APPENDIX D

INNER LOOP NORTH PRE-SCREENING CRASH ANALYSIS





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Reference: Inner Loop North Crash Analysis – Initial Crash Screening

1 Introduction

Under the development of the Project Scoping Report for the Inner Loop North Transformation Project, Stantec has completed an initial screening of the crash history within the project study area with a focus on the following areas:

- Inner Loop (NYS Route 940 T) between I-490 and East Main Street
- I-490 between Child Street to Culver Road
- Multiple Intersections including:
 - W broad St/W Main St,
 - W Main St/S Plymouth Ave,
 - W broad St/S Plymouth Ave,
 - S Plymouth Ave/Spring St,
 - W Main St/Exchange Blvd,
 - W broad St/ Exchange Blvd,
 - Court St/Exchange Blvd,
 - W Main St/South Ave,
 - W broad St/South Ave,
 - Court St/South Ave,
 - W Main St/N Chestnut St,
 - W broad St/N Chestnut St,
 - Court St/N Chestnut St,
 - Woodbury Blvd/N Chestnut St,
 - Monroe Ave/Howell St,
 - N Union St/East Ave,
 - N Union St/Howell St,
 - S Goodman St/Monroe Ave,

- S Goodman St/East Ave,
- S Goodman St/University Ave,
- o Culver Rd/East Ave,
- o State St/Lyell Ave,
- o State St/Brown St,
- Saint Paul St/Upper Falls Blvd,
- State St/Andrews St,
- Saint Paul St/Andrews St,
- N Clinton Ave/Andrews St,
- N Chestnut St/Andrews St,
- Scio St/University Ave,
- Morrie Silver Way/N Plymouth Ave,
- Morrie Silver Way/State St,
- Commercial St/State St.
- Central Ave/Joseph Ave,
- Central Ave/N Clinton Ave,
- Central Ave/North St,
- Hudson Ave/North St.

Crash reports for the study area were obtained from the New York State Department of Transportation CLEAR Safety application for a 22-month period between June 01, 2021, to March 31, 2023. The purpose of this safety screening is to identify segments, ramps, and intersections within the study area that exhibit the following:

- 1. Potential for Safety improvements (PSI)¹ greater than 0 based on the Excess Observed Crash Frequency² for a comparable facility type based on NYSDOT Safey Performance Functions.
- 2. Site locations are within the limits of previously identified priority investigation locations (PILs).
- 3. Crash/Collision types that are overrepresented such as pedestrian/bicyclist crashes.
- 4. High injury and fatality crashes.

As a result, a list of sites or "hot spots" and systemic patterns will be identified to be reviewed under a crash analysis during preliminary design. This memorandum is broken down into individual screenings for each of the focus areas listed above. In addition, this screening also provides a comparison between the scoping report crash analysis (2021-2023) and the planning study (2014-2019) crash focusing on any changes in frequencies and patterns. This comparison is limited by the study area of the planning study crash analysis.

2 Inner Loop (NYS 940T) between I-490 and East Main Street Safety Screening

2.1 Crash History Overview

A total of **294 crash reports** (MV-104A) for the Inner Loop mainline and ramp facilities between I-490 and East Main Street were reviewed for the 22-month period between June 1, 2021, to March 1, 2023. Of the total number of crashes evaluated, **49 involved injuries**, **243 involved property damage only, and 2 resulted in a fatality. Vulnerable user crashes included four (4) involving pedestrians and one (1) involving a bicyclist.**

2.2 Observed Crash Frequency Analysis

The following sections summarize the comparison between the predicted crash frequency and the observed crash frequency for each segment, ramp, and ramp terminus intersection. For the intersections that overlap with the Inner Loop North Transformation planning study, the observed crash frequencies have been provided for a comparison. Crashes involving injuries and fatalities have also been tabulated for the sites studied within the Inner Loop limits.

2.2.1 INNER LOOP SEGMENT CRASH FREQUENCIES

As shown in table 1 on the following page, several segments within the Inner Loop are exhibiting higher than predicted crash frequencies. In particular, the segment adjacent to the Allen Street WB on/off ramp was observed to have the highest crash frequency out of all of the segments

¹ The predicted crash frequency was determined using the Safety Performance Functions from the NYSDOT Highway Safety Improvement Program Procedures and Techniques ('Red Book').

² For this initial screening and based on the guidance provided by the FHWA Highway Safety Manual for data sets including less than 2-years of data and varying availability of traffic volume data, Excess Observed Crash frequency was used as the metric to measure the potential safety improvement.

within the limits of the Inner Loop. As observed in the field, this segment operates with several weave maneuvers that potentially contribute to the higher frequency of crashes.

Table 1: Inner Loop Crash Frequency by Segments						
Location	# of Crashes	Observed Crash Frequency	Predicted Crash Frequency	PSI		
ILN On- Allen St On Ramp (EB)	7	3.82	1.43	2.39		
Allen St On-Cumberland St Off Ramp (EB)	4	2.18	0.61	1.57		
Cumberland St Off-On Ramp (EB)	8	4.36	1.54	2.82		
Cumberland St On- Delevan St Off Ramp (EB)	4	2.18	0.85	1.33		
Scio St Off-E Main On Ramp (EB)	2	1.09	2.34	-1.25		
ILN On-Lyndhurst On Ramp (WB)	1	0.55	0.33	0.22		
Lyndhurst St On-Cumberland St Off (WB)	3	1.64	0.9	0.74		
Cumberland St Off-On Ramp (WB)	15	8.18	2.12	6.06		
Cumberland St On-Allen St Off Ramp (WB)	13	7.09	0.52	6.57		
Allen St Off-On Ramp (WB)	30	16.37	1.79	14.58		

2.2.2 INNER LOOP RAMP CRASH FREQUENCIES

As shown in table 3 on the following page, several ramps connecting to and from the Inner Loop are exhibiting higher than predicted crash frequencies. The direct connection ramps between the Inner Loop and I-490 are among the ramps with the highest observed crash frequencies. It should be noted that **the ramp from I-490 WB to the Inner Loop was listed as a Primary Investigation Location (PIL) by NYSDOT and will be considered as a hot spot for further investigation**.

Table 2: Inner Loop Crash Frequency by ramp facility						
Location	# of Crashes	Observed Crash Frequency	Predicted Crash Frequency	PSI		
Inner Loop to I-490 EB Ramp	14	7.64	0.5	7.14		
I-490 WB to Inner Loop EB	4	2.18	0.22	1.96		
I-490 EB to Inner Loop Ramp	7	3.82	1.22	2.60		
Inner Loop Ramp to I-490 WB	2	1.09	0.34	0.75		
Allen St EB On-Ramp	1	0.55	0.06	0.49		
Allen St-WB Off-Ramp	1	0.55	0.1	0.45		
Scio St - Off Ramp	1	0.55	0.12	0.43		
ILN Entrance Ramp @ E Main St	1	0.55	0.23	0.32		
Cumberland St EB On-Ramp	0	0.00	0.04	-0.04		
Cumberland St WB Off-Ramp	0	0.00	0.07	-0.07		
Lyndhurst St On Ramp	0	0.00	0.07	-0.07		
Cumberland St-WB On-Ramp	0	0.00	0.1	-0.10		

Table 2: Inner Loop Crash Frequency by ramp facility

Cumberland St EB Off-Ramp	1	0.55	0.3	0.25	
ILN Exit Ramp @ E Main St	0	0.00	0.42	-0.42	
ILN Entry Ramp @ N Union St	5	2.73	0.27	2.46	
ILN Exit Ramp @ N Union St	4	2.18	0.46	1.72	

Within these segments, there were 2 total crashes with severity levels involving injuries. No fatalities were reported during the study period. Table 4 below displays the ramps with observed crashes with severity types K, A, B, & C.

Table 4: Inner Loop Ramps with observed Fatal and Injury Crashes

Location	No of Crashes	Injury	Fatality
Inner Loop to I-490 EB Ramp	1	1	0
I-490 EB to Inner Loop Ramp	1	1	0

2.2.3 INNER LOOP INTERSECTION CRASH FREQUENCIES

This section focusses on the ramp terminus or frontage road intersections previously studied under the Inner Loop North Transformation Planning Study. These locations were revisited to determine the following:

- Confirm locations identified as hot spot locations in the previous study remain as focus areas for safety improvement for the Inner Loop North project.
- If patterns or changes in crash frequencies have occurred that result in additional hot spots being identified

As shown in table 5, several intersections along the Inner Loop (either ramp terminus intersections or frontage road intersections) are exhibiting higher than predicted crash frequencies. Five (5) locations (highlighted green) identified under the previous planning study crash analysis have seen a reduction in crashes between 2021-2023. Beyond the limits of previous planning study crash analysis the current crash analysis also identified two (2) locations highlighted in yellow with crash frequencies higher than predicted.

Table 5: Inner Loop Crash Frequency by intersection



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Location	# of Crashes	Observed Crash Frequency 2021-2023 (2014-2019) ³	Predicted Crash Frequency	PSI
Ramp P at Plymouth Street	10	5.46 (0.6)	4.00	1.46
Allen Street EB at Plymouth Street	0	0 (0.4)	1.55	-1.55
Allen Street WB at Plymouth Street	1	0.55 (1.6)	1.97	-1.42
Allen Street EB at State Street	11	6 (9.6)	4.86	1.14
Allen Street WB at State Street	11	6 <mark>(8.2)</mark>	5.25	0.75
Allen St WB at Mill Street	0	0 <i>(</i> 0.4)	0.33	-0.33
Cumberland Street EB at St. Paul Street	14	7.64 <mark>(12.6)</mark>	6.89	0.75
Cumberland Street WB at St. Paul Street	17	9.27 <mark>(12.2)</mark>	5.34	3.93
Cumberland Street WB at Westcott Street	1	0.55 <mark>(0.4)</mark>	0.33	0.22
Cumberland Street EB at N. Clinton Avenue	20	10.91 <mark>(8.4)</mark>	1.31	9.60
Cumberland Street WB at N. Clinton Avenue	6	3.27 <mark>(7)</mark>	1.95	1.32
Cumberland Street EB at Joseph Avenue	2	1.09 <mark>(3.6)</mark>	2.60	-1.51
Cumberland Street WB at Joseph Avenue	13	7.09 <mark>(7.4)</mark>	3.04	4.05
Cumberland Street WB at North Street	2	1.09 <mark>(3.6)</mark>	2.69	-1.60
Delevan Street at North Street	0	0 (1)	0.63	-0.63
Lyndhurst Street at North Street	1	0.55 <mark>(0.8)</mark>	0.64	-0.09
Lyndhurst Street at Scio Street	5	2.73 <mark>(4)</mark>	1.36	1.37
Delevan Street at Scio Street	3	1.64 <mark>(1.4)</mark>	1.02	0.62
Lyndhurst Street at Lays Aly	0	0 (0.2)	0.11	-0.11
Lyndhurst at N. Union Street	2	1.09 (0.8)	0.97	0.12
E. Main Street at University Avenue/Pitkin Street	7	3.82 <mark>(3.2)</mark>	2.53	1.29
E. Main Street at University Avenue/Inner Loop	12	6.55 <mark>(18.6)</mark>	5.88	0.67
E. Main Street at N. Union Street	17	9.27 (11.4)	4.78	4.49
N. Union Street at University Avenue	12	6.55 <mark>(8)</mark>	3.50	3.05
N. Union Street at Inner Loop	2	1.09 (0.6)	1.09	0.00

³ Crash frequencies from the Inner Loop North Transformation Planning Study for locations that were revisited under this screening analysis are tabulated in table 3. The frequency is shown in red if the location previously exceeded the predicted crash frequency.

Each of the intersections reported crashes involving injuries within the Inner Loop corridor, resulting in a total of 44 injury crashes. Locations with clusters of high injury crashes include Allen Street Eb @ State Street, Cumberland St WB @ St. Paul, Cumberland St EB @ N. Clinton Ave, and East Main Street @ University Ave. No fatalities were reported during the study period. Table 6 below displays each intersection with observed crashes with severity types K, A, B, & C.

