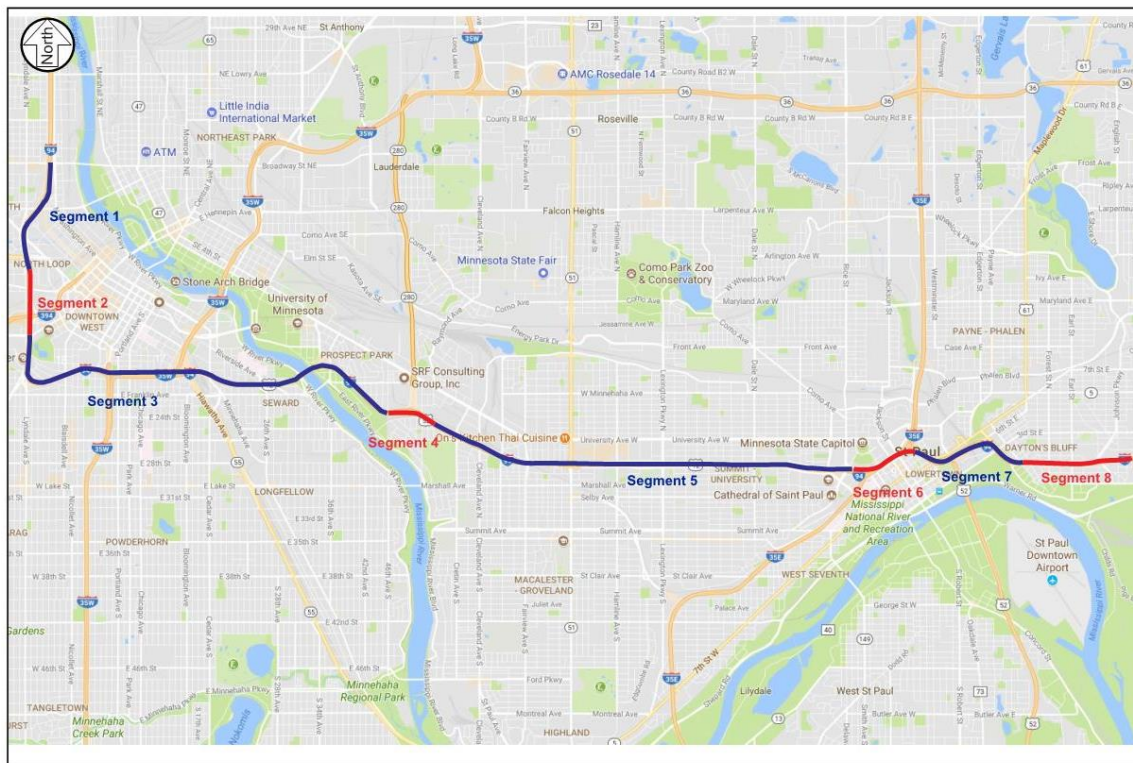
The cross section of I-94 within the study area varies between a six and eight-lane urban freeway with auxiliary lanes between many of the interchanges. The study covers approximately 15 miles, spanning from Broadway Avenue in Minneapolis to TH 61 in Saint Paul. The MnDOT Crash Toolkit has predetermined segments for all freeways in the state. For the study corridor, a total of eight segments from the Toolkit encompass the study corridor. All the segments correspond to the I-94 segments contained in the 2015 Sections Toolkit except Segment 1, Broadway Avenue to TH 55. Segment 1 in the Toolkit is a sub-segment of I-94 from approximately 1 mile south of I-694 to TH 55. Therefore, 19.4 miles of I-94 are included in the segment analysis. All segments are two-way.

The eight I-94 segments are:

1. Approximately 1 mile south of I-694 to TH 55
2. TH 55 to I-394
3. I-394 to Hennepin/Ramsey County Line
4. Hennepin/Ramsey County Line to TH 280
5. TH 280 to Marion Street
6. Marion Street to I-35E
7. I-35E to Mound Boulevard
8. Mound Boulevard to TH 61

The crash analysis corridor segments are shown in Figure 1.

FIGURE 1 – CORRIDOR SEGMENTS



SEGMENT CRASH HISTORY (2011-2015) – NON-JUNCTION CRASHES

Table 1 contains crash severity data and crash costs for the non-junction crashes that occurred on the eight segments that cover the Rethinking I-94 study area. The crash cost rank in Table 1 is the rank of the Rethinking I-94 study segments over the entire state of Minnesota highways including interstates, state and trunk highways.

