Traffic Safety Improvement Program

Traffic Control Devices Category
FY 2026

Applications Received by August 16, 2024

Applications listed in alphabetical order by applicant.

Page No:	Applicant	Improvement	$$$	
			Total Project	Requested
4	Appanoose County	Speed Feedback Signs	$15,000	$14,184
15	City of Andrew	Speed Feedback Signs	$15,000	$15,000
19	City of Bellevue	RRFB	$20,000	$15,000
28	City of Charlotte	Speed Feedback Signs	$10,000	$10,000
32	City of Delmar	Speed Feedback Signs	$15,000	$15,000
38	City of Des Moines	Flashing Yellow Arrow conversion and retroreflective backplates	$350,000	$294,600
65	City of Elgrin	Speed Feedback Signs	$9,731	$9,731
78	City of Grand Mound	Solar Flashing Beacons	$4,118	$4,118
100	City of Iowa City	Install traffic signal	$832,000	$500,000
124	City of Marion/District 6	Retroreflective backplates	$119,000	$119,000
422	City of Martelle	Solar Flashing Beacons and Speed feedback signs	$4,466	$4,466
436	City of Perry	Traffic signal upgrades and install pedestrian signal	$59,285	$59,285
453	City of Sioux City	Upgrade to 12 inch lenses and install retroreflective backplates	$31,581	$31,581
472	City of West Burlington	Traffic signal upgrades	$71,603	$58,766
495	Clinton County	Solar Flashing Beacons	$8,260	$8,260
520	Fremont County	Portable Temporary Traffic Signals	$56,900	$56,900
530	Hamilton County	Portable Changeable Message signs	$39,300	$39,300
543	Henry County	Solar Flashing Beacons and Speed feedback signs	$31,092	$10,962
554	Humboldt County	Solar Flashing Beacons	$24,716	$24,716

565	Jackson, Cedar, and Jones County	Portable Temporary Traffic Signals	$60,300	$60,300
577	Lee County	Portable Temporary Traffic Signals	$65,000	$65,000
591	Local Systems Bureau	Sign Replacement Program for Cities and Counties	$200,000	$200,000
593	Marion County	Solar Flashing Beacons	$10,000	$10,000
613	Story County and Boone County	Portable Temporary Traffic Signals	$60,000	$60,000
626	Traffic and Safety Bureau	Work Zone Sign Package Program	$70,000	$70,000
630	**Total**		$2,182,352	$1,756,169

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** 5-20-24

Location / Title of Project: Unionville Speed Feedback Signs

Applicant: Appanoose County Secondary Roads

Contact Person: Brad Skinner Title: Engineer

Complete Mailing Address: 1200 Hwy 2 W

Centerville, IA 52544

Phone: (641)856-6193 (Area Code) E-Mail: bskinner@appanoosecounty.net

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): City of Unionville

Contact Person: Gina Kraus Title: City Clerk

Complete Mailing Address:

Phone: (641)799-3019 (Area Code) E-Mail: Unionvillecity52594@gmail.com

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	14,184.00
Total Project Cost	$	15,000.00
Safety Funds Requested	**$**	**14,184.00**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information

Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the Appanoose County Secondary Roads

Signed: _____ 7/15/24
Signature Date Signed

BRAD SKINNER
Printed Name

Attest: _____ 7-15-24
Signature Date Signed

Rhea D Wilson
Printed Name

Traffic Safety Improvement Program
Grant Application for Speed Feedback Signs

CITY OF UNIONVILLE RESOLUTION No. 20240712

WHEREAS: The Board of Supervisors is empowered under authority of Iowa Code Section 306.4 2021 Code of Iowa to operate and manage the Secondary Road System; and

WHEREAS: The State of Iowa has available Grant funds associated with the Traffic Safety Improvement Program up to a maximum of $500,000 per location; and

WHEREAS: The County Engineer recommends application for funding of Speed Feedback Signs for County highways entering the City of Unionville.

NOW THEREFORE, BE IT RESOLVED: That we, the City Council of Unionville Iowa do hereby declare support for and endorsement of the Grant Application for said signs, currently planned for installation in FY 2026. The Board further endorses the submittal of such application for grant funding and assures that the County will adequately maintain such improvements within the Appanoose County Secondary Roads system; and directs the County Engineer to pursue available funding for said project.

Passed and Adopted this 11th day of July 2024.

Denise Ewing
Mayor
Unionville, Iowa

ATTEST:

Gina Kraus
City Clerk
Unionville, Iowa

Traffic Safety Improvement Program

Grant Application for Speed Feedback Signs

APPANOOSE COUNTY RESOLUTION No. 2024-30

WHEREAS: The Board of Supervisors is empowered under authority of Iowa Code Section 306.4 2021 Code of Iowa to operate and manage the Secondary Road System; and

WHEREAS: The State of Iowa has available Grant funds associated with the Traffic Safety Improvement Program up to a maximum of $500,000 per location; and

WHEREAS: The County Engineer recommends application for funding of Speed Feedback Signs for County highways entering the City of Unionville.

NOW THEREFORE, BE IT RESOLVED: That we, the Board of Supervisors of Appanoose County do hereby declare support for and endorsement of the Grant Application for said signs, currently planned for installation in FY 2026. The Board further endorses the submittal of such application for grant funding and assures that the County will adequately maintain such improvements within the Appanoose County Secondary Roads system; and directs the County Engineer to pursue available funding for said project.

Passed and Adopted this 15th day of July 2024.

Linda Henry

Chairman Board of Supervisors
Appanoose County, Iowa

ATTEST:

Kelly Howard/jo

Kelly Howard
Appanoose County Auditor

Narrative

The Appanoose County Secondary Roads, in cooperation with the City of Unionville, is applying for the Traffic Safety Improvement Program (funds) with the intent to purchase four sets of Speed Feedback Signs for the Farm to Market roads through Unionville. The City of Unionville could greatly benefit from the added safety these signs create by making drivers more aware of their speed through town.

There are two Farm to Market roads that intersect in the city of Unionville that carry around 1000 VPD, many of which are semis and travelers looking for a short cut around Centerville. Traffic levels have also increased in recent years due to significant growth around Sundown Lake, a mile northwest of Unionville, which attracts high levels of seasonal and weekend drivers. There are approximately 75 residents that live in town, but many area residents utilize a Market & Grill eatery, church, event gatherings building, community center and park. Along these routes, we have had many residents install homemade signs in the right of way to try to get drivers attention to slow down. Unionville is located in the northeast part of the county, and does not have regular law enforcement, contracting with Appanoose County Sherrif for coverage. Having these signs strategically placed will hopefully make drivers aware of their speed before entering the city with possible pedestrians and traffic conflicts.

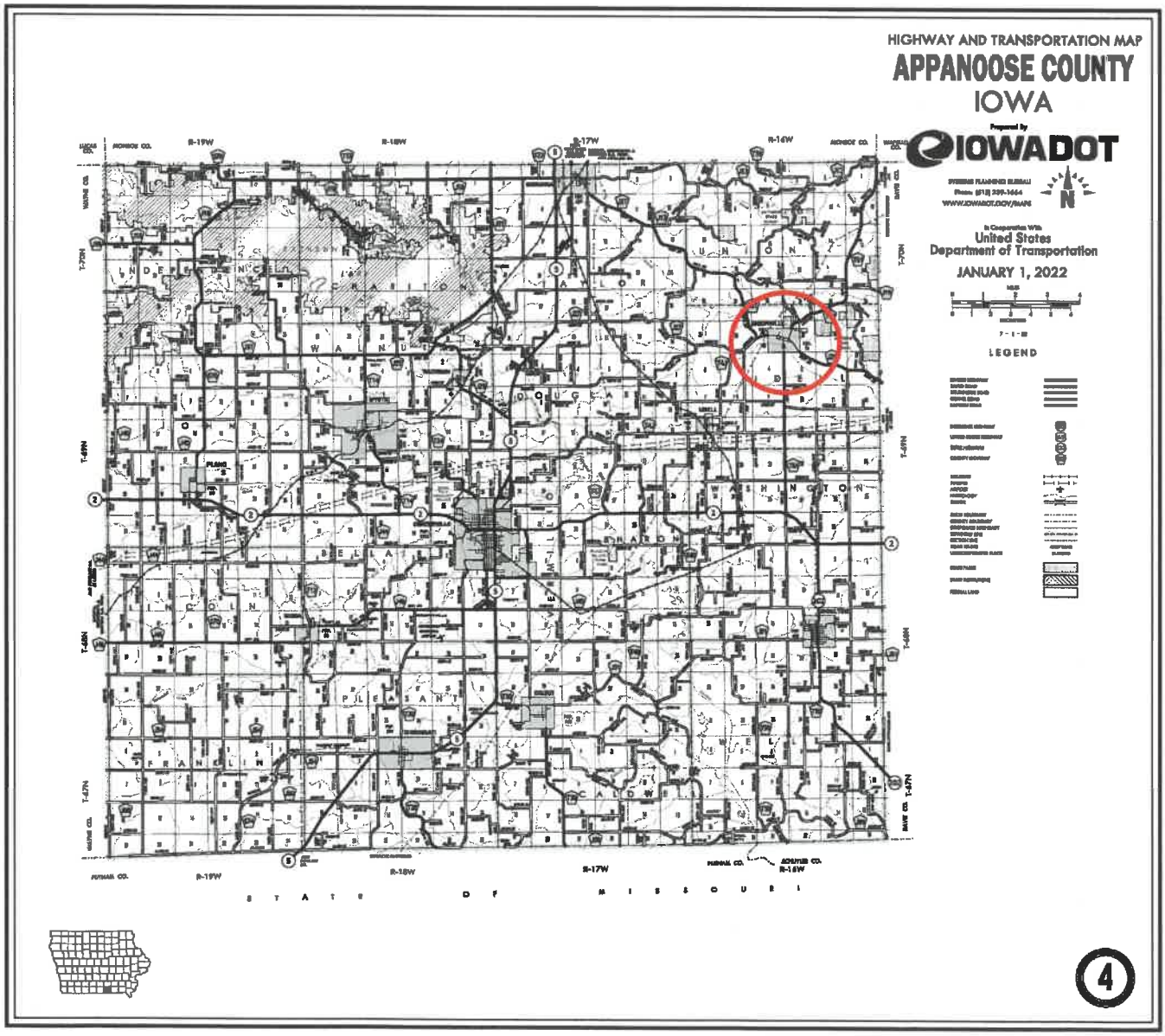
All four directions entering Unionville have speed limits of 55mph entering into 30mph speed zone at the city limits. On the west side of Unionville, Appanoose County Secondary Roads performed a speed study and found that the 85th percentile speed was actually between 45-50mph on the shorter stretch from the stop intersection of J3T to the city limits. This led to initiating a 45mph speed limit on the west side prior to the 30mph speed limit through town, to help slow traffic entering from the west.

The speed feedback signs will be placed at each entry to the city of Unionville. We believe the traffic entering from the west side is at a reduced speed, but still not slowing down to 30 mph through town. The north and south side of town on Hwy T61 will have one sign just inside the City Limits at each location. At the south location, there was a fatal crash in 2023 where the driver veered off of the edge of the road, likely with speed as a factor. On both the north and east sides of Unionville, there is not a speed limit change or stop condition for approximately ten miles for either side. Adding speed feedback signs at the North and East City Limits will be a good reminder to traffic that there is a city approaching and to check their speed.

Time Schedule

TSIP Application Due	August 15, 2024
TSIP Award Notification	Mid-January, 2025
TSIP Funding Available	July 1, 2025
Quotes Accepted	July 2025
Installation of Signs	August 2025

Map

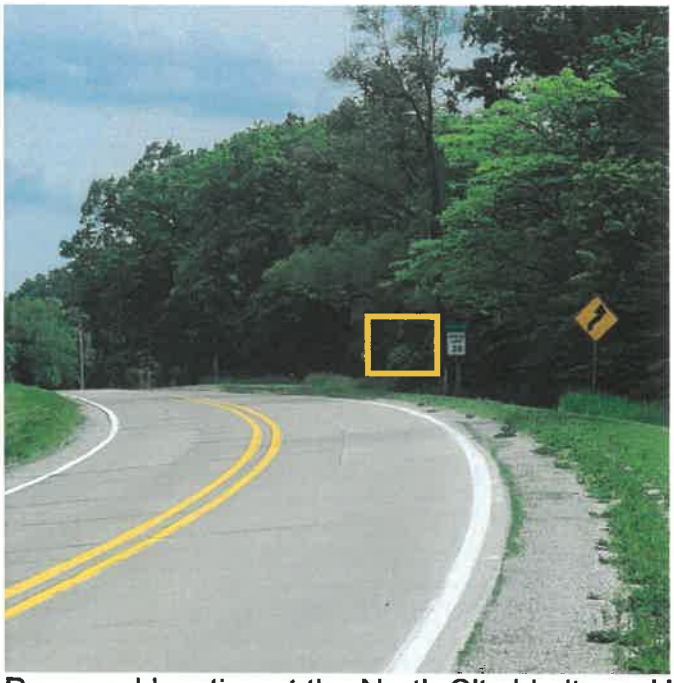


Pictures of Project Site

Location 1

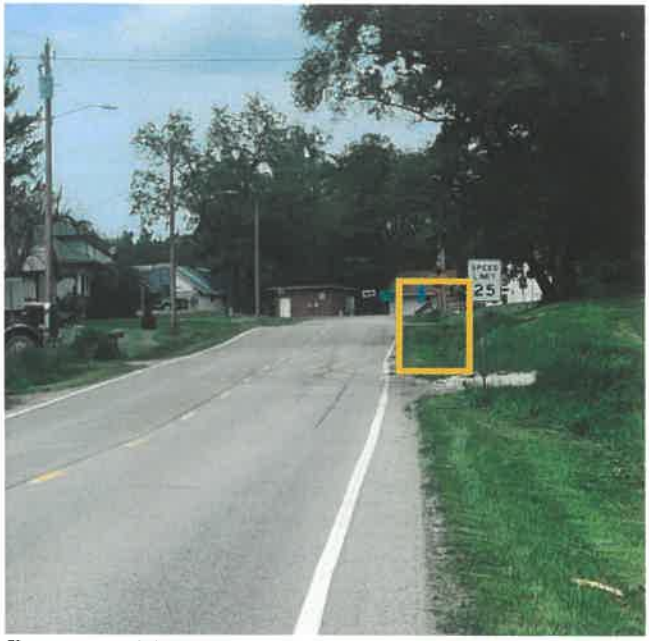
Proposed location on west side of Unionville on Hwy J3T. Residential homes, community center and park located around the curve.

Location 2



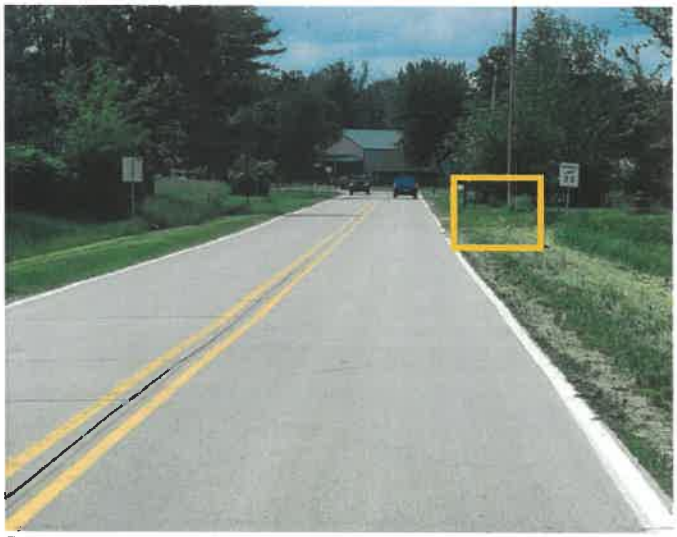
Proposed location at the North City Limits on Hwy T61. Residential homes located around the curve.

Location 3



Proposed location on the south side of Unionville approaching the intersection of Hwy J3T. There is a church at the other side of the intersection with many vehicles parking along side the road Hwy J3T during church events. This is also the location of a fatal crash in 2023.

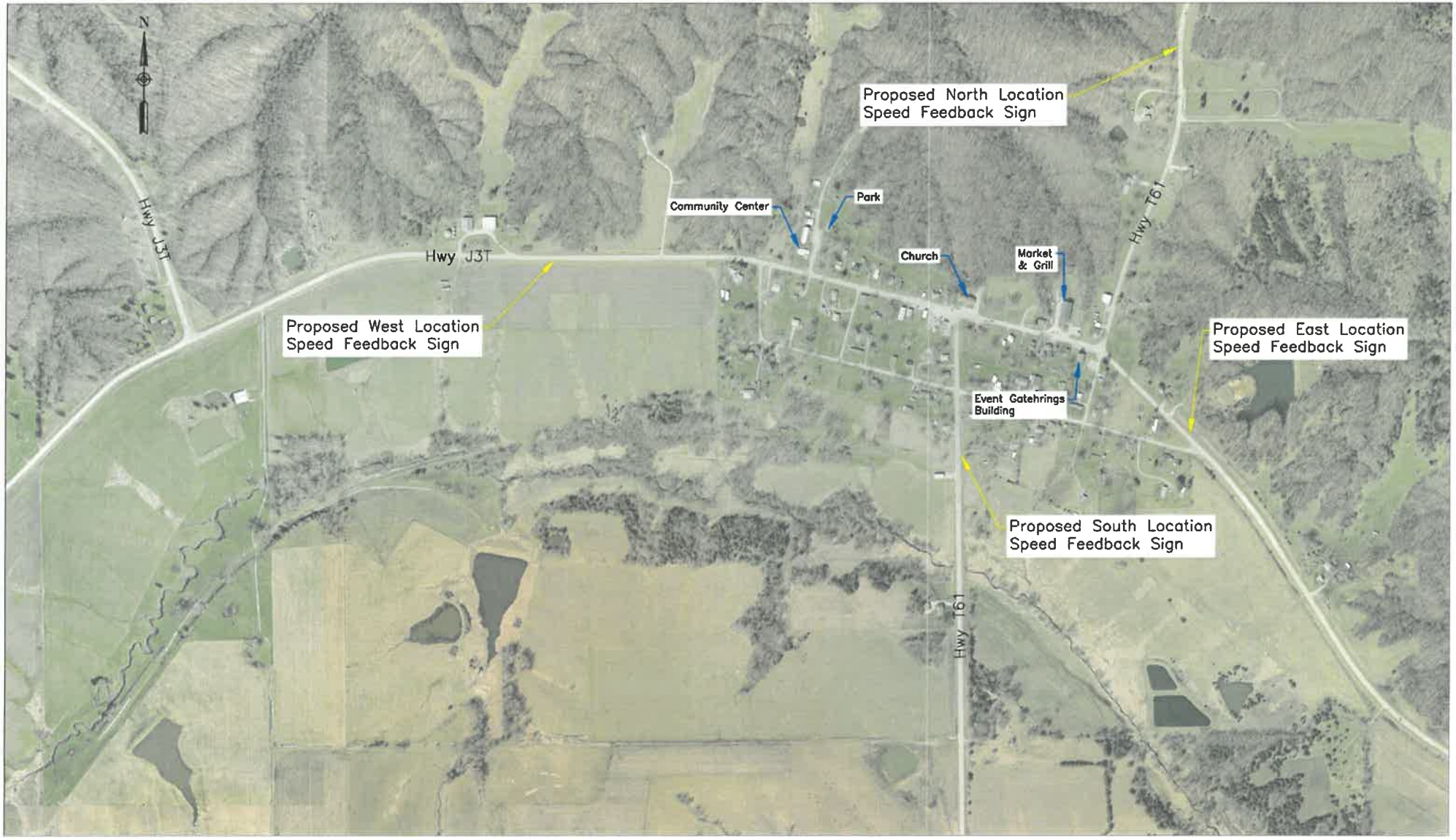
Location 4



Proposed location on the east side of Unionville. The Market and Grill eatery is shown in this picture, with the event gatherings building located across the street.

Rev. 07/23

Plan View of Project Location



Rev. 07/23

Itemized Breakdown of Cost

STALKER radar
appliedconcepts, inc.

QUOTE
 # 2089816

855 E. Collins Blvd
Richardson, TX 75081
Phone: 972-398-3780
Fax: 972-398-3781

National Toll Free: 1-800- STALKER

Inside Sales Partner: Danial Khan
danial@stalkerradar.com

Reg Sales Mgr: Peter Bauer
972-398-3780
peter@stalkerradar.com

Date: 05/29/24

Effective From : 05/29/2024 **Valid Through:**08/27/2024

Lead Time: 45 working days

Bill To:	**Customer ID:** 070924	**Ship To:**	*FedEx Ground*
Appanoose County Secondary Roads 1200 IA-2 Centerville, IA 52544-3413	Accounts Payable	Appanoose County Secondary Roads 1200 IA-2 Centerville, IA 52544-3413	Assistant Engineer Kenzie Milani

Grp	Qty	Package	Description	Wrnty/Mo	Price	Ext Price
1	4	836-0015-00	PMG 15 Inch Display with Traffic Analyst	24	$3,546.00	$14,184.00

Ln	Qty	Part Number	Description	Price	Ext Price
1	4	200-1315-00	15" PMG w/Traffic Analyst, configured with:		$0.00
2	4	035-0002-21	15" and 18" PMG Shipping Box		$0.00
3	16	035-0002-20	PMG Corner Packing Foam		$0.00
4	4	060-1000-24	24-Month Warranty		$0.00
5	4	006-0076-00	PMG Installation Guide		$0.00
6	4	200-1285-00	15"PMG Speed Display		$0.00
7	4	200-5542-12	15" PMG Controller, Normal Speed - 4G/Standalone		$0.00
8	4	200-1285-11	15" PMG Bezel, Black		$0.00
9	4	200-1339-11	15" PMG Display - Amber LED, No Strobes		$0.00
10	4	200-1285-50	No Flash Selected		$0.00
11	4	200-1206-55*	12" PMG Pole Mount, 2-Part		$0.00
12	4	200-1395-01*	PMG Backpack - SLA w/Solar		$0.00
13	8	047-0049-00	Cover Plate on Quad Bay Unit		$0.00
14	4	047-0044-00	15" PMG Bracket for Battery Backpack		$0.00
15	4	047-1003-00	PMG Power Cover Plate		$0.00
16	4	200-1567-01	15" PMG - USB Com, USB Memory Stick - v2		$0.00
17	4	200-1206-60	PMG Key Fob and Control Module		$0.00
18	4	200-1206-08	PMG Expanded Memory Option, 8GB		$0.00
19	4	200-1330-50	PMG 50W Solar Power Package		$0.00
20	4	200-1419-00*	Battery Backpack Solar Option Kit		$0.00
21	4	200-1369-63	15" YOUR SPEED Yellow Surround, Backpack		$0.00
				Group Total	$14,184.00

Grp	Qty	Package	Description	Wrnty/Mo	Price	Ext Price
2	11		Selected Accessories	0		$0.00

Ln	Qty	Part Number	Description	Price	Ext Price
22	8	200-1397-00	PMG Backpack Battery Kit - SLA 22Ah w/Wiring	$0.00	$0.00
23	4	200-1397-00	PMG Backpack Battery Kit - SLA 22Ah w/Wiring	$85.00	$340.00
				Group Total	$340.00

Continued on Next Page

STALKER radar

appliedconcepts, inc.

QUOTE
 # 2089816

855 E. Collins Blvd
Richardson, TX 75081
Phone: 972-398-3780
Fax: 972-398-3781

National Toll Free: 1-800- STALKER

Date: 05/29/24

Inside Sales Partner: Danial Khan
danial@stalkerradar.com

Reg Sales Mgr: Peter Bauer
972-398-3780
peter@stalkerradar.com

Effective From : 05/29/2024 **Valid Through:** 08/27/2024 Lead Time: 45 working days

Bill To:	**Ship To:**
Appanoose County Secondary Roads 1200 IA-2 Centerville, IA 52544-3413 **Customer ID:** 070924 Accounts Payable	Appanoose County Secondary Roads 1200 IA-2 Centerville, IA 52544-3413 *FedEx Ground* Assistant Engineer Kenzie Milani

Product	$14,524.00	Sub-Total:	$14,524.00
Discount	$0.00	Sales Tax 0%	$0.00
		Shipping & Handling:	$370.00
		Total: USD	**$14,894.00**

Payment Terms: Net 30 days

State Contract # MA19220

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE
TSIP FUNDS

GENERAL INFORMATION **DATE:** 07/04/2024

Location / Title of Project: HWY 62 NORTH AND SOUTH AND 150TH STREET EAST

Applicant: CITY OF ANDREW

Contact Person: CHRIS BUDDE Title: CITY CLERK

Complete Mailing Address: PO BOX 74
ANDREW, IA 52030

Phone: 563-672-3570 (Area Code) E-Mail: andrewia@netins.net

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: _____ (Area Code) E-Mail: _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	
Total Project Cost	$	
Safety Funds Requested	$	**$15,000 for 3 signs**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information

Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the CITY OF ANDREW

Signed: Chris Budde 7-3-24

Signature Date Signed

CHRIS BUDDE

Printed Name

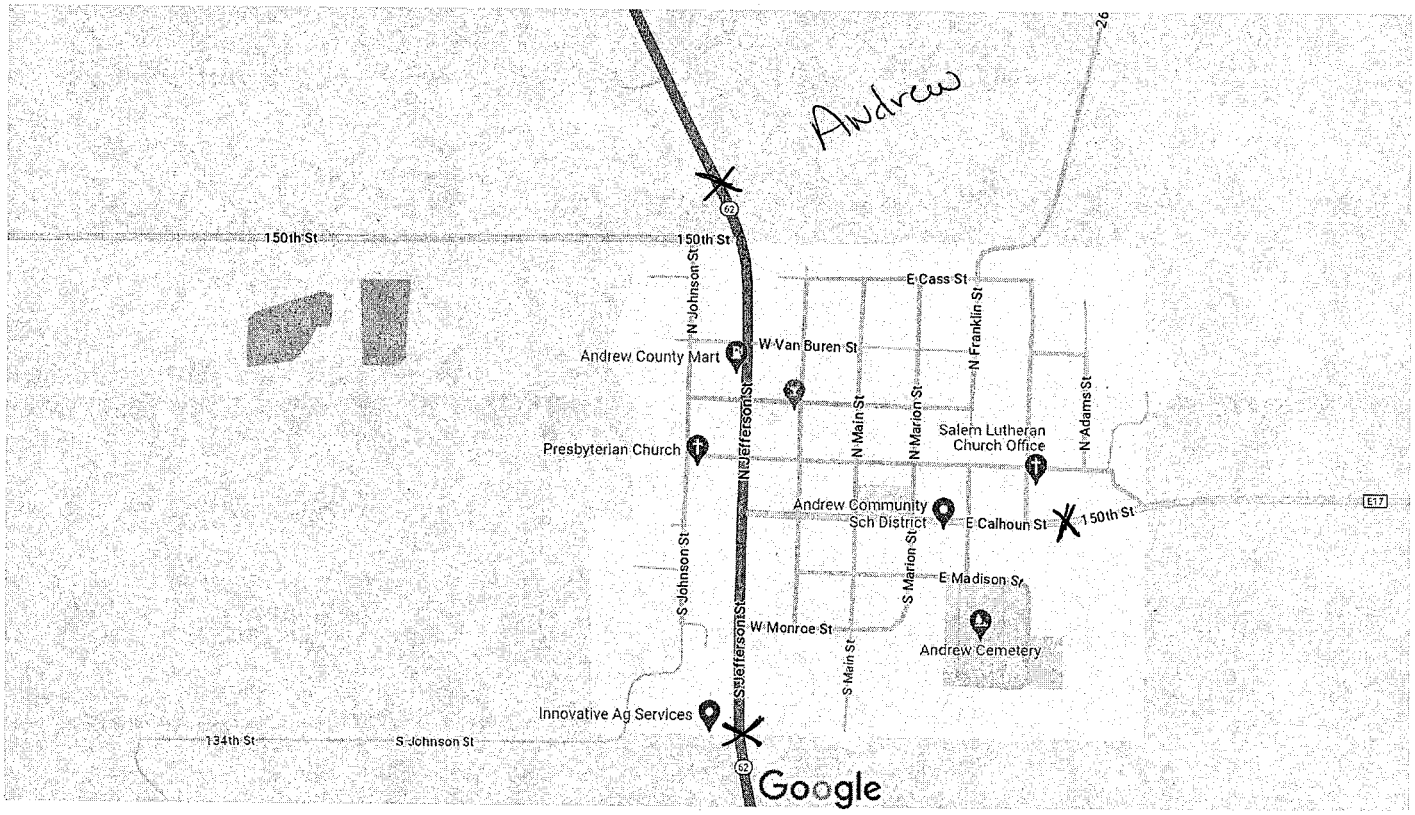
Attest: _____

Signature Date Signed

_____

Printed Name

Google Maps



Map data ©2024 500 ft

Intersection/Segment ID	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All Value
1699	IA 62 N	No	No	-0.183415
4350	IA 62 N	No	No	-0.16184

Andrew

Rev. 07/23

Application for SITE-SPECIFIC TSIP FUNDS

GENERAL INFORMATION **DATE:** 08/08/2024

Location / Title of Project: State & S. 8th Street RRFB

Applicant: City of Bellevue

Contact Person: Teresa Weinschenk Title: City Clerk/Administrator

Complete Mailing Address: 106 N. Third Street
Bellevue, IA 52031

Phone: (563) 422-1389 (Area Code) E-Mail: Teresa.weinschenk@bellevueia.gov

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: (Area Code) E-Mail:

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	$17,882.46
Total Project Cost	$	$20,000.00
Safety Funds Requested	**$**	**$15,000.00**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☒ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information

Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
2017112252	IA 62/State St and S 8th St	☐	☐	<=0	-0.01
		☐	☐		

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the City of Bellevue

Signed: Teresa Weinschenk 08/09/2024
Signature Date Signed

Teresa Weinschenk
Printed Name

Attest: Dennis Schroeder 08/09/2024
Signature Date Signed

Dennis Schroeder
Printed Name

NOTARIAL SEAL IOWA
DENNIS L. SCHROEDER
Commission Number 828604
My Comm. Exp. 12-02-2026

The City of Bellevue is requesting TSIP Funds for Rectangular Rapid Flashing Beacons (RRFB) for the crossing on Hwy 62/State and S. 8th Street.

The crosswalk is currently marked with piano markings which worked well before Felderman Park was established at the end of S. 8th Street in 2017. Felderman Park has become a popular recreational area for children and adults. There is a trout stream, walking path and soccer practice/games at the park. The park continues to develop into a gathering place for activities for young adults and children.

As the park continues to gain popularity, there are more and more pedestrians using this crossing. Over the last several months, it is estimated that over 400 residents use this crossing each week, with most of them being children under the age of 14. Bellevue Elementary School is expected to open by Fall of 2025. This crossing will also serve as a safer crossing for students who will need to cross from the south side of town over to the north on their way to school. The speed limit through this area is 35 mph. The Rectangular Rapid Flashing Beacons would alert drivers to slow down and be alert because there are pedestrians in the crosswalk.

HWY 62/State Street is heavily traveled. Locally, there are several popular destination places along this portion of the highway including a gas station/convenience store, Roeder Brothers, Inc. Family Dollar, Collins Aerospace, not to mention Bellevue High School and soon to be Bellevue Elementary School. In addition, the Bellevue Fire Station, Medical Associates and Mill Valley Care Center are also accessed off this road. Regionally this highway is the main route for any person traveling to the northwest on either Hwy 62 or Bellevue-Cascade Rd. Back in 2021 the traffic count was 1720 just for drivers traveling on to either Bellevue-Cascade Rd (610) or Hwy 62 (1010). That number doesn't consider local traffic that is accessing the road to go to any of the destination areas along the route. Regional and local traffic is estimated to be significantly higher given the increases in population, residential homes west of Bellevue, school enrollment, and the tourism opportunities in Bellevue.

This would be the first set of RRFB's for Bellevue. The City Council is passionate about improving the safety of this intersection since many children cross at this location. Locals may be aware and, on the lookout, given the popularity of this intersection, but tourists and

especially younger, less experienced drivers may not be as aware or may be more likely to be distracted. The RRFB's are an essential element in the City's ongoing desire to ensure the safety of its family and children on its city streets and state highways. Although RRFB's success rates may vary, studies have shown that driver yield rates can increase from anywhere from 84.6% to as much as 98%. Regardless of the number, any increase in driver awareness increases the safety of those who are using this crosswalk.

In summation, Bellevue Mayor and City Council are committed to the safety of our residents and have set aside funding to provide any match to ensure the RRFB's can be installed. Bellevue has always respected and valued the partnership with the Iowa Department of Transportation and the regional RPA. These funding opportunities are essential to the ability of cities to effectively finance traffic safety improvements especially given the budgetary restraints that have been recently imposed on Iowa cities. That said, Bellevue also understands that funding is limited which is why if it wasn't for the absolute need to protect the families and children using this intersection, this request would not be made.

As always, thank you for your time and generous consideration of our request. We look forward to continuing to partner with you for years to come. Together we make a difference.

Quote

Traffic Safety Corp.
2708 47th Avenue
Sacramento, CA 95822, USA
https://www.xwalk.com

US: +1 888 446 9255
Worldwide: +1 916 394 9884

Customer Number: 02-QUOTEIA
Quote Number: 0151253

Quote Date: 8/6/2024
Expires On: 9/5/2024

Salesperson: Julio Campos
julio.campos@trafficsafetycorp.com
Direct Line: 916.330.1072

Bill To:
Bellevue, IA 52031
United States
nick.kilburg@bellevue.ia.gov

Ship To:
Bellevue, IA 52031
United States

Confirm To: Nick Kilburg

Notes: Ph: (563) 221-1317

Ship Via	Terms
BEST WAY	Prepay by Check, ACH or CC

Item / Description	UOM	Qty Quoted	Price	Amount
SI-TS40W11230S1B Solar LED Flashing Wireless Ped Xing 30"x30" Sign for Wireless Communication, w/Wired Activation (Sensor/Push-Button Not Included). Type IX.	EA	6	2,602.41	15,614.46
AC-BDL3FS-Y ADA Push Button LED&Beep Pressure Activated IP 67 w/Frame 9"x12" & Sign YELLOW	EA	6	378.00	2,268.00

At time of order advise size/shape of pole. U channel will not work
POLE PRICE NOT INCLUDED IN THE QUOTE
BY MUTCD THE BOTTOM OF THE SIGN NEEDS TO 7' ABOVE GROUND.

We do not have a resale certificate or sales tax exemption number on file for you. Please submit your exemption/certificate number if you have one. Thank you!

Freight Allowed
We Appreciate Your Business

Traffic Safety Warranty: https://www.xwalk.com/pages/sys_warranty.htm

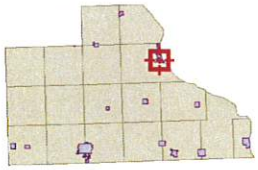
Net Order:	$17,882.46
Freight:	$0.00
Sales Tax:	$0.00
Order Total:	$17,882.46 USD


EIGHTH
Mill Creek
Trout Area


DX
EIGHTH
Mill Creek
Trout Area

Beacon™ Jackson County, IA

Overview



Legend

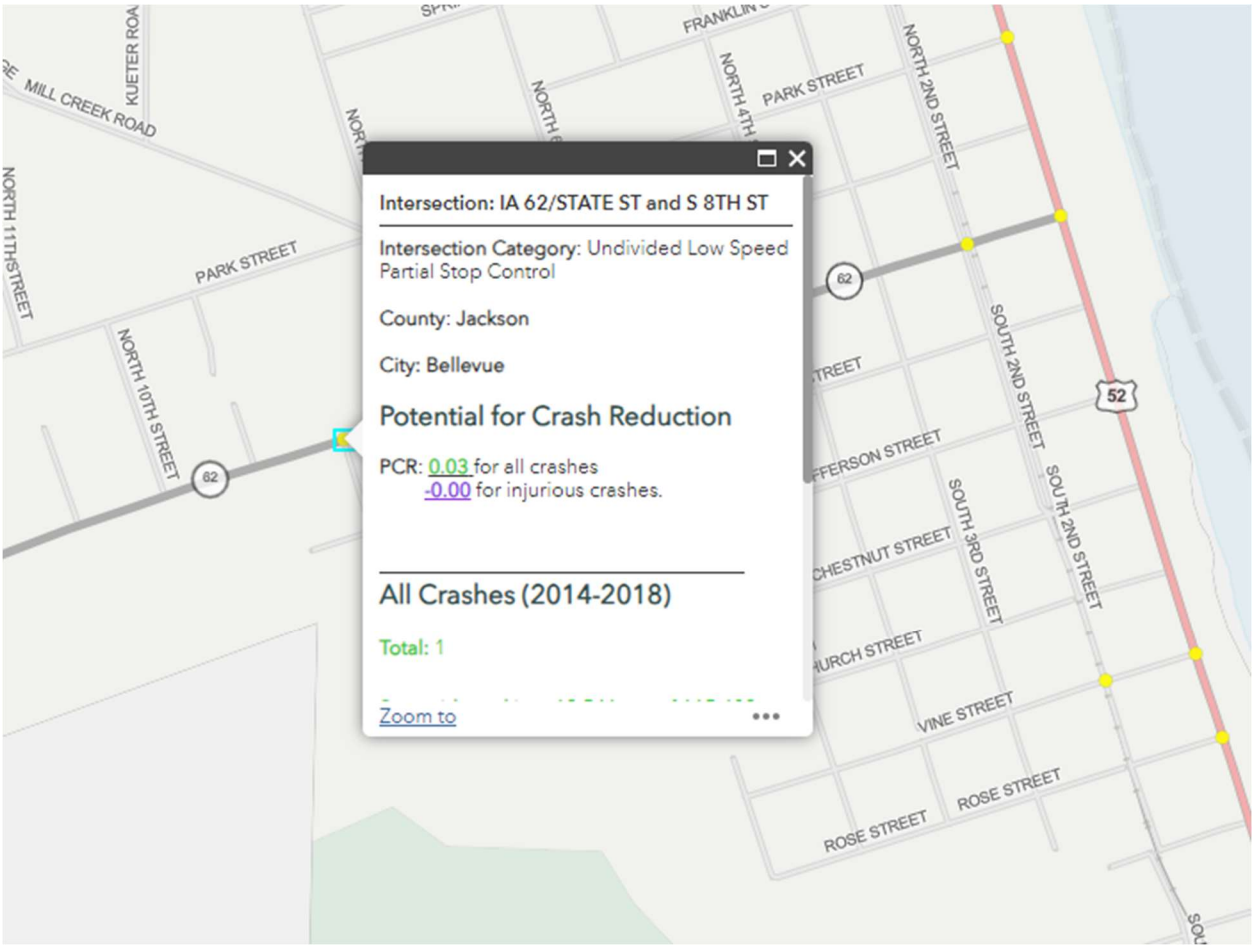
- Corporate Limits
- Parcels
- Political Townships
- Centerlines
- Tree Inventory 2015

NOTICE: This map is compiled for assessment and tax information purposes from official county records. All information shown is for the forgoing purpose and does not represent a survey of land. THIS MAP IS FOR VIEWING PURPOSES NOT A LEGAL DOCUMENT.

Date created: 6/13/2024
Last Data Uploaded: 6/12/2024 6:58:24 PM

Developed by Schneider GEOSPATIAL

City of Bellevue PCR information to the Intersection of IA62/State St. and S 8th St.



Rev. 07/23

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** 07/04/2024

Location / Title of Project HWY 136 EAST AND WEST OF CHARLOTTE

Applicant CITY OF CHARLOTTE

Contact Person CHRIS BUDDE Title CITY CLERK

Complete Mailing Address PO BOX 128

CHARLOTTE, IA 52731

Phone 563-677-2710 (Area Code) E-Mail clerk@iowatelecom.net

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 _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	
Total Project Cost	$	
Safety Funds Requested	**$**	**$10,000 for 2 signs**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the CITY OF CHARLOTTE

Signed: Chris Budde 7-3-24

Signature Date Signed

CHRIS BUDDE

Printed Name

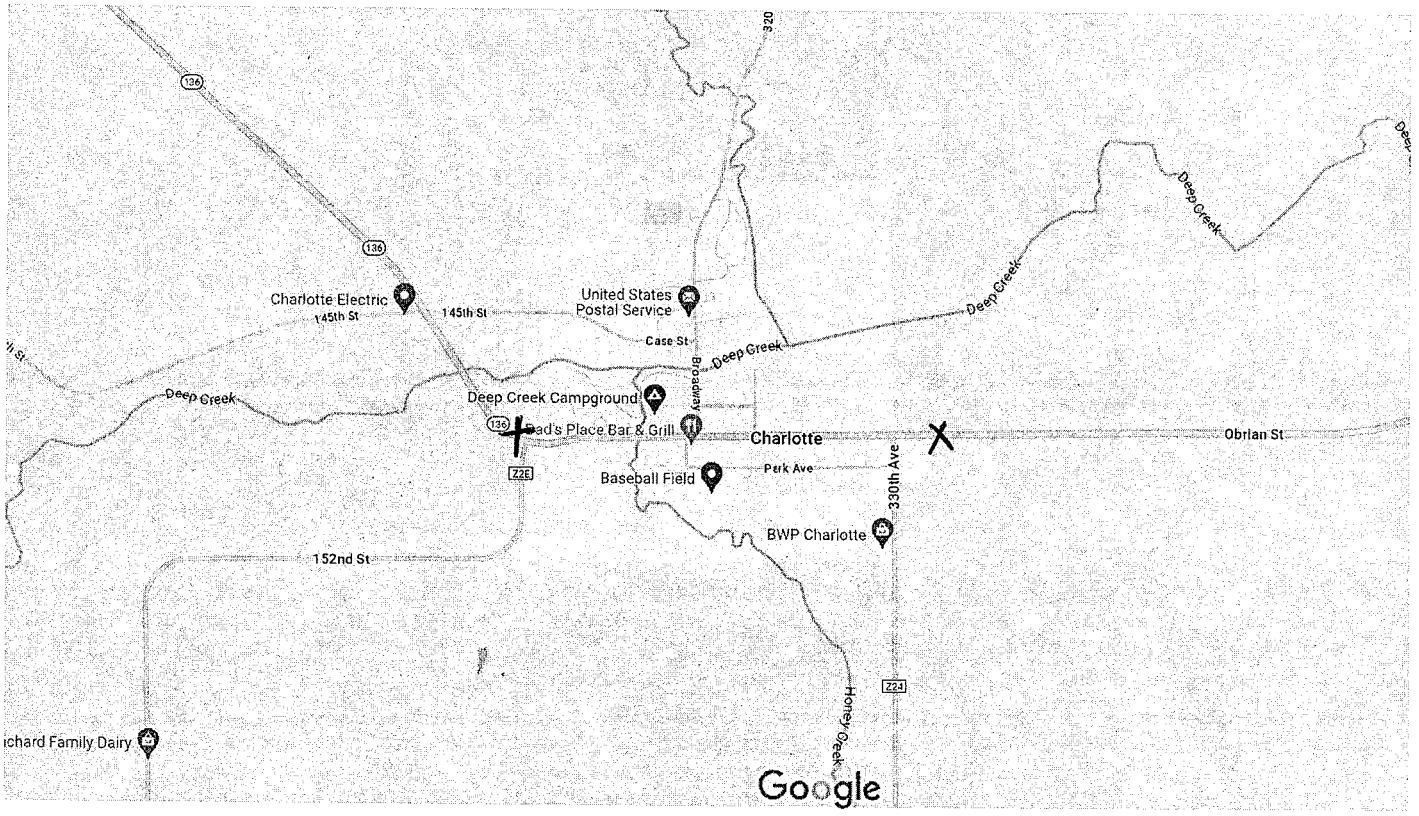
Attest: _____

Signature Date Signed

_____

Printed Name

Google Maps



Map data ©2024 1000 ft

Intersection/Segment ID	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All Value
2017100592	US 136 and Humeston Rd	N	N	-0.03
1324	IA 136 N	N	N	-0.105449

Charlotte

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE
TSIP FUNDS

GENERAL INFORMATION **DATE:** 07/04/2024

Location / Title of Project: HWY 136 ON EAST & WEST ENTRY OF DELMAR AND SOUTH OF DELMAR

Applicant: CITY OF DELMAR

Contact Person: CHRIS BUDDE Title: CITY CLERK

Complete Mailing Address: PO BOX 175

DELMAR, IA 52037

Phone: 563-574-4256 (Area Code) E-Mail: delmarc@fbcom.net

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: (Area Code) E-Mail:

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	
Total Project Cost	$	
Safety Funds Requested	**$**	**$15,000 for 3 signs**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the CITY OF DELMAR

Signed: Chris Budde 7-3-24

Signature Date Signed

CHRIS BUDDE

Printed Name

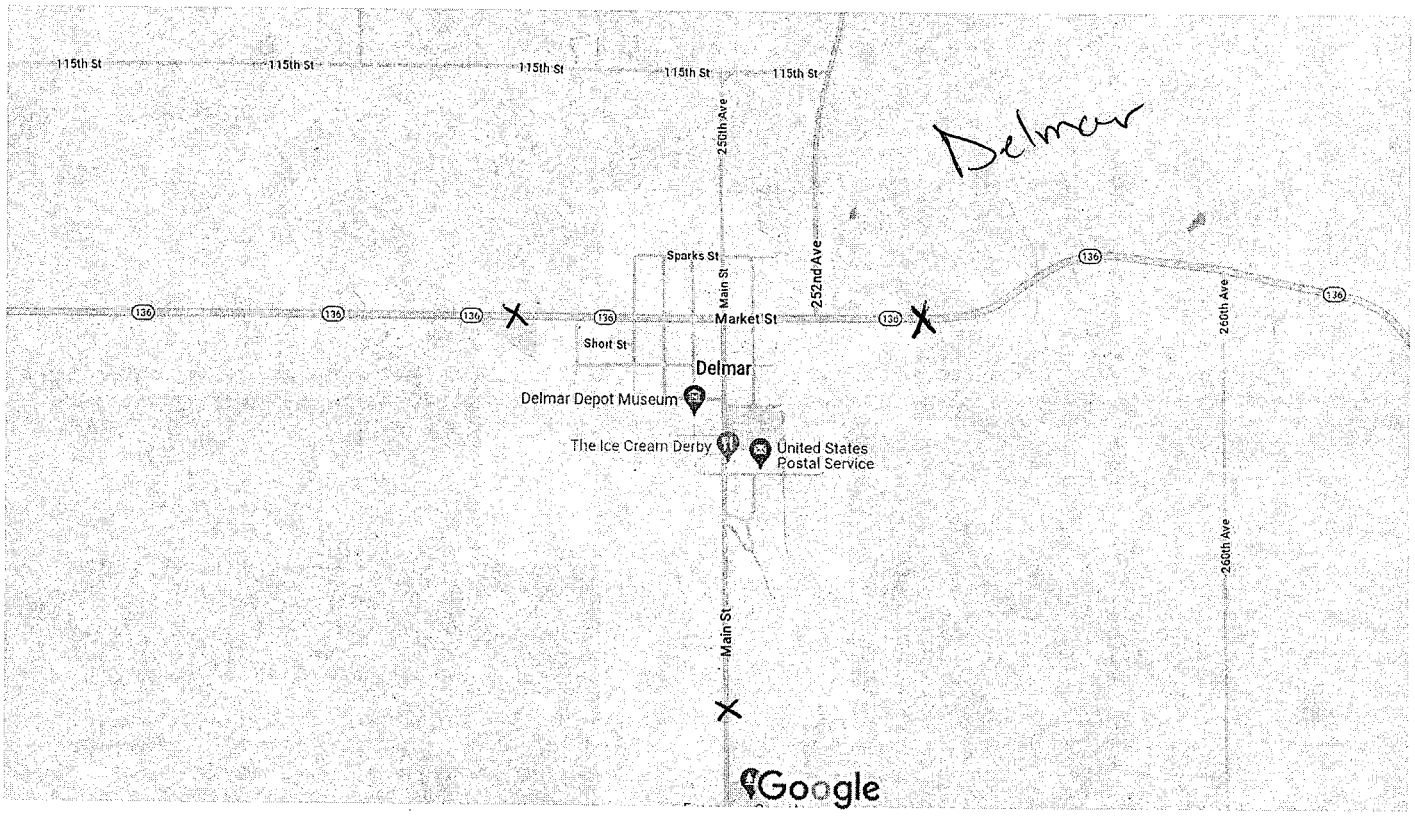
Attest: _____

Signature Date Signed

_____

Printed Name

Google Maps



Map data ©2024 1000 ft

Intersection/Segment ID	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All Value
3218	IA 136 N	N	N	-0.003819
5997	IA 136 N	N	N	-0.039972

Delmar

Application for FY2026 Traffic Safety Improvement Program (TSIP) Funding
Iowa Department of Transportation

(Traffic Control Device)

Citywide Installation of FYA Traffic Signal Heads & Retroreflective Backplates

Along Five Corridors

Des Moines Engineering Department
Traffic and Transportation Division
Steve Naber, P.E.
City Engineer

August 15, 2024

THIS PAGE IS INTENTIONALLY BLANK

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** 8/5/2024

Location / Title of Project: Citywide installation of FYA traffic signal heads & retroreflective backplates

Applicant: City of Des Moines

Contact Person: Calvin Miller Title: Engineering Administrative Manager

Complete Mailing Address: 400 Robert D Ray Drive

Des Moines, IA 50309-1891

Phone: 515-283-4748 (Area Code) E-Mail: cbmiller@dmgov.org

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): N/A

Contact Person: _____ Title: _____

Complete Mailing Address: _____

_____

Phone: _____ (Area Code) E-Mail: _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	294,600
Total Project Cost	$	350,000
Safety Funds Requested	**$**	**294,600**

Additional Project Safety Documentation (when available):

☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan

☒ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan

☐ Iowa DOT TEAP Study or similar analysis and concept

☒ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information

Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
2017065285	E 14th & E Grand	☒	☐	1.65	0.063
2017065282	E 15th & E Grand	☒	☐	3.94	0.785
-	E 14th & E Court	☐	☐	-	-

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
-	E 15th (Johnson Ct) & E Court	☐	☐	-2.67	-0.224
2017127555	SE 14th & Hartford	☒	☐	4.88	0.172
2017127551	SE 14th & E Bell	☐	☐	0.5	0.150
2017127546	SE 14th & E Park	☒	☐	5.69	0.297
2017066249	Indianola & E Park	☒	☐	1.15	0.181
2017127544	SE 14th & E Watrous	☒	☐	1.17	0.760
-	SE 14th & Market Place	☐	☐	-	-
2017127540	SE 14th & E Diehl	☐	☒	0.98	-0.027
2017065273	SE 14th & Cummins	☐	☐	-	0.001
2017066607	56th St & University	☐	☒	0.177	0
2017066617	ML King Jr & University	☒	☐	0.080	2.92
2017066633	Penn & University	☒	☐	-	2.52
2017065390	Williams & E University	☐	☒	0.061	0.32
2017129646	E 9th & E University	☐	☐	-	-
2017065243	Delaware & E Euclid	☐	☒	0.027	0.4
2017065244	E 25th & E Euclid	☐	☒	-	0.79
2017065245	E 26th St & E Euclid	☒	☐	0.194	1.74
2017127525	E 33rd & E Euclid	☒	☐	0.294	-
2017066472	E 29th & Hubbell	☐	☐	0.001	-
2017129370	E 33rd & Hubbell	☐	☒	-0.100	0.82
2017066470	Hubbell & Guthrie	☒	☐	0.124	2.69
2017066778	Dixon & Guthrie	☐	☐	0.046	0.06
2017066766	30th & Hickman	☐	☒	-	0.57
2017157737	Keo & I 235 (South Ramp)	☒	☐	-	5.08

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the City of Des Moines, Iowa

Signed: _____ 8/5/24
Signature Date Signed

Connie Bosen, Mayor
Printed Name

Attest: _____ 8/5/24
Signature Date Signed

Laura Baumgartner, City Clerk
Printed Name

★ Roll Call Number
24-1047

Agenda Item Number
7

Date August 5, 2024

APPROVING THE FISCAL YEAR 2026 TRAFFIC SAFETY IMPROVEMENT PROGRAM (TSIP) APPLICATION TO THE IOWA DEPARTMENT OF TRANSPORTATION (IOWA DOT) FOR THE CITYWIDE INSTALLATION OF FLASHING YELLOW ARROW (FYA) TRAFFIC SIGNAL HEADS ALONG FIVE CORRIDORS.

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF DES MOINES, IOWA:

1. That the Fiscal Year 2026 Traffic Safety Improvement Program (TSIP) application for the citywide installation of FYA traffic signal heads along five corridors is approved, and the Mayor is hereby authorized and directed to execute the application and the City Clerk to attest to the Mayor's signature.

2. The City Manager is authorized to submit applications to the Iowa DOT for TSIP Funds to cover the materials and equipment costs for the FYA traffic signal head installations.

3. The City understands if the application is approved it will be responsible for the labor to install the materials and equipment, and any additional funds, if required, to complete the project and the City of Des Moines will provide adequate resources to maintain the improvements for their useful life.

(Council Letter Number 24-312 attached)

Moved by Coleman to adopt. Second by Simonson

FORM APPROVED: s/Kathleen Vanderpool
Kathleen Vanderpool
Deputy City Attorney

SLN:pw

COUNCIL ACTION	YEAS	NAYS	PASS	ABSENT
BOESEN	✓			
COLEMAN	✓			
GATTO				✓
MANDELBAUM	✓			
SIMONSON	✓			
VOSS	✓			
WESTERGAARD	✓			
TOTAL	6			1

MOTION CARRIED APPROVED

Connie Boesen Mayor

CERTIFICATE

I, LAURA BAUMGARTNER, City Clerk of said City hereby certify that at a meeting of the City Council of said City of Des Moines, held on the above date, among other proceedings the above was adopted.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal the day and year first above written.

Laura Baumgartner City Clerk

Background

The City of Des Moines monitors signalized intersection locations where red light running (RLR) and left turn crashes are prevalent. Using data from the Iowa DOT's *Iowa Crash Analysis Tool* (ICAT), City staff determines which signalized intersections have higher occurrences of RLR and left turn crashes to prioritize traffic signal equipment upgrades.

Proposed Project Concept

The proposed project will install four-section flashing yellow arrow (FYA) left turn traffic signal heads and retroreflective backplates along five main corridors, E 14th St (US 69)/SE 14th St (US 69), University Ave/E University Ave (IA 163), E Euclid Ave (US 6), Hubbell Ave and Guthrie Ave, and at two other isolated intersections. Intersections are shown in Table B-1. Focusing on City corridors, that are also US or state routes, provides consistency in traffic signal operations along the corridor and aids driver expectancy. The safety improvements focus on three main areas:

- upgrading existing left turn traffic signal heads to comply with the Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) current standard of a four-section head with a left turn FYA arrow centered over exclusive left turn lanes,
- updating the left turn traffic signal phasing to either change from permissive to protected/permissive or from protected/permissive to protected only during peak travel times, and
- installing retroreflective backplates which is a FHWA Proven Safety Countermeasure to reduce crashes.

These improvements are supported by the City's Transportation Master Plan, MoveDSM, and the Vision Zero Transportation Safety Action Plan.

Existing Conditions

The signalized intersections along the corridors in this project have varying existing conditions for left turning traffic. Half of the locations have left turn phasing for the major street but not the side streets. Some locations have existing 5-section left turn traffic signal heads for protected/permitted left turn phasing. Other locations have left turn protected/permitted phasing using 4-section traffic signal heads with bimodal left turn arrows (one face shares the solid yellow and solid green arrow). Most of the corridors have a mixture of 5-section heads and 4-section FYA left turn traffic signal heads on the major road.

Speed limits vary both throughout the corridor and at each intersection. Both the side street and major street speed limits are listed in Table B-1. Clear zones are determined by functional classification and vary by intersection. In all locations, clear zones meet either Iowa Department of Transportation (DOT) or Statewide Urban Design and Specifications (SUDAS) standards. Table B-1 lists the functional classification of the major road. All intersections meet applicable MUTCD standards.

Safety Justification

According to the Iowa DOT's 2016-2020 Potential for Crash Reduction (PCR) data, all but four of the proposed project intersections have medium or high PCR levels in one or both the severe crashes (KAB) and all crashes (KABCO) categories. The four intersections that have negligible PCR levels are included for corridor consistency. The Iowa DOT intersection PCR values are included in Table B-1.

The proposed project corridors, except for Guthrie Ave and a portion of Hubbell Ave, fall on the High Injury Network (HIN) identified by the City's Vision Zero Plan. Upgrading the traffic signal heads, left turn phasing, and backplates are measures included in the plan. This project takes a low-cost, first step towards reducing fatal and serious injury crashes in the corridors.

In the five-year period from January 2019 to December 2023, ICAT crash data for the entire City of Des Moines predominant crash causes included 1,832 ran traffic signal crashes and 1,469 failure to yield right-of-way (FTYROW): making left turn crashes. These same crashes resulted in 3,073 occurrences of more serious injury type crashes (head-on, angle, broadside) with approximately 72 percent categorized as broadside collisions.

Table B-1. Project Intersections by Corridor

PCR Int #	Intersection	Speed Limit		Functional Class	PCR (2016-2020)		CRF Applied		
		Major Rd	Minor Rd	Major Rd/Minor Rd	KAB	KABCO	FYA (SI-20)	LT Prot Only (SI-21)	Reflect BP (SI-10)
E 14th St/SE 14th St (US 69)									
2017065285	**E 14th & E Grand**	35	30	principal arterial/minor arterial	0.063	1.65	X		X
2017065282	**E 15th & E Grand**	35	30	principal arterial/minor arterial	0.785	3.94	X		X
-	**E 14th & E Court**	35	35/30	principal arterial/minor arterial	-	-	X		X
-	**E 15th & E Court**	35	30	principal arterial/minor arterial	-0.224	-2.67	X		X
2017127555	**SE 14th & Hartford**	40	30/40	principal arterial/collector	0.172	4.88	X	X	X
2017127551	**SE 14th & E Bell**	40	25	principal arterial/local	0.150	0.5	X		X
2017127546	**SE 14th & E Park**	35	25/30	principal arterial/minor arterial	0.297	5.69			X
2017066249	**Indianola & E Park**	35	25	minor arterial	0.181	1.15	X	X	X
2017127544	**SE 14th & E Watrous**	40	30	principal arterial/collector	0.760	1.17	X	X	X
-	**SE 14th & Market Place**	40	25	principal arterial/local	-	-		X	X
2017127540	**SE 14th & E Diehl**	40	25	principal arterial/ local	-0.027	0.98		X	X
2017065273	**SE 14th & Cummins**	35	30	minor arterial/collector	0.001	-		X	X
University Ave/E University Ave (IA 163)									
2017066607	**56th St & University**	30/35	30	minor arterial	0.177	0	X		X
2017066617	**ML King Jr & University**	30	30	principal arterial/minor arterial	0.080	2.92		X	X
2017066633	**Penn & University**	35	30	minor arterial	-	2.52		X	X
2017065390	**Williams & E University**	40	30	principal arterial/ collector	0.061	0.32	X		X
2017129646	**E 9th & E University**	35	30	minor arterial/local	-	-	X	X	X
Euclid Ave/E Euclid Ave (US 6)									
2017065243	**Delaware & E Euclid**	35	35/30	principal arterial/ minor arterial	0.027	0.4		X	X
2017065244	**E 25th & E Euclid**	35	25	principal arterial/ local	-	0.79	X	X	X
2017065245	**E 26th St & E Euclid**	35	25	principal arterial/ local	0.194	1.74	X	X	X
2017127525	**E 33rd & E Euclid**	40	25/35	principal arterial/ local	0.294	-	X		X
Hubbell Ave & Guthrie Ave									
2017066472	**E 29th & Hubbell**	35	30	minor arterial/collector	0.001	-			X
2017129370	**E 33rd & Hubbell**	40	35	minor arterial/collector	-0.100	0.82			X
2017066470	**Hubbell & Guthrie**	35	30/25	minor arterial	0.124	2.69		X	X
2017066778	**Dixon & Guthrie**	35	30/25	minor arterial/collector	0.046	0.06	X		X
Other Intersections									
2017066766	**30th & Hickman**	30/35	25	minor arterial/collector	-	0.57	X	X	X
2017157737	**Keo & I 235 (South Ramp)**	35	45	minor arterial	-	5.08		X	X

The proposed 27 project intersections in the same analysis period recorded 186 ran traffic signal crashes and 151 FTYROW: making left turn crashes. Approximately six percent of the City's signalized intersections account for 10 percent of the ran traffic signal crashes and 10 percent of the left turn FTYROW crashes. Approximately 36 percent of the project's 27 intersections' total crashes have a more serious crash type (broadside, head-on, angle), with the most frequent crash type being broadside crashes.