Table 6: Inner Loop Infersections with observed tatal and injury crashes					
Location	Number of Crashes	Injury	Fatal		
Ramp P at Plymouth Street	2	2	0		
Allen Street EB at Plymouth Street	0	0	0		
Allen Street WB at Plymouth Street	0	0	0		
Allen Street EB at State Street	5	5	0		
Allen Street WB at State Street	2	2	0		
Allen St WB at Mill Street	0	0	0		
Cumberland Street EB at St. Paul Street	1	1	0		
Cumberland Street WB at St. Paul Street	5	5	0		
Cumberland Street WB at Westcott Street	0	0	0		
Cumberland Street EB at N. Clinton Avenue	7	7	0		
Cumberland Street WB at N. Clinton Avenue	1	1	0		
Cumberland Street EB at Joseph Avenue	1	1	0		
Cumberland Street WB at Joseph Avenue	2	2	0		
Cumberland Street WB at North Street	1	1	0		
Delevan Street at North Street	0	0	0		
Lyndhurst Street at North Street	1	1	0		
Lyndhurst Street at Scio Street	1	1	0		
Delevan Street at Scio Street	0	0	0		
Lyndhurst Street at Lays Aly	0	0	0		
Lyndhurst at N. Union Street	0	0	0		
E. Main Street at University Avenue/Pitkin Street	2	2	0		

Table 6: Inner Loop Intersections with observed fatal and injury crashes

Table 6 (cont.): Inner Loop Intersections with observed fatal and injury crashes

Location	Number of Crashes	Injury	Fatal
E. Main Street at University Avenue/Inner Loop	7	7	0
E. Main Street at N. Union Street	3	3	0
N. Union Street at University Avenue	2	2	0
N. Union Street at Inner Loop	1	1	0

2.2.4 INNER LOOP FACILITY WIDE CRASH FREQUENCY

The facility wide crash frequency calculated by combining the observed crash frequencies from the segments, ramps, and intersections is **163 crashes per year**. This is roughly 2x the predicted crash frequency **(82 crashes per year)** and indicates a high potential for safety improvement. This crash frequency will be used as a metric to determine overall facility improvements during preliminary design.

2.3 Overrepresented Collision Types

Several collision types were reported within the study area for the Inner Loop facility between I-490 and East Main Street. A comparison of collision types between the Inner Loop North Transformation Planning Study and this study is provided below in table 7.

Collision Type	2021-20)23	2014-20)19
Comsion type	Total	Percent	Total	Percent
Rear End	78	27%	311	34%
Right Angle	63	21%	163	18%
Overtaking	47	16%	235	26%
Left Turn	32	11%	51	6%
Other	60	21%	83	9%
Right Turn	4	1%	17	2%
Sideswipe	2	1%	6	1%
Unknown	2	1%	7	1%
Head On	1	0%	9	1%
Bicyclist	1	1%	13	1%
Pedestrian	4	0%	12	1%

Table	7: inner	loop	Collision	Type	Summary	

As shown in table 7, similar patterns between the two studies exist including prominent proportions of Rear end, right angle, and overtaking crashes. These crash types represent 64% of the crashes observed under this screening and 78% under the previous study. New patterns include a higher percentage of left turn crashes and crashes reported as "other". Vulnerable user crashes including pedestrian and bicyclists remain low however will be studied further under preliminary design. Most of the crashes have occurred during fair weather with dry pavement.

2.4 Inner Loop Facility Screening Summary

As a result of this screening, the following locations and collision types were identified as areas for further investigation ranked by priority under the crash analysis for the preliminary design phase of the Inner Loop North project.

PIN 4CR0.17– ILN Pre-Screening Crash Analysis May 24, 2024

Collison Types:

- Rear End
- Right Angle
- Overtaking
- Left Turn
- Other

Table 8: Focus Segments

Priority	Location	PSI
1	Allen St Off-On Ramp (WB)	14.58
2	Cumberland St On-Allen St Off Ramp (WB)	6.57
3	Cumberland St Off-On Ramp (WB)	6.06
4	Cumberland St Off-On Ramp (EB)	2.82
5	ILN On- Allen St On Ramp (EB)	2.39
6	Allen St On-Cumberland St Off Ramp (EB)	1.57
7	Cumberland St On- Scio St Off Ramp (EB)	1.33
8	Lyndhurst St On-Cumberland St Off (WB)	0.74
9	ILN On-Lyndhurst On Ramp (WB)	0.22

Table 9: Focus Ramps

Priority	Location	PSI
1	I-490 WB to Inner Loop Ramp	7.14
2	Inner Loop to I-490 EB Ramp	3.6
3	I-490 EB to Inner Loop Ramp	2.6
4	ILN Entry Ramp @ N Union St	2.46
5	ILN Exit Ramp @ N Union St	1.72
6	Inner Loop Ramp to I-490 WB	0.75
7	Allen St EB On-Ramp	0.49
8	Allen St-WB Off-Ramp	0.45
9	Scio St - Off Ramp	0.43
10	ILN Entrance Ramp @ E Main St	0.32

Table 10: Focus Intersections

Priority	Location	PSI
1	Cumberland Street EB at N. Clinton Avenue	9.6
2	E. Main Street at N. Union Street	4.49
3	Cumberland Street WB at Joseph Avenue	4.05
4	Cumberland Street WB at St. Paul Street	3.93
5	N. Union Street at University Avenue	3.05
6	Ramp P at Plymouth Street	1.46
7	Lyndhurst Street at Scio Street	1.37
8	Cumberland Street WB at N. Clinton Avenue	1.32
9	E. Main Street at University Avenue/Pitkin Street	1.29
10	Allen Street EB at State Street	1.14
11	Allen Street WB at State Street	0.75
12	Cumberland Street EB at St. Paul Street	0.75
13	E. Main Street at University Avenue/Inner Loop	0.67
14	Delevan Street at Scio Street	0.62
15	Cumberland Street WB at Westcott Street	0.22
16	Lyndhurst at N. Union Street	0.12

3 I-490 between Child Street and Culver Road

3.1 Crash History Overview

A total of **400 crash reports** (MV-104A) along I-490 were reviewed, locations were checked for accuracy, and the data was corrected as necessary for the 22-month period between June 1, 2021, to March 1, 2023. Of the total number of crashes evaluated, **58 involved injuries**, **341 involved property damage only, and 1 fatality**. **Vulnerable user crashes included three (3) involving pedestrians and one (1) involving a bicyclist**.

3.2 Observed Crash Frequency Analysis

The following sections summarize the comparison between the predicted crash frequency and the observed crash frequency for each segment, ramp, and ramp terminus intersection within the I-490 study limits. Also summarized are the locations of injury and fatality crashes.

3.2.1 I-490 Segment Crash Frequencies

As shown in table 11, several segments within the I-490 are exhibiting higher than predicted crash frequencies. In particular, the EB segment between Exit 12 and Exit 13 as well as the WB segment between Exit 13 and the direct connection ramp from the Inner Loop are exhibiting the highest crash frequencies for I-490 within the study area. These sites are a major focus for alternative development for how various options connect to I-490 and will be looked at in detail under preliminary design.

Location	No of Crashes	N obs	N pred	PSI
Wilder St On Ramp- Exit 12 Off Ramp (EB)	12	6.55	9.07	-2.52
Exit 12 Off-Exit 13 ILN Off Ramp (EB)	27	14.73	5.94	8.79
Exit 13 ILN Off-Platt St On-Ramp (EB)	3	1.64	1.58	0.06
Platt St On-ILN On Ramp (EB)	7	3.82	3.96	-0.14
ILN On- Boys Club On Ramp (EB)	7	3.82	3.32	0.50
Boys Club On- S Plymouth On Ramp (EB)	2	1.09	1.87	-0.78
S Plymouth On- Exit 15 Off Ramp (EB)	12	6.55	8.79	-2.24
Exit 15 Off - Howell/Woodbury On Ramp (EB)	4	2.18	6.23	-4.05
Howell/Woodbury- Bryon St On Ramp (EB)	1	0.55	1.45	-0.90
Bryon St On- Exit 17 Off Ramp (EB)	19	10.37	17.38	-7.01
Exit 17 Off-On Ramp (EB)	13	7.09	6.75	0.34
Exit 17 On-Exit 18 Off Ramp (EB)	5	2.73	2.54	0.19
Exit 18 Off-On Ramp (EB)	4	2.18	7.06	-4.88

Table 11: I-490 Crash Frequency by Segments

Table 11(Cont.): 1-490 Crash Frequency by Segments				
Location	No of Crashes	N obs	N pred	PSI
Exit 18 On- Exit 19 Off Ramp (EB)	4	8.73	5.13	3.60
Exit 19 Off-On Ramp (EB)	16	13.64	10.75	2.89
Exit 19 Off-On Ramp (WB)	25	9.82	5.06	4.76
Exit 19 On-18 Off Ramp (WB)	18	2.73	3.69	-0.96
Exit 18 Off-18 On Ramp (WB)	5	3.82	4.91	-1.09
Exit 18 On -17 Off Ramp (WB)	7	2.73	1.76	0.97
Exit 17 Off-On Ramp (WB)	5	2.73	4.52	-1.79
Exit 17 On- 16 Off Ramp (WB)	5	3.82	7.11	-3.29
Exit 16 Off- Howell St On Ramp (WB)	7	10.91	8.23	2.68
Howell St On- Exit 14 Off Ramp (WB)	20	8.18	7.96	0.22
Exit 14 Off- 13 Off Ramp (WB)	15	12	6.33	5.67
Exit 13 Off-ILN On Ramp (WB)	22	12	4.91	7.09
ILN On-Broad St On Ramp (WB)	22	8.18	8.12	0.06
Broad St On-Child St Off Ramp (WB)	15	7.09	14.95	-7.86

Table 11(Cont.): I-490 Crash Frequency by Segments

Within these segments, there were 28 total crashes involving injuries and 0 involving fatalities. Table 12 below displays the segments with observed crashes with severity types K, A, B, & C.

Location	Number of Crashes	Injury	Fatality
Exit 14 Off- 13 Off Ramp (WB)	6	6	0
ILN On-Broad St On Ramp (WB)	1	1	0
Howell St On- Exit 14 Off Ramp (WB)	1	1	0
Exit 16 Off- Howell St On Ramp (WB)	7	7	0
Platt St On-ILN On Ramp (EB)	1	1	0
Bryon St On- Exit 17 Off Ramp (EB)	3	3	0
Boys Club On- S Plymouth On Ramp (EB)	1	1	0
Exit 12 Off-Exit 13 ILN Off Ramp (EB)	4	4	0
Howell/Woodbury- Bryon St On Ramp (EB)	3	3	0
Wilder St On Ramp- Exit 12 Off Ramp (EB)	1	1	0

Table 12: I-490 Segments with observed Fatal and Injury Crashes

3.2.2 I-490 Ramp Crash Frequencies

As shown in table 13 on the following page, only five (5) ramps out of the 26 ramps studied, exhibited higher observed crash frequencies than the predicted crash frequency.

Table 13: 1-490 Crash Frequencies by ramp facility			
Location	N obs	N pred	PSI
West Exit Ramp (WB) to Washington Street	1.09	0.11	0.98
East Exit Ramp (EB) to Brown Street	0.00	0.09	-0.09
East Exit Ramp to South Avenue	1.09	0.11	0.98
West Entrance Ramp from Howell Street	0.55	0.4	0.15
West Exit Ramp (NB) to Clinton Avenue	0.00	0.33	-0.33
East Entrance Ramp (EB) from Boys Club Place	0.00	0.04	-0.04
East Entrance Ramp (EB) from Platt Street	0.00	0.04	-0.04
West Entrance Ramp from Monroe Avenue	0.00	0.05	-0.05
West Entrance Ramp from South Goodman Street	0.00	0.05	-0.05
West Entrance Ramp from Culver Road	0.00	0.06	-0.06
East Entrance Ramp from Monroe Avenue	0.00	0.07	-0.07
East Entrance Ramp from South Goodman Street	0.00	0.08	-0.08
East Exit Ramp (NB/SB) to South Goodman Street	0.00	0.13	-0.13
Entrance Ramp (WB) from Brown Street	0.00	0.14	-0.14
East Entrance Ramp from Culver Road	0.00	0.16	-0.16
East Entrance Ramp from Byron Street	0.00	0.19	-0.19
East Exit Ramp (NB/SB) to Culver Road	1.09	0.19	0.90
East Exit Ramp (NB/SB) to Monroe Avenue	0.00	0.19	-0.19
West Exit Ramp (NB/SB) to Monroe Avenue	0.00	0.22	-0.22
East Entrance Ramp (EB) from South Plymouth Avenue	0.00	0.24	-0.24
West Exit Ramp (NB/SB) to South Goodman Street	0.00	0.26	-0.26
West Exit Ramp (NB/SB) to Culver Road	0.55	0.26	0.29
East Entrance Ramp from South Avenue	0.00	0.69	-0.69
East Exit Ramp to Howell Street	0.00	0.69	-0.69
East Entrance Ramp from Woodbury Boulevard	0.00	0.78	-0.78
East Entrance Ramp from Howell Street	0.00	1.09	-1.09

Table 13: I-490 Crash Frequencies by ramp facility

Within these ramps, there was 1 crash involving injury. Table 14 below displays the ramp with observed crash severity level C.

