

COUNCIL ACTION FORM

**SUBJECT: APPROVAL OF TSIP (TRAFFIC SAFETY IMPROVEMENTS PROGRAM)
APPLICATION FOR 2020/21 S. DAYTON AVE. IMPROVEMENTS**

BACKGROUND:

The Iowa DOT administers a Traffic Safety Improvement Program, which has the intent of distributing funds for roadway safety improvements, traffic control devices, research, studies, or public information initiatives. Cities, counties, or the Iowa DOT may request TSIP funding for use on any public roads. One requirement of the application is a resolution by the local government that the project has the local funding required for the project and that the project will be adequately maintained.

The project includes the signalization of the Westbound and Eastbound ramp-intersections with S. Dayton and U.S. Highway 30. Also, at the S. Dayton and S.E. 16th Street intersection, there will be widening that includes a westbound left-turn lane and a southbound right-lane. These improvements should increase the capacity of the S. Dayton corridor to respond to current and future traffic congestion.

The revenues and expenses for this project are as follows:

Revenues		Expenses	
G.O. Bonds - FY 20/21 Budget	\$700,000	Engineering & Admin	\$179,950
U-STEP Grant (Anticipated)	\$400,000	Construction	\$899,750
TSIP Grant (Application)	\$500,000		
Total	\$1,600,000	Total	\$1,079,700

ALTERNATIVES:

- 1a. Approve the TSIP Grant Application for the 2020/21 S. Dayton Ave Improvements.
- b. Commit the local funding as shown in the 2020/21 Budget necessary for the construction of the project beyond any Traffic Safety Improvement Program (TSIP) funding.
- c. Commit to accepting and maintaining the 2020/21 S. Dayton Ave Improvements in accordance with the Iowa DOT’s Transportation Safety Improvement Program (TSIP)
2. Do not approve the TSIP Grant Application for the 2020/21 S. Dayton Ave Improvements.

MANAGER'S RECOMMENDED ACTION:

Proceeding with this grant application may significantly reduce the local costs for the S. Dayton Ave Improvements project. Therefore, it is the recommendation of the City Manager that the City Council adopt Alternative No. 1, as described above.



Application for SITE-SPECIFIC TSIP FUNDS

GENERAL INFORMATIONDATE: 8/13/2020Location / Title of Project 2020/21 S. Dayton Ave Improvements (US HWY 30 & SE 16th St)Applicant City of AmesContact Person Damion Pregitzer Title Traffic EngineerComplete Mailing Address 515 Clark AvenueAmes, IA 50010Phone 515-239-5275 E-Mail Damion.pregitzer@cityofames.org
(Area Code)

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

Phone _____ E-Mail _____

(Area Code)

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:**Funding Amount**Total Safety Cost \$ 842,300Total Project Cost \$ 1,079,700**Safety Funds Requested** \$ 500,000

Does this project appear on a Safety Improvement Candidate List or is there a safety study recommendation for this project?

 Yes – Explain _____ No

Background:

A request was received from District 1 of the Iowa DOT to study congestion at the EB off-ramp of US HWY 30 onto S. Dayton Avenue in September of 2019. City staff had already been conducting a study of the SE 16th Street and S. Dayton Avenue intersection, which was experiencing significant peak hour delays. Traffic from the S. Bell business district, in combination with the significant amount of trucks accessing US HWY 30 through the S. Dayton interchange, was causing queuing problems at the WB and SB approach of the intersection. The City of Ames programmed a combined signal / intersection project in fiscal year 2020/21 to make improvements to the S. Dayton Interchange corridor.

SE 16th & S. Dayton: This four-way intersection is currently signalized with protected / permissive left turns for NB & SB traffic. The north, south, and eastbound approaches have designated left turn lanes. Westbound has a single lane approach.

US HWY 30 WB & S. Dayton: This ramp terminal is currently stop controlled for WB traffic only. The northbound approach has a designated left turn lane. The westbound off-ramp has a dedicated right turn lane and a combined thru/left lane.

US HWY 30 EB & S. Dayton: This ramp terminal is currently stop controlled for EB traffic only. The southbound approach has a designated left turn lane. The eastbound off-ramp has a dedicated left turn lane and a combined thru/right lane.

The S. Dayton Interchange area is the main gateway to the SE industrial district of the City of Ames. Located at the intersection is a node of Highway Oriented Commercial property. It is also the location of a significant portion of the community's commercial hotels.

The area has seen a significant growth in traffic, including a large percentage of heavy trucks.

Proposed Concept:

The proposed concept, as shown in Attachment G-2, includes the following:

- Signalizing both the EB & WB US HWY 30 ramp terminals.
- Adding a SB left turn lane at S. Dayton & SE 16th Street.
- Adding a WB left turn lane at S. Dayton & SE 16th Street.

Safety Justification:

The City conducted a warrant study and a corridor traffic simulation. The traffic study found that a WB left turn lane and SB right turn lane were needed to improve intersection capacity. The existing traffic signal also required phasing and timing improvements associated with the proposed geometric improvements. The warrant study for the US HWY 30 westbound ramp showed that all 3 volume warrants (Warrants 1, 2, 3) were met. The warrant study for the US HWY 30 eastbound ramp did not indicate volume warrants were met; however, the Coordinated Signal System warrant, and the All-Way Stop Warrant were met. Furthermore, the

signalization of both ramp terminals allows for the implementation of adaptive signal control technology.

The proposed traffic signals and additional turn lanes will reduce delays and queuing and lead to a better Level of Service for users of the corridor and provide a safe transfer of right-of-way. The interchanges along US HWY 30 in Ames have experienced significant queueing in recent history, where peak hour traffic backs up onto the HWY 30 mainline. The S. Dayton Interchange location presents additional complications due to its proximity with the newly reconstructed Interstate 35 – US Highway 30 interchange. Modern traffic signals will also provide urban level street lighting, which is expected to help with nighttime operations, especially during inclement weather.

ENGINEER'S ESTIMATE
 S. DAYTON AVE IMPROVEMENTS
 PUBLIC WORKS DEPT.- TRAFFIC DIV.
 CITY OF AMES, IA
 8/12/2020

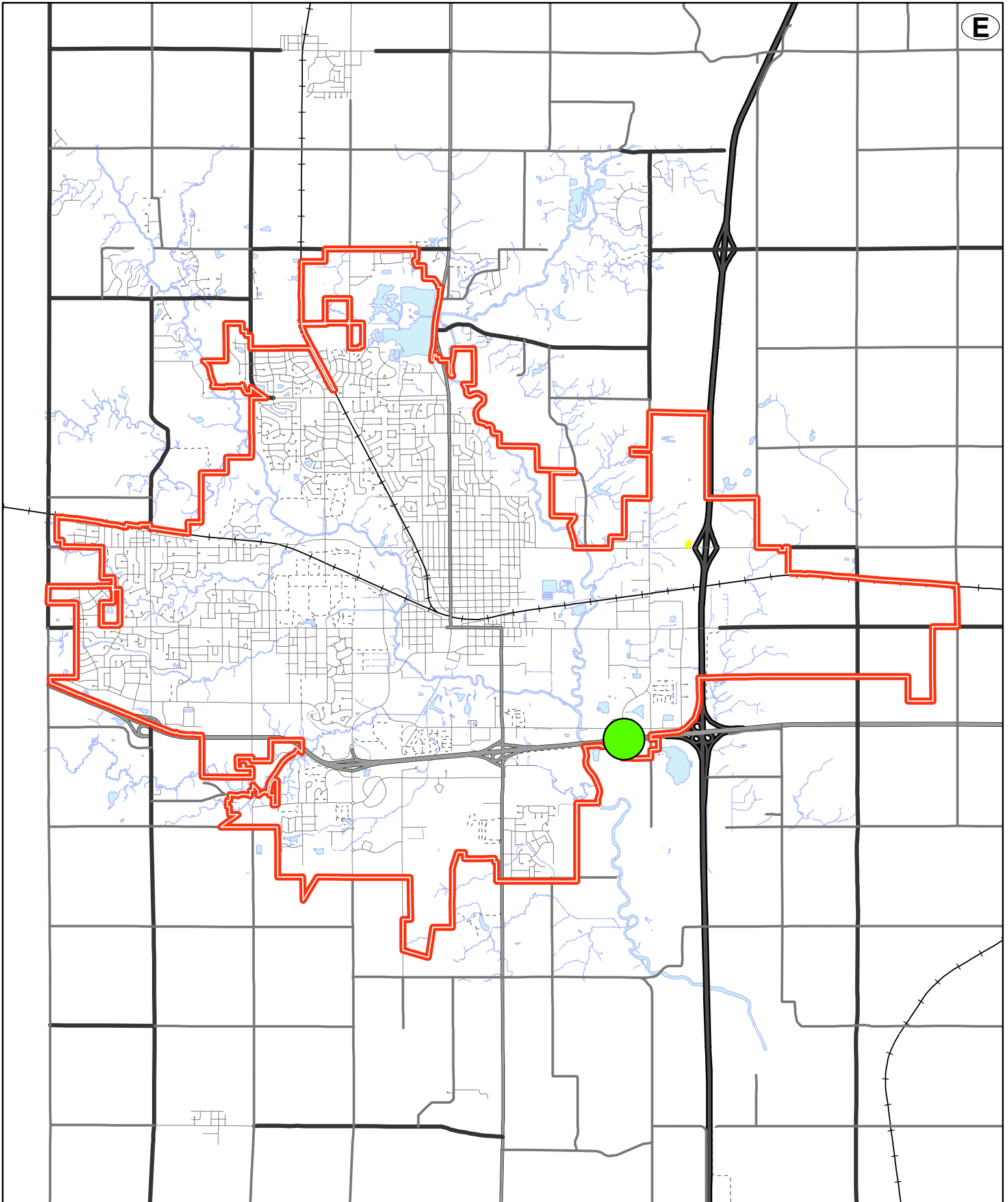
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Safety Related Item

Item #	Item Code	Description	Est Quant	Unit	Unit Price	Amount
<i>Division 2 - Earthwork</i>						
2.1	2010-108-D-2	Topsoil, Compost-amended, 4" Depth	200	cy	50.00	10,000.00
2.2	2010-108-E-0	Excavation, Class 10	400	cy	30.00	12,000.00
2.3	2010-108-G-0	Subgrade Preparation, 12" Depth	1600	sy	5.00	8,000.00
2.4	2010-108-I-0	Special Backfill, 6" Depth	1600	sy	20.00	32,000.00
<i>Division 4 - Sewers and Drains</i>						
4.1	4020-108-A-1	Storm Sewer, Trenched, RCP, 15" dia.	16	lf	100.00	1,600.00
4.2	4040-108-A-0	Subdrain and Fittings, Perforated, PVC, 4" dia.	1400	lf	10.00	14,000.00
4.3	4040-108-D-0	Subdrain Outlets & Connections	7	ea	250.00	1,750.00
<i>Division 6 - Structures for Sanitary and Storm Sewer</i>						
6.1	6010-108-B-0	Intake Type SW-505	1	ea	6000.00	6,000.00
6.2	6010-108-H-0	Remove Manhole/Intake	1	ea	1000.00	1,000.00
<i>Division 7 - Streets and Related Work</i>						
7.1	7010-108-A-0	Pavement,PCC, 8" Depth	600	sy	65.00	39,000.00
7.2	7010-108-A-0	Pavement,PCC, 10" Depth	700	sy	75.00	52,500.00
7.3	7030-108-A-0	Removal of Sidewalk/Shared Use Path/Driveway	110	sy	10.00	1,100.00
7.4	7030-108-C-0	Shared Use Path, PCC, 6" depth	100	sy	50.00	5,000.00
7.5	7030-108-D-0	Special Subgrade Preparation for Shared Use Path	100	sy	10.00	1,000.00
7.6	7030-108-G-0	Detectable Warning	30	sf	40.00	1,200.00
7.7	7040-108-H-0	Pavement Removal	500	sy	12.00	6,000.00
7.8	7040-xxx-x-x	Granular Shoulder	100	ton	20.00	2,000.00
<i>Division 8 - Traffic Control</i>						
8.1	8010-108-A-0	Traffic Signal Modifications	1	ls	60000.00	60,000.00
8.2	8010-108-A-0	Traffic Signalization of Ramp	1	ls	600000.00	600,000.00
8.3	8020-108-B-0	Painted Pavement Markings, Solvent/Waterborne	40	sta	200.00	8,000.00
8.4	8020-108-G-0	Painted Symbols and Legends	10	ea	250.00	2,500.00
8.5	8020-108-K-0	Pavement Markings Removed	10	sta	200.00	2,000.00
8.6	8030-108-A-0	Temporary Traffic Control	1	ls	5000.00	5,000.00
<i>Division 9 - Sitework and Landscaping</i>						
9.1	9010-108-B-0	Hydraulic Seeding, Seeding, Fertilizing, and Mulching	0.2	ac	10000.00	2,000.00
9.2	9040-108-N-1	Silt Fence & Removal	1400	lf	4.00	5,600.00
<i>Division 11 - Miscellaneous</i>						
11.1	11010-108-A	Construction Survey/Staking	1	ls	3000.00	3,000.00
11.2	11010-108-B	Pedestrian Facility Construction Survey & Staking	1	ls	500.00	500.00
11.3	11020-108-A	Mobilization	1	ls	15000.00	15,000.00
11.4	11060-108-A	Concrete Washout	1	ls	2000.00	2,000.00
TOTAL OF SAFETY RELATED ITEMS						\$ 842,300.00
SUBTOTAL						899,750.00
ENGINEERING (20%)						179,950.00
CONTINGENCY (0%)						0.00
TOTAL						\$1,079,700.00
FUNDING SOURCES						
TSIP FUNDS (APPLIED FOR)			\$	500,000		
ROAD USE TAX			\$	200,000		
U-STEP FUNDS			\$	400,000		
TOTAL			\$	1,100,000		

Time Schedule

Date	Activity
August 2020	Submit TSIP Grant Application
November 2020	Prepare Plans and Specifications
December 2020	Grant Approval from Commission
January 2021	Iowa DOT Plan Review
March 2021	Final Plan Revisions
July 2021	Bid Letting
August 2021	Award Project
May-June 2022	Begin Construction
October-November 2022	Project Completion



2020/21 S. Dayton Ave Improvements
(US HWY 30 Ramps & SE 16th)

 Project Location

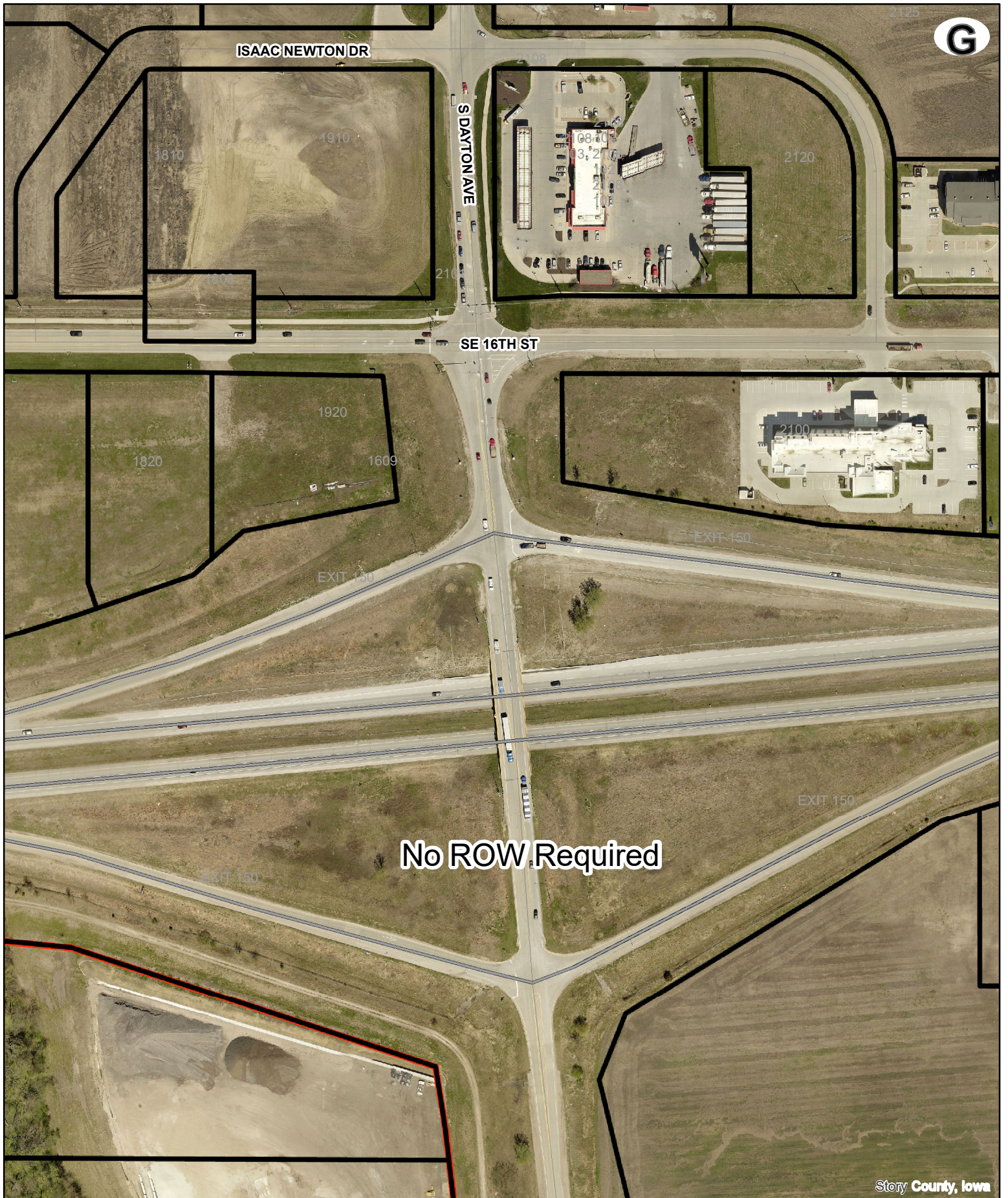


1 inch = 6,612 feet

Date: 8/12/2020



Looking West-Southwest from SE 16th Street & Isaac Newton Drive



2125

G

ISAAC NEWTON DR

1810

1910

S DAYTON AVE

1808

2120

1808

210

SE 16TH ST

1920

1820

1609

2100

EXIT 450

EXIT 150

EXIT 150

No ROW Required

EXIT 150

Story County, Iowa



2020/21 S. Dayton Ave Improvements
(US HWY 30 Ramp & SE 16th St)