All eight of the study segments rank in the top 25 crash cost segments (interstates, state and trunk highways) in Minnesota. Five of the segments are in the top 10 crash cost segments, with two segments ranked 1 and 2 in the state. Crash cost associated with the I-94 crashes occurring between the Hennepin/Ramsey County Line and the TH 280 Interchange was \$6,108,000, which was highest in the state. Crash cost associated with the I-94 crashes occurring between the Hennepin Avenue interchange to the Hennepin/Ramsey County Line was \$ 4,666,000, the second highest crash cost in the state. There were 12 fatal (K) crashes and 25 incapacitating injury (A) crashes in the study area. Over 75% of the fatal and incapacitating crashes occurred in two study segments: Segment 1 (I-94 from 1-Mile South of I-694 to TH 55) and Segment 3 (I-94 from I-394 to Hennepin/Ramsey County Line).

The crash totals, by severity, are compared to the other interstate highways located in the Metro area. There are 258 total miles of interstate highway in the Metro area; the Rethinking I-94 segments are 7.5% of this total however, the study segments experienced almost 21% of the total interstate crashes from 2011 to 2015. Overall, the fatal and incapacitating injury crashes in Rethinking I-94 study segments are 22% and 16% of the total K and A crashes along the interstate highways in the Metro area. The total number of crashes reported along the I-94 segments, excluding the interchanges in the Rethinking I-94 study area was 6,889 over the five years (2011-2015).

Since crash counts and crash costs don't account for traffic volumes, segment crash rates and fatal (F) and incapacity injury (A) crash rates (FAR) were reviewed for the study area. These rates were then compared to all interstate segments within the Metro Area (67 total) and all segments statewide (108 total) which are shown in Table 2.

Six of the eight segments experience crash rates higher than metro average and all eight segments experience higher crash rates than statewide average. The average crash rate for the study corridor is approximately two times larger than the metro and statewide averages for freeway facilities. Four of the eight study segments experience FARs that exceed metro and statewide averages. The segment between Hennepin/Ramsey County Line and TH 280 is almost four times average FAR for metro freeway facilities and over three times the average FAR statewide.

Five of the eight segments rank in the top 10 metro and statewide with the segment between the Hennepin/Ramsey County Line and TH 280 ranking number 1 in the metro and statewide. Four of the study segments rank in the top 10 metro and 20 statewide in FAR. These are segments 1 through 4 and span from one mile south of I-694 to TH 280. Segments 5 through 8 (TH 280 to TH 61) have low FAR rankings even though segments 6 and 7 (Marion Street to Mounds Boulevard) rank in the top 10 in terms of crash rates.

TABLE 1 – RETHINKING I-94 STUDY SEGMENT CRASH SUMMARY (NON-JUNCTION CRASHES)

Study Segment	Description	Length (Miles)	Crash Severity					Total Crashes	Crash Cost**	Crash Cost Rank
			K	A	B	C	PD			
1	1-Mile South of I-694 to TH 55*	5.8	6	8	99	173	594	880	\$1,634,400	15
2	TH 55 to I-394	0.8	0	2	19	57	220	298	\$2,700,000	9
3	I-394 to Hennepin/Ramsey Co Line	4.7	3	11	215	537	2491	3257	\$4,666,000	2
4	Hennepin/Ramsey Co Line to TH 280	0.5	1	2	31	83	270	387	\$6,108,000	1
5	TH 280 to Marion Street	4.2	1	2	46	191	570	810	\$1,459,000	19
6	Marion Street to I-35 E	0.9	1	0	16	102	299	418	\$3,156,000	6
7	I-35E to Mound Boulevard	1.4	0	0	29	127	441	597	\$2,676,000	10
8	Mound Boulevard to TH 61	1.2	0	0	15	39	188	242	\$1,247,000	24
TOTAL Rethinking I-94 Segments		19.4	12	25	470	1,309	5,073	6,889		
TOTAL All Interstate Segments in the Metro Area		258	55	158	2,148	5,929	23,993	32,283		
Percent of TOTAL Rethinking I-94 Segments		7.5%	22%	16%	22%	22%	21%	21%		

*Only 1.1 miles of segment one are included in the study area.