Table 14: I-49 Ramp with observed Fatal and Injury Crashes

Location	No of Crashes	Injury	Fatality
West Exit Ramp (NB/SB) to Culver Rd	1]	0

3.2.3 I-490 Intersection Crash Frequencies

As shown in table 15, four (4) I-490 ramp intersections are exhibiting higher than predicted crash frequencies. The intersection of Brown Street/West Broad/Campbell St/I-490 WB On Ramp has the highest potential for safety improvement. This location will be prioritized for investigation as the intersection geometry likely contributes to high crash rates.

Table 13. 1-470 Clash Hequency by famp intersection			
Location	N obs	N pred	PSI
Allen Street & Brown Street	4.36	3.75	0.61
Brown Street & W Broad Street	14.18	3.77	10.41
S Plymouth Ave & Troup St	0.55	2.78	-2.23
S Goodman St & I-490 EB On/Off Ramp	3.27	5.36	-2.09
Monroe Ave & I-490 EB On/Off Ramp	1.64	3.95	-2.31
Culver Rd & I-490 EB On/Off Ramps	2.18	5.58	-3.4
Culver Rd & I-490 WB On/Off Ramps	7.64	5.78	1.86
Monroe Ave & I-490 WB On/Off Ramp	1.09	3.94	-2.85
S Goodman St & I-490 WB On/Off Ramps	1.64	5.96	-4.32
Woodbury Blvd & South Avenue	6.55	3.19	3.36

Table 1C.	1 400 Carel	F		Indexes all and
Iable 15:	1-490 Crasn	Frequency b	y ramp	Intersection

Each of the intersections reported crashes involving injuries within I-490 resulting in a total of 26 injury crashes. One fatality was reported during the study period. Locations with clusters of high injury crashes include Allen St & Brown St, Brown St & Broad St, Culver Rd & I-490 WB On/Off Ramps, and Woodbury Blvd & South Avenue. Table 16 below displays each intersection with observed crashes with severity types K, A, B, & C.

The fatal crash at the junction of Brown St and W Broad St occurred when a pedestrian, moving southward across Brown Street, was hit by a vehicle traveling southwest on Brown Street, nearing the I-490 underpass. The incident took place in the evening under dark lighted conditions.

Location	Total	Injury	Fatal	
Allen Street & Brown Street	4	4	0	
Brown Street & W Broad Street	8	7	1	
S Plymouth Ave & Troup St	0	0	0	
S Goodman St & I-490 EB On/Off Ramp	1	1	0	
Monroe Ave & I-490 EB On/Off Ramp	0	0	0	
Culver Rd & I-490 EB On/Off Ramps	3	3	0	
Culver Rd & I-490 WB On/Off Ramps	5	5	0	
Monroe Ave & I-490 WB On/Off Ramp	0	0	0	
S Goodman St & I-490 WB On/Off Ramps	2	2	0	
Woodbury Blvd & South Avenue	4	4	0	

Table 16: I-490 Intersections with observed fatality and injury crashes

3.2.4 I-490 FACILITY WIDE CRASH FREQUENCY

The facility wide observed crash frequency calculated by combining the observed crash frequencies from the segments, ramps, and intersections is **218 crashes per year**. When compared to the facility wide predicted crash frequency of **220 crashes per year**, the potential for safety improvement is -2.94. This indicates that under existing conditions, I-490 as a facility is not exhibiting a higher number of crashes than predicted for similar facilities. However, this will be used to study the impact of traffic volume changes at various locations due to the Inner Loop North Alternatives.

3.3 Overrepresented Collision Types

Several collision types were reported within the study area for the I-490 between Child St and Culver Road. A breakdown of collision types is provided below in table 17.

Table 17:1490 Collision type summary				
		2021-2023		
Collision Type	Total	Percent		
Rear End	147	37%		
Right Angle	18	4%		
Overtaking	86	21%		
Left Turn	30	7%		
Other	109	28%		
Right Turn	1	0%		
Sideswipe	3	1%		
Unknown	0	0%		
Head On	2	0%		
Pedestrian	3	1%		
Bicyclist	1	0%		

	Table 17: I	490 Collision t	ype summary
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As shown in table 17, this study included prominent proportions of rear end, overtaking, and other crashes. These collision types represent 86% of the crashes observed under this screening. The majority of these crashes have occurred during fair weather with dry pavement.

3.4 I-490 Facility Screening Summary

As a result of the I-490 screening, the following locations and collision types were identified as areas for further investigation ranked by priority under the crash analysis for the preliminary design phase of the Inner Loop North project.

Collison Types:

- Rear End
- Overtaking
- Other

PIN 4CR0.17– ILN Pre-Screening Crash Analysis May 24, 2024

Segments:

Table 18: Focus Segments				
Priority	Location	PSI		
1	Exit 12 Off-Exit 13 ILN Off Ramp (EB)	8.79		
2	Exit 13 Off-ILN On Ramp (WB)	7.09		
3	Exit 14 Off- 13 Off Ramp (WB)	5.67		
4	Exit 19 Off-On Ramp (WB)	4.76		
5	Exit 18 On- Exit 19 Off Ramp (EB)	3.60		
6	Exit 19 Off-On Ramp (EB)	2.89		
7	Exit 16 Off- Howell St On Ramp (WB)	2.68		
8	Exit 18 On -17 Off Ramp (WB)	0.97		
9	ILN On- Boys Club On Ramp (EB)	0.50		
10	Exit 17 Off-On Ramp (EB)	0.34		
11	Howell St On- Exit 14 Off Ramp (WB)	0.22		
12	Exit 17 On-Exit 18 Off Ramp (EB)	0.19		
13	Exit 13 ILN Off-Platt St On-Ramp (EB)	0.06		
14	ILN On-Broad St On Ramp (WB)	0.06		

Ramps:

Table 19: Focus Ramps

Priority	Location	PSI
1	West Exit Ramp (WB) to Washington Street	0.98
2	East Exit Ramp to South Avenue	0.98
3	East Exit Ramp (NB/SB) to Culver Road	0.90
4	West Exit Ramp (NB/SB) to Culver Road	0.29
5	West Entrance Ramp from Howell Street	0.15

Intersections:

Table 20: Focus Intersections

Priority	Location	PSI
1	Brown Street & W Broad Street	10.41
2	Woodbury Blvd & South Avenue	3.36
3	Culver Rd & I-490 WB On/Off Ramps	1.86
4	Allen Street & Brown Street	0.61

4 Additional focus Intersections within City of Rochester

4.1 Crash History Overview

A total of **347 crash reports** (MV-104A) for several focus intersections (excluding the ramp terminus intersections and frontage road intersections previously identified under Section 2) within the City of Rochester that are included in the traffic impact study for the 22-month period between June 1, 2021, to March 1, 2023. Of the total number of crashes evaluated, **100 involved injuries**, **244 involved property damage only, and there were 3 fatalities. Vulnerable user crashes included 5 involving pedestrians and 5 involving a bicyclist**.

4.2 Observed Crash Frequency Analysis

The following sections summarize the comparison between the predicted crash frequency and the observed crash frequency and injury/fatality statistics for each intersection identified as a focus intersection for the project.

As shown in table 21, several intersections are exhibiting higher than predicted crash frequencies. Intersections such as Broad St/Exchange St, N Union St/East Ave, State St/Lyell Ave, St. Paul St/Upper Falls Blvd, and Morrie Silver Way/State St are locations of very high crash frequencies.

Location	No of Crashes	N obs	N pred	PSI
W Broad St/W Main St	10	5.46	4.55	0.91
W Main St/ S Plymouth Ave	5	2.73	4.34	-1.61
W Broad St/ S Plymouth Ave	5	2.73	3.11	-0.38
S Plymouth Ave/ Spring St	1	0.55	1.71	-1.16
W/E Main St / Exchange Blvd	12	6.55	5.22	1.33
W/E Broad St / Exchange Blvd	19	10.37	4.28	6.09
Court St / Exchange Blvd	2	1.09	2.61	-1.52
E Main St/ South Avenue	9	4.91	3.93	0.98
W Broad St/ South Ave	13	7.09	4.22	2.87
Court St/ South Ave	6	3.27	3.61	-0.34
W/E Main St/ N Chestnut St	15	8.18	4.75	3.43
W/E Broad St/ N Chestnut Ave	3	1.64	3.8	-2.16
Court St/ N Chestnut Ave	3	1.64	2.94	-1.30
Woodbury Blvd/ N Chestnut Ave	3	1.64	3.25	-1.61
Monroe Ave/ Howell St	3	1.64	4.54	-2.90
N Union St/ Howell St	1	0.55	1.37	-0.82
N Union St/ East Ave	16	8.73	2.33	6.40
S Goodman St/ Monroe Ave	11	6.00	5.34	0.66
S Goodman St/ East Ave	9	4.91	3.01	1.90
S Goodman St/ University Ave	14	7.64	4.52	3.12
Culver Rd/ East Ave	17	9.27	6.32	2.95

Table 21: Crash Frequency by City Intersections

State St/ Lyell Ave	40	21.82	10.91	10.91
State St/ Brown St	12	6.55	4.78	1.77
St Paul Str/ Upper Falls Blvd	30	16.37	8.24	8.13
State St/ Andrews St	1	0.55	3.09	-2.54
St Paul Str/Andrews St	8	4.36	2.63	1.73
N Clinton Ave/ Andrews St	12	6.55	2.2	4.35
N Chestnut St/ Andrews St	10	5.46	3.76	1.70
Scio St/ University Ave	7	3.82	1.96	1.86
Morrie Silver Way/N Plymouth Ave	11	6.00	1.59	4.41
Morrie Silver Way/State Street	18	9.82	3.73	6.09
Commercial St/State St	0	0.00	2.24	-2.24
Central Ave/Joseph Ave	8	4.36	2.22	2.14
Central Ave/N Clinton Ave	5	2.73	1.03	1.70
Central Ave/North Street	3	1.64	2.55	-0.91
Hudson Ave/ North Street	8	4.36	2.9	1.46

A total of 103 injury crashes and three (3) fatal crashes were reported during the study period. Table 16 below displays each intersection with observed crashes with severity types K, A, B, & C. Crash which occurred at the intersection of N Union St & East Ave involved a bicyclist travelling west on east ave and made a wide turn to travel south on union street on red light in front of a vehicle travelling north on union street which resulted in fatality. This incident occurred during daylight condition. Crash which occurred at the intersection of east main street and south avenue involved two vehicles which struck each other at right angles. This incident occurred due to one vehicle travelling at high speed and disregarding the right of way to the other vehicle and thereby resulting in fatality. The incident took place early in the morning under dark lighted conditions. The intersection of state street & lyell avenue observed a fatal crash where a vehicle travelling west veered off the roadway and struck a curb on the south side of lyell avenue. This incident took place early in the morning under dark lighted conditions.