Based on the Iowa DOT's Planning-Level Crash Reduction Factor (CRF) List dated July 2019, installing FYA left turn traffic signal heads for permissive left turn phasing is expected to reduce all crashes by 10 percent (CRF SI-20). At intersections, changing left turn phasing to protected only on the major approach is expected to reduce all crashes by 25 percent (CRF SI-21). Per the Iowa DOT, installing retroreflective backplates to traffic signal heads is expected to reduce all crashes by five percent (CRF SI-10). For the project intersections based on Table B-1, CRF SI-20 applies to 16 locations (59%), CRF SI-21 applies to 15 locations (56%), and CRF SI-10 applies to all the intersections (100%). The individual CRFs were multiplied by the intersection occurrence percentage to get an adjusted CRF for the benefit-cost calculation.

The total cost estimate for the project is $350,000 including labor. The materials only cost estimate is $294,600. All costs were determined to be safety related. The benefit cost ratio for the proposed safety project is 228:1.

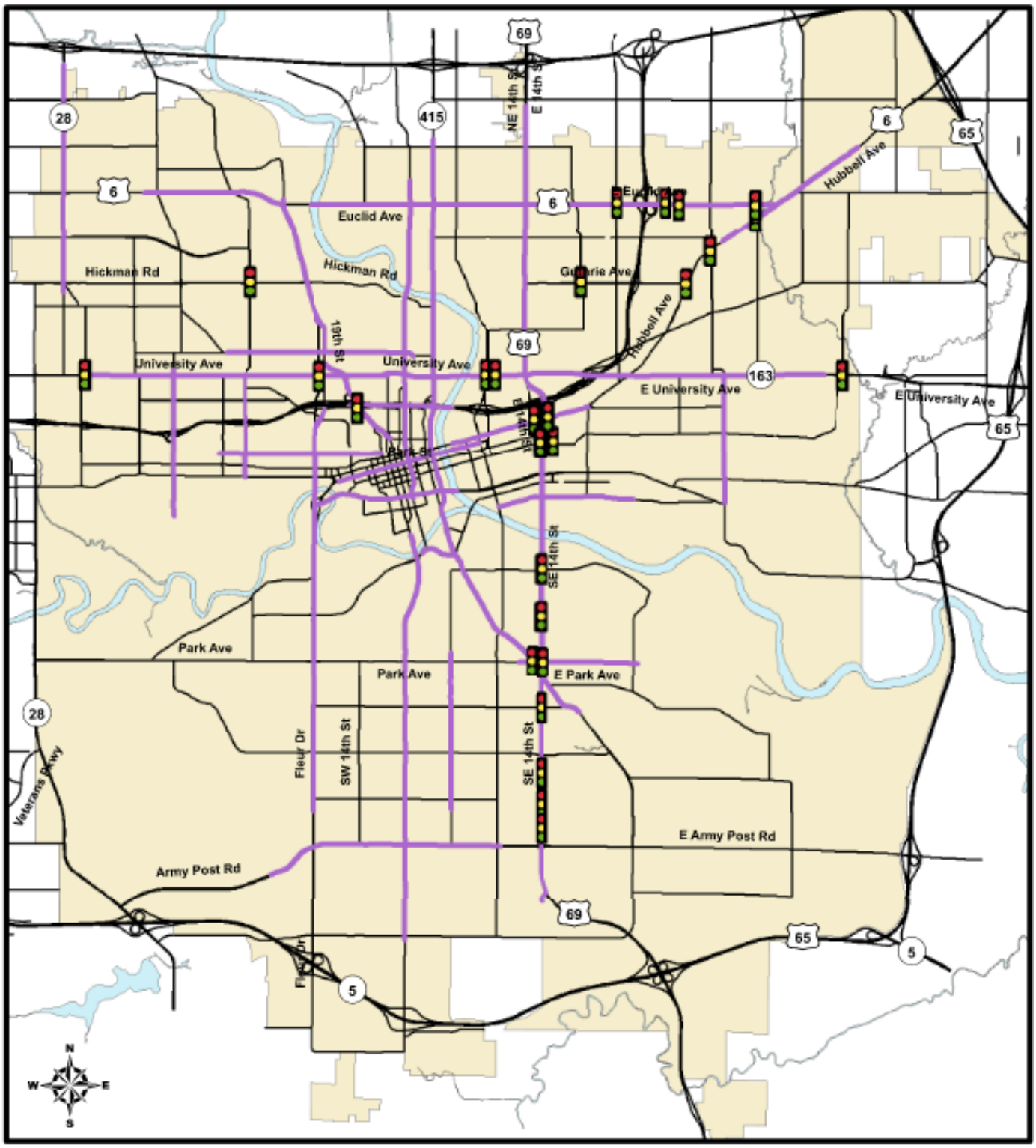
COST ESTIMATE
FY2026 TSIP - TRAFFIC CONTROL DEVICE APPLICATION

NO.	Des Moines, IA	QTY	UNIT	UNIT PRICE	AMOUNT
1	4-SECTION SIGNAL HEAD WITH TUNNEL VISORS, 12" LED (LT ARROW R,SY,FY,G), BACKPLATE WITH 3" RETROREFLECTIVE YELLOW TAPE	70	EA	$ 1,500.00	$ 105,000.00
2	4-SECTION SIGNAL HEAD WITH TUNNEL VISORS, 12" LED (LT ARROW R,SY,FY,G) OPTICALLY LIMITED, BACKPLATE WITH 3" RETROREFLECTIVE YELLOW TAPE	3	EA	$ 2,000.00	$ 6,000.00
3	3-SECTION SIGNAL HEAD WITH TUNNEL VISORS, 12" LED (LT ARROW R,Y,G), BACKPLATE WITH 3" RETROREFLECTIVE YELLOW TAPE	1	EA	$ 1,500.00	$ 1,500.00
4	CABINET MODIFICATION SUPPLIES	1	LS	$ 10,000.00	$ 10,000.00
5	DETECTION (RADAR)	8	EA	$ 7,500.00	$ 60,000.00
6	HANDHOLE, TYPE I	2	EA	$ 1,300.00	$ 2,600.00
7	HANDHOLE, TYPE IV	1	EA	$ 2,100.00	$ 2,100.00
8	SIGNAL CABLE - 16C #14	9930	LF	$ 4.50	$ 44,685.00
9	SIGNAL CABLE - 7C #14	1080	LF	$ 3.00	$ 3,240.00
10	TRACER- 1C #10	1100	LF	$ 1.50	$ 1,650.00
11	GROUND- 1C #6 STRANDED	1100	LF	$ 1.75	$ 1,925.00
12	PULL TAPE	1100	LF	$ 0.75	$ 825.00
13	3" PVC (SCHEDULE 80)	1100	LF	$ 18.00	$ 19,800.00
14	DETECTION CABLE	2100	LF	$ 4.00	$ 8,400.00
				SUB-TOTAL	$ 267,800.00
				CONTINGENCY (10%)	$ 26,800.00
			(MATERIAL & EQUIPMENT)	**TOTAL**	**$ 294,600.00**
			(BY CITY OF DES MOINES)	**LABOR TOTAL**	**$60,000.00**
				PROJECT TOTAL	**$354,600.00**

Schedule

July 2024	Crash Analysis and TSIP Application Preparation
August 5, 2024	Des Moines City Council TSIP Application Approval
August 10, 2024	TSIP Application submitted to Iowa DOT
January 2025	Iowa DOT Approval
Spring 2025	TSIP Agreement
Summer/Fall 2025	Purchase Equipment and Install Underground, if needed
Winter 2025/Spring 2025	Receive Equipment and Begin Installation
Summer/Fall 2025	Completion

FY26 TSIP TCD Proposed Project Locations



THIS PAGE IS INTENTIONALLY BLANK.

(for printing purposes)

Project Site Photos *(Source: Street Smart by CycloMedia)*

E 14th & E Grand

Looking south on E 14th Street (US 69)

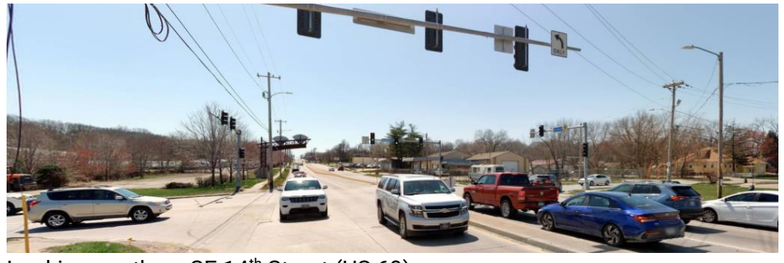
Looking west on Grand Ave

E 14th & E Court

Looking south on E 14th St (US 69)

Looking west on E Court Ave

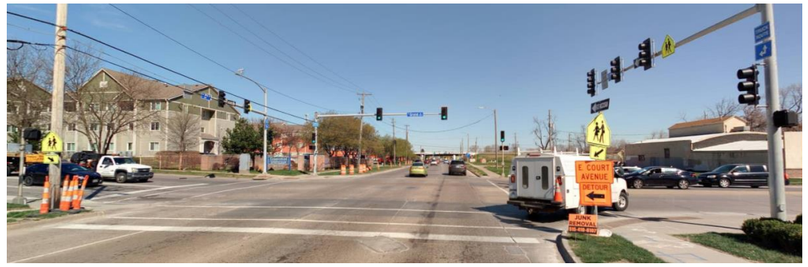
SE 14th & Hartford



Looking south on SE 14th Street (US 69)

Looking east on E Hartford Ave

E 15th & E Grand



Looking north on E 15th St (US 69)

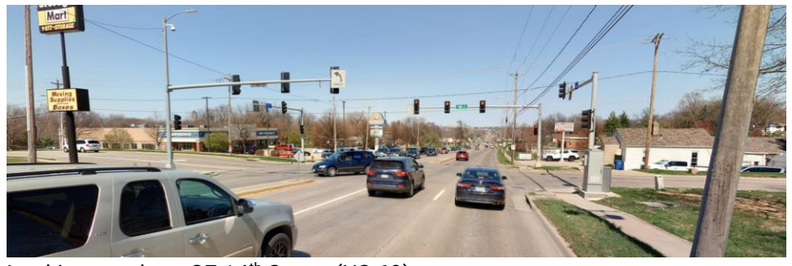
Looking east on E Grand Ave

E 15th & E Court

Looking north on E 15th St (US 69)

Looking east on E Court Ave

SE 14th & E Bell



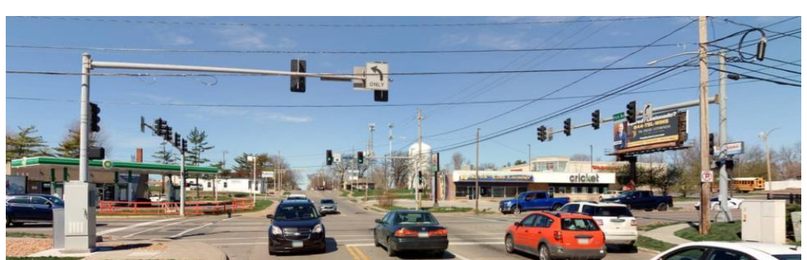
Looking south on SE 14th Street (US 69)

Looking west on E Bell Ave

Project Site Photos *(Source: Street Smart by CycloMedia)*

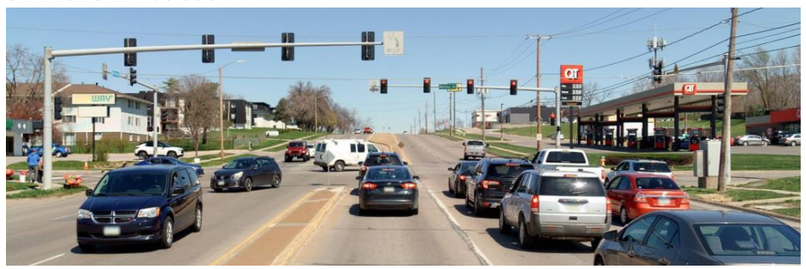
SE 14th & E Park

Looking south on SE 14th Street (US 69)

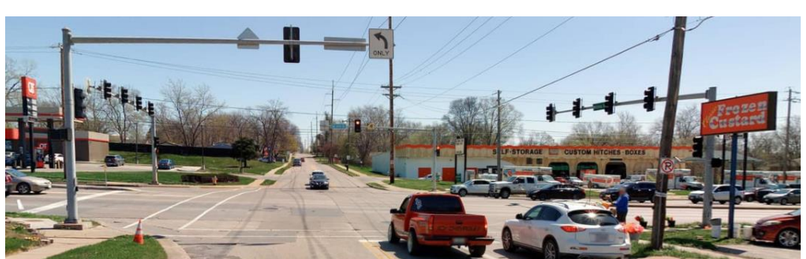


Looking west on E Park Ave

SE 14th & E Watrous

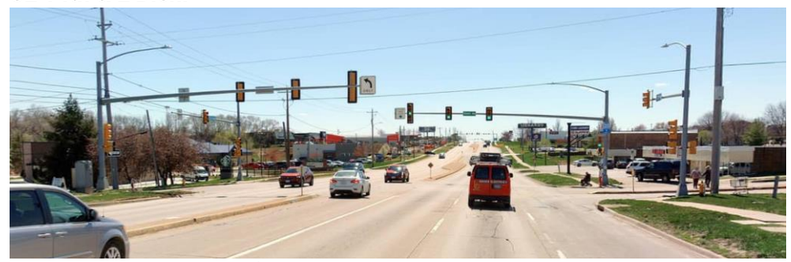


Looking south on SE 14th Street (US 69)

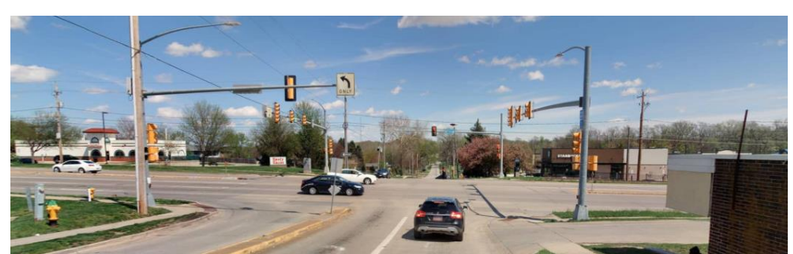


Looking west on E Watrous Ave

SE 14th & E Diehl

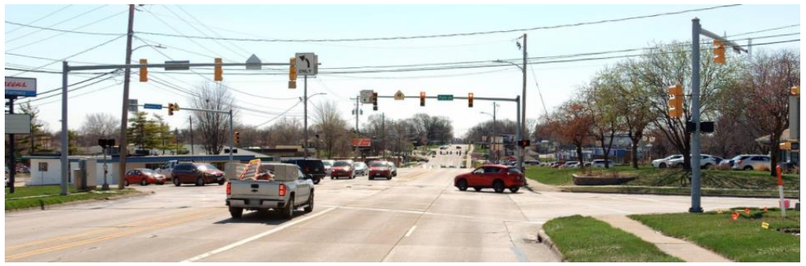


Looking south on SE 14th Street (US 69)



Looking east on E Diehl Ave

Indianola & E Park



Looking southeast on Indianola Ave

Looking east on E Park Ave

SE 14th & Market Place

Looking south on SE 14th Street (US 69)

Looking east on Market Place

SE 14th & Cummins

Looking south on SE 14th Street (US 69)

Looking east on Cummins Rd

Project Site Photos *(Source: Street Smart by CycloMedia)*

56th St & University

Looking west on University Ave

Looking south on 55th St/56th St

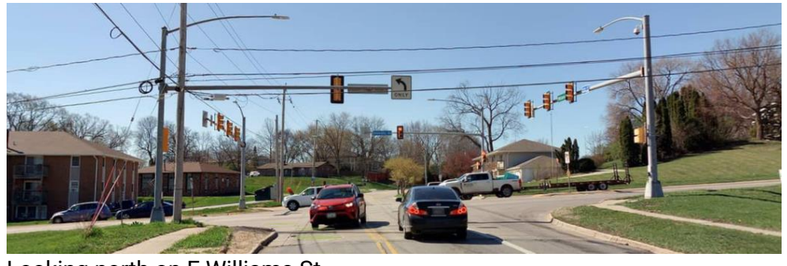
Penn & University

Looking west on E University Ave

Looking south on Pennsylvania Ave

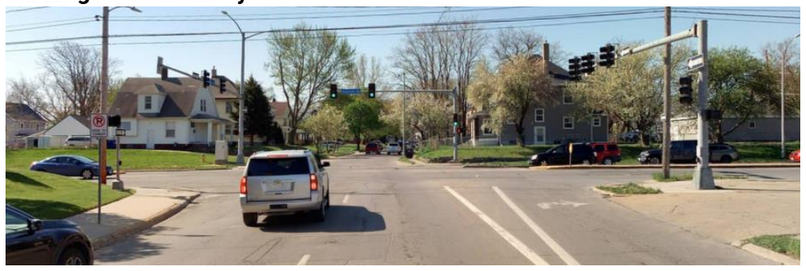
Williams & E University

Looking west on E University Ave (IA 163)



Looking north on E Williams St

ML King Jr & University

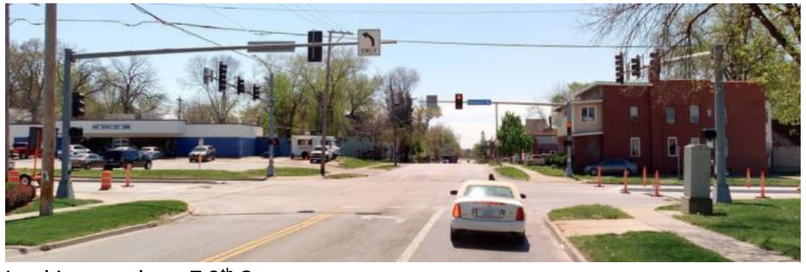


Looking south on ML King Jr Parkway

Looking west on University Ave

E 9th & E University

Looking west on E University Ave



Looking south on E 9th St

Delaware & E Euclid

Looking east on E Euclid Ave (US 6)

Looking south on Delaware Ave

Project Site Photos *(Source: Street Smart by CycloMedia)*

E 25th & E Euclid

Looking west on E Euclid Ave (US 6)

Looking north on E 25th Street

E 33rd & E Euclid

Looking east on E Euclid Ave (US 6)

Looking south on E 33rd Street

E 29th & Hubbell

Looking northeast on Hubbell Ave

Looking south on E 29th Street

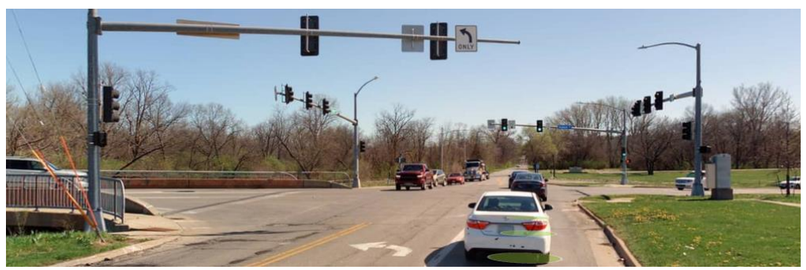
E 26th St & E Euclid

Looking east on E Euclid Ave (US 6)

Looking south on E 26th Street

E 33rd & Hubbell

Looking southwest on Hubbell Ave



Looking south on E 33rd Street

Hubbell & Guthrie

Looking northeast on Hubbell Ave

Looking west on Guthrie Ave

Dixon & Guthrie

Looking west on Guthrie Ave

Looking north on Dixon Street

30th & Hickman

Looking west on Hickman Road

30th & Hickman

Looking south on 30th Street

Keo & I 235 (South Ramp)

Looking southeast on Keosauqua Way

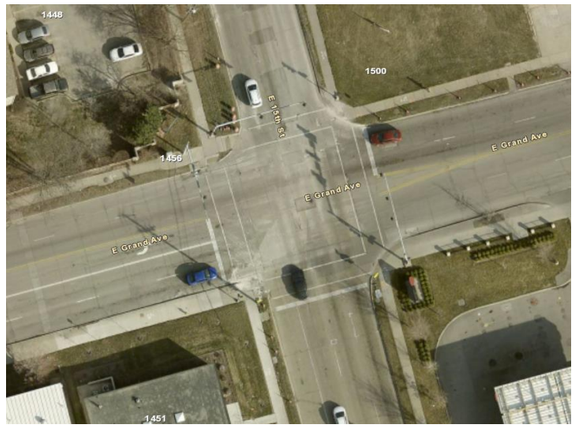
Looking east on I-235 WB Exit Ramp

Plan Views *(Source: Des Moines Maps)*

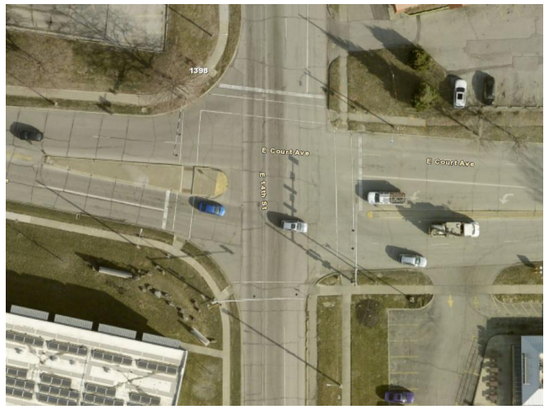
All work is within existing City or State right-of-way. No additional right-of-way is required.

E 14th & E Grand

E 15th & E Grand



E 14th & E Court



E 15th & E Court

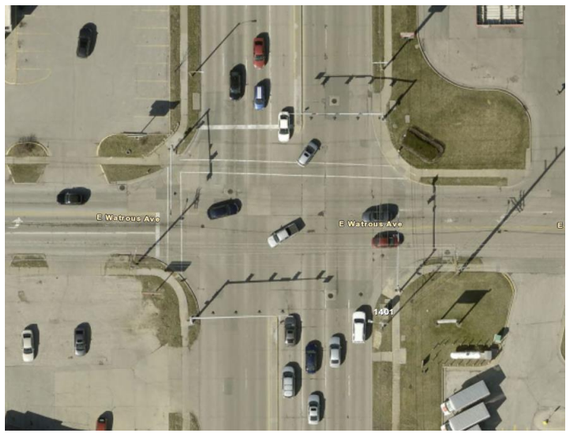
SE 14th & Hartford

SE 14th & E Bell

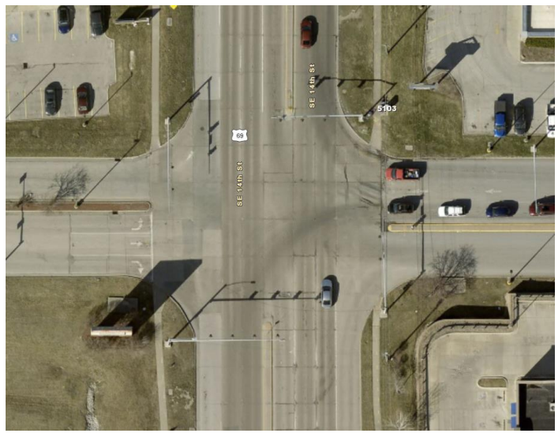
SE 14th & E Park

Indianola & E Park

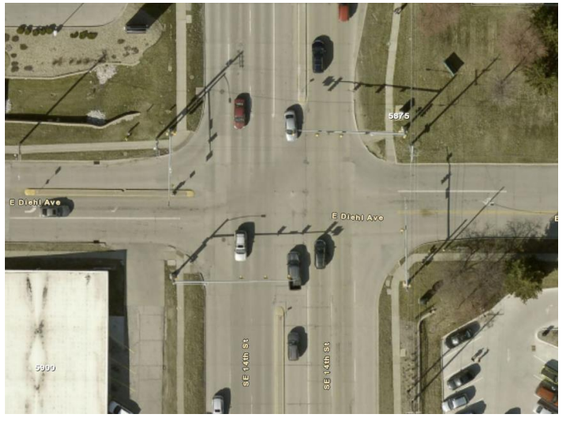
SE 14th & E Watrous



SE 14th & Market Place



SE 14th & E Diehl



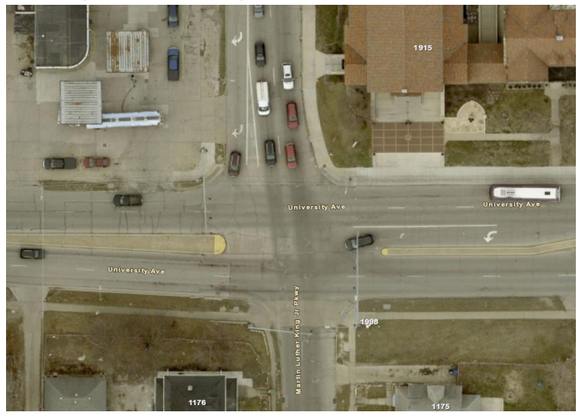
SE 14th & Cummins

Plan Views *(Source: Des Moines Maps)*

All work is within existing City or State right-of-way. No additional right-of-way is required.

56th St & University

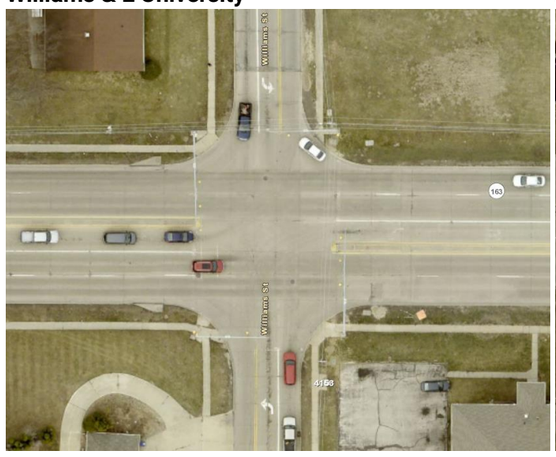
ML King Jr & University



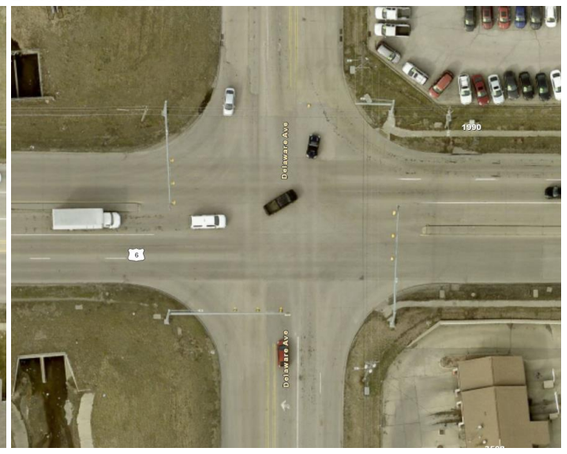
Pennsylvania & E University

E 9th & E University

Williams & E University

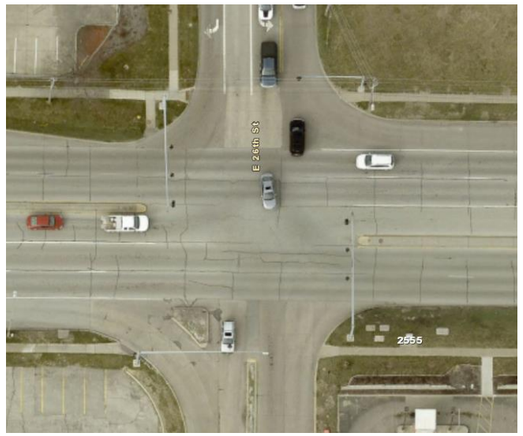


Delaware & E Euclid



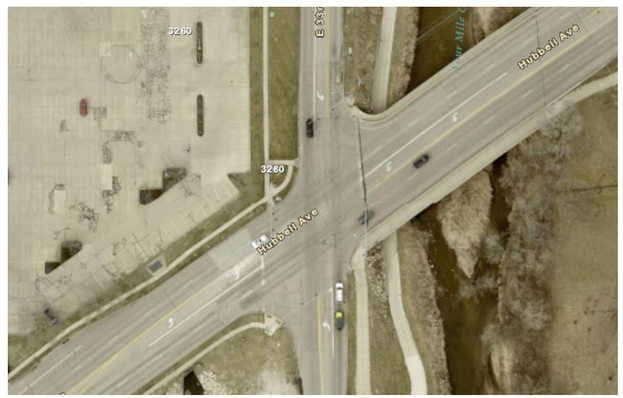
E 25th & E Euclid

E 26th St & E Euclid



E 33rd & E Euclid

E 33rd & Hubbell



E 29th & Hubbell

Hubbell & Guthrie

THIS PAGE IS INTENTIONALLY BLANK.

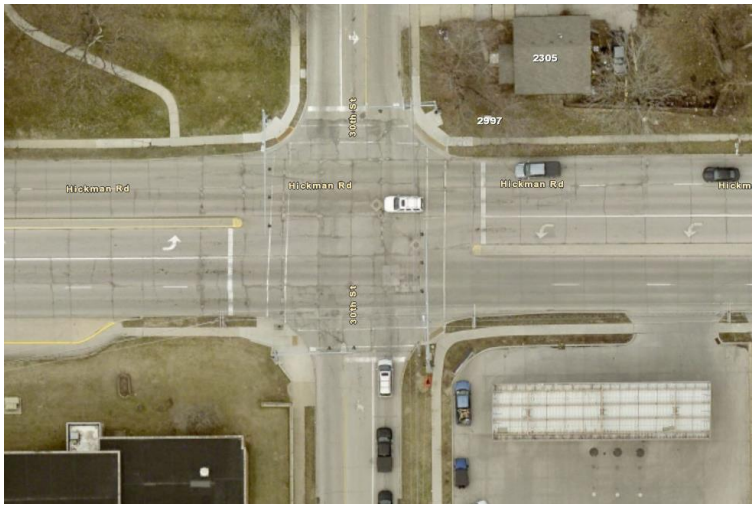
(for printing purposes)

Plan Views *(Source: Des Moines Maps)*

All work is within existing City or State right-of-way. No additional right-of-way is required.

Dixon & Guthrie

30th & Hickman



Keo & I 235 (South Ramp)

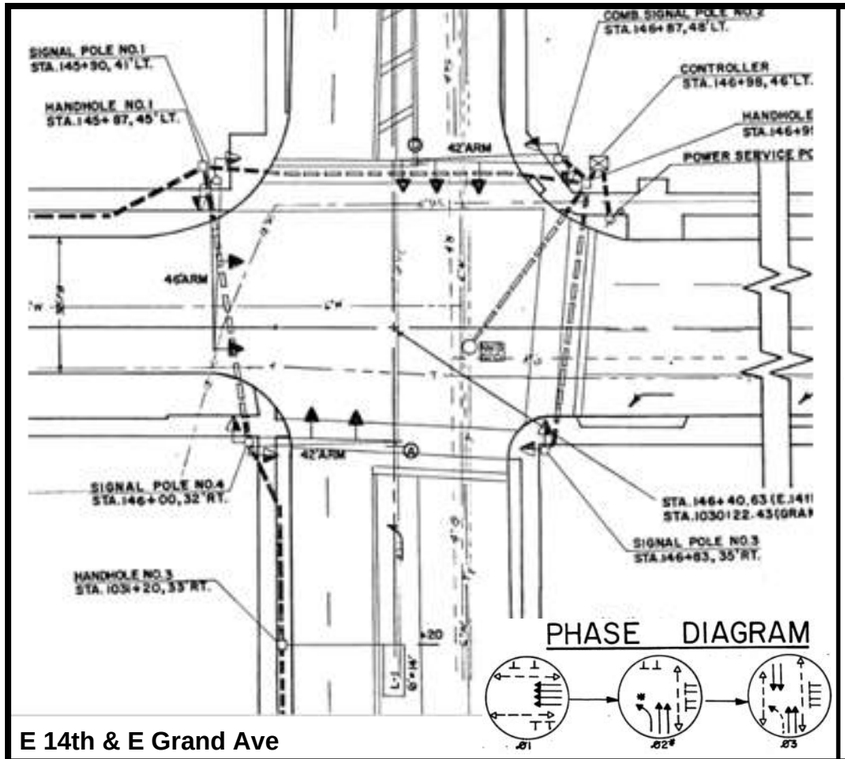
Table H-1 contains estimated 2023 Average Annual Daily Traffic (AADT) for the proposed project intersections. Data was obtained through Streetlight which uses probe data technology to estimate traffic volumes.

Table H-1 2023 Estimated AADT (Source: Streetlight)

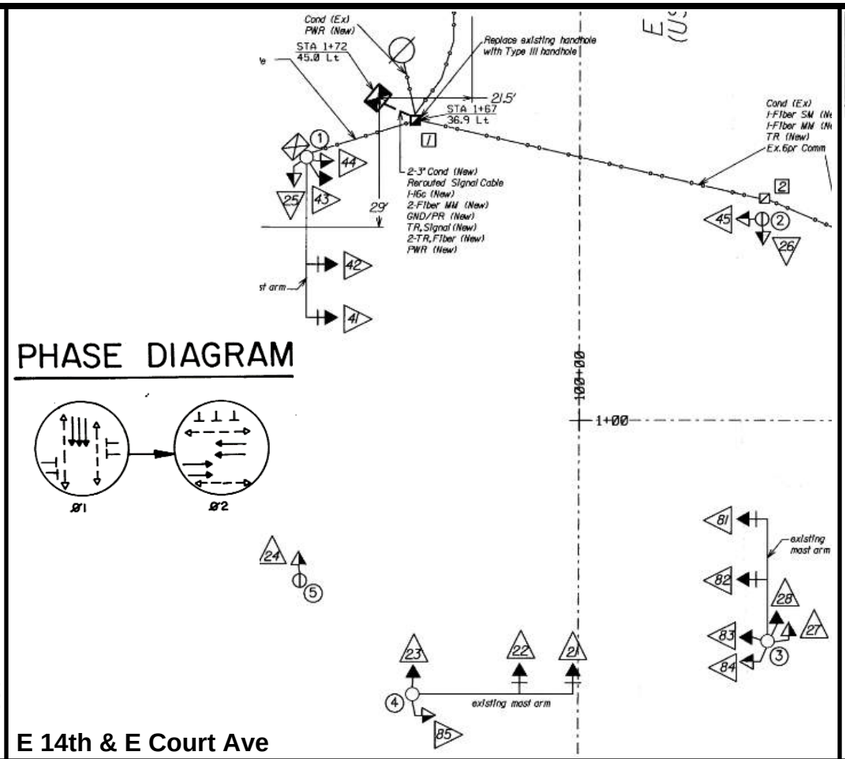
Intersection	2023 Estimated AADT*	
	Major Road	Minor Road
(E/SE) 14th Street		
E 14th^ & E Grand	19,600-20,600	5,000-7,400
E 15th^ & E Grand	19,500-20,600	7,400-8,200
E 14th^ & E Court	17,800	3,000
E 15th^ & E Court	16,800	3,000
SE 14th & Hartford	32,400	3,300-6,000
SE 14th & E Bell	27,700	300-500
SE 14th & E Park	27,500	5,900-7,200
Indianola & E Park	15,500	5,200-5,900
SE 14th & E Watrous	28,800	2,300-5,500
SE 14th & Market Place	25,100	-
SE 14th & E Diehl	24,100	300-1,600
SE 14th & Cummins	22,900	500
(E) University		
56th St & University	10,300	6,100
ML King Jr & University	8,100	8,000-9,000
Penn & University	11,500-13,500	7,700
E 9th & E University	13,000-13,500	1,500
Williams & E University	21,900-23,300	2,000
E Euclid		
Delaware & E Euclid	16,000-17,100	3,400-5,700
E 25th & E Euclid	23,900	2,400
E 26th St & E Euclid	17,700-23,900	2,600
E 33rd & E Euclid	7,200-9,200	3,300-4,600
Hubbell		
E 33rd & Hubbell	7,100-8,300	3,300-4,700
E 29th & Hubbell	7,900	3,800-4,100
Hubbell & Guthrie	6,400-7,400	2,400-5,700
Guthrie		
Dixon & Guthrie	4,600-6,900	1,100-2,300
30th & Hickman	8,700-9,100	5,500
Keo & I 235 (South Ramp)	24,300	14,500

** 2023 Estimated AADT was obtained from Streetlight data*

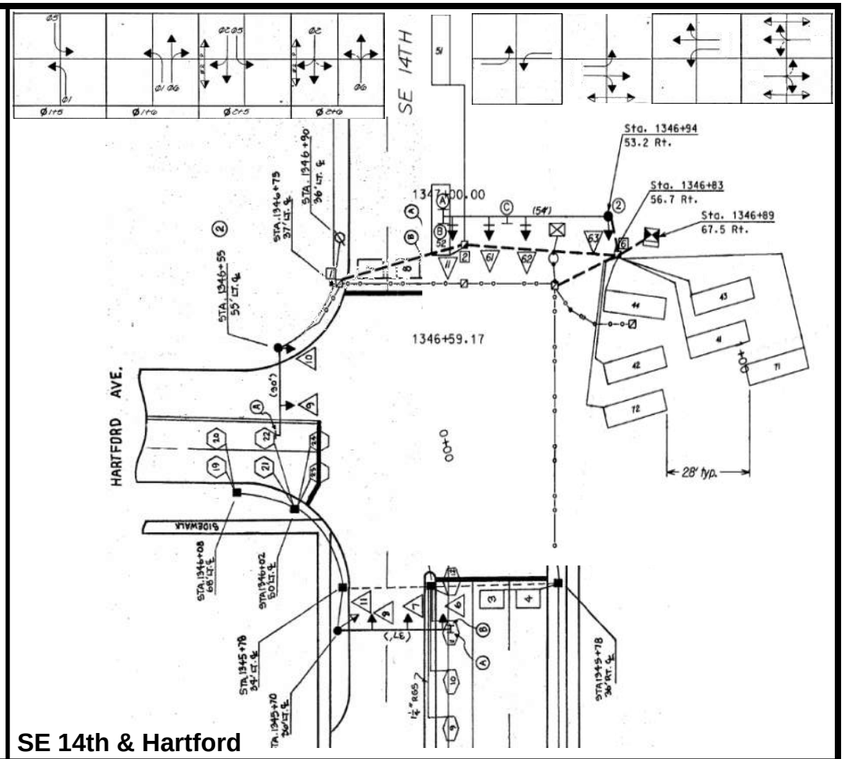
^ Estimated AADT is for one direction of travel only



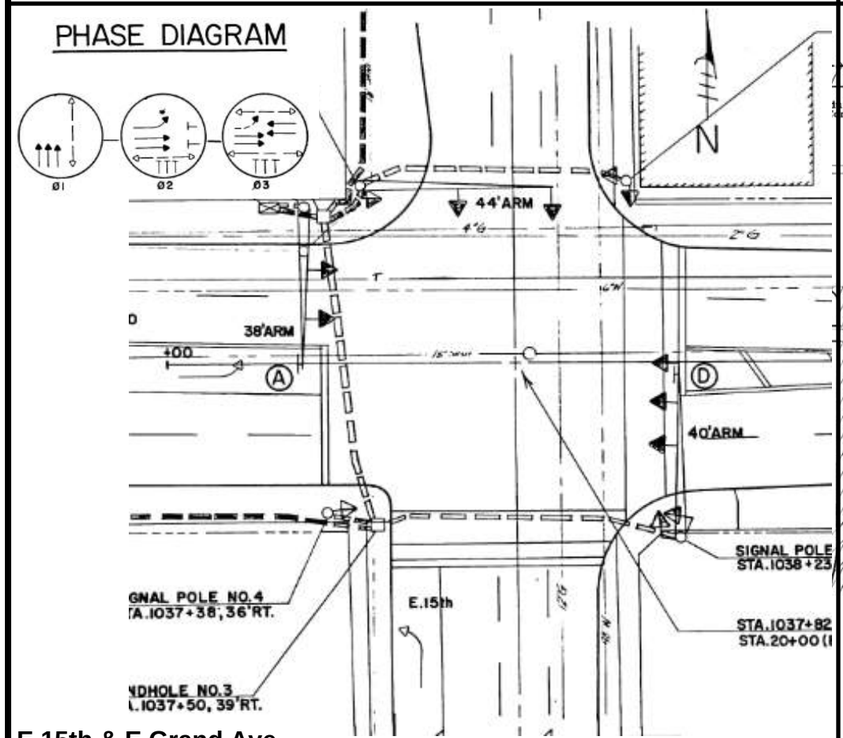
E 14th & E Grand Ave



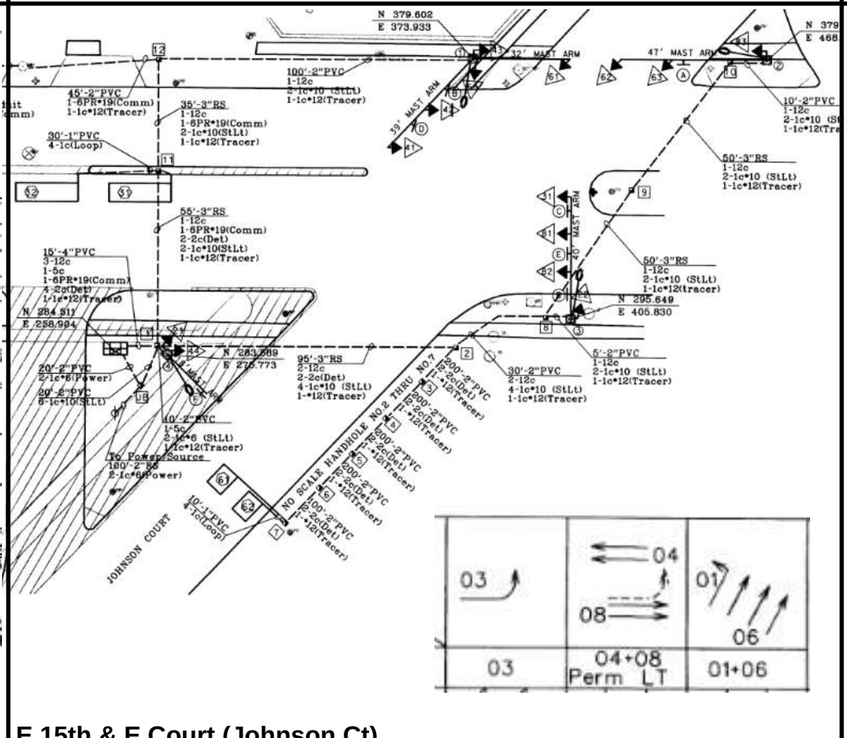
E 14th & E Court Ave



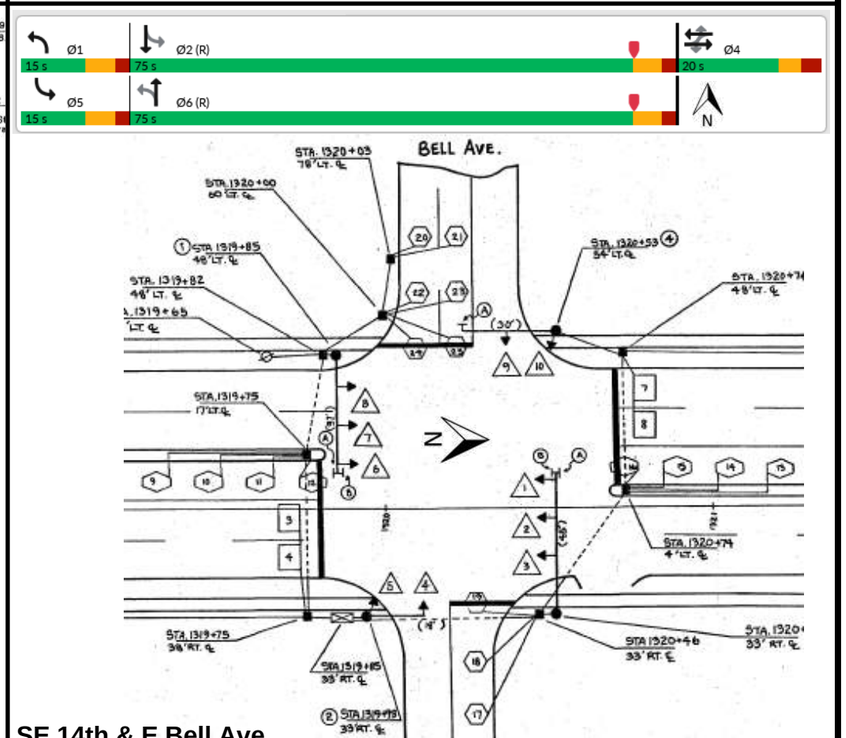
SE 14th & Hartford



E 15th & E Grand Ave



E 15th & E Court (Johnson Ct)



SE 14th & E Bell Ave

FY2026 TSIP - Citywide Installation of FYA Traffic Signal Heads & Retroreflective Backplates

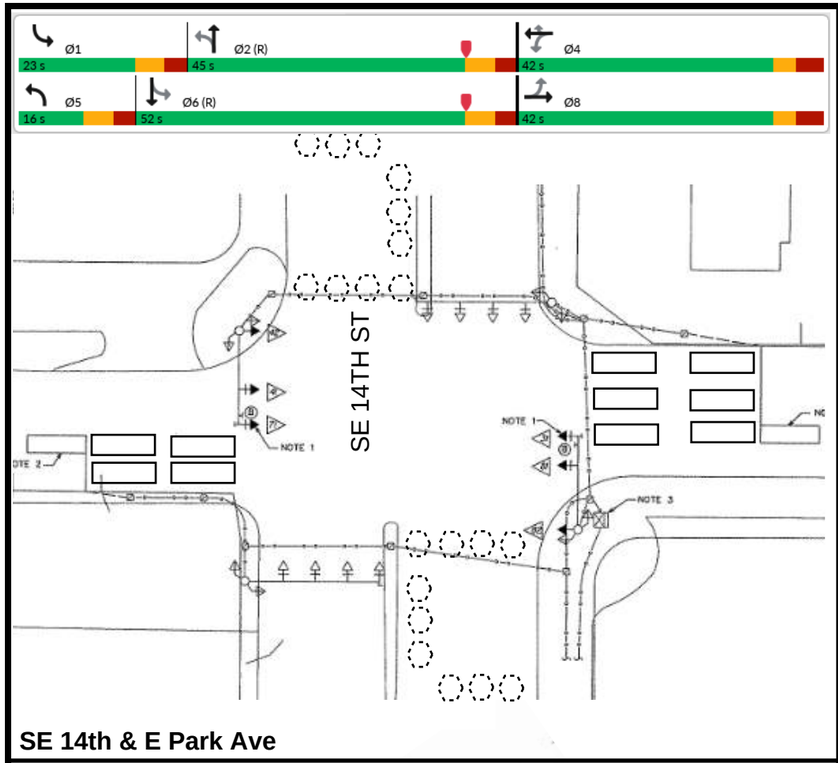
City of Des Moines

N

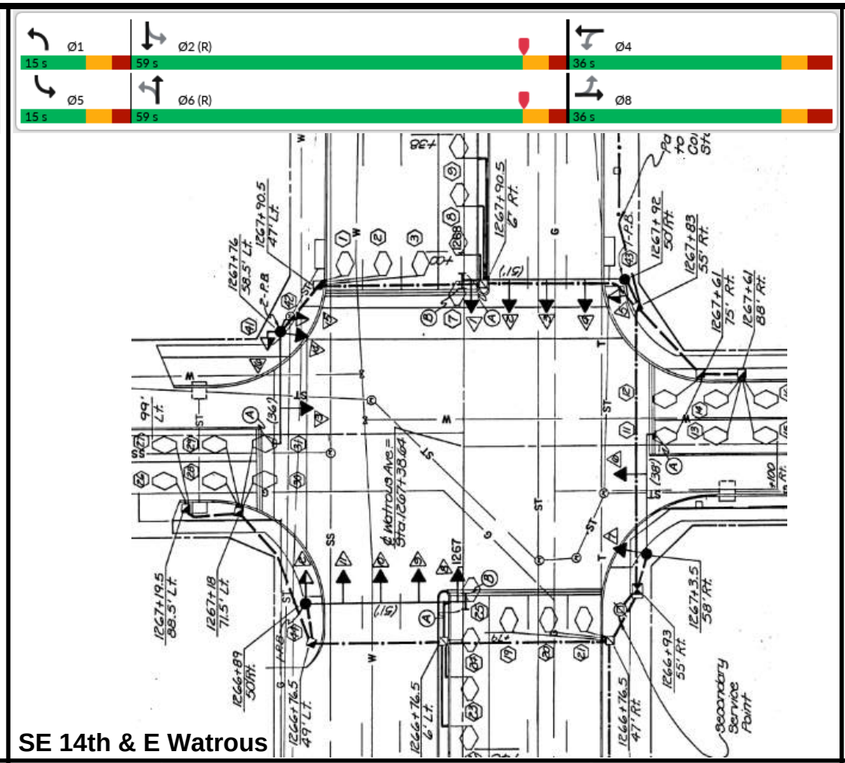
ITEM I - TRAFFIC SIGNAL LAYOUT

FIGURE 1

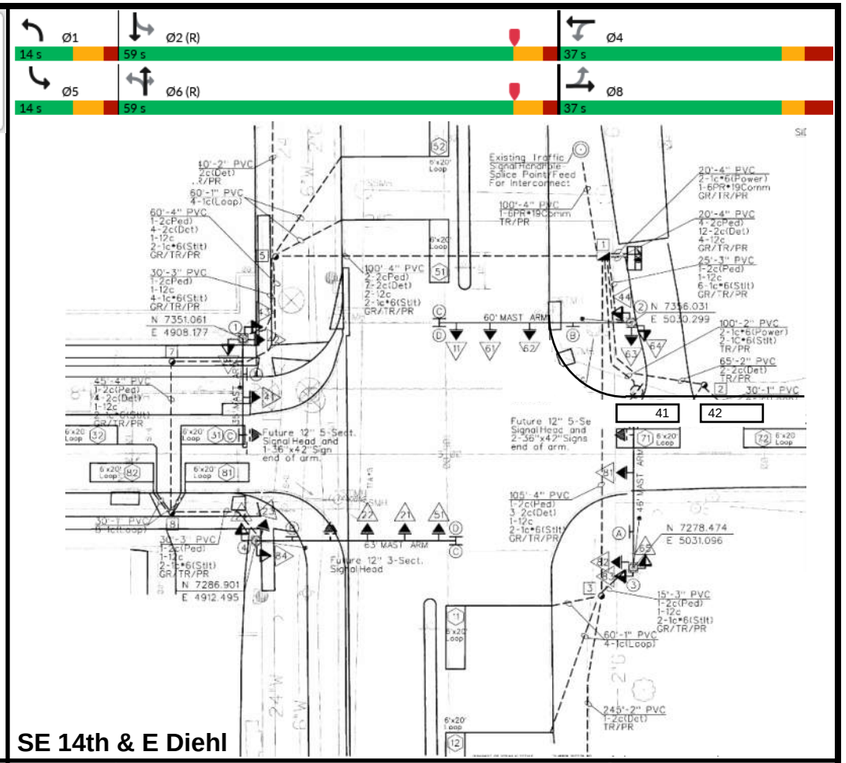
CITY OF DES MOINES ENGINEERING DEPARTMENT



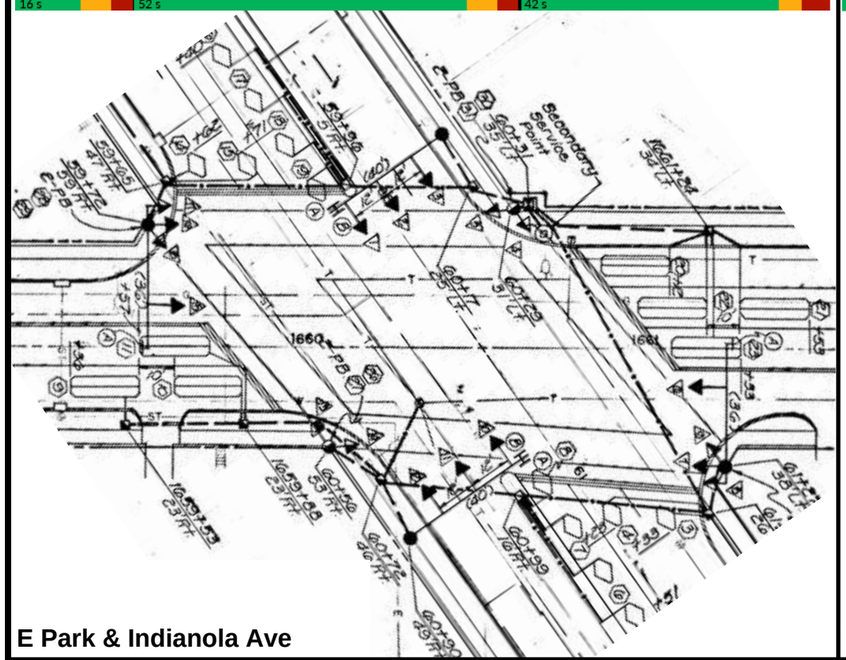
SE 14th & E Park Ave



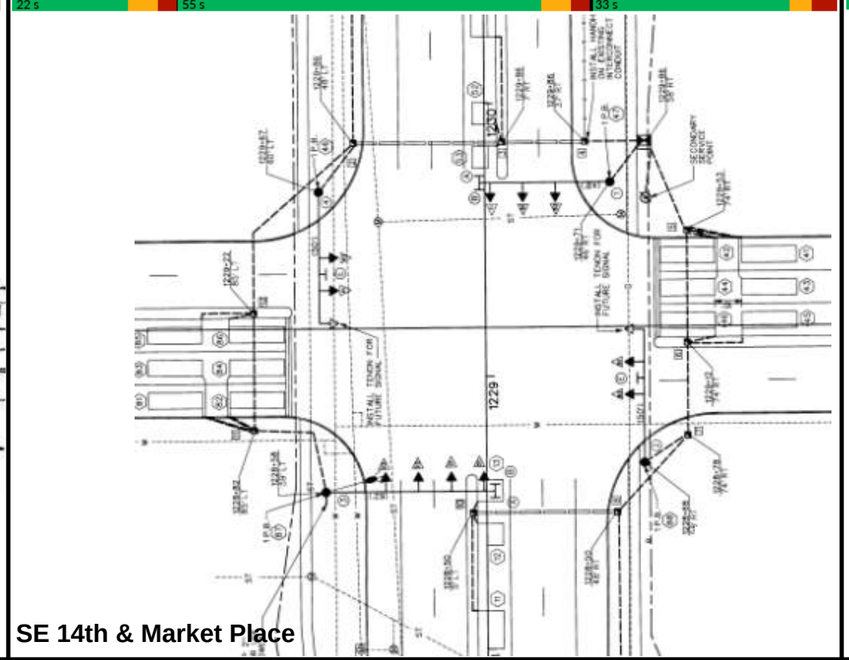
SE 14th & E Watrous



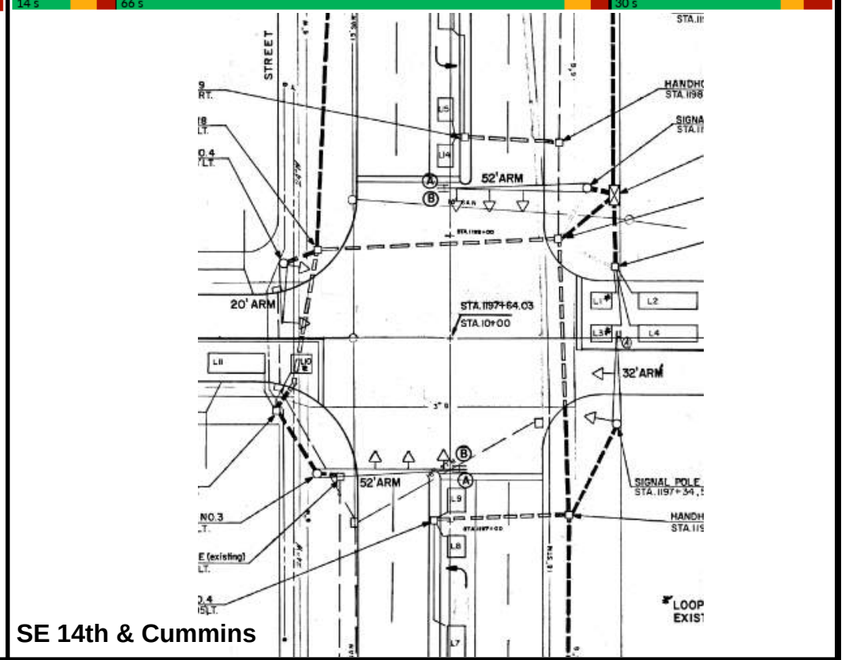
SE 14th & E Diehl



E Park & Indianola Ave



SE 14th & Market Place



SE 14th & Cummins

FY2026 TSIP - Citywide Installation of FYA Traffic Signal Heads & Retroreflective Backplates