Existing ROW

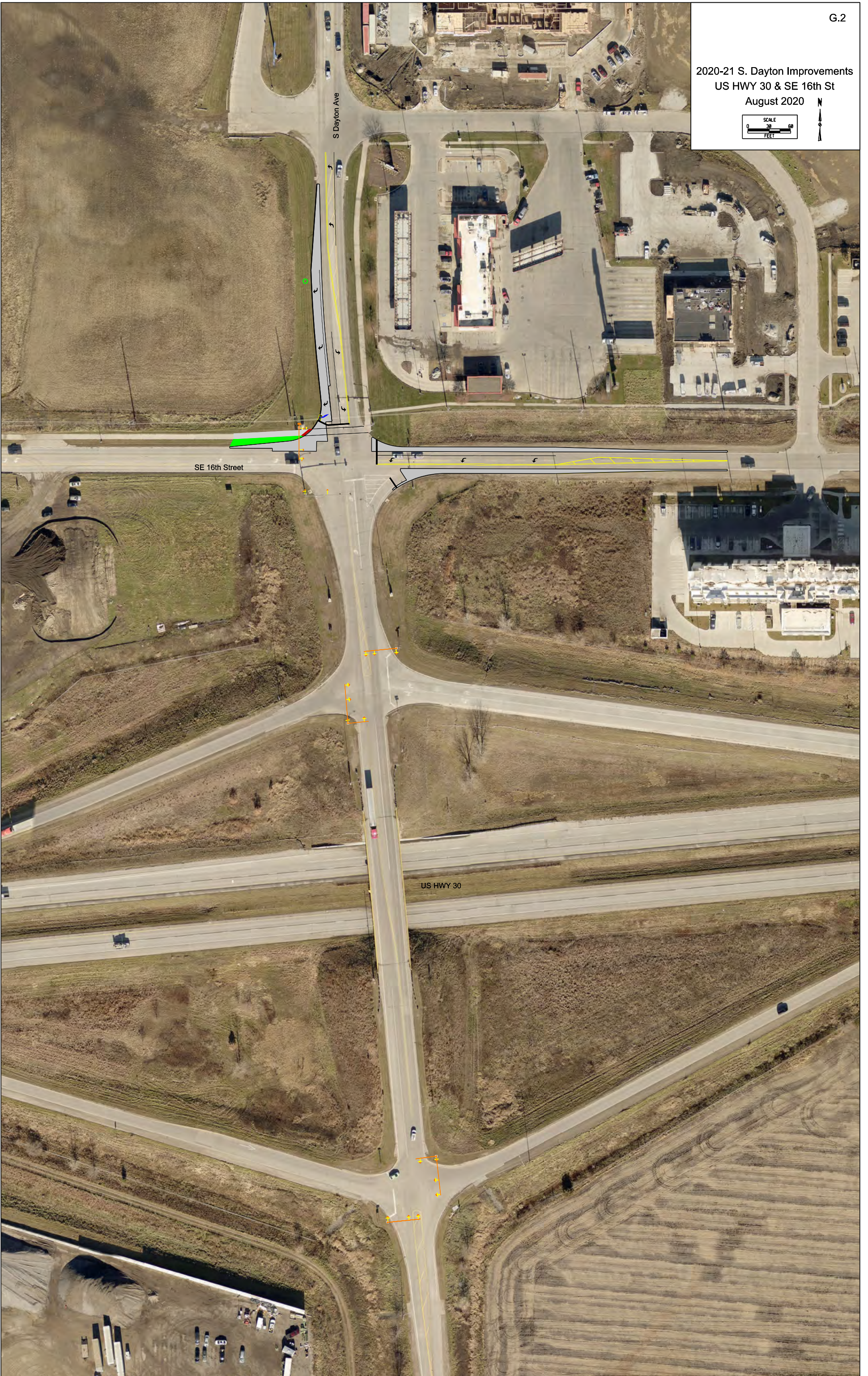
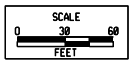


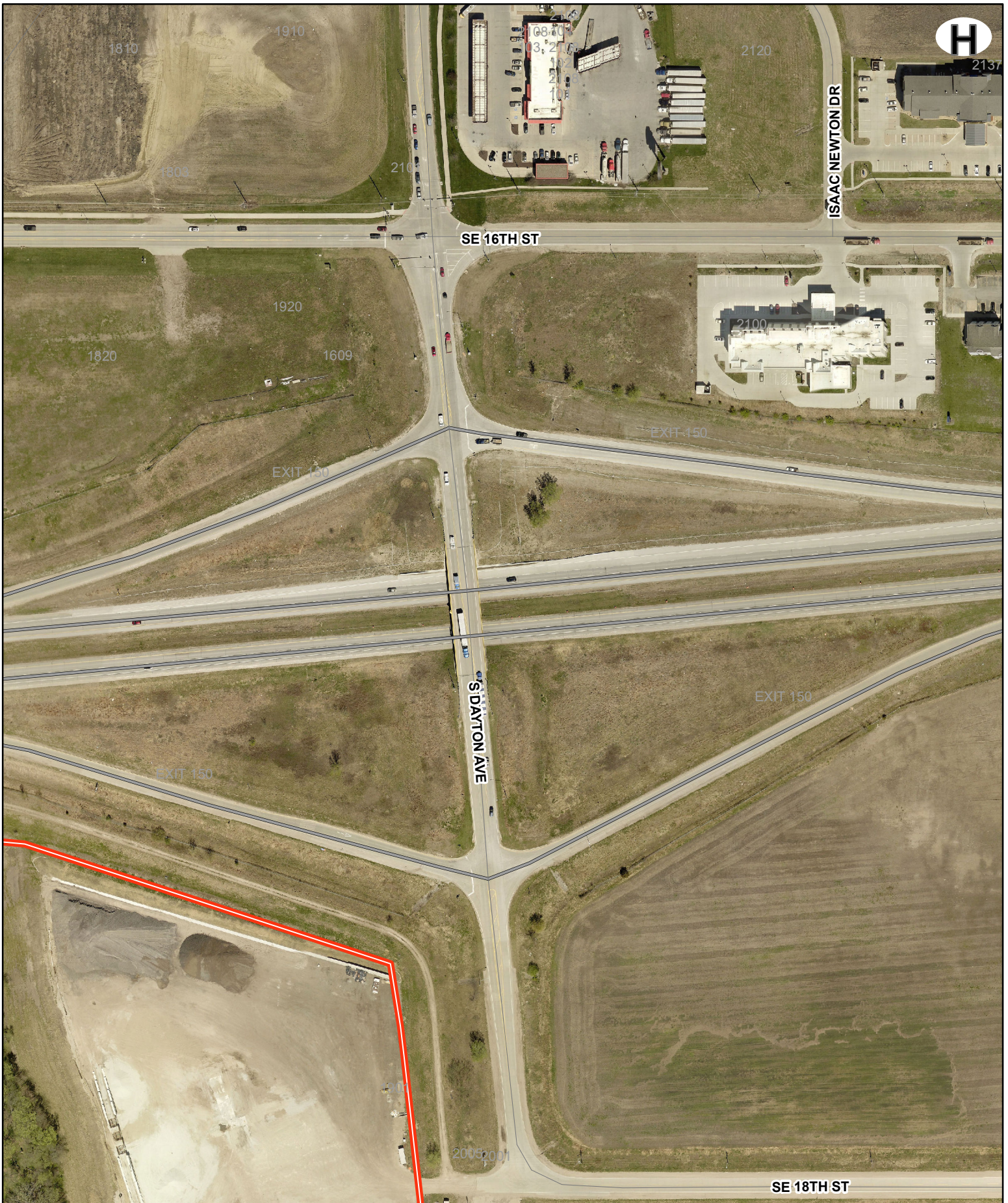
NORTH

1 inch = 200 feet

Date: 8/13/2020

2020-21 S. Dayton Improvements
US HWY 30 & SE 16th St
August 2020





2020/21 S. Dayton Ave Improvements
(US HWY 30 Ramp & SE 16th St)
Aerial Photograph



1 inch = 200 feet

Date: 8/13/2020



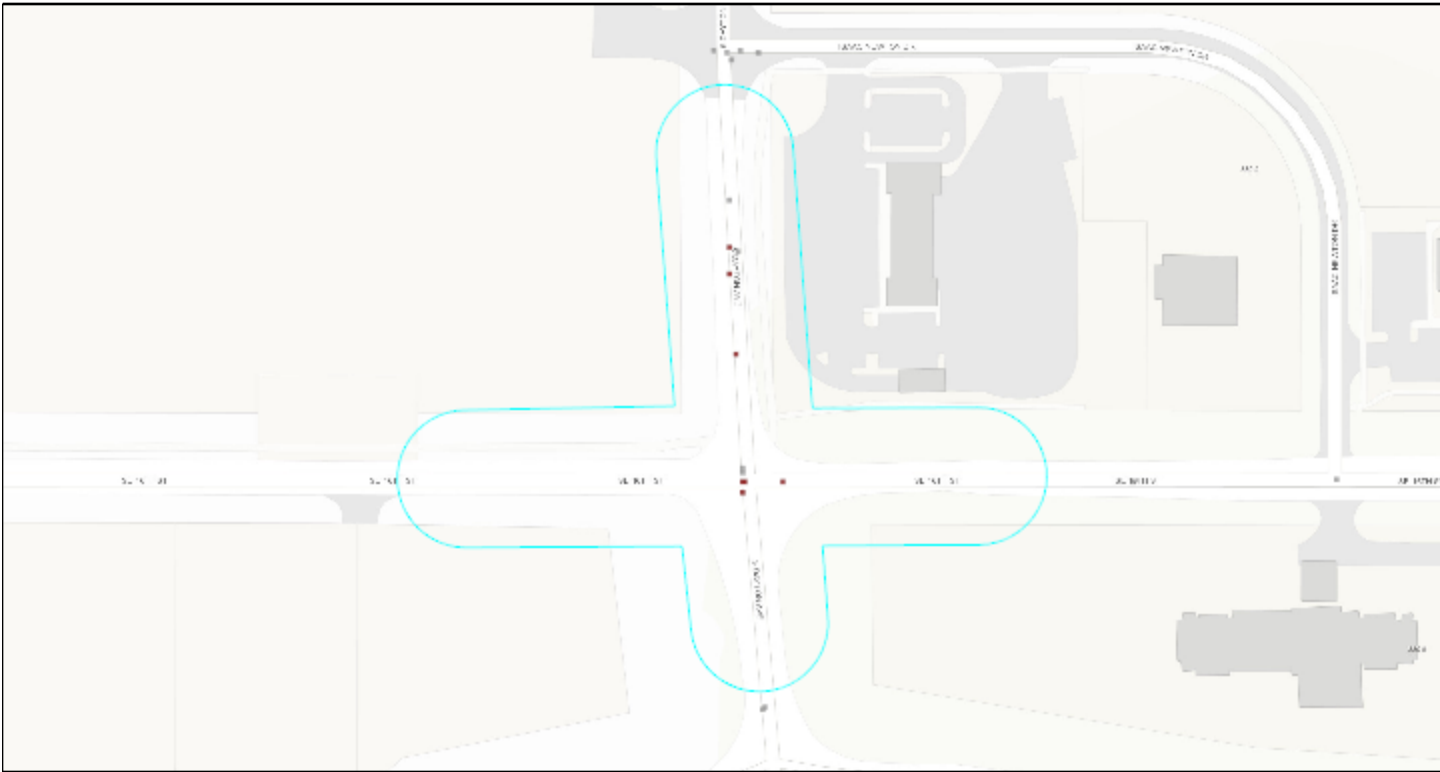
Iowa Crash Analysis Tool
Quick Report
2015-2019

Crash Severity		13
Fatal Crash		0
Suspected Serious Injury Crash		0
Suspected Minor Injury Crash		2
Possible/Unknown Injury Crash		1
Property Damage Only		10

Injury Status Summary		7
Fatalities		0
Suspected serious/incapacitating		0
Suspected minor/non-incapacitating		3
Possible (complaint of pain/injury)		4
Unknown		0

Property/Vehicles/Occupants	
Property Damage Total (dollars):	85,999.00
Average (per crash dollars):	6,615.31
Total Vehicles:	26.00
Average (per crash):	2.00
Total Occupants:	35.00
Average (per crash):	2.69

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.54
Major Injuries/Crash:	0.00
Minor Injuries/Crash:	0.23
Possible/Unknown Injuries/Crash:	0.31





Iowa Crash Analysis Tool
Quick Report
2015-2019

Major Cause			13
Animal	0	Ran traffic signal	1
Ran stop sign	0	Failed to yield to emergency vehicle	0
FTYROW: At uncontrolled intersection	0	FTYROW: Making right turn on red signal	0
FTYROW: From stop sign	0	FTYROW: From yield sign	0
FTYROW: Making left turn	1	FTYROW: From driveway	0
FTYROW: From parked position	0	FTYROW: To pedestrian	0
FTYROW: Other	1	Drove around RR grade crossing gates	0
Disregarded RR Signal	0	Crossed centerline (undivided)	0
Crossed median (divided)	0	Traveling wrong way or on wrong side of road	0
Aggressive driving/road rage	0	Driving too fast for conditions	0
Exceeded authorized speed	0	Improper or erratic lane changing	0
Operating vehicle in an reckless, erratic, ca...	1	Followed too close	5
Passing: On wrong side	0	Passing: Where prohibited by signs/markings	0
Passing: With insufficient distance/inadequa...	0	Passing: Through/around barrier	0
Passing: Other passing	0	Made improper turn	0
Driver Distraction: Manual operation of an e...	0	Driver Distraction: Talking on a hand-held d...	0
Driver Distraction: Talking on a hands free ...	0	Driver Distraction: Adjusting devices (radio...	0
Driver Distraction: Other electronic device ...	0	Driver Distraction: Passenger	0
Driver Distraction: Unrestrained animal	0	Driver Distraction: Reaching for object(s)/f...	0
Driver Distraction: Inattentive/lost in thou...	0	Driver Distraction: Other interior distracti...	0
Driver Distraction: Exterior distraction	0	Ran off road - right	0
Ran off road - straight	0	Ran off road - left	0
Lost control	0	Swerving/Evasive Action	0
Over correcting/over steering	0	Failed to keep in proper lane	0
Failure to signal intentions	0	Traveling on prohibited traffic way	0
Vehicle stopped on railroad tracks	0	Other: Vision obstructed	0
Other: Improper operation	0	Other: Disregarded warning sign	0
Other: Disregarded signs/road markings	0	Other: Illegal off-road driving	0
Downhill runaway	0	Separation of units	0
Towing improperly	0	Cargo/equipment loss or shift	0
Equipment failure	0	Oversized load/vehicle	0
Other: Getting off/out of vehicle	0	Failure to dim lights/have lights on	0
Improper backing	0	Improper starting	0
Illegally parked/unattended	0	Driving less than the posted speed limit	0
Operator inexperience	0	Other	3
Unknown	1	Not reported	0
Other: No improper action	0		



**Iowa Crash Analysis Tool
Quick Report
2015-2019**

Time of Day/Day of Week														
Day of Week	12 AM to 2 AM	2 AM to 4 AM	4 AM to 6 AM	6 AM to 8 AM	8 AM to 10 AM	10 AM to Noon	Noon to 2 PM	2 PM to 4 PM	4 PM to 6 PM	6 PM to 8 PM	8 PM to 10 PM	10 PM to 12 AM	Not reported	Total
Sunday	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Monday	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Tuesday	0	0	0	0	0	1	1	0	2	0	0	0	0	4
Wednesday	0	0	0	0	0	1	0	1	0	0	0	1	0	3
Thursday	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Friday	0	0	0	0	0	0	1	0	1	0	0	0	0	2
Saturday	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	0	0	0	0	0	2	2	1	6	1	0	1	0	13