**Crash costs are reported as total cost per mile per year.

TABLE 2 – RETHINKING I-94 STUDY SEGMENT CRASH SUMMARY (NON-JUNCTION CRASHES)

Study Segment	Description	Length (Miles)	Crash Severity		Total Crashes	Crash Rate**	FAR***	Crash Rate Rank (Metro/State)	FAR Rank (Metro/State)
			K	A					
1	1-Mile South of I- 694 to TH 55*	5.8	6	8	880	0.74	1.18	25/30	5/13
2	TH 55 to I-394	0.8	0	2	298	1.77	1.19	5/5	4/12
3	I-394 to Hennepin/Ramsey Co Line	4.7	3	11	3257	2.42	1.04	3/3	6/16
4	Hennepin/Ramsey Co Line to TH 280	0.5	1	2	387	2.54	1.97	1/1	2/2
5	TH 280 to Marion Street	4.2	1	2	810	0.70	0.26	29/33	47/78
6	Marion Street to I-35 E	0.9	1	0	418	1.73	0.41	7/7	33/63
7	I-35E to Mound Boulevard	1.4	0	0	597	1.74	0.00	6/6	55/91
8	Mound Boulevard to TH 61	1.2	0	0	242	0.91	0.00	18/19	55/91
TOTAL Rethinking I-94 Segments		19.4	12	25	6,889	1.42	0.76		
TOTAL All Interstate Segments in the Metro Area		258	55	158	32,283	0.79	0.52		
Percent of TOTAL Rethinking I-94 Segments		914	103	268	42,282	0.68	0.59		

*Only 1.1 miles of segment one are included in the study area.

**Crash rate was obtained from MnDOT’s 2015 Crash Toolkit

***FAR was obtained from MnDOT’s 2015 Crash Toolkit

Interchange Analysis

INTERCHANGE CRASH HISTORY (2011-2015)

The 2015 Intersections Toolkit was used to determine the crash data for the interchanges located in the Rethinking I-94 study area. Table 3 contains the crash severity and crash cost for the interchanges located in the Rethinking I-94 study area. The source of this information is the 2015 Intersections Toolkit. The crash cost rank is the rank of the Rethinking I-94 study interchanges over all interchanges (interstates, state and trunk highways) located in Minnesota.

Thirteen of the twenty-five interchanges in the Rethinking I-94 study area rank in the top 25 crash cost interchanges (interstates, state and trunk highways) in the entire state. Seven of the interchanges are in the top 10 with two of the interchanges (JCT I-35W/TH 65 and TH 280) ranked at one and two, respectively.

There are 211 interchanges located along the interstate system in the Metro area. Twenty-five or 12% of those interchanges are located in the Rethinking I-94 study area. On average, the Rethinking I-94 interchange crash totals are double that ratio. In other words, 12% of the interchanges in the Metro area experienced almost 24% of the total interchange crashes and crash cost from 2011 to 2015. Twenty-six percent of the total fatal crashes reported at the interstate interchanges in the Metro area occur at the 25 interchanges in the Rethinking I-94 study area.

Since crash counts and crash costs don't account for traffic volumes, interchange crash rates and fatal (F) and incapacity injury (A) crash rates (FAR) were reviewed for the study area. These rates were then compared to all interstate interchanges within the Metro Area (211 total) and all interchanges statewide (367 total) which are shown in Table 4.

Eighteen of the 25 segments experience crash rates higher than metro and statewide average. The average crash rate for the interchanges within the study corridor is approximately 46% times greater than the metro and statewide averages for interstate interchanges. Thirteen of the 25 study interchanges experience FARs that exceed metro and statewide averages.

Six of the 25 interchanges rank in the top 10 metro and statewide with the I-94/I-35W/TH 65 interchange ranking number 1 in the metro and statewide. Two of the study interchanges rank in the top 10 metro and 50 statewide in FAR. These are the I-94/N 4th/N 7th Street and I-94/I-35W/TH 65 interchanges.