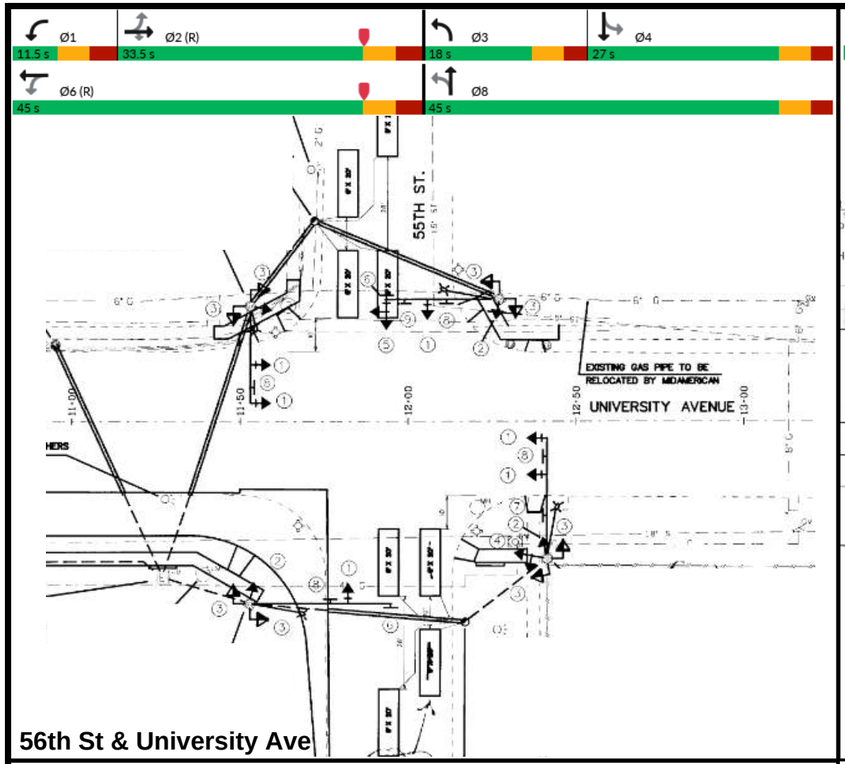
City of Des Moines

N

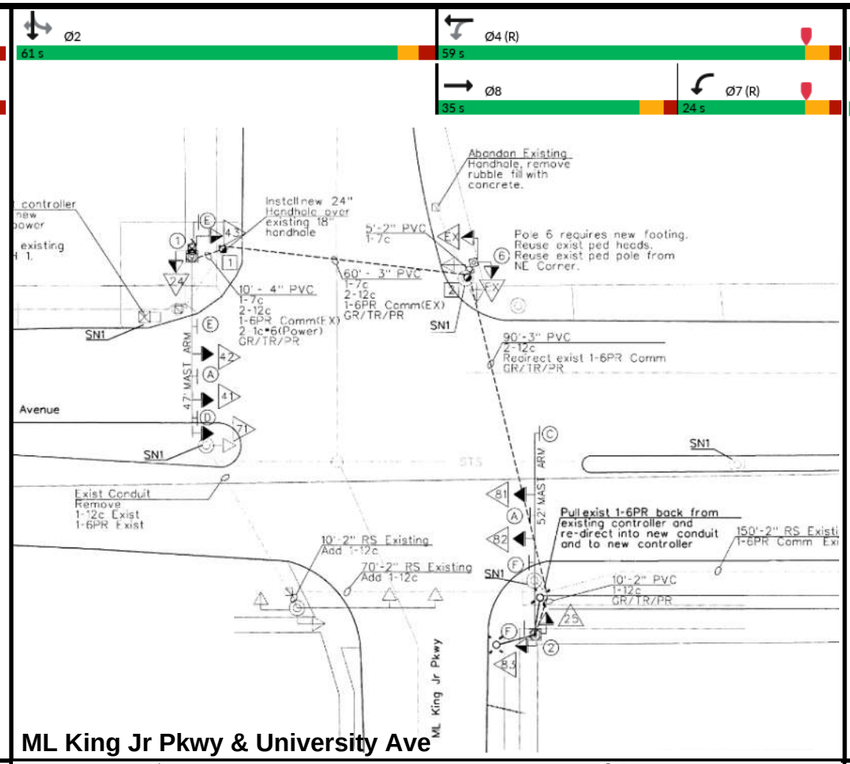
ITEM I - TRAFFIC SIGNAL LAYOUT

FIGURE 2

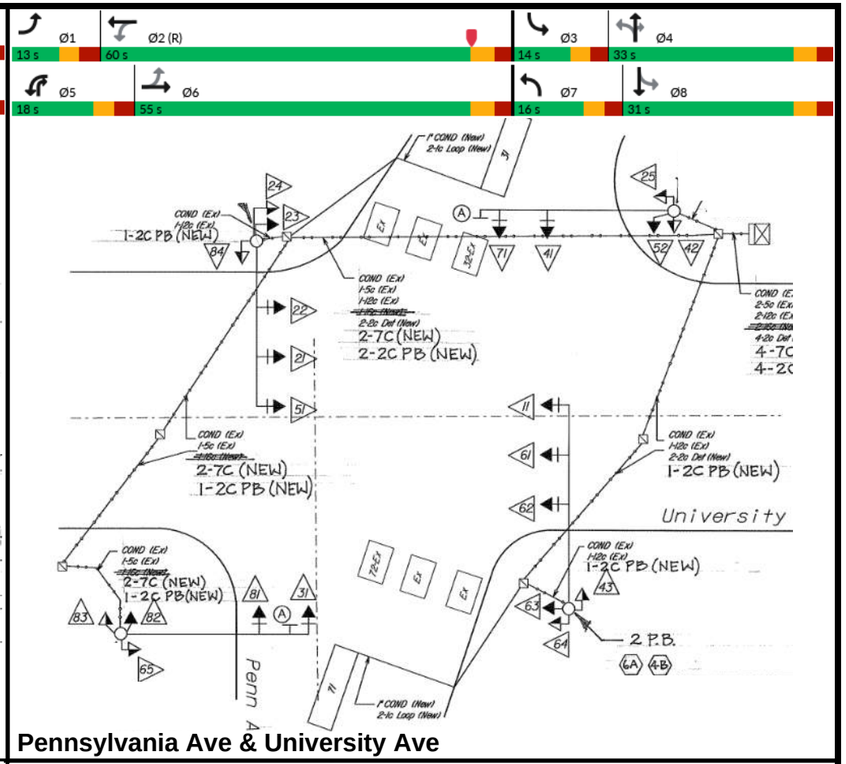
CITY OF DES MOINES ENGINEERING DEPARTMENT



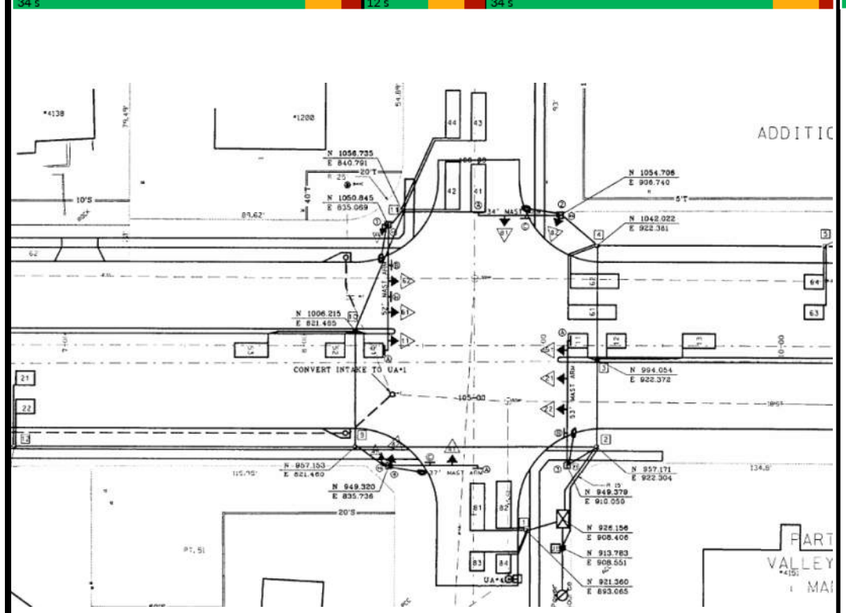
56th St & University Ave



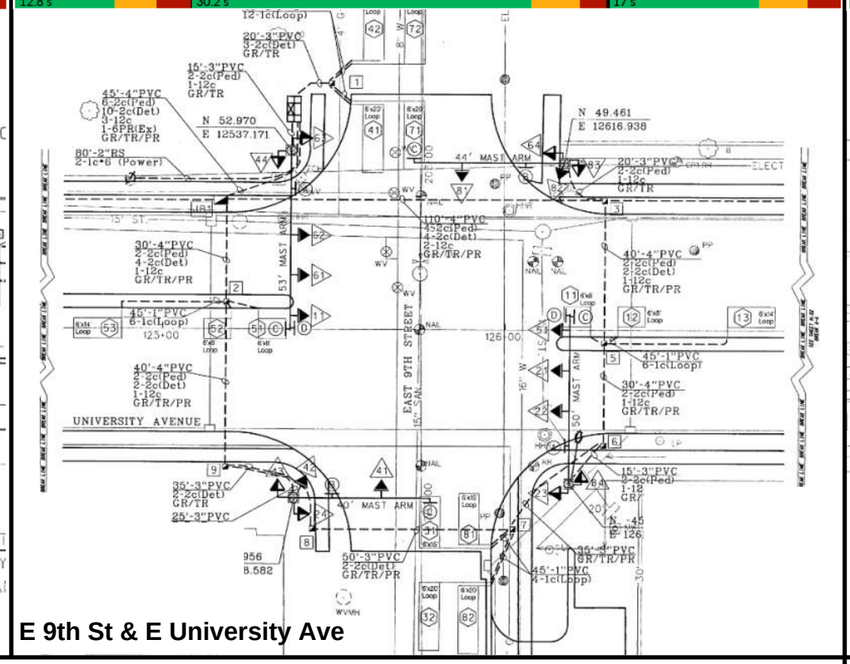
ML King Jr Pkwy & University Ave



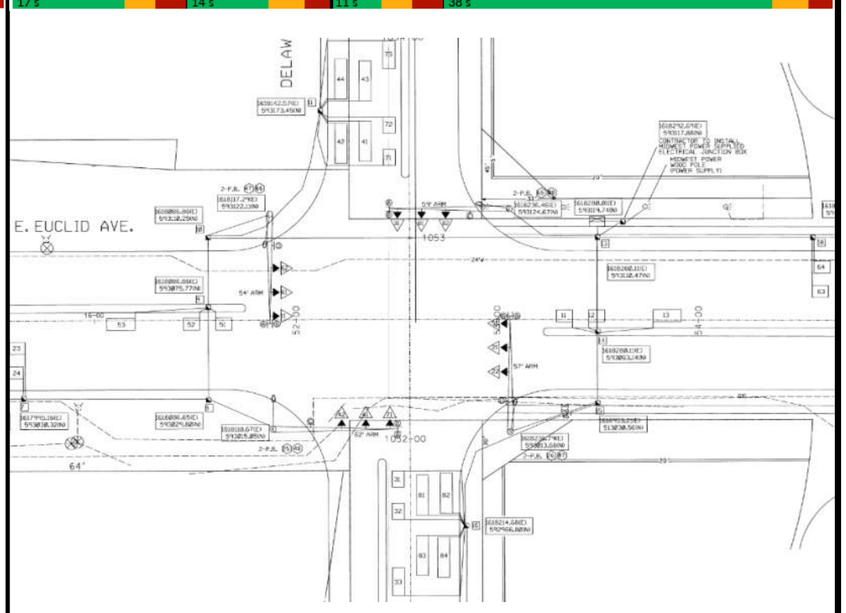
Pennsylvania Ave & University Ave



Williams St & E University Ave



E 9th St & E University Ave



Delaware Ave & E Euclid Ave

FY2026 TSIP - Citywide Installation of FYA Traffic Signal Heads & Retroreflective Backplates

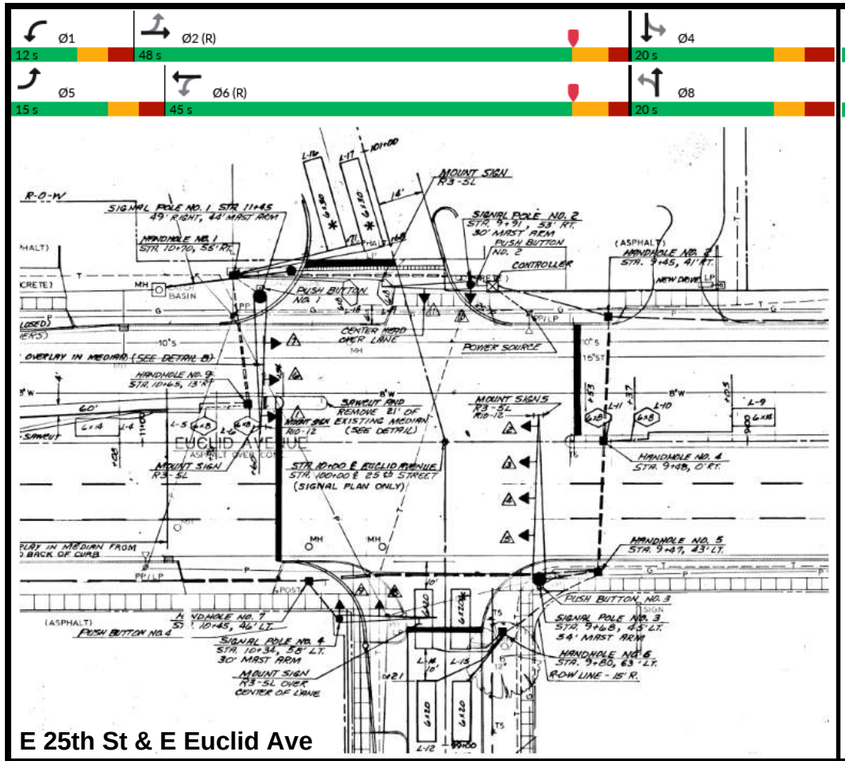
City of Des Moines

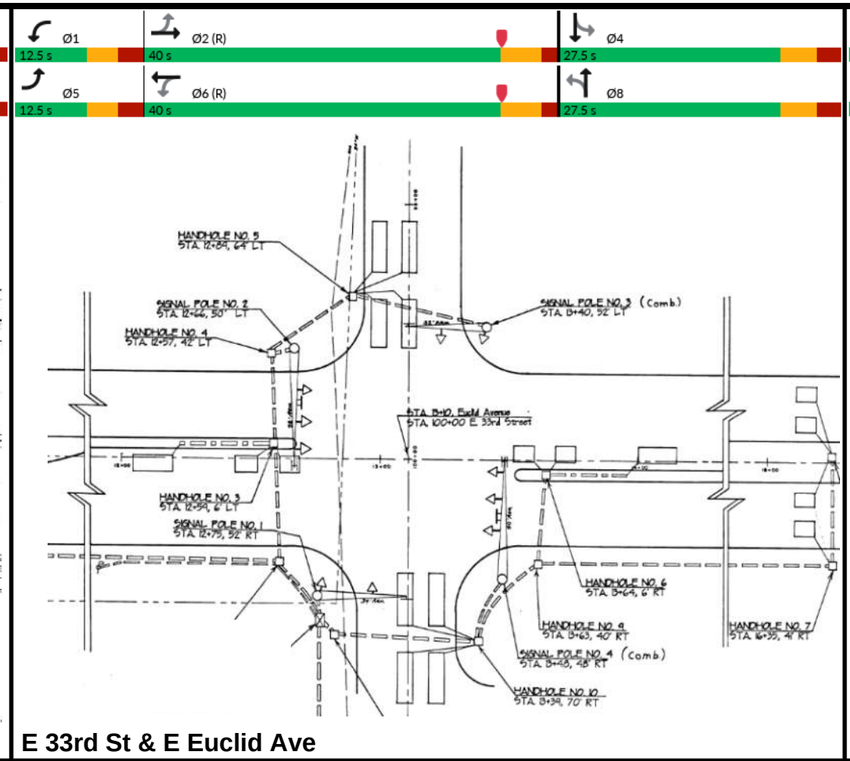
N

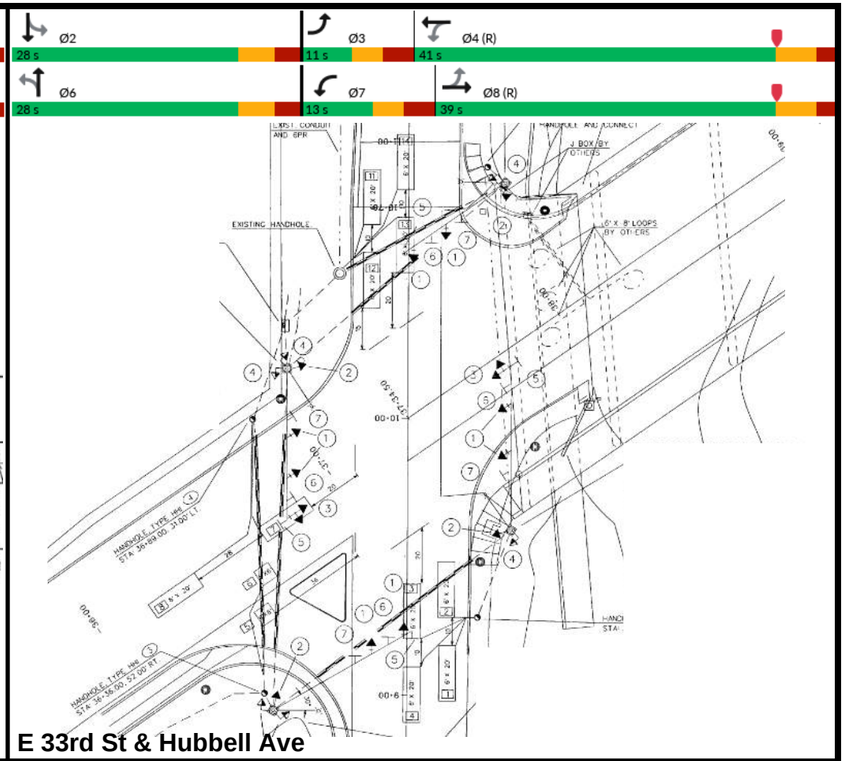
ITEM I - TRAFFIC SIGNAL LAYOUT

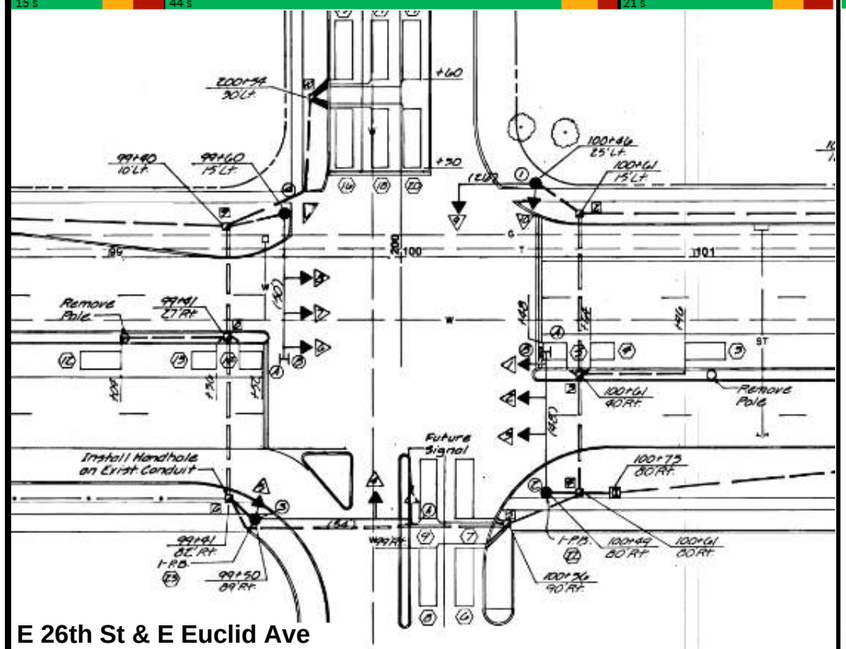
FIGURE 3

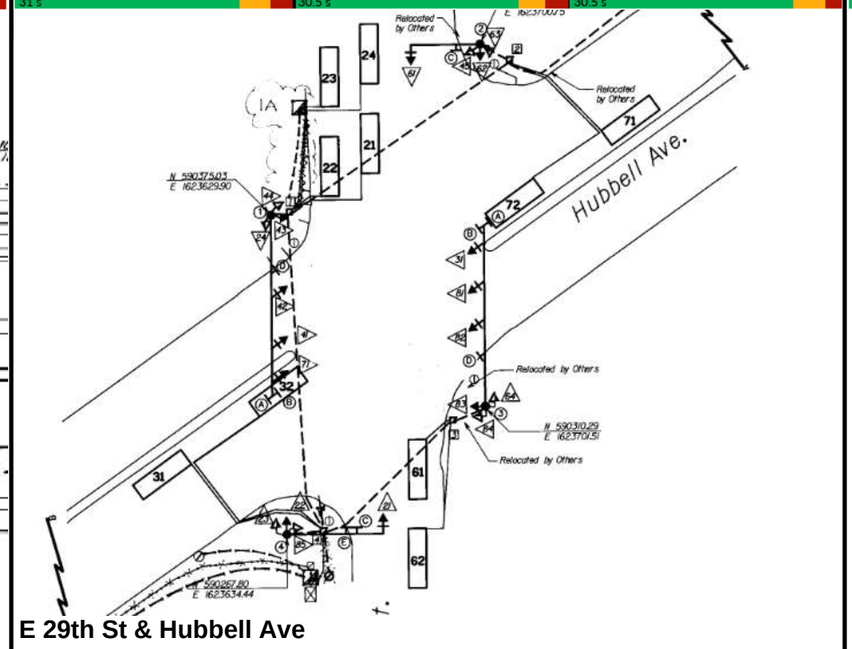
CITY OF DES MOINES ENGINEERING DEPARTMENT

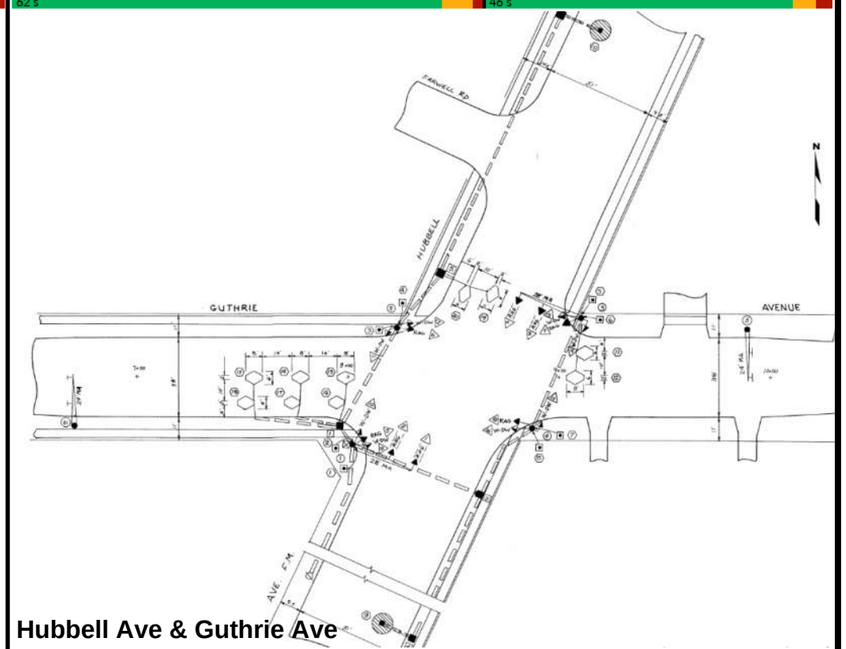












FY2026 TSIP - Citywide Installation of FYA Traffic Signal Heads & Retroreflective Backplates

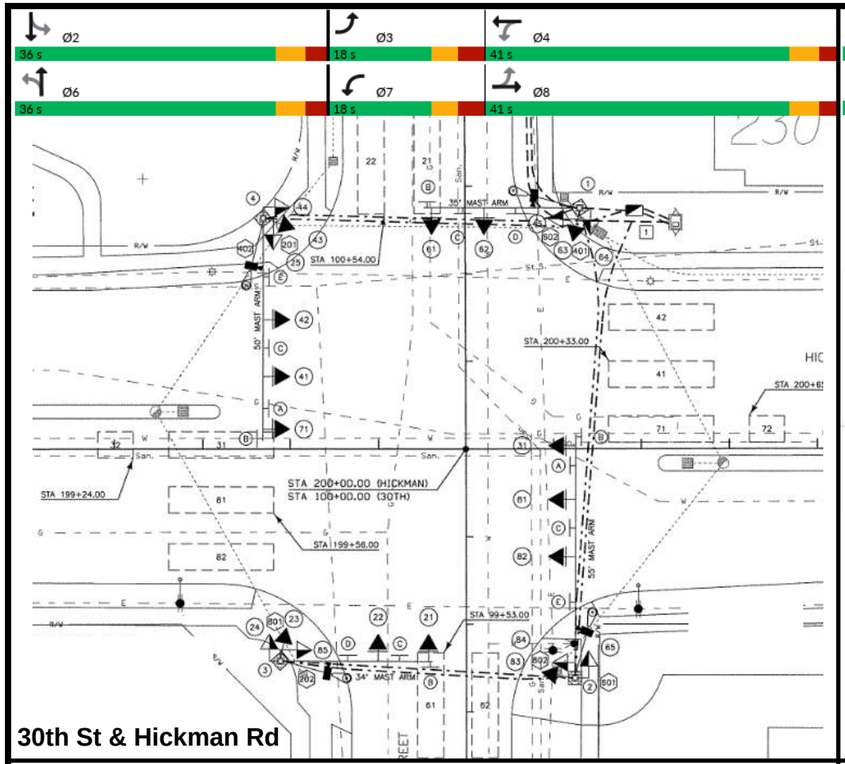
City of Des Moines

N

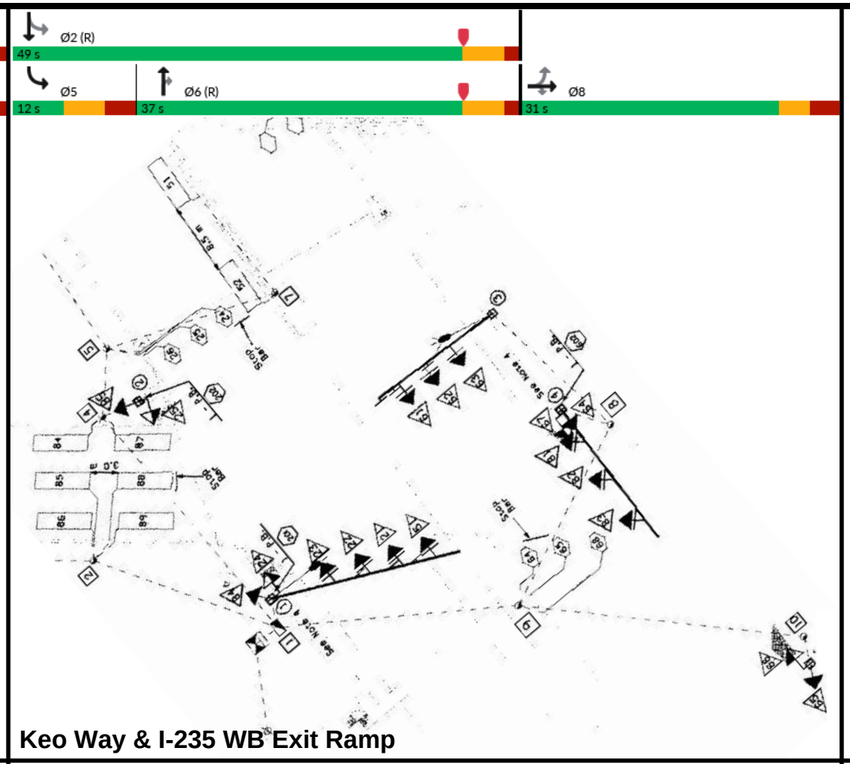
ITEM I - TRAFFIC SIGNAL LAYOUT

FIGURE 4

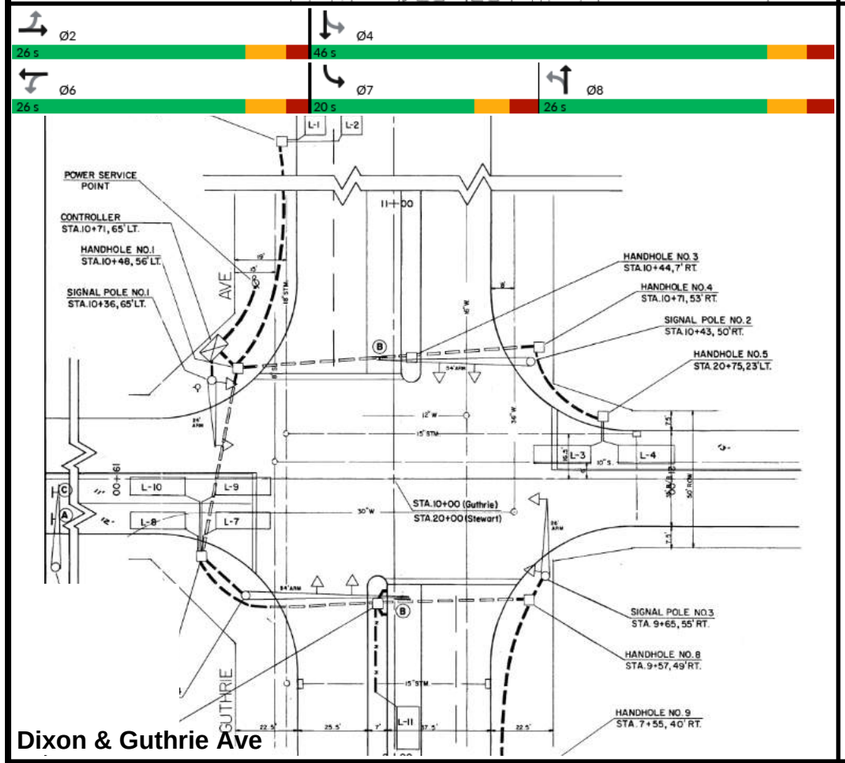
CITY OF DES MOINES ENGINEERING DEPARTMENT



30th St & Hickman Rd



Keo Way & I-235 WB Exit Ramp



Dixon & Guthrie Ave

FY2026 TSIP - Citywide Installation of FYA Traffic Signal Heads & Retroreflective Backplates

City of Des Moines

N

ITEM I - TRAFFIC SIGNAL LAYOUT

FIGURE 5

CITY OF DES MOINES ENGINEERING DEPARTMENT

THIS PAGE IS INTENTIONALLY BLANK.

(for printing purposes)

County:	Polk	Prepared By:	Molly Long
Location:	Various Intersections, City of Des Mo	Date Prepared:	7/22/2024
Proposed Improvements:	Adding FYA to perm LTs, changing doghouse 5-section heads to FYA, changing bimodal heads to FYA, adding retroreflective backplates.		
Estimated Improvement Cost:	$ 350,000		
Inflation on Crash Costs:	4%	Annual Maintenance:	2%
Discount Rate:	4%	(% of Improvement Cost)	
Estimated Service Life:	15	Annual Maintenance Cost:	$ 7,000

Method Choice: CRF Method

The Crash Reduction Factor (CRF) Method applies one to three CRFs to historical crashes to estimate reductions in future crashes. Crash Modification Factors (CMFs) can be converted to CRFs. For additional information, click the "Learn More" button.

Crash Reduction Factor (CRF) Method

Traffic Growth Factor:	1%
Number of CRFs:	3
Years of Crash History:	5

Combined CRF (Dominant Common Residuals Method)

Iowa DOT's preferred methodology for combining CRFs is Dominant Common Residuals, since it is more conservative than the other options.

	CRF 1:	CRF 2:	CRF 3:	**Combined CRF**
CRF Value (%)	5	5.9	13.9	**20.2**

Crash Severity	Rounded Societal Costs	Crash History (Total):	CRF (from above)	Crash History - Annual Avg	Crashes Saved Annually
Fatal (K)	$ 4,200,000	6	20.2	**1.20**	**0.24**
Serious Injury (A)	$ 4,200,000	18	20.2	**3.60**	**0.73**
Minor Injury (B)	$ 280,000	131	20.2	**26.20**	**5.29**
Possible/Unknown Injury (C)	$ 130,000	383	20.2	**76.60**	**15.46**
Property Damage Only (O)	$ 20,000	836	20.2	**167.20**	**33.74**

Crash Severity	Annual Societal Benefit
Fatal (K)	**$ 1,017,010**
Serious Injury (A)	**$ 3,051,030**
Minor Injury (B)	**$ 1,480,315**
Possible/Unknown Injury (C)	**$ 2,009,402**
Property Damage Only (O)	**$ 674,778**

Total Benefits and Costs

		Implementation Cost	$ 350,000
		Present Value of Maint.	$ 77,829
Present Value Benefits (Societal Benefits)	$ 97,515,797	Present Value Costs (Impl. and Maint. Costs)	$ 427,829
Present Value Net Return	$ 97,087,968		
Benefit Cost Ratio	**227.93**		

Form continues on next page

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE
TSIP FUNDS

DATE: 8/5/2024

GENERAL INFORMATION

Location / Title of Project: City of Elgin - Speed Feedback Signs

Applicant: City of Elgin

Contact Person: Ginger Wander Title: City Clerk / Treasurer

Complete Mailing Address: 212 Main Street PO Box 155

Elgin IA 52141

Phone: 563. 426. 5998 (Area Code) E-Mail: elgincityclerk@gmail.com

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 (Area Code) E-Mail

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	9731.00
Total Project Cost	$	9731.00
Safety Funds Requested	$	9731.00

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
2017027996	W51 + West Street	☐	☐	-0.01	
2017028002	B64 + Mill Street	☐	☐	-0.03	
2017106765	W51 South + Cedar Road			-0.00	

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the City of Elgin

Signed: Ginger Wandes 8/5/2024

Signature Date Signed

Ginger Wandes

Printed Name

Attest: 8/5/2024

Signature Date Signed

James Knoblach

Printed Name

RESOLUTION NO. 2024-21

RESOLUTION SUPPORTING THE CITY OF ELGIN, IOWA APPLICATION TO THE IOWA DEPARTMENT OF TRANSPORTATION TRAFFIC SAFETY IMPROVEMENT PROGRAM FUNDING TO INSTALL SPEED FEEDBACK SIGNS IN THE CITY OF ELGIN, FAYETTE COUNTY, IOWA

WHEREAS, the City of Elgin, Fayette County, Iowa has identified a number of safety issues with drivers going over the posted speed limit at the intersections of W51 (Main Street) and West Street, B64 (Center Street) and Mill Street, W51 South and Cedar Road, and

WHEREAS, the City of Elgin supports the efforts of the Elgin City Council to improve safety at the aforementioned intersections through the installation of speed feedback signs, and

WHEREAS, the City of Elgin, Iowa resolves to maintain new traffic speed feedback signs and city streets therein, and

WHEREAS, the improvements will provide a safety benefit to the traveling public,

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Elgin, Iowa;

PASSED and APPROVED this 5th day of August 2024.

Mayor James Knobloch

Attest:

Ginger Wander, City Clerk

City of Elgin, Iowa

The City of Elgin, Iowa City Council recently had a speed data analysis completed due to an increasing number of concerned citizens over the years regarding speeding at our 3 main intersections entering/exiting the City of Elgin.

This analysis was conducted in a 1-week time frame with devices set in place at the intersections of W51/Main Street and West Street, and at W51 South/Cedar Road.

At W51/Main Street and West Street, the speed limit is posted at 35 mph. The average speed during testing was 38mph with the fastest speed recorded at 80mph. During this timeframe a total of 10,295 vehicles were analyzed.

At W51 South/Cedar Road, during the same 1-week time frame where it is a posted the speed limit of 30 mph, the analysis recorded an average speed of 41 mph and the fastest speed of 71 mph. During this timeframe a total of 4,443 vehicles were analyzed.

B64/Center Street was not included in the analysis however, the city and residents have the same concerns. The speed limit here changes from 30-mph to 25pmh and it is felt drivers are exceeding the limit.

All three of the main intersections entering/exiting the City of Elgin have a fair amount of housing with children in the direct vicinity, as well as a bike trail that extends from our neighboring City of Clermont. This bike trail crosses over the intersection of B64 (Center Street) and Mill Street furthering the concerns over public and pedestrian safety.

While no crashes have occurred to date with the highest speeds, the risk of crash severity is high.

The City of Elgin does not employ our own police services for our citizens, we contract with the Fayette County Sheriff's department. With the number of small cities in our county that cannot afford their own police force the Sheriff's office has a very full schedule. Often times they are unable to patrol our city at certain times of the day/week.

Our resident's concerns have increased over time, and we would like to do our best to address those concerns with the speed feedback signs. From our research with other cities who have had these signs in place for an extended period, we have found there has been a significant decrease in speeders as well as safety issues.

The City Council and Streets Department will place the proposed signs in the roadway ROW according to the MUTCD. The City of Elgin, Iowa appreciates the opportunity to apply for this program and are grateful for your support.

2024 Speed Analysis

W51 and West Street - West Entry to Elgin

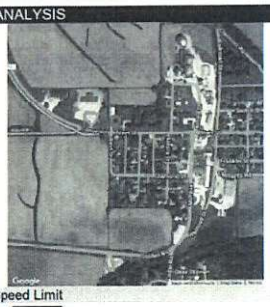
Default Report Title
Use Preferences to Define Titles

Intersection ID 2017024996

SPEED DATA ANALYSIS

Location

elgin
Latitude: 42.956617
Longitude: -91.645427



Analysis Time Period

Start	End
2/19/2024 2:49 PM	2/26/2024 11:50 AM

Vehicles Analyzed	10,295
Speed Limit	35
Total Enforceable Violations	1,263
Average Speed	38
% Enforceable Violations	12%
Fastest Speed	80
Enforcement Rating	MEDIUM
85th Percentile Speed	44

W51/Cedar Road - South Entry to Elgin

Default Report Title
Use Preferences to Define Titles

Intersection ID 2017106765

SPEED DATA ANALYSIS

Location

Elgin
Latitude: 42.951941
Longitude: -91.643104

Analysis Time Period

Start	End
2/19/2024 2:24 PM	2/26/2024 11:45 AM

Vehicles Analyzed	4,443
Speed Limit	30
Total Enforceable Violations	2,394
Average Speed	41
% Enforceable Violations	54%
Fastest Speed	71
Enforcement Rating	HIGH
85th Percentile Speed	50

Document C

Project Cost Estimate

Installation of Posts & Speed Feedback Signs

Intersection Improvements:

W51 South/Cedar Road	$3,116.67 (speed feedback sign) + $127 (post & base)
B64 & Mill Street	$3,116.67 (speed feedback sign) + $127 (post & base)
W51 West & West Street	$3,116.66 (speed feedback sign)+ $127 (post & base)

Project Total = $9,731.00

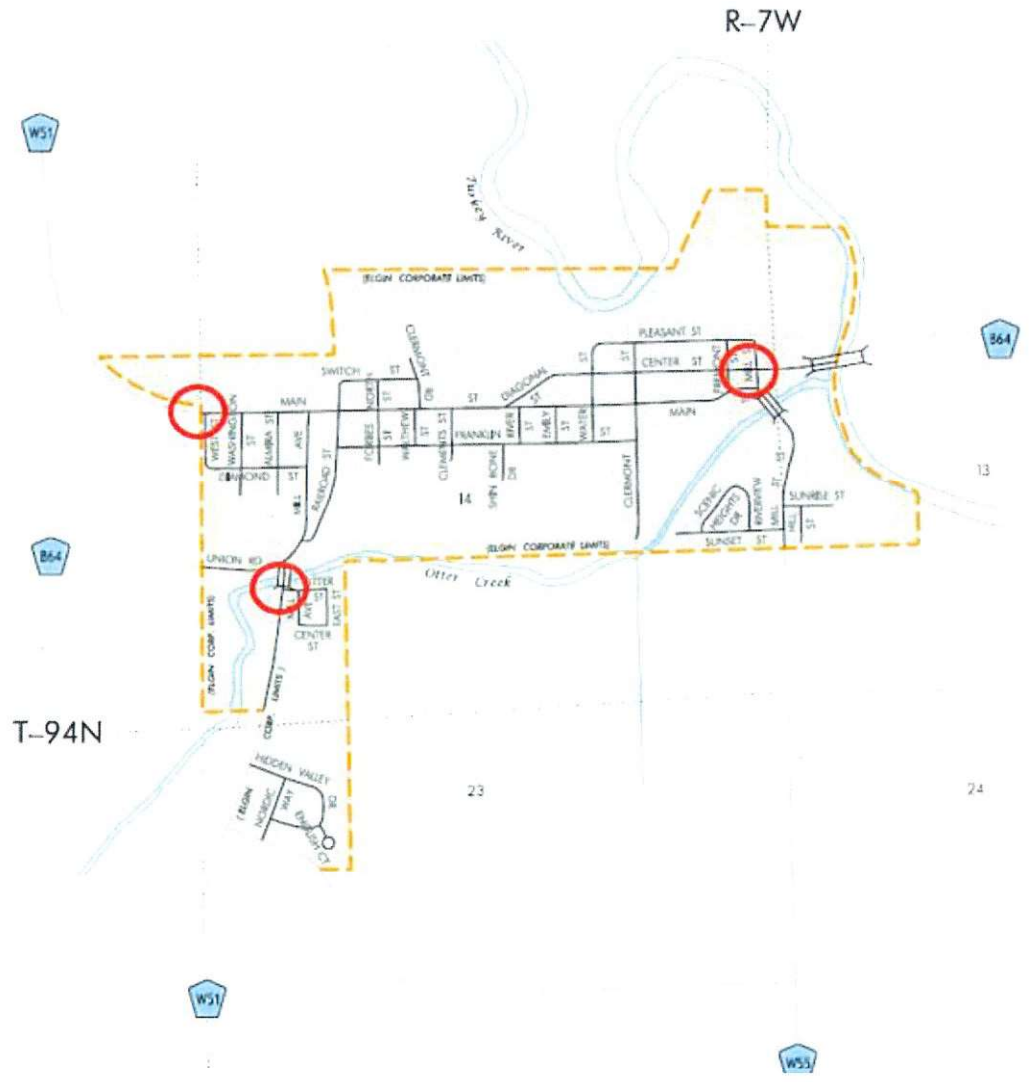
Document D

Proposed Schedule:

Grant Approval	December 2024
Grant Award	July 1, 2025
Construction	Fall 2025

Document E

City of Elgin – Three Locations for Speed Feedback Signs



South Entry to Elgin:

W51 South/Cedar Road (facing North) Speed Feedback Sign would be placed to the right side of this image in the ROW.

East Entry to Elgin:

Intersection of B64 & Mill Street (facing West) Speed Feedback Sign would be placed to the right side of this image in the ROW.

North and West Entry to Elgin:

Intersection of W51 & West Street (facing East) Speed Feedback Sign would be placed to the right side of this image in the ROW.

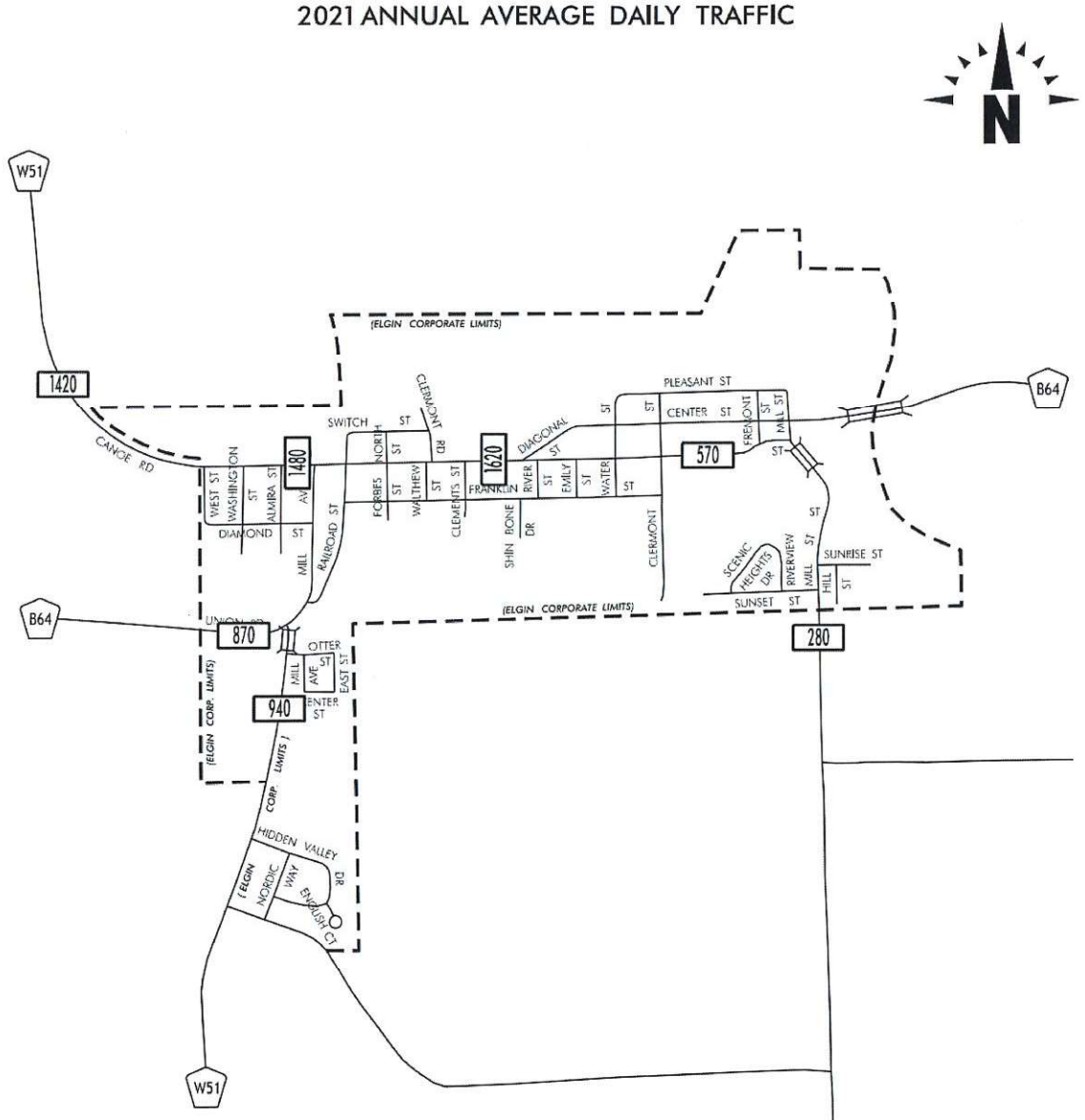
IOWADOT

TRAFFIC FLOW MAP OF

ELGIN

FAYETTE COUNTY

2021 ANNUAL AVERAGE DAILY TRAFFIC



PREPARED BY
IOWA DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING AND PROGRAMMING
OFFICE OF SYSTEM PLANNING
PHONE (515) 239-1289

LEGEND

RECORDER ONLY
MANUAL COUNT

Documents G, I and J are purposefully omitted.

A.

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE
TSIP FUNDS

GENERAL INFORMATION **DATE:** July 8th, 2024

Location / Title of Project City of Grand Mound/ Lighted Solar Stop Signs

Applicant The City of Grand Mound

Contact Person Melissa Conner Title City Clerk

Complete Mailing Address P.O. Box 206 Grand Mound, IA 52751

Phone 1-563-847-2190 E-Mail gmcity@gmtel.net
(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	$	4,118.00
Total Project Cost	$	4,118.00
Safety Funds Requested	**$**	**4,118.00**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
2017101387	FULTON ST AND EAST ST	☐	☐	0.00	0.00
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the City of Grand Mound

Signed: Kurt Crosthwaite — July 8th, 2024
Signature — Date Signed

Kurt Crosthwaite, Mayor
Printed Name

Attest: Melissa B. Conner — July 8th, 2024
Signature — Date Signed

Melissa Conner, City Clerk
Printed Name

RESOLUTION NO. 24-17

A RESOLUTION APPROVING THE TRANSPORTATION SAFETY IMPROVEMENT PROGRAM (TSIP) APPLICATION FOR FLASHING LED STOP SIGNS

WHEREAS, the Iowa Department of Transportation has adopted the Traffic Safety Improvement Program (TSIP) to allow for funding to be provided to local jurisdictions for eligible traffic safety improvement projects; and

WHEREAS, as the City Council of the City of Grand Mound, Iowa, has determined that providing a northbound and southbound flashing LED stop sign will help reduce the risk of an accident or injury to the public by improving safety by increasing visibility of the required stop at the high traffic flow intersection of East Street (a farm to market route) and Fulton Street; and

WHEREAS, Flashing LED stop signs are recognized as traffic control devices in the manual on uniform traffic control devices; and

WHEREAS, the City Council of the City of Grand Mound, Iowa, recommends a TSIP application be submitted to the Iowa Department of Transportation for possible traffic control device funds to the above-mentioned devices.

NOW THEREFORE BE IT RESOLVED, by the City Council of the City of Grand Mound, Iowa, to endorse the preparation and submittal of the application for the TSIP to the Iowa Department of Transportation, and hereby commits to accepting and maintaining the Flashing LED Stop Sign Traffic Control Devices.

BE IT FURTHER RESOLVED, that the City Council authorizes the placement and maintenance of traffic control devices as necessary for the enforcement of the traffic control regulations and safety of the public.

PASSED AND APPROVED this 8th day of July, 2024.

ROLL CALL: Schanze Aye Beitelspacher Aye Banowetz Aye

Green Aye Beuthien Aye

Kurt Crosthwaite, Mayor

Attest: _____

Melissa Conner, City Clerk

The City of Grand Mound
615 Sunnyside Street; P.O. Box 206
Grand Mound, IA 52751
1-563-847-2190
gmcity@gmtel.net
www.cityofgrandmound.org

July 8th, 2024

NARRATIVE
TSIP Flashing LED Stop Signs

The City of Grand Mound is seeking to improve the safety and traffic operation of the intersection of East Street (a farm to market route) and Fulton Street.

Both roadways are 2-lane roadways. East street is a farm to market route and the intersection lies adjacent to the United States Postal Service which is a busy area in the community. Both roadways have residential properties that are home to multiple young children in the area who frequently cross the intersection to reach the bus stops and parks throughout the community.

The posted speed limit leading up to the intersection and stop signs is 25 mph. Before reaching the intersection and 25 mph signs, the speed from the north and south routes which lead to county roads outside of city limits reduce from 55 mph to 45 mph to 25 mph. The North bound leg of East street leads up to an intersection with Hwy 30.

Crash History
The Iowa DOT PCR website for 2016-2020, shows the intersection is classified as negligible PCR level intersection (PCR between 0 and 0.2) which means it is, "performing better than expected". The intersection category ranking for all way stop control is 3,569 out of 5,616. The statewide ranking category is 46,396 out of 115,309. A high ranking intersection means the worse the intersection is performing in regards to safety when it is compared to a similar category across the state of Iowa. While the intersection is performing better than expected, with 0 crashes within the last 10 year crash history. The City is looking to continue to be proactive to prevent accidents rather than reactive and continue to improve safety at the high traffic intersection. In 2014 the traffic count for Fulton Street was 280 and classified as a Local Collector. The traffic count for East Street was 490 and classified as a Major Collector and Farm to Market Route per the Iowa Traffic Data through the Iowa Department of Transportation.

Conclusion/Recommendations

In conclusion, the overall problem is that eye witness accounts testify that traffic is not stopping at the stop signs and there have been many close calls of pedistrans, including small children who have had near misses at the intersections from traffic not stopping. The overall goal is to increase awareness and visibility of the stop signs on the highly traveled road to get traffic to stop completely to reduce the risk of accident, injury or death to pedestrians. The plan is to install a northbound and southbound facing flashing LED stop sign to increase visibility and safety. The City of Grand Mound is requesting funding to cover the materials in the amount of $4,118.00 and the City will cover the cost of labor and maintenance of the sign installation and future maintenance.

C.

Your Cart (2 items)

TAPCO

BlinkerStop® Flashing LED STOP Sign (R1-1)

SKU: 2180-00208
Size: 36 in H x 36 in W
Power Source: Solar
LED Color: Red
Sheeting Color: Red

Price:	$1,775.00
Quantity:	2
Total:	**$3,550.00**

Are you tax exempt?

Before you place your order please create account and/or notify us of your existing account and we will apply your tax exempt status once we recieve or confirm your tax exemption status.

Subtotal:	$3,550.00
Shipping:	**$355.00** (CHANGE)
Tax:	$213.00
Coupon Code:	ADD COUPON
Total:	$4,118.00

CHECK OUT

The City of Grand Mound
615 Sunnyside Street; P.O. Box 206
Grand Mound, IA 52751
1-563-847-2190
gmcity@gmtel.net
www.cityofgrandmound.org

July 8th, 2024

TIME SCHEDULE
TSIP Flashing LED Stop Signs

TSIP Application Due	August 2024
TSIP Award Announced	January 2025
TSIP Funding Available	July 2025
Purchase 2 LED Flashing Stop Signs	July 2025
Install 2 LED Flashing Stop Signs	August 2025
Installation & project complete	August 2025

E.

Location intersection for Northbound And Southbound Flashing LED Stop Signs to be Instaled.

N
01-26-22

LEGEND

INTERSTATE ROUTE	35
FREEWAY OR EXPRESSWAY ROUTE	30
U.S. NUMBERED ROUTE	6
BUSINESS ROUTE	61
STATE NUMBERED ROUTE	44
UNSIGNED ROUTE	46
COUNTY NUMBERED ROUTE	R38
SECONDARY ROAD OR ADJOINING CITY STREET	
CITY STREET	
PARK, INSTITUTION, OR FEDERAL ROAD	
RAILROAD	
CORPORATION LINE	
SECTION LINE	
CUL-DE-SAC	
SECTION, TOWNSHIP & RANGE NUMBERS	9, T-81N, R-30W

SCALE IN MILES
0 0.1 0.2 0.3 0.4 0.5 0.75 1.0
0 0.1 0.2 0.3 0.4 0.5 1.0 1.5 2.0
SCALE IN KILOMETERS

HIGHWAY AND STREET MAP OF

GRAND MOUND
IOWA

PREPARED BY
IOWA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION DEVELOPMENT DIVISION
SYSTEMS PLANNING BUREAU
PHONE (515) 239-1664
IN COOPERATION WITH
UNITED STATES DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

23–3032


Search Google Maps
532 East St
Grand Mound, Iowa
Google Street View
Aug 2021
See more dates
Clinton St
Fulton St
Washington St
Williams St
Expand
East St
Google


Search Google Maps
450 East St
Grand Mound, Iowa
Google Street View
Aug 2021
See more dates
East St
Clinton St
Fulton St
Williams St
Washington St
Expand
Google

Plan View

G.

Beacon™ Clinton County, IA

Overview

Legend

- Parcels
- Subdivisions
- Buildings on Land Lease and Ag Dwellings
- Condo and Townhome Units
- Condo Parcels
- Lots
- Railroad Centerlines
- Road Centerlines
- Road Right of Way
- Railroad Right of Way
- Corporate Boundary
- Political Townships
- Sections
- Quarter-Sections
- Quarter-Quarter-Sections
- Creeks
- Rivers and Lakes

Parcel ID	4601930000	**Alternate ID**	1718283009	**Owner Address**	HOUSE JOHN C & MICHELLE R
Sec/Twp/Rng	n/a	**Class**	R		P O BOX 207
Property Address	711 FULTON ST	**Acreage**	n/a		GRAND MOUND, IA 52751
	GRAND MOUND				

Tax District 0520-GRAND MOUND CORP\CENTRAL SCH

Brief Tax Description ORIGINAL TOWN GRAND MOUND LOT 2 BLK 12

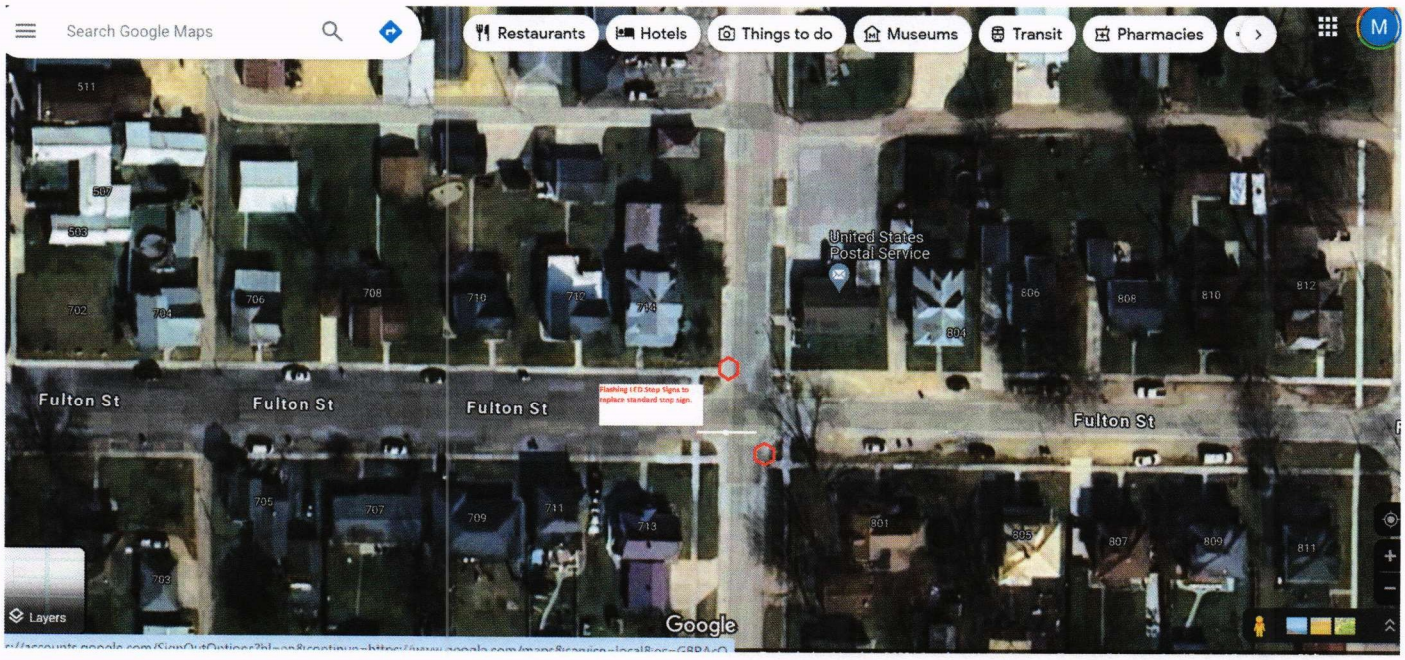
(Note: Not to be used on legal documents)

Date created: 6/19/2024

Last Data Uploaded: 6/19/2024 2:23:13 AM

Developed by Schneider GEOSPATIAL

PLAN VIEW


Search Google Maps
Restaurants
Hotels
Things to do
Museums
Transit
Pharmacies
United States Postal Service
Fulton St
Fulton St
Fulton St
Fulton St
Flashing LED Stop Signs to replace standard stop sign.
511
507
503
702
704
706
708
710
712
714
804
806
808
810
812
705
707
709
711
713
801
805
807
809
811
703
Layers
Google

H.

Iowa Traffic Data

IOWA | D

Average Traffic Volume | Traffic Collection | Turning Movement | References

NNUAL AVERAGE DAILY TRAFFIC AADT)

lick on the road for additional nformation.