Manner of Crash Collision	13
Non-collision (single vehicle)	0
Head-on (front to front)	0
Rear-end (front to rear)	9
Angle, oncoming left turn	1
Broadside (front to side)	2
Sideswipe, same direction	0
Sideswipe, opposite direction	0
Rear to rear	0
Rear to side	0
Not reported	0
Other	1
Unknown	0

Surface Conditions	13
Dry	12
Wet	1
Ice/frost	0
Snow	0
Slush	0
Mud, dirt	0
Water (standing or moving)	0
Sand	0
Oil	0
Gravel	0
Not reported	0
Other	0
Unknown	0

Fixed Object Struck	26		
Bridge overhead structure	0	Bridge pier or support	0
Bridge/bridge rail parapet	0	Curb/island/raised median	0
Ditch	0	Embankment	0
Ground	0	Culvert/pipe opening	0
Guardrail - face	0	Guardrail - end	0
Concrete traffic barrier (median or right sid...	0	Other traffic barrier	0
Cable barrier	0	Impact attenuator/crash cushion	0
Utility pole/light support	0	Traffic sign support	0
Traffic signal support	0	Other post/pole/support	0
Fire hydrant	0	Mailbox	0
Tree	0	Landscape/shrubbery	0
Snow bank	0	Fence	0
Wall	0	Building	0
Other fixed object	0	None (no fixed object struck)	26



Iowa Crash Analysis Tool
Quick Report
2015-2019

Driver Age/Driver Gender					
Driver Age - 5 year Bins	Female	Male	Not reported	Unknown	Total
< 14	0	0	0	0	0
= 14	0	0	0	0	0
= 15	0	0	0	0	0
= 16	0	0	0	0	0
= 17	1	0	0	0	1
= 18	0	0	0	0	0
= 19	0	1	0	0	1
= 20	2	0	0	0	2
>= 21 and <= 24	3	1	0	0	4
>= 25 and <= 29	2	0	0	0	2
>= 30 and <= 34	0	2	0	0	2
>= 35 and <= 39	2	1	0	0	3
>= 40 and <= 44	0	2	0	0	2
>= 45 and <= 49	0	1	0	0	1
>= 50 and <= 54	1	1	0	0	2
>= 55 and <= 59	0	2	0	0	2
>= 60 and <= 64	1	1	0	0	2
>= 65 and <= 69	0	0	0	0	0
>= 70 and <= 74	0	0	0	0	0
>= 75 and <= 79	0	0	0	0	0
>= 80 and <= 84	0	0	0	0	0
>= 85 and <= 89	1	0	0	0	1
>= 90 and <= 94	0	0	0	0	0
>= 95	0	0	0	0	0
Not reported	0	0	0	0	0
Unknown	0	0	0	0	0
Total	13	12	0	0	25

Alcohol Test Given	26
None	26
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

Drug Test Given	26
None	26
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

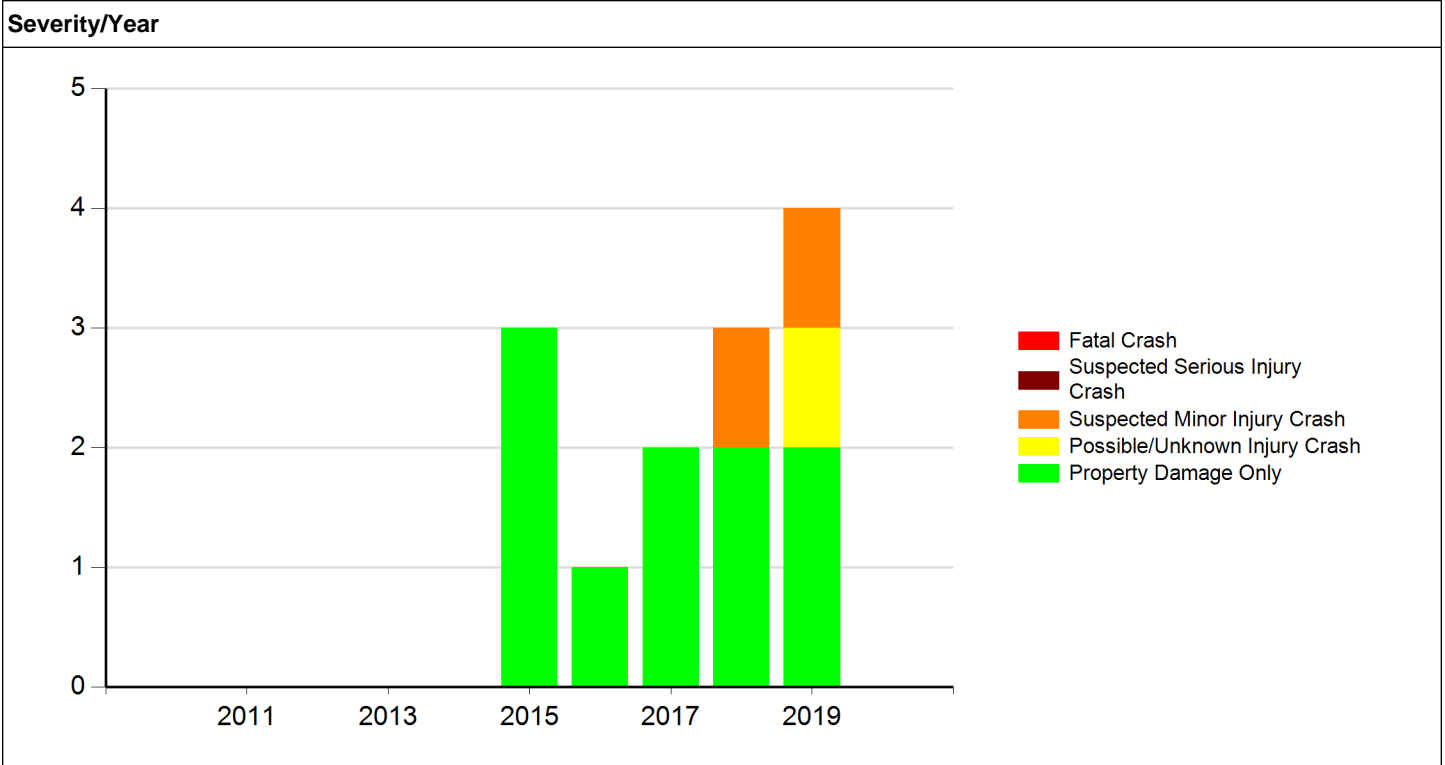
Drug Test Result	26
Negative	0
Cannabis	0
Central Nervous System depressants	0
Central Nervous System stimulants	0
Hallucinogens	0
Inhalants	0
Narcotic Analgesics	0
Dissociative Anesthetic (PCP)	0
Prescription Drug	0
Not reported	26
Other	0

Drug/Alcohol Related	13
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug/Alcohol (< Statutory)	0
Drug/Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	13



Iowa Crash Analysis Tool
Quick Report
2015-2019

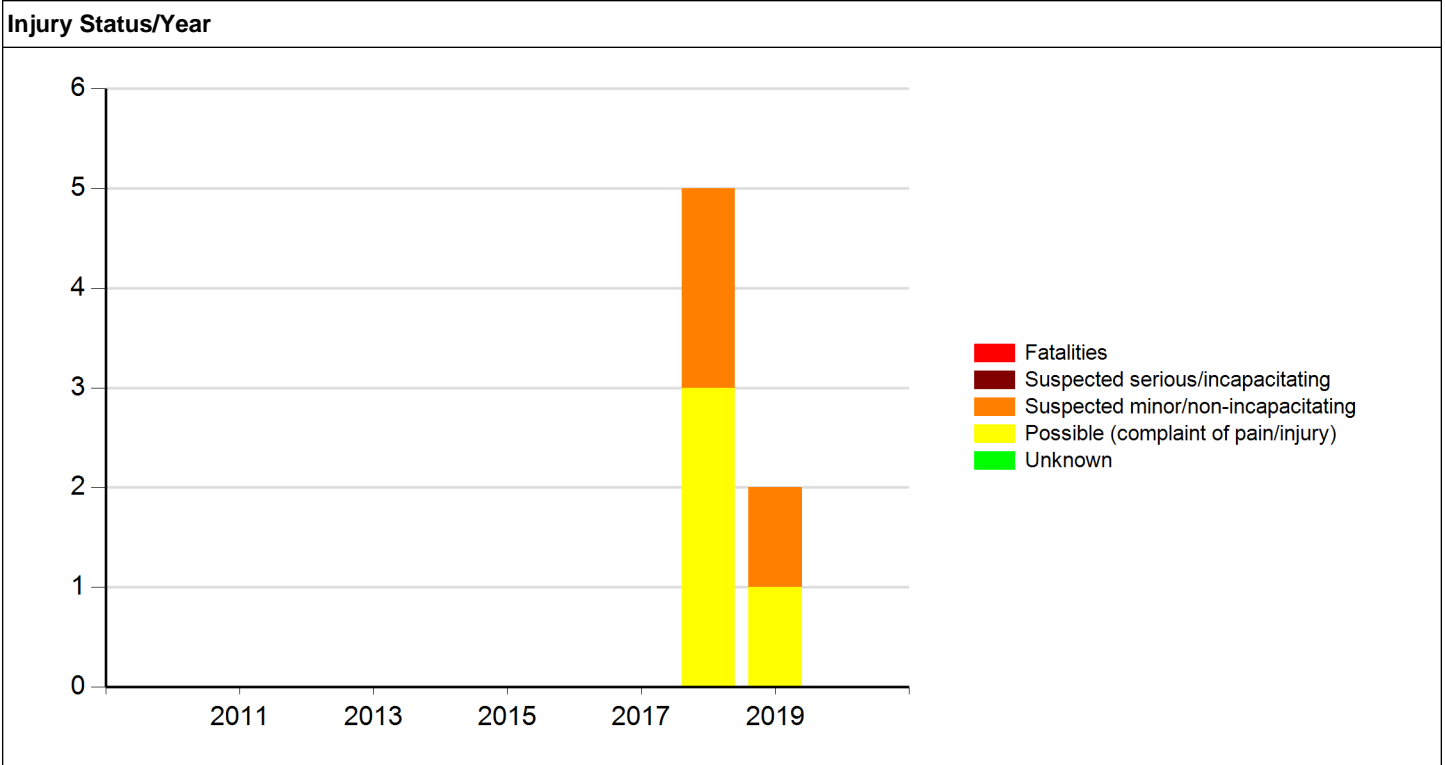
Crash Severity - Annual						
Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	Total
2010	0	0	0	0	0	0
2011	0	0	0	0	0	0
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	3	3
2016	0	0	0	0	1	1
2017	0	0	0	0	2	2
2018	0	0	1	0	2	3
2019	0	0	1	1	2	4
2020	0	0	0	0	0	0
Total	0	0	2	1	10	13





Iowa Crash Analysis Tool
Quick Report
2015-2019

Injury Status - Annual						
Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	Total
2010	0	0	0	0	0	0
2011	0	0	0	0	0	0
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	2	3	0	5
2019	0	0	1	1	0	2
2020	0	0	0	0	0	0
Total	0	0	3	4	0	7





Meeting the following criteria

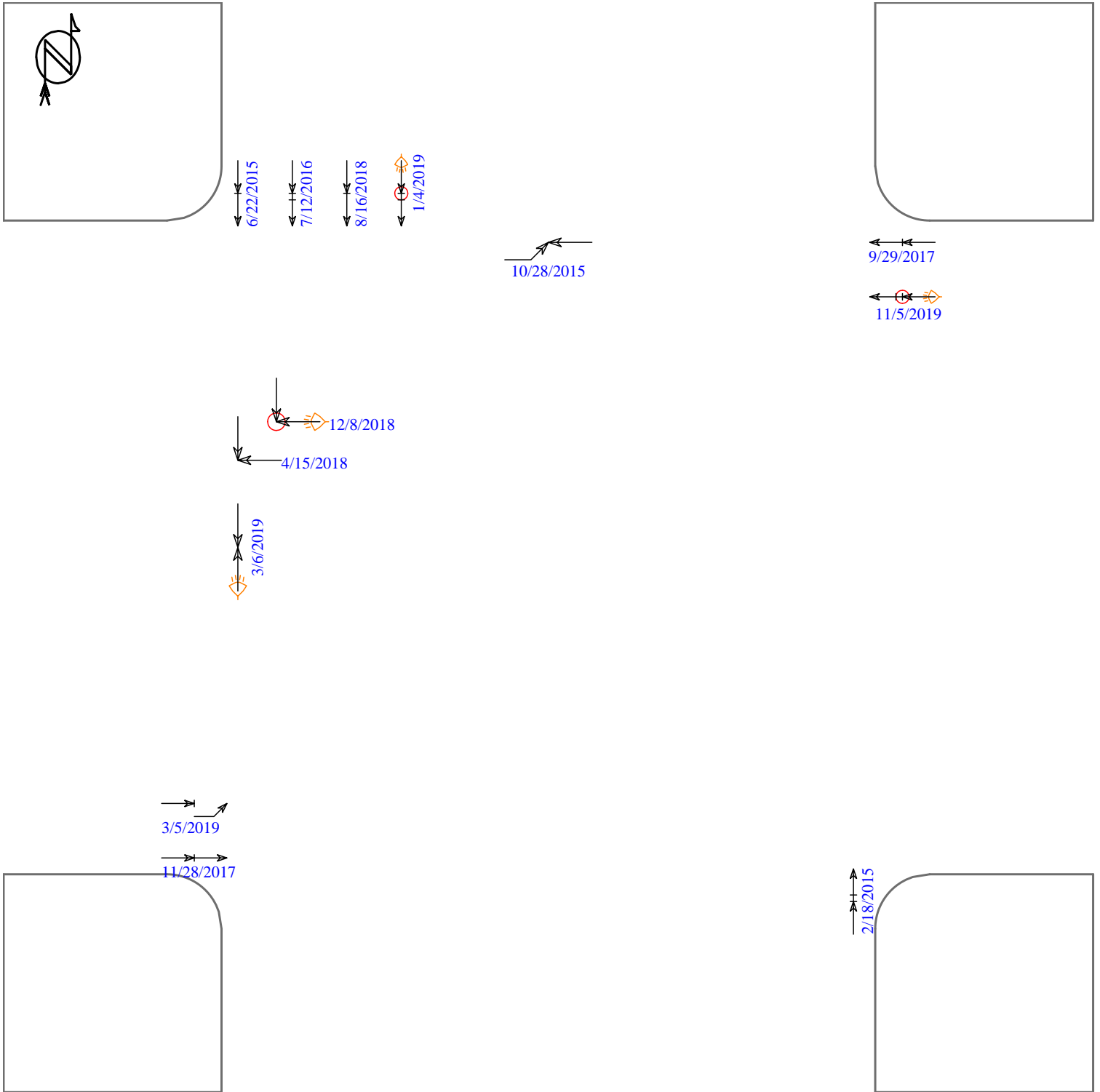
Jurisdiction: Statewide
Year: 2015, 2016, 2017, 2018, 2019
Map Selection: Yes
Filter: None

Analyst Information

SE 16th and S Dayton

13 Crashes

Clear



(0) crashes could not be placed in this schematic

- ← Straight
- ←| Stopped
- ← Unknown
- ↔ Backing
- ↔ Overtaking
- ↔ Sideswipe

- ▭ Parked
- ↔ Erratic
- ↔ Out of control
- ↗ Right turn
- ↖ Left turn
- ↪ U-turn

- × Pedestrian
- ⊗ Bicycle
- Injury
- Fatality
- ⚡ Nighttime
- ⚠ DUI

Fixed objects:

- General
- ⊞ Signal
- ⊞ Tree
- Pole
- ⊞ Curb
- ⊞ Animal
- ◁ 3rd vehicle
- * Extra data