Location	Total	Injury	Fatal
W Broad St/W Main St	2	2	0
W Main St/ S Plymouth Ave	3	3	0
W Broad St/ S Plymouth Ave	3	3	0
S Plymouth Ave/ Spring St	0	0	0
W/E Main St / Exchange Blvd	2	2	0
W/E Broad St / Exchange Blvd	6	6	0
Court St / Exchange Blvd	1	1	0
E Main St/ South Avenue	3	2	1
W Broad St/ South Ave	6	6	0

Table 22: Fatality & Injury Crash Frequency by Intersections

Court St/ South Ave	1	1	0
W/E Main St/ N Chestnut St	6	6	0
W/E Broad St/ N Chestnut Ave	1	1	0
Court St/ N Chestnut Ave	0	0	0
Woodbury Blvd/ N Chestnut Ave	1	1	0
Monroe Ave/ Howell St	2	2	0
N Union St/ Howell St	0	0	0
N Union St/ East Ave	2	1	1
S Goodman St/ Monroe Ave	4	4	0
S Goodman St/ East Ave	2	2	0
S Goodman St/ University Ave	6	6	0
Culver Rd/ East Ave	2	2	0
State St/ Lyell Ave	10	9	1
State St/ Brown St	0	0	0
St Paul Str/ Upper Falls Blvd	9	9	0
State St/ Andrews St	0	0	0
St Paul Str/Andrews St	2	2	0
N Clinton Ave/ Andrews St	9	9	0
N Chestnut St/ Andrews St	2	2	0
Scio St/ University Ave	4	4	0
Morrie Silver Way/ N Plymouth Ave	0	5	0
Morrie Silver Way/State St	0	7	0
Commercial St/State St	0	0	0
Central Ave/Joseph Ave	0	2	0
Central Ave/N Clinton Ave	0	2	0
Central Ave/North St	0	0	0
Hudson Ave/North St	0	1	0

4.3 Overrepresented Collision Types

Several collision types were reported within the study area for the City of Rochester's intersections. A breakdown of collision types is provided in Table 23.

Table 23: City Intersections Collision Typ	<u>e Summa</u>	Y
Collision Type	2021	-2023
	Total	Percent
Rear End	80	23%
Right Angle	127	37%
Overtaking	41	12%

Table 23: City Intersections Collision Type Summary

Left Turn	45	13%
Other	15	4%
Right Turn	6	2%
Sideswipe	11	3%
Unknown	0	0%
Head On	12	3%
Pedestrian	5	1%
Bicyclist	5	1%
Total	347	100%

4.4 City Intersections Screening Summary

The following locations were identified as areas for further investigation during the preliminary design phase. These locations have been ranked by priority as follows:

Intersections:

	Table 24: Focus Intersections	
Priority	Location	PSI
1	State St/ Lyell Ave	10.91
2	St Paul Str/ Upper Falls Blvd	8.13
3	N Union St/ East Ave	6.4
4	Morrie Silver Way/State Street	6.09
5	W/E Broad St / Exchange Blvd	6.09
6	Morrie Silver Way/N Plymouth Ave	4.41
7	N Clinton Ave/ Andrews St	4.35
8	W/E Main St/ N Chestnut St	3.43
9	<u>S Goodman St/ University Ave</u>	3.12
10	Culver Rd/ East Ave	2.95
11	W Broad St/ South Ave	2.87
12	Central Ave/Joseph Ave	2.14
13	Scio St/ University Ave	1.86
14	State St/ Brown St	1.77
15	<u>St Paul Str/Andrews St</u>	1.73
16	Central Ave/N Clinton Ave	1.7
17	N Chestnut St/ Andrews St	1.7
18	Hudson Ave/North St	1.46
19	W/E Main St / Exchange Blvd	1.33
20	E Main St/ South Avenue	0.98
21	W Broad St/W Main St	0.91
22	<u>S Goodman St/ East Ave</u>	0.9
23	<u>S Goodman St/ Monroe Ave</u>	0.66

5 Conclusion

As a result of these screenings, the crash history within the project study areas outlined above has resulted in several locations (23 segments, 15 ramps, and 43 intersections) and systemic patterns (Rear End, Right Angle, Overtaking, Left turn, and Other) that warrant further investigation under preliminary design of the Inner Loop North Transformation Project. Specific patterns and recommendations will be identified in the analysis completed under preliminary design. Additional locations may be studied depending on the expected impacts to traffic volumes at key locations identified under the preferred alternative.

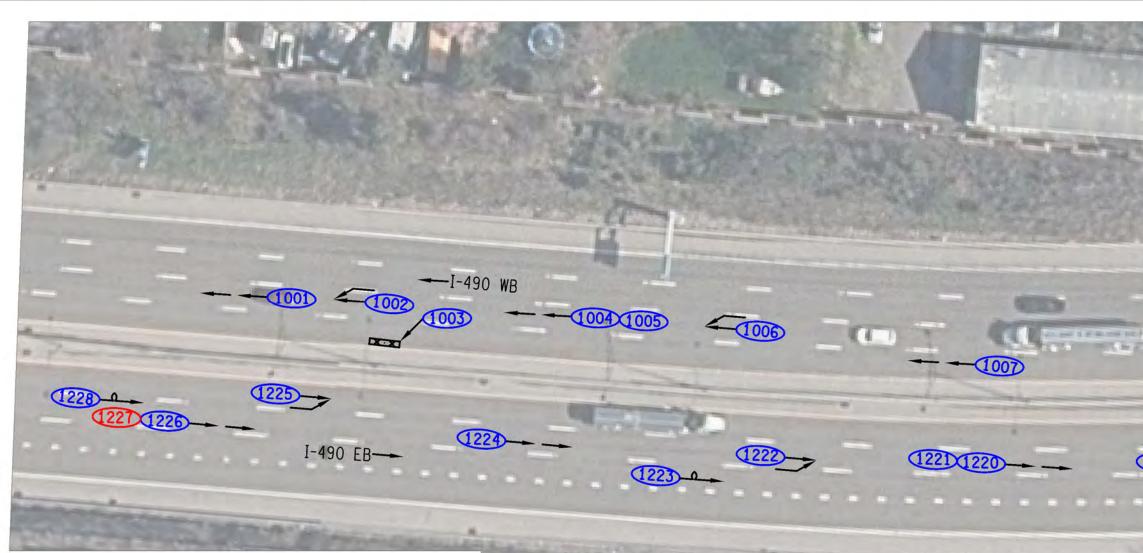
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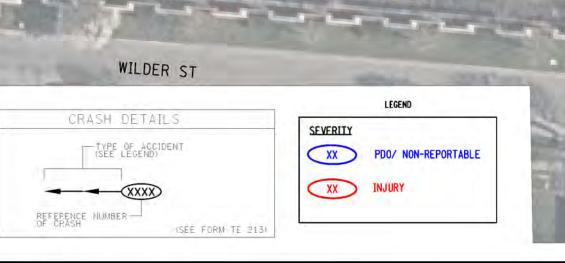
FOR: Rory Weilnau, PE, ENV SP Associate, Transportation Engineer