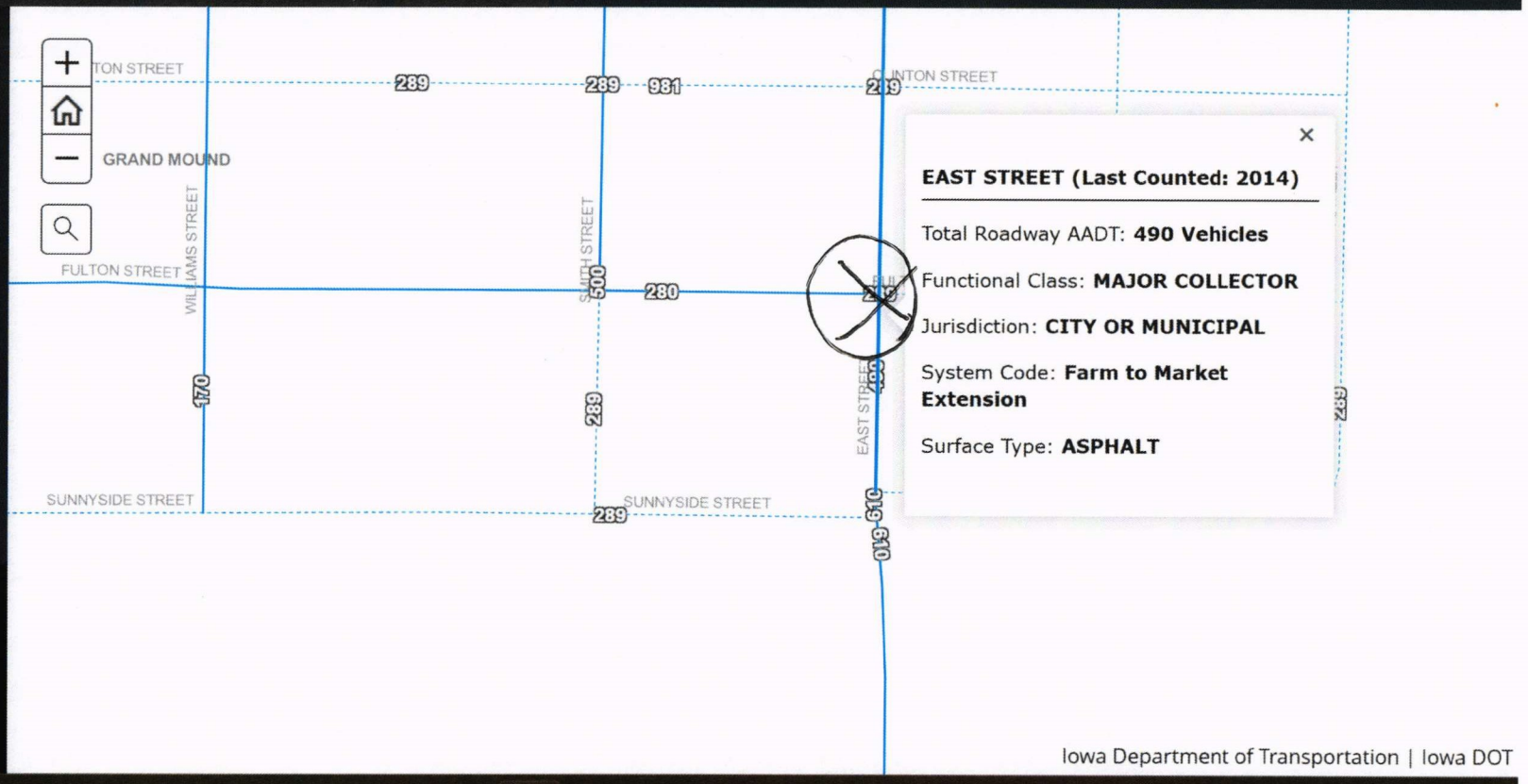
OTE: Secondary and Municipal Traffic vailable at inner zoom scales only.

hematic map displaying Interstate, rimary, Secondary and Municipal ehicular Annual Average Daily raffic (AADT) information for the oad segments in the state of Iowa.

dditional information about a pecific count contact the Systems lanning Bureau's Traffic Collection nd Analysis Team at 515-239-1664.

AADT

- 5000 or more
- 2000 - 4999



Iowa Department of Transportation | Iowa DOT

Search

3:56 PM
6/18/2024

Potential for Crash Reduction (PCR)

Crash Reduction

PCR Map About PCRs and Safety Performance Functions (SPF) PCR Level Definitions

Contact us PCR ranking (2014-2018 intersections)

Intersection: FULTON ST and EAST ST

Primary Road Intersections
PCR All Crashes (KABCO)
(2016-2020)

Intersection ID: 2017101387 - (41.8231, -90.6459)
Category: All Way Stop Control
District: 6
County: Clinton
City: Grand Mound

PCR Level All Crashes (KABCO): Negligible PCR - below zero (<= 0)
PCR Value All Crashes (KABCO): -0.00 crash/year for all crashes
Category Ranking All Way Stop Control
3,569 out of 5,616
Statewide Ranking Category:
46,396 out of 115,309

Google Street View

Potential for Crash Reduction (PCR)

Intersection: FULTON ST and EAST ST

Intersection Category: All Way Stop Control

County: Clinton

City: Grand Mound

Potential for Crash Reduction

PCR: -0.00 for all crashes
-0.00 for injurious crashes.

All Crashes (2014-2018)

Total: 0

Statewide ranking: 47,485 out of 115,489

Category ranking All Way Stop Control: 3,538 out of 5,618

Fatal and Injury Crashes

Total: 0
Statewide ranking: 30,401 out of 115,489

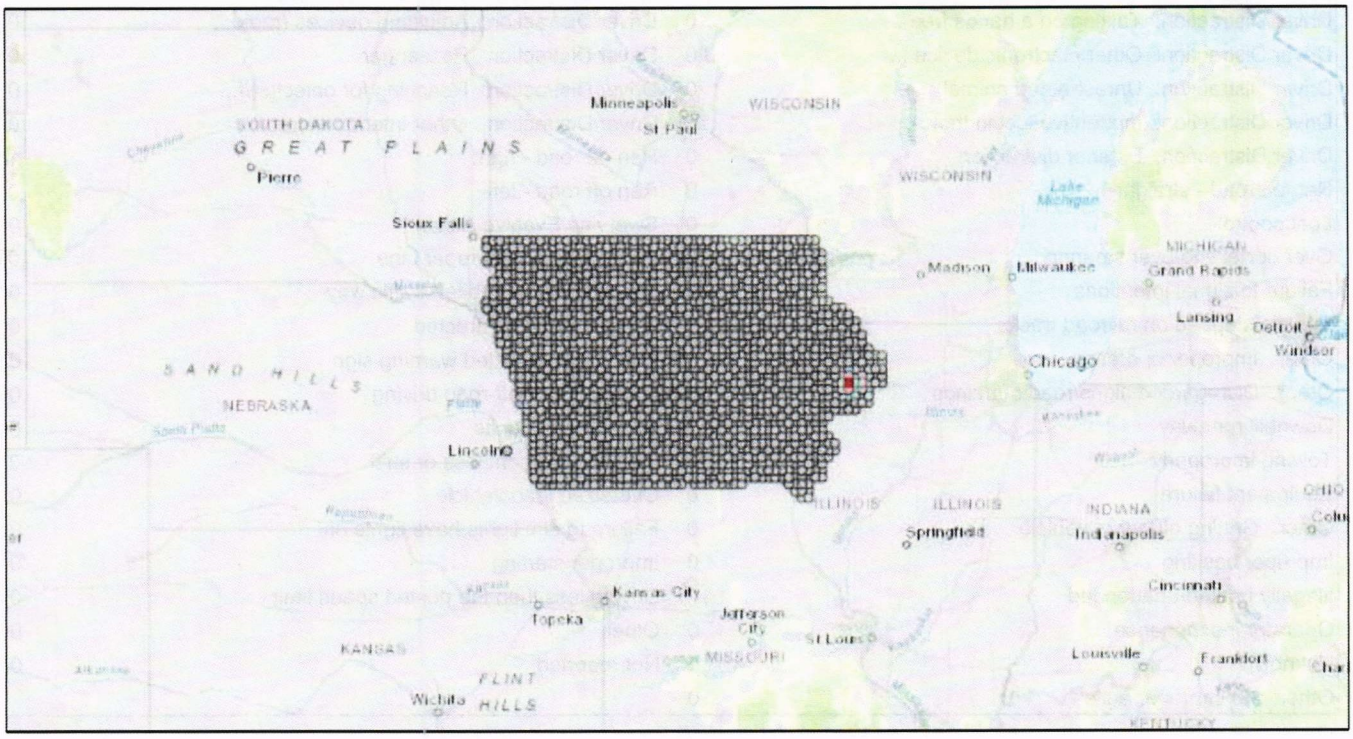
Iowa Crash Analysis Tool
Quick Report
2020-2024

Crash Severity	9
Fatal Crash	0
Suspected Serious Injury Crash	0
Suspected Minor Injury Crash	2
Possible/Unknown Injury Crash	1
Property Damage Only	6

Injury Status Summary	6
Fatalities	0
Suspected serious/incapacitating	0
Suspected minor/non-incapacitating	3
Possible (complaint of pain/injury)	1
Uninjured	0
Unknown	0
Not Reported	2

Property/Vehicles/Occupants	
Property Damage Total (dollars):	71,200.00
Average (per crash dollars):	7,911.11
Total Vehicles:	17.00
Average (per crash):	1.89
Total Occupants:	25.00
Average (per crash):	2.78

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.44
Major Injuries/Crash:	0.00
Minor Injuries/Crash:	0.33
Possible/Unknown Injuries/Crash:	0.11



Major Cause			9
Animal	0	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	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	2	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	2
Exceeded authorized speed	0	Improper or erratic lane changing	0
Operating vehicle in an reckless/erratic/care...	1	Followed too close	0
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	1
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	0
Unknown	1	Not reported	0
Other: No improper action	0		

Iowa Crash Analysis Tool
Quick Report
2020-2024

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	1	0	0	0	0	1	0	0	0	0	0	2
Tuesday	0	0	0	0	0	0	0	1	1	0	0	1	0	3
Wednesday	0	0	0	1	0	0	0	0	0	0	0	1	0	2
Thursday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Friday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Saturday	0	0	0	1	0	0	0	0	1	0	0	0	0	2
Total	0	0	1	2	0	0	0	2	2	0	0	2	0	9

Manner of Crash Collision	9
Non-collision (single vehicle)	1
Head-on (front to front)	0
Rear-end (front to rear)	3
Angle (oncoming left turn)	0
Broadside (front to side)	4
Sideswipe (same direction)	0
Sideswipe (opposite direction)	0
Rear to rear	1
Rear to side	0
Not reported	0
Other	0
Unknown	0

Surface Conditions	9
Dry	5
Wet	3
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	1

Fixed Object Struck			17
Bridge overhead structure	0	Bridge pier or support	0
Bridge/bridge rail parapet	0	Curb/island/raised median	0
Ditch	1	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	1	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)	15

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	1	0	0	0	1
= 16	0	0	0	0	0
= 17	0	2	0	0	2
= 18	0	0	0	0	0
= 19	1	0	0	0	1
= 20	0	1	0	0	1
>= 21 and <= 24	0	1	0	0	1
>= 25 and <= 29	1	0	0	0	1
>= 30 and <= 34	1	0	0	0	1
>= 35 and <= 39	0	0	0	0	0
>= 40 and <= 44	1	0	0	0	1
>= 45 and <= 49	0	1	0	0	1
>= 50 and <= 54	1	0	0	0	1
>= 55 and <= 59	0	0	0	0	0
>= 60 and <= 64	0	0	0	0	0
>= 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	2	0	0	2
>= 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	4	0	4
Total	6	7	4	0	17

Drug/Alcohol Related	9
Drug	1
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	8

Alcohol Test Given	17
None	12
Blood	0
Urine	0
Breath	1
Vitreous	0
Refused	0
Not reported	4

Drug Test Given	17
None	12
Blood	0
Urine	1
Breath	0
Vitreous	0
Refused	0
Not reported	4

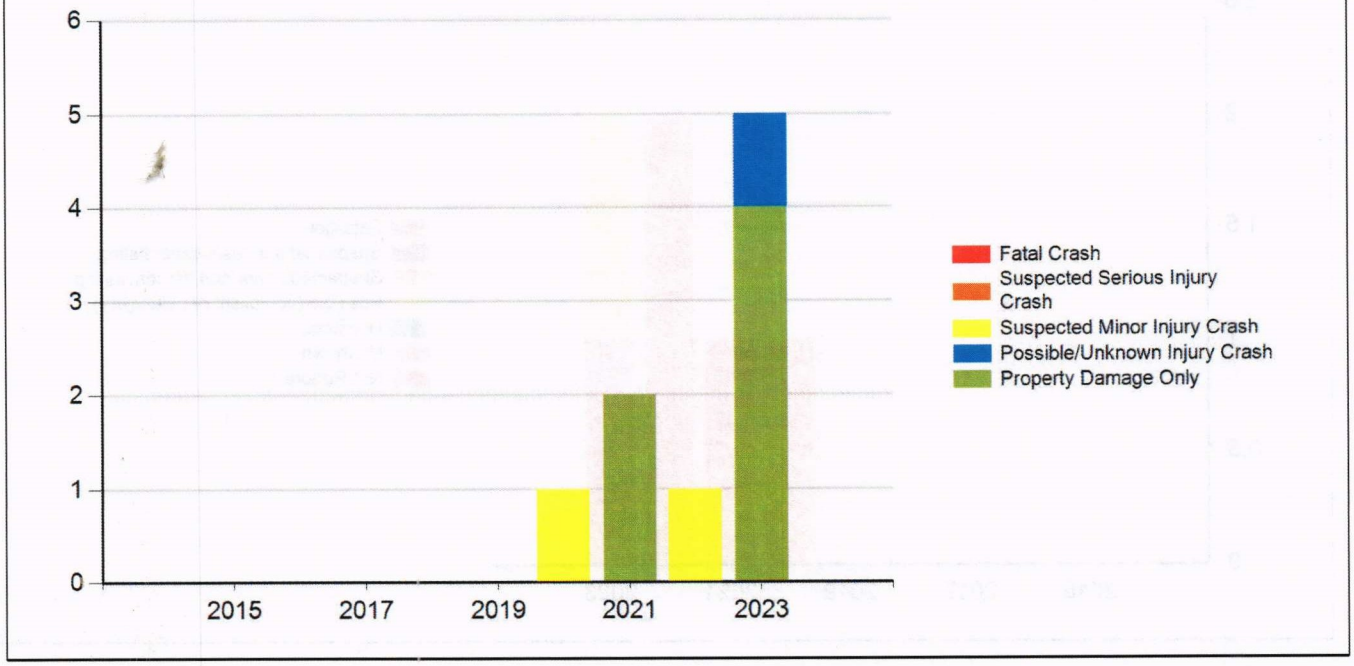
Drug Test Result	17
Negative	0
Cannabis	0
Central Nervous System depressants	0
Central Nervous System stimulants	0
Hallucinogens	0
Inhalants	0
Narcotic Analgesics	0
Dissociative Anesthetic (PCP)	0
Prescription Drug	0
Not reported	17
Other	0

Iowa Crash Analysis Tool
Quick Report
2020-2024

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	Total
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	1	0	0	1
2021	0	0	0	0	2	2
2022	0	0	1	0	0	1
2023	0	0	0	1	4	5
2024	0	0	0	0	0	0
Total	0	0	2	1	6	9

Severity/Year

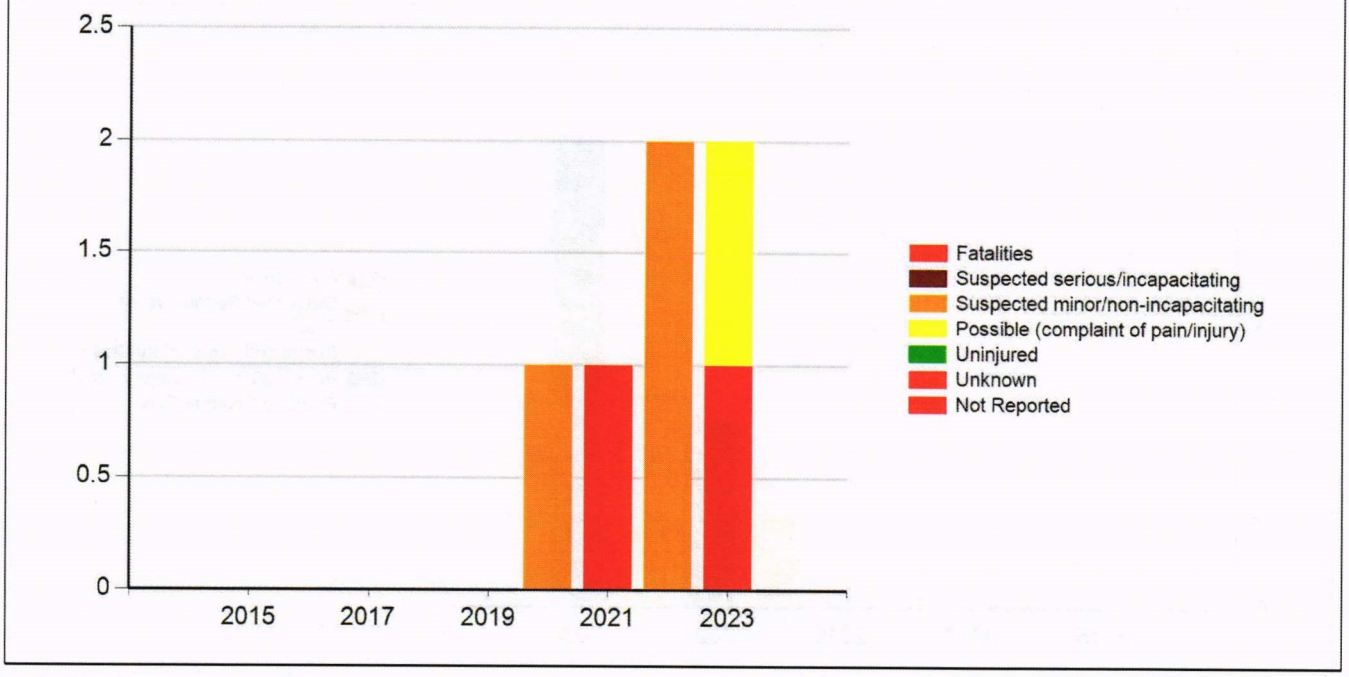


Iowa Crash Analysis Tool
Quick Report
2020-2024

Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Uninjured	Unknown	Not Reported	**Total**
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0
2020	0	0	1	0	0	0	0	1
2021	0	0	0	0	0	0	1	1
2022	0	0	2	0	0	0	0	2
2023	0	0	0	1	0	0	1	2
2024	0	0	0	0	0	0	0	0
Total	0	0	3	1	0	0	2	6

Injury Status/Year



Meeting the following criteria

Jurisdiction: Cities (Grand Mound)
Year: 2020, 2021, 2022, 2023, 2024
Map Selection: No
Filter: None

Analyst Information

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** August 15, 2024

Location / Title of Project N. Dodge Street / ACT Circle

Applicant City of Iowa City

Contact Person Justin Harland Title Senior Engineer

Complete Mailing Address 410 East Washington Street

Iowa City, IA 52240

Phone 319-356-5154 E-Mail justin-harland@iowa-city.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	$	516,650
Total Project Cost	$	832,000
Safety Funds Requested	**$**	**500,000**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the City of Iowa City

Signed: _____ 8/13/24

Signature Date Signed

Jason Havel, City Engineer

Printed Name

Attest: _____

Signature Date Signed

_____

Printed Name

A. APPLICATION RESOLUTION

5.c

Prepared by: Sarah Walz, Associate Transportation Planner, 410 E. Washington St., Iowa City, IA 52240 (319) 356-5239

Resolution no. 24-200

Resolution Declaring the City of Iowa City's Application for Traffic Safety Improvement Program (TSIP) Funds for Traffic Control Devices on North Dodge Street (Highway 1) and ACT Circle.

Whereas, the Iowa Department of Transportation administers the Traffic Safety Improvement Program (TSIP), the purpose of which is to fund traffic engineering improvements that reduce vehicle collisions; and

Whereas, proposed traffic safety improvements are included in the 2024-2028 Capital Improvement Program as project #S3982 North Dodge St / ACT Circle – Signalization.

Whereas, the City of Iowa City's application and proposed project conforms with the adopted Metropolitan Planning Organization of Johnson County Long Range Transportation Plan by helping to reduce collisions and increasing the efficiency of the road network; and

Whereas, a requirement of the grant application is a resolution officially endorsing the application and the assurances that any funded improvements will be adequately maintained.

Now, therefore, be it resolved by the City Council of the City Iowa City, Iowa that:

1. The City hereby officially endorses and directs City staff to submit a TSIP application to the Iowa DOT before the August 15, 2024, deadline for traffic control devices for the intersection of North Dodge Street and ACT Circle and agrees to adequately maintain any funded improvements.
2. The City Engineer or designee is hereby authorized to execute the "Application Certification for Local Government".
3. The City Manager or designee is hereby authorized to execute all necessary agreements and documents for said grant with the Iowa Department of Transportation.

Whereas, the City Council finds said proposal to be in the public interest and is consistent with its adopted traffic calming program.

Passed and approved this 6th day of August, 2024.

Bruce Teague

Bruce Teague, Mayor

Approved by

Attest: Kellie K Grace

Kellie Grace, City Clerk

City Attorney's Office – 07/30/2024

Moved by Dunn, seconded by Moe,

that the Resolution be adopted and upon roll call there were:

AYES:	NAYS:	ABSENT:	
X			Alter
X			Bergus
X			Dunn
X			Harmsen
X			Moe
X			Salih
X			Teague

B. NARRATIVE

The City of Iowa City is requesting Traffic Safety Improvement Program (TSIP) funds to signalize the intersection of North Dodge Street (Highway 1) and ACT Circle.

Existing Conditions

The intersection of North Dodge Street and ACT Circle is located less than ¼ mile from Interstate 80 (Exit 246). The intersection is currently only stop controlled for ACT Circle and has limited sight distance due to the vertical curvature of Dodge Street. The intersection currently meets applicable MUTCD traffic signal warrants.

North Dodge Street (Highway 1) is a four-lane roadway with dedicated left (northbound) and right (southbound) turn lanes at the intersection. The street serves as a major entryway to the east side of Iowa City and serves both local and state highway traffic through Iowa City from I-80 to the downtown area and University of Iowa campus. The daily average traffic count is 20,600 vehicles per day (2022,. Iowa-DOT). The posted speed limit on this segment of North Dodge Street is 45 MPH, however, 85th-percentile speeds are 53.4 mph for northbound vehicles and 51.5 mph for southbound vehicles (MPOJC, 2021).

ACT Circle is a private, two-lane street (no outlet) with a dedicated left-turn lane at the intersection, which is stop-controlled. ACT Circle serves several commercial uses, including a gas station, restaurant, motel, and fitness center. In addition, office and warehouse/light industrial uses (SmartScripts and a University of Iowa warehouse) are located at the end of the cul-de-sac. ACT Circle has an ADT of approximately 1,575 (2021, MPOJC). The posted speed limit is 25 mph.

The intersection is located adjacent to the 200-acre ACT property. Since 2020, the existing office buildings on the ACT campus have been under-utilized as the company reduced its workforce and transitioned to more remote work. In 2024, the Iowa City Community School District acquired one office building (7 acres). The remainder of the property is being sold and is being planned for major redevelopment with a mix of commercial and residential uses. An extension of ACT Drive is proposed, which would connect to North Dodge as a fourth leg of the intersection and would significantly increase traffic through the intersection.

Proposed Concept

The proposed concept is to install traffic control signals for motorists and pedestrians at this intersection to reduce the potential for, and the severity of, future collisions. This includes all materials and equipment for the traffic control signals, including underground components, detection, communications, cabinet and controller, poles, and signage; as well as other costs identified in the cost estimate.

Safety Justification

A traffic signal analysis performed in October 2021 (see Item H) found that four of the five applicable MUTCD warrants were met. Of the warrants analyzed, only the crash experience warrant was not met (Table 2). However, the intersection capacity analysis completed as part of the study showed that ACT Circle left-turning movements experienced significant delay during the AM peak hour performing at LOS E, and during the PM peak hour performing at LOS F. This

may contribute to drivers taking inadequate gaps. Limited sight distance (due to vertical curvature of Dodge Street just north of the intersection) along with the high vehicle speeds on the segment of North Dodge Street, also creates the potential for severe crashes. This situation will be further exacerbated with the addition of a fourth leg to the intersection and more vehicle delay without the addition of a traffic signal.

Table 1. Summary of Examined Warrants

Warrant	Description	Warrant Met?
1A	Minimum Vehicular Volume (8-hr)	**Yes**
1B	Interuption of Continuous Traffic (8-hr)	**Yes**
2	4-hr Vehicular Volume	**Yes**
3	Peak Hour Volume	**Yes**
4	Pedestrian Volume	n/a
5	School Crossing	n/a
6	Coordinated Signal System	n/a
7	Collision Experience	No
8	Roadway Network	**Yes**

City of Iowa City
N Dodge Street and ACT Circle Intersection Traffic Improvements
Opinion of Aniticipated Project Costs - Concept Stage
July 26, 2024

	Description	Quantity	Unit	Unit Cost	Extended Cost
1	Clearing and Grubbing	1	LS	$ 3,500.00	$ 3,500.00
2	Topsoil, On-site	20	CY	$ 20.00	$ 400.00
3	Subgrade Preparation	150	SY	$ 5.00	$ 750.00
4	Subbase, Modified, 12"	150	SY	$ 20.00	$ 3,000.00
5	Pavement, PCC, 9", C-SUD	150	SY	$ 70.00	$ 10,500.00
6	PCC Pavement Samples and Testing	1	LS	$ 2,000.00	$ 2,000.00
7	Removal of Shared Use Path	120	SY	$ 15.00	$ 1,800.00
8	Shared Use Path, 8', 6"	120	SY	$ 75.00	$ 9,000.00
9	Pavement Removal	150	SY	$ 10.00	$ 1,500.00
10	Detectable Warning	40	SF	$ 100.00	$ 4,000.00
11	Traffic Signal	1	LS	$ 450,000.00	$ 450,000.00
12	Painted Pavement Markings	1	STA	$ 300.00	$ 300.00
13	Painted Symbols and Legends	4	EA	$ 350.00	$ 1,400.00
14	Grooves Cut for Pavement Markings	1	STA	$ 150.00	$ 150.00
15	Grooves Cut for Symbols and Legends	4	EA	$ 200.00	$ 800.00
16	Temporary Traffic Control	1	LS	$ 10,000.00	$ 10,000.00
17	Sod	80	SQ	$ 100.00	$ 8,000.00
18	SWPPP Preparation	1	LS	$ 1,500.00	$ 1,500.00
19	SWPPP Management	1	LS	$ 2,000.00	$ 2,000.00
20	Filter Sock	300	LF	$ 1.50	$ 450.00
21	Filter Sock Removal	300	LF	$ 1.00	$ 300.00
22	Inlet Protection Device	4	EA	$ 150.00	$ 600.00
23	Inlet Protection Device, Maintenance	4	EA	$ 50.00	$ 200.00
24	Construction Survey	1	LS	$ 10,000.00	$ 10,000.00
25	Mobilization	1	LS	$ 50,000.00	$ 50,000.00
26	Concrete Washout	1	LS	$ 1,500.00	$ 1,500.00

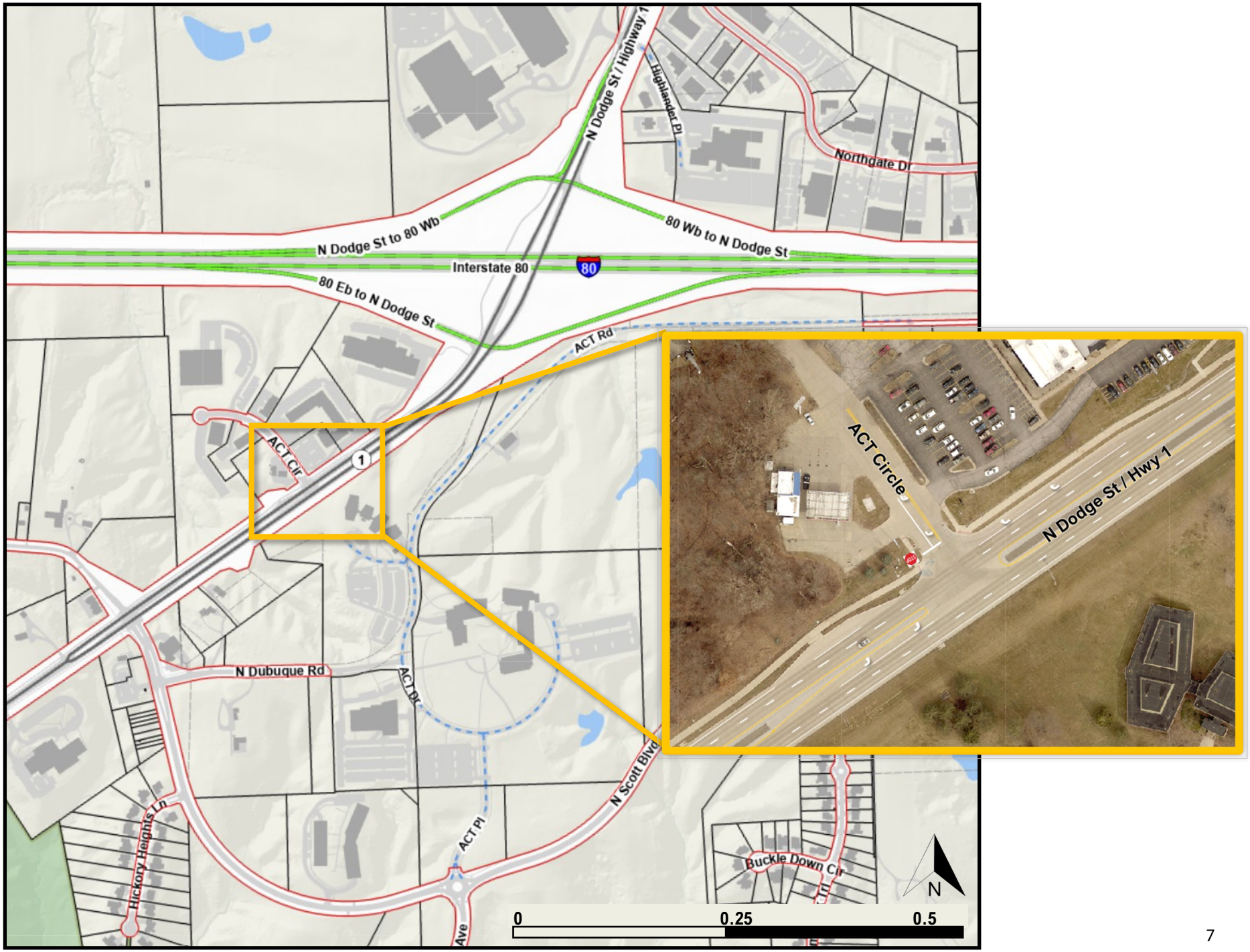
Construction Total	**$**	**574,000.00**
Construction Contingency (20%)	$	114,800.00
Design Services (Consultant)	$	86,100.00
Engineering & Administration (City of Iowa City)	$	57,400.00
Anticipated Project Total	**$**	**832,000.00**
Eligible Costs	**$**	**516,650.00**

Sources
Road Use Tax: $332,000
TSIP: $500,000

City of Iowa City
N Dodge Street and ACT Circle Intersection Traffic Improvements
Anticipated Schedule

Phase Desciption	Date(s)
Design	January-March 2025
Bidding	July 2025
Letting	August 2025
Construction	September 2025-May 2026
Project Completion	July 2026

E. Project Location Map



F. COLOR PICTURES OF PROJECT SITE

Image 1: North Dodge Street / Hwy 1, Northbound Approach

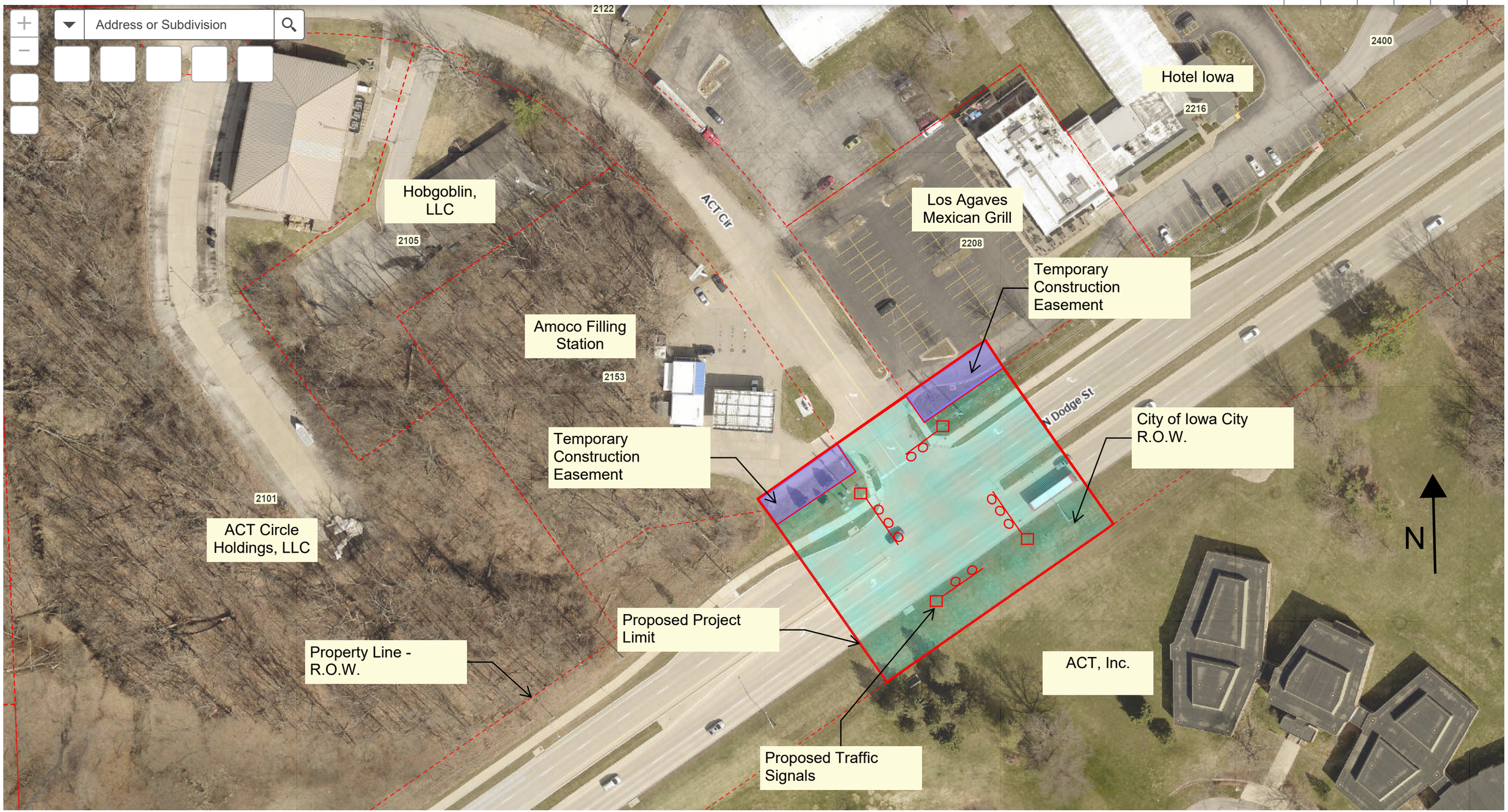
Image 2: North Dodge Street / Hwy 1, Southbound Approach

Image 3: ACT Circle: Eastbound Approach

Image 4: View of the limited sight distance for vehicles entering N. Dodge Street from ACT Circle.

Image 5: Aerial view of the intersection and surrounding uses with approximate location of fourth leg from ACT Drive.

Engineering Map with ArcGIS Web AppBuilder



60ft

2,185,432.310 619,708.682 Feet

H: PEAK HOUR COUNTS

PM PEAK HOUR - 9/16/2021

VEHICLES	DODGE ST From North				ACT CIRCLE From East				DODGE ST From South				ACT CIRCLE From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	*Totals*
4:30 PM	19	203	0	0	0	0	0	0	0	228	16	0	22	0	15	0	503
4:45 PM	11	190	0	0	0	0	0	0	0	254	12	0	10	1	11	0	489
5:00 PM	8	192	0	1	0	0	0	0	0	216	11	1	17	1	22	0	467
5:15 PM	10	186	0	0	0	0	0	0	0	231	10	0	14	2	10	0	463
Peak Hour Totals	48	771	0	1	0	0	0	0	0	929	49	1	63	4	58	0	1922

TRUCKS	DODGE ST From North				ACT CIRCLE From East				DODGE ST From South				ACT CIRCLE From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	*Totals*
4:30 PM	0	5	0	0	0	0	0	0	0	4	0	0	1	0	0	0	10
4:45 PM	0	3	0	0	0	0	0	0	0	4	0	0	0	0	0	0	7
5:00 PM	0	1	0	0	0	0	0	0	0	5	0	0	0	0	0	0	6
5:15 PM	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	5
Peak Hour Totals	0	12	0	0	0	0	0	0	0	15	0	0	1	0	0	0	28

BIKES	DODGE ST From North				ACT CIRCLE From East				DODGE ST From South				ACT CIRCLE From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	*Totals*
4:30 PM	0	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	3
4:45 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
5:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:15 PM	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4
Peak Hour Totals	0	3	0	1	0	0	0	0	0	7	1	1	0	0	0	0	11

AM PEAK HOUR - 9/9/2021

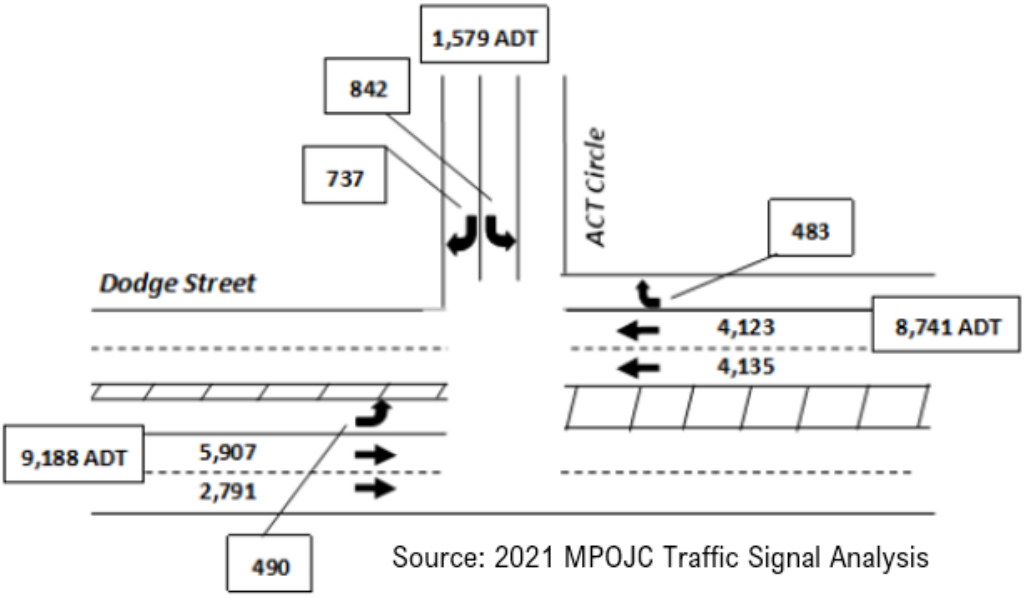
VEHICLES	DODGE ST				ACT CIRCLE				DODGE ST				ACT CIRCLE				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	*Totals*
7:30 AM	9	226	0	0	0	0	0	0	0	164	5	0	7	0	4	0	415
7:45 AM	10	295	0	0	0	0	0	0	0	164	9	0	8	0	2	0	488
8:00 AM	13	199	0	0	0	0	0	0	0	133	9	1	8	0	8	0	370
8:15 AM	19	178	0	0	0	0	0	0	0	161	12	0	3	0	5	0	378
Peak Hour Totals	51	898	0	0	0	0	0	0	0	622	35	1	26	0	19	0	1651

TRUCKS	DODGE ST				ACT CIRCLE				DODGE ST				ACT CIRCLE				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	*Totals*
7:30 AM	0	9	0	0	0	0	0	0	0	1	0	0	0	0	0	0	10
7:45 AM	0	10	0	0	0	0	0	0	0	4	0	0	0	0	0	0	14
8:00 AM	1	9	0	0	0	0	0	0	0	3	0	0	0	0	1	0	14
8:15 AM	0	7	0	0	0	0	0	0	0	4	0	0	0	0	0	0	11
Peak Hour Totals	1	35	0	0	0	0	0	0	0	12	0	0	0	0	1	0	49

BIKES	DODGE ST				ACT CIRCLE				DODGE ST				ACT CIRCLE				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	*Totals*
7:30 AM	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1
8:15 AM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
Peak Hour Totals	0	3	0	1	0	0	0	0	0	2	0	2	0	0	0	0	5

Diagram 1

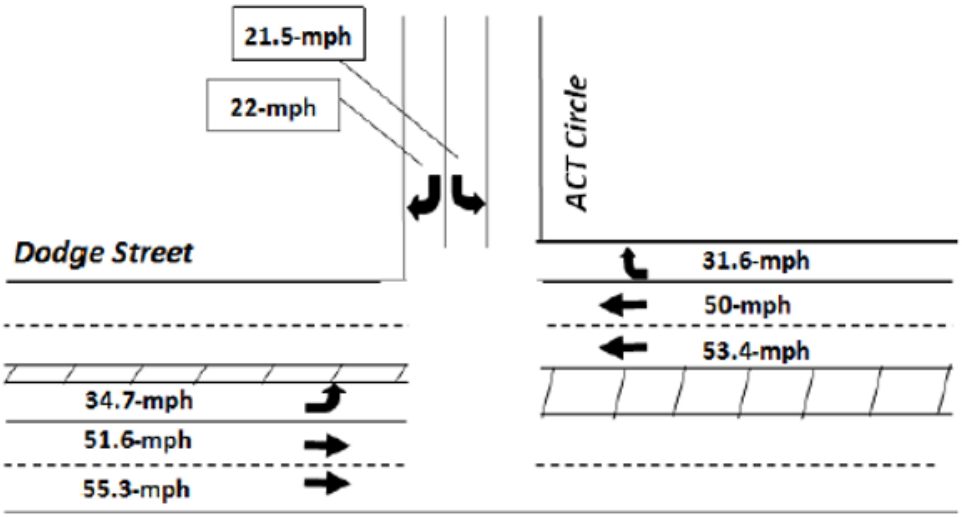
2021 Average Daily Traffic (ADT) Counts



Source: 2021 MPOJC Traffic Signal Analysis

Diagram 2

2021 85th-Percentile Speeds



Source: 2021 MPOJC Traffic Signal Analysis

Date: October 13, 2021

To: Jason Havel, City Engineer
Kent Ralston, Transportation Planner

From: Emily Bothell, Sr. Associate Transportation Planner

Re: North Dodge Street and ACT Circle Traffic Signal Warrant Analysis Update

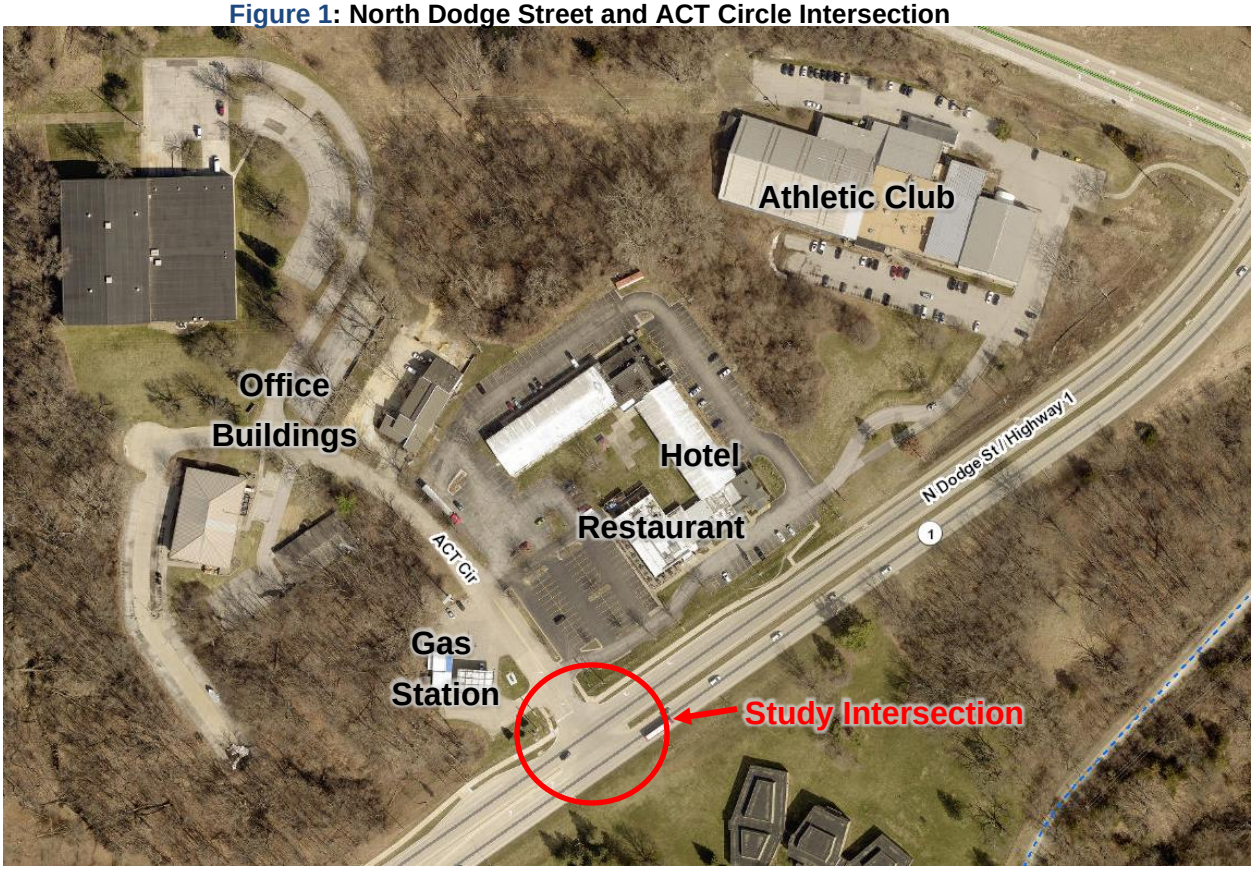
INTRODUCTION

This memorandum is an update to the 2015 traffic signal warrant analysis for the intersection of North Dodge Street and ACT Circle in Iowa City. The update was requested by the City of Iowa City to determine how traffic patterns and/or volumes have changed since the last study was completed, and to assess whether a traffic signal is warranted at this location.

EXISTING CONDITONS

Figure 1 shows an aerial view of the intersection of North Dodge Street and ACT Circle. The three-leg intersection is currently stop controlled for ACT Circle only. North Dodge Street is posted at 45-mph while ACT Circle is posted at 25-mph within the study area.

Figure 1: North Dodge Street and ACT Circle Intersection



The study area is located on the north side of Iowa City, near Interstate 80, in a predominantly commercial area (**Figure 1**). East of ACT Circle, a frontage road leads to a restaurant, hotel and athletic club, and west of the intersection is a gas station. ACT Circle is a north-south two lane street that terminates in a cul-de-sac located northwest of the intersection.

North Dodge Street (Highway 1) is a primarily north-south (east-west at this intersection) arterial street that connects Iowa City's downtown to Interstate 80. At the study intersection, turn lanes are provided as follows: a left-turn lane for eastbound North Dodge Street, right-turn lane for westbound North Dodge Street and left and right turn lanes for southbound ACT Circle.

TRAFFIC COUNTS AND 85th-PERCENTILE SPEEDS

MPOJC collected traffic counts and 85th-percentile speeds at the intersection in September/ October 2021. Dodge Street carries a majority of the traffic with average entering vehicles being 9,188 eastbound and 8,741 westbound as shown in **Figure 2**. 85th-percentile speeds range from 50-mph to 55-mph for the through lanes on North Dodge Street as shown in **Figure 3.**

Figure 2: 2021 Average Daily Traffic (ADT) Counts

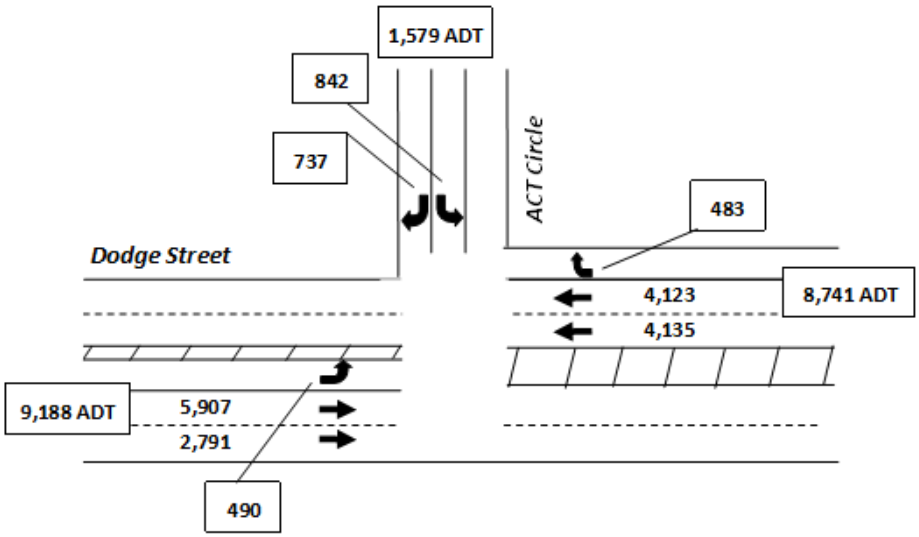
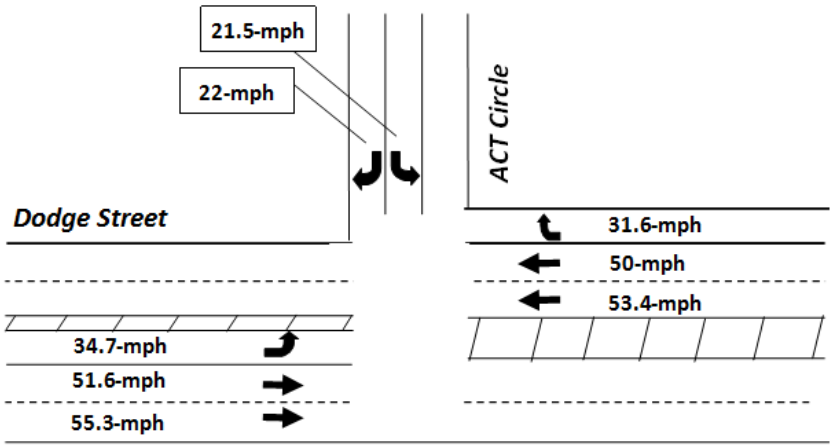


Figure 3: 85th-Percentile Speeds



TRAFFIC SIGNAL WARRANT ANALYSIS

A traffic signal warrant analysis was performed to determine the need for a traffic signal. At a minimum, at least 1 of the 9 warrants must be met, but the satisfaction of a warrant does not in itself require the installation of a traffic signal.

The nine traffic signal warrants are as follows:

1) Eight-Hour Vehicular Volume
2) Four-Hour Vehicular Volume
3) Peak Hour
4) Pedestrian Volume *(not evaluated)*
5) School Crossing *(not evaluated)*
6) Coordinated Signal System *(not evaluated)*
7) Crash Experience
8) Roadway Network
9) Intersection Near a Grade Crossing (*not evaluated*)

Traffic signal warrants 1-3, 7, and 8 of the *Manual on Uniform Traffic Control Devices* (MUTCD) were evaluated with respect to the observed traffic volumes. See the MUTCD for further detail of each warrant.

Warrants 4-6 and 9 are not applicable to this intersection due to the following:

- Warrant 4 was not evaluated due to the low presence of pedestrians.
- Warrant 5 was not evaluated because there is not a school in the immediate vicinity of the intersection.
- Warrant 6 was not evaluated because current traffic control functions independent of other signalized intersections.
- Warrant 9 was not evaluated because the intersection is not near a grade crossing.

Warrant 1 Analysis – Eight-Hour Vehicular Volume

The 70 percent volume thresholds were used in place of the 100 percent volume thresholds because the 85th-percentile speeds on the major street exceed 40-mph (averaging 53.4-mph northbound and 51.6-mph southbound).

Warrant 1a – Minimum Vehicular Volume

Warrant 1a (**Table 1**) examines whether the intersection meets the minimum vehicular volume per hour to warrant a traffic signal. Eight 1-hour periods must meet appropriate traffic volumes. With a two-lane approach on North Dodge Street and one-lane approach at ACT Circle; during each hour the major street (N Dodge Street) must have a total of 420 vehicles entering the intersection and the higher volume minor leg (ACT Circle) must have 105 vehicles entering the intersection to meet Warrant 1a. Eight one-hour periods meet the required minimum vehicular volumes; therefore **Warrant 1a is met**.

Warrant 1b – Interruption of Continuous Traffic

Warrant 1b (**Table 1**) examines whether the traffic on the major street is so heavy that traffic on a minor street suffers excessive delay or conflict in entering or crossing the major street. During each hour the major street (N Dodge Street) must have a total of 630 entering vehicles and the higher volume minor leg (ACT Circle) must have 53 vehicles entering the intersection to meet Warrant 1b. Fourteen one-hour periods meet the required volumes; therefore **Warrant 1b is met**.

Table 1: Warrant 1 - Eight Hour Vehicular Volume

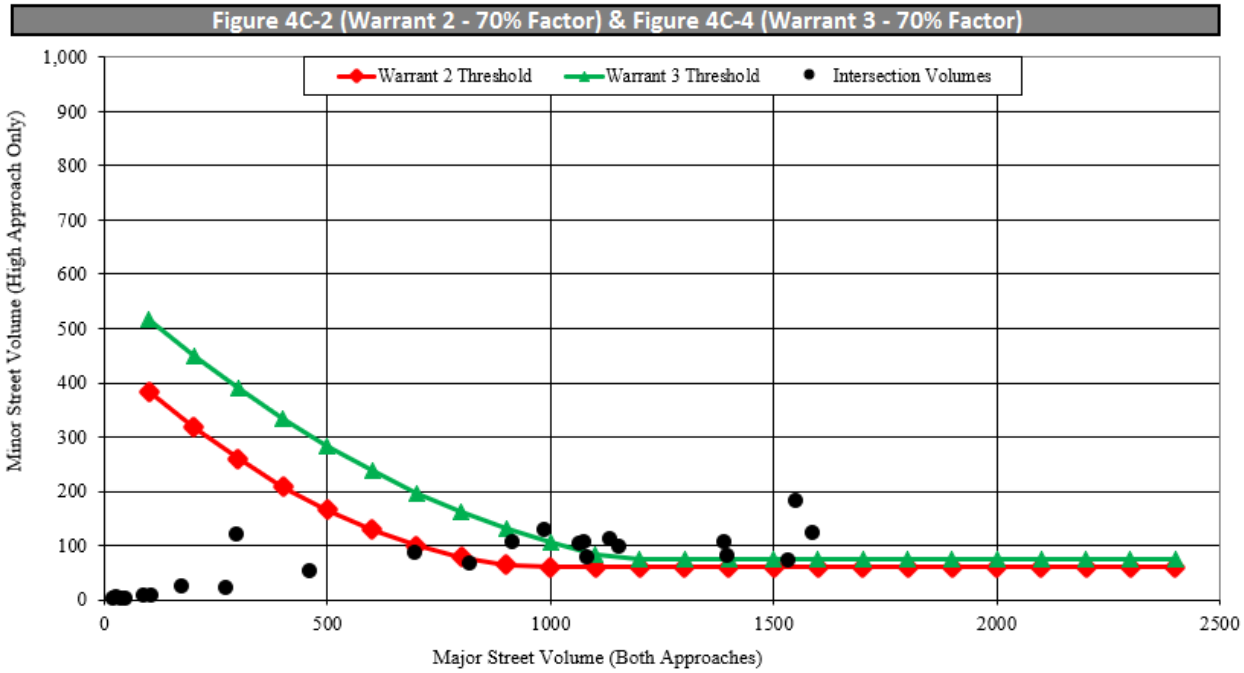
Dodge Street and ACT Circle								
Iowa City	Dates Data Gathered: September 21-24, 2021 & September 28-October 1, 2021							
	Entering Traffic			Total Entering Traffic	Major Street Total	Highest Minor Approach	Warranted?	
	Dodge Street		ACT Circle					
Time	Eastbound	Westbound	Southbound				1A	1B
100	22	14	2	38	36	2	No	No
200	10	16	5	31	26	5	No	No
300	10	12	2	24	22	2	No	No
400	45	44	7	96	89	7	No	No
500	119	177	15	311	296	15	No	No
600	310	509	66	886	820	66	No	Yes
700	622	914	71	1606	1535	71	No	Yes
800	647	751	79	1477	1398	79	No	Yes
900	519	565	77	1161	1084	77	No	Yes
1000	539	528	103	1170	1067	103*	Yes	Yes
1100	407	509	107	1023	916	107	Yes	Yes
1200	587	545	111	1244	1133	111	Yes	Yes
1300	569	507	105	1181	1076	105	Yes	Yes
1400	630	525	98	1253	1155	98	No	Yes
1500	841	549	106	1496	1390	106	Yes	Yes
1600	950	637	124	1711	1587	124	Yes	Yes
1700	883	669	182	1734	1552	182	Yes	Yes
1800	530	457	128	1116	988	128	Yes	Yes
1900	385	311	85	781	696	85	No	Yes
2000	264	198	53	515	462	53	No	No
2100	137	137	22	297	275	22	No	No
2200	83	92	24	199	175	24	No	No
2300	58	48	7	114	107	7	No	No
2400	22	25	1	49	48	1	No	No

*This hour is considered met for warrant 1a as the highest minor approach is very close to meeting the threshold (by two vehicles).

Warrant 2 Analysis – Four-Hour Vehicular Volume

The four-hour vehicle volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is a principal reason to consider installing a traffic control signal. To meet Warrant 2, traffic volumes on both streets must meet the required volume threshold for four 1-hour periods. **Figure 4** graphically depicts the required vehicular volume threshold for the major and minor streets (red line) in comparison to the observed volumes. Twelve one-hour periods meet the required volumes; therefore **Warrant 2 is met**.

Figure 4: Warrant 2 and 3 Vehicular Volume Thresholds



Warrant 3 Analysis – Peak Hour

The peak hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of one hour on an average day, the minor street traffic suffers undue delay when entering or crossing the major street. Peak hour traffic volumes on both streets must meet required thresholds under Warrant 3. **Figure 4** graphically depicts the required vehicular volume threshold for the major and minor streets (green line) in comparison to the observed volumes. Nine hours meet the required thresholds; therefore **Warrant 3 is met**.

Warrant 7 Analysis – Collision Experience

Because the installation of traffic signals often results in a trade of one type of collision for another, Warrant 7 states that there must be 5 or more crashes, susceptible to correction by a traffic signal, within a twelve month period for the warrant to be met. Between 2015 and 2019 there were a total of 14 collisions at the intersection, none of which were fatal or resulted in serious injury. Of the 14 collisions, six occurred in a twelve month period but only two collisions are of the type correctable by a traffic signal. No collisions were reported in 2020. **Table 2** shows the six collisions that occurred in a twelve month period, the major cause and manner of collision. As there were not five collisions, susceptible to correction by a traffic signal, within a twelve month period; **Warrant 7 is not met**.

Table 2: Collision Summary

N. Dodge Street & ACT Circle: 2015-2019			
Date of Collision	**Major Cause**	**Manner of Crash**	**Correctable by a traffic signal?**
4/12/2016	Other	Rear-end	No
5/10/2016	Ran stop sign	Broadside	Yes
7/21/2016	Unknown	Rear-end	No
7/27/2016	Passing	Rear-end	No
9/12/2016	FTYROW: from stop sign	Broadside	Yes
12/5/2016	Followed too close	Rear-end	No

Warrant 8 Analysis – Roadway Network

Warrant 8 is used when evaluating whether a traffic signal at an intersection might be justified to encourage concentration and organization of traffic flow on a roadway network. Warrant 8 is met when one or both of the following criteria are met:

A. *The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2 and 3 during an average weekday; or*
B. *The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).*

A major route as used in this signal warrant shall have one or more of the following characteristics:

A. *It is part of the street or highway system that serves as the principal roadway network for through traffic flow; or*
B. *It includes rural or suburban highways outside, entering, or traversing a City; or*
C. *It appears as a major route on an official plan, such as a major street plan in an urban traffic and transportation study.*

The North Dodge Street/ACT Circle intersection has greater than 1,000 entering vehicles per hour during both the AM and PM peak hours and Warrants 1, 2 and 3 are currently met; therefore the intersection meet criteria A and criteria B was not analyzed.