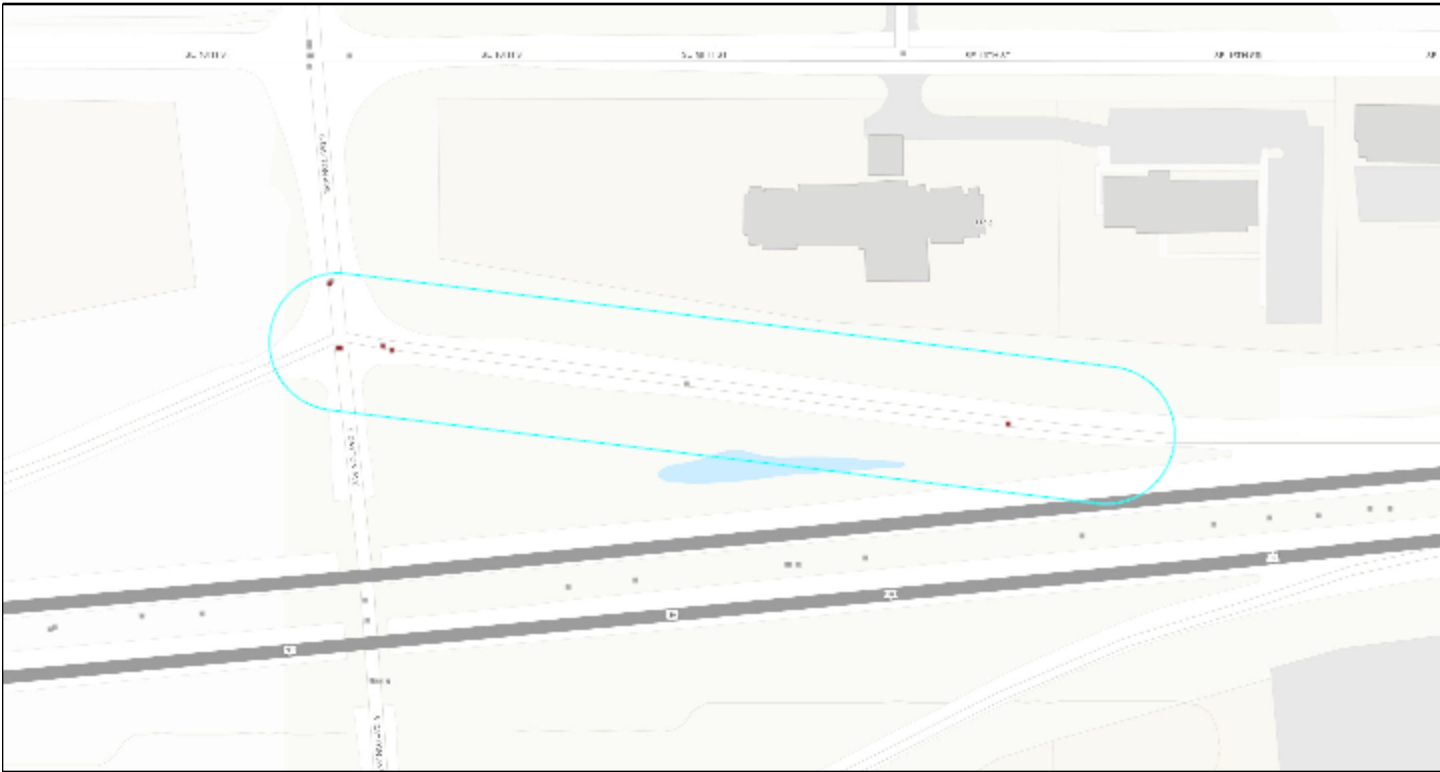
Iowa Crash Analysis Tool
Quick Report
2015-2019

Crash Severity	8
Fatal Crash	0
Suspected Serious Injury Crash	0
Suspected Minor Injury Crash	0
Possible/Unknown Injury Crash	0
Property Damage Only	8

Injury Status Summary	0
Fatalities	0
Suspected serious/incapacitating	0
Suspected minor/non-incapacitating	0
Possible (complaint of pain/injury)	0
Unknown	0

Property/Vehicles/Occupants	
Property Damage Total (dollars):	37,500.00
Average (per crash dollars):	4,687.50
Total Vehicles:	15.00
Average (per crash):	1.88
Total Occupants:	25.00
Average (per crash):	3.13

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.00
Major Injuries/Crash:	0.00
Minor Injuries/Crash:	0.00
Possible/Unknown Injuries/Crash:	0.00





Iowa Crash Analysis Tool
Quick Report
2015-2019

Major Cause			8
Animal	0	Ran traffic signal	0
Ran stop sign	0	Failed to yield to emergency vehicle	0
FTYROW: At uncontrolled intersection	0	FTYROW: Making right turn on red signal	0
FTYROW: From stop sign	1	FTYROW: From yield sign	0
FTYROW: Making left turn	0	FTYROW: From driveway	0
FTYROW: From parked position	0	FTYROW: To pedestrian	0
FTYROW: Other	0	Drove around RR grade crossing gates	0
Disregarded RR Signal	0	Crossed centerline (undivided)	0
Crossed median (divided)	0	Traveling wrong way or on wrong side of road	0
Aggressive driving/road rage	0	Driving too fast for conditions	0
Exceeded authorized speed	0	Improper or erratic lane changing	0
Operating vehicle in an reckless, erratic, ca...	0	Followed too close	5
Passing: On wrong side	0	Passing: Where prohibited by signs/markings	0
Passing: With insufficient distance/inadequa...	0	Passing: Through/around barrier	0
Passing: Other passing	0	Made improper turn	0
Driver Distraction: Manual operation of an e...	0	Driver Distraction: Talking on a hand-held d...	0
Driver Distraction: Talking on a hands free ...	0	Driver Distraction: Adjusting devices (radio...	0
Driver Distraction: Other electronic device ...	0	Driver Distraction: Passenger	0
Driver Distraction: Unrestrained animal	0	Driver Distraction: Reaching for object(s)/f...	0
Driver Distraction: Inattentive/lost in thou...	1	Driver Distraction: Other interior distracti...	0
Driver Distraction: Exterior distraction	0	Ran off road - right	0
Ran off road - straight	0	Ran off road - left	1
Lost control	0	Swerving/Evasive Action	0
Over correcting/over steering	0	Failed to keep in proper lane	0
Failure to signal intentions	0	Traveling on prohibited traffic way	0
Vehicle stopped on railroad tracks	0	Other: Vision obstructed	0
Other: Improper operation	0	Other: Disregarded warning sign	0
Other: Disregarded signs/road markings	0	Other: Illegal off-road driving	0
Downhill runaway	0	Separation of units	0
Towing improperly	0	Cargo/equipment loss or shift	0
Equipment failure	0	Oversized load/vehicle	0
Other: Getting off/out of vehicle	0	Failure to dim lights/have lights on	0
Improper backing	0	Improper starting	0
Illegally parked/unattended	0	Driving less than the posted speed limit	0
Operator inexperience	0	Other	0
Unknown	0	Not reported	0
Other: No improper action	0		



**Iowa Crash Analysis Tool
Quick Report
2015-2019**

Time of Day/Day of Week														
Day of Week	12 AM to 2 AM	2 AM to 4 AM	4 AM to 6 AM	6 AM to 8 AM	8 AM to 10 AM	10 AM to Noon	Noon to 2 PM	2 PM to 4 PM	4 PM to 6 PM	6 PM to 8 PM	8 PM to 10 PM	10 PM to 12 AM	Not reported	Total
Sunday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuesday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wednesday	0	0	0	0	2	0	0	0	0	0	1	0	0	3
Thursday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Friday	0	0	0	1	1	0	0	0	1	0	0	0	0	3
Saturday	0	0	0	0	1	0	1	0	0	0	0	0	0	2
Total	0	0	0	1	4	0	1	0	1	0	1	0	0	8

Manner of Crash Collision	8
Non-collision (single vehicle)	1
Head-on (front to front)	0
Rear-end (front to rear)	6
Angle, oncoming left turn	0
Broadside (front to side)	1
Sideswipe, same direction	0
Sideswipe, opposite direction	0
Rear to rear	0
Rear to side	0
Not reported	0
Other	0
Unknown	0

Surface Conditions	8
Dry	7
Wet	1
Ice/frost	0
Snow	0
Slush	0
Mud, dirt	0
Water (standing or moving)	0
Sand	0
Oil	0
Gravel	0
Not reported	0
Other	0
Unknown	0

Fixed Object Struck	15
Bridge overhead structure	0
Bridge/bridge rail parapet	0
Ditch	0
Ground	0
Guardrail - face	0
Concrete traffic barrier (median or right sid...	0
Cable barrier	0
Utility pole/light support	0
Traffic signal support	0
Fire hydrant	0
Tree	0
Snow bank	0
Wall	0
Other fixed object	0
Bridge pier or support	0
Curb/island/raised median	0
Embankment	0
Culvert/pipe opening	0
Guardrail - end	0
Other traffic barrier	0
Impact attenuator/crash cushion	0
Traffic sign support	1
Other post/pole/support	0
Mailbox	0
Landscape/shrubbery	0
Fence	0
Building	0
None (no fixed object struck)	14



Iowa Crash Analysis Tool
Quick Report
2015-2019

Driver Age/Driver Gender					
Driver Age - 5 year Bins	Female	Male	Not reported	Unknown	Total
< 14	0	0	0	0	0
= 14	0	0	0	0	0
= 15	0	0	0	0	0
= 16	0	0	0	0	0
= 17	0	0	0	0	0
= 18	0	0	0	0	0
= 19	0	1	0	0	1
= 20	0	1	0	0	1
>= 21 and <= 24	2	0	0	0	2
>= 25 and <= 29	1	2	0	0	3
>= 30 and <= 34	0	0	1	0	1
>= 35 and <= 39	1	0	0	0	1
>= 40 and <= 44	0	1	0	0	1
>= 45 and <= 49	0	0	0	0	0
>= 50 and <= 54	1	0	0	0	1
>= 55 and <= 59	0	1	0	0	1
>= 60 and <= 64	0	3	0	0	3
>= 65 and <= 69	0	0	0	0	0
>= 70 and <= 74	0	0	0	0	0
>= 75 and <= 79	0	0	0	0	0
>= 80 and <= 84	0	0	0	0	0
>= 85 and <= 89	0	0	0	0	0
>= 90 and <= 94	0	0	0	0	0
>= 95	0	0	0	0	0
Not reported	0	0	0	0	0
Unknown	0	0	0	0	0
Total	5	9	1	0	15

Alcohol Test Given	15
None	15
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

Drug Test Given	15
None	15
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

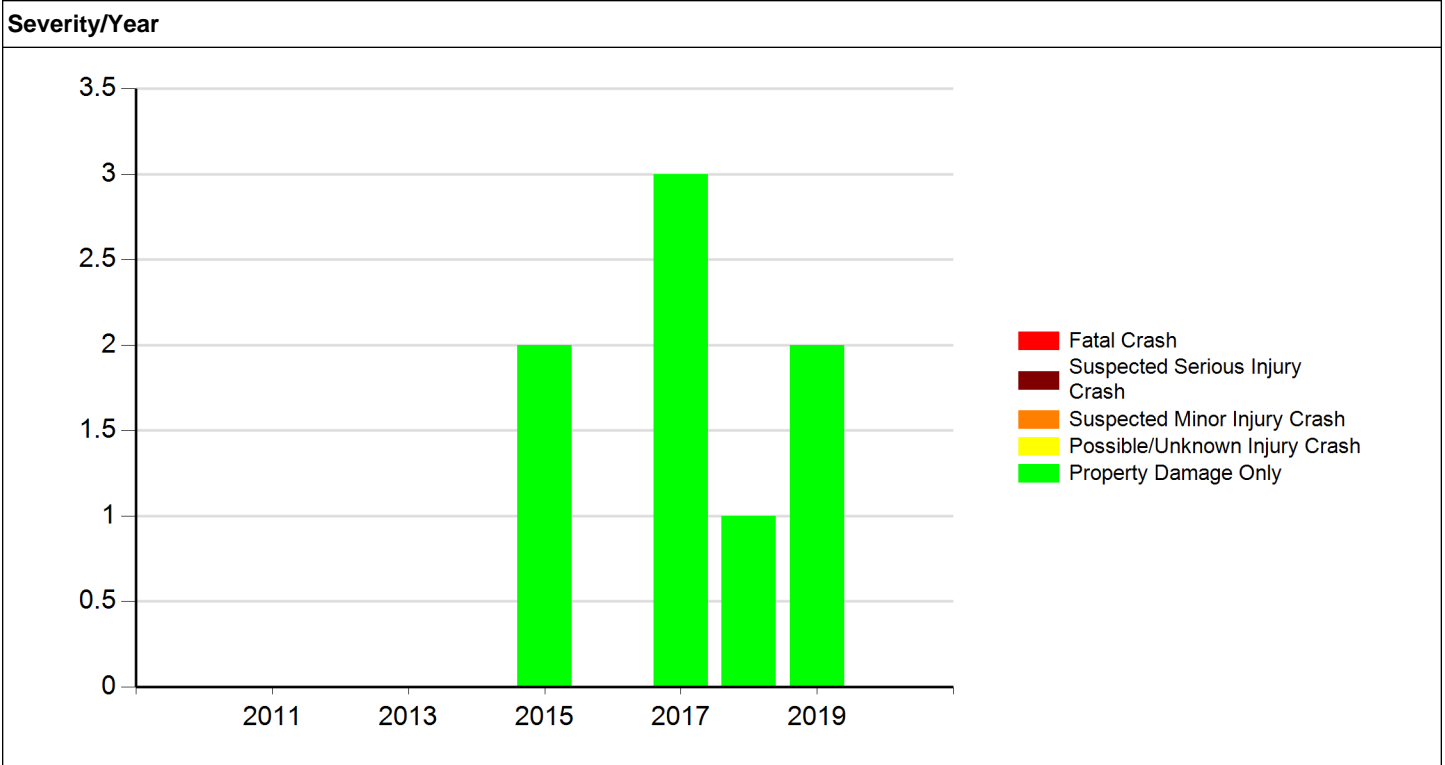
Drug Test Result	15
Negative	0
Cannabis	0
Central Nervous System depressants	0
Central Nervous System stimulants	0
Hallucinogens	0
Inhalants	0
Narcotic Analgesics	0
Dissociative Anesthetic (PCP)	0
Prescription Drug	0
Not reported	15
Other	0

Drug/Alcohol Related	8
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug/Alcohol (< Statutory)	0
Drug/Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	8



Iowa Crash Analysis Tool
Quick Report
2015-2019

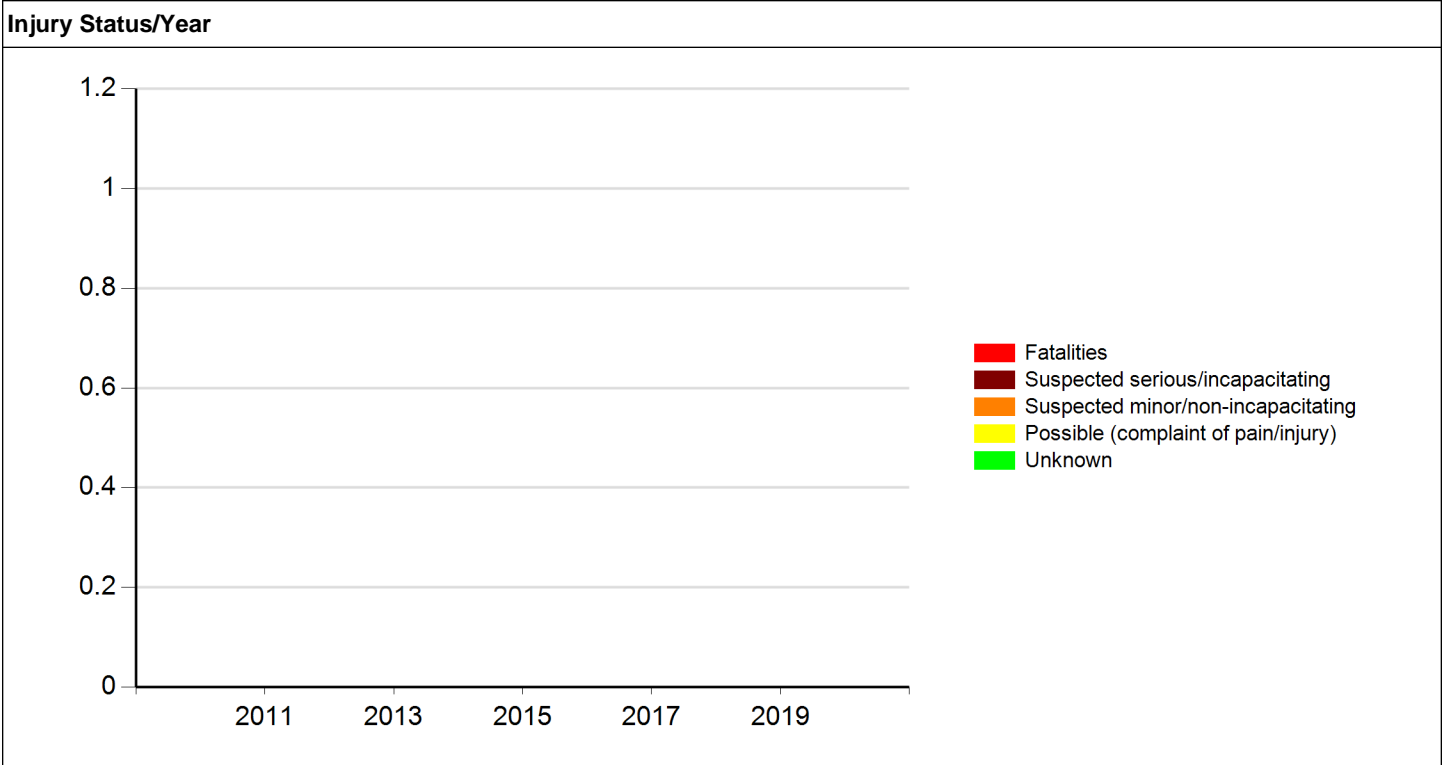
Crash Severity - Annual						
Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	Total
2010	0	0	0	0	0	0
2011	0	0	0	0	0	0
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	2	2
2016	0	0	0	0	0	0
2017	0	0	0	0	3	3
2018	0	0	0	0	1	1
2019	0	0	0	0	2	2
2020	0	0	0	0	0	0
Total	0	0	0	0	8	8