> Phone: 585 413 5348 Fax: 585 272 1814 Rory.Weilnau@stantec.com

Attachment: Inner Loop North Crash Diagrams



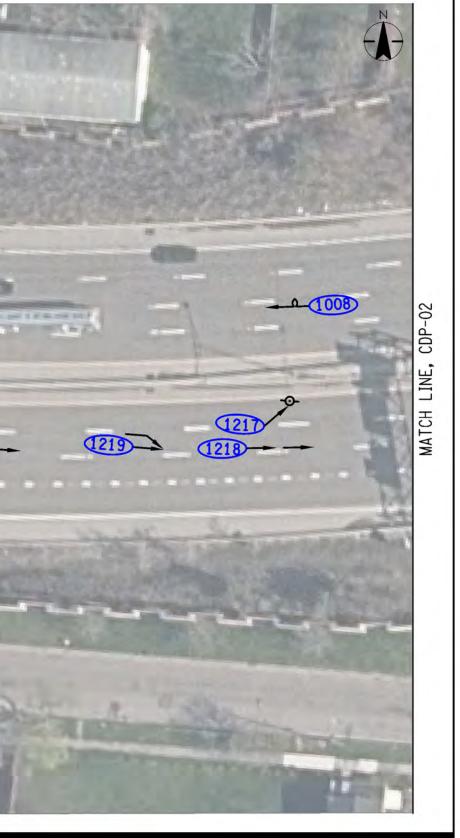
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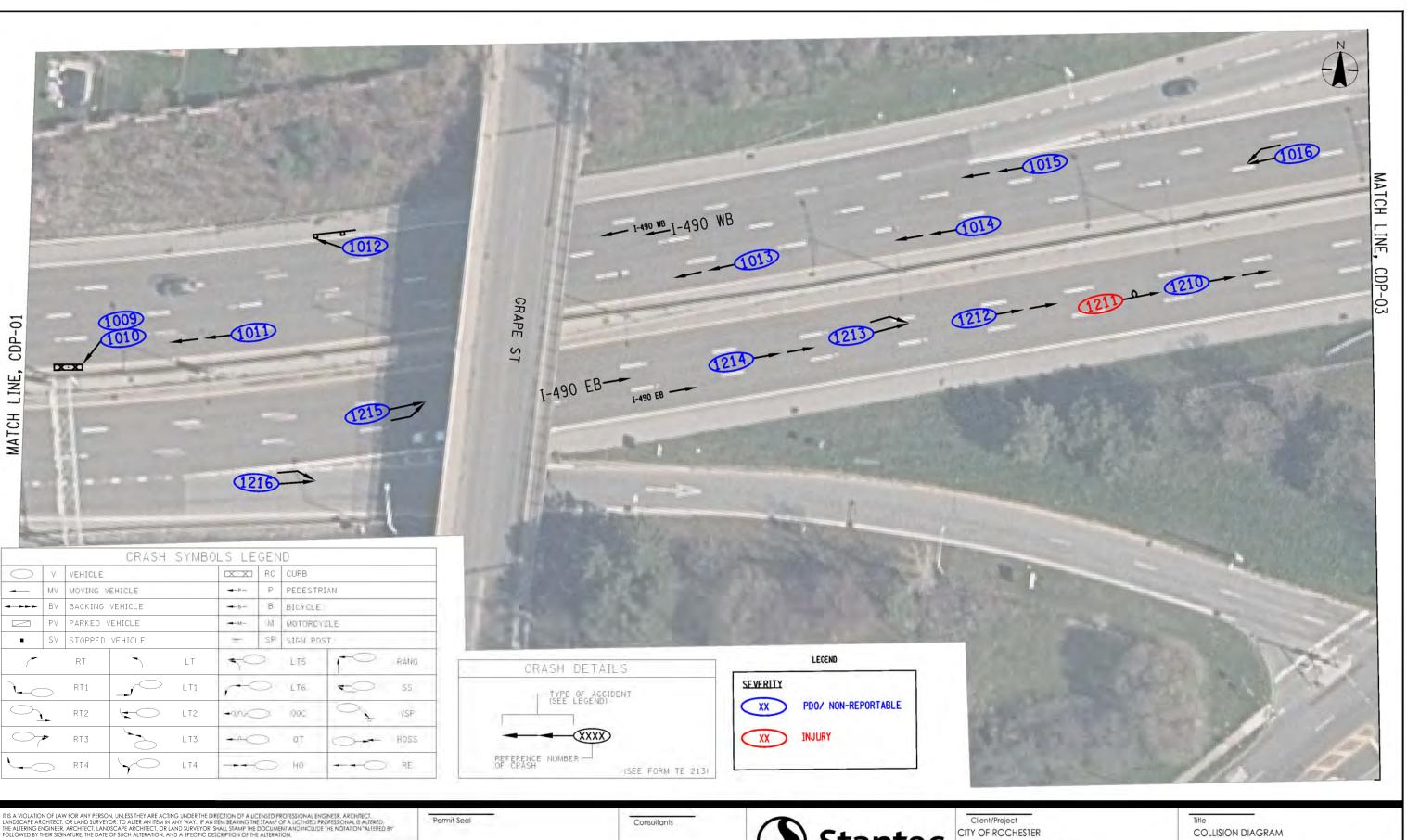
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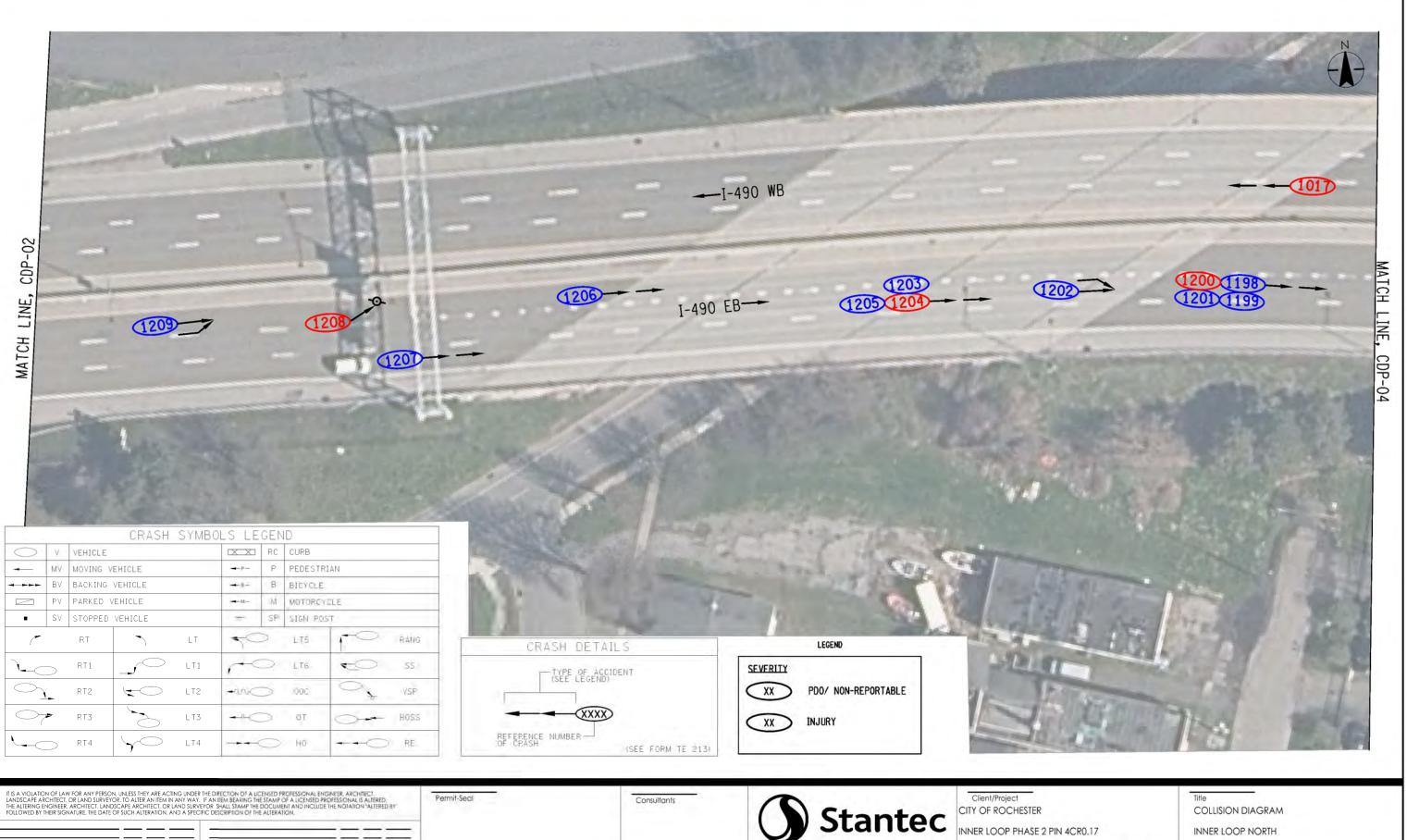
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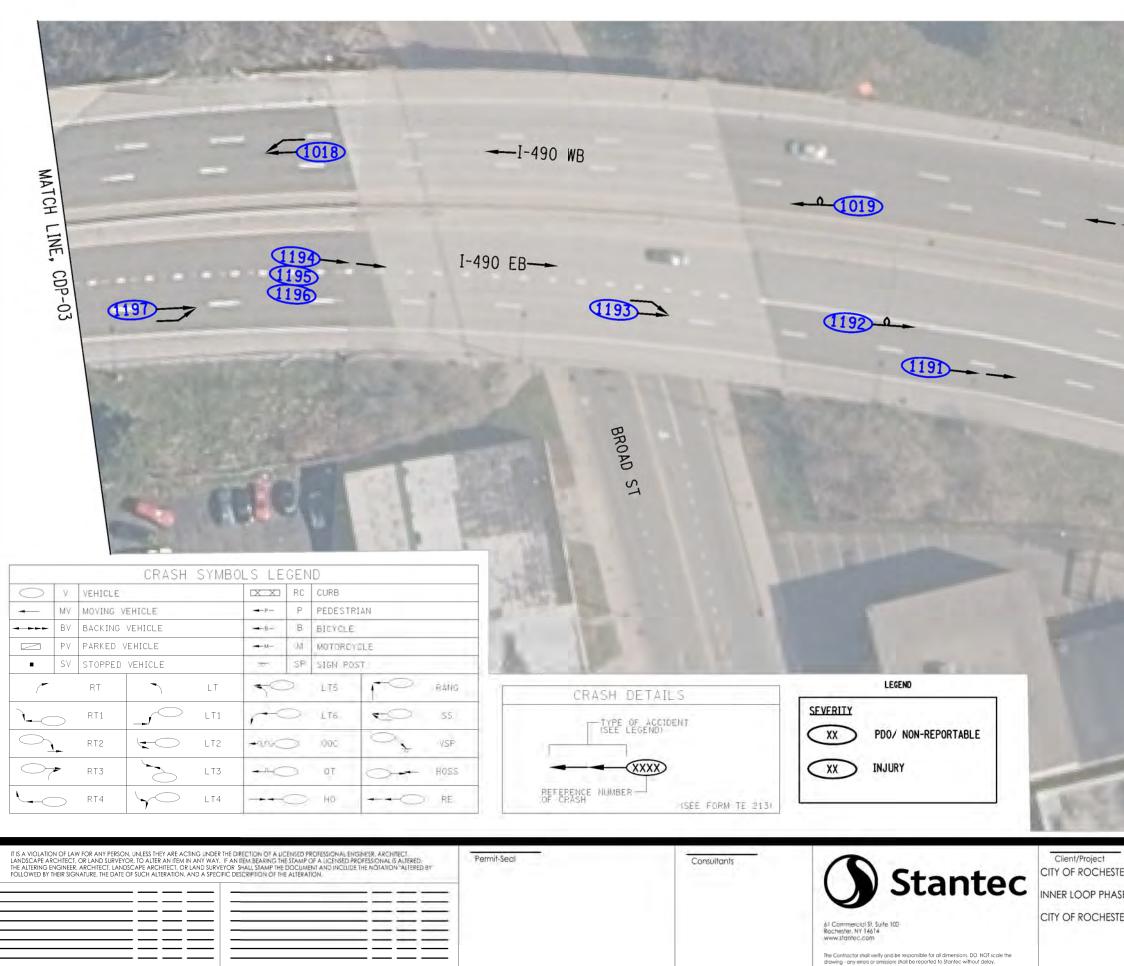
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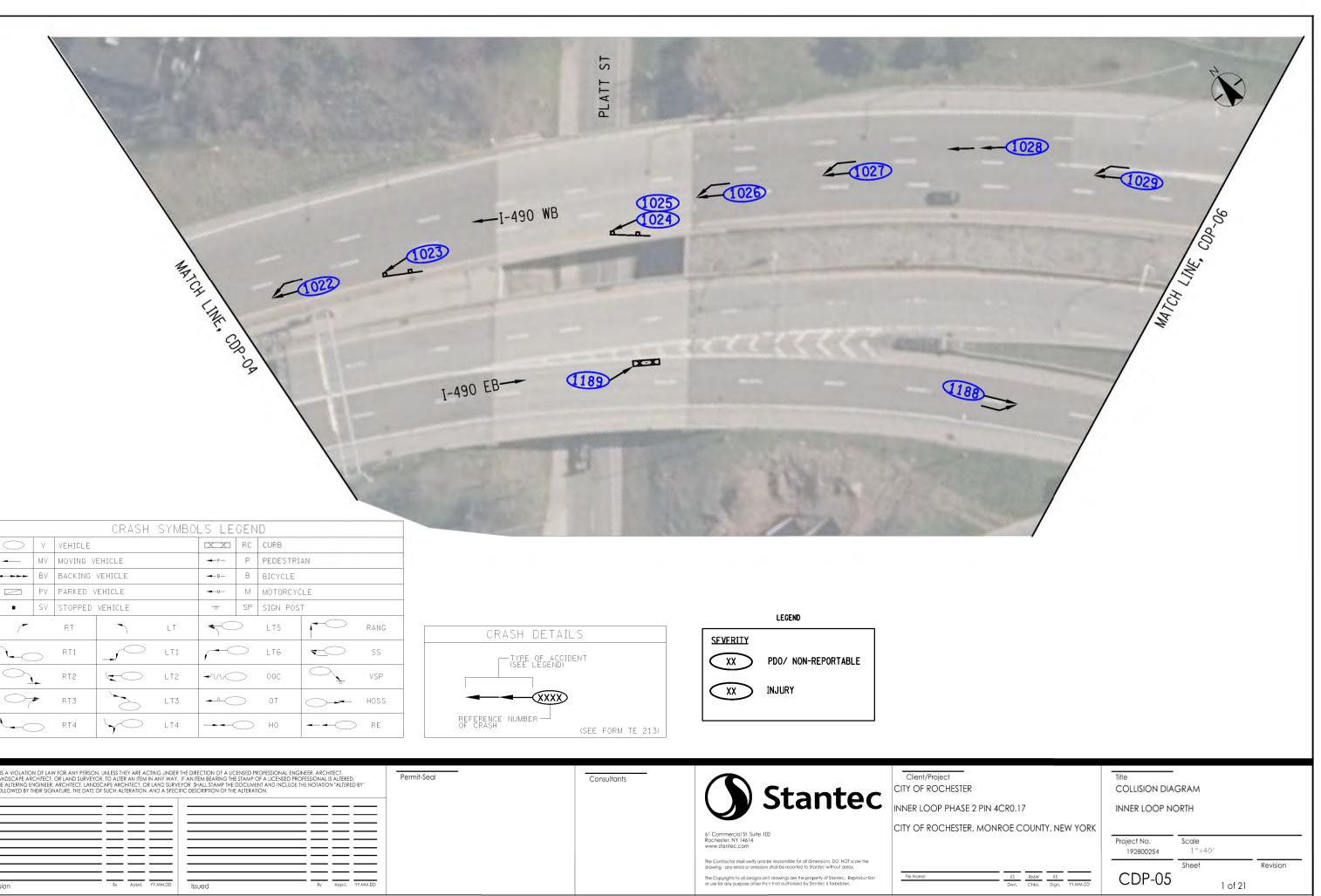
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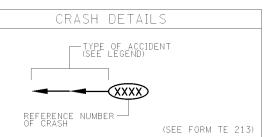
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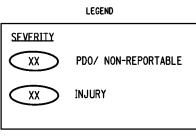
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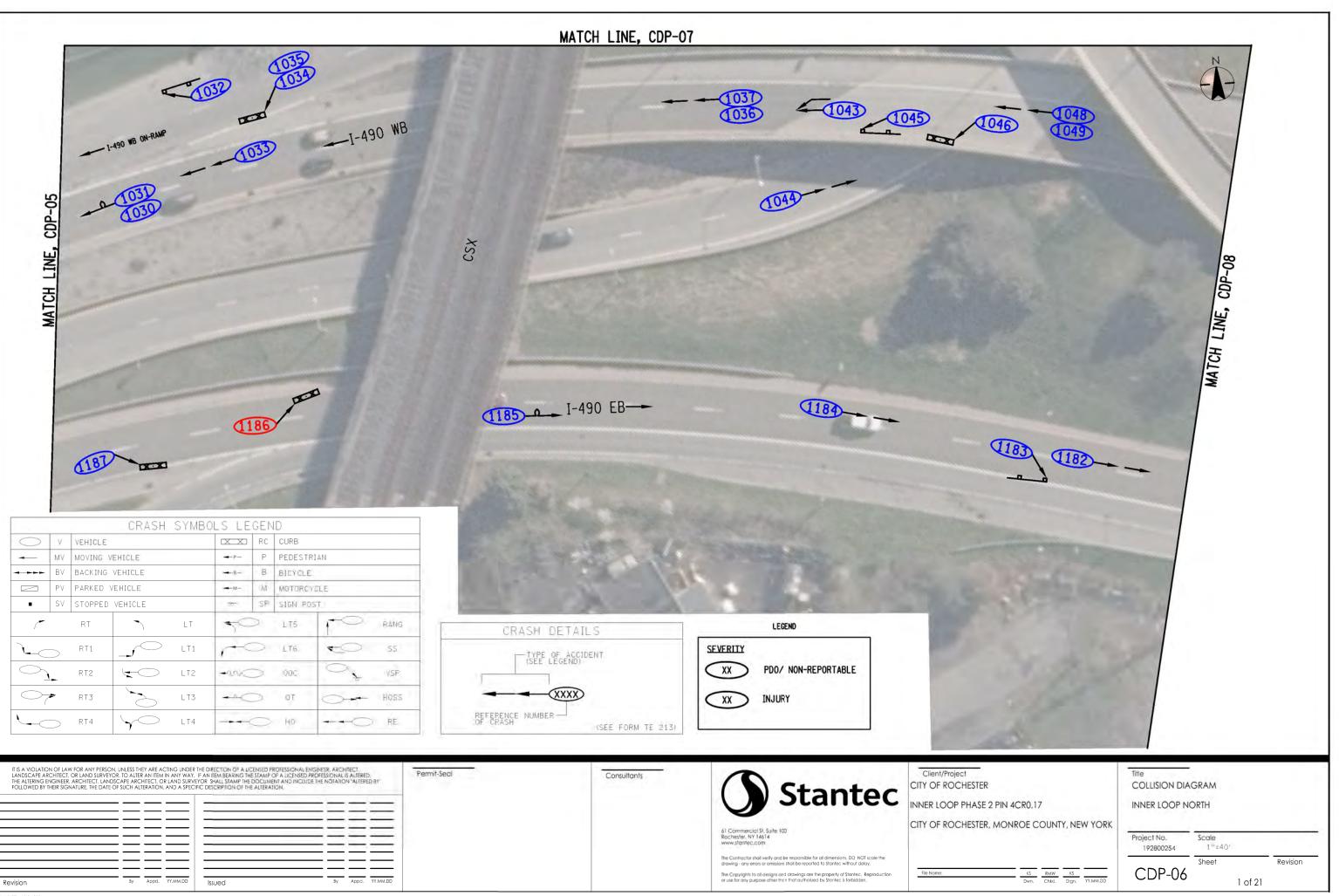