Under major route characteristics, the North Dodge Street and ACT Circle intersection is part of the Iowa City arterial street system. North Dodge is a north-south arterial street that provides access between downtown and the eastside of Iowa City to Interstate 80. North Dodge Street serves as part of the principal roadway network for through traffic flow in Iowa City, therefore major route characteristic A is met.

To the northeast of city limits, North Dodge Street turns into Highway 1 which is a rural state highway that also provides access to I-80, Solon and beyond, therefore characteristic B is met.

North Dodge Street is reflected in the adopted MPOJC Long Range Transportation Plan as part of the official arterial street network; therefore characteristic C is met.

The North Dodge Street/ACT Circle intersection meets criteria A, and characteristics A, B and C of Warrant 8; therefore **Warrant 8 is met.**

CAPACITY ANALYSIS

Existing Conditions

Existing intersection capacity was analyzed using unsignalized intersection capacity methods outlined in the latest edition of the *Highway Capacity Manual* (HCM) and using *Synchro 10* software. By using HCM methods, control delay is calculated as seconds of delay per vehicle and a corresponding level of service (LOS) is also shown. Level of service describes operating conditions based on several factors including speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. **Table 3** exhibits LOS with its control delay ranges at unsignalized intersections. A LOS A represents the best operating conditions (free-flow movement), and LOS F represents the worst conditions, i.e. extreme congestion and stop-and-go conditions.

Table 3: Intersection LOS / Delay

Level of Service	Unsignalized	Signalized
	Average Control Delay (s/veh)	
A	<10	<10
B	>10-15	>10-20
C	>15-25	>20-35
D	>25-35	>35-55
E	>35-50	>55-80
F	>50	>80

Table 4 shows average delay and LOS under existing conditions. Overall, the intersection performs very well during both peak periods at LOS A. The greatest delay is experienced by the southbound left-turning movement during the AM and PM peak hours with delay ranging from 39.4 sec/veh (LOS E) – 71.2 sec/veh (LOS F). The east- and westbound movements operate very well with the greatest delay being 10.7 sec/veh for the eastbound left-turning movement during the AM peak hour.

Table 4: LOS / Delay Summary – Existing and Proposed Conditions

Direction	Existing Conditions				Signalized Conditions with Permissive EB LT on Dodge Street				Signalized Conditions with Protected/Permissive EB LT on Dodge Street			
	Control Delay (s/veh)		LOS		Control Delay (s/veh)		LOS		Control Delay (s/veh)		LOS	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
North Dodge Street												
Eastbound												
- Left	10.7	10.1	**B**	**B**	7.8	6.9	**A**	**A**	5.5	5.6	**A**	**A**
- Through	0.0	0.0	**A**	**A**	4.8	5.4	**A**	**A**	3.5	4.4	**A**	**A**
Westbound												
- Right	0.0	0.0	**A**	**A**	3.9	3.8	**A**	**A**	6.0	6.7	**A**	**A**
- Through	0.0	0.0	**A**	**A**	5.5	5.0	**A**	**A**	8.3	8.9	**A**	**A**
ACT Circle												
Southbound												
- Left	39.4	71.2	**E**	**F**	8.7	9.5	**A**	**A**	13.2	12.5	**B**	**B**
- Right	12.2	12.0	**B**	**B**	8.8	9.7	**A**	**A**	13.4	12.8	**B**	**B**
Intersection	0.9	2.8	**A**	**A**	5.4	5.5	**A**	**A**	6.5	**6.8**	**A**	**A**

Existing intersection capacity under signalized conditions was analyzed using signalized capacity methods outlined in the latest edition of the *Highway Capacity Manual* (HCM) and using *Synchro 10* software. By using HCM methods, control delay is calculated as seconds of delay per vehicle and a corresponding level of service (LOS) is also shown. Level of service describes operating conditions based on several factors including speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. **Table 3** exhibits LOS with its control delay ranges at signalized intersections.

Signalized Conditions with a Permissive EB Left-Turn on Dodge Street

The intersection was analyzed under signalized conditions with a permissive eastbound left-turn on North Dodge Street. As shown in **Table 4**, the intersection continues to operate well under these conditions. As compared to existing conditions, overall intersection delay increases but delay is distributed amongst all movements. The southbound left-turning movement experiences minimal delay with 8.7 sec/veh during the AM peak hour and 9.5 sec/veh during the PM peak hour. All movements operate well at LOS A.

Signalized Conditions with a Permissive/ Protected EB Left-Turn on Dodge Street

The intersection was also analyzed under signalized conditions with a permissive and protected eastbound left-turn on North Dodge Street. Overall, the intersection performs well at LOS A, but delay is the highest under this scenario. When comparing all movements, delay is also the highest for the southbound movements during both peak hours.

CONCLUSION

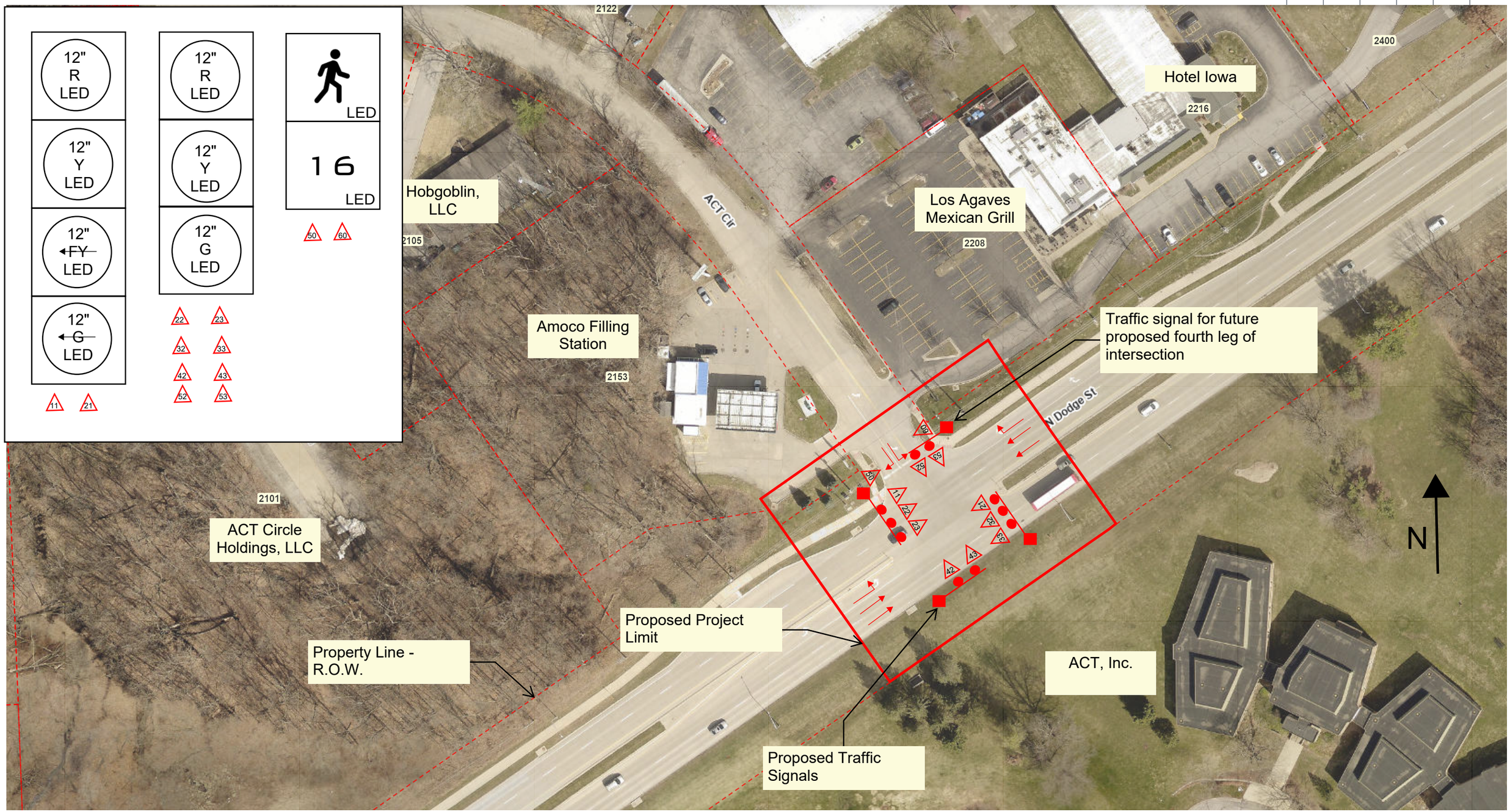
Based on analysis of the MUTCD traffic signal warrants; Warrants 1-3 and 8 are all met at the intersection of North Dodge Street and ACT Circle. Of the warrants analyzed, the crash experience warrant (warrant 7) is the only warrant not met. Furthermore, while the capacity analysis shows that overall intersection delay is less than 5 sec/veh during both peak hours, the southbound left-turning movement experiences 39.4 seconds of delay per vehicle during the AM peak hour and fails during the PM peak hour (71.2 sec/veh).

Table 5: Summary of Examined Warrants

Warrant	Description	Warrant Met?
1a	Minimum Vehicular Volume	Yes
1b	Interruption of Continuous Traffic	Yes
2	Four Hour Vehicular Volumes	Yes
3	Peak Hour Volumes	Yes
4	Pedestrian Volume	n/a
5	School Crossing	n/a
6	Coordinated Signal System	n/a
7	Crash Experience	No
8	Roadway Network	Yes

In 2015, the analysis showed there was essentially not enough side street traffic to warrant stopping all vehicles on Dodge Street which carries the vast majority of traffic at the intersection. Since 2015, there has been a notable increase in vehicles accessing ACT Circle. As all vehicular volume warrants are met, along with the roadway network warrant, staff recommends further discussing the merits of installing a traffic control signal as long as the existing land uses along ACT Circle will remain and continue to generate the same or more traffic.

Engineering Map with ArcGIS Web AppBuilder



60ft

2,185,432.310 619,708.682 Feet

TRAFFIC ENGINEERING ASSISTANCE PROGRAM

IA 13 Corridor Traffic Study

Prepared for:

City of Marion

In Cooperation With:

Iowa Department of Transportation &

Iowa Department of Public Safety

Governor's Traffic Safety Bureau

February 19, 2024

IOWADOT

SNYDER & ASSOCIATES

IOWA | MISSOURI | NEBRASKA | SOUTH DAKOTA | WISCONSIN

February 19, 2024

Michael D. Barkalow, P.E. &L.S.I.
City Engineer
City of Marion
1225 6th Avenue, Suite 200
Marion, Iowa 52302

RE: IA 13 CORRIDOR TRAFFIC STUDY
TRAFFIC ENGINEERING ASSISTANCE PROGRAM
S&A PROJECT NO.: 122.1000.01K

Dear Mr. Barkalow:

Snyder & Associates has completed the IA 13 Corridor Traffic Study. The study was requested by the City of Marion and completed as part of Iowa's Traffic Engineering Assistance Program (TEAP). TEAP is managed by the Iowa Department of Transportation and is partially funded through the Iowa Governor's Traffic Safety Bureau, as provided by the U.S. Department of Transportation, in accordance with the provisions of Section 402, Title 23, United States Code. The opinions, findings and conclusions expressed in this report are those of Snyder & Associates, Inc.

We are pleased to provide assistance to City of Marion through the completion of this study. Should you have any questions regarding this study, please contact us.

Sincerely,

SNYDER & ASSOCIATES, INC.

Timothy D. Crouch

Timothy D. Crouch, P.E., PTOE
Project Manager

Enclosures

CC: Chris Poole, P.E., Iowa DOT, Traffic & Safety Bureau
Jim Schnoebelen, P.E., Iowa DOT District 6
Jesse Tibodeau, P.E., Iowa DOT District 6
Cathy Cutler, Iowa DOT District 6
Newman Abuissa, Iowa DOT District 6
Dillon Feldmann, P.E., Iowa DOT Local Systems

V:\Projects\2022\122.1000.01K\Deliverables\Ltr_2024-09-19_TEAPTransmittal.docx

INFORMATION SHEET
IOWA DEPARTMENT OF TRANSPORTATION
TRAFFIC ENGINEERING ASSISTANCE PROGRAM

IA 13 Corridor / Traffic Study
February 19, 2024

1. Local Jurisdiction: City of Marion

2. Reason TEAP Study Originated:
The City requested to have this corridor studied due to steady development in the area. City staff has received many requests for additional turn lanes, traffic signals, and reduced speed limits in the corridor area. Traffic counts taken at Kacena Drive in 2022 suggest at least one signal warrant may be met. City staff would prefer to have the corridor looked at holistically, rather than an intersection at a time, to prioritize and coordinate future improvements.

3. Scope of Services Provided:
Review crash history and potential for crash reduction (PCR) data for the study intersections and corridor as a whole, prepare 2045 AM and PM turning movement traffic forecasts for the study intersections, perform traffic operations analysis using estimated 2045 peak hour traffic for the existing intersection lane configuration and recommended additional turn lanes, evaluate the need for additional right- and left-turn lanes at the study intersections, evaluate applicable MUTCD traffic signal warrant criteria for the unsignalized study intersections, determine intersection lane configurations and turn lane lengths at the study intersections, provide recommendations for future traffic signal/intersections within the study area and conduct a planning level review for potential alternative intersection designs, and review existing access along the study corridor and provide access management recommendations.

4. The Engineer, Snyder & Associates, submitted a final report dated January XX, 2024 with the following recommendations:

- Intersection recommendations -
  - IA 13 & Rec Dr:
    - No changes are recommended for this intersection.

  - IA 13 & 29th Ave/Fernow Rd:
    - Signalize intersection – Signal warrant analysis, existing traffic volumes met warrants 1, 2 & 3.
    - Construct EB right and left-turn lanes and WB left-turn lanes (100’ each) if traffic signals are installed.
    - Construct SB right-turn lane (100’) – *NCHRP Report 457* with two-way stop or traffic signal control.
    - A multi-lane roundabout could be considered as an alternative intersection to traffic signal control. No additional turn lanes would be required for the side streets and no turn lanes would be needed for IA 13.

- IA 13 & Prairie Ridge Ave:
  - No changes in traffic control, remain two-way stop control. Consider restricting turning movements as traffic volumes increase. Provide alternative access to IA 13 via adjacent intersections.
  - Construct NB right-turn lane (100') – *NCHRP Report 457* with two-way stop or traffic signal control.

- IA 13 & Kacena Ave:
  - Signalize intersection – Signal warrant analysis, existing traffic volumes met warrants 2 & 3.
  - Construct EB right and left-turn lanes and WB left-turn lane (with signalization, 100' each) if traffic signals are installed..
  - Construct NB right-turn lane (100') – *NCHRP Report 457* with two-way stop or traffic signal control.
  - A multi-lane roundabout could be considered as an alternative intersection to traffic signal control. No additional turn lanes would be required for the side streets and no turn lanes would be needed for IA 13.

- IA 13 & Hennessey/Pawnee Ave:
  - No changes are recommended for this intersection.
  - As EB traffic volumes increase, left turns and right turns on the EB approach should be reconstructed to include a right-thru lane and a left-turn lane. The additional lane will allow for flexibility in traffic signal phasing for the east/west traffic and improve traffic operations at the intersection.
  - Further review/study of the removal of the traffic signals and restricted median.

- IA 13 & US 151/Dubuque Rd
  - No changes are recommended for this intersection.

- IA 13 & Linn Aire Ave:
  - Extend EB right-turn lane to approximately 150' in length.
  - Construct WB left-turn lane (100').
  - Convert NB right/thru-lane to thru only.
  - Construct NB right-turn lane (150').

- IA 13 & IA 100/Secrist Rd:
  - Convert EB thru/left-turn lane to left turn only.
  - Convert EB right-turn lane to thru only.
  - Construct EB right-turn lane (300').
  - Extend WB left-turn lane (125').

- Consider offset right- and left-turn lanes on IA13 to improve visibility of approaching traffic and reducing the potential shadowing of vehicles in the thru lanes next to the right-turn lanes.

Table 1: Turn Lane Length Summary (in feet)

Intersection	Lane	Existing	Recommended
IA 13 & 29th Ave / Fernow Rd	EB Right	-	100
	WB Left	-	100
	SB Right	-	100
IA 13 & Prairie Ridge Ave	EB Right	-	100
	WB Left	-	100
	NB Right	-	100
IA 13 & Kacena Ave	EB Right	-	100
	WB Left	-	100
	NB Right	-	100
IA 13 & Linn Aire Ave	EB Right	60	150
	WB Left	-	100
	NB Right	-	150
IA 13 & IA 100 / Secrist Rd	WB Left	80	125
	EB Right	230	300

- A potential alternative to improve the operations at IA 13 & IA 100/Secrist Rd would be to improve Secrist Rd east of the intersection to the intersection with Hindman Rd. Then, pave Hindman Rd from IA 100 to US 151. This route could serve as an alternative for EB traffic on IA 100 that continues east on US 151. Eastbound traffic could avoid the IA 13/US 151 intersection by using this alternative route. This may reduce the EB left-turn volume at IA 100/IA 13 and the NB right-turn volume at IA 13/US 151. Further origin-destination traffic study would need to be completed to determine the extent of traffic that would be redirected to the new route. The traffic volumes available for this study did not provide this linkage.

- At three of the four intersections with traffic signals a high percentage of the reported crashes are rear-end crashes. This is somewhat typical of signalized intersections to have a larger number of rear-end crashes, however, the percentage of rear-end crashes at these three intersections appears to be higher than normal –

  - IA 13 & US 151/Dubuque Rd/10th Ave – 36 out of 65 crashes were rear-end (55%).
  - IA 13 & Linn Aire Ave – 13 out of 22 crashes were rear-end (59%).
  - IA 13 & IA 100/Secrist Rd – 18 out of 31 crashes were rear-end (58%).

  A review of the traffic signal change and clearance intervals should be conducted to verify they are consistent with the ITE Traffic Control Devices Handbook, 2nd Edition, using the NCHRP Report *Guidelines for Timing Yellow and All-Red Intervals at Signalized Intersections* method in the handbook. The recent installation of the automated traffic enforcement cameras at the US 151/Dubuque Rd/10th Ave intersection may result in fewer crashes at that intersection.

  Additionally, improvements in the corridor traffic signal timings can help improve traffic flow/progression and improved safety as a result of fewer stops and less delay. Besides the

traditional method of updated signal timings based on recent traffic counts, there is new technology to assist with the timing of traffic signals. One method is the use of automated traffic signal performance measures which are available in the newer traffic signal controllers. The performance measures are monitored to identify issues in traffic operations and adjustments are made to the traffic signal timings to improve the operations. Adaptive traffic signal control technology is also available which monitors traffic volumes and automatically adjusts the traffic signal timings to accommodate changes in the traffic volumes. The adaptive traffic signal technologies are more beneficial in corridors where large, unexpected changes in volumes occur.

- Install yellow retroreflective strips on the traffic signal backplates to enhance the traffic signal visibility and improve driver awareness of the traffic signals.

- The speed limits in the corridor should be reviewed/evaluated when changes are made to the roadway environment, increased development adjacent to the corridor, or after significant changes in traffic volumes. With the increasing traffic volumes within the corridor and the recent installation of the traffic signals at the intersection with Hennessey Pkwy/Pawnee Ave a review of the current speed limit in the corridor could be accomplished.

5. The order of magnitude construction cost opinion for proposed improvements is as follows:

Recommendations	Cost Estimate	Notes
Traffic Signalization	$350,000	Per Intersection
Construction of new turn lane	$250,000 – 350,000	Per lane, depending on the length of the turn lane
Conversion to Roundabout	$2,000,000 – 2,500,000	Per Intersection

6. Potential funding sources are as follows:

Funding for traffic safety improvements on public roads under county, city, or state jurisdiction may be available through the Traffic Safety Improvement Program (TSIP). The application deadline for TSIP funding is August 15th of each year. “Site specific” funding is eligible for up to $500,000 with no local match required. Application forms are available from the Iowa DOT, and the application is submitted to the Iowa DOT Traffic and Safety Bureau. More information can be found at: https://iowadot.gov/traffic/traffic-and-safety-programs/tsip/tsip-program

The Urban-State Traffic Engineering Program (U-STEP) provides funding for solving traffic operation and safety problems on primary roads in Iowa Cities. City must match 45 percent of the constructions cost and the city must also engineer and administer the project. A maximum funding of $200,000 per project for spot improvements (single intersection) or a maximum of $400,000 per project for linear improvements (two or more intersections) is available through this program. Prior to approval of funding, Iowa DOT will review plans and specifications.

Since IA 13 is a state highway, Iowa DOT program funding would be a potential funding source for improvements to the state highway.

The Federal-aid Surface Transportation Block Grant (STBG) Program is another potential funding source. The intent of the program is to aid public road jurisdictions with funding for roads on federal-aid routes. This program requires a minimum of 20 percent non-federal funding match. The STBG program is administered by the Metropolitan Planning Organization (MPO).

Further information on potential funding sources is available on the Iowa DOT website at: https://iowadot.gov/pol_leg_services/Funding-Guide.pd

TRAFFIC ENGINEERING ASSISTANCE PROGRAM

IA 13 CORRIDOR / TRAFFIC STUDY
MARION, IOWA

Prepared by:

Snyder & Associates, Inc.

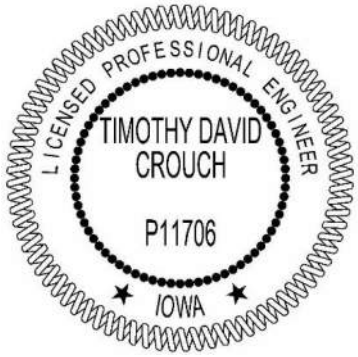
Prepared for:

City of Marion

In Cooperation with:

Iowa Department of Transportation &
Iowa Department of Public Safety
Governor's Traffic Safety Bureau

February 19, 2024



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Timothy D. Crouch 2/19/2024

Timothy D Crouch, P.E. Date

License Number P11706

My License Renewal Date is December 31, 2025

Pages or sheets covered by this seal:

All pages

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDIX

- Intersection Traffic Counts – City of Marion
- Iowa DOT ICAT Crash Data
- Turn Lane Warrant Worksheets
- Traffic Signal Warrant Analysis Worksheets
- Capacity Analysis Reports

1. BACKGROUND

At the request of the City of Marion and the Iowa DOT, this study reviewed the current intersection operations and evaluated intersection lane configurations along IA 13 at the intersections with IA 100/Secrist Road, Linn Aire Avenue, 10th Avenue/US 151/Dubuque Road, Hennessey Parkway/Pawnee Ave, Kacena Avenue, Prairie Ridge Avenue, 29th Avenue/Fernow Road, and Rec Drive. The 35th Avenue/Radio Road intersection was removed from the scope per city staff, indicating analysis of this intersection would not be beneficial at this time. This section of IA 13 is a divided four-lane roadway with eight intersecting streets and steady development in the surrounding area. The City staff has received many requests for additional turn lanes, traffic signals, and reduced speed limits in the study area. They are interested in identification of the need for potential additional turn lane construction, the need for traffic signals at unsignalized intersections, potential for alternative intersection designs and possible access management needs. The study area is shown in Figure 1.

Figure 1: Study Area

2. EXISTING CONDITIONS

The speed limit on IA 13 is 50 mph throughout most of the study area. The speed limit changes to 55 mph about 1,600' south of Linn Aire Ave and about 300' north of Prairie Ridge Ave. And the speed limit increases to 65 mph 550' north of Fernow Road and 1,600' south of IA 100.

Within the study area IA 13 is a 4-lane divided, high speed highway with up to 22,000 vehicles per day in some locations, per the IDOT's 2022 AADT data. The median varies in width throughout the corridor and is both a depressed (ditch) median from south of US 151 to the north and a raised/curbed median from south of US 151 to the south end of the study area. The corridor has a rural cross section with partial paved shoulders and gravel shoulders.

The intersections of Hennessey Pkwy/Pawnee Ave, US 151 (Dubuque Rd), Linn Aire Ave, and IA 100 are currently signalized, with the remainder having stop conditions for the side streets. All intersections have left turn lanes in place along IA 13, but only the intersections of Hennessey Pkwy/Pawnee Ave, US 151 (Dubuque Rd), IA 100, and Linn Aire Ave (SB only) have right turn lanes along IA 13. None of the stop-controlled intersections currently have right turn lanes along IA 13. Existing intersections included in the study are summarized in Table 1 and shown in Figures 2-9. There are currently no pedestrian facilities along the corridor or at the intersections, such as sidewalks/paths, pedestrian pushbuttons, painted crosswalks, etc. The Grant Wood Trail crosses IA 13 via a culvert/underpass about midway between Linn Aire Ave and IA 100.

Figure 2: IA 13 & Rec Dr

Figure 3: IA 13 & 29th Ave/Fernow Rd

Figure 4: IA 13 & Prairie Ridge Ave

Figure 5: IA 13 & Kacena Ave

Figure 6: IA 13 & Pawnee Ave / Hennessey Pkwy

Figure 7: IA 13 & US 151 / Dubuque Rd / 10th Ave

Figure 8: IA 13 & Linn Aire Ave

Figure 9: IA 13 & IA 100 / Secrist Rd

Table 2: Existing Study Intersections

Intersection	Control	Lane Configurations
IA 13 & Rec Dr	Stop (EB)	EB: One Approach Lane NB: LT / Thru / Thru SB: Thru / Thru+RT
IA 13 & 29th Ave & Fernow Rd	TWSC (EB / WB)	EB & WB: One Approach Lane NB & SB: LT / Thru / Thru+RT
IA 13 & Prairie Ridge Ave	TWSC (EB / WB)	EB & WB: One Approach Lane NB & SB: LT / Thru / Thru+RT
IA 13 & Kacena Ave	TWSC (EB / WB)	EB & WB: One Approach Lane NB & SB: LT / Thru / Thru+RT
IA 13 & Pawnee Ave / Hennessey Pkwy	Signal	EB: One Approach Lane WB: LT / Thru+RT NB & SB: LT / Thru / Thru / RT
IA 13 & US 151	Signal	EB: LT / Thru / Thru / RT WB: LT / LT / Thru / Thru / RT NB & SB: LT / Thru / Thru / RT
IA 13 & Linn Aire Ave	Signal	EB: Thru+LT / RT WB: One Approach Lane NB: LT / Thru / Thru+RT SB: LT / Thru / Thru / RT
IA 13 & IA 100 / Secrist Rd	Signal	EB: LT / Thru+LT / RT WB: LT / Thru+RT NB: LT / LT / Thru / Thru+RT SB: LT / Thru / Thru / RT

TWSC = Two-way stop-controlled

Consultation with the city staff provided the following comments and observations of the study corridor:

- A traffic signal warrant analysis was completed for the Kacena Ave intersection in the fall of 2022 and the traffic signal warrants were satisfied.
- The school's bus facility is located south of Linn Aire Ave, east of IA 13 on 62nd St. The buses access IA 13 via Linn Aire Dr or north on 62nd St to US 151, then west to IA 13.
- Automated traffic enforcement cameras were installed at the IA 13/US 151 intersection in August 2023. The cameras will enforce red light running and the speed limit. The cameras monitor/enforce the NB, SB, and WB directions at this intersection.
- Advance "Be Prepared to Stop When Flashing" warning signs and beacons are installed on the IA 13 approaches to the intersection with IA 100.
- An advance traffic signal warning sign with flashing beacon is installed on southbound IA 13 in advance of the intersection with Hennessey Pkwy/Pawnee Ave.
- The 35th Ave/Radio Rd intersection was not counted by the city – it was decided that it wouldn't be very beneficial at this time due to the intersection being partially gravel with minimal traffic compared to the other study intersections.

- The city has received calls/complaints about east bound left turning movements during evening rush hour traffic on IA 100 taking numerous cycles to get onto IA 13.

3. EXISTING TRAFFIC DATA AND AADT HISTORY

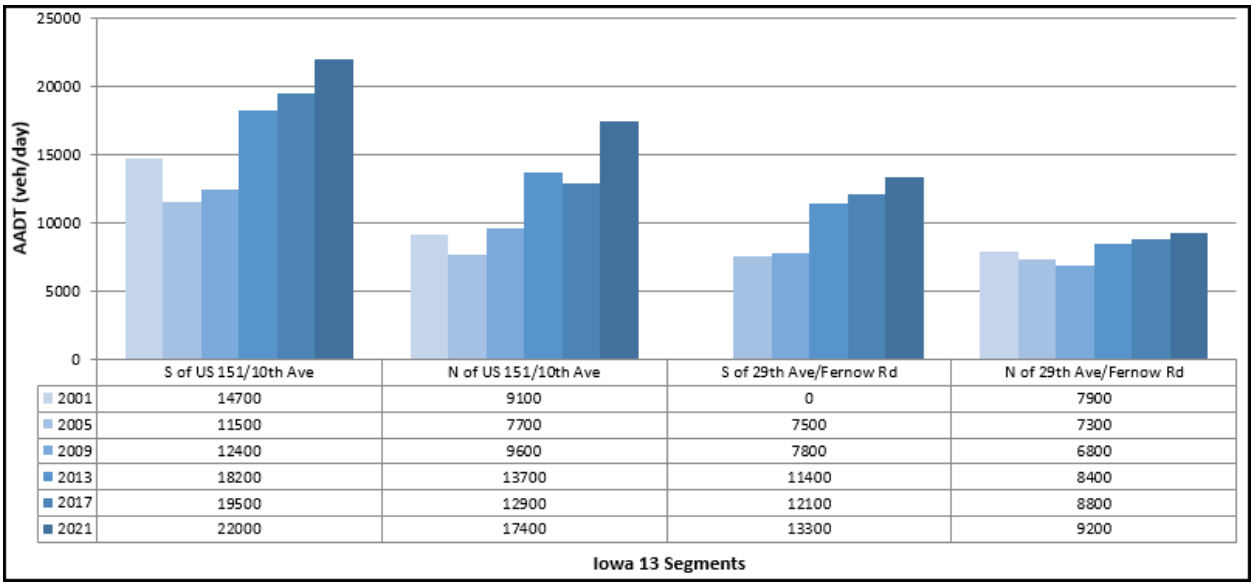
The 2021 traffic counts for IA 13, from Iowa DOT historical traffic counts, show an annual average daily traffic (AADT) of 22,000 vehicles per day (vpd) on IA 13 south of US 151, and an AADT of 17,400 vpd north of US 151.

Intersection turning movement traffic counts were collected by staff from the City of Marion at the following intersections with IA 13:

- IA 100 / Secrist Rd
- Linn Aire Ave
- 10th Ave / US 151 / Dubuque Rd
- Hennessey Pkwy / Pawnee Ave
- Kacena Ave
- Prairie Ridge Ave
- 29th Ave / Fernow Rd
- Rec Dr

There was an issue with the SB right turn traffic volumes at the IA 13 & Linn Aire Ave intersection. To account for this issue, counts were taken for the AM and PM peak hours using the Iowa DOT mounted traffic camera live feed for this location.

The intersection traffic counts are included in the Appendix. Historical traffic volumes from the Iowa DOT city traffic maps were reviewed and are shown in Figure 10.



	S of US 151/10th Ave	N of US 151/10th Ave	S of 29th Ave/Fernow Rd	N of 29th Ave/Fernow Rd
2001	14700	9100	0	7900
2005	11500	7700	7500	7300
2009	12400	9600	7800	6800
2013	18200	13700	11400	8400
2017	19500	12900	12100	8800
2021	22000	17400	13300	9200

Figure 10: Historic Traffic Volumes

4. CRASH HISTORY

The crash history from 2018 through 2022 for the IA 13 corridor and the study intersections was reviewed using reported crash data obtained from the Iowa DOT's Iowa Crash Analysis Tool (ICAT). The review included the crash severity, crash type, major causes, driver demographics, time of day distribution, and the potential for crash reduction (PCR) number from the Iowa DOT.

Table 2 summarizes all the crashes for the study corridor and study intersections. Refer to the Appendix for additional crash data and intersection collision diagrams.

Table 3: Study Intersection Crash Summary on IA 13 (2018-2022)

Intersection or Corridor	Crashes (Injurious Crashes)	Crash Severity	Predominant Crash Types (Crashes)	Predominant Major Causes (Crashes)
IA 13 Corridor (IA 100/Secrist Rd to 35th Ave/Radio Rd)	249 (75)	2 Serious 24 Minor 49 Possible 174 PDO	·Rear-end (140) ·Broadside (50) ·Non-collision (25) ·Sideswipe (20) ·Angle, oncoming left (8)	·Followed too close (90) ·Ran traffic signal (18) ·Driving too fast for conditions (18) ·FTYROW: From stop sign (15) ·FTYROW: From yield sign (13) ·Animal (9)
IA 13 & Rec Dr	1 (0)	1 PDO	·Non-collision (1)	·Animal (1)
IA 13 & 29th Ave / Fernow Rd	30 (4)	4 Minor 26 PDO	·Rear-end (18) ·Broadside (7) ·Non-collision (5)	·Followed too close (10) ·FTYROW: From yield sign (5) ·Driving too fast for conditions (4)
IA 13 & Prairie Ridge Ave	6 (1)	1 Minor 5 PDO	·Broadside (4) ·Rear-end (1) ·Sideswipe (1)	·FTYROW: From stop sign (4) ·FTYROW: From yield sign (2)
IA 13 & Kacena Ave	11 (2)	2 Possible 9 PDO	·Broadside (7) ·Rear-end (2) ·Non-collision (1) ·Sideswipe (1)	·FTYROW: From yield sign (4) ·FTYROW: From stop sign (3) ·Followed too close (1)
IA 13 & Hennessey Pkwy / Pawnee Ave*	11 (5)	3 Minor 2 Possible 6 PDO	·Broadside (5) ·Angle, oncoming left (2) ·Non-collision (1) ·Rear-end (1)	·FTYROW: From stop sign (3) ·Ran traffic signal (2) ·Driving too fast for conditions (2)
IA 13 & 10th Ave / US 151 / Dubuque Rd	65 (22)	1 Serious 6 Minor 15 Possible 43 PDO	·Rear-end (36) ·Broadside (14) ·Sideswipe (7) ·Non-collision (3) ·Angle, oncoming left (3)	·Followed too close (19) ·Ran traffic signal (9) ·Other/Unknown (15) ·Driving too fast for conditions (3) ·Interior Distraction (3)
IA 13 & Linn Aire Ave	22 (8)	1 Minor 7 Possible 14 PDO	·Rear-end (13) ·Broadside (5) ·Sideswipe (3) ·Non-collision (1)	·Followed too close (9) ·Ran traffic signal (4) ·Animal (1) ·Improper lane changing (1)
IA 13 & IA 100/Secrist Rd	31 (11)	1 Serious 4 Minor 6 Possible 20 PDO	·Rear-end (18) ·Sideswipe (4) ·Angle, oncoming left (3) ·Broadside (3) ·Non-collision (2)	·Followed too close (13) ·Operating vehicle in a reckless manner (3) ·Driving too fast for conditions (3) ·Made improper turn (2)

PDO = Property Damage Only, FTYROW = Failure to Yield Right of Way
*IA 13 & Hennessey Pkwy/Pawnee Ave was two-way stop control on Hennessey Pkwy/Pawnee Ave prior to 2020. Traffic signals were installed and operational in 2020.

The Iowa DOT uses a safety performance functions (SPF) methodology to prioritize high crash intersections in Iowa. “A safety performance function (SPF) is an equation used to predict the average number of crashes per year at a location as a function of exposure and, in some cases,

roadway or intersection characteristics. Generally, SPFs more realistically demonstrate the relationship between crashes and traffic volume."[1]

Table 3 summarizes the intersection information/rankings from the Iowa DOT "Potential for Crash Reduction (PCR) of Intersections" web page. The PCR value is a comparison between the predicted/estimated crash experience and the actual crash experience. The intersections of Grant St with the north school drive and the south school drive were not included within the Iowa DOT "Potential for Crash Reduction (PCR) of Intersections" map, so they were not included within the analysis. The PCR information is based on the 2016-2020 crash data, as compared to the crash history review which is based on 2018-2022 crash data.

Table 4: Potential for Crash Reduction (PCR) 2016-2020

Intersection	Category	PCR Level (All / Severe)	Ranking (All Crashes)	Ranking (Severe Crashes)
IA 13 & Rec Dr	Divided High Speed Partial Stop Control	Negligible / Negligible	434 out of 1,088	402 out of 1,088
IA 13 & 29th Ave/Fernow Rd	Divided High Speed Partial Stop Control	High / Medium	2 out of 1,088	65 out of 1,088
IA 13 & Prairie Ridge Ave	Divided High Speed Partial Stop Control	Negligible / Negligible	221 out of 1,088	508 out of 1,088
IA 13 & Kacena Ave	Divided High Speed Partial Stop Control	Medium / Negligible	60 out of 1,088	522 out of 1,088
IA 13 & Hennessey Pkwy / Pawnee Ave	High Speed Traffic Signal Control	Not Available	Not Available	Not Available
IA 13 & 10th Ave/ US 151/Dubuque Rd	High Speed Traffic Signal Control	High / Medium	4 out of 260	57 out of 260
IA 13 & Linn Aire Ave	High Speed Traffic Signal Control	Medium / Negligible	50 out of 260	127 out of 260
IA 13 & IA 100/Secrist Rd	High Speed Traffic Signal Control	Negligible / Medium	113 out of 260	33 out of 260

A negligible PCR level for an intersection means that the intersection is performing better than expected in comparison with other intersections of the same category within the state. A Medium PCR level means that the intersection has room for improvement. High PCR level intersections are considered to be performing worse than other intersections of the same category, indicating significant potential for safety improvement. Additional details on the two "High" PCR level intersections are provided in the following paragraphs.

At the US 151/Dubuque Rd intersection, the PCR level is "High" for all crashes indicating the safety performance is worse than expected when compared to similar intersections across the state in the category of "High Speed Traffic Signal Control". This intersection ranks in the bottom 1.5% for all crashes within this category, or 98.5% of this type of intersection has a better safety performance. There have been 22 injurious crashes reported in 2018-2022. The most predominant

[1] Iowa DOT. Potential for Crash Reduction (PCR) of Intersections Study. Online available at: https://iowadot.maps.arcgis.com/apps/MapSeries/index.html?appid=6920b9b36fa54caa90c25bd6dcdd0c7e

crash type at this location is rear-end, occurring 36 times between 2018-2022. The crashes are predominantly caused by following too close and running a red light at the traffic signal.

At the 29th Ave/Fernow Rd intersection, the PCR level is also "High" for all crashes, indicating the safety performance is worse than expected when compared to similar intersections across the state in the category of "Divided High Speed Partial Stop Control". This intersection ranks in the bottom 0.2% for all crashes within this category, or 99.8% of this type of intersection has a better safety performance. There were 30 crashes reported from 2018-2022 with four involving possible minor injuries and 26 property damage only. Most crashes (18) were rear-end crashes on eastbound Fernow Rd. Ten crashes were caused by following too close, with another five being caused by failing to yield the right of way at a yield sign.

5. TURN LANE WARRANT ANALYSIS

The potential need for northbound and southbound right-turn lanes on IA 13 at the unsignalized study intersections were evaluated. *NCHRP Report 457, Evaluating Intersection Improvements: An Engineering Study Guide*, was used to evaluate the need for right-turn lanes at the four stop-controlled study intersections based on existing traffic volumes and estimated 2045 traffic volumes. Traffic volumes for 2045 were estimated using a growth factor of 1.3% per year along IA 13 and US 151 and 0.5% per year for side streets applied to the 2023 intersection traffic volumes to estimate the design year 2045 volumes. The estimated growth rate is based on historic count data and 2045 traffic projections provided by the Corridor MPO.

The construction of a right-turn lane on the major road of a two-way stop controlled intersection can significantly improve the traffic operations and safety at the intersection. The NCHRP right-turn lane evaluation is based on guidelines developed to evaluate the operating and crash costs related to the right-turn maneuver relative to the cost of constructing the turn lane.

NCHRP Report 457 right-turn lane criteria is met at the Prairie Ridge Ave and Kacena Ave intersections in the NB direction using 2023 PM and the Design Year 2045 PM traffic volumes. The 29th Ave/Fernow Rd intersection also satisfies the criteria for a SB right-turn lane using the 2023 AM and the Design Year 2045 AM and PM estimated traffic volumes.

Left-turn lanes already exist in both NB and SB directions at all four stop-controlled study intersections. There are also existing left-turn lanes in the NB and SB directions at the four signalized study intersections. There are dual left turn lanes at the IA 100/Secrist Rd intersection in the EB and NB direction and at the US 151 intersection in the WB direction. Due to the existing NB/SB left turn lanes on IA 13 at the stop-controlled intersections, review of the NCHRP Report 745 criteria for left-turn lanes is not necessary. Approaches without left-turn lanes will be analyzed in the traffic operations analysis and the need for left-turn lanes will be based on the traffic operations results.

Table 4 provides a summary of the right-turn lane analysis for the four two-way stop-controlled study intersections. The turn lane warrant worksheets are provided in the Appendix.

Table 5: Right Turn Lane Criteria Analysis Summary

		Meets Criteria?	
Intersection	**Direction**	**Existing 2023 Traffic (AM / PM)**	**DY 2045 Traffic (AM / PM)**
IA 13 & Rec Dr	NB	-----	-----
	SB	No / No	No / No
IA 13 & 29th Ave / Fernow Rd	NB	No / No	No / No
	SB	**Yes** / No	**Yes / Yes**
IA 13 & Prairie Ridge Ave	NB	No / **Yes**	No / **Yes**
	SB	No / No	No / No
IA 13 & Kacena Ave	NB	No / **Yes**	No / **Yes**
	SB	No / No	No / No

NCHRP Report 457 also provides guidance on the need for turn lanes at intersections with traffic signal control. The following are excerpts from Report 457.

- A minimum of two lanes should be considered for the minor-road approaches to an arterial street or highway. These turn lanes may serve any combination of through or turn movements. This practice will minimize the effect of a new signal on the major-road operations.
- The following criteria can be used to estimate the number of lanes needed for left-turn movement:
    - Provide one or more exclusive lanes, if a left-turn phase is provided.
    - Provide one exclusive lane, if left-turn volumes are between 100 veh/hr and 300 veh/hr.
    - Provide two exclusive lanes, if left-turn volumes are greater than 300 veh/hr.
    - This criterion is most appropriate when the opposing and adjacent through movements have flow rates of 450 veh/hr or more. Exclusive turn lanes may not be needed for lower flow rates.
- An exclusive right-turn lane should be considered when the right-turn volume exceeds 300 veh/hr and the adjacent through lane volume exceeds 300 veh/hr/lane.

For intersections with traffic signal control, a minimum of two lanes is recommended for each approach. At the existing stop-controlled intersections all EB and WB approaches should be reconstructed to provide a minimum of two lanes when traffic signals are installed.

6. SIGNAL WARRANT ANALYSIS

The warrant analysis for the current stop-controlled intersections was conducted according to Manual on Uniform Traffic Control Devices (MUTCD), 2009 Edition, criteria. The following MUTCD warrants were evaluated: Warrant 1 (8-hour volumes), Warrant 2 (4-hour volumes), Warrant 3 (Peak Hour volumes), Warrant 7 (Crash Experience).

The minor street right turn volumes were reduced using a process developed by the Ohio DOT (and accepted by Iowa DOT) which considers lane configuration on the approach, the proportion of right turns to other traffic on the approach, and the conflicting through volumes on the major

street. The lane configuration and proportion of right turns determine the right-turn base reduction factor. This reduction factor is reduced (i.e. does not reduce right turns as much) by subtracting the percentage corresponding to the conflicting through volume on the major street. Traffic signal warrant analysis using the 2023 traffic counts and the 2044 design year estimated traffic counts was conducted for the intersection. For the design year (2044) Warrant 3 (Peak Hour volumes) was evaluated using the estimated peak hour volumes. Traffic signal warrant analysis worksheets are included in the appendix.

The warrant analysis results indicate the existing 2023 traffic volumes meet the traffic signal warrants for two of the four unsignalized intersections: IA 13 & Fernow Rd / 29th Ave and IA 13 & Kacena Ave. At Fernow Rd, Warrant 1, Warrant 2, and Warrant 3 are all met. At Kacena Ave, Warrants 2 and 3 are met but not Warrant 1. The other two unsignalized study intersections did not meet signal warrants with existing traffic volumes.

For the Design Year (2044) scenario, the estimated peak hour volumes for the IA 13 & Prairie Ridge Ave intersection satisfy Warrant 3 (Peak Hour). Signal warrant analysis results are summarized in Table 5.

Table 6: Signal Warrant Analysis Results

Intersection	Existing (2023) Traffic – Yes/No	Warrants Met	Design Year (2045) Traffic – Yes/No	Warrants Met
IA 13 & Rec Dr	**No**	---	**No**	---
IA 13 & 29th Ave/Fernow Rd	**Yes**	Warrants 1, 2 & 3	**Yes**	Warrant 3
IA 13 & Prairie Ridge Ave	**No**	---	**Yes**	Warrant 3
IA 13 & Kacena Ave	**Yes**	Warrants 2 & 3	**Yes**	Warrant 3

The intersection traffic operations for the three study intersections meeting signal warrants will be analyzed under existing conditions with two-way stop control and with signalized traffic control. The results of the traffic operations analysis will be discussed in section 7.

7. CAPACITY ANALYSIS

Intersection capacity analysis was completed following the methods outlined in the Highway Capacity Manual, 6th Edition (HCM), incorporated into the traffic analysis software Synchro 11. Intersection delay is a function of traffic factors such as traffic volume, turning vehicles, vehicle types and arrival patterns as well as geometric factors such as number of lanes and type of traffic control. Intersection operations are categorized by equating ranges of average vehicular delay in seconds per vehicle (sec/veh) to level of service (LOS) criteria.

LOS A is considered the most desirable level, with the least delay, while LOS F experiences the most delay. LOS C is often considered the acceptable goal for intersection delay, while urban side street approaches often experience LOS D or E due to two-way stop operation or signal priority to the mainline approaches, and LOS F is operating over capacity. Table 6 below shows LOS criteria as defined by the HCM for both signalized and unsignalized intersections.

Table 7: Level of Services (LOS) Definition

LOS	Average Delay per Vehicle (seconds)	
	Signalized Intersection	Unsignalized Intersection
A	< 10	< 10
B	10 to 20	10 to 15
C	20 to 35	15 to 25
D	35 to 55	25 to 35
E	55 to 80	35 to 50
F	> 80 or V/C > 1.0	> 50 or V/C > 1.0

V/C = Volume to Capacity Ratio

Capacity analysis was completed for future year 2045 conditions with estimated traffic for both existing roadway geometry and proposed roadway geometry with additional turn lanes and any intersection control alterations. The estimated 2045 traffic volumes were determined as described in Section 5.

Two scenarios were analyzed:

- Existing Geometry (2023)
- Proposed Geometry:
  - 29th Ave/Fernow Rd Intersection:
    - Signalize intersection
    - Add SB right turn lane (160')
    - Add EB right turn lane (100')
  - Prairie Ridge Ave Intersection:
    - Signalize intersection
    - Add NB right turn lane (100')
    - Add EB right turn lane (100')
  - Kacena Ave Intersection:
    - Signalize intersection
    - Add NB right turn lane (100')
    - Add EB right turn lane (100')
  - Linn Aire Ave Intersection:
    - Extend EB right turn lane (140')
    - Add WB left turn lane (150') – protected permissive phasing
    - Add NB right turn lane (150')
    - Convert existing NB thru/right turn lane to thru only lane
  - IA 100 / Secrist Rd Intersection:
    - Convert EB thru/left turn lane to left only – protected only left turn phasing
    - Convert EB right turn lane to thru only
    - Add EB right turn lane (300') – permissive overlap phasing for all dedicated right turn lanes

Results of AM and PM peak hour capacity analyses for the study scenarios (existing geometry with estimated future traffic, proposed geometry with estimated future traffic) are summarized in Tables 7 and 8. The associated capacity analysis reports are included in the Appendix.

Table 8: Existing Geometry Capacity Analysis

Scenario	Roadway Geometry	Intersection	Control / Movement	AM Peak		PM Peak	
				Delay (sec)	LOS	Delay (sec)	LOS
Existing (2023)	Existing Geometry	IA 13 & Rec Dr *(EB Stop Control)*	EB Stop	11	B	13	B
			NB Left	9	A	8	A
		IA 13 & 29th Ave / Fernow Rd *(EB/WB TWSC)*	EB Stop	39	E	30	D
			WB Stop	40	E	48	E
			NB Left	10	A	9	A
			SB Left	8	A	0	A
		IA 13 & Prairie Ridge Ave *(EB/WB TWSC)*	EB Stop	18	C	28	D
			WB Stop	50	E	53	F
			NB Left	9	A	9	A
			SB Left	9	A	10	A
		IA 13 & Kacena Ave *(EB/WB TWSC)*	EB Stop	40	E	53	F
			WB Stop	45	E	53	F
			NB Left	10	A	9	A
			SB Left	8	A	10	A
		IA 13 & Pawnee Ave / Hennessey Pkwy *(Signal)*	EB	17	B	19	B
			WB	17	B	16	B
			NB	10	A	16	B
			SB	13	B	16	B
			Overall	**13**	**B**	**16**	**B**
		IA 13 & US 151 / Dubuque Rd *(Signal)*	EB	21	C	35	D
			WB	37	D	29	C
			NB	11	B	16	B
			SB	17	B	17	B
			Overall	**23**	**C**	**23**	**C**
		IA 13 & Linn Aire Ave *(Signal)*	EB	26	C	17	B
			WB	71	E	47	D
			NB	13	B	15	B
			SB	22	C	17	B
			Overall	**23**	**C**	**18**	**B**
		IA 13 & IA 100 / Secrist Rd *(Signal)*	EB	32	C	45	D
			WB	55	D	62	E
			NB	28	C	35	D
			SB	25	C	30	C
			Overall	**29**	**C**	**36**	**D**

Scenario	Roadway Geometry	Intersection	Control / Movement	AM Peak		PM Peak	
				Delay (sec)	LOS	Delay (sec)	LOS
Design Year (2045)	Existing Geometry	IA 13 & Rec Dr *(EB Stop Control)*	EB Stop	12	B	17	C
			NB Left	10	A	9	A
		IA 13 & 29th Ave / Fernow Rd *(EB/WB TWSC)*	EB Stop	100+	F	100+	F
			WB Stop	93	F	100+	F
			NB Left	11	B	10	B
			SB Left	8	A	0	A
		IA 13 & Prairie Ridge Ave *(EB/WB TWSC)*	EB Stop	29	D	67	F
			WB Stop	100+	F	100+	F
			NB Left	11	B	10	A
			SB Left	9	A	11	B
		IA 13 & Kacena Ave *(EB/WB TWSC)*	EB Stop	100+	F	100+	F
			WB Stop	100+	F	100+	F
			NB Left	11	B	10	A
			SB Left	9	A	12	B
		IA 13 & Pawnee Ave / Hennessey Pkwy *(Signal)*	EB	24	C	26	C
			WB	27	C	24	C
			NB	13	B	18	B
			SB	12	B	18	B
			Overall	**14**	**B**	**19**	**B**
		IA 13 & US 151 / Dubuque Rd *(Signal)*	EB	25	C	40	D
			WB	31	C	37	D
			NB	14	B	24	C
			SB	25	C	24	C
			Overall	**24**	**C**	**30**	**C**
		IA 13 & Linn Aire Ave *(Signal)*	EB	36	D	34	C
			WB	100+	F	100+	F
			NB	26	C	30	C
			SB	70	E	23	C
			Overall	**58**	**E**	**32**	**C**
		IA 13 & IA 100 / Secrist Rd *(Signal)*	EB	74	E	66	E
			WB	100+	F	93	F
			NB	42	D	45	D
			SB	43	D	39	D
			Overall	**51**	**D**	**48**	**D**

Table 9: Proposed Intersection Geometry Capacity Analysis

Scenario	Roadway Geometry	Intersection	Control / Movement	AM Peak Delay (sec)	AM Peak LOS	PM Peak Delay (sec)	PM Peak LOS
Existing (2023)	Proposed Improvements	IA 13 & Rec Dr *(EB Stop Control)*	EB Stop	11	B	13	B
			NB Left	9	A	8	A
		IA 13 & 29th Ave / Fernow Rd *(Signal)*	EB	9	A	9	A
			WB	15	B	14	B
			NB	15	B	13	B
			SB	16	B	14	B
			Overall	**14**	**B**	**12**	**B**
		IA 13 & Prairie Ridge Ave *(Signal)*	EB	4	A	7	A
			WB	12	B	12	B
			NB	7	A	7	A
			SB	9	A	6	A
			Overall	**9**	**A**	**7**	**A**
		IA 13 & Kacena Ave *(Signal)*	EB	8	A	10	A
			WB	13	B	12	B
			NB	6	A	6	A
			SB	6	A	6	A
			Overall	**7**	**A**	**7**	**A**
		IA 13 & Pawnee Ave / Hennessey Pkwy *(Signal)*	EB	17	B	19	B
			WB	17	B	16	B
			NB	10	A	16	B
			SB	13	B	16	B
			Overall	**13**	**B**	**16**	**B**
		IA 13 & US 151 / Dubuque Rd *(Signal)*	EB	21	C	35	D
			WB	37	D	29	C
			NB	11	B	16	B
			SB	17	B	17	B
			Overall	**23**	**C**	**23**	**C**
		IA 13 & Linn Aire Ave *(Signal)*	EB	39	D	22	C
			WB	61	E	30	C
			NB	16	B	17	B
			SB	30	C	18	B
			Overall	**29**	**C**	**19**	**B**
		IA 13 & IA 100 / Secrist Rd *(Signal)*	EB	23	C	31	C
			WB	54	D	60	E
			NB	29	C	34	C
			SB	26	C	29	C
			Overall	**28**	**C**	**32**	**C**

Scenario	Roadway Geometry	Intersection	Control / Movement	AM Peak Delay (sec)	AM Peak LOS	PM Peak Delay (sec)	PM Peak LOS
Design Year (2045)	Proposed Improvements	IA 13 & Rec Dr (EB Stop Control)	EB Stop	12	B	17	C
			NB Left	10	A	9	A
		IA 13 & 29th Ave / Fernow Rd *(Signal)*	EB	11	B	10	B
			WB	16	B	18	B
			NB	17	B	11	B
			SB	18	B	17	B
			Overall	**16**	**B**	**13**	**B**
		IA 13 & Prairie Ridge Ave *(Signal)*	EB	4	A	8	A
			WB	14	B	14	B
			NB	8	A	8	A
			SB	10	A	6	A
			Overall	**9**	**A**	**7**	**A**
		IA 13 & Kacena Ave *(Signal)*	EB	11	B	13	B
			WB	17	B	15	B
			NB	6	A	7	A
			SB	8	A	8	A
			Overall	**8**	**A**	**8**	**A**
		IA 13 & Pawnee Ave / Hennessey Pkwy *(Signal)*	EB	24	C	26	C
			WB	27	C	24	C
			NB	13	B	18	B
			SB	12	B	18	B
			Overall	**14**	**B**	**19**	**B**
		IA 13 & US 151 / Dubuque Rd *(Signal)*	EB	25	C	4	D
			WB	31	C	37	D
			NB	14	B	24	C
			SB	28	C	24	C
			Overall	**24**	**C**	**30**	**C**
		IA 13 & Linn Aire Ave *(Signal)*	EB	100+	F	36	D
			WB	100+	F	59	E
			NB	21	C	23	C
			SB	64	E	22	C
			Overall	**57**	**E**	**26**	**C**
		IA 13 & IA 100 / Secrist Rd *(Signal)*	EB	61	E	47	D
			WB	97	F	76	E
			NB	42	D	40	D
			SB	40	D	35	C
			Overall	**47**	**D**	**40**	**D**

The capacity analysis with existing geometry 2023 shows a poor LOS during the AM peak at the 29th Ave/Fernow Rd (EB & WB), Prairie Ridge Ave (WB), and Kacena Ave (EB & WB) stop-controlled intersections. The same intersections and approaches show a poor LOS during the PM peak, with the EB approach at 29th Ave/Fernow Rd having an acceptable LOS. For the signalized intersections, all show an acceptable overall LOS. There are two intersections (IA 13 with Linn Aire Ave and IA 100/Secrist Rd) that have one approach with a LOS E designation in only one of the peak hours. When looking at the Design Year 2045 proposed traffic, there are poor levels of service at the same intersections, with some additional approaches showing concern. The existing geometry capacity results for the IA 13 intersections with Pawnee Ave/Hennessey Pkwy and US 151/Dubuque Rd indicate LOS C or better for both intersections, for both 2023 and 2045 traffic.

The capacity analysis with the proposed geometry and traffic control improvements (additional turn lanes and signalization) at the study intersections show satisfactory levels of delay at all of the proposed signalized intersections (29th Ave/Fernow Rd, Prairie Ridge Ave, and Kacena Ave) for the 2023 and 2045 traffic levels, a noticeable decrease in delay at all locations in all directions. However, there are still failing levels of service at two intersections in the design year: IA 13 & Linn Aire Ave and IA 13 & IA 100/Secrist Ave. With the proposed improvements applied at Linn Aire Ave, there are still failing levels of service in the EB and WB directions. The failing LOS in the EB direction is new as opposed to the traffic operations with the existing geometry, this is likely due to significant increases in the thru volumes on IA 13 and the EB thru volume. At this intersection, it may be difficult to achieve acceptable levels of service and delay for minor street movements during the peak hours due to the nature (minor intersection) and location of the intersection and the high traffic volumes on IA 13. With the proposed improvements applied at IA 100/Secrist Rd, there is significant delay in the EB and WB directions in the design year. However, there is still improvement in delay in all directions and to the intersection overall.

8. ALTERNATIVE INTERSECTION CONCEPT REVIEW

The three existing two-way stop control intersections (29th Ave/Fernow Rd, Prairie Ridge Ave, and Kacena Ave) were reviewed for possible redesign as roundabout intersections. First, vehicular movements were analyzed within the potential roundabouts to determine the number of lanes required for each approach. All three intersections' Peak Hour Traffic Roundabout Vehicular Movements planning sheets are included in the appendix.

With the introduction of roundabouts at the three study intersections, the minor approaches could remain single lane approaches. The IA 13 approaches could utilize either dual or single lanes for traversing the roundabout. Since existing IA 13 has two thru lanes, a two-lane approach was reviewed for IA 13, with the left lane being thru/left and the right lane being thru/right. Intersection capacity analysis was also completed for the roundabout intersection design. The associated roundabout capacity analysis results are shown in Table 9 and the full reports are included in the appendix. There may be some inconsistencies in between delay and LOS that are due to rounding of the delay values. All LOS designations are correct as determined by the LOS category definition.

The overall intersection LOS is LOS A at all three intersections, for the existing year and design year. In the design year AM peak hour the EB movements at the 29th Ave/Fernow Rd and Kacena Ave intersections are at LOS B.