Iowa Crash Analysis Tool
Quick Report
2015-2019

Injury Status - Annual						
Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	Total
2010	0	0	0	0	0	0
2011	0	0	0	0	0	0
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
Total	0	0	0	0	0	0





Meeting the following criteria

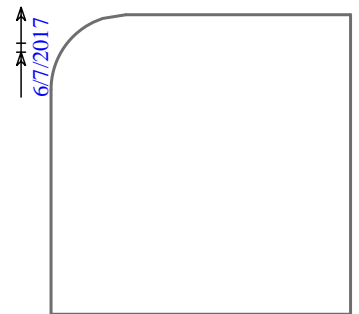
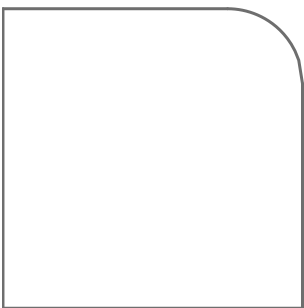
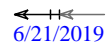
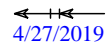
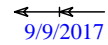
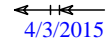
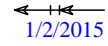
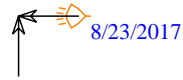
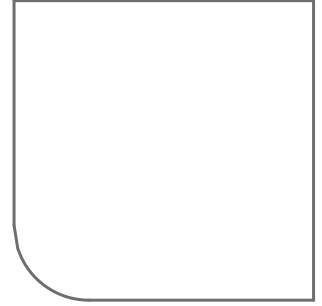
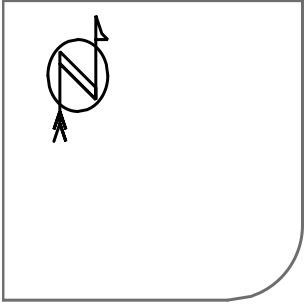
Jurisdiction: Statewide
Year: 2015, 2016, 2017, 2018, 2019
Map Selection: Yes
Filter: None

Analyst Information

WB Off-Ramp

8 Crashes

Clear



(0) crashes could not be placed in this schematic

- ← Straight
- ←| Stopped
- ← Unknown
- ↔ Backing
- ↔ Overtaking
- ↔ Sideswipe

- ▭ Parked
- ↔ Erratic
- ↔ Out of control
- ↘ Right turn
- ↙ Left turn
- ↻ U-turn

- × Pedestrian
- ⊗ Bicycle
- Injury
- Fatality
- ⚡ Nighttime
- ⚠ DUI

Fixed objects:

- General
- ⊞ Signal
- ⊞ Tree
- ⊞ Pole
- ⊞ Curb
- ⊞ Animal
- ◁ 3rd vehicle
- * Extra data



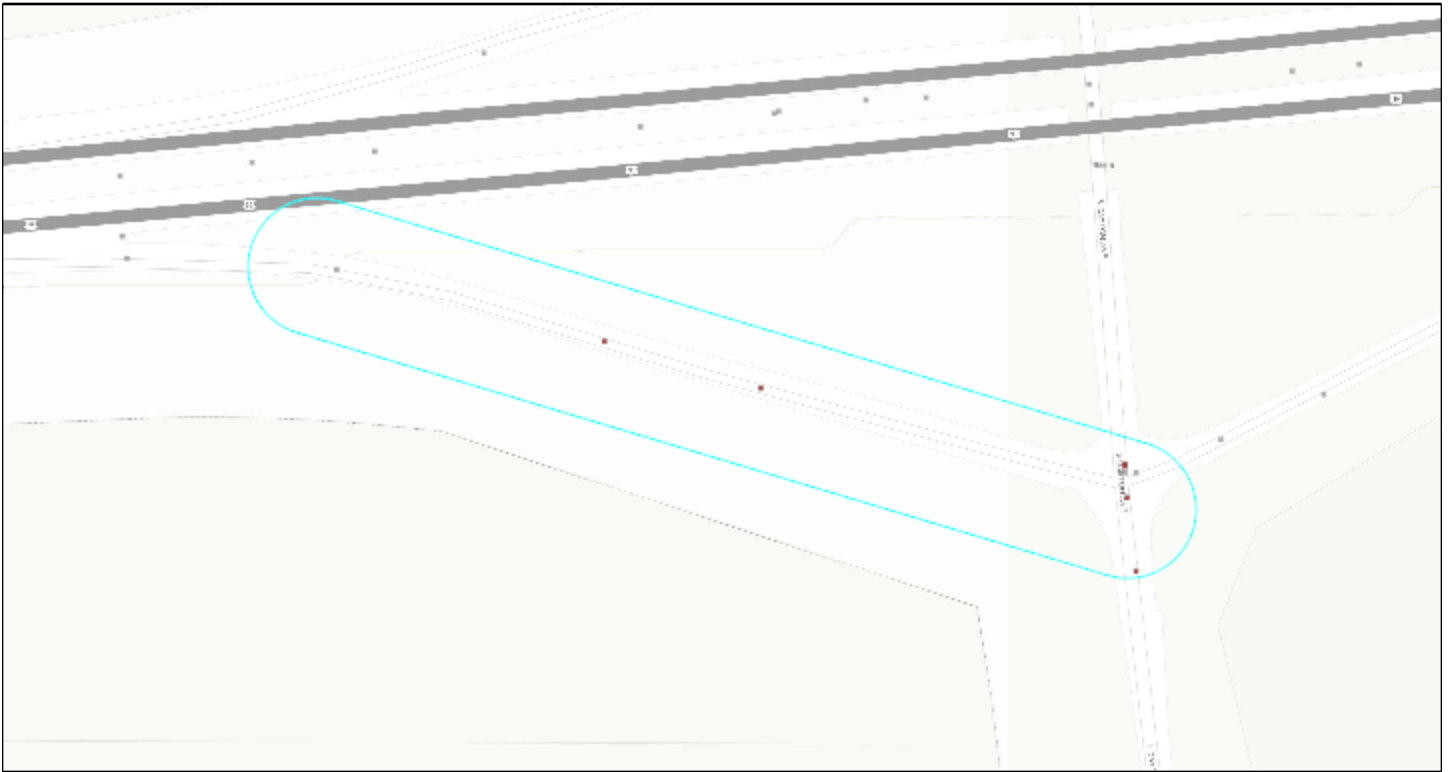
Iowa Crash Analysis Tool
Quick Report
2015-2019

Crash Severity		8
Fatal Crash		0
Suspected Serious Injury Crash		1
Suspected Minor Injury Crash		0
Possible/Unknown Injury Crash		0
Property Damage Only		7

Injury Status Summary		1
Fatalities		0
Suspected serious/incapacitating		1
Suspected minor/non-incapacitating		0
Possible (complaint of pain/injury)		0
Unknown		0

Property/Vehicles/Occupants	
Property Damage Total (dollars):	67,900.00
Average (per crash dollars):	8,487.50
Total Vehicles:	12.00
Average (per crash):	1.50
Total Occupants:	14.00
Average (per crash):	1.75

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.13
Major Injuries/Crash:	0.13
Minor Injuries/Crash:	0.00
Possible/Unknown Injuries/Crash:	0.00





Iowa Crash Analysis Tool
Quick Report
2015-2019

Major Cause			8
Animal	2	Ran traffic signal	0
Ran stop sign	1	Failed to yield to emergency vehicle	0
FTYROW: At uncontrolled intersection	0	FTYROW: Making right turn on red signal	0
FTYROW: From stop sign	2	FTYROW: From yield sign	0
FTYROW: Making left turn	0	FTYROW: From driveway	0
FTYROW: From parked position	0	FTYROW: To pedestrian	0
FTYROW: Other	0	Drove around RR grade crossing gates	0
Disregarded RR Signal	0	Crossed centerline (undivided)	0
Crossed median (divided)	0	Traveling wrong way or on wrong side of road	0
Aggressive driving/road rage	0	Driving too fast for conditions	0
Exceeded authorized speed	0	Improper or erratic lane changing	0
Operating vehicle in an reckless, erratic, ca...	0	Followed too close	2
Passing: On wrong side	0	Passing: Where prohibited by signs/markings	0
Passing: With insufficient distance/inadequa...	0	Passing: Through/around barrier	0
Passing: Other passing	0	Made improper turn	0
Driver Distraction: Manual operation of an e...	0	Driver Distraction: Talking on a hand-held d...	0
Driver Distraction: Talking on a hands free ...	0	Driver Distraction: Adjusting devices (radio...	0
Driver Distraction: Other electronic device ...	0	Driver Distraction: Passenger	0
Driver Distraction: Unrestrained animal	0	Driver Distraction: Reaching for object(s)/f...	0
Driver Distraction: Inattentive/lost in thou...	0	Driver Distraction: Other interior distracti...	0
Driver Distraction: Exterior distraction	0	Ran off road - right	0
Ran off road - straight	1	Ran off road - left	0
Lost control	0	Swerving/Evasive Action	0
Over correcting/over steering	0	Failed to keep in proper lane	0
Failure to signal intentions	0	Traveling on prohibited traffic way	0
Vehicle stopped on railroad tracks	0	Other: Vision obstructed	0
Other: Improper operation	0	Other: Disregarded warning sign	0
Other: Disregarded signs/road markings	0	Other: Illegal off-road driving	0
Downhill runaway	0	Separation of units	0
Towing improperly	0	Cargo/equipment loss or shift	0
Equipment failure	0	Oversized load/vehicle	0
Other: Getting off/out of vehicle	0	Failure to dim lights/have lights on	0
Improper backing	0	Improper starting	0
Illegally parked/unattended	0	Driving less than the posted speed limit	0
Operator inexperience	0	Other	0
Unknown	0	Not reported	0
Other: No improper action	0		



**Iowa Crash Analysis Tool
Quick Report
2015-2019**

Time of Day/Day of Week														
Day of Week	12 AM to 2 AM	2 AM to 4 AM	4 AM to 6 AM	6 AM to 8 AM	8 AM to 10 AM	10 AM to Noon	Noon to 2 PM	2 PM to 4 PM	4 PM to 6 PM	6 PM to 8 PM	8 PM to 10 PM	10 PM to 12 AM	Not reported	Total
Sunday	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Monday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuesday	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Wednesday	0	0	0	1	2	0	1	0	0	0	0	0	0	4
Thursday	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Friday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Saturday	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Total	0	0	1	2	2	0	2	0	0	0	1	0	0	8

Manner of Crash Collision	8
Non-collision (single vehicle)	2
Head-on (front to front)	0
Rear-end (front to rear)	2
Angle, oncoming left turn	0
Broadside (front to side)	2
Sideswipe, same direction	0
Sideswipe, opposite direction	0
Rear to rear	0
Rear to side	0
Not reported	2
Other	0
Unknown	0

Surface Conditions	8
Dry	5
Wet	1
Ice/frost	0
Snow	0
Slush	0
Mud, dirt	0
Water (standing or moving)	0
Sand	0
Oil	0
Gravel	0
Not reported	2
Other	0
Unknown	0

Fixed Object Struck	12
Bridge overhead structure	0
Bridge/bridge rail parapet	0
Ditch	0
Ground	0
Guardrail - face	0
Concrete traffic barrier (median or right sid...)	0
Cable barrier	0
Utility pole/light support	0
Traffic signal support	0
Fire hydrant	0
Tree	0
Snow bank	0
Wall	0
Other fixed object	0
Bridge pier or support	0
Curb/island/raised median	0
Embankment	0
Culvert/pipe opening	0
Guardrail - end	0
Other traffic barrier	0
Impact attenuator/crash cushion	0
Traffic sign support	0
Other post/pole/support	0
Mailbox	0
Landscape/shrubbery	0
Fence	0
Building	0
None (no fixed object struck)	12



Iowa Crash Analysis Tool
Quick Report
2015-2019

Driver Age/Driver Gender					
Driver Age - 5 year Bins	Female	Male	Not reported	Unknown	Total
< 14	0	0	0	0	0
= 14	0	0	0	0	0
= 15	0	0	0	0	0
= 16	0	0	0	0	0
= 17	0	0	0	0	0
= 18	0	0	0	0	0
= 19	0	2	0	0	2
= 20	1	0	0	0	1
>= 21 and <= 24	0	1	0	0	1
>= 25 and <= 29	0	0	0	0	0
>= 30 and <= 34	1	2	0	0	3
>= 35 and <= 39	0	0	0	0	0
>= 40 and <= 44	0	1	0	0	1
>= 45 and <= 49	0	0	0	0	0
>= 50 and <= 54	0	1	0	0	1
>= 55 and <= 59	0	0	0	0	0
>= 60 and <= 64	0	1	0	0	1
>= 65 and <= 69	0	1	0	0	1
>= 70 and <= 74	0	0	0	0	0
>= 75 and <= 79	0	0	0	0	0
>= 80 and <= 84	0	0	0	0	0
>= 85 and <= 89	0	0	0	0	0
>= 90 and <= 94	0	0	0	0	0
>= 95	0	0	0	0	0
Not reported	0	0	0	0	0
Unknown	0	0	1	0	1
Total	2	9	1	0	12

Alcohol Test Given	12
None	11
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	1

Drug Test Given	12
None	11
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	1

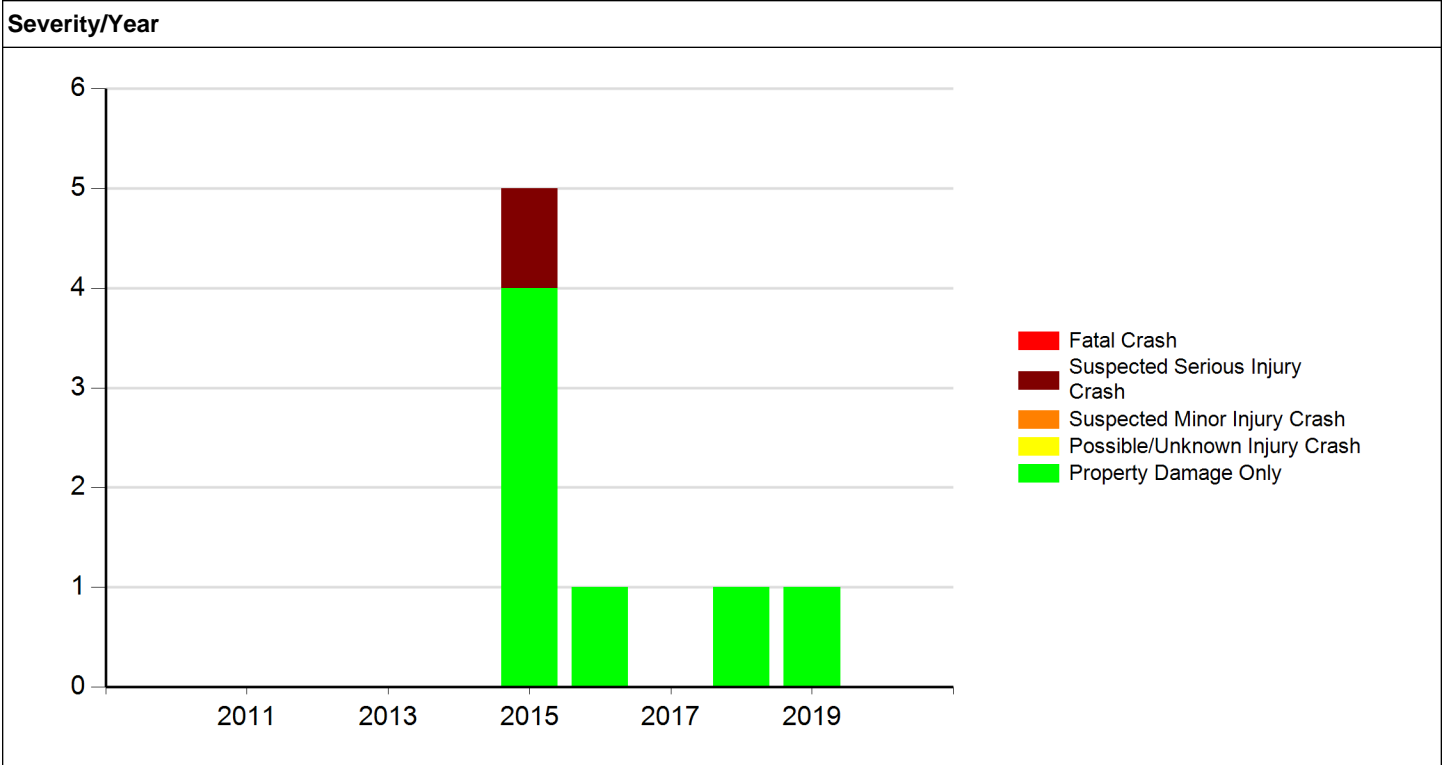
Drug Test Result	12
Negative	0
Cannabis	0
Central Nervous System depressants	0
Central Nervous System stimulants	0
Hallucinogens	0
Inhalants	0
Narcotic Analgesics	0
Dissociative Anesthetic (PCP)	0
Prescription Drug	0
Not reported	12
Other	0