TABLE 3 – RETHINKING I-94 STUDY INTERCHANGE CRASH SUMMARY

Study Interchange	Description	Crash Severity					Total Crashes	Crash Cost	Crash Cost Rank
		K	A	B	C	PD			
1a	Broadway Ave	1	2	36	91	278	408	\$3,613,000	12
1b	N 4 th & N 7 th Streets	3	2	19	47	127	198	\$2,531,000	36
1c	TH 55	1	2	54	133	324	514	\$4,992,000	4
2a	I-394	1	5	35	109	467	617	\$4,507,000	6
3a	Lyndale Ave/ Hennepin Ave	1	2	35	93	453	584	\$3,878,000	8
3b	I-35W/ TH 65	1	7	71	239	950	1268	\$8,851,000	1
3c	I-35W / TH 55 (Hiawatha Ave)	0	3	51	199	603	776	\$4,968,000	5
3d	Cedar Ave	0	3	17	37	169	226	\$1,791,000	70
3e	25th Ave	1	1	15	28	161	206	\$1,562,000	92
3f	Riverside Ave	1	0	8	35	175	219	\$1,347,000	118
3g	Huron Blvd	0	0	19	43	221	283	\$1,696,000	82
4a	TH 280	2	2	51	137	501	693	\$5,454,000	2
5a	Vandalia Street	2	1	23	81	309	416	\$3,166,000	20
5b	Snelling Ave	0	4	19	95	508	626	\$3,451,000	14
5c	Hamline Ave	0	0	9	38	133	180	\$1,139,000	158
5d	Lexington Ave	1	3	22	99	472	597	\$3,679,000	11
5e	Dale Street	0	1	19	100	313	433	\$2,896,000	25
5f	Marion Street	2	2	20	117	356	497	\$3,847,000	10
6a	W. JCT I- 35E	0	0	18	83	278	379	\$2,412,000	39

Study Interchange	Description	Crash Severity					Total Crashes	Crash Cost	Crash Cost Rank
		K	A	B	C	PD			
6b	E. JCT I- 35E	0	1	32	105	375	513	\$3,515,000	13
7a	6 th Street/ TH 61	0	0	12	72	291	375	\$2,046,000	51
7b	TH 5/ 7 th Street	0	1	11	33	123	168	\$1,223,000	142
7c	TH 52 LaFayette 6 th Street	1	1	22	73	308	405	\$2,770,000	29
7d	Mounds Blvd / TH 61	0	0	14	20	137	171	\$1,016,000	188
8a	E. JCT TH 61	0	0	14	38	107	159	\$1,269,000	132
TOTAL (Rethinking I-94 Study Interchanges)		18	43	646	2,065	8,139	10,911	\$77,619,000	
TOTAL (All Interstate Interchanges in the Metro Area)		68	208	2,901	8,500	33,787	45,464	\$330,306,000	
Percent of TOTAL (Rethinking I-94 Study Interchanges versus all interstate interchanges in the Metro area)		26%	21%	22%	24%	24%	24%	23%	

TABLE 4 – RETHINKING I-94 STUDY INTERCHANGE CRASH SUMMARY

Study Interchange	Description	Crash Severity		Total Crashes	Crash Rate*	FAR**	Crash Rate Rank (Metro/State)	FAR Rank (Metro/State)
		K	A					
1a	Broadway Ave	1	2	408	1.52	1.12	15/17	38/88
1b	N 4 th & N 7 th Streets	3	2	198	0.92	2.32	77/111	5/37
1c	TH 55	1	2	514	2.10	1.22	3/3	26/75
2a	I-394	1	5	617	1.55	1.51	12/13	15/58
3a	Lyndale Ave/ Hennepin Ave	1	2	584	1.54	0.79	14/16	64/115
3b	I-35W/ TH 65	1	7	1268	3.02	1.91	1/1	10/46
3c	I-35W / TH 55 (Hiawatha Ave)	0	3	776	1.36	0.53	25/32	95/148
3d	Cedar Ave	0	3	226	0.72	0.96	120/182	49/100
3e	25th Ave	1	1	206	0.66	0.64	133/210	79/132
3f	Riverside Ave	1	0	219	0.73	0.33	118/176	128/181
3g	Huron Blvd	0	0	283	0.96	0.00	71/103	139/192
4a	TH 280	2	2	693	2.08	1.20	4/4	29/78
5a	Vandalia Street	2	1	416	1.23	0.89	36/48	55/106
5b	Snelling Ave	0	4	626	1.79	1.15	5/6	35/85
5c	Hamline Ave	0	0	180	0.56	0.00	162/258	139/192
5d	Lexington Ave	1	3	597	1.67	1.12	9/10	37/87
5e	Dale Street	0	1	433	1.35	0.31	28/35	131/184
5f	Marion Street	2	2	497	1.55	1.24	13/14	23/71
6a	W. JCT I- 35E	0	0	379	1.70	0.00	8/9	139/192