Table 10: Roundabout Geometry Capacity Analysis

Scenario	Roadway Geometry	Intersection	Control / Movement	AM Peak		PM Peak	
				Delay (sec)	LOS	Delay (sec)	LOS
Existing (2023)	Proposed Improvements	IA 13 & 29th Ave / Fernow Rd *(Roundabout)*	EB	10	A	7	A
			WB	4	A	6	A
			NB	5	A	6	A
			SB	7	A	6	A
			Overall	**7**	**A**	**6**	**A**
		IA 13 & Prairie Ridge Ave *(Roundabout)*	EB	7	A	5	A
			WB	6	A	7	A
			NB	5	A	6	A
			SB	7	A	6	A
			Overall	**6**	**A**	**6**	**A**
		IA 13 & Kacena Ave *(Roundabout)*	EB	8	A	6	A
			WB	5	A	6	A
			NB	5	A	6	A
			SB	7	A	5	A
			Overall	**6**	**A**	**6**	**A**
Scenario	Roadway Geometry	Intersection	Control / Movement	AM Peak		PM Peak	
				Delay (sec)	LOS	Delay (sec)	LOS
Design Year (2045)	Proposed Improvements	IA 13 & 29th Ave / Fernow Rd (Roundabout)	EB	15	B	9	A
			WB	5	A	7	A
			NB	5	A	7	A
			SB	8	A	7	A
			Overall	**9**	**A**	**7**	**A**
		IA 13 & Prairie Ridge Ave (Roundabout)	EB	9	A	7	A
			WB	8	A	9	A
			NB	5	A	8	A
			SB	8	A	7	A
			Overall	**7**	**A**	**7**	**A**
		IA 13 & Kacena Ave (Roundabout)	EB	10	B	7	A
			WB	5	A	9	A
			NB	5	A	9	A
			SB	8	A	6	A
			Overall	**7**	**A**	**8**	**A**

A second alternative design for the three unsignalized intersections would include restricting the Prairie Ridge Ave intersection to a right-in/right-out (RI/RO) intersection. The restricted left turns and the east/west through movements will be redistributed to the adjacent intersections, 29th Ave/Fernow Rd and Kacena Ave, which will be signalized, or reconstructed as roundabouts. The necessary roadway connections from Prairie Ridge Ave to the adjacent intersections are either already in place or will need to be constructed with future development adjacent to IA 13. The benefits of restricting Prairie Ridge Rd to RI/RO include a reduction in the number of possible conflict points at the intersection and improved traffic operations and safety within the corridor.

Restricting the Prairie Ridge Ave intersection to RI/RO movements is typical practice and in line with the Iowa DOT access management practice. The restriction of the Prairie Ridge Ave intersection could be accomplished in steps. When traffic signals are installed, or the intersections are reconstructed as roundabouts at the 29th Ave/Fernow Rd and Kacena Ave intersections, the Prairie Ridge Rd intersection could remain as a full intersection as existing. Drivers on Prairie

Ridge Rd would have the option to access IA 13 via one of the adjacent intersections. If operational and safety concerns develop as traffic volumes on Prairie Ridge Rd increase, turn restrictions can be put in place at that time. Depending on the type of concerns that develop, the east/west through movements and left turns can be restricted allowing the north/south left turns, or implementing the full restrictions making the intersection a RI/RO intersection could be put into place.

Intersection capacity analysis was completed for the RI/RO scenario for Prairie Ridge Rd intersection design and traffic signal control at 29th Ave/Fernow Rd and at Kacena Ave. The traffic volumes for restricted movements at Prairie Ridge Rd were redistributed to the 29th Ave/Fernow Rd and Kacena Ave intersections for the analysis. The associated capacity analysis results are shown in Table 10 and the full reports are included in the appendix.

Table 11: Capacity Analysis for RI/RO at Prairie Ridge Ave

Scenario	Roadway Geometry	Intersection	Control / Movement	AM Peak		PM Peak	
				Delay (sec)	LOS	Delay (sec)	LOS
Existing (2023)	Proposed Improvements	IA 13 & 29th Ave / Fernow Rd *(Signal)*	EB	9	A	9	A
			WB	15	B	14	B
			NB	15	B	14	B
			SB	16	B	15	B
			Overall	**14**	**B**	**13**	**B**
		IA 13 & Prairie Ridge Ave *(TWSC - Restricted RIRO Median)*	EB	11	B	10	B
			WB	10	B	11	B
			NB	0	-	0	-
			SB	0	-	0	-
		IA 13 & Kacena Ave *(Signal)*	EB	7	A	11	B
			WB	18	B	14	B
			NB	9	A	7	A
			SB	12	B	8	A
			Overall	**11**	**B**	**8**	**A**

Scenario	Roadway Geometry	Intersection	Control / Movement	AM Peak		PM Peak	
				Delay (sec)	LOS	Delay (sec)	LOS
Design Year (2045)	Proposed Improvements	IA 13 & 29th Ave / Fernow Rd *(Signal)*	EB	11	B	11	B
			WB	16	B	18	B
			NB	17	B	13	B
			SB	19	B	18	B
			Overall	**16**	**B**	**14**	**B**
		IA 13 & Prairie Ridge Ave *(TWSC - Restricted RIRO Median)*	EB	13	B	11	B
			WB	11	B	13	B
			NB	0	-	0	-
			SB	0	-	0	-
		IA 13 & Kacena Ave *(Signal)*	EB	9	A	13	B
			WB	22	C	17	B
			NB	9	A	8	A
			SB	13	B	9	A
			Overall	**12**	**B**	**9**	**A**

The overall intersection LOS for the two intersections, 29th Ave/Fernow Rd and Kacena Ave, are LOS B at both intersections, for the existing year and design year with the exception of Kacena Ave in the design year PM peak where the results are LOS A. The LOS for the Prairie Ridge Rd

intersection is LOS B for both the existing and design years. The results are similar to the results without the restricted median at Prairie Ridge Ave.

9. ACCESS MANAGEMENT

Access along IA 13 is currently well managed and not an issue. Intersections are well spaced except for the intersections near the IA 13 and US 151/Dubuque Rd/10th Ave intersection (west and north of the intersection). Ideally, intersection spacing would be every ¼ mile with traffic signals allowed every ½ mile. Any future intersections and traffic signal installation should follow this practice.

Removal of the traffic signal at Pawnee Ave/Hennessey Parkway and restrictions of side street movements, either a ¾ access (left turns from IA 13 allowed, lefts/thru movements from the side street restricted) or full median closure could be reviewed/considered. The removal of the traffic signal and median restrictions would improve the traffic signal spacing in the corridor, allowing for better traffic operations and safety. Alternative access is available to US 151/Dubuque Rd/10th Ave if the traffic signal is removed and median restrictions implemented.

On the intersecting side streets, the first access away from the intersection should be located outside of the functional area of the intersection as described in the Iowa DOT Access Management Manual[2], section 2.13, Access Near Highway Intersections. The intersection functional area is shown in Figure 11, which was taken from the Access Management Manual. Access control should extend for 150 feet from the near edge of IA 13 as a minimum.

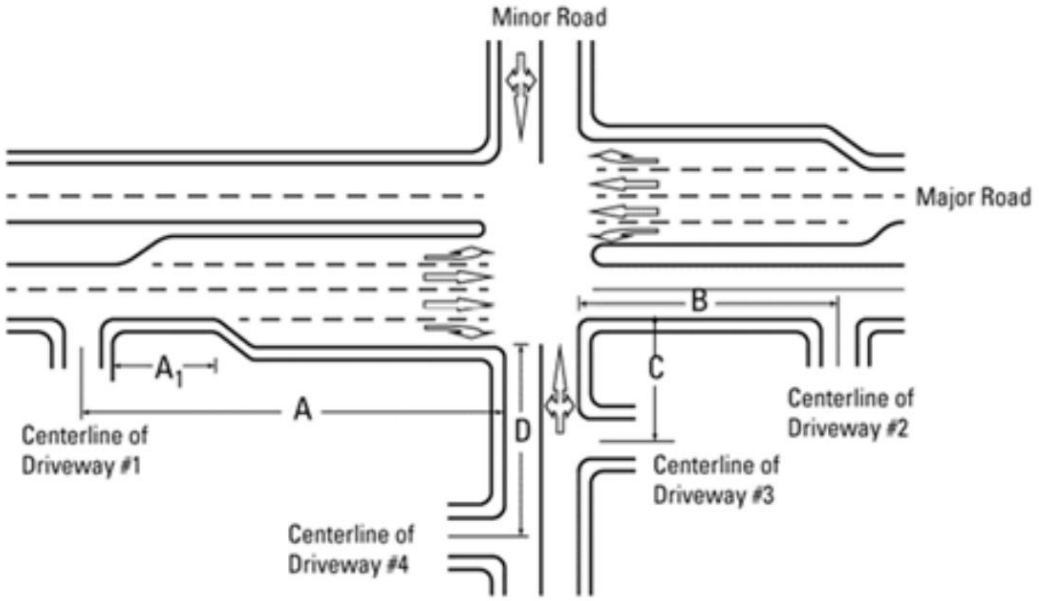


Figure 11: Functional Area of an Intersection

[2] Iowa *DOT Access Management Manual, First Edition*, 8/18/2023, https://iowadot.gov/traffic/pdfs/MM1359-Access-Management-Manual.pdf

There are three intersections where the first access is located within the functional area of the intersection.

- Kacena Ave – the frontage road intersection to the east is located approximately 130' from IA 13. Currently, this intersection does not impact the operations of the IA 13 intersection. However, if the IA 13/Kacena Ave intersection becomes signalized it may have an impact. At that time, it may be necessary to increase the offset to the frontage road intersection. If the parcel in the SE corner of the intersection is developed, the frontage road intersection and access to the parcel should be relocated further from the IA 13 intersection.
- At the IA 13 intersection with Pawnee Ave/Hennessey Pkwy, there is a frontage road connection in the NE corner of the intersection which is approximately 65' from the IA 13 intersection. The frontage road is a low volume road and may not be an operational issue. Oredian on Hennessey Pkwy may need to be constructed restricting the access to right-in / right-out access (RI/RO) preventing potential backing onto the IA 13. Or, future relocation of the frontage road to align with Carlson Way would also remove the access from the functional area of the intersection. The accesses located on the west side of IA 13 are close to the minimum distance of 150'. If operational or safety issues occur at these access locations, they could be closed, or restricted to RI/RO, as both businesses have acceptable access from Red Fox Way.
- Linn Aire Ave – there are access drives located within 130' on both sides of IA 13. The access on the east side is a driveway to an outdoor storage lot which is low volume, but similar to the frontage road access on Hennessey Pkwy, it may need to be restricted to a RI/RO access by constructing a raised median, or possibly relocated. On the west side the access is a driveway to Hupp Electric Motors. This access is also low volume and the peak hour for entering traffic is likely earlier than the peak hour for the connecting roadway to Walmart to the north. However, if operational or safety issues occur, alternative access options will need to be considered.

10. CONCLUSIONS AND RECOMMENDATIONS

- Intersection recommendations -
  - IA 13 & Rec Dr:
    - No changes are recommended for this intersection.

  - IA 13 & 29th Ave/Fernow Rd:
    - Signalize intersection – Signal warrant analysis, existing traffic volumes met warrants 1, 2 & 3.
    - Construct EB right and left-turn lanes and WB left-turn lanes (100' each) if traffic signals are installed.
    - Construct SB right-turn lane (100') – *NCHRP Report 457* with two-way stop or traffic signal control.
    - A multi-lane roundabout could be considered as an alternative intersection to traffic signal control. No additional turn lanes would be required for the side streets and no turn lanes would be needed for IA 13.

- IA 13 & Prairie Ridge Ave:
  - No changes in traffic control, remain two-way stop control. Consider restricting turning movements as traffic volumes increase. Provide alternative access to IA 13 via adjacent intersections.
  - Construct NB right-turn lane (100') – *NCHRP Report 457* with two-way stop or traffic signal control.

- IA 13 & Kacena Ave:
  - Signalize intersection – Signal warrant analysis, existing traffic volumes met warrants 2 & 3.
  - Construct EB right and left-turn lanes and WB left-turn lane (with signalization, 100' each) if traffic signals are installed..
  - Construct NB right-turn lane (100') – *NCHRP Report 457* with two-way stop or traffic signal control.
  - A multi-lane roundabout could be considered as an alternative intersection to traffic signal control. No additional turn lanes would be required for the side streets and no turn lanes would be needed for IA 13.

- IA 13 & Hennessey/Pawnee Ave:
  - No changes are recommended for this intersection.
  - As EB traffic volumes increase, left turns and right turns on the EB approach should be reconstructed to include a right-thru lane and a left-turn lane. The additional lane will allow for flexibility in traffic signal phasing for the east/west traffic and improve traffic operations at the intersection.
  - Further review/study of the removal of the traffic signals and restricted median.

- IA 13 & US 151/Dubuque Rd
  - No changes are recommended for this intersection.

- IA 13 & Linn Aire Ave:
  - Extend EB right-turn lane to approximately 150' in length.
  - Construct WB left-turn lane (100').
  - Convert NB right/thru-lane to thru only.
  - Construct NB right-turn lane (150').

- IA 13 & IA 100/Secrist Rd:
  - Convert EB thru/left-turn lane to left turn only.
  - Convert EB right-turn lane to thru only.
  - Construct EB right-turn lane (300').
  - Extend WB left-turn lane (125').

- Consider offset right- and left-turn lanes on IA13 to improve visibility of approaching traffic and reducing the potential shadowing of vehicles in the thru lanes next to the right-turn lanes.

Table 12: Turn Lane Length Summary (in feet)

Intersection	Lane	Existing	Recommended
IA 13 & 29th Ave / Fernow Rd	EB Right	-	100
	WB Left	-	100
	SB Right	-	100
IA 13 & Prairie Ridge Ave	EB Right	-	100
	WB Left	-	100
	NB Right	-	100
IA 13 & Kacena Ave	EB Right	-	100
	WB Left	-	100
	NB Right	-	100
IA 13 & Linn Aire Ave	EB Right	60	150
	WB Left	-	100
	NB Right	-	150
IA 13 & IA 100 / Secrist Rd	WB Left	80	125
	EB Right	230	300

- A potential alternative to improve the operations at IA 13 & IA 100/Secrist Rd would be to improve Secrist Rd east of the intersection to the intersection with Hindman Rd. Then, pave Hindman Rd from IA 100 to US 151. This route could serve as an alternative for EB traffic on IA 100 that continues east on US 151. Eastbound traffic could avoid the IA 13/US 151 intersection by using this alternative route. This may reduce the EB left-turn volume at IA 100/IA 13 and the NB right-turn volume at IA 13/US 151. Further origin-destination traffic study would need to be completed to determine the extent of traffic that would be redirected to the new route. The traffic volumes available for this study did not provide this linkage.

- At three of the four intersections with traffic signals a high percentage of the reported crashes are rear-end crashes. This is somewhat typical of signalized intersections to have a larger number of rear-end crashes, however, the percentage of rear-end crashes at these three intersections appears to be higher than normal –

  - IA 13 & US 151/Dubuque Rd/10th Ave – 36 out of 65 crashes were rear-end (55%).
  - IA 13 & Linn Aire Ave – 13 out of 22 crashes were rear-end (59%).
  - IA 13 & IA 100/Secrist Rd – 18 out of 31 crashes were rear-end (58%).

  A review of the traffic signal change and clearance intervals should be conducted to verify they are consistent with the ITE Traffic Control Devices Handbook, 2nd Edition, using the NCHRP Report *Guidelines for Timing Yellow and All-Red Intervals at Signalized Intersections* method in the handbook. The recent installation of the automated traffic enforcement cameras at the US 151/Dubuque Rd/10th Ave intersection may result in fewer crashes at that intersection.

  Additionally, improvements in the corridor traffic signal timings can help improve traffic flow/progression and improved safety as a result of fewer stops and less delay. Besides the

traditional method of updated signal timings based on recent traffic counts, there is new technology to assist with the timing of traffic signals. One method is the use of automated traffic signal performance measures which are available in the newer traffic signal controllers. The performance measures are monitored to identify issues in traffic operations and adjustments are made to the traffic signal timings to improve the operations. Adaptive traffic signal control technology is also available which monitors traffic volumes and automatically adjusts the traffic signal timings to accommodate changes in the traffic volumes. The adaptive traffic signal technologies are more beneficial in corridors where large, unexpected changes in volumes occur.

- Install yellow retroreflective strips on the traffic signal backplates to enhance the traffic signal visibility and improve driver awareness of the traffic signals.

- The speed limits in the corridor should be reviewed/evaluated when changes are made to the roadway environment, increased development adjacent to the corridor, or after significant changes in traffic volumes. With the increasing traffic volumes within the corridor and the recent installation of the traffic signals at the intersection with Hennessey Pkwy/Pawnee Ave a review of the current speed limit in the corridor could be accomplished.

11.OPINION OF PROBABLE COSTS

Planning level probable costs for the recommendations found in this study are included below.

Table 13: Opinion of Probable Project Costs (Planning Level)

Recommendations	Cost Estimate	Notes
Traffic Signalization	$350,000	Per Intersection
Construction of new turn lane	$250,000 – 350,000	Per lane, depending on the length of the turn lane
Conversion to Roundabout	$2,000,000 – 2,500,000	Per Intersection

Notes:
1. This opinion represents approximate construction costs only and does not provide a detailed list of project pay items. This opinion is to be used to as a planning number only.
2. Costs represent current dollars as of report date.

12.POTENTIAL FUNDING SOURCES

Funding for traffic safety improvements on public roads under county, city, or state jurisdiction may be available through the Traffic Safety Improvement Program (TSIP). The application deadline for TSIP funding is August 15th of each year. “Site specific” funding is eligible for up to $500,000 with no local match required. Application forms are available from the Iowa DOT, and the application is submitted to the Iowa DOT Traffic and Safety Bureau. More information can be found at: https://iowadot.gov/traffic/traffic-and-safety-programs/tsip/tsip-program

The Urban-State Traffic Engineering Program (U-STEP) provides funding for solving traffic operation and safety problems on primary roads in Iowa Cities. City must match 45 percent of the

constructions cost and the city must also engineer and administer the project. A maximum funding of $200,000 per project for spot improvements (single intersection) or a maximum of $400,000 per project for linear improvements (two or more intersections) is available through this program. Prior to approval of funding, Iowa DOT will review plans and specifications.

Since IA 13 is a state highway, Iowa DOT program funding would be a potential funding source for improvements to the state highway.

The Federal-aid Surface Transportation Block Grant (STBG) Program is another potential funding source. The intent of the program is to aid public road jurisdictions with funding for roads on federal-aid routes. This program requires a minimum of 20 percent non-federal funding match. The STBG program is administered by the Metropolitan Planning Organization (MPO).

Further information on potential funding sources is available on the Iowa DOT website at: https://iowadot.gov/pol_leg_services/Funding-Guide.pd

Appendix

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Rec Dr
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-RecDr_9-27-23
Site Code :
Start Date : 9/27/2023

Groups Printed- All Vehicles

	Highway 13 Soutbound					Westbound					Highway 13 Northbound					Rec Dr Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 AM	0	1	0	0	1	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	6
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
12:30 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
12:45 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Total	0	4	0	0	4	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	16
01:00 AM	0	1	0	0	1	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	5
01:15 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
01:45 AM	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
Total	0	5	0	0	5	0	0	0	0	0	1	9	0	0	10	0	0	0	0	0	15
02:00 AM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	7
02:15 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
02:30 AM	0	6	0	0	6	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	7
02:45 AM	0	5	0	0	5	0	0	0	0	0	1	5	0	0	6	0	1	0	0	1	12
Total	0	16	0	0	16	0	0	0	0	0	1	11	0	0	12	0	1	0	0	1	29
03:00 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
03:15 AM	0	5	0	0	5	0	0	0	0	0	1	2	0	0	3	0	2	0	0	2	10
03:30 AM	0	6	0	0	6	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	10
03:45 AM	0	7	0	0	7	0	0	0	0	0	0	4	0	0	4	0	1	0	0	1	12
Total	0	19	0	0	19	0	0	0	0	0	1	11	0	0	12	0	3	0	0	3	34
04:00 AM	0	10	0	0	10	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	16
04:15 AM	0	9	0	0	9	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	13
04:30 AM	0	21	0	0	21	0	0	0	0	0	1	8	0	0	9	0	0	0	0	0	30
04:45 AM	0	22	0	0	22	0	0	0	0	0	2	10	0	0	12	0	0	0	0	0	34
Total	0	62	0	0	62	0	0	0	0	0	4	27	0	0	31	0	0	0	0	0	93
05:00 AM	0	17	0	0	17	0	0	0	0	0	1	7	0	0	8	0	0	0	0	0	25
05:15 AM	0	42	0	0	42	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	59
05:30 AM	0	44	0	0	44	0	0	0	0	0	2	17	0	0	19	0	1	0	0	1	64
05:45 AM	0	68	0	0	68	0	0	0	0	0	1	9	0	0	10	0	0	0	0	0	78
Total	0	171	0	0	171	0	0	0	0	0	4	50	0	0	54	0	1	0	0	1	226
06:00 AM	0	60	0	0	60	0	0	0	0	0	1	26	0	0	27	0	0	0	0	0	87
06:15 AM	0	107	0	0	107	0	0	0	0	0	3	41	0	0	44	0	0	0	0	0	151
06:30 AM	0	101	0	0	101	0	0	0	0	0	3	46	0	0	49	0	0	0	0	0	150
06:45 AM	0	103	0	0	103	0	0	0	0	0	4	54	0	0	58	1	0	2	0	3	164
Total	0	371	0	0	371	0	0	0	0	0	11	167	0	0	178	1	0	2	0	3	552
07:00 AM	0	98	4	0	102	0	0	0	0	0	13	52	0	0	65	0	0	1	0	1	168
07:15 AM	0	112	7	0	119	0	0	0	0	0	24	59	0	0	83	1	0	4	0	5	207
07:30 AM	0	116	0	0	116	0	0	0	0	0	2	49	0	0	51	0	0	4	0	4	171
07:45 AM	0	100	0	0	100	0	0	0	0	0	11	47	0	0	58	0	0	2	0	2	160
Total	0	426	11	0	437	0	0	0	0	0	50	207	0	0	257	1	0	11	0	12	706
08:00 AM	0	94	0	0	94	0	0	0	0	0	3	53	0	0	56	0	0	5	0	5	155
08:15 AM	0	81	0	0	81	0	0	0	0	0	5	56	0	0	61	2	0	2	0	4	146
08:30 AM	0	62	0	0	62	0	0	0	0	0	8	51	0	0	59	1	0	7	0	8	129
08:45 AM	0	66	0	0	66	0	0	0	0	0	6	47	0	0	53	0	0	5	0	5	124
Total	0	303	0	0	303	0	0	0	0	0	22	207	0	0	229	3	0	19	0	22	554
09:00 AM	0	59	0	0	59	0	0	0	0	0	4	56	0	0	60	5	0	2	0	7	126

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Rec Dr
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-RecDr_9-27-23
Site Code :
Start Date : 9/27/2023

Groups Printed- All Vehicles

	Highway 13 Soutbound					Westbound					Highway 13 Northbound					Rec Dr Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
09:15 AM	0	70	2	0	72	0	0	0	0	0	3	52	0	0	55	0	0	4	0	4	131
09:30 AM	0	64	0	0	64	0	0	0	0	0	2	59	0	0	61	0	0	4	0	4	129
09:45 AM	0	70	0	0	70	0	0	0	0	0	1	58	0	0	59	0	0	4	0	4	133
Total	0	263	2	0	265	0	0	0	0	0	10	225	0	0	235	5	0	14	0	19	519
10:00 AM	0	63	0	0	63	0	0	0	0	0	2	55	0	0	57	0	0	1	0	1	121
10:15 AM	0	63	0	0	63	0	0	0	0	0	2	43	0	0	45	0	0	1	0	1	109
10:30 AM	0	69	2	0	71	0	0	0	0	0	1	46	0	0	47	0	0	0	0	0	118
10:45 AM	0	58	3	0	61	0	0	0	0	0	5	56	0	0	61	2	0	3	0	5	127
Total	0	253	5	0	258	0	0	0	0	0	10	200	0	0	210	2	0	5	0	7	475
11:00 AM	0	73	0	0	73	0	0	0	0	0	0	45	0	0	45	2	0	5	0	7	125
11:15 AM	0	59	0	0	59	0	0	0	0	0	1	60	0	0	61	1	0	0	0	1	121
11:30 AM	0	68	0	0	68	0	0	0	0	0	4	60	0	0	64	0	0	6	0	6	138
11:45 AM	0	73	1	0	74	0	0	0	0	0	2	60	0	0	62	0	0	5	0	5	141
Total	0	273	1	0	274	0	0	0	0	0	7	225	0	0	232	3	0	16	0	19	525
12:00 PM	0	64	0	0	64	0	0	0	0	0	3	79	0	0	82	0	0	3	0	3	149
12:15 PM	0	63	1	0	64	0	0	0	0	0	4	59	0	0	63	0	0	3	0	3	130
12:30 PM	0	56	0	0	56	0	0	0	0	0	6	74	0	0	80	0	0	4	0	4	140
12:45 PM	0	62	1	0	63	0	0	0	0	0	3	74	0	0	77	1	0	4	0	5	145
Total	0	245	2	0	247	0	0	0	0	0	16	286	0	0	302	1	0	14	0	15	564
01:00 PM	0	72	0	0	72	0	0	0	0	0	7	77	0	0	84	0	0	1	0	1	157
01:15 PM	0	51	0	0	51	0	0	0	0	0	3	75	0	0	78	1	0	4	0	5	134
01:30 PM	0	54	0	0	54	0	0	0	0	0	5	81	0	0	86	0	0	3	0	3	143
01:45 PM	0	67	1	0	68	0	0	0	0	0	3	58	0	0	61	0	0	0	0	0	129
Total	0	244	1	0	245	0	0	0	0	0	18	291	0	0	309	1	0	8	0	9	563
02:00 PM	0	68	1	0	69	0	0	0	0	0	1	76	0	0	77	0	0	6	0	6	152
02:15 PM	0	52	0	0	52	0	0	0	0	0	6	91	0	0	97	0	0	0	0	0	149
02:30 PM	0	62	0	0	62	0	0	0	0	0	2	65	0	0	67	0	0	3	0	3	132
02:45 PM	0	73	0	0	73	0	0	0	0	0	1	66	0	0	67	0	0	2	0	2	142
Total	0	255	1	0	256	0	0	0	0	0	10	298	0	0	308	0	0	11	0	11	575
03:00 PM	0	67	0	0	67	0	0	0	0	0	9	91	0	0	100	0	0	5	0	5	172
03:15 PM	0	63	0	0	63	0	0	0	0	0	5	89	0	0	94	1	0	2	0	3	160
03:30 PM	0	82	0	0	82	0	0	0	0	0	5	101	0	0	106	0	0	3	0	3	191
03:45 PM	0	72	0	0	72	0	0	0	0	0	5	98	0	0	103	0	0	6	0	6	181
Total	0	284	0	0	284	0	0	0	0	0	24	379	0	0	403	1	0	16	0	17	704
04:00 PM	0	76	0	0	76	0	0	0	0	0	5	116	0	0	121	16	0	28	0	44	241
04:15 PM	0	66	1	0	67	0	0	0	0	0	2	106	0	0	108	5	0	8	0	13	188
04:30 PM	0	79	0	0	79	0	0	0	0	0	4	124	0	0	128	0	0	2	0	2	209
04:45 PM	0	86	0	0	86	0	0	0	0	0	3	122	0	0	125	1	0	5	0	6	217
Total	0	307	1	0	308	0	0	0	0	0	14	468	0	0	482	22	0	43	0	65	855
05:00 PM	0	77	1	0	78	0	0	0	0	0	7	128	0	0	135	0	1	4	0	5	218
05:15 PM	0	73	0	0	73	0	0	0	0	0	7	122	0	0	129	2	0	4	0	6	208
05:30 PM	0	68	0	0	68	0	0	0	0	0	6	110	0	0	116	0	0	1	0	1	185
05:45 PM	0	80	2	0	82	0	0	0	0	0	7	98	0	0	105	0	0	2	0	2	189
Total	0	298	3	0	301	0	0	0	0	0	27	458	0	0	485	2	1	11	0	14	800
06:00 PM	0	48	2	0	50	0	0	0	0	0	15	91	0	0	106	0	0	2	0	2	158
06:15 PM	0	49	3	0	52	0	0	0	0	0	17	61	0	0	78	0	0	4	0	4	134
06:30 PM	0	39	0	0	39	0	0	0	0	0	3	60	0	0	63	1	0	3	0	4	106
06:45 PM	0	43	0	0	43	0	0	0	0	0	0	57	0	0	57	0	0	0	0	0	100
Total	0	179	5	0	184	0	0	0	0	0	35	269	0	0	304	1	0	9	0	10	498

Snyder & Associates
2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Rec Dr
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-RecDr_9-27-23
Site Code :
Start Date : 9/27/2023

Groups Printed- All Vehicles

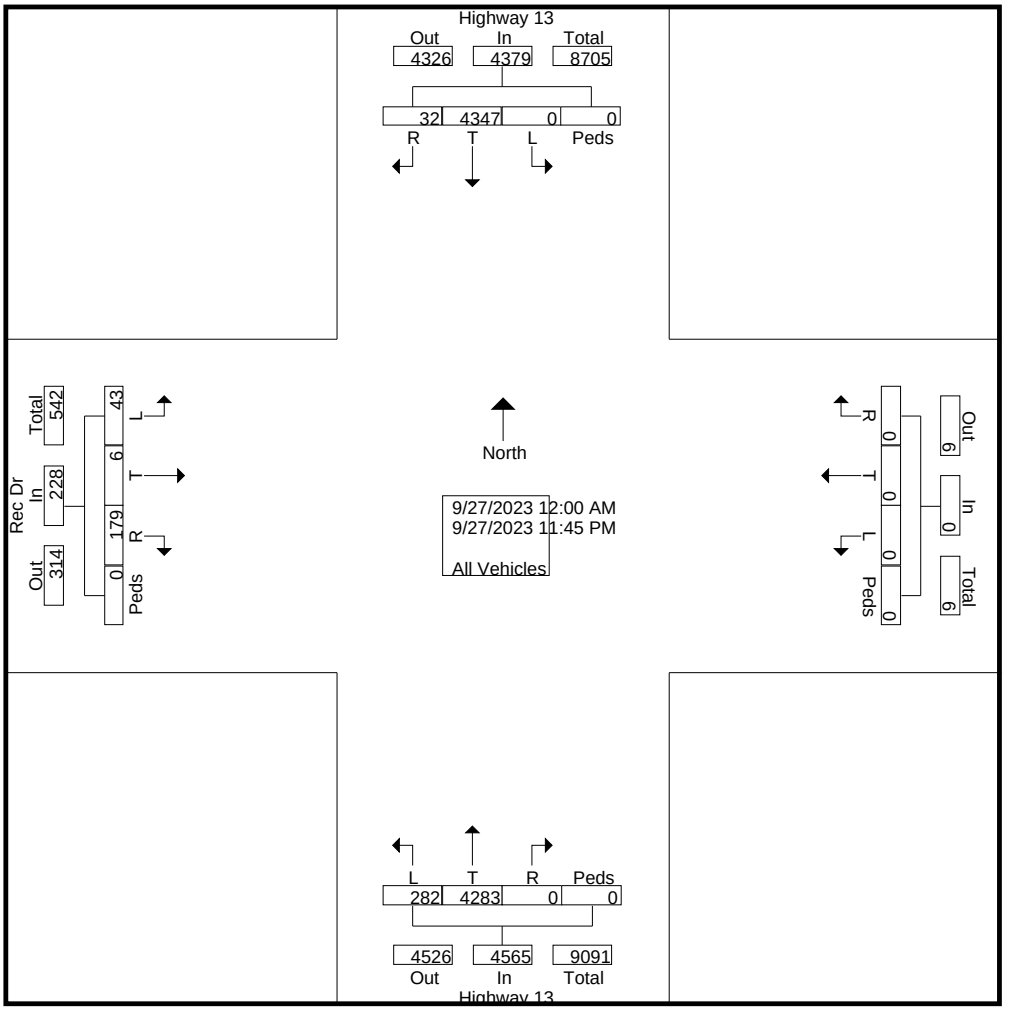
	Highway 13 Soutbound					Westbound					Highway 13 Northbound					Rec Dr Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 PM	0	46	0	0	46	0	0	0	0	0	0	30	0	0	30	0	0	0	0	0	76
07:15 PM	0	48	0	0	48	0	0	0	0	0	0	52	0	0	52	0	0	0	0	0	100
07:30 PM	0	42	0	0	42	0	0	0	0	0	3	49	0	0	52	0	0	0	0	0	94
07:45 PM	0	34	0	0	34	0	0	0	0	0	3	60	0	0	63	0	0	0	0	0	97
Total	0	170	0	0	170	0	0	0	0	0	6	191	0	0	197	0	0	0	0	0	367
08:00 PM	0	28	0	0	28	0	0	0	0	0	4	46	0	0	50	0	0	0	0	0	78
08:15 PM	0	39	0	0	39	0	0	0	0	0	1	46	0	0	47	0	0	0	0	0	86
08:30 PM	0	24	0	0	24	0	0	0	0	0	1	36	0	0	37	0	0	0	0	0	61
08:45 PM	0	14	0	0	14	0	0	0	0	0	0	22	0	0	22	0	0	0	0	0	36
Total	0	105	0	0	105	0	0	0	0	0	6	150	0	0	156	0	0	0	0	0	261
09:00 PM	0	21	0	0	21	0	0	0	0	0	3	28	0	0	31	0	0	0	0	0	52
09:15 PM	0	16	0	0	16	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	33
09:30 PM	0	7	0	0	7	0	0	0	0	0	1	15	0	0	16	0	0	0	0	0	23
09:45 PM	0	4	0	0	4	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	19
Total	0	48	0	0	48	0	0	0	0	0	4	75	0	0	79	0	0	0	0	0	127
10:00 PM	0	6	0	0	6	0	0	0	0	0	1	14	0	0	15	0	0	0	0	0	21
10:15 PM	0	8	0	0	8	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	14
10:30 PM	0	8	0	0	8	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	20
10:45 PM	0	8	0	0	8	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	16
Total	0	30	0	0	30	0	0	0	0	0	1	40	0	0	41	0	0	0	0	0	71
11:00 PM	0	3	0	0	3	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	13
11:15 PM	0	7	0	0	7	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	12
11:30 PM	0	2	0	0	2	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	10
11:45 PM	0	4	0	0	4	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	8
Total	0	16	0	0	16	0	0	0	0	0	0	27	0	0	27	0	0	0	0	0	43
Grand Total	0	4347	32	0	4379	0	0	0	0	0	282	4283	0	0	4565	43	6	179	0	228	9172
Apprch %	0	99.3	0.7	0		0	0	0	0		6.2	93.8	0	0		18.9	2.6	78.5	0		
Total %	0	47.4	0.3	0	47.7	0	0	0	0	0	3.1	46.7	0	0	49.8	0.5	0.1	2	0	2.5	

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Rec Dr
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-RecDr_9-27-23
Site Code :
Start Date : 9/27/2023
Page No : 4



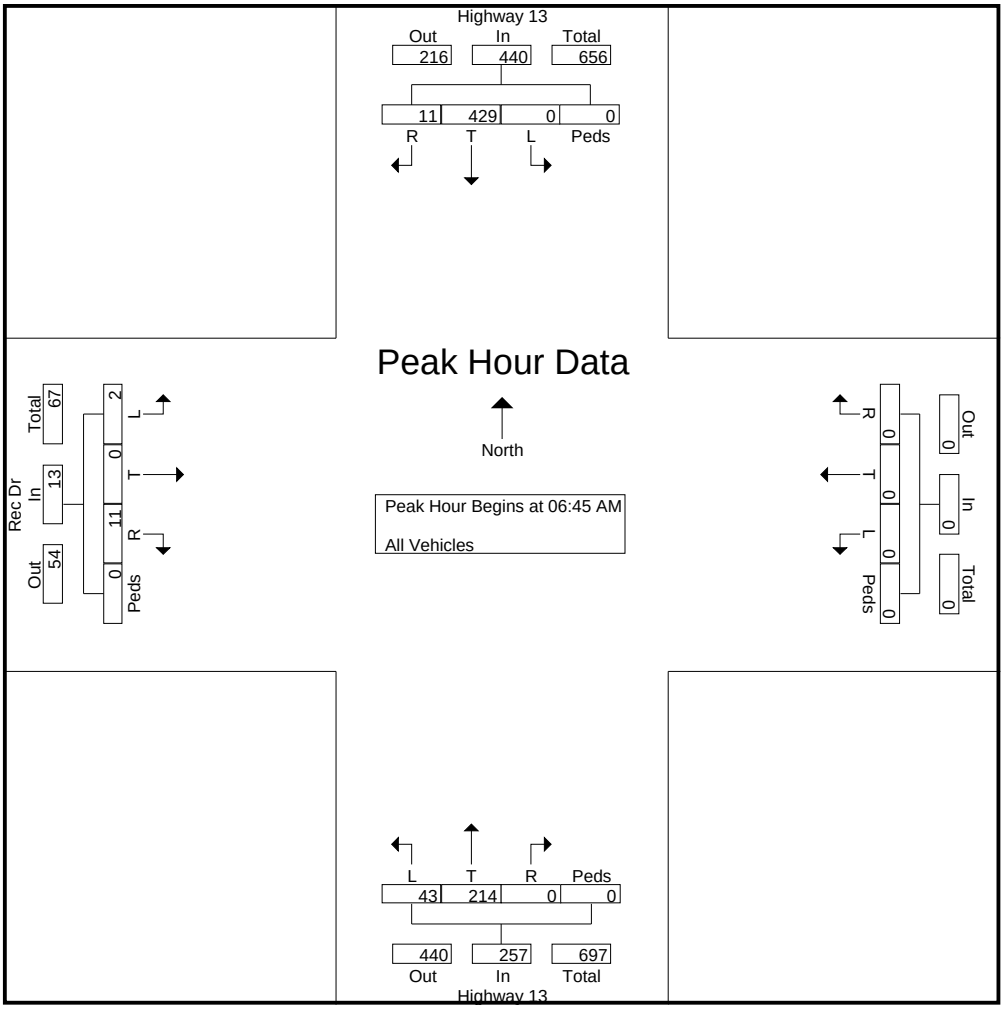
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Rec Dr
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-RecDr_9-27-23
Site Code :
Start Date : 9/27/2023

	Highway 13 Soutbound					Westbound					Highway 13 Northbound					Rec Dr Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:45 AM																					
06:45 AM	0	103	0	0	103	0	0	0	0	0	4	54	0	0	58	**1**	0	2	0	3	164
07:00 AM	0	98	4	0	102	0	0	0	0	0	13	52	0	0	65	0	0	1	0	1	168
07:15 AM	0	112	**7**	0	**119**	0	0	0	0	0	**24**	**59**	0	0	**83**	1	0	**4**	0	**5**	**207**
07:30 AM	0	**116**	0	0	116	0	0	0	0	0	2	49	0	0	51	0	0	4	0	4	171
Total Volume	0	429	11	0	440	0	0	0	0	0	43	214	0	0	257	2	0	11	0	13	710
% App. Total																					
PHF	.000	.925	.393	.000	.924	.000	.000	.000	.000	.000	.448	.907	.000	.000	.774	.500	.000	.688	.000	.650	.857



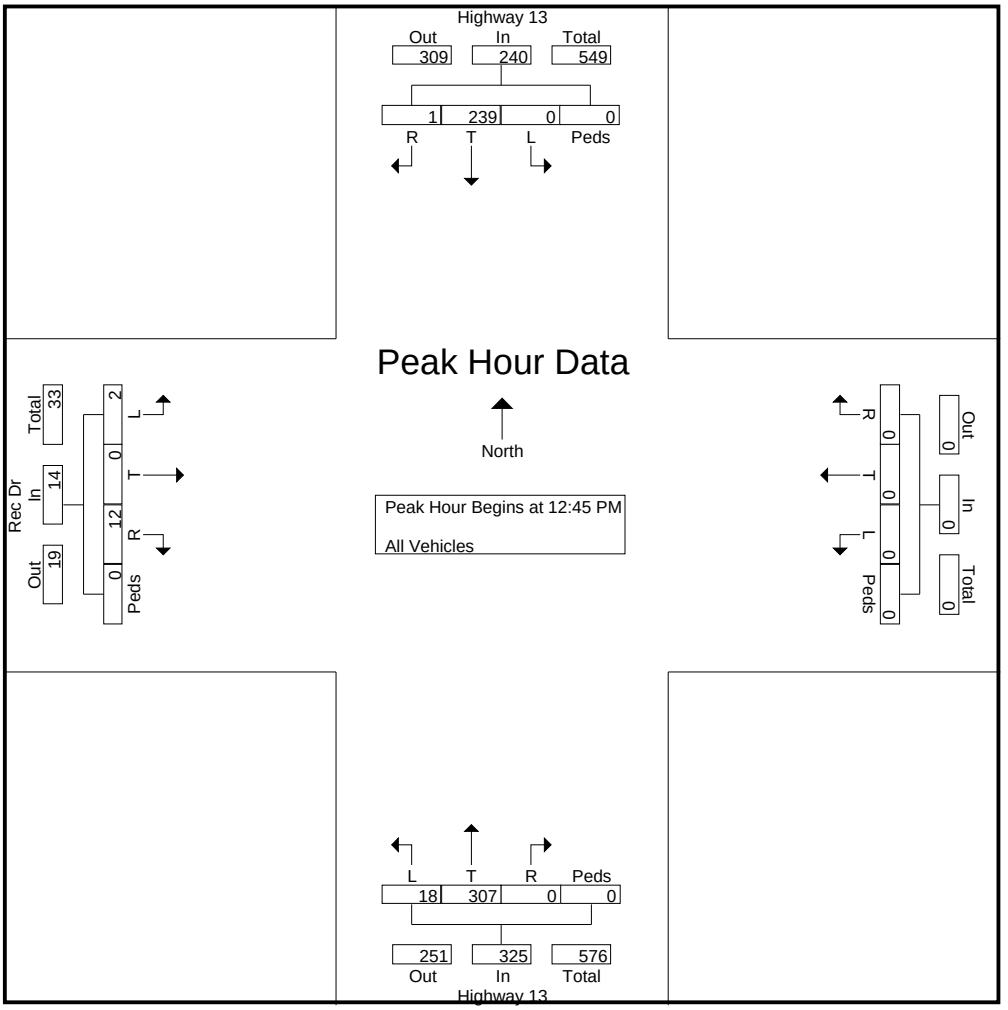
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Rec Dr
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-RecDr_9-27-23
Site Code :
Start Date : 9/27/2023
Page No : 6

	Highway 13 Soutbound					Westbound					Highway 13 Northbound					Rec Dr Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:45 PM																					
12:45 PM	0	62	**1**	0	63	0	0	0	0	0	3	74	0	0	77	**1**	0	**4**	0	**5**	145
01:00 PM	0	**72**	0	0	**72**	0	0	0	0	0	**7**	77	0	0	84	0	0	1	0	1	**157**
01:15 PM	0	51	0	0	51	0	0	0	0	0	3	75	0	0	78	1	0	4	0	5	134
01:30 PM	0	54	0	0	54	0	0	0	0	0	5	**81**	0	0	**86**	0	0	3	0	3	143
Total Volume	0	239	1	0	240	0	0	0	0	0	18	307	0	0	325	2	0	12	0	14	579
% App. Total																					
PHF	.000	.830	.250	.000	.833	.000	.000	.000	.000	.000	.643	.948	.000	.000	.945	.500	.000	.750	.000	.700	.922



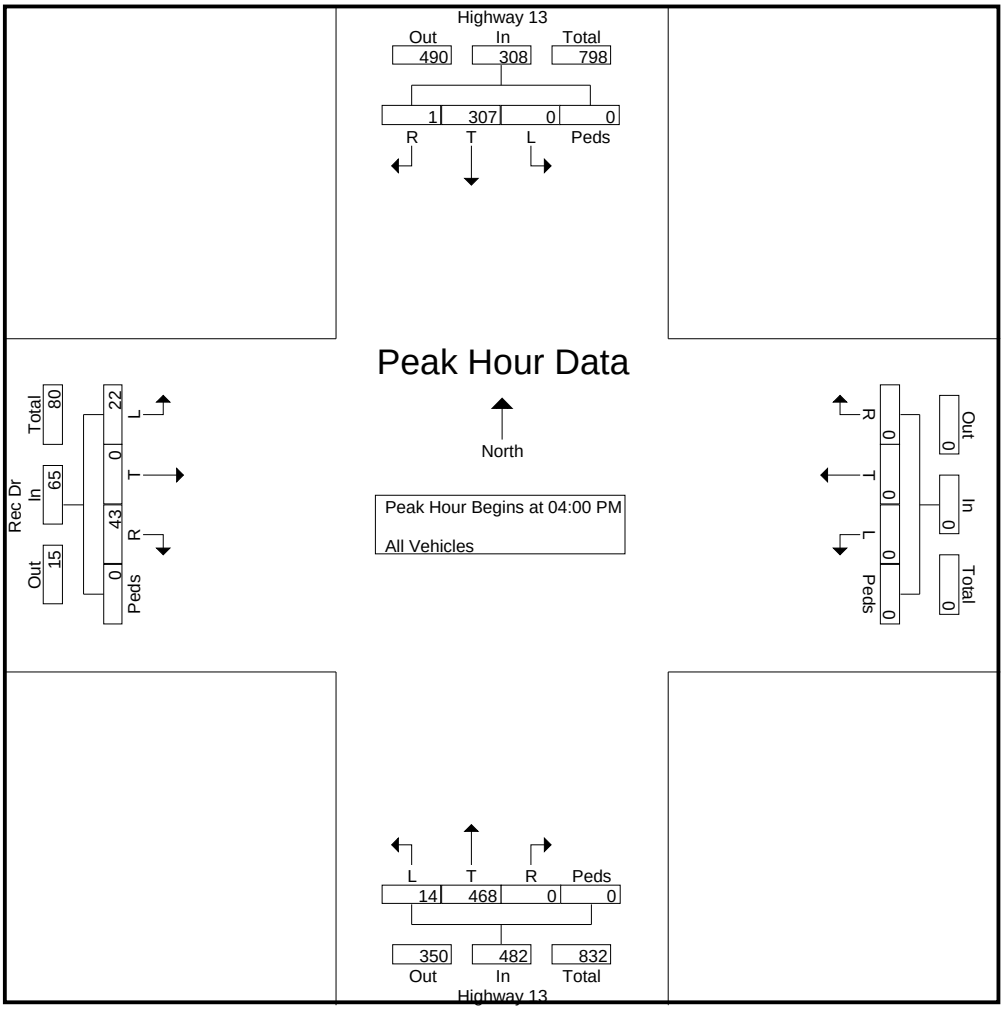
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Rec Dr
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-RecDr_9-27-23
Site Code :
Start Date : 9/27/2023

	Highway 13 Soutbound					Westbound					Highway 13 Northbound					Rec Dr Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	76	0	0	76	0	0	0	0	0	**5**	116	0	0	121	**16**	0	**28**	0	**44**	**241**
04:15 PM	0	66	**1**	0	67	0	0	0	0	0	2	106	0	0	108	5	0	8	0	13	188
04:30 PM	0	79	0	0	79	0	0	0	0	0	4	**124**	0	0	**128**	0	0	2	0	2	209
04:45 PM	0	**86**	0	0	**86**	0	0	0	0	0	3	122	0	0	125	1	0	5	0	6	217
Total Volume	0	307	1	0	308	0	0	0	0	0	14	468	0	0	482	22	0	43	0	65	855
% App. Total																					
PHF	.000	.892	.250	.000	.895	.000	.000	.000	.000	.000	.700	.944	.000	.000	.941	.344	.000	.384	.000	.369	.887



Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & 29th Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-29thAve_9-13-23
Site Code :
Start Date : 9/13/2023
Page No : 1

Groups Printed- All Vehicles

	Highway 13 Soutbound					Fernow Rd Westbound					Highway 13 Northbound					29th Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 AM	0	2	0	0	2	0	0	0	0	0	2	6	0	0	8	0	1	0	0	1	11
12:15 AM	0	0	0	0	0	0	0	0	0	0	1	4	0	0	5	0	3	0	0	3	8
12:30 AM	0	4	0	0	4	0	0	0	0	0	4	7	0	0	11	0	4	0	0	4	19
12:45 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	8	0	0	8	0	0	0	0	0	7	17	0	0	24	0	8	0	0	8	40
01:00 AM	0	2	0	0	2	0	0	0	0	0	4	2	0	0	6	0	0	0	0	0	8
01:15 AM	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	4	0	0	4	8
01:30 AM	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	3
01:45 AM	0	2	0	0	2	0	0	0	0	0	1	2	0	0	3	0	1	0	0	1	6
Total	0	5	0	0	5	0	0	0	0	0	6	9	0	0	15	0	5	0	0	5	25
02:00 AM	0	4	0	0	4	0	0	0	0	0	2	2	0	0	4	0	0	0	0	0	8
02:15 AM	0	5	0	0	5	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	7
02:30 AM	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	8
02:45 AM	0	3	0	0	3	0	0	0	0	0	1	1	0	0	2	0	1	0	0	1	6
Total	0	17	0	0	17	0	0	0	0	0	4	7	0	0	11	0	1	0	0	1	29
03:00 AM	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	6
03:15 AM	0	2	0	0	2	0	0	0	0	0	1	3	0	0	4	0	4	0	0	4	10
03:30 AM	0	4	0	0	4	0	0	0	0	0	1	7	0	0	8	0	1	0	0	1	13
03:45 AM	0	13	0	0	13	0	0	0	0	0	1	2	0	0	3	0	5	0	0	5	21
Total	0	23	0	0	23	0	0	0	0	0	3	14	0	0	17	0	10	0	0	10	50
04:00 AM	0	9	0	0	9	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	16
04:15 AM	0	17	0	0	17	0	0	0	0	0	2	2	0	0	4	0	6	0	0	6	27
04:30 AM	0	10	0	0	10	0	0	0	0	0	0	7	0	0	7	0	7	0	0	7	24
04:45 AM	0	18	0	0	18	0	0	0	0	0	3	9	0	0	12	0	9	0	0	9	39
Total	0	54	0	0	54	0	0	0	0	0	5	25	0	0	30	0	22	0	0	22	106
05:00 AM	0	25	0	0	25	0	0	0	0	0	4	7	0	0	11	0	10	0	0	10	46
05:15 AM	0	39	0	0	39	0	0	0	0	0	8	9	0	0	17	0	13	0	0	13	69
05:30 AM	0	58	0	0	58	0	1	0	0	1	8	16	0	0	24	0	23	0	0	23	106
05:45 AM	0	61	0	0	61	0	1	0	0	1	11	14	0	0	25	0	23	0	0	23	110
Total	0	183	0	0	183	0	2	0	0	2	31	46	0	0	77	0	69	0	0	69	331
06:00 AM	0	65	5	0	70	1	1	0	0	2	10	26	0	0	36	1	0	26	0	27	135
06:15 AM	0	89	2	0	91	1	1	0	0	2	11	28	0	0	39	2	0	40	0	42	174
06:30 AM	0	95	5	0	100	3	2	1	0	6	19	43	0	0	62	4	5	41	0	50	218
06:45 AM	0	77	6	0	83	0	2	1	0	3	41	55	0	0	96	8	0	58	0	66	248
Total	0	326	18	0	344	5	6	2	0	13	81	152	0	0	233	15	5	165	0	185	775
07:00 AM	0	93	8	0	101	1	2	0	0	3	44	39	0	0	83	8	0	56	0	64	251
07:15 AM	1	103	11	0	115	4	0	1	0	5	51	61	0	0	112	11	0	64	0	75	307
07:30 AM	0	127	10	0	137	2	2	0	0	4	39	62	1	0	102	13	2	78	0	93	336
07:45 AM	1	103	9	0	113	3	2	1	0	6	49	48	0	0	97	4	5	65	0	74	290
Total	2	426	38	0	466	10	6	2	0	18	183	210	1	0	394	36	7	263	0	306	1184
08:00 AM	1	61	8	0	70	2	2	0	0	4	28	55	0	0	83	6	0	42	0	48	205
08:15 AM	1	83	6	0	90	2	0	0	0	2	25	44	0	0	69	4	1	52	0	57	218
08:30 AM	0	68	11	0	79	0	5	0	0	5	33	52	0	0	85	3	2	42	0	47	216
08:45 AM	0	70	5	0	75	0	1	0	0	1	37	37	0	0	74	1	4	37	0	42	192
Total	2	282	30	0	314	4	8	0	0	12	123	188	0	0	311	14	7	173	0	194	831
09:00 AM	1	65	9	0	75	0	0	1	0	1	14	40	0	0	54	11	3	52	0	66	196

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & 29th Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-29thAve_9-13-23
Site Code :
Start Date : 9/13/2023

Groups Printed- All Vehicles

	Highway 13 Soutbound					Fernow Rd Westbound					Highway 13 Northbound					29th Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
09:15 AM	0	72	4	0	76	1	0	0	0	1	12	55	0	0	67	7	0	27	0	34	178
09:30 AM	1	74	7	0	82	1	1	0	0	2	16	44	0	0	60	3	0	25	0	28	172
09:45 AM	0	57	7	0	64	0	0	0	0	0	18	45	0	0	63	8	0	25	0	33	160
Total	2	268	27	0	297	2	1	1	0	4	60	184	0	0	244	29	3	129	0	161	706
10:00 AM	0	68	3	0	71	2	2	0	0	4	24	59	0	0	83	2	6	17	0	25	183
10:15 AM	0	70	2	0	72	0	1	0	0	1	20	58	0	0	78	7	0	22	0	29	180
10:30 AM	0	57	8	0	65	1	1	0	0	2	15	43	0	0	58	3	7	34	0	44	169
10:45 AM	0	72	5	0	77	0	0	0	0	0	15	57	0	0	72	6	0	32	0	38	187
Total	0	267	18	0	285	3	4	0	0	7	74	217	0	0	291	18	13	105	0	136	719
11:00 AM	1	64	11	0	76	0	0	1	0	1	17	46	2	0	65	5	6	26	0	37	179
11:15 AM	0	58	4	0	62	1	1	0	0	2	34	45	1	0	80	7	1	30	0	38	182
11:30 AM	0	60	7	0	67	1	0	0	0	1	28	56	1	0	85	8	0	24	0	32	185
11:45 AM	0	62	1	0	63	0	3	0	0	3	30	53	3	0	86	9	0	34	0	43	195
Total	1	244	23	0	268	2	4	1	0	7	109	200	7	0	316	29	7	114	0	150	741
12:00 PM	2	61	4	0	67	0	1	1	0	2	39	60	0	0	99	6	0	33	0	39	207
12:15 PM	0	68	6	0	74	0	0	1	0	1	38	65	1	0	104	8	0	37	0	45	224
12:30 PM	1	52	2	0	55	0	1	0	0	1	27	63	1	0	91	11	0	31	0	42	189
12:45 PM	0	65	1	0	66	2	0	1	0	3	34	64	0	0	98	4	1	27	0	32	199
Total	3	246	13	0	262	2	2	3	0	7	138	252	2	0	392	29	1	128	0	158	819
01:00 PM	1	49	6	0	56	0	4	0	0	4	34	74	1	0	109	6	0	43	0	49	218
01:15 PM	0	65	3	0	68	0	1	0	0	1	32	64	0	0	96	10	4	24	0	38	203
01:30 PM	0	57	2	0	59	0	2	0	0	2	26	69	1	0	96	3	10	32	0	45	202
01:45 PM	0	52	9	0	61	2	0	0	0	2	30	79	0	0	109	1	3	30	0	34	206
Total	1	223	20	0	244	2	7	0	0	9	122	286	2	0	410	20	17	129	0	166	829
02:00 PM	0	65	4	0	69	2	0	0	0	2	50	64	1	0	115	6	9	21	0	36	222
02:15 PM	0	54	5	0	59	2	0	0	0	2	55	63	0	0	118	3	1	24	0	28	207
02:30 PM	0	65	7	0	72	0	4	0	0	4	39	81	0	0	120	6	4	33	0	43	239
02:45 PM	0	63	8	0	71	0	3	0	0	3	39	67	1	0	107	12	0	42	0	54	235
Total	0	247	24	0	271	4	7	0	0	11	183	275	2	0	460	27	14	120	0	161	903
03:00 PM	0	57	7	0	64	3	0	0	0	3	40	68	1	0	109	11	0	42	0	53	229
03:15 PM	0	76	7	0	83	1	4	0	0	5	51	83	1	0	135	6	0	42	0	48	271
03:30 PM	2	75	15	0	92	1	4	0	0	5	54	95	1	0	150	14	0	54	0	68	315
03:45 PM	1	76	8	0	85	0	3	1	0	4	48	107	3	0	158	12	2	45	0	59	306
Total	3	284	37	0	324	5	11	1	0	17	193	353	6	0	552	43	2	183	0	228	1121
04:00 PM	0	97	12	0	109	1	3	0	0	4	67	96	1	0	164	6	3	52	0	61	338
04:15 PM	0	82	11	0	93	3	0	1	0	4	71	114	2	0	187	10	0	51	0	61	345
04:30 PM	0	75	3	0	78	0	3	0	0	3	68	99	0	0	167	7	0	50	0	57	305
04:45 PM	0	71	8	0	79	1	1	0	0	2	63	108	0	0	171	1	1	59	0	61	313
Total	0	325	34	0	359	5	7	1	0	13	269	417	3	0	689	24	4	212	0	240	1301
05:00 PM	0	84	16	0	100	0	4	1	0	5	57	119	1	0	177	14	2	58	0	74	356
05:15 PM	1	67	7	0	75	0	1	1	0	2	72	106	2	0	180	20	0	30	0	50	307
05:30 PM	0	66	8	0	74	1	0	1	0	2	50	100	0	0	150	21	0	36	0	57	283
05:45 PM	2	51	5	0	58	0	0	1	0	1	45	85	0	0	130	6	2	30	0	38	227
Total	3	268	36	0	307	1	5	4	0	10	224	410	3	0	637	61	4	154	0	219	1173
06:00 PM	1	61	7	0	69	2	1	0	0	3	54	75	0	0	129	16	5	47	0	68	269
06:15 PM	0	51	5	0	56	1	2	0	0	3	48	74	0	0	122	22	0	52	0	74	255
06:30 PM	2	52	13	0	67	0	0	0	0	0	48	53	0	0	101	8	11	58	0	77	245
06:45 PM	0	41	15	0	56	0	1	0	0	1	44	47	0	0	91	6	4	38	0	48	196
Total	3	205	40	0	248	3	4	0	0	7	194	249	0	0	443	52	20	195	0	267	965

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & 29th Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-29thAve_9-13-23
Site Code :
Start Date : 9/13/2023