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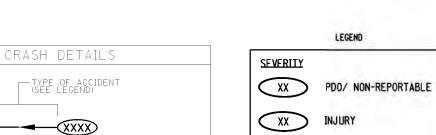


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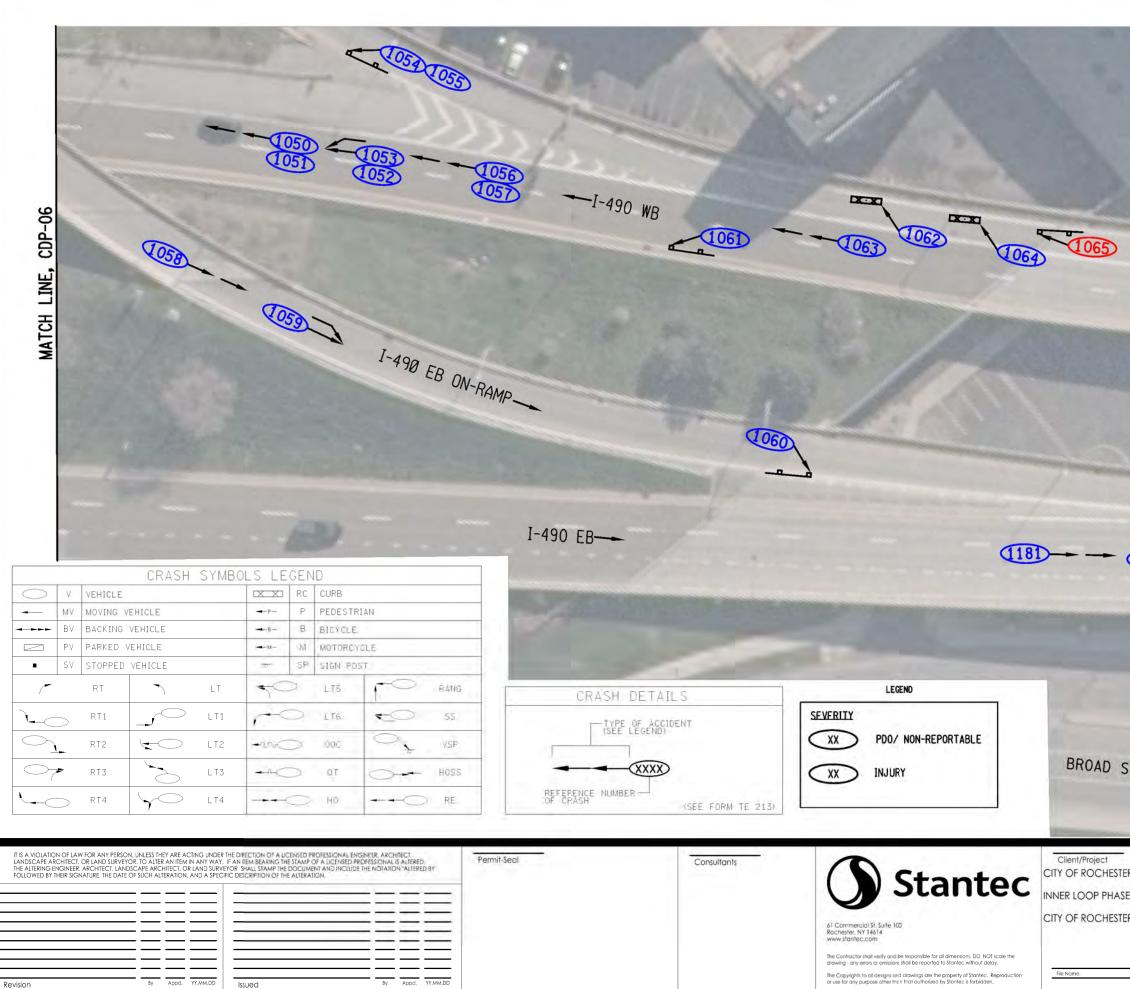
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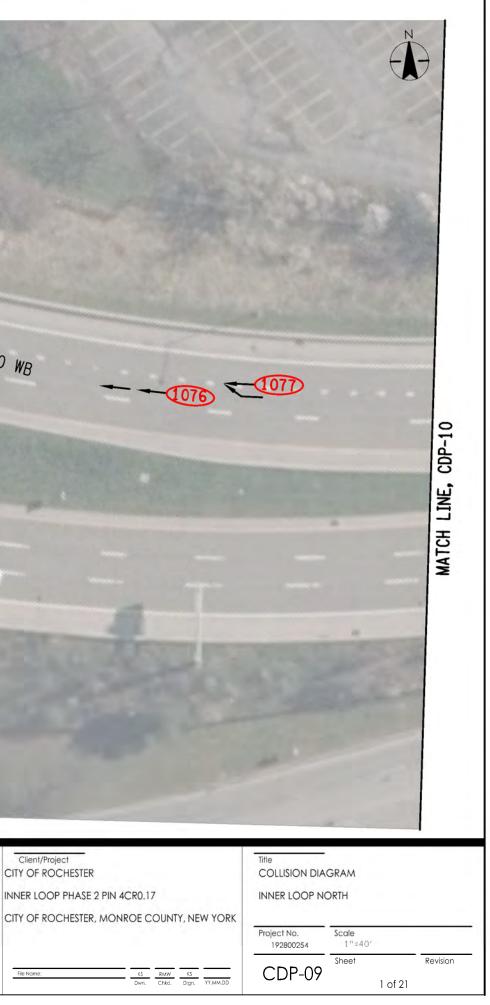
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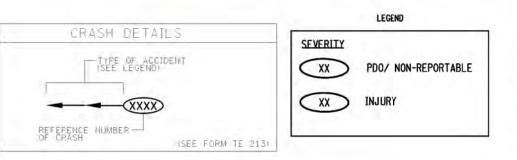
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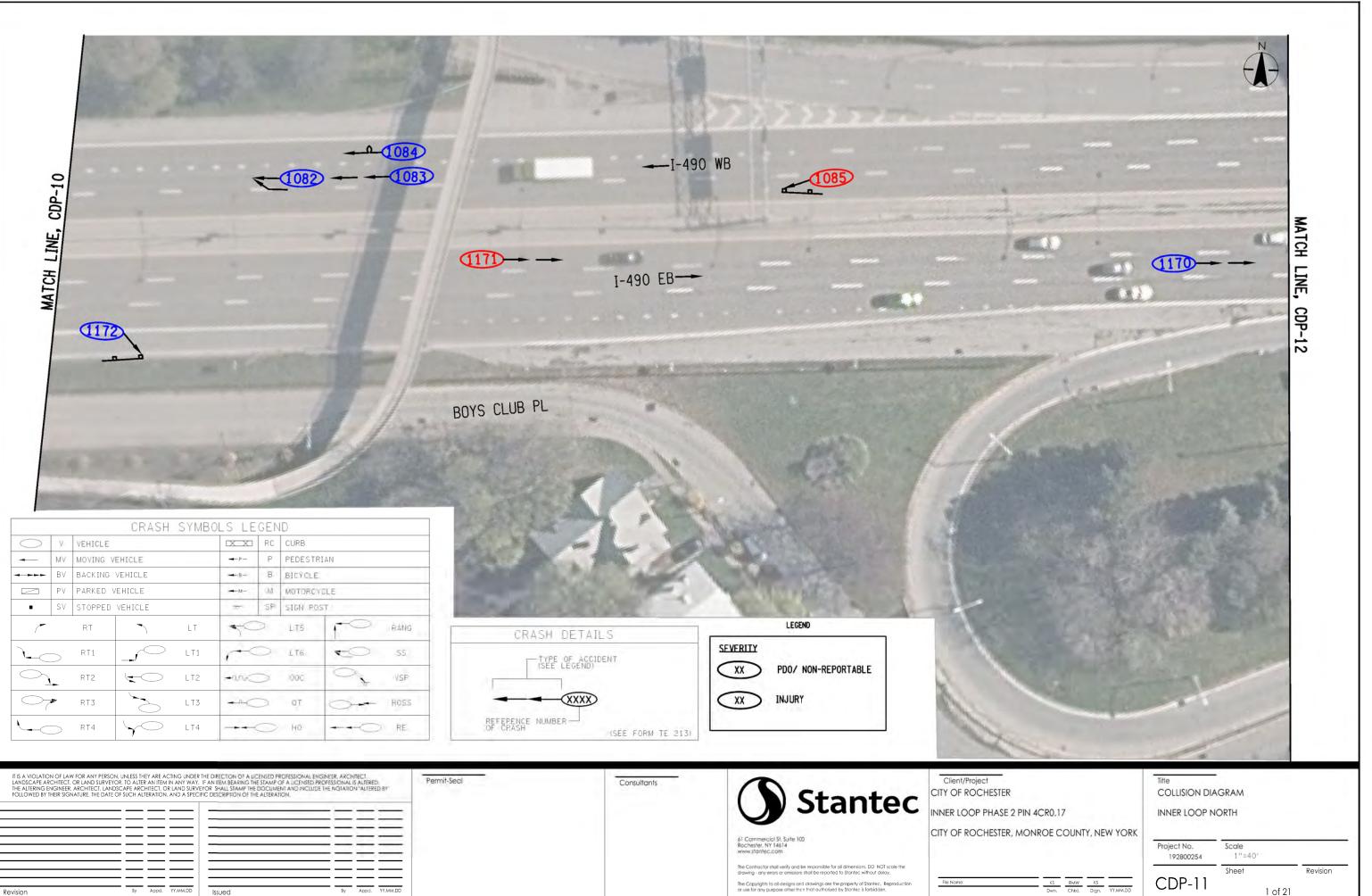