Study Interchange	Description	Crash Severity		Total Crashes	Crash Rate*	FAR**	Crash Rate Rank (Metro/State)	FAR Rank (Metro/State)
		K	A					
6b	E. JCT I- 35E	0	1	513	1.15	0.22	42/56	137/190
7a	6 th Street/ TH 61	0	0	375	1.36	0.00	27/33	139/192
7b	TH 5/ 7 th Street	0	1	168	0.56	0.34	161/257	127/180
7c	TH 52 LaFayette 6 th Street	1	1	405	1.04	0.51	57/79	97/150
7d	Mounds Blvd / TH 61	0	0	171	0.73	0.00	119/178	139/192
8a	E. JCT TH 61	0	0	159	0.63	0.00	144/229	139/192
TOTAL Rethinking I-94 Interstate Interchanges		18	43	10,911	1.34	0.75		
TOTAL All Interstate Interchanges in the Metro		68	208	45,464	0.92	0.56		
TOTAL All Interstate Interchanges in the State		92	262	51,176	0.90	0.62		
*Crash rate was obtained from MnDOT's 2015 Crash Toolkit								
**FAR was obtained from MnDOT's 2015 Crash Toolkit								

Findings and Conclusions

The crash analysis used crash data for five years (2011 to 2015) obtained from MnDOT's 2015 Crash Toolkit for the state, the Metro interstates and the Rethinking I-94 study area. The purpose of the existing crash analysis is to identify locations along the study corridor with chronic crash issues to better understand the crash issues at specific I-94 segments and interchange locations.

NON-JUNCTION CRASHES (2011-2015):

- The total number of crashes reported along the I-94 segments, excluding the interchanges in the Rethinking I-94 study area, was 6,889 over the five years (2011-2015) in the 19.4-mile corridor (using MnDOT Crash Toolkit segments).
- A total of 12 fatal (K) crashes and 25 incapacitating injury (A) crashes were reported along the eight segments in the Rethinking I-94 study area.
- All eight segments on I-94 corridor are in the top 25 segments in Minnesota based on crash cost, with five segments in the top 10 in the state.
- The total crash cost for the 19.4-mile study area is \$23,646,000 for the five-year window (2011 – 2015)
- Crash cost associated with the I-94 crashes occurring between the Hennepin/Ramsey County Line to the TH 280 Interchange) was \$6,108,000 which was highest in the state.
- Crash cost associated with the I-94 crashes occurring between the Hennepin Avenue interchange to Hennepin/Ramsey County Line was \$ 4,666,000, the second highest crash cost in the state.
- There are 258 total miles of interstate highway in the Metro area; the Rethinking I-94 segments are 7.5% of this total however, the study segments experienced almost 21% of the total interstate crashes from 2011 to 2015.
- Six of the eight segments experience crash rates higher than metro average and all eight segments experience higher crash rates than statewide average.
- The average crash rate for the study corridor is approximately two times larger than the metro and statewide averages for freeway facilities.
- Four of the eight study segments experience FARs that exceed metro and statewide averages.
- The segment between Hennepin/Ramsey County Line and TH 280 is almost four times average FAR for metro freeway facilities and over three times the average FAR statewide.
- Five of the eight segments rank in the top 10 metro and statewide with the segment between the Hennepin/Ramsey County Line and TH 280 ranking number 1 in the metro and statewide.

- Four of the study segments rank in the top 10 metro and 20 statewide in FAR. These are segments 1 through 4 and span from one mile south of I-694 to TH 280.

INTERCHANGE CRASHES (2011-2015):

- Thirteen of the 25 interchanges in the study area rank in the top 25 crash cost interchanges in the state.
- Seven of the interchange crash costs rank in the top 10 in the state.
- Crash costs associated with the I-94 crashes occurring at the I-35W/TH 65 interchange was \$ 8,851,000 which is the highest crash cost in the state.
- Crash cost associated with the I-94 crashes occurring at the TH 280 interchange was \$ 5,454,000, the second highest crash cost in the state.
- The number of interchanges located in the Rethinking I-94 study area is 25, or 12% of the total number of interchanges (211) located along the interstate system in the Metro area. However, these interchanges experienced 24% of the total crashes occurring at interchanges in the Metro area.
- Twenty-six percent of the total fatal crashes reported at the interstate interchanges in the Metro area occur at the 25 interchanges in the Rethinking I-94 study area.
- Eighteen of the 25 segments experience crash rates higher than metro and statewide average.
- The average crash rate for the interchanges within the study corridor is approximately 46% times greater than the metro and statewide averages for interstate interchanges.
- Thirteen of the 25 study interchanges experience FARs that exceed metro and statewide averages.
- Six of the 25 interchanges rank in the top 10 metro and statewide with the I-94/I-35W/TH 65 interchange ranking number 1 in the metro and statewide.
- Two of the study interchanges rank in the top 10 metro and 50 statewide in FAR. These are the I-94/N 4th/N 7th Street and I-94/I-35W/TH 65 interchanges.

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