Groups Printed- All Vehicles

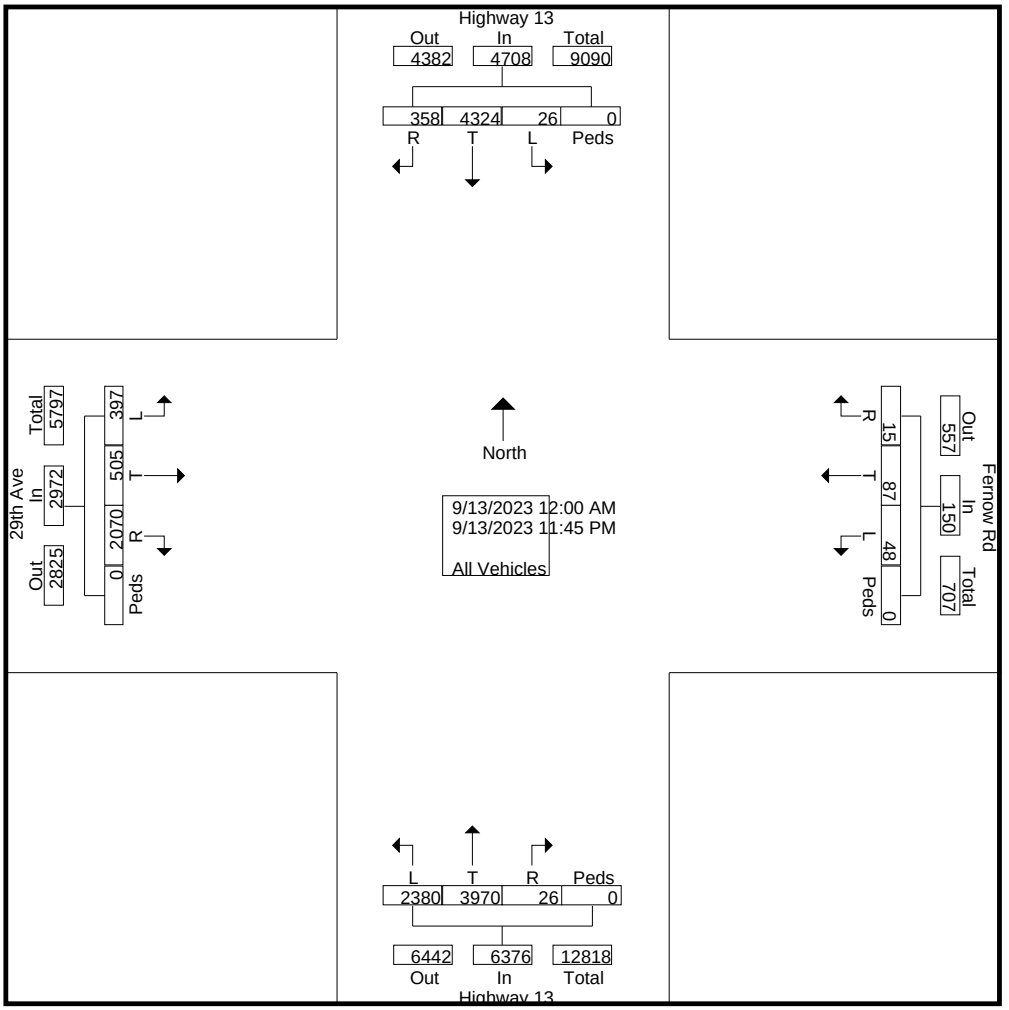
	Highway 13 Soutbound					Fernow Rd Westbound					Highway 13 Northbound					29th Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 PM	0	38	0	0	38	0	1	0	0	1	34	53	0	0	87	0	26	0	0	26	152
07:15 PM	0	48	0	0	48	0	0	0	0	0	38	45	0	0	83	0	33	0	0	33	164
07:30 PM	2	46	0	0	48	0	1	0	0	1	47	52	0	0	99	0	33	0	0	33	181
07:45 PM	0	39	0	0	39	0	4	0	0	4	34	38	0	0	72	0	46	0	0	46	161
Total	2	171	0	0	173	0	6	0	0	6	153	188	0	0	341	0	138	0	0	138	658
08:00 PM	1	51	0	0	52	0	1	0	0	1	34	32	0	0	66	0	29	0	0	29	148
08:15 PM	0	48	0	0	48	0	0	0	0	0	32	46	0	0	78	0	19	0	0	19	145
08:30 PM	1	39	0	0	40	0	0	0	0	0	17	36	0	0	53	0	22	0	0	22	115
08:45 PM	0	17	0	0	17	0	2	0	0	2	28	24	0	0	52	0	11	0	0	11	82
Total	2	155	0	0	157	0	3	0	0	3	111	138	0	0	249	0	81	0	0	81	490
09:00 PM	0	14	0	0	14	0	1	0	0	1	15	22	0	0	37	0	9	0	0	9	61
09:15 PM	1	20	0	0	21	0	0	0	0	0	18	17	0	0	35	0	14	0	0	14	70
09:30 PM	1	14	0	0	15	0	1	0	0	1	8	19	0	0	27	0	8	0	0	8	51
09:45 PM	0	7	0	0	7	0	0	0	0	0	18	7	0	0	25	0	8	0	0	8	40
Total	2	55	0	0	57	0	2	0	0	2	59	65	0	0	124	0	39	0	0	39	222
10:00 PM	0	7	0	0	7	0	0	0	0	0	12	14	0	0	26	0	6	0	0	6	39
10:15 PM	0	7	0	0	7	0	0	0	0	0	10	12	0	0	22	0	6	0	0	6	35
10:30 PM	0	8	0	0	8	0	0	0	0	0	6	6	0	0	12	0	6	0	0	6	26
10:45 PM	0	5	0	0	5	0	1	0	0	1	3	6	0	0	9	0	1	0	0	1	16
Total	0	27	0	0	27	0	1	0	0	1	31	38	0	0	69	0	19	0	0	19	116
11:00 PM	0	8	0	0	8	0	0	0	0	0	6	5	0	0	11	0	3	0	0	3	22
11:15 PM	0	5	0	0	5	0	0	0	0	0	4	10	0	0	14	0	2	0	0	2	21
11:30 PM	0	1	0	0	1	0	1	0	0	1	5	9	0	0	14	0	4	0	0	4	20
11:45 PM	0	1	0	0	1	0	0	0	0	0	2	6	0	0	8	0	0	0	0	0	9
Total	0	15	0	0	15	0	1	0	0	1	17	30	0	0	47	0	9	0	0	9	72
Grand Total	26	4324	358	0	4708	48	87	15	0	150	2380	3970	26	0	6376	397	505	2070	0	2972	14206
Apprch %	0.6	91.8	7.6	0		32	58	10	0		37.3	62.3	0.4	0		13.4	17	69.7	0		
Total %	0.2	30.4	2.5	0	33.1	0.3	0.6	0.1	0	1.1	16.8	27.9	0.2	0	44.9	2.8	3.6	14.6	0	20.9	

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & 29th Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-29thAve_9-13-23
Site Code :
Start Date : 9/13/2023



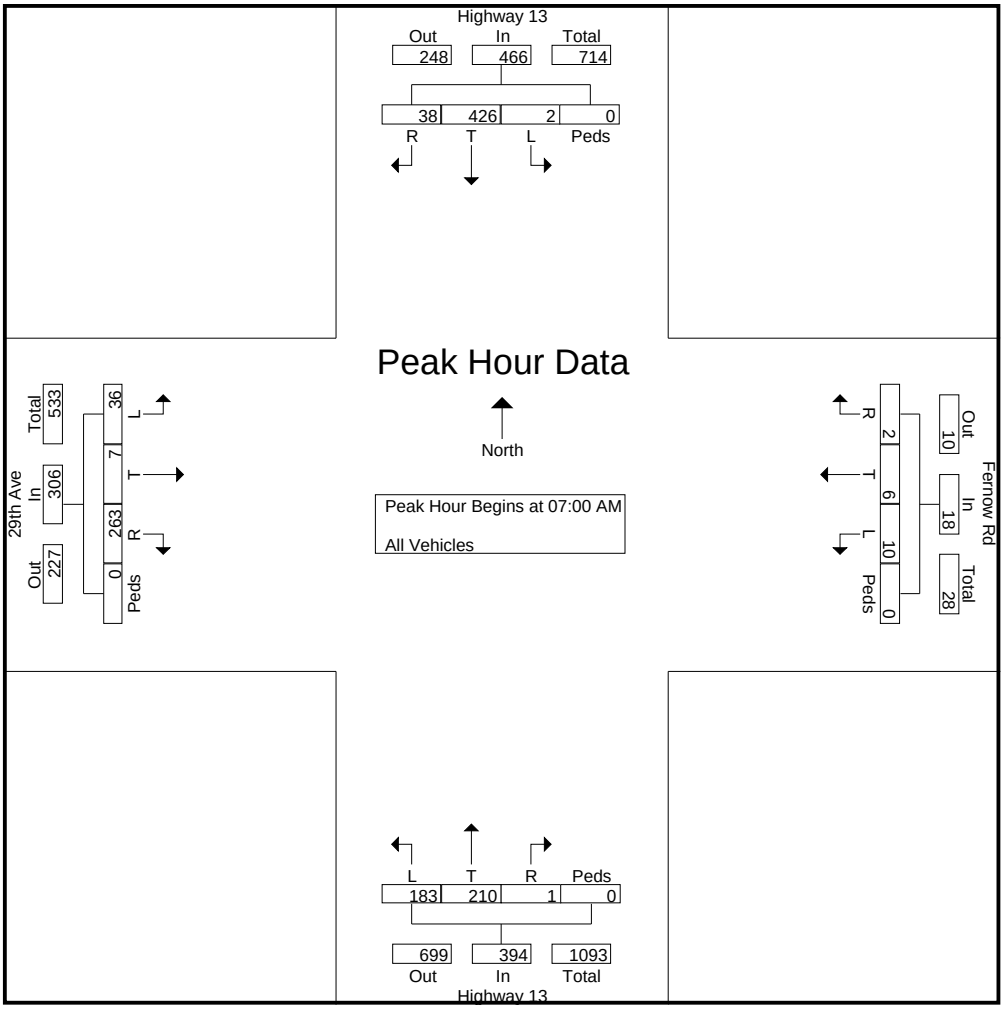
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & 29th Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-29thAve_9-13-23
Site Code :
Start Date : 9/13/2023
Page No : 5

	Highway 13 Soutbound					Fernow Rd Westbound					Highway 13 Northbound					29th Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	93	8	0	101	1	**2**	0	0	3	44	39	0	0	83	8	0	56	0	64	251
07:15 AM	**1**	103	**11**	0	115	**4**	0	**1**	0	5	**51**	61	0	0	**112**	11	0	64	0	75	307
07:30 AM	0	**127**	10	0	**137**	2	2	0	0	4	39	**62**	**1**	0	102	**13**	2	**78**	0	**93**	**336**
07:45 AM	1	103	9	0	113	3	2	1	0	**6**	49	48	0	0	97	4	**5**	65	0	74	290
Total Volume	2	426	38	0	466	10	6	2	0	18	183	210	1	0	394	36	7	263	0	306	1184
% App. Total																					
PHF	.500	.839	.864	.000	.850	.625	.750	.500	.000	.750	.897	.847	.250	.000	.879	.692	.350	.843	.000	.823	.881

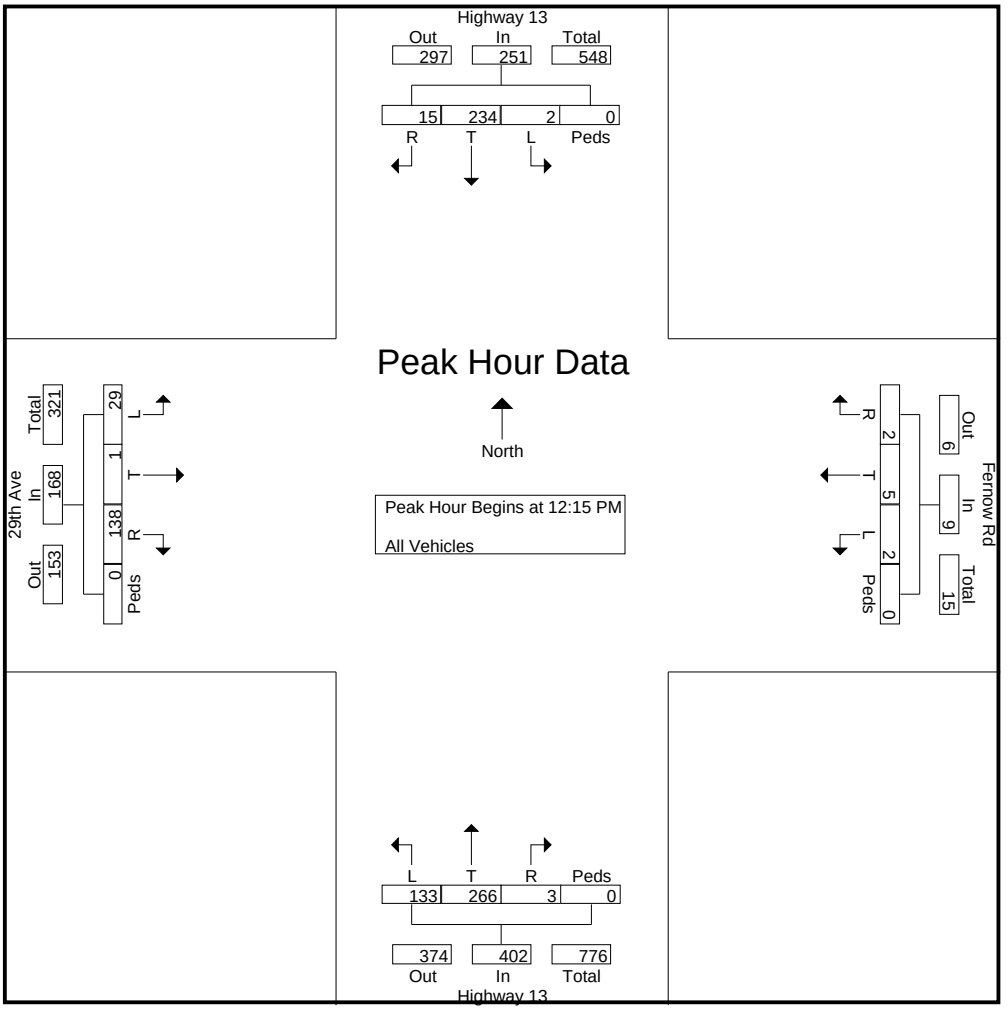


Snyder & Associates
2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & 29th Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-29thAve_9-13-23
Site Code :
Start Date : 9/13/2023

	Highway 13 Soutbound					Fernow Rd Westbound					Highway 13 Northbound					29th Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:15 PM																					
12:15 PM	0	**68**	**6**	0	**74**	0	0	**1**	0	1	**38**	65	**1**	0	104	8	0	37	0	45	**224**
12:30 PM	**1**	52	2	0	55	0	1	0	0	1	27	63	1	0	91	**11**	0	31	0	42	189
12:45 PM	0	65	1	0	66	**2**	0	1	0	3	34	64	0	0	98	4	**1**	27	0	32	199
01:00 PM	1	49	6	0	56	0	**4**	0	0	**4**	34	**74**	1	0	**109**	6	0	**43**	0	**49**	218
Total Volume	2	234	15	0	251	2	5	2	0	9	133	266	3	0	402	29	1	138	0	168	830
% App. Total																					
PHF	.500	.860	.625	.000	.848	.250	.313	.500	.000	.563	.875	.899	.750	.000	.922	.659	.250	.802	.000	.857	.926



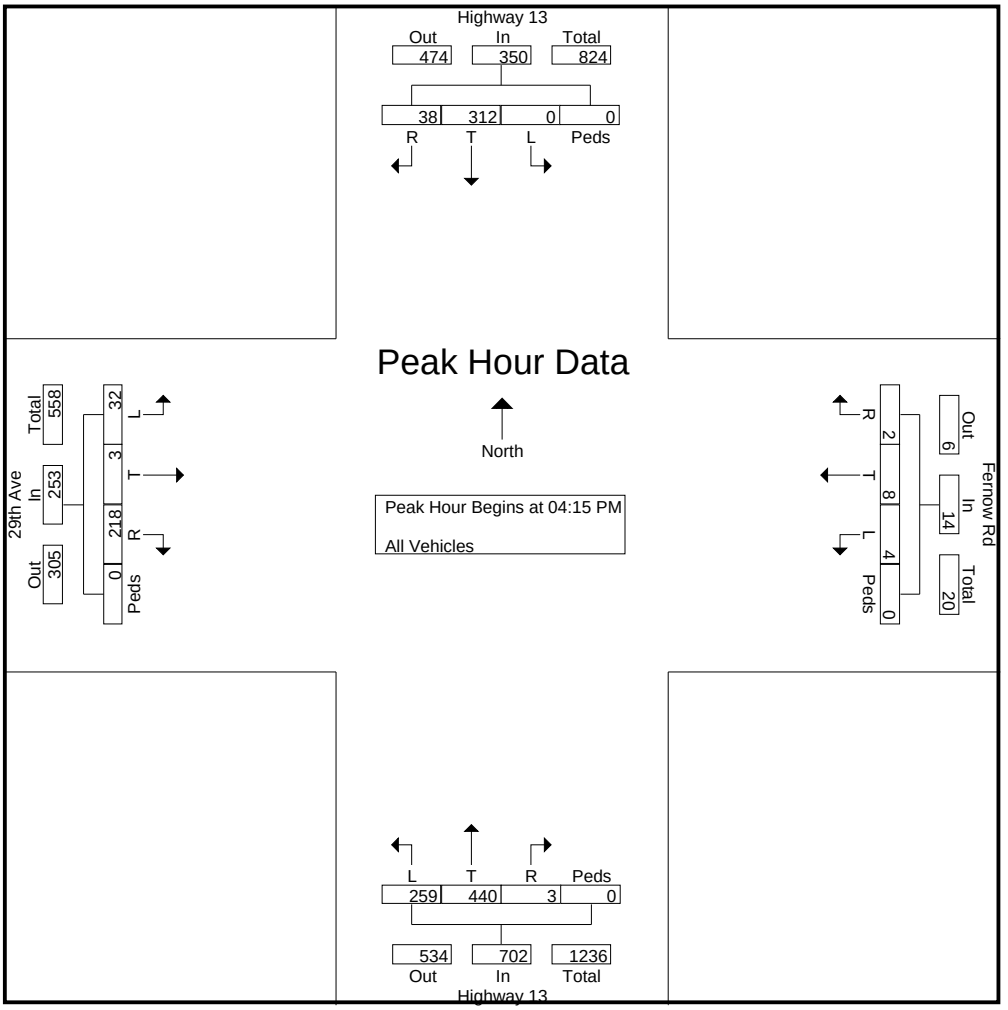
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & 29th Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-29thAve_9-13-23
Site Code :
Start Date : 9/13/2023

	Highway 13 Soutbound					Fernow Rd Westbound					Highway 13 Northbound					29th Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	82	11	0	93	**3**	0	**1**	0	4	**71**	114	**2**	0	**187**	10	0	51	0	61	345
04:30 PM	0	75	3	0	78	0	3	0	0	3	68	99	0	0	167	7	0	50	0	57	305
04:45 PM	0	71	8	0	79	1	1	0	0	2	63	108	0	0	171	1	1	**59**	0	61	313
05:00 PM	0	**84**	**16**	0	**100**	0	**4**	1	0	**5**	57	**119**	1	0	177	**14**	**2**	58	0	**74**	**356**
Total Volume	0	312	38	0	350	4	8	2	0	14	259	440	3	0	702	32	3	218	0	253	1319
% App. Total																					
PHF	.000	.929	.594	.000	.875	.333	.500	.500	.000	.700	.912	.924	.375	.000	.939	.571	.375	.924	.000	.855	.926



Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Prairie Ridge Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Prairie Hill_8-29-23
Site Code :
Start Date : 8/29/2023
Page No : 1

Groups Printed- All Vehicles

	Highway 13 Soutbound					Prairie Ridge Ave Westbound					Highway 13 Northbound					Prairie Ridge Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 AM	0	1	0	0	1	0	1	0	0	1	0	6	0	0	6	0	1	0	0	1	9
12:15 AM	0	3	0	0	3	0	0	0	0	0	1	7	0	0	8	0	0	0	0	0	11
12:30 AM	0	2	0	0	2	0	1	0	0	1	0	5	0	0	5	0	0	0	0	0	8
12:45 AM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	7
Total	0	9	0	0	9	0	2	0	0	2	1	22	0	0	23	0	1	0	0	1	35
01:00 AM	0	0	0	0	0	0	1	0	0	1	0	8	0	0	8	0	0	0	0	0	9
01:15 AM	0	3	0	0	3	0	0	0	0	0	1	4	0	0	5	0	0	0	0	0	8
01:30 AM	0	6	0	0	6	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	9
01:45 AM	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
Total	0	11	0	0	11	0	1	0	0	1	1	17	0	0	18	0	0	0	0	0	30
02:00 AM	0	3	0	0	3	0	0	0	0	0	0	7	0	0	7	0	1	0	0	1	11
02:15 AM	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	5
02:30 AM	0	5	0	0	5	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	8
02:45 AM	0	5	0	0	5	0	1	0	0	1	0	4	0	0	4	0	0	0	0	0	10
Total	0	15	0	0	15	0	2	0	0	2	0	16	0	0	16	0	1	0	0	1	34
03:00 AM	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
03:15 AM	0	5	0	0	5	0	1	0	0	1	0	3	0	0	3	0	0	0	0	0	9
03:30 AM	0	8	0	0	8	0	1	0	0	1	0	3	0	0	3	0	0	0	0	0	12
03:45 AM	0	9	0	0	9	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	17
Total	0	27	0	0	27	0	2	0	0	2	0	14	0	0	14	0	0	0	0	0	43
04:00 AM	0	13	0	0	13	0	1	0	0	1	0	5	0	0	5	0	0	0	0	0	19
04:15 AM	0	20	0	0	20	0	4	0	0	4	0	3	0	0	3	0	0	0	0	0	27
04:30 AM	0	19	0	0	19	0	4	0	0	4	0	5	0	0	5	0	2	0	0	2	30
04:45 AM	0	31	0	0	31	0	4	0	0	4	0	20	0	0	20	0	1	0	0	1	56
Total	0	83	0	0	83	0	13	0	0	13	0	33	0	0	33	0	3	0	0	3	132
05:00 AM	0	38	0	0	38	0	6	0	0	6	1	10	0	0	11	0	1	0	0	1	56
05:15 AM	0	58	0	0	58	0	8	0	0	8	0	13	0	0	13	0	2	0	0	2	81
05:30 AM	0	71	0	0	71	0	9	0	0	9	0	30	0	0	30	0	2	0	0	2	112
05:45 AM	0	79	0	0	79	0	7	0	0	7	1	36	0	0	37	0	9	0	0	9	132
Total	0	246	0	0	246	0	30	0	0	30	2	89	0	0	91	0	14	0	0	14	381
06:00 AM	2	91	0	0	93	4	0	0	0	4	1	41	1	0	43	0	1	6	0	7	147
06:15 AM	0	142	1	0	143	14	3	2	0	19	0	67	0	0	67	0	1	5	0	6	235
06:30 AM	4	145	0	0	149	18	0	8	0	26	0	52	4	0	56	0	1	5	0	6	237
06:45 AM	4	156	0	0	160	11	2	6	0	19	1	85	2	0	88	1	0	4	0	5	272
Total	10	534	1	0	545	47	5	16	0	68	2	245	7	0	254	1	3	20	0	24	891
07:00 AM	6	143	0	0	149	20	3	9	0	32	0	85	5	0	90	1	1	8	0	10	281
07:15 AM	4	155	0	0	159	29	0	16	0	45	1	113	4	0	118	1	5	8	0	14	336
07:30 AM	5	198	2	0	205	31	0	16	0	47	2	96	4	0	102	1	0	8	0	9	363
07:45 AM	5	165	3	0	173	15	0	5	0	20	0	88	4	0	92	0	1	3	0	4	289
Total	20	661	5	0	686	95	3	46	0	144	3	382	17	0	402	3	7	27	0	37	1269
08:00 AM	1	104	1	0	106	14	2	3	0	19	3	91	5	0	99	1	1	7	0	9	233
08:15 AM	4	106	3	0	113	10	2	9	0	21	2	77	8	0	87	1	1	7	0	9	230
08:30 AM	1	112	0	0	113	1	16	0	0	17	1	78	8	0	87	0	2	1	0	3	220
08:45 AM	4	94	0	0	98	6	0	2	0	8	0	79	4	0	83	0	1	2	0	3	192
Total	10	416	4	0	430	31	20	14	0	65	6	325	25	0	356	2	5	17	0	24	875
09:00 AM	5	96	0	0	101	7	2	1	0	10	1	54	2	0	57	0	3	0	0	3	171

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Prairie Ridge Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Prairie Hill_8-29-23
Site Code :
Start Date : 8/29/2023

Groups Printed- All Vehicles

	Highway 13 Soutbound					Prairie Ridge Ave Westbound					Highway 13 Northbound					Prairie Ridge Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
09:15 AM	5	82	0	0	87	7	0	3	0	10	1	69	4	0	74	0	2	3	0	5	176
09:30 AM	4	118	0	0	122	12	0	3	0	15	0	62	5	0	67	0	1	1	0	2	206
09:45 AM	1	103	0	0	104	3	0	3	0	6	1	61	4	0	66	0	0	3	0	3	179
Total	15	399	0	0	414	29	2	10	0	41	3	246	15	0	264	0	6	7	0	13	732
10:00 AM	3	87	0	0	90	2	1	1	0	4	2	60	5	0	67	0	2	1	0	3	164
10:15 AM	4	67	1	0	72	7	2	1	0	10	1	75	3	0	79	0	0	1	0	1	162
10:30 AM	2	73	1	0	76	4	8	0	0	12	2	67	7	0	76	1	2	0	0	3	167
10:45 AM	1	103	0	0	104	6	0	0	0	6	1	61	5	0	67	0	0	0	0	0	177
Total	10	330	2	0	342	19	11	2	0	32	6	263	20	0	289	1	4	2	0	7	670
11:00 AM	0	101	1	0	102	3	6	0	0	9	0	75	2	0	77	0	3	0	0	3	191
11:15 AM	3	86	0	0	89	7	0	0	0	7	2	86	4	0	92	2	2	0	0	4	192
11:30 AM	0	92	0	0	92	5	1	0	0	6	1	84	4	0	89	0	6	0	0	6	193
11:45 AM	2	80	1	0	83	4	10	0	0	14	2	82	7	0	91	0	7	0	0	7	195
Total	5	359	2	0	366	19	17	0	0	36	5	327	17	0	349	2	18	0	0	20	771
12:00 PM	1	76	0	0	77	5	2	0	0	7	0	71	5	0	76	0	3	0	0	3	163
12:15 PM	2	76	0	0	78	2	4	0	0	6	0	102	4	0	106	1	2	0	0	3	193
12:30 PM	5	83	0	0	88	4	9	0	0	13	1	83	7	0	91	1	1	0	0	2	194
12:45 PM	0	92	0	0	92	3	1	0	0	4	0	89	3	0	92	0	2	0	0	2	190
Total	8	327	0	0	335	14	16	0	0	30	1	345	19	0	365	2	8	0	0	10	740
01:00 PM	2	57	0	0	59	5	0	0	0	5	2	87	4	0	93	1	4	0	0	5	162
01:15 PM	0	90	0	0	90	6	1	0	0	7	3	85	3	0	91	0	4	0	0	4	192
01:30 PM	2	78	1	0	81	10	0	3	0	13	1	80	6	0	87	0	0	2	0	2	183
01:45 PM	4	77	0	0	81	4	1	3	0	8	3	87	4	0	94	1	1	0	0	2	185
Total	8	302	1	0	311	25	2	6	0	33	9	339	17	0	365	2	9	2	0	13	722
02:00 PM	3	91	0	0	94	6	0	4	0	10	1	103	3	0	107	0	0	0	0	0	211
02:15 PM	2	84	1	0	87	5	0	2	0	7	2	117	9	0	128	0	0	1	0	1	223
02:30 PM	1	100	1	0	102	9	0	2	0	11	3	113	3	0	119	0	3	2	0	5	237
02:45 PM	4	103	0	0	107	6	0	6	0	12	0	118	3	0	121	2	0	3	0	5	245
Total	10	378	2	0	390	26	0	14	0	40	6	451	18	0	475	2	3	6	0	11	916
03:00 PM	8	90	0	0	98	5	2	2	0	9	3	105	2	0	110	0	0	5	0	5	222
03:15 PM	4	96	1	0	101	2	0	3	0	5	2	112	8	0	122	1	1	3	0	5	233
03:30 PM	4	134	1	0	139	4	0	1	0	5	3	146	14	0	163	0	4	2	0	6	313
03:45 PM	11	93	0	0	104	16	0	6	0	22	3	159	11	0	173	3	2	2	0	7	306
Total	27	413	2	0	442	27	2	12	0	41	11	522	35	0	568	4	7	12	0	23	1074
04:00 PM	7	132	0	0	139	15	0	4	0	19	5	148	5	0	158	0	11	0	0	11	327
04:15 PM	4	132	0	0	136	6	2	5	0	13	0	158	5	0	163	2	1	1	0	4	316
04:30 PM	5	156	1	0	162	7	0	10	0	17	8	167	17	0	192	0	5	0	0	5	376
04:45 PM	7	112	2	0	121	11	2	10	0	23	6	188	10	0	204	0	4	4	0	8	356
Total	23	532	3	0	558	39	4	29	0	72	19	661	37	0	717	2	21	5	0	28	1375
05:00 PM	10	124	0	0	134	11	0	2	0	13	5	165	13	0	183	0	1	6	0	7	337
05:15 PM	10	107	0	0	117	5	7	6	0	18	4	168	5	0	177	0	4	7	0	11	323
05:30 PM	5	99	1	0	105	8	1	10	0	19	3	152	22	0	177	0	1	7	0	8	309
05:45 PM	4	85	0	0	89	5	3	4	0	12	5	135	15	0	155	0	4	1	0	5	261
Total	29	415	1	0	445	29	11	22	0	62	17	620	55	0	692	0	10	21	0	31	1230
06:00 PM	1	77	1	0	79	11	0	5	0	16	3	104	5	0	112	3	1	2	0	6	213
06:15 PM	3	91	0	0	94	4	5	1	0	10	2	107	10	0	119	0	2	3	0	5	228
06:30 PM	3	67	0	0	70	8	0	2	0	10	3	82	10	0	95	0	3	3	0	6	181
06:45 PM	4	46	0	0	50	10	0	1	0	11	6	93	11	0	110	0	3	3	0	6	177
Total	11	281	1	0	293	33	5	9	0	47	14	386	36	0	436	3	9	11	0	23	799

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Prairie Ridge Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Prairie Hill_8-29-23
Site Code :
Start Date : 8/29/2023

Groups Printed- All Vehicles

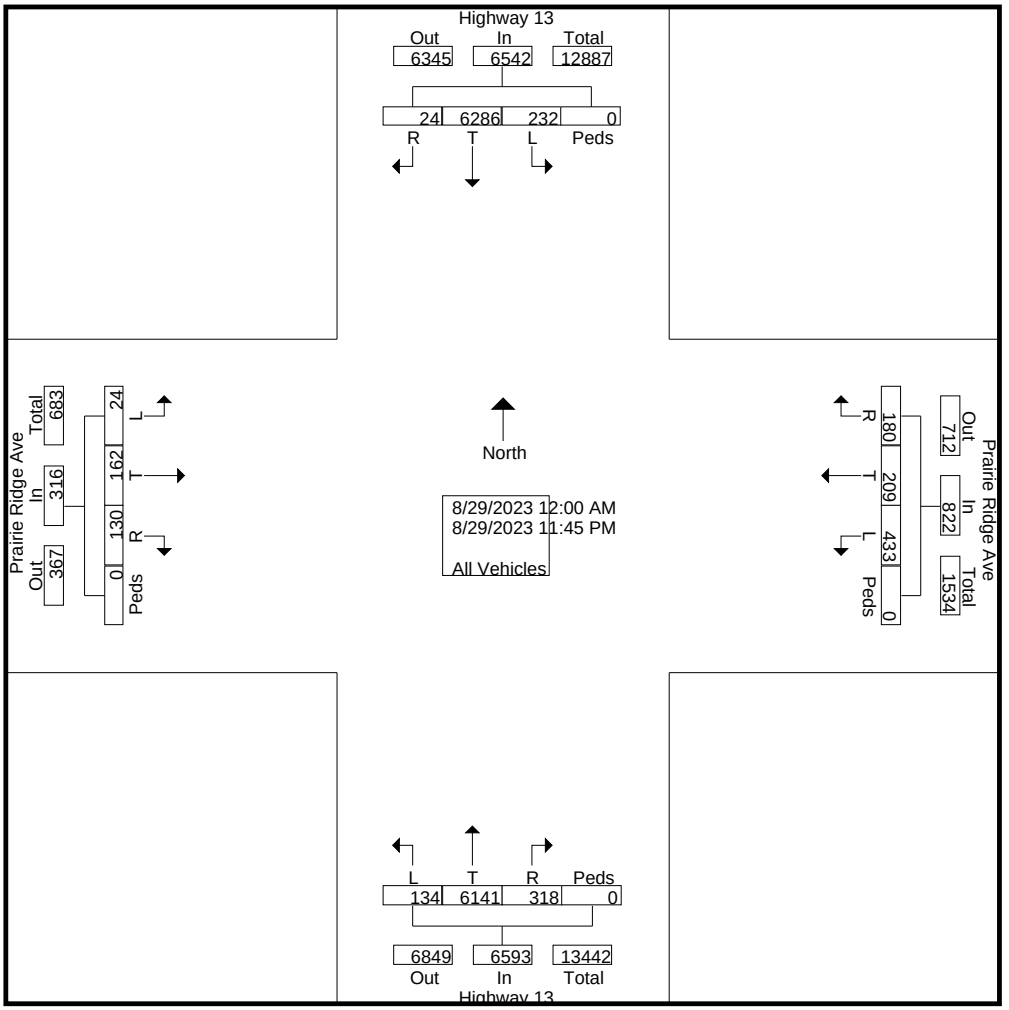
	Highway 13 Soutbound					Prairie Ridge Ave Westbound					Highway 13 Northbound					Prairie Ridge Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 PM	5	52	0	0	57	0	8	0	0	8	2	65	0	0	67	0	4	0	0	4	136
07:15 PM	3	49	0	0	52	0	6	0	0	6	2	64	0	0	66	0	2	0	0	2	126
07:30 PM	5	48	0	0	53	0	5	0	0	5	3	101	0	0	104	0	0	0	0	0	162
07:45 PM	1	41	0	0	42	0	6	0	0	6	6	63	0	0	69	0	6	0	0	6	123
Total	14	190	0	0	204	0	25	0	0	25	13	293	0	0	306	0	12	0	0	12	547
08:00 PM	2	43	0	0	45	0	4	0	0	4	1	63	0	0	64	0	5	0	0	5	118
08:15 PM	2	56	0	0	58	0	8	0	0	8	2	88	0	0	90	0	3	0	0	3	159
08:30 PM	5	44	0	0	49	0	3	0	0	3	3	58	0	0	61	0	0	0	0	0	113
08:45 PM	3	41	0	0	44	0	2	0	0	2	0	44	0	0	44	0	5	0	0	5	95
Total	12	184	0	0	196	0	17	0	0	17	6	253	0	0	259	0	13	0	0	13	485
09:00 PM	4	29	0	0	33	0	1	0	0	1	0	51	0	0	51	0	1	0	0	1	86
09:15 PM	6	31	0	0	37	0	2	0	0	2	2	42	0	0	44	0	5	0	0	5	88
09:30 PM	1	25	0	0	26	0	2	0	0	2	3	52	0	0	55	0	1	0	0	1	84
09:45 PM	0	17	0	0	17	0	3	0	0	3	0	27	0	0	27	0	1	0	0	1	48
Total	11	102	0	0	113	0	8	0	0	8	5	172	0	0	177	0	8	0	0	8	306
10:00 PM	1	16	0	0	17	0	3	0	0	3	1	29	0	0	30	0	0	0	0	0	50
10:15 PM	1	18	0	0	19	0	0	0	0	0	0	18	0	0	18	0	0	0	0	0	37
10:30 PM	1	18	0	0	19	0	2	0	0	2	1	22	0	0	23	0	0	0	0	0	44
10:45 PM	2	6	0	0	8	0	3	0	0	3	0	16	0	0	16	0	0	0	0	0	27
Total	5	58	0	0	63	0	8	0	0	8	2	85	0	0	87	0	0	0	0	0	158
11:00 PM	3	4	0	0	7	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	20
11:15 PM	0	2	0	0	2	0	0	0	0	0	2	7	0	0	9	0	0	0	0	0	11
11:30 PM	0	5	0	0	5	0	2	0	0	2	0	10	0	0	10	0	0	0	0	0	17
11:45 PM	1	3	0	0	4	0	1	0	0	1	0	5	0	0	5	0	0	0	0	0	10
Total	4	14	0	0	18	0	3	0	0	3	2	35	0	0	37	0	0	0	0	0	58
Grand Total	232	6286	24	0	6542	433	209	180	0	822	134	6141	318	0	6593	24	162	130	0	316	14273
Apprch %	3.5	96.1	0.4	0		52.7	25.4	21.9	0		2	93.1	4.8	0		7.6	51.3	41.1	0		
Total %	1.6	44	0.2	0	45.8	3	1.5	1.3	0	5.8	0.9	43	2.2	0	46.2	0.2	1.1	0.9	0	2.2	

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Prairie Ridge Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Prairie Hill_8-29-23
Site Code :
Start Date : 8/29/2023

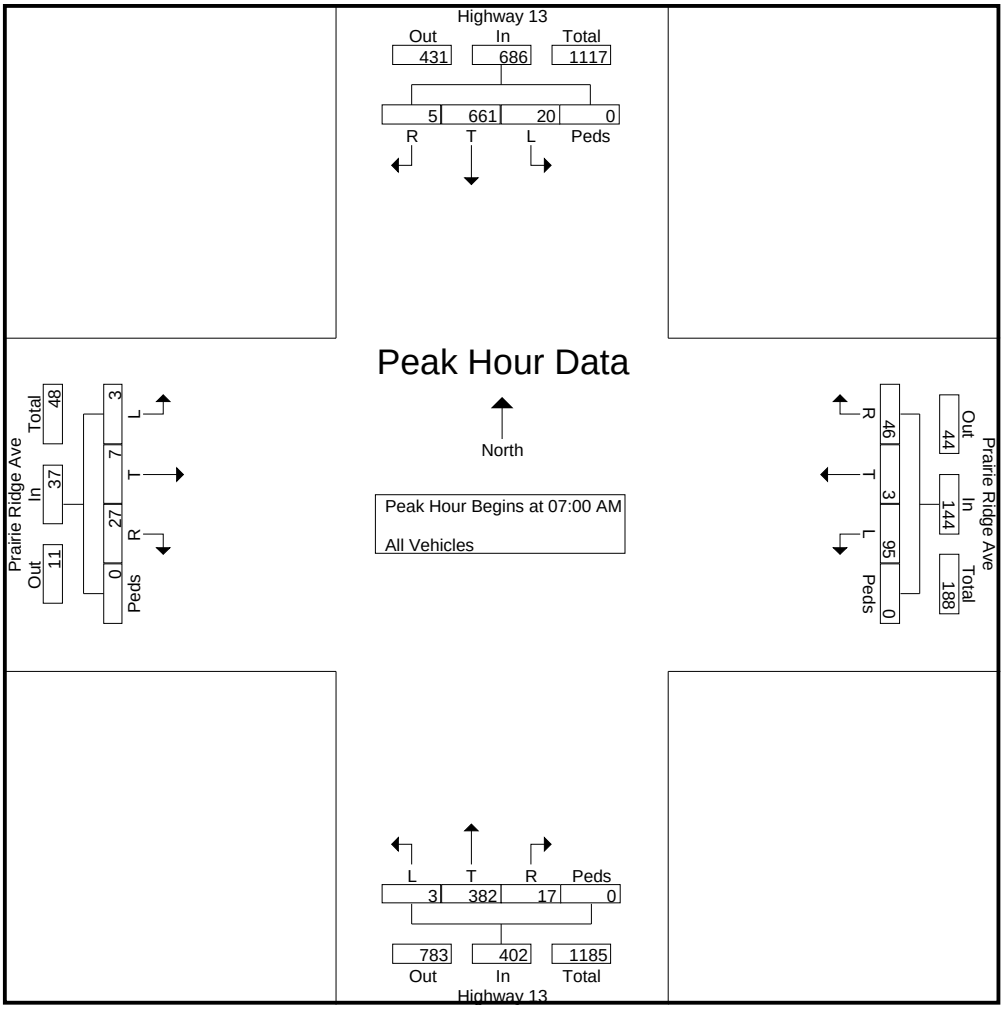


Snyder & Associates
2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Prairie Ridge Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Prairie Hill_8-29-23
Site Code :
Start Date : 8/29/2023

	Highway 13 Soutbound					Prairie Ridge Ave Westbound					Highway 13 Northbound					Prairie Ridge Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**6**	143	0	0	149	20	**3**	9	0	32	0	85	**5**	0	90	**1**	1	**8**	0	10	281
07:15 AM	4	155	0	0	159	29	0	**16**	0	45	1	**113**	4	0	**118**	1	**5**	8	0	**14**	336
07:30 AM	5	**198**	2	0	**205**	**31**	0	16	0	**47**	**2**	96	4	0	102	1	0	8	0	9	**363**
07:45 AM	5	165	**3**	0	173	15	0	5	0	20	0	88	4	0	92	0	1	3	0	4	289
Total Volume	20	661	5	0	686	95	3	46	0	144	3	382	17	0	402	3	7	27	0	37	1269
% App. Total																					
PHF	.833	.835	.417	.000	.837	.766	.250	.719	.000	.766	.375	.845	.850	.000	.852	.750	.350	.844	.000	.661	.874



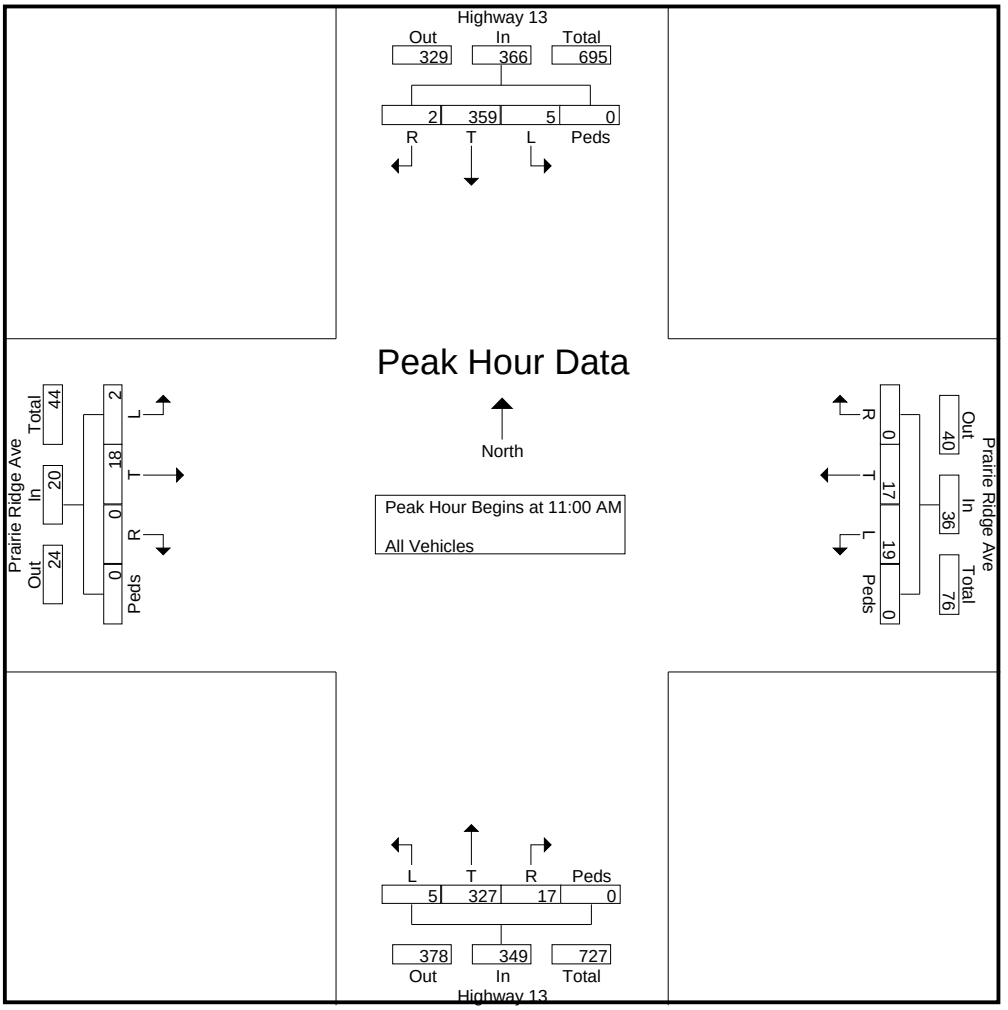
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Prairie Ridge Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Prairie Hill_8-29-23
Site Code :
Start Date : 8/29/2023
Page No : 6

	Highway 13 Soutbound					Prairie Ridge Ave Westbound					Highway 13 Northbound					Prairie Ridge Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:00 AM																					
11:00 AM	0	**101**	**1**	0	**102**	3	6	0	0	9	0	75	2	0	77	0	3	0	0	3	191
11:15 AM	**3**	86	0	0	89	**7**	0	0	0	7	**2**	**86**	4	0	**92**	**2**	2	0	0	4	192
11:30 AM	0	92	0	0	92	5	1	0	0	6	1	84	4	0	89	0	6	0	0	6	193
11:45 AM	2	80	1	0	83	4	**10**	0	0	**14**	2	82	**7**	0	91	0	**7**	0	0	**7**	**195**
Total Volume	5	359	2	0	366	19	17	0	0	36	5	327	17	0	349	2	18	0	0	20	771
% App. Total																					
PHF	.417	.889	.500	.000	.897	.679	.425	.000	.000	.643	.625	.951	.607	.000	.948	.250	.643	.000	.000	.714	.988



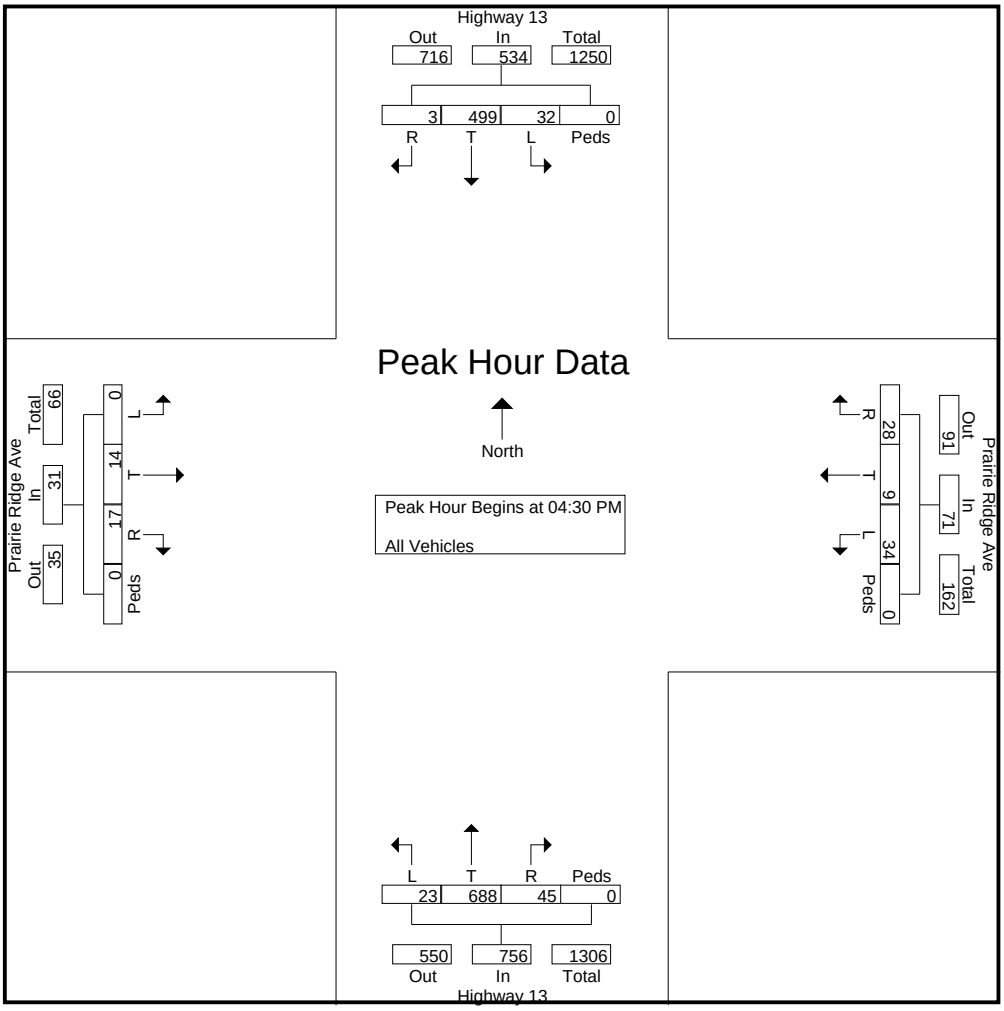
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Prairie Ridge Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Prairie Hill_8-29-23
Site Code :
Start Date : 8/29/2023

	Highway 13 Soutbound					Prairie Ridge Ave Westbound					Highway 13 Northbound					Prairie Ridge Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	5	**156**	1	0	**162**	7	0	**10**	0	17	**8**	167	**17**	0	192	0	**5**	0	0	5	**376**
04:45 PM	7	112	**2**	0	121	**11**	2	10	0	**23**	6	**188**	10	0	**204**	0	4	4	0	8	356
05:00 PM	**10**	124	0	0	134	11	0	2	0	13	5	165	13	0	183	0	1	6	0	7	337
05:15 PM	10	107	0	0	117	5	**7**	6	0	18	4	168	5	0	177	0	4	**7**	0	**11**	323
Total Volume	32	499	3	0	534	34	9	28	0	71	23	688	45	0	756	0	14	17	0	31	1392
% App. Total																					
PHF	.800	.800	.375	.000	.824	.773	.321	.700	.000	.772	.719	.915	.662	.000	.926	.000	.700	.607	.000	.705	.926



Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Kacena Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Kacena_9-6-23
Site Code :
Start Date : 9/6/2023
Page No : 1

Groups Printed- All Vehicles

	Highway 13 Soutbound					E Kacena Ave Westbound					Highway 13 Northbound					Kacena Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 AM	0	5	0	0	5	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	14
12:15 AM	0	3	0	0	3	0	0	0	0	0	0	6	0	0	6	0	1	0	0	1	10
12:30 AM	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	7
12:45 AM	0	4	0	0	4	0	0	0	0	0	1	4	0	0	5	0	0	0	0	0	9
Total	0	13	0	0	13	0	0	0	0	0	1	25	0	0	26	0	1	0	0	1	40
01:00 AM	0	5	0	0	5	0	0	0	0	0	1	4	0	0	5	0	1	0	0	1	11
01:15 AM	0	3	0	0	3	0	0	0	0	0	1	4	0	0	5	0	0	0	0	0	8
01:30 AM	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
01:45 AM	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	7
Total	1	11	0	0	12	0	0	0	0	0	2	14	0	0	16	0	1	0	0	1	29
02:00 AM	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
02:15 AM	0	4	0	0	4	0	2	0	0	2	0	7	0	0	7	0	0	0	0	0	13
02:30 AM	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	6
02:45 AM	0	10	0	0	10	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	14
Total	0	20	0	0	20	0	2	0	0	2	0	15	0	0	15	0	0	0	0	0	37
03:00 AM	0	5	0	0	5	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	9
03:15 AM	0	11	0	0	11	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	15
03:30 AM	0	10	0	0	10	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	13
03:45 AM	0	14	0	0	14	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	18
Total	0	40	0	0	40	0	0	0	0	0	1	14	0	0	15	0	0	0	0	0	55
04:00 AM	0	6	0	0	6	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	13
04:15 AM	0	27	0	0	27	0	1	0	0	1	1	1	0	0	2	0	4	0	0	4	34
04:30 AM	0	24	0	0	24	0	1	0	0	1	0	12	0	0	12	0	0	0	0	0	37
04:45 AM	0	26	0	0	26	0	1	0	0	1	0	7	0	0	7	0	0	0	0	0	34
Total	0	83	0	0	83	0	3	0	0	3	1	27	0	0	28	0	4	0	0	4	118
05:00 AM	0	33	0	0	33	0	1	0	0	1	0	5	0	0	5	0	4	0	0	4	43
05:15 AM	0	64	0	0	64	0	1	0	0	1	1	17	0	0	18	0	4	0	0	4	87
05:30 AM	0	80	0	0	80	0	4	0	0	4	0	22	0	0	22	0	5	0	0	5	111
05:45 AM	0	100	0	0	100	0	2	0	0	2	1	23	0	0	24	0	5	0	0	5	131
Total	0	277	0	0	277	0	8	0	0	8	2	67	0	0	69	0	18	0	0	18	372
06:00 AM	0	93	0	0	93	6	0	0	0	6	0	38	1	0	39	0	6	2	0	8	146
06:15 AM	1	142	0	0	143	7	5	1	0	13	1	49	3	0	53	1	0	6	0	7	216
06:30 AM	0	177	0	0	177	1	4	1	0	6	3	59	0	0	62	1	7	9	0	17	262
06:45 AM	0	151	1	0	152	6	0	2	0	8	4	97	1	0	102	1	0	12	0	13	275
Total	1	563	1	0	565	20	9	4	0	33	8	243	5	0	256	3	13	29	0	45	899
07:00 AM	0	161	1	0	162	9	0	3	0	12	6	114	2	0	122	1	11	8	0	20	316
07:15 AM	0	185	2	0	187	10	0	0	0	10	7	120	5	0	132	1	5	13	0	19	348
07:30 AM	2	213	4	0	219	9	1	1	0	11	9	100	3	0	112	0	13	10	0	23	365
07:45 AM	1	172	1	0	174	5	0	1	0	6	6	83	2	0	91	1	12	3	0	16	287
Total	3	731	8	0	742	33	1	5	0	39	28	417	12	0	457	3	41	34	0	78	1316
08:00 AM	1	131	2	0	134	5	2	1	0	8	12	86	3	0	101	2	2	16	0	20	263
08:15 AM	0	144	2	0	146	5	3	1	0	9	11	83	3	0	97	1	22	8	0	31	283
08:30 AM	2	152	1	0	155	6	2	1	0	9	6	81	1	0	88	0	4	15	0	19	271
08:45 AM	2	136	6	0	144	2	2	5	0	9	8	86	5	0	99	10	0	0	0	10	262
Total	5	563	11	0	579	18	9	8	0	35	37	336	12	0	385	13	28	39	0	80	1079
09:00 AM	2	100	4	0	106	2	9	0	0	11	0	69	7	0	76	4	0	5	0	9	202

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Kacena Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Kacena_9-6-23
Site Code :
Start Date : 9/6/2023

Groups Printed- All Vehicles

	Highway 13 Soutbound					E Kacena Ave Westbound					Highway 13 Northbound					Kacena Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
09:15 AM	0	80	0	0	80	3	3	1	0	7	2	90	6	0	98	1	4	5	0	10	195
09:30 AM	1	96	0	0	97	4	0	4	0	8	4	87	3	0	94	4	2	1	0	7	206
09:45 AM	2	84	0	0	86	9	0	2	0	11	3	83	2	0	88	3	23	4	0	30	215
Total	5	360	4	0	369	18	12	7	0	37	9	329	18	0	356	12	29	15	0	56	818
10:00 AM	0	88	1	0	89	2	0	0	0	2	6	98	5	0	109	3	21	1	0	25	225
10:15 AM	5	70	2	0	77	9	0	3	0	12	6	91	6	0	103	1	11	5	0	17	209
10:30 AM	3	91	0	0	94	2	2	2	0	6	7	93	2	0	102	0	27	0	0	27	229
10:45 AM	2	104	3	0	109	4	0	0	0	4	1	68	6	0	75	0	12	3	0	15	203
Total	10	353	6	0	369	17	2	5	0	24	20	350	19	0	389	4	71	9	0	84	866
11:00 AM	11	106	1	0	118	4	4	1	0	9	14	68	4	0	86	0	20	6	0	26	239
11:15 AM	1	116	2	0	119	5	6	0	0	11	11	72	5	0	88	1	2	10	0	13	231
11:30 AM	1	126	3	0	130	4	12	1	0	17	6	84	5	0	95	1	4	2	0	7	249
11:45 AM	1	124	0	0	125	4	3	1	0	8	8	63	4	0	75	1	0	8	0	9	217
Total	14	472	6	0	492	17	25	3	0	45	39	287	18	0	344	3	26	26	0	55	936
12:00 PM	1	118	2	0	121	3	0	5	0	8	7	86	5	0	98	1	5	3	0	9	236
12:15 PM	0	110	0	0	110	4	0	2	0	6	4	97	2	0	103	2	3	6	0	11	230
12:30 PM	1	98	0	0	99	6	0	2	0	8	4	111	3	0	118	3	0	3	0	6	231
12:45 PM	2	105	0	0	107	2	1	0	0	3	6	87	1	0	94	0	4	2	0	6	210
Total	4	431	2	0	437	15	1	9	0	25	21	381	11	0	413	6	12	14	0	32	907
01:00 PM	0	83	0	0	83	3	2	0	0	5	5	125	2	0	132	0	4	5	0	9	229
01:15 PM	0	98	2	0	100	4	0	1	0	5	2	108	2	0	112	2	-1	1	0	2	219
01:30 PM	1	90	1	0	92	4	0	0	0	4	5	121	1	0	127	0	3	9	0	12	235
01:45 PM	1	96	1	0	98	7	1	2	0	10	4	109	6	0	119	3	2	6	0	11	238
Total	2	367	4	0	373	18	3	3	0	24	16	463	11	0	490	5	8	21	0	34	921
02:00 PM	1	87	3	0	91	4	3	0	0	7	4	118	8	0	130	1	4	6	0	11	239
02:15 PM	1	101	2	0	104	4	0	2	0	6	7	122	6	0	135	2	2	3	0	7	252
02:30 PM	4	110	2	0	116	7	-1	1	0	7	8	107	6	0	121	1	2	6	0	9	253
02:45 PM	0	92	3	0	95	1	2	1	0	4	11	134	7	0	152	2	3	6	0	11	262
Total	6	390	10	0	406	16	4	4	0	24	30	481	27	0	538	6	11	21	0	38	1006
03:00 PM	3	91	2	0	96	2	4	0	0	6	9	119	4	0	132	2	4	9	0	15	249
03:15 PM	1	123	3	0	127	9	0	0	0	9	6	126	10	0	142	3	11	12	0	26	304
03:30 PM	1	144	3	0	148	2	2	1	0	5	4	156	3	0	163	2	6	9	0	17	333
03:45 PM	1	136	3	0	140	1	2	0	0	3	13	151	6	0	170	4	6	9	0	19	332
Total	6	494	11	0	511	14	8	1	0	23	32	552	23	0	607	11	27	39	0	77	1218
04:00 PM	1	167	3	0	171	3	0	3	0	6	12	181	5	0	198	3	11	13	0	27	402
04:15 PM	1	117	0	0	118	3	1	1	0	5	10	204	6	0	220	3	5	9	0	17	360
04:30 PM	3	143	3	0	149	5	2	0	0	7	16	157	6	0	179	0	5	9	0	14	349
04:45 PM	1	137	4	0	142	3	4	2	0	9	9	196	11	0	216	5	9	8	0	22	389
Total	6	564	10	0	580	14	7	6	0	27	47	738	28	0	813	11	30	39	0	80	1500
05:00 PM	2	144	2	0	148	7	0	2	0	9	12	205	14	0	231	8	9	6	0	23	411
05:15 PM	4	143	2	0	149	4	2	1	0	7	5	207	6	0	218	2	8	4	0	14	388
05:30 PM	2	148	3	0	153	5	0	3	0	8	8	210	10	0	228	4	6	7	0	17	406
05:45 PM	1	109	4	0	114	3	3	0	0	6	8	141	3	0	152	1	5	7	0	13	285
Total	9	544	11	0	564	19	5	6	0	30	33	763	33	0	829	15	28	24	0	67	1490
06:00 PM	0	98	3	0	101	3	0	1	0	4	7	152	7	0	166	3	6	4	0	13	284
06:15 PM	1	97	3	0	101	9	0	0	0	9	7	115	6	0	128	1	4	5	0	10	248
06:30 PM	1	79	2	0	82	2	1	0	0	3	8	123	4	0	135	1	4	4	0	9	229
06:45 PM	0	62	1	0	63	1	1	2	0	4	9	92	12	0	113	1	7	4	0	12	192
Total	2	336	9	0	347	15	2	3	0	20	31	482	29	0	542	6	21	17	0	44	953