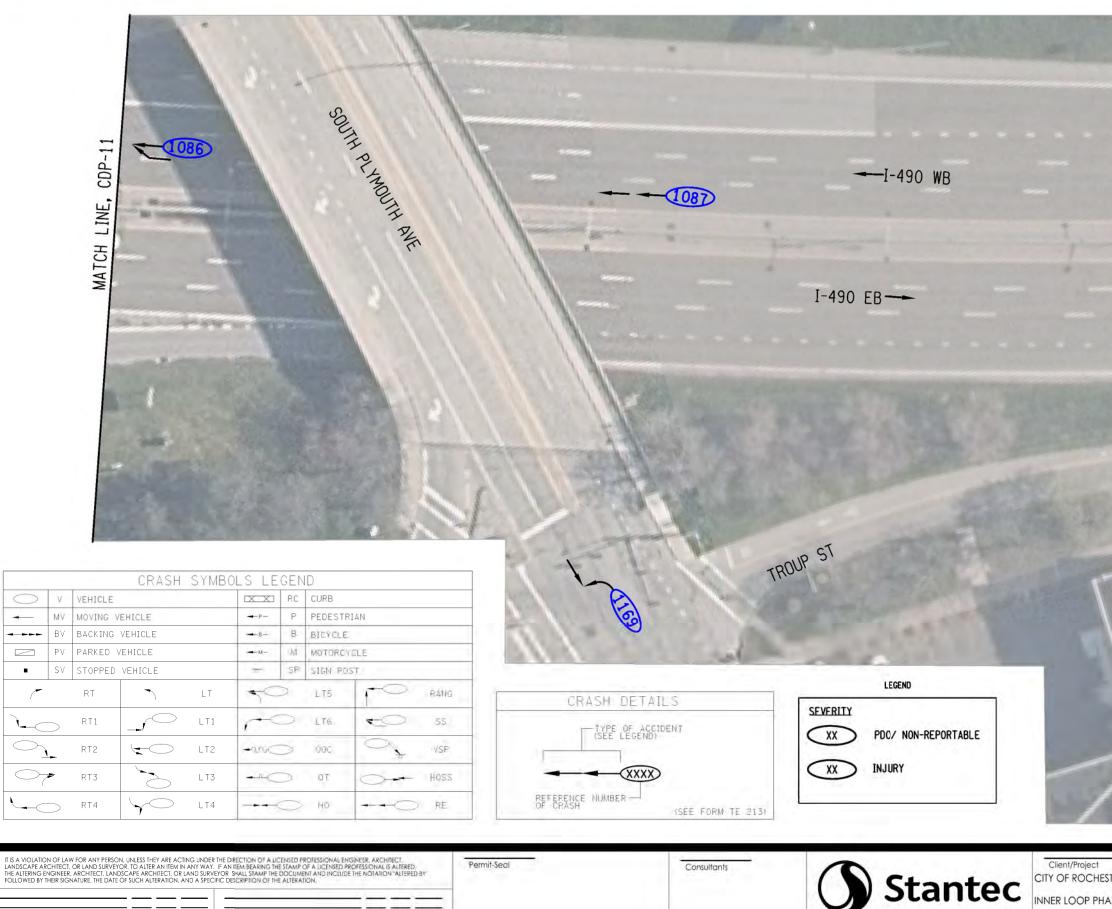


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				61 Commercial 51, Suite 100 Rochester, NY 14614 www.stantec.com	CITY OF ROCHESTE
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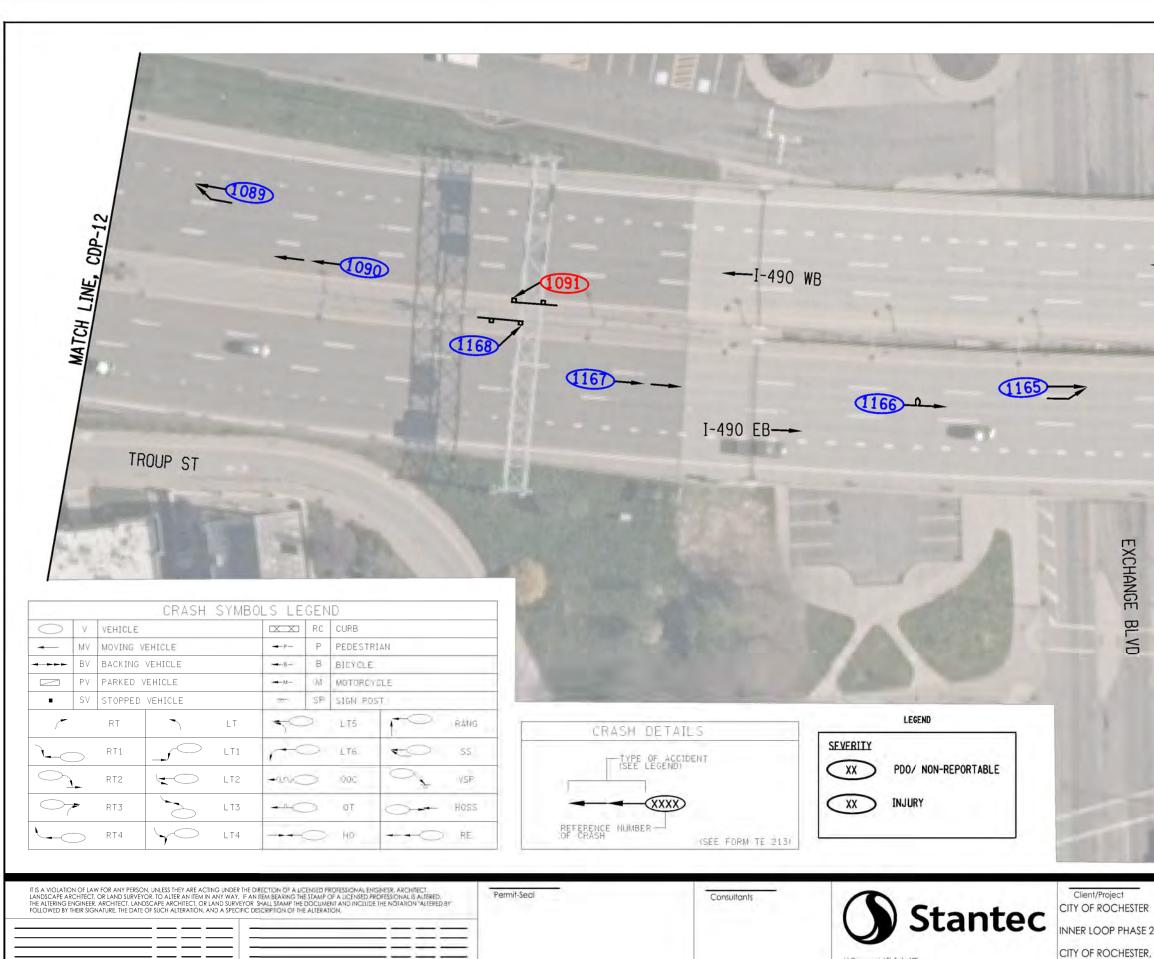
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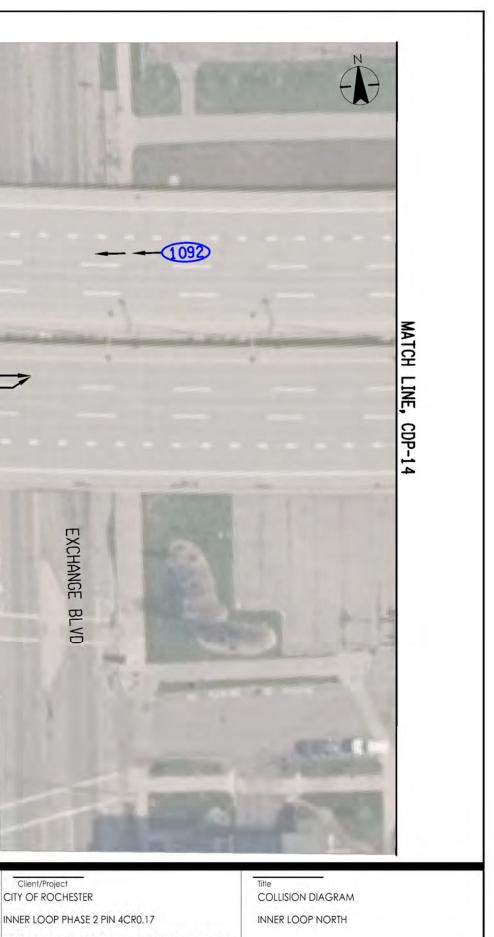
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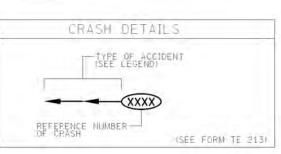
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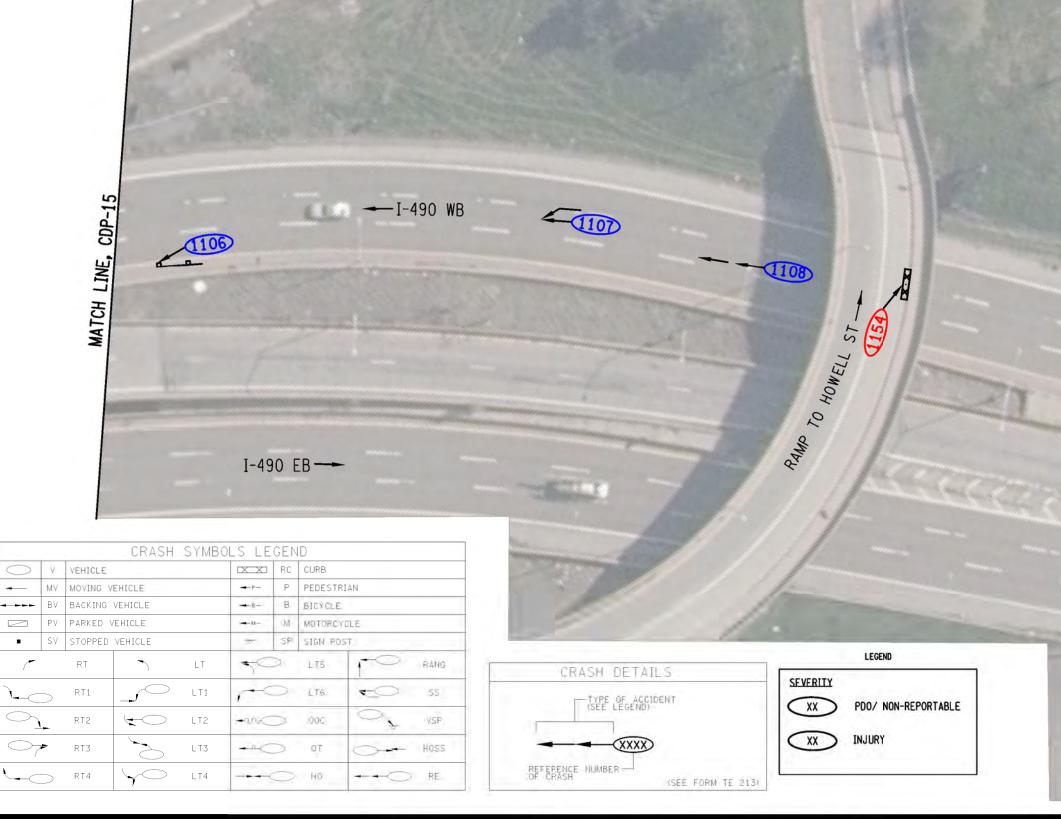
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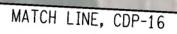