Drug/Alcohol Related	8
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug/Alcohol (< Statutory)	0
Drug/Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	8



Iowa Crash Analysis Tool
Quick Report
2015-2019

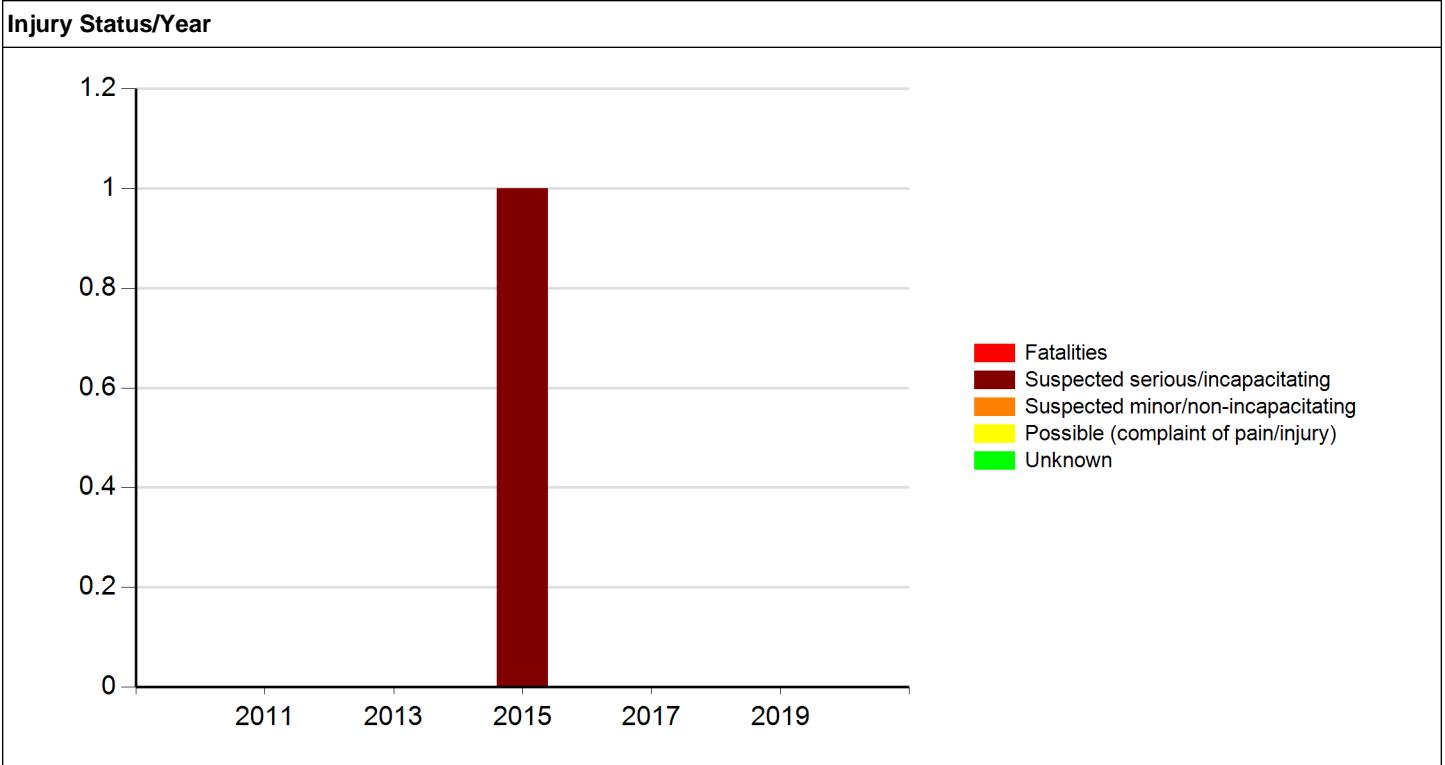
Crash Severity - Annual							
Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	Total	
2010	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0
2015	0	1	0	0	4	5	5
2016	0	0	0	0	1	1	1
2017	0	0	0	0	0	0	0
2018	0	0	0	0	1	1	1
2019	0	0	0	0	1	1	1
2020	0	0	0	0	0	0	0
Total	0	1	0	0	7	8	8





Iowa Crash Analysis Tool
Quick Report
2015-2019

Injury Status - Annual						
Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	Total
2010	0	0	0	0	0	0
2011	0	0	0	0	0	0
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	1	0	0	0	1
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
Total	0	1	0	0	0	1





Meeting the following criteria

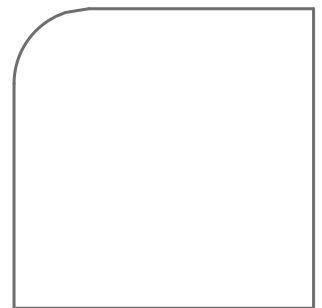
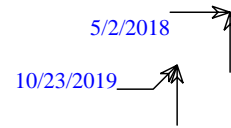
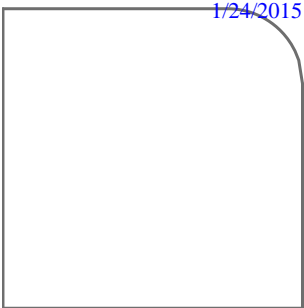
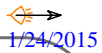
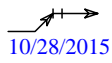
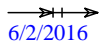
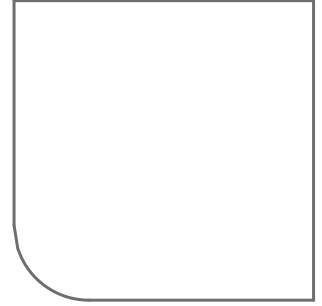
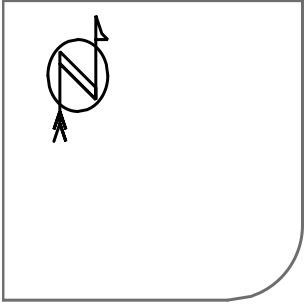
Jurisdiction: Statewide
Year: 2015, 2016, 2017, 2018, 2019
Map Selection: Yes
Filter: None

Analyst Information

EB Off-Ramp

8 Crashes

Clear



(2) crashes could not be placed in this schematic

- ← Straight
- ←| Stopped
- ← Unknown
- ↔ Backing
- ↔ Overtaking
- ↔ Sideswipe

- ▭ Parked
- ↔ Erratic
- ↔ Out of control
- ↗ Right turn
- ↖ Left turn
- ↪ U-turn

- × Pedestrian
- ⊗ Bicycle
- Injury
- Fatality
- ⚡ Nighttime
- ⚠ DUI

Fixed objects:

- General
- ⊞ Signal
- ⊞ Tree
- Pole
- ⊞ Curb
- ⊞ Animal
- ◁ 3rd vehicle
- * Extra data

2020 S Dayton Interchange Study - TMC

Thu Nov 7, 2019

AM Peak (Nov 07 2019 7:45AM - 8:45 AM)

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

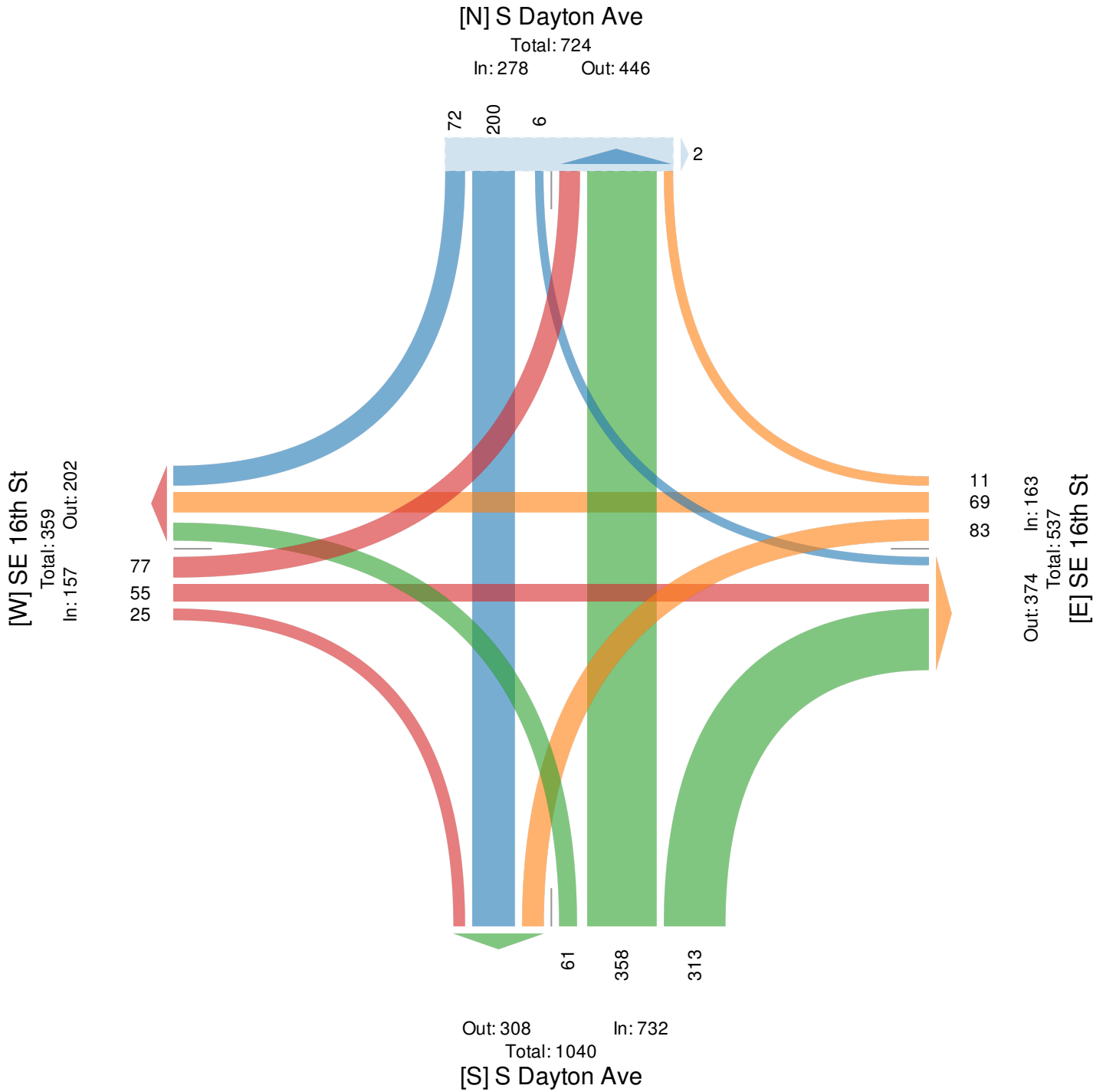
All Movements

ID: 743576, Location: 42.008262, -93.586614

Provided by: City of Ames

(IA)

515 Clark Avenue,
Ames, IA, 12345, US



2020 S Dayton Interchange Study - TMC

Thu Nov 7, 2019

PM Peak (Nov 07 2019 5PM - 6 PM) - Overall Peak Hour

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

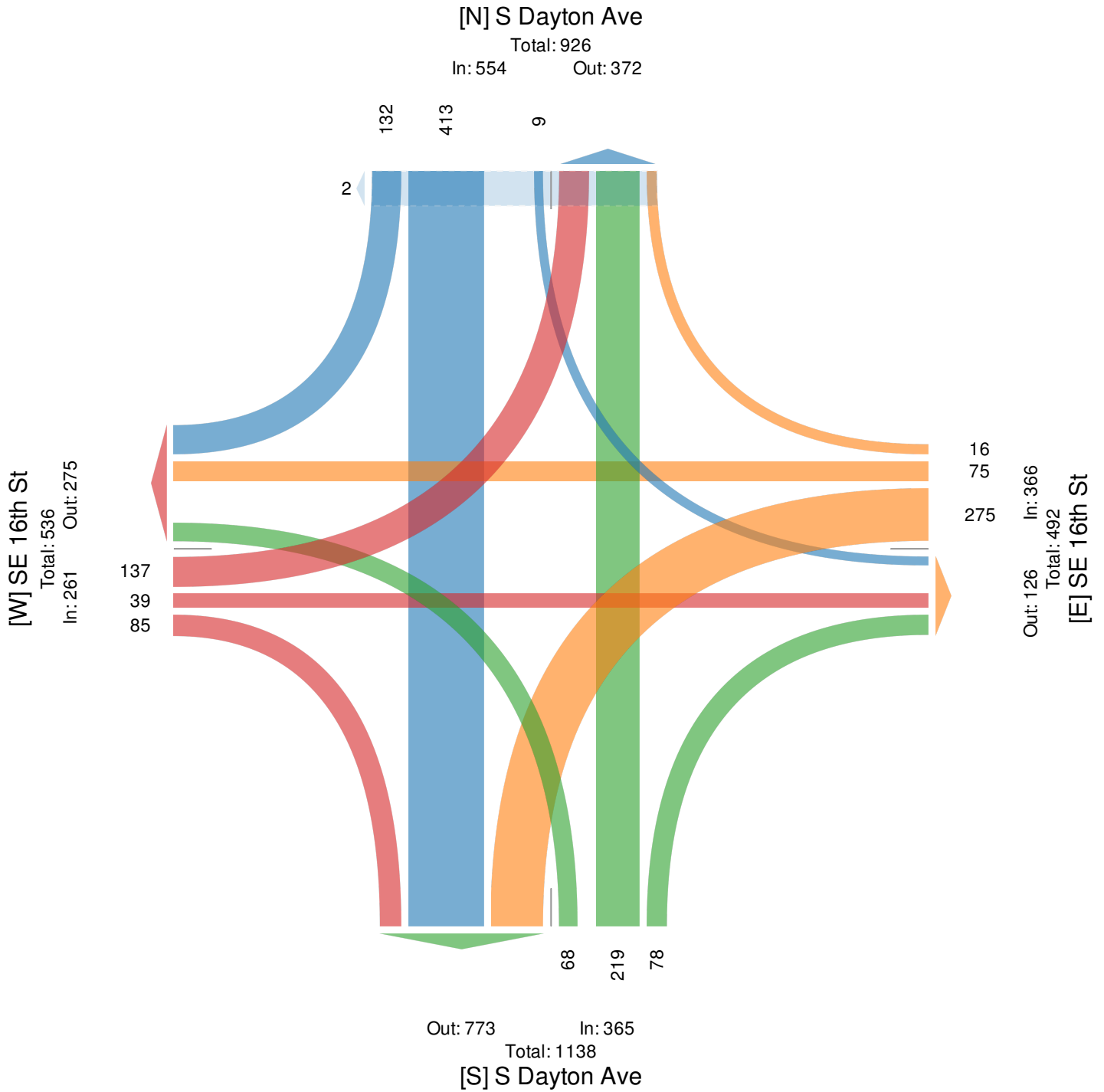
ID: 743576, Location: 42.008262, -93.586614

Provided by: City of Ames

(IA)