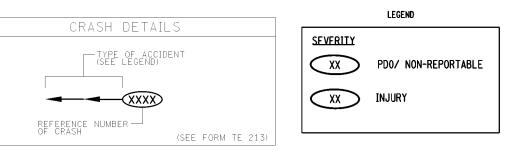
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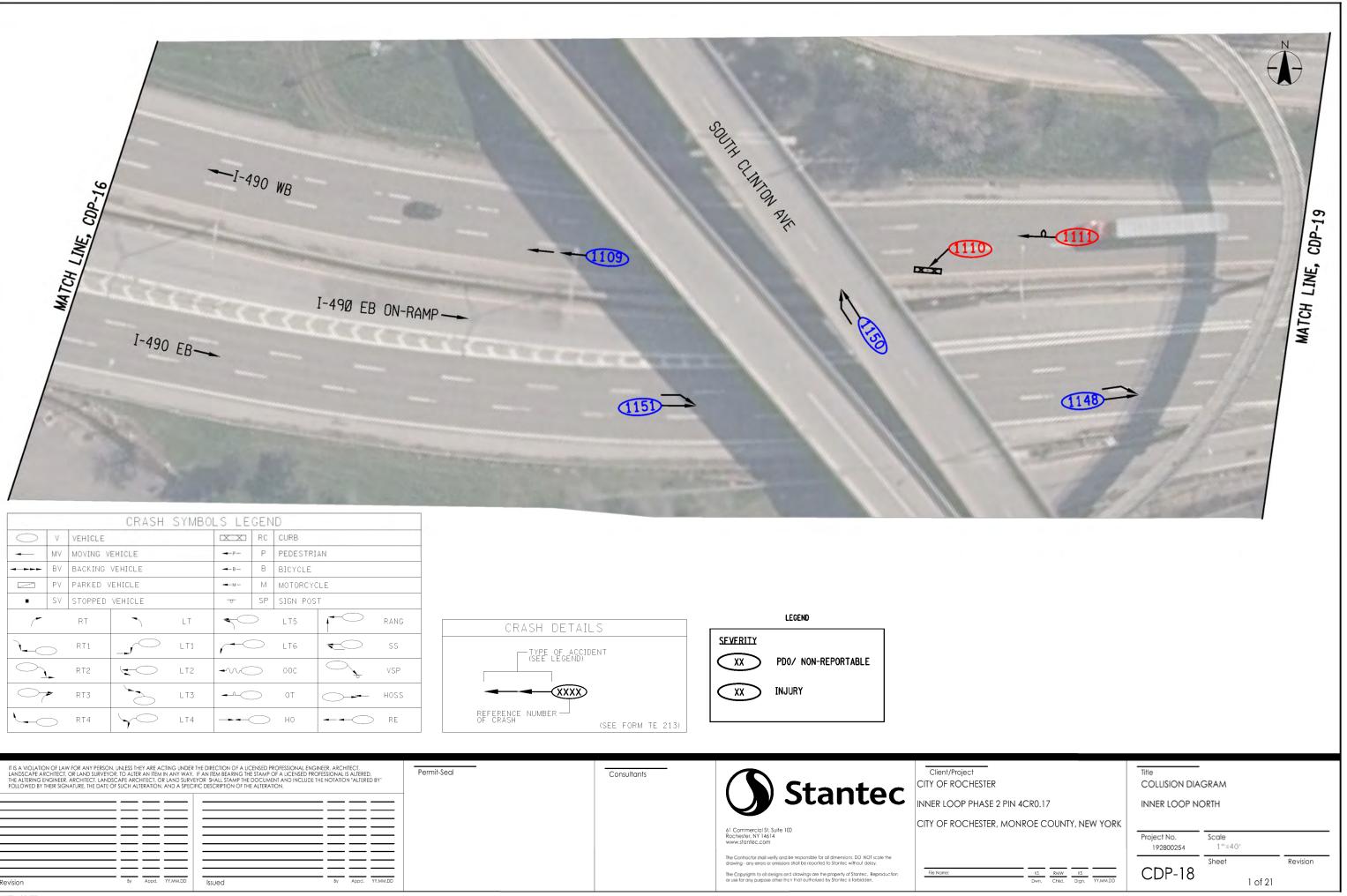


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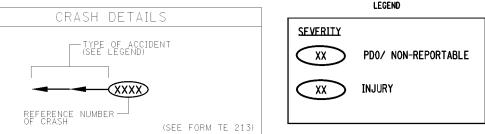
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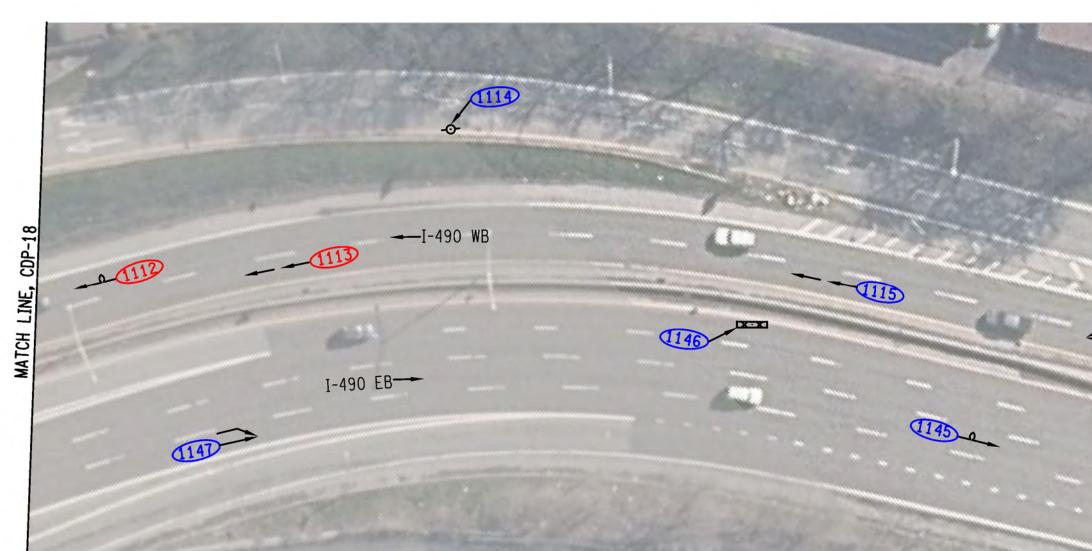
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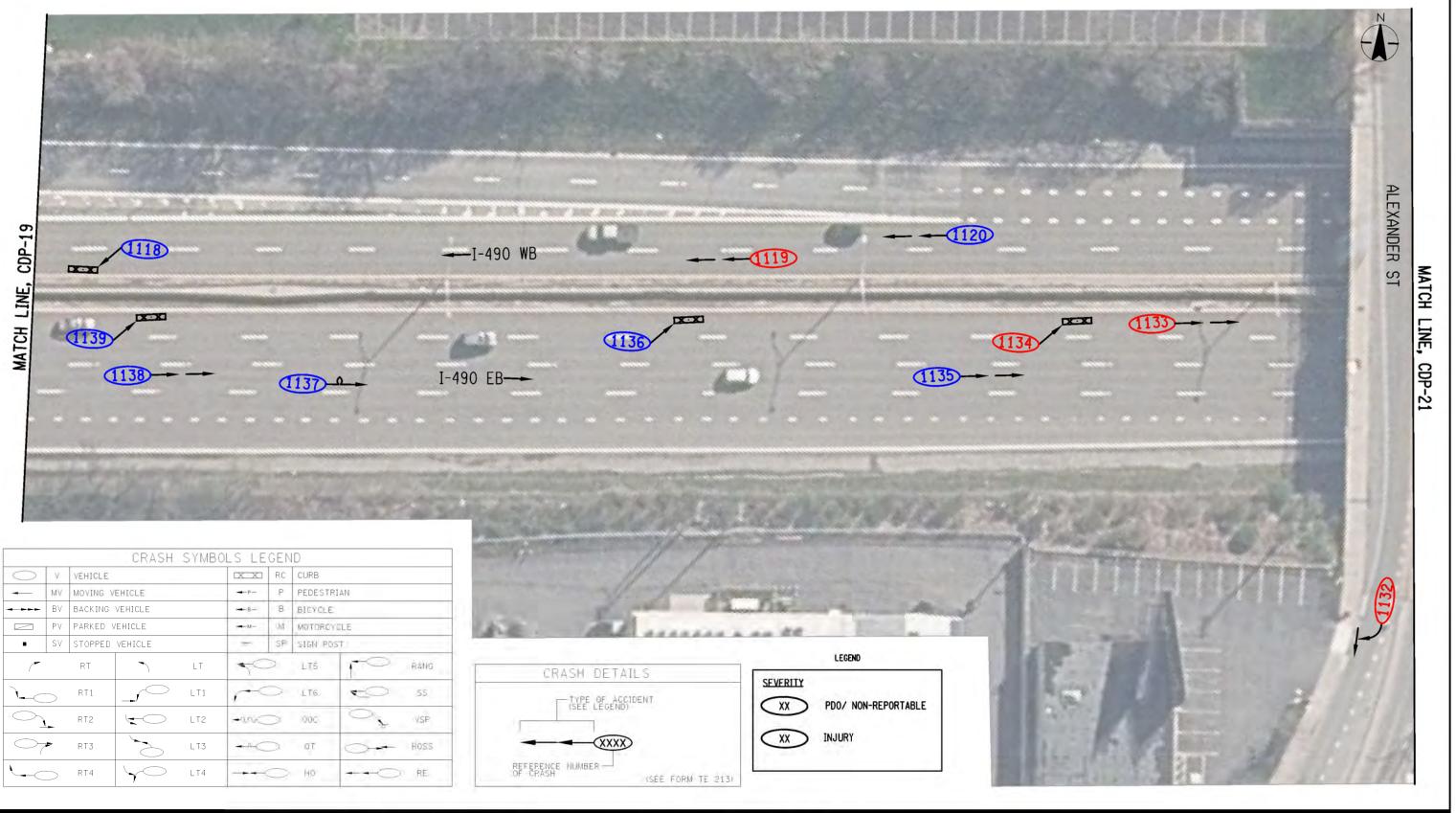
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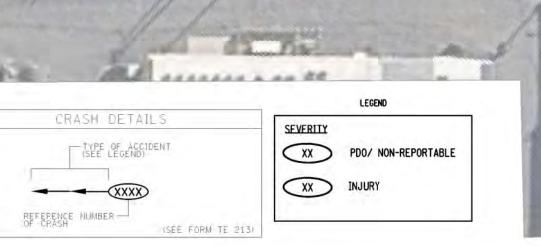
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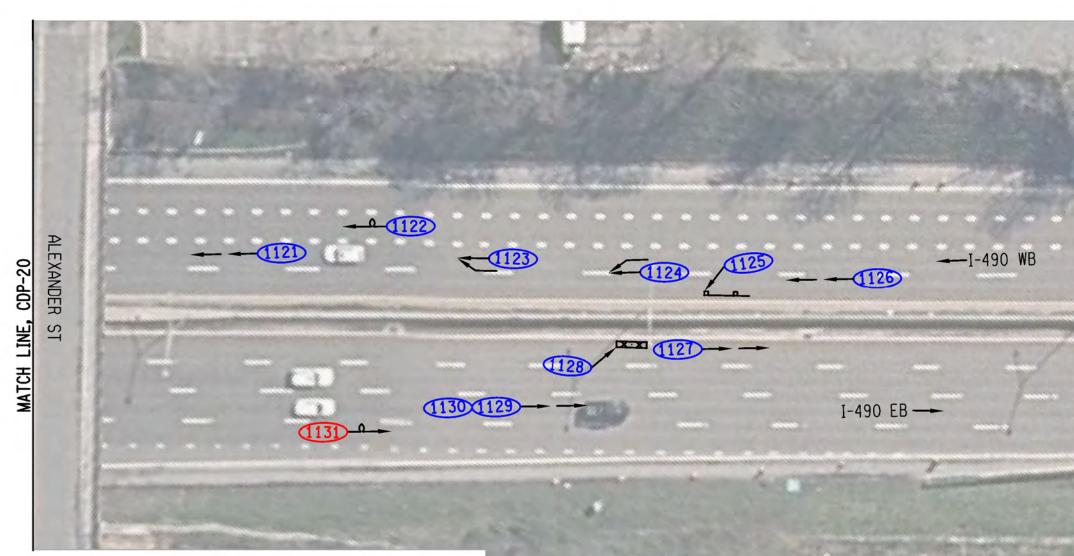
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	By Appd. YY.MM.DD	Issued	By Appd. YY.MM.DD		



he Contractor shall verify and be responsible for all dimensions. DO NOT scale the trawing - any errors or omissions shall be reported to Stantec without delay.

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CITY OF ROCHES

File Name:



TER	Title COLLISION DIA	GRAM	
SE 2 PIN 4CR0.17	INNER LOOP NO	ORTH	
TER, MONROE COUNTY, NEW YORK			
TER, MONROE COUNTY, NEW YORK	Project No. 192800254	Scale 1"=40'	
			Revision