515 Clark Avenue,

Ames, IA, 12345, US



2020 S Dayton Interchange Study - TMC

Thu Nov 7, 2019

AM Peak (7:15 AM - 8:15 AM) - Overall Peak Hour

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

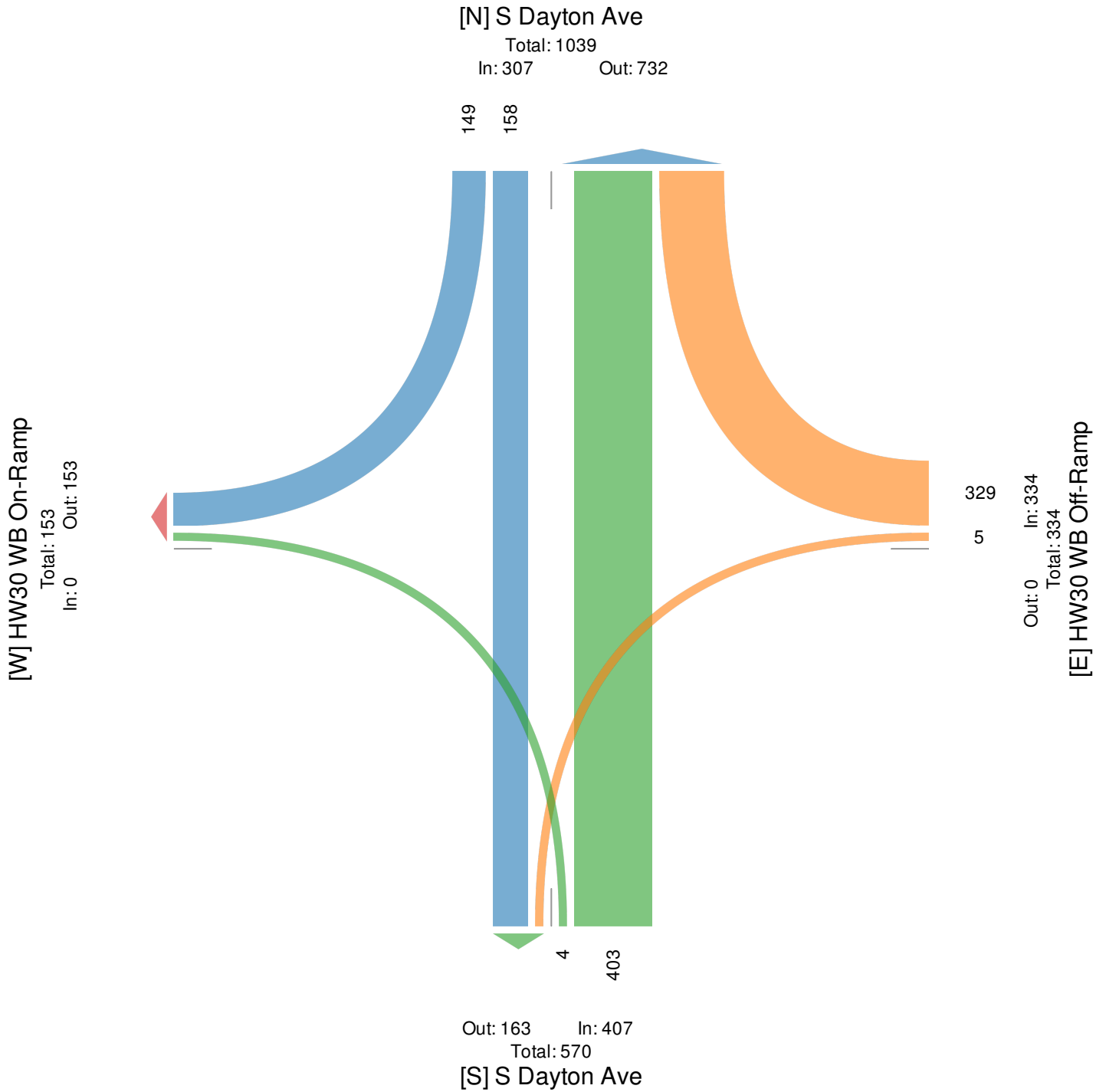
ID: 743579, Location: 42.007423, -93.586506

Provided by: City of Ames

(IA)

515 Clark Avenue,

Ames, IA, 12345, US



2020 S Dayton Interchange Study - TMC

Thu Nov 7, 2019

PM Peak (Nov 07 2019 4:30PM - 5:30 PM) - Overall Peak Hour

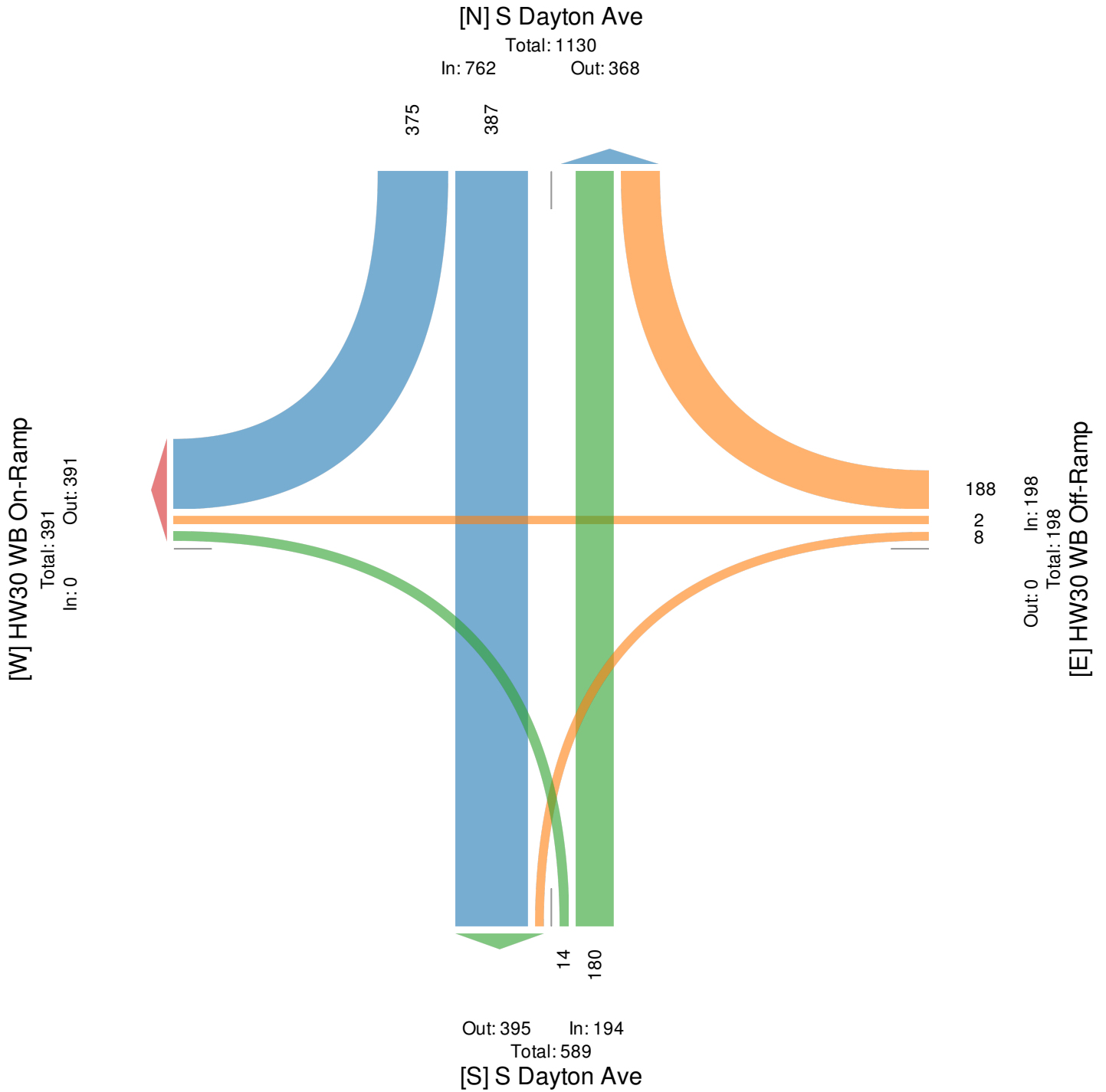
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 743581, Location: 42.007423, -93.586506

Provided by: City of Ames
(IA)

515 Clark Avenue,
Ames, IA, 12345, US



2020 S Dayton Interchange Study - TMC

Thu Nov 7, 2019

AM Peak (7:15 AM - 8:15 AM)

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

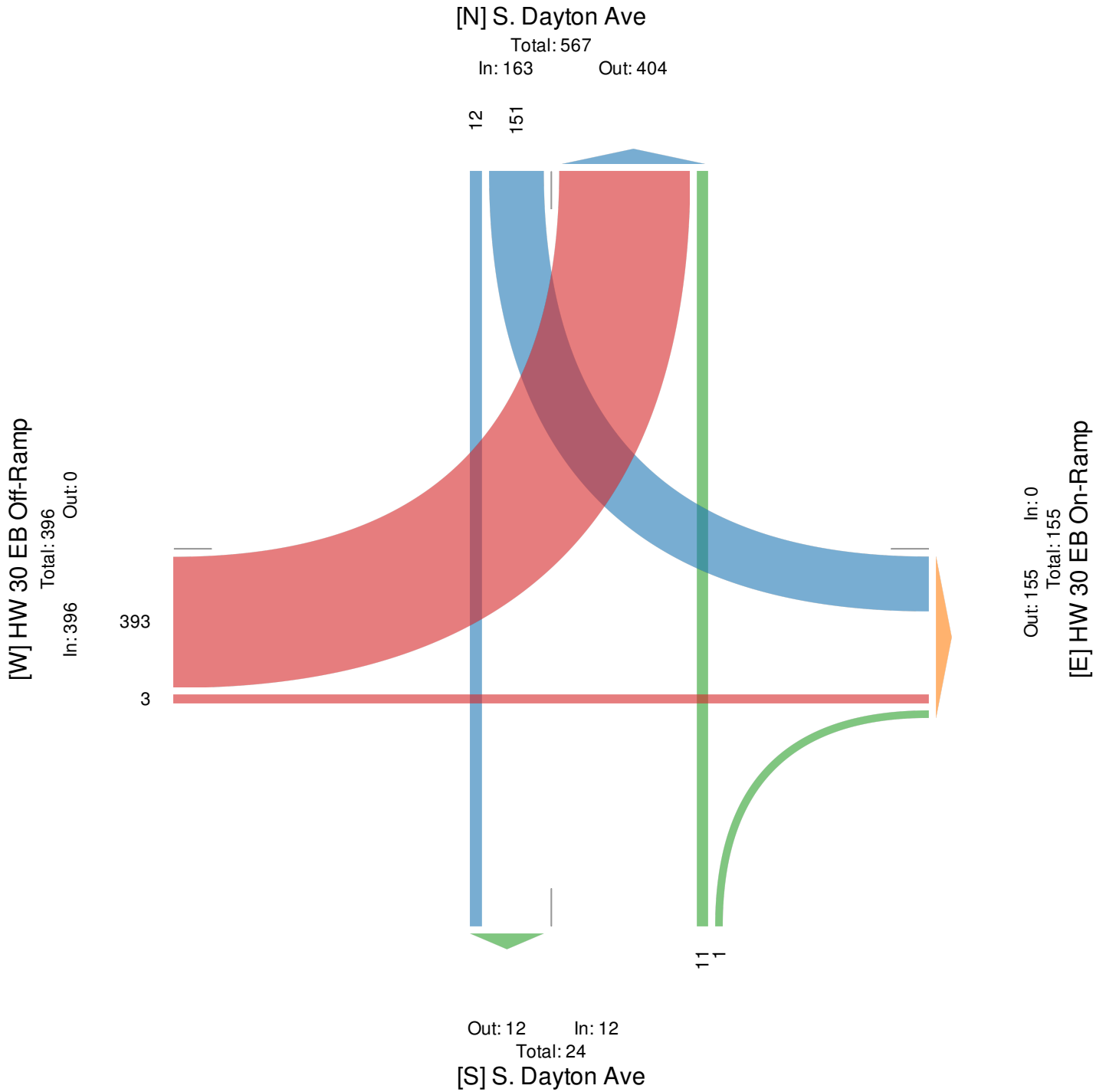
ID: 743574, Location: 42.005469, -93.586273

Provided by: City of Ames

(IA)

515 Clark Avenue,

Ames, IA, 12345, US



2020 S Dayton Interchange Study - TMC

Thu Nov 7, 2019

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

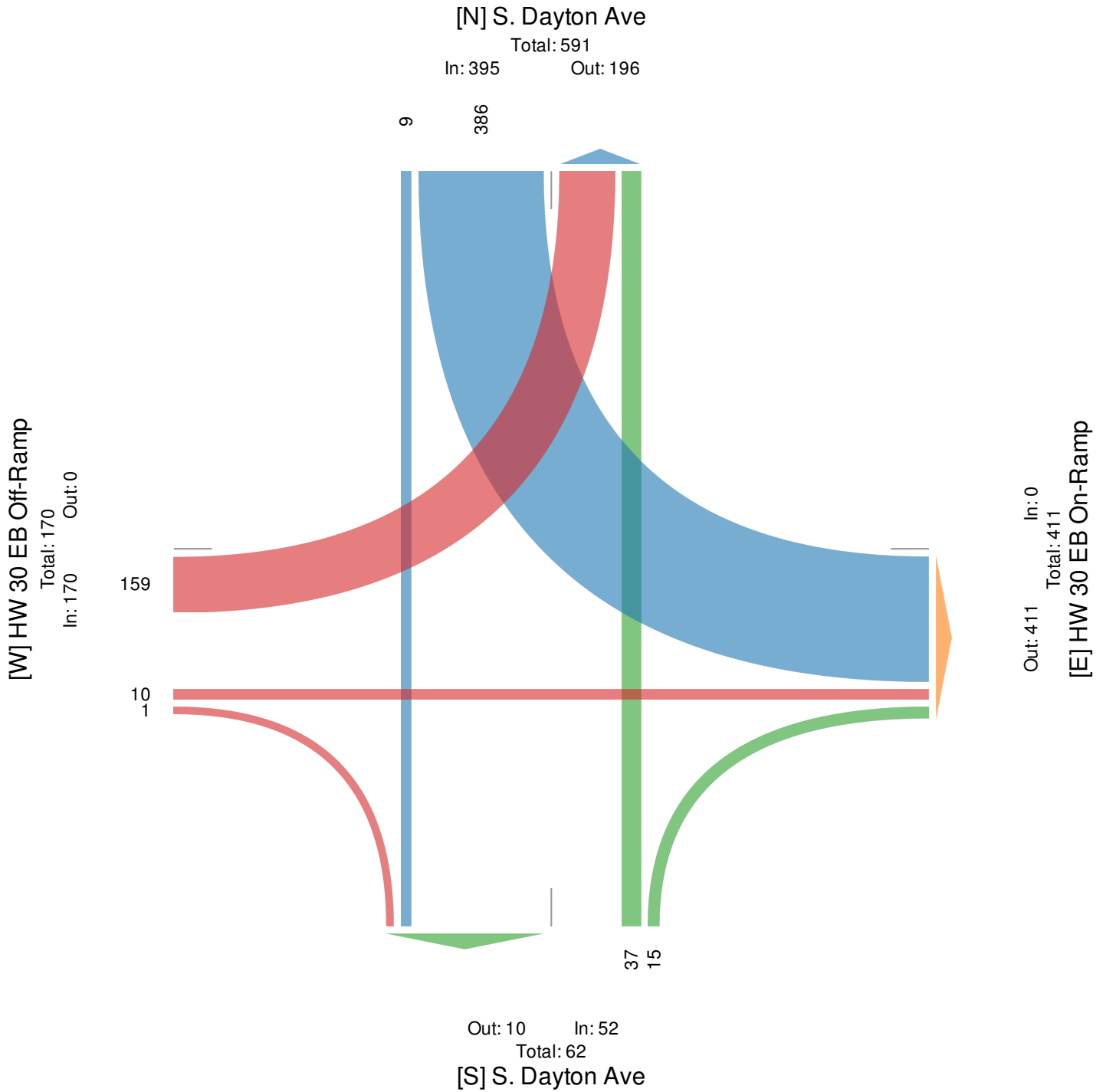
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

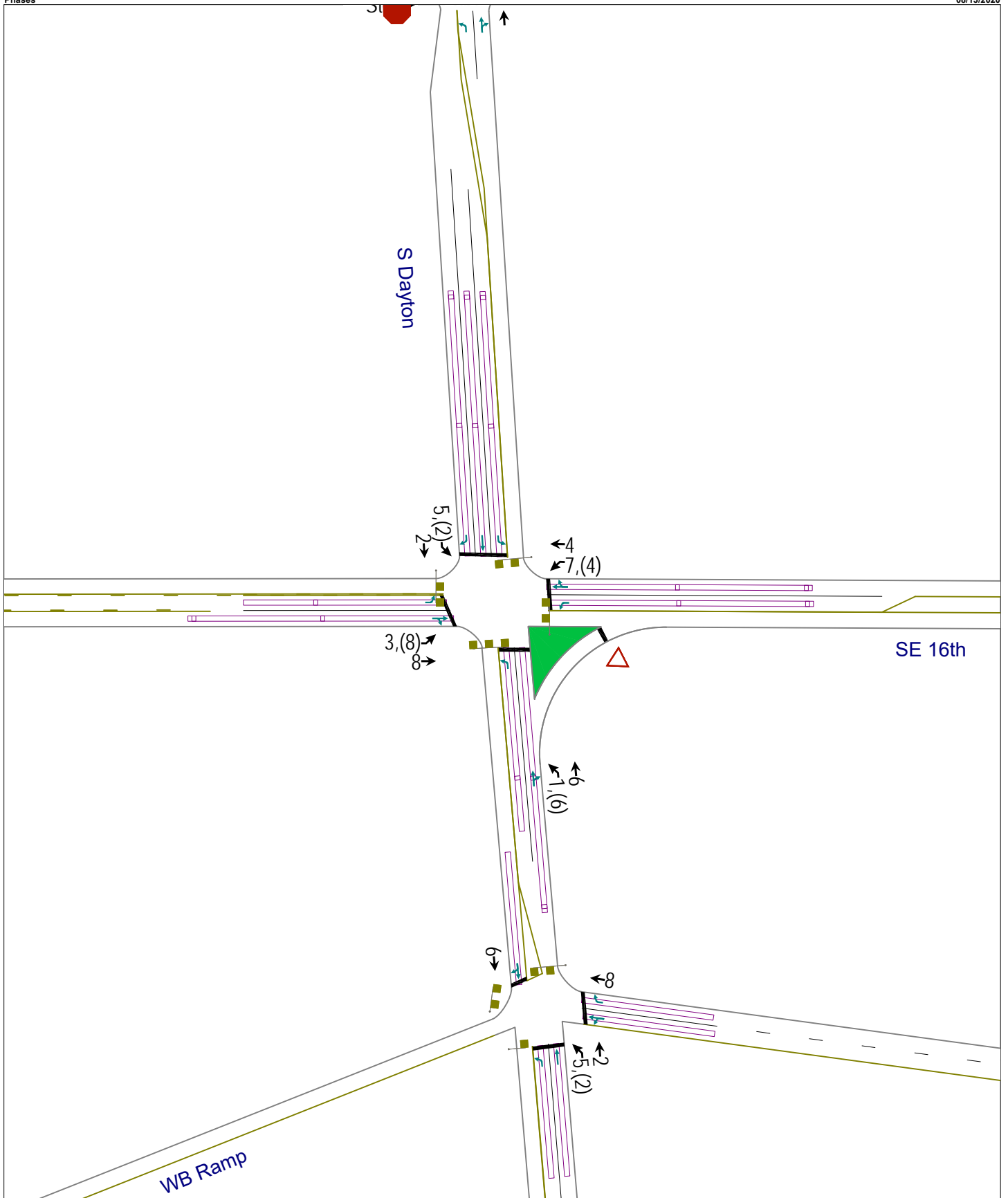
All Movements

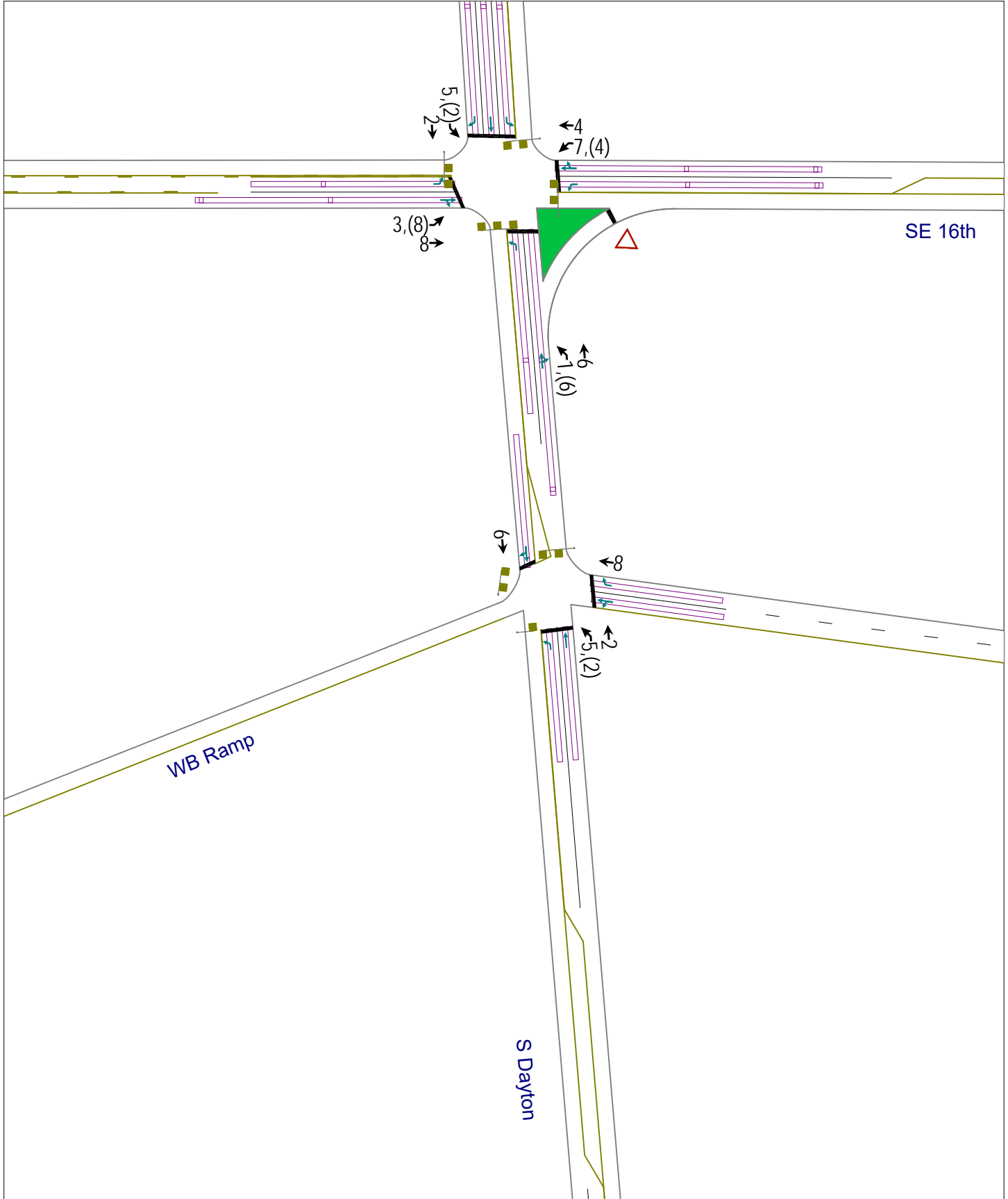
ID: 743574, Location: 42.005469, -93.586273

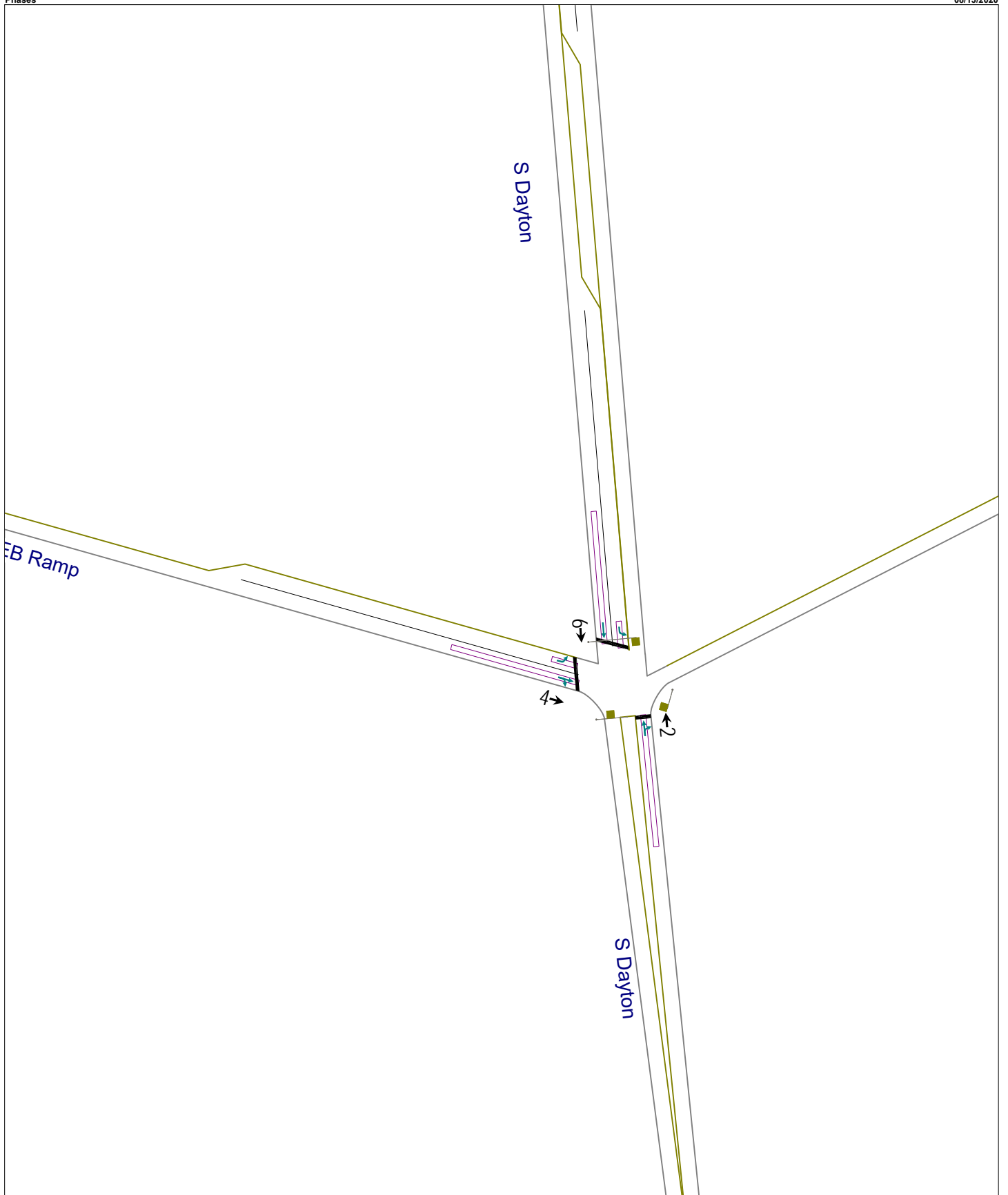
Provided by: City of Ames
(IA)

515 Clark Avenue,
Ames, IA, 12345, US









Intersection or Spot Benefit / Cost Safety Analysis

Rev. 5/18

Iowa DOT Office of Traffic & Safety

County: Story Prepared by: DNP Date Prepared: Aug 13, 2020
 Intersection: HW 30 & S Dayton Interchange (ramp terminals)

Improvement

Proposed Improvement(s): Signalization of WB On-Ramp Intersections

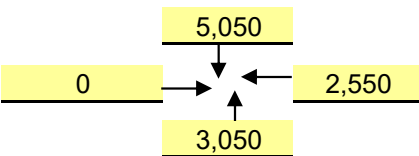
\$ 300,000 Estimated Improvement Cost, **EC** 15 Estimated Service Life, years, **Y**
\$ - Other Annual Cost (after initial year), **AC** 28 Crash Reduction Factor (integer), **CRF**
\$ - Present Value Other Annual Costs, **OC** 4.0% Discount Rate (time value of \$), **INT**

$$OC = \frac{AC}{INT} \left(1 - \frac{1}{(1 + INT)^Y} \right)$$
\$ 300,000 Present Value Cost, **COST** = EC + OC

Traffic Volume Data

Source: City of Ames 11/7/2019 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



3,887,250 Current Annual Entering Veh., **AEV** = DEV * 365

12,364 veh / day, Final Year DEV, **FDEV**

62.57 MEV, Total Million Entering Veh. Over life of Project, **TMEV**

$$TMEV = \frac{AEV}{-G} \left(1 - \left(\frac{1+G}{1} \right)^Y \right) / 10^6$$

1.0% Projected Traffic Growth (0%-10%), **G**

10,650 Current Daily Entering Vehicles, **DEV**

Crash Data

<u>2015</u> First full year -->	<u>2019</u> Last full year	<u>5.0</u> years, Time Period, T
<u>0</u> Additional months		
<u>0</u> Fatal Crashes	<u>0</u> Fatalities @	\$4,500,000 \$ -
	<u>0</u> Major Injuries @	\$325,000 \$ -
<u>0</u> Injury Crashes	<u>0</u> Minor Injuries @	\$65,000 \$ -
	<u>0</u> Possible Injuries @	\$35,000 \$ -
<u>8</u> Property Damage Only	(assumed cost per crash)	\$7,400 \$ -
<u>8</u> Total Crashes, TA	-OR- enter all Property Costs of all crashes:	<u>\$ 37,500</u>
	Total \$ Loss, LOSS	<u>\$ 37,500</u>

1.60 Current Crashes / Year, **AA** = TA / T 0.41 Crashes / MEV, Crash Rate, **CR**
 $CR = TA \times 10^6 / (DEV \times 365 \times T)$
\$ 4,688 Cost per Crash, **AVC** = LOSS / TA
25.8 Total Expected Crashes, **TECR** = CR x TMEV \$ 24,875 Present Value of Avoided Crashes, **BENEFIT**
0.45 Crashes Avoided First Year **AAR** = AA x CRF / 100
\$ 2,100 Crash Costs Avoided in First Year, AAR x AVC
7.2 Total Avoided Crashes, **TECR** x CRF / 100

$$BEN. = \frac{AVC \times AAR}{(INT - G)} \left(1 - \left(\frac{1+G}{1+INT} \right)^Y \right)$$

Benefit / Cost Ratio

Benefit : Cost = \$24,875 : \$300,000 = 0.08 : 1

Intersection or Spot Benefit / Cost Safety Analysis

Rev. 5/18

Iowa DOT Office of Traffic & Safety

County: Story Prepared by: DNP Date Prepared: Aug 13, 2020
 Intersection: HW 30 & S Dayton Interchange (ramp terminals)

Improvement

Proposed Improvement(s): Signalization of EB On-Ramp Intersections

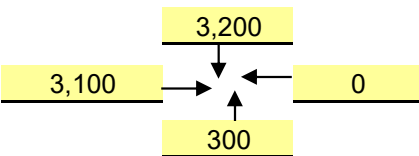
\$ 300,000 Estimated Improvement Cost, **EC** 15 Estimated Service Life, years, **Y**
\$ - Other Annual Cost (after initial year), **AC** 35 Crash Reduction Factor (integer), **CRF**
\$ - Present Value Other Annual Costs, **OC** 4.0% Discount Rate (time value of \$), **INT**

$$OC = \frac{AC}{INT} \left(1 - \frac{1}{(1 + INT)^Y} \right)$$
\$ 300,000 Present Value Cost, **COST** = EC + OC

Traffic Volume Data

Source: City of Ames 11/7/2019 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



2,409,000 Current Annual Entering Veh., **AEV** = DEV * 365

7,662 veh / day, Final Year DEV, **FDEV**

38.78 MEV, Total Million Entering Veh. Over life of Project, **TMEV**

$$TMEV = \frac{AEV}{-G} \left(1 - \left(\frac{1+G}{1} \right)^Y \right) / 10^6$$

1.0% Projected Traffic Growth (0%-10%), **G**

6,600 Current Daily Entering Vehicles, **DEV**

Crash Data

<u>2015</u> First full year -->	<u>2019</u> Last full year	<u>5.0</u> years, Time Period, T
<u>0</u> Additional months		
<u>0</u> Fatal Crashes	<u>0</u> Fatalities @	\$4,500,000 \$ -
	<u>1</u> Major Injuries @	\$325,000 \$ 325,000
<u>1</u> Injury Crashes	<u>0</u> Minor Injuries @	\$65,000 \$ -
	<u>0</u> Possible Injuries @	\$35,000 \$ -
<u>7</u> Property Damage Only	(assumed cost per crash)	\$7,400 \$ -
<u>8</u> Total Crashes, TA	-OR- enter all Property Costs of all crashes:	\$ 67,900
	Total \$ Loss, LOSS	\$ 392,900

1.60 Current Crashes / Year, **AA** = TA / T 0.66 Crashes / MEV, Crash Rate, **CR**
 $CR = TA \times 10^6 / (DEV \times 365 \times T)$
\$ 49,113 Cost per Crash, **AVC** = LOSS / TA
25.8 Total Expected Crashes, **TECR** = CR x TMEV \$ 322,198 Present Value of Avoided Crashes, **BENEFIT**
0.55 Crashes Avoided First Year **AAR** = AA x CRF / 100
\$ 27,201 Crash Costs Avoided in First Year, AAR x AVC
8.9 Total Avoided Crashes, **TECR** x CRF / 100

$$BEN. = \frac{AVC \times AAR}{(INT - G)} \left(1 - \left(\frac{1+G}{1+INT} \right)^Y \right)$$

Benefit / Cost Ratio

Benefit : Cost = \$322,198 : \$300,000 = 1.07 : 1

SE 16th & S Dayton

Type	CMF	CRF	Number of Crashes By Type	Crash Aspect	Percentage of Total Crashes	Factored CRF
Install Left Turn Lane	0.41	0.59	4	Rear-End	30.8%	18.09
Install Right Turn Lane	0.70	0.30	4	Rear-End	30.8%	9.23
Permissive to Prt/Perm FYA	0.60	0.40	3	Left-Turn	23.1%	9.28
Adaptive Control	0.64	0.36	2	All	15.4%	5.54
Total Crashes			13		Cumulative CRF	42.14

WB Off-Ramp

Type	CMF	CRF	Number of Crashes By Type	Crash Aspect	Percentage of Total Crashes	Factored CRF
Install Traffic Signal (Major Road 40 Mph)	0.33	0.67	2	Angle / Broadside	15.4%	10.31
Interchange Lighting	0.50	0.50	1	Nighttime	7.7%	3.85
Adaptive Control	0.64	0.36	5	All	38.5%	13.85
Total Crashes			8		Cumulative CRF	28.00

EB Off-Ramp

Type	CMF	CRF	Number of Crashes By Type	Crash Aspect	Percentage of Total Crashes	Factored CRF
Install Traffic Signal (Major Road 40 Mph)	0.33	0.67	2	Angle / Broadside	15.4%	10.31
Interchange Lighting	0.50	0.50	2	Nighttime	15.4%	7.69
Adaptive Control	0.64	0.36	6	All	46.2%	16.62
Total Crashes			10		Cumulative CRF	34.62