Snyder & Associates
2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Kacena Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Kacena_9-6-23
Site Code :
Start Date : 9/6/2023

Groups Printed- All Vehicles

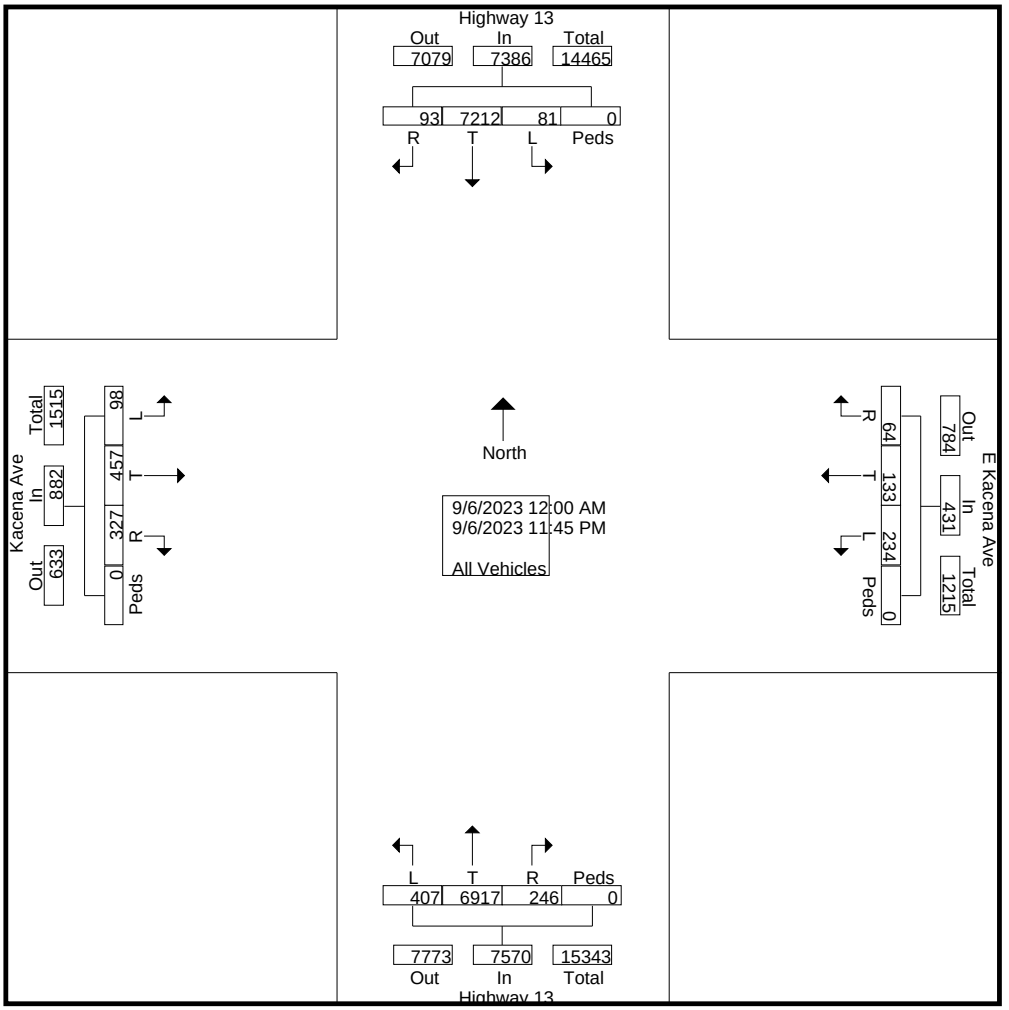
	Highway 13 Soutbound					E Kacena Ave Westbound					Highway 13 Northbound					Kacena Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 PM	0	82	0	0	82	0	6	0	0	6	2	87	0	0	89	0	9	0	0	9	186
07:15 PM	2	63	0	0	65	0	0	0	0	0	7	94	0	0	101	0	6	0	0	6	172
07:30 PM	1	50	0	0	51	0	4	0	0	4	3	90	0	0	93	0	11	0	0	11	159
07:45 PM	1	63	0	0	64	0	4	0	0	4	9	83	0	0	92	0	8	0	0	8	168
Total	4	258	0	0	262	0	14	0	0	14	21	354	0	0	375	0	34	0	0	34	685
08:00 PM	0	50	0	0	50	0	1	0	0	1	3	74	0	0	77	0	8	0	0	8	136
08:15 PM	0	66	0	0	66	0	2	0	0	2	5	75	0	0	80	0	8	0	0	8	156
08:30 PM	0	37	0	0	37	0	1	0	0	1	3	60	0	0	63	0	11	0	0	11	112
08:45 PM	0	26	0	0	26	0	0	0	0	0	2	67	0	0	69	0	7	0	0	7	102
Total	0	179	0	0	179	0	4	0	0	4	13	276	0	0	289	0	34	0	0	34	506
09:00 PM	1	29	0	0	30	0	3	0	0	3	0	54	0	0	54	0	4	0	0	4	91
09:15 PM	1	23	0	0	24	0	0	0	0	0	2	41	0	0	43	0	4	0	0	4	71
09:30 PM	0	23	0	0	23	0	1	0	0	1	1	37	0	0	38	0	2	0	0	2	64
09:45 PM	0	20	0	0	20	0	3	0	0	3	3	34	0	0	37	0	4	0	0	4	64
Total	2	95	0	0	97	0	7	0	0	7	6	166	0	0	172	0	14	0	0	14	290
10:00 PM	1	19	0	0	20	0	2	0	0	2	2	33	0	0	35	0	2	0	0	2	59
10:15 PM	0	18	0	0	18	0	1	0	0	1	0	20	0	0	20	0	2	0	0	2	41
10:30 PM	0	10	0	0	10	0	2	0	0	2	0	17	0	0	17	0	0	0	0	0	29
10:45 PM	0	3	0	0	3	0	1	0	0	1	1	15	0	0	16	0	1	0	0	1	21
Total	1	50	0	0	51	0	6	0	0	6	3	85	0	0	88	0	5	0	0	5	150
11:00 PM	0	5	0	0	5	0	1	0	0	1	1	13	0	0	14	0	1	0	0	1	21
11:15 PM	0	4	0	0	4	0	0	0	0	0	2	21	0	0	23	0	0	0	0	0	27
11:30 PM	0	3	0	0	3	0	0	0	0	0	1	8	0	0	9	0	0	0	0	0	12
11:45 PM	0	6	0	0	6	0	0	0	0	0	2	10	0	0	12	0	0	0	0	0	18
Total	0	18	0	0	18	0	1	0	0	1	6	52	0	0	58	0	1	0	0	1	78
Grand Total	81	7212	93	0	7386	234	133	64	0	431	407	6917	246	0	7570	98	457	327	0	882	16269
Apprch %	1.1	97.6	1.3	0		54.3	30.9	14.8	0		5.4	91.4	3.2	0		11.1	51.8	37.1	0		
Total %	0.5	44.3	0.6	0	45.4	1.4	0.8	0.4	0	2.6	2.5	42.5	1.5	0	46.5	0.6	2.8	2	0	5.4	

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Kacena Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Kacena_9-6-23
Site Code :
Start Date : 9/6/2023
Page No : 4



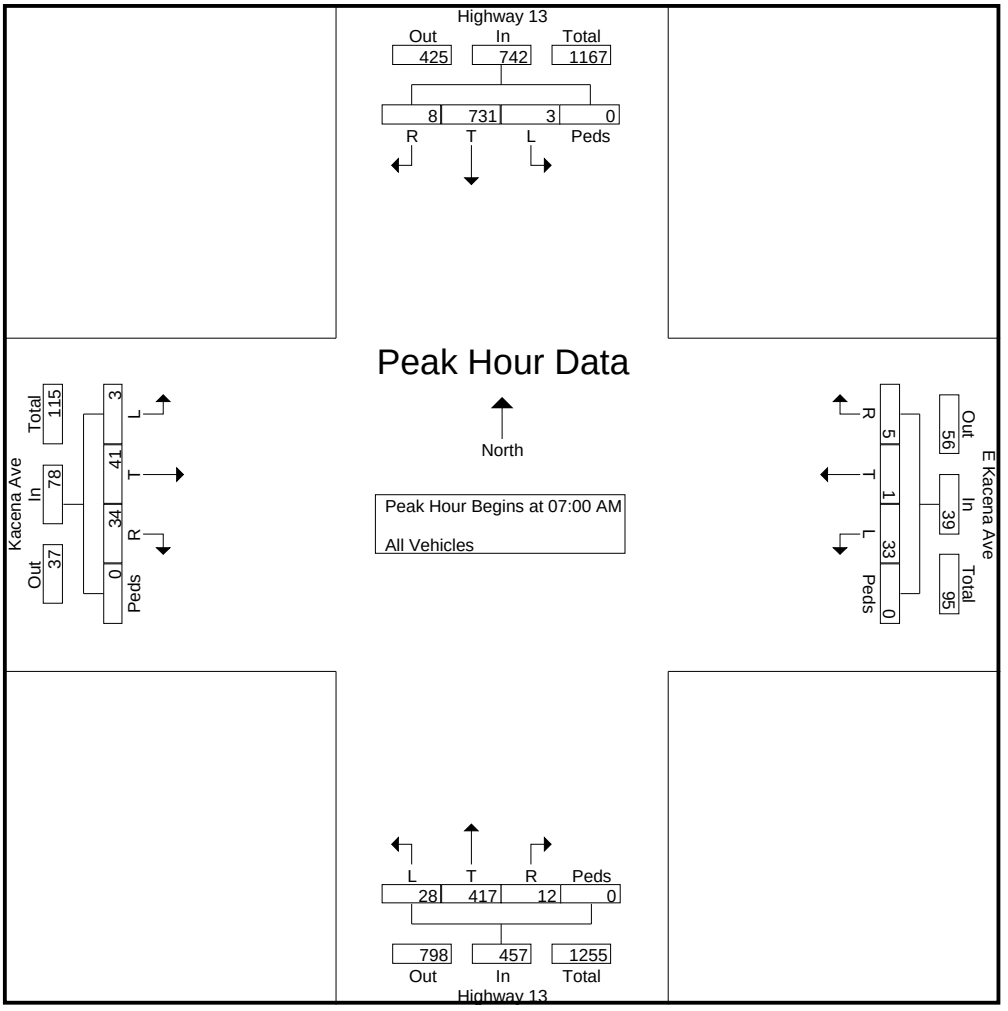
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Kacena Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Kacena_9-6-23
Site Code :
Start Date : 9/6/2023

	Highway 13 Soutbound					E Kacena Ave Westbound					Highway 13 Northbound					Kacena Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	161	1	0	162	9	0	**3**	0	**12**	6	114	2	0	122	**1**	11	8	0	20	316
07:15 AM	0	185	2	0	187	**10**	0	0	0	10	7	**120**	**5**	0	**132**	1	5	**13**	0	19	348
07:30 AM	**2**	**213**	**4**	0	**219**	9	**1**	1	0	11	**9**	100	3	0	112	0	**13**	10	0	**23**	**365**
07:45 AM	1	172	1	0	174	5	0	1	0	6	6	83	2	0	91	1	12	3	0	16	287
Total Volume	3	731	8	0	742	33	1	5	0	39	28	417	12	0	457	3	41	34	0	78	1316
% App. Total																					
PHF	.375	.858	.500	.000	.847	.825	.250	.417	.000	.813	.778	.869	.600	.000	.866	.750	.788	.654	.000	.848	.901



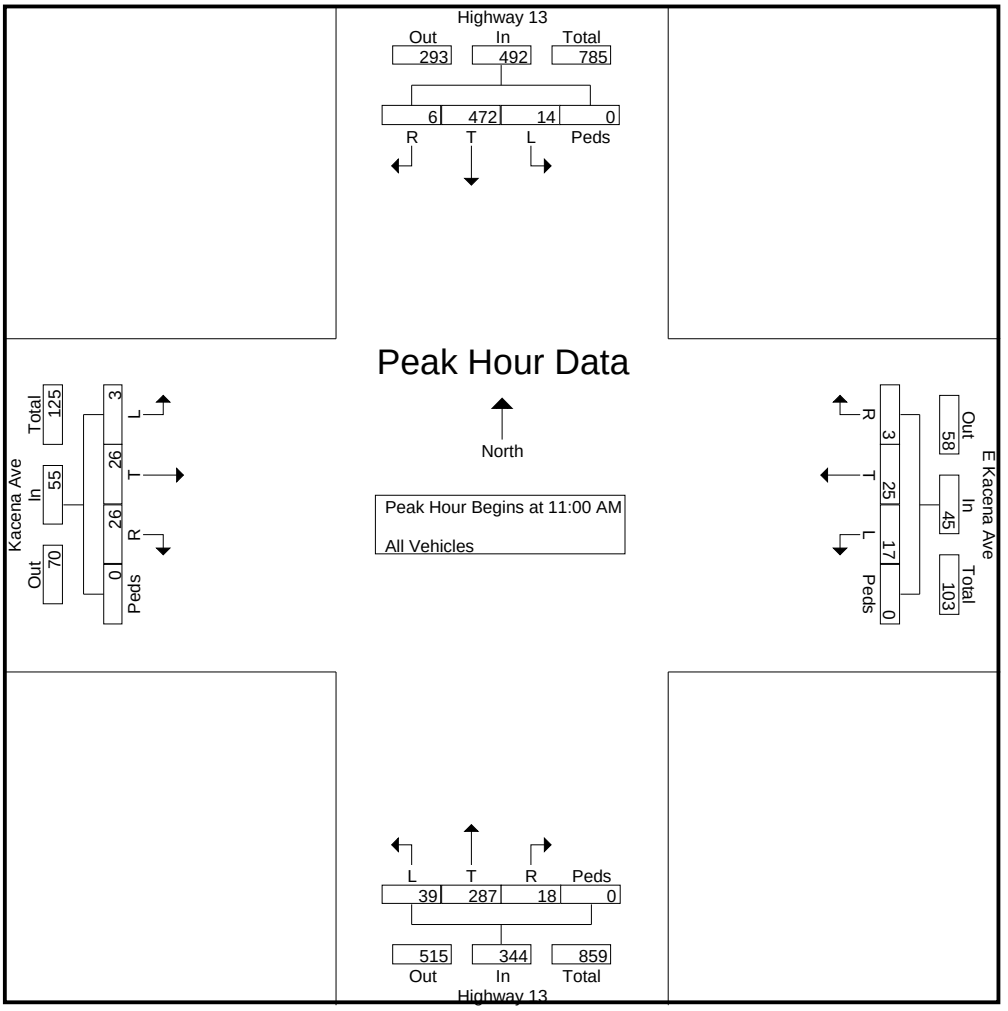
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Kacena Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Kacena_9-6-23
Site Code :
Start Date : 9/6/2023

	Highway 13 Soutbound					E Kacena Ave Westbound					Highway 13 Northbound					Kacena Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:00 AM																					
11:00 AM	**11**	106	1	0	118	4	4	**1**	0	9	**14**	68	4	0	86	0	**20**	6	0	**26**	239
11:15 AM	1	116	2	0	119	**5**	6	0	0	11	11	72	**5**	0	88	**1**	2	**10**	0	13	231
11:30 AM	1	**126**	**3**	0	**130**	4	**12**	1	0	**17**	6	**84**	5	0	**95**	1	4	2	0	7	**249**
11:45 AM	1	124	0	0	125	4	3	1	0	8	8	63	4	0	75	1	0	8	0	9	217
Total Volume	14	472	6	0	492	17	25	3	0	45	39	287	18	0	344	3	26	26	0	55	936
% App. Total																					
PHF	.318	.937	.500	.000	.946	.850	.521	.750	.000	.662	.696	.854	.900	.000	.905	.750	.325	.650	.000	.529	.940



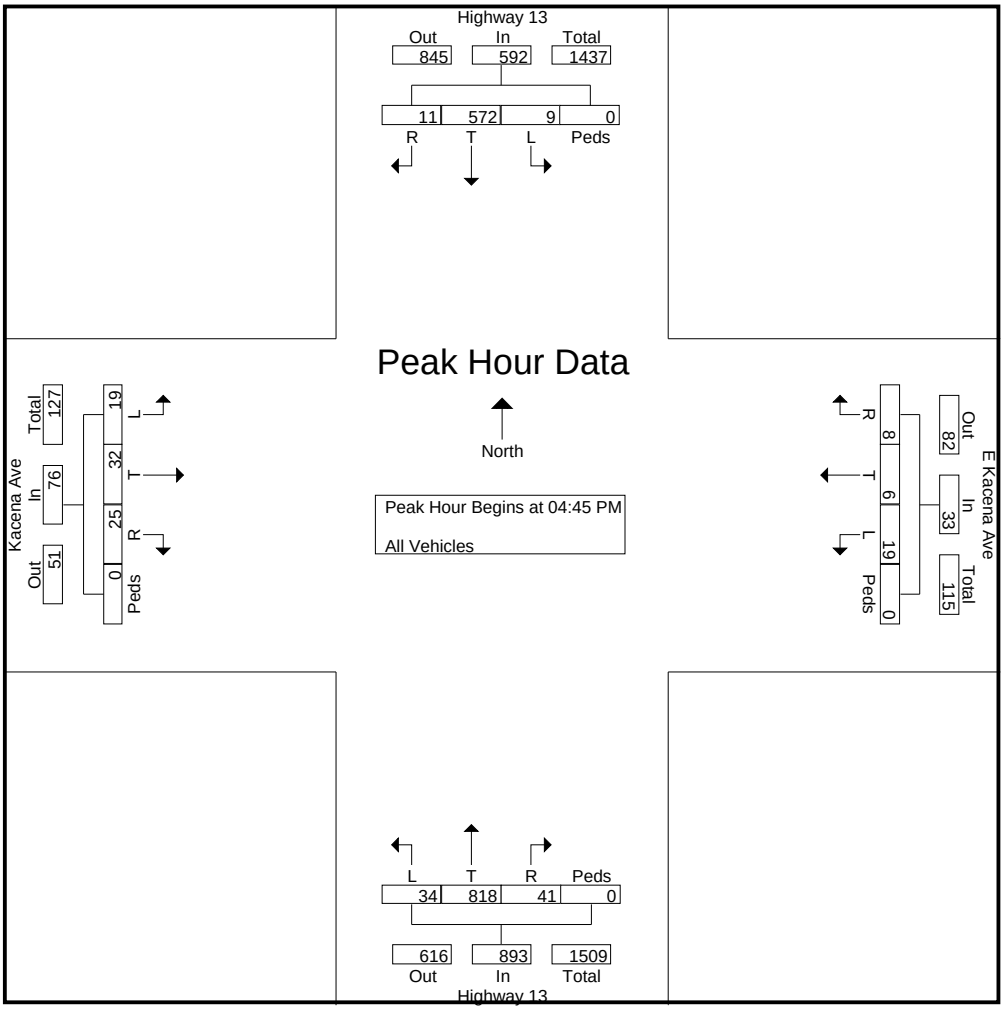
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Kacena Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Kacena_9-6-23
Site Code :
Start Date : 9/6/2023

	Highway 13 Soutbound					E Kacena Ave Westbound					Highway 13 Northbound					Kacena Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	1	137	**4**	0	142	3	**4**	2	0	**9**	9	196	11	0	216	5	**9**	**8**	0	22	389
05:00 PM	2	144	2	0	148	**7**	0	2	0	9	**12**	205	**14**	0	**231**	**8**	9	6	0	**23**	**411**
05:15 PM	**4**	143	2	0	149	4	2	1	0	7	5	207	6	0	218	2	8	4	0	14	388
05:30 PM	2	**148**	3	0	**153**	5	0	**3**	0	8	8	**210**	10	0	228	4	6	7	0	17	406
Total Volume	9	572	11	0	592	19	6	8	0	33	34	818	41	0	893	19	32	25	0	76	1594
% App. Total																					
PHF	.563	.966	.688	.000	.967	.679	.375	.667	.000	.917	.708	.974	.732	.000	.966	.594	.889	.781	.000	.826	.970



Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Hennessey Pkwy
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Hennessey_10-24-23
Site Code :
Start Date : 10/24/2023
Page No : 1

Groups Printed- All Vehicles

	Highway 13 Soutbound					Hennessey Pkwy Westbound					Highway 13 Northbound					Pawnee Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 AM	2	2	0	0	4	3	0	0	0	3	1	6	3	0	10	0	1	0	0	1	18
12:15 AM	1	2	0	0	3	1	2	0	0	3	0	7	2	0	9	0	0	0	0	0	15
12:30 AM	0	3	0	0	3	0	0	0	0	0	0	3	2	0	5	0	0	0	0	0	8
12:45 AM	0	3	0	0	3	3	3	0	0	6	0	3	3	0	6	0	0	0	0	0	15
Total	3	10	0	0	13	7	5	0	0	12	1	19	10	0	30	0	1	0	0	1	56
01:00 AM	0	2	0	0	2	3	1	0	0	4	0	4	3	0	7	0	0	0	0	0	13
01:15 AM	0	5	0	0	5	4	1	0	0	5	0	3	2	0	5	0	0	0	0	0	15
01:30 AM	1	2	0	0	3	2	0	0	0	2	0	2	0	0	2	0	0	0	0	0	7
01:45 AM	2	2	0	0	4	1	3	0	0	4	0	1	4	0	5	0	0	0	0	0	13
Total	3	11	0	0	14	10	5	0	0	15	0	10	9	0	19	0	0	0	0	0	48
02:00 AM	2	4	0	0	6	1	2	0	0	3	0	2	2	0	4	0	0	0	0	0	13
02:15 AM	1	4	0	0	5	0	1	0	0	1	0	5	2	0	7	0	0	0	0	0	13
02:30 AM	4	5	0	0	9	2	1	0	0	3	0	2	0	0	2	0	0	0	0	0	14
02:45 AM	0	3	0	0	3	3	1	0	0	4	0	0	1	0	1	0	0	0	0	0	8
Total	7	16	0	0	23	6	5	0	0	11	0	9	5	0	14	0	0	0	0	0	48
03:00 AM	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	5
03:15 AM	0	3	0	0	3	0	1	0	0	1	1	2	0	0	3	0	0	0	0	0	7
03:30 AM	2	8	0	0	10	5	0	0	0	5	0	4	2	0	6	0	0	0	0	0	21
03:45 AM	1	10	0	0	11	4	2	0	0	6	0	3	1	0	4	0	0	0	0	0	21
Total	3	22	0	0	25	9	3	0	0	12	1	13	3	0	17	0	0	0	0	0	54
04:00 AM	4	11	0	0	15	11	3	0	0	14	0	4	0	0	4	0	0	0	0	0	33
04:15 AM	1	17	0	0	18	12	2	0	0	14	0	1	2	0	3	0	0	0	0	0	35
04:30 AM	5	30	1	0	36	11	0	0	0	11	0	6	1	0	7	0	1	0	0	1	55
04:45 AM	2	36	0	0	38	7	2	0	0	9	0	16	2	0	18	0	1	0	0	1	66
Total	12	94	1	0	107	41	7	0	0	48	0	27	5	0	32	0	2	0	0	2	189
05:00 AM	6	42	0	0	48	10	3	0	0	13	1	8	3	0	12	0	0	0	0	0	73
05:15 AM	6	48	0	0	54	28	2	0	0	30	1	8	2	0	11	0	0	0	0	0	95
05:30 AM	8	74	0	0	82	29	9	0	0	38	0	10	4	0	14	0	1	0	0	1	135
05:45 AM	16	77	0	0	93	25	9	0	0	34	0	28	11	0	39	0	2	0	0	2	168
Total	36	241	0	0	277	92	23	0	0	115	2	54	20	0	76	0	3	0	0	3	471
06:00 AM	6	103	0	0	109	29	9	5	0	43	3	20	4	0	27	0	2	1	0	3	182
06:15 AM	19	155	0	0	174	46	20	15	0	81	0	22	10	0	32	0	4	2	0	6	293
06:30 AM	14	177	0	0	191	55	19	12	0	86	0	51	5	0	56	0	2	1	0	3	336
06:45 AM	11	157	0	0	168	33	22	14	0	69	2	78	5	0	85	3	3	1	0	7	329
Total	50	592	0	0	642	163	70	46	0	279	5	171	24	0	200	3	11	5	0	19	1140
07:00 AM	14	175	1	0	190	36	12	5	0	53	0	103	11	0	114	0	1	0	0	1	358
07:15 AM	13	176	0	0	189	34	35	12	0	81	0	136	6	0	142	0	0	1	0	1	413
07:30 AM	24	239	0	0	263	30	19	22	0	71	1	88	13	0	102	0	4	2	0	6	442
07:45 AM	21	177	1	0	199	40	18	25	0	83	3	100	16	0	119	0	4	3	0	7	408
Total	72	767	2	0	841	140	84	64	0	288	4	427	46	0	477	0	9	6	0	15	1621
08:00 AM	18	150	6	0	174	22	31	24	0	77	1	89	16	0	106	0	5	0	0	5	362
08:15 AM	21	136	0	0	157	27	25	17	0	69	0	97	18	0	115	1	1	1	0	3	344
08:30 AM	17	141	6	0	164	34	20	16	0	70	6	80	9	0	95	0	6	1	0	7	336
08:45 AM	11	115	2	0	128	22	21	14	0	57	1	66	20	0	87	0	0	2	0	2	274
Total	67	542	14	0	623	105	97	71	0	273	8	332	63	0	403	1	12	4	0	17	1316
09:00 AM	7	116	3	0	126	25	20	12	0	57	2	79	10	0	91	0	2	0	0	2	276

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Hennessey Pkwy
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Hennessey_10-24-23
Site Code :
Start Date : 10/24/2023

Groups Printed- All Vehicles

	Highway 13 Soutbound					Hennessey Pkwy Westbound					Highway 13 Northbound					Pawnee Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
09:15 AM	9	102	0	0	111	29	11	9	0	49	0	86	9	0	95	0	0	0	0	0	255
09:30 AM	4	100	0	0	104	20	13	10	0	43	1	70	16	0	87	1	1	0	0	2	236
09:45 AM	5	94	1	0	100	24	16	8	0	48	2	73	22	0	97	1	4	1	0	6	251
Total	25	412	4	0	441	98	60	39	0	197	5	308	57	0	370	2	7	1	0	10	1018
10:00 AM	8	88	4	0	100	27	11	5	0	43	1	89	16	0	106	2	17	2	0	21	270
10:15 AM	11	100	2	0	113	27	10	6	0	43	4	79	17	0	100	3	6	1	0	10	266
10:30 AM	7	92	1	0	100	17	18	8	0	43	4	67	18	0	89	0	7	1	0	8	240
10:45 AM	11	78	3	0	92	27	22	8	0	57	3	71	18	0	92	1	6	3	0	10	251
Total	37	358	10	0	405	98	61	27	0	186	12	306	69	0	387	6	36	7	0	49	1027
11:00 AM	16	78	3	0	97	45	26	13	0	84	4	92	27	0	123	2	9	2	0	13	317
11:15 AM	16	88	2	0	106	24	27	14	0	65	3	84	31	0	118	3	11	0	0	14	303
11:30 AM	21	102	9	0	132	45	27	17	0	89	21	85	24	0	130	4	16	2	0	22	373
11:45 AM	13	84	6	0	103	45	30	20	0	95	13	102	28	0	143	8	20	15	0	43	384
Total	66	352	20	0	438	159	110	64	0	333	41	363	110	0	514	17	56	19	0	92	1377
12:00 PM	18	107	8	0	133	40	36	19	0	95	10	83	40	0	133	4	25	11	0	40	401
12:15 PM	30	108	8	0	146	43	42	25	0	110	16	115	30	0	161	4	10	14	0	28	445
12:30 PM	15	108	14	0	137	51	53	27	0	131	10	85	31	0	126	2	9	17	0	28	422
12:45 PM	17	61	2	0	80	32	18	12	0	62	6	88	29	0	123	4	15	16	0	35	300
Total	80	384	32	0	496	166	149	83	0	398	42	371	130	0	543	14	59	58	0	131	1568
01:00 PM	9	92	4	0	105	43	24	18	0	85	13	99	30	0	142	5	25	16	0	46	378
01:15 PM	12	95	5	0	112	32	26	11	0	69	13	119	28	0	160	5	10	10	0	25	366
01:30 PM	13	107	1	0	121	30	21	13	0	64	6	103	29	0	138	2	12	10	0	24	347
01:45 PM	7	91	3	0	101	34	17	11	0	62	11	123	15	0	149	8	11	8	0	27	339
Total	41	385	13	0	439	139	88	53	0	280	43	444	102	0	589	20	58	44	0	122	1430
02:00 PM	15	76	6	0	97	31	39	27	0	97	5	138	31	0	174	4	12	6	0	22	390
02:15 PM	8	91	0	0	99	34	28	13	0	75	18	144	20	0	182	0	13	8	0	21	377
02:30 PM	10	105	5	0	120	30	38	19	0	87	6	112	31	0	149	10	16	3	0	29	385
02:45 PM	17	98	1	0	116	24	39	24	0	87	10	101	24	0	135	3	12	10	0	25	363
Total	50	370	12	0	432	119	144	83	0	346	39	495	106	0	640	17	53	27	0	97	1515
03:00 PM	14	78	3	0	95	19	26	17	0	62	9	119	29	0	157	8	20	3	0	31	345
03:15 PM	32	97	4	0	133	33	31	21	0	85	7	100	27	0	134	8	8	7	0	23	375
03:30 PM	20	115	8	0	143	38	45	22	0	105	9	183	45	0	237	1	11	6	0	18	503
03:45 PM	17	112	5	0	134	37	29	28	0	94	9	160	33	0	202	3	15	3	0	21	451
Total	83	402	20	0	505	127	131	88	0	346	34	562	134	0	730	20	54	19	0	93	1674
04:00 PM	17	144	6	0	167	30	38	17	0	85	10	162	38	0	210	1	9	8	0	18	480
04:15 PM	16	134	6	0	156	39	33	22	0	94	8	195	40	0	243	5	14	13	0	32	525
04:30 PM	24	137	4	0	165	36	48	23	0	107	12	157	41	0	210	3	10	6	0	19	501
04:45 PM	32	122	7	0	161	45	28	21	0	94	12	164	46	0	222	2	15	7	0	24	501
Total	89	537	23	0	649	150	147	83	0	380	42	678	165	0	885	11	48	34	0	93	2007
05:00 PM	14	100	4	0	118	38	47	23	0	108	15	174	29	0	218	7	14	9	0	30	474
05:15 PM	28	80	4	0	112	44	33	22	0	99	11	171	45	0	227	4	9	12	0	25	463
05:30 PM	23	92	4	0	119	38	32	25	0	95	13	163	41	0	217	8	18	6	0	32	463
05:45 PM	17	87	3	0	107	38	28	19	0	85	10	134	31	0	175	6	17	10	0	33	400
Total	82	359	15	0	456	158	140	89	0	387	49	642	146	0	837	25	58	37	0	120	1800
06:00 PM	16	63	8	0	87	56	43	27	0	126	12	89	46	0	147	0	13	7	0	20	380
06:15 PM	23	90	8	0	121	43	54	32	0	129	19	108	29	0	156	6	17	6	0	29	435
06:30 PM	15	61	6	0	82	38	40	25	0	103	11	91	37	0	139	5	15	12	0	32	356
06:45 PM	20	59	9	0	88	35	43	27	0	105	10	76	21	0	107	5	10	10	0	25	325
Total	74	273	31	0	378	172	180	111	0	463	52	364	133	0	549	16	55	35	0	106	1496

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Hennessey Pkwy
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Hennessey_10-24-23
Site Code :
Start Date : 10/24/2023

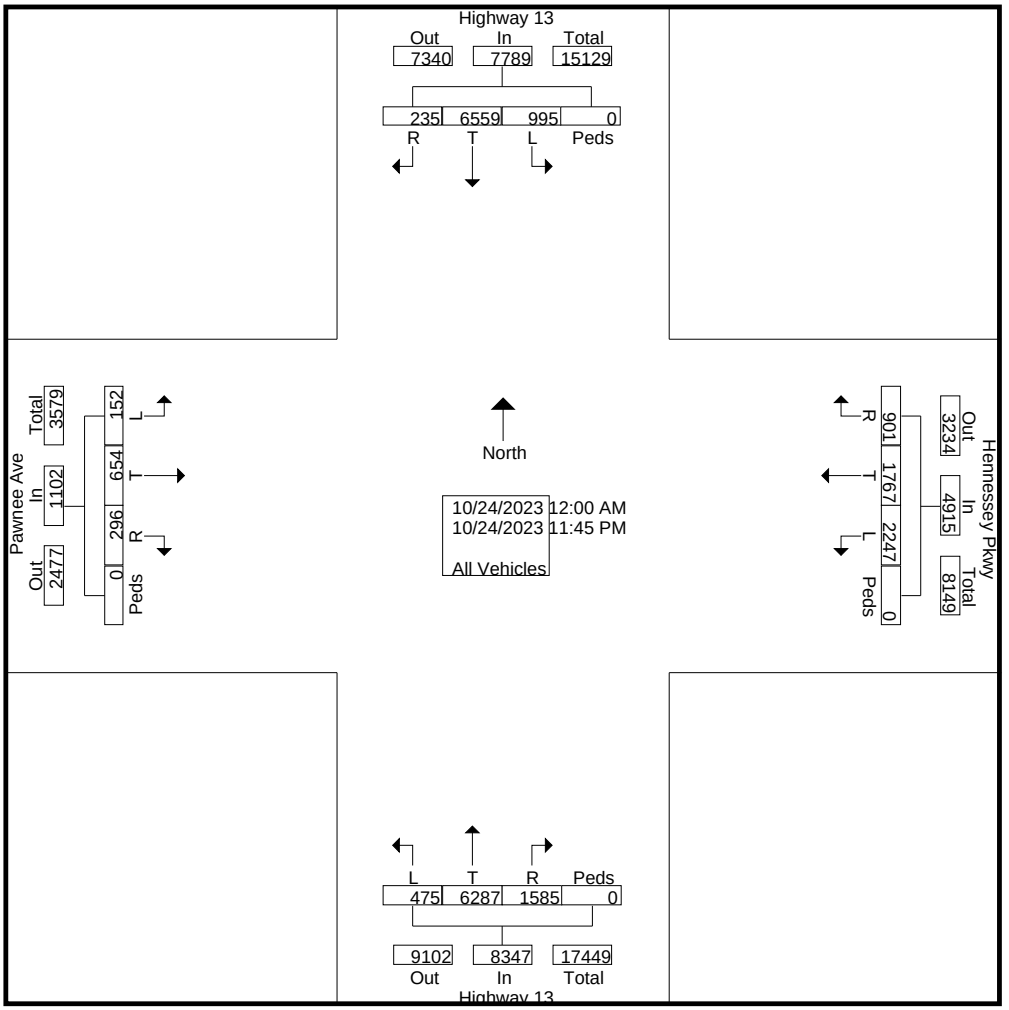
Groups Printed- All Vehicles

	Highway 13 Soutbound					Hennessey Pkwy Westbound					Highway 13 Northbound					Pawnee Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 PM	15	58	6	0	79	30	27	0	0	57	10	54	24	0	88	0	10	0	0	10	234
07:15 PM	15	59	8	0	82	23	32	0	0	55	11	75	15	0	101	0	17	0	0	17	255
07:30 PM	7	46	2	0	55	11	37	0	0	48	9	83	21	0	113	0	17	0	0	17	233
07:45 PM	10	24	2	0	36	20	17	0	0	37	3	53	17	0	73	0	14	0	0	14	160
Total	47	187	18	0	252	84	113	0	0	197	33	265	77	0	375	0	58	0	0	58	882
08:00 PM	6	19	3	0	28	34	21	0	0	55	4	41	24	0	69	0	13	0	0	13	165
08:15 PM	2	26	2	0	30	12	21	0	0	33	7	59	11	0	77	0	6	0	0	6	146
08:30 PM	6	23	1	0	30	16	6	0	0	22	11	40	24	0	75	0	7	0	0	7	134
08:45 PM	4	23	2	0	29	20	18	0	0	38	22	44	16	0	82	0	7	0	0	7	156
Total	18	91	8	0	117	82	66	0	0	148	44	184	75	0	303	0	33	0	0	33	601
09:00 PM	7	34	6	0	47	4	9	0	0	13	5	43	10	0	58	0	7	0	0	7	125
09:15 PM	7	24	5	0	36	18	8	0	0	26	4	28	15	0	47	0	11	0	0	11	120
09:30 PM	3	15	0	0	18	11	21	0	0	32	4	34	6	0	44	0	8	0	0	8	102
09:45 PM	5	14	0	0	19	21	3	0	0	24	2	28	8	0	38	0	8	0	0	8	89
Total	22	87	11	0	120	54	41	0	0	95	15	133	39	0	187	0	34	0	0	34	436
10:00 PM	4	13	1	0	18	14	6	0	0	20	0	19	13	0	32	0	5	0	0	5	75
10:15 PM	7	16	0	0	23	9	8	0	0	17	0	20	9	0	29	0	0	0	0	0	69
10:30 PM	6	8	0	0	14	15	3	0	0	18	0	14	5	0	19	0	0	0	0	0	51
10:45 PM	5	6	0	0	11	6	6	0	0	12	0	16	7	0	23	0	1	0	0	1	47
Total	22	43	1	0	66	44	23	0	0	67	0	69	34	0	103	0	6	0	0	6	242
11:00 PM	1	11	0	0	12	9	7	0	0	16	1	7	9	0	17	0	0	0	0	0	45
11:15 PM	3	8	0	0	11	10	6	0	0	16	1	11	8	0	20	0	1	0	0	1	48
11:30 PM	2	2	0	0	4	5	1	0	0	6	0	17	4	0	21	0	0	0	0	0	31
11:45 PM	0	3	0	0	3	0	1	0	0	1	1	6	2	0	9	0	0	0	0	0	13
Total	6	24	0	0	30	24	15	0	0	39	3	41	23	0	67	0	1	0	0	1	137
Grand Total	995	6559	235	0	7789	2247	1767	901	0	4915	475	6287	1585	0	8347	152	654	296	0	1102	22153
Apprch %	12.8	84.2	3	0		45.7	36	18.3	0		5.7	75.3	19	0		13.8	59.3	26.9	0		
Total %	4.5	29.6	1.1	0	35.2	10.1	8	4.1	0	22.2	2.1	28.4	7.2	0	37.7	0.7	3	1.3	0	5	

Snyder & Associates
2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Hennessey Pkwy
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Hennessey_10-24-23
Site Code :
Start Date : 10/24/2023
Page No : 4



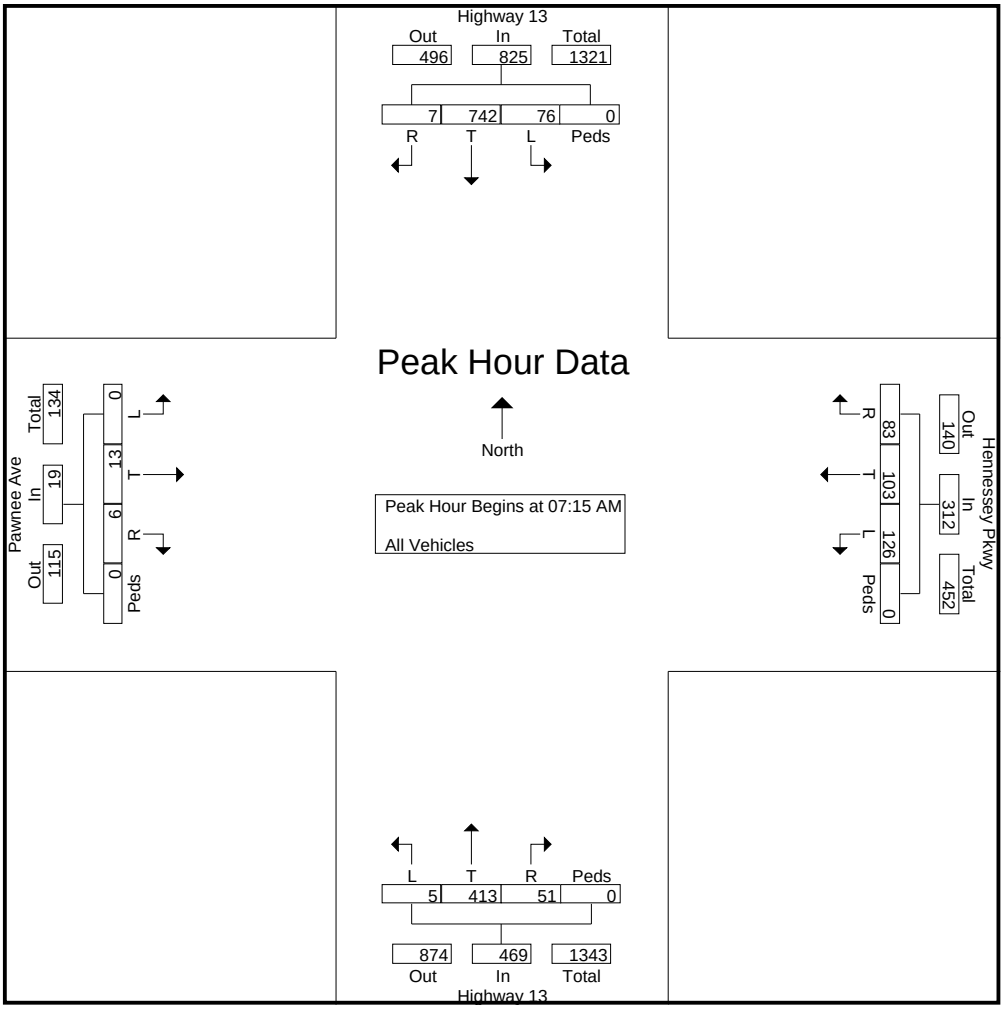
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Hennessey Pkwy
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Hennessey_10-24-23
Site Code :
Start Date : 10/24/2023

	Highway 13 Soutbound					Hennessey Pkwy Westbound					Highway 13 Northbound					Pawnee Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	13	176	0	0	189	34	**35**	12	0	81	0	**136**	6	0	**142**	0	0	1	0	1	413
07:30 AM	**24**	**239**	0	0	**263**	30	19	22	0	71	1	88	13	0	102	0	4	2	0	6	**442**
07:45 AM	21	177	1	0	199	**40**	18	**25**	0	**83**	**3**	100	**16**	0	119	0	4	**3**	0	**7**	408
08:00 AM	18	150	**6**	0	174	22	31	24	0	77	1	89	16	0	106	0	**5**	0	0	5	362
Total Volume	76	742	7	0	825	126	103	83	0	312	5	413	51	0	469	0	13	6	0	19	1625
% App. Total																					
PHF	.792	.776	.292	.000	.784	.788	.736	.830	.000	.940	.417	.759	.797	.000	.826	.000	.650	.500	.000	.679	.919

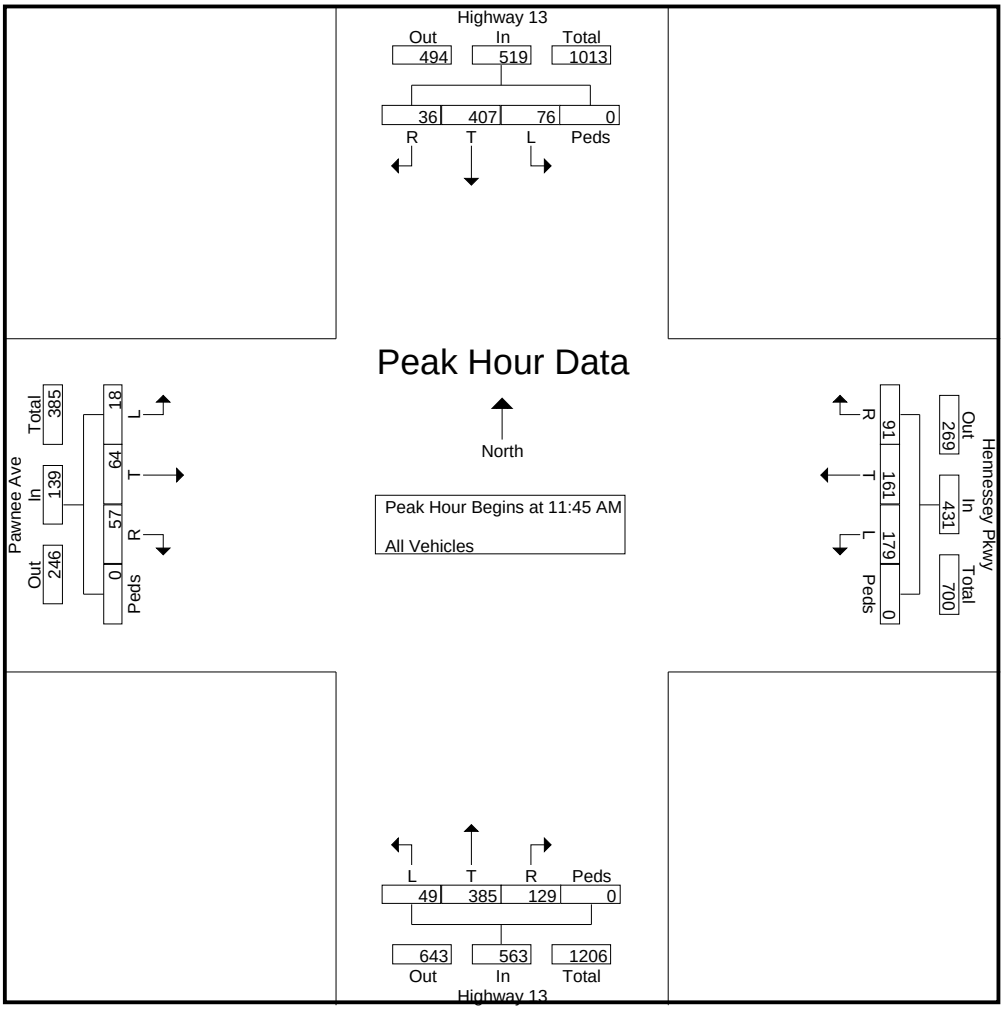


Snyder & Associates
2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Hennessey Pkwy
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Hennessey_10-24-23
Site Code :
Start Date : 10/24/2023

	Highway 13 Soutbound					Hennessey Pkwy Westbound					Highway 13 Northbound					Pawnee Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	13	84	6	0	103	45	30	20	0	95	13	102	28	0	143	**8**	20	15	0	**43**	384
12:00 PM	18	107	8	0	133	40	36	19	0	95	10	83	**40**	0	133	4	**25**	11	0	40	401
12:15 PM	**30**	**108**	8	0	**146**	43	42	25	0	110	**16**	**115**	30	0	**161**	4	10	14	0	28	**445**
12:30 PM	15	108	**14**	0	137	**51**	**53**	**27**	0	**131**	10	85	31	0	126	2	9	**17**	0	28	422
Total Volume	76	407	36	0	519	179	161	91	0	431	49	385	129	0	563	18	64	57	0	139	1652
% App. Total																					
PHF	.633	.942	.643	.000	.889	.877	.759	.843	.000	.823	.766	.837	.806	.000	.874	.563	.640	.838	.000	.808	.928



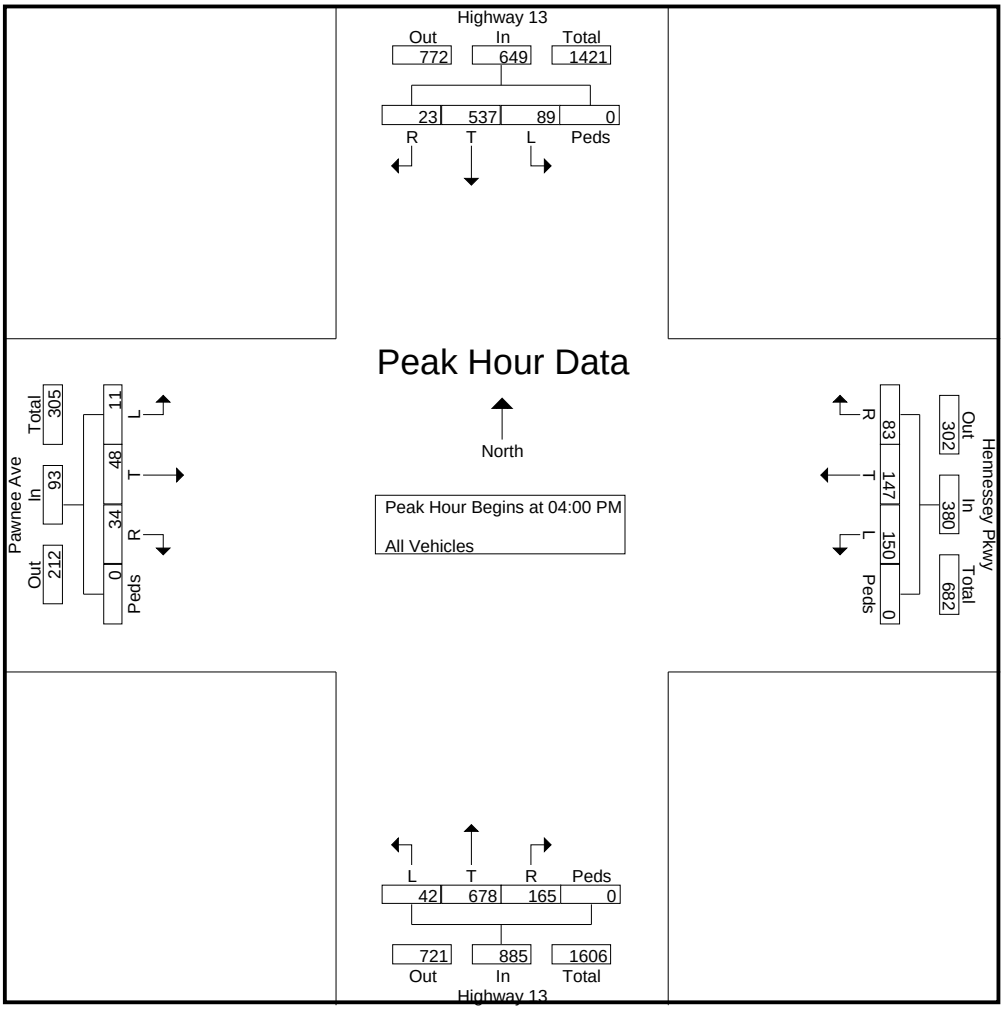
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Hennessey Pkwy
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-Hennessey_10-24-23
Site Code :
Start Date : 10/24/2023
Page No : 7

	Highway 13 Soutbound					Hennessey Pkwy Westbound					Highway 13 Northbound					Pawnee Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	17	**144**	6	0	**167**	30	38	17	0	85	10	162	38	0	210	1	9	8	0	18	480
04:15 PM	16	134	6	0	156	39	33	22	0	94	8	**195**	40	0	**243**	**5**	14	**13**	0	**32**	**525**
04:30 PM	24	137	4	0	165	36	**48**	**23**	0	**107**	**12**	157	41	0	210	3	10	6	0	19	501
04:45 PM	**32**	122	**7**	0	161	**45**	28	21	0	94	12	164	**46**	0	222	2	**15**	7	0	24	501
Total Volume	89	537	23	0	649	150	147	83	0	380	42	678	165	0	885	11	48	34	0	93	2007
% App. Total																					
PHF	.695	.932	.821	.000	.972	.833	.766	.902	.000	.888	.875	.869	.897	.000	.910	.550	.800	.654	.000	.727	.956



Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 151
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY151_10-12-23
Site Code :
Start Date : 10/12/2023
Page No : 1

Groups Printed- All Vehicles

	Highway 13 Soutbound					Highway 151 Westbound					Highway 13 Northbound					Highway 151 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 AM	0	3	3	0	6	6	0	0	0	6	1	8	13	0	22	2	1	0	0	3	37
12:15 AM	1	0	1	0	2	7	2	0	0	9	0	8	12	0	20	1	2	0	0	3	34
12:30 AM	0	0	3	0	3	9	2	0	0	11	2	5	8	0	15	0	1	0	0	1	30
12:45 AM	3	6	1	0	10	3	1	1	0	5	1	2	4	0	7	1	1	0	0	2	24
Total	4	9	8	0	21	25	5	1	0	31	4	23	37	0	64	4	5	0	0	9	125
01:00 AM	1	3	0	0	4	5	5	1	0	11	1	5	9	0	15	2	4	0	0	6	36
01:15 AM	0	3	2	0	5	7	1	0	0	8	1	4	7	0	12	0	0	1	0	1	26
01:30 AM	1	1	0	0	2	7	0	1	0	8	1	3	10	0	14	0	1	0	0	1	25
01:45 AM	0	2	1	0	3	3	0	0	0	3	0	6	4	0	10	0	1	0	0	1	17
Total	2	9	3	0	14	22	6	2	0	30	3	18	30	0	51	2	6	1	0	9	104
02:00 AM	0	3	0	0	3	4	1	1	0	6	3	3	7	0	13	0	0	0	0	0	22
02:15 AM	0	3	0	0	3	4	0	0	0	4	1	3	8	0	12	0	1	0	0	1	20
02:30 AM	2	7	1	0	10	4	1	2	0	7	0	3	6	0	9	2	0	0	0	2	28
02:45 AM	0	3	0	0	3	8	1	0	0	9	1	7	3	0	11	0	2	1	0	3	26
Total	2	16	1	0	19	20	3	3	0	26	5	16	24	0	45	2	3	1	0	6	96
03:00 AM	0	1	0	0	1	5	1	0	0	6	2	4	11	0	17	1	1	1	0	3	27
03:15 AM	2	5	2	0	9	10	1	0	0	11	0	4	9	0	13	0	0	0	0	0	33
03:30 AM	0	3	1	0	4	9	0	0	0	9	1	2	14	0	17	0	1	0	0	1	31
03:45 AM	1	10	3	0	14	4	0	1	0	5	1	2	19	0	22	2	2	1	0	5	46
Total	3	19	6	0	28	28	2	1	0	31	4	12	53	0	69	3	4	2	0	9	137
04:00 AM	0	10	4	0	14	14	4	1	0	19	0	1	9	0	10	1	3	3	0	7	50
04:15 AM	2	16	2	0	20	18	9	4	0	31	0	2	13	0	15	1	7	2	0	10	76
04:30 AM	1	16	8	0	25	18	5	3	0	26	1	6	20	0	27	2	0	6	0	8	86
04:45 AM	5	25	11	0	41	17	4	2	0	23	0	11	8	0	19	2	4	3	0	9	92
Total	8	67	25	0	100	67	22	10	0	99	1	20	50	0	71	6	14	14	0	34	304
05:00 AM	4	41	6	0	51	30	7	1	0	38	2	4	22	0	28	1	11	1	0	13	130
05:15 AM	7	57	13	0	77	39	10	3	0	52	3	5	22	0	30	3	6	10	0	19	178
05:30 AM	13	70	13	0	96	49	14	7	0	70	3	12	25	0	40	0	7	13	0	20	226
05:45 AM	17	62	17	0	96	64	28	3	0	95	1	21	30	0	52	3	11	11	0	25	268
Total	41	230	49	0	320	182	59	14	0	255	9	42	99	0	150	7	35	35	0	77	802
06:00 AM	15	83	17	0	115	70	23	6	0	99	4	12	32	0	48	9	18	24	0	51	313
06:15 AM	29	135	18	0	182	91	40	4	0	135	3	32	35	0	70	13	25	10	0	48	435
06:30 AM	26	163	32	0	221	123	55	19	0	197	4	26	43	0	73	9	30	24	0	63	554
06:45 AM	27	121	29	0	177	108	54	18	0	180	17	48	48	0	113	9	29	14	0	52	522
Total	97	502	96	0	695	392	172	47	0	611	28	118	158	0	304	40	102	72	0	214	1824
07:00 AM	29	137	26	0	192	108	63	13	0	184	4	50	57	0	111	7	53	31	0	91	578
07:15 AM	21	150	45	0	216	129	68	32	0	229	22	63	68	0	153	19	48	36	0	103	701
07:30 AM	20	164	51	0	235	120	67	20	0	207	18	54	58	0	130	17	44	42	0	103	675
07:45 AM	36	122	51	0	209	115	60	18	0	193	20	62	62	0	144	14	44	25	0	83	629
Total	106	573	173	0	852	472	258	83	0	813	64	229	245	0	538	57	189	134	0	380	2583
08:00 AM	29	88	25	0	142	104	58	25	0	187	15	63	72	0	150	24	31	16	0	71	550
08:15 AM	14	99	23	0	136	104	61	17	0	182	14	60	65	0	139	25	31	25	0	81	538
08:30 AM	19	89	34	0	142	121	47	13	0	181	9	75	52	0	136	25	40	24	0	89	548
08:45 AM	26	81	33	0	140	95	45	11	0	151	8	42	86	0	136	19	42	20	0	81	508
Total	88	357	115	0	560	424	211	66	0	701	46	240	275	0	561	93	144	85	0	322	2144
09:00 AM	21	90	44	0	155	79	42	17	0	138	13	44	86	0	143	21	32	15	0	68	504

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 151
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY151_10-12-23
Site Code :
Start Date : 10/12/2023

Groups Printed- All Vehicles

	Highway 13 Soutbound					Highway 151 Westbound					Highway 13 Northbound					Highway 151 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
09:15 AM	14	66	32	0	112	103	44	13	0	160	18	59	61	0	138	31	33	19	0	83	493
09:30 AM	15	80	36	0	131	86	39	8	0	133	9	53	84	0	146	29	42	27	0	98	508
09:45 AM	11	77	35	0	123	87	50	17	0	154	21	54	71	0	146	22	41	14	0	77	500
Total	61	313	147	0	521	355	175	55	0	585	61	210	302	0	573	103	148	75	0	326	2005
10:00 AM	9	76	34	0	119	81	50	16	0	147	10	52	82	0	144	34	48	28	0	110	520
10:15 AM	14	78	31	0	123	108	42	21	0	171	10	46	53	0	109	23	40	13	0	76	479
10:30 AM	15	74	43	0	132	72	42	15	0	129	20	48	101	0	169	24	50	20	0	94	524
10:45 AM	8	71	37	0	116	77	52	11	0	140	11	62	70	0	143	48	42	20	0	110	509
Total	46	299	145	0	490	338	186	63	0	587	51	208	306	0	565	129	180	81	0	390	2032
11:00 AM	19	79	33	0	131	88	63	14	0	165	15	61	73	0	149	36	48	23	0	107	552
11:15 AM	15	89	35	0	139	96	57	15	0	168	16	63	81	0	160	30	43	25	0	98	565
11:30 AM	22	71	53	0	146	81	52	10	0	143	21	57	73	0	151	52	49	24	0	125	565
11:45 AM	15	71	31	0	117	96	34	15	0	145	16	50	96	0	162	54	60	34	0	148	572
Total	71	310	152	0	533	361	206	54	0	621	68	231	323	0	622	172	200	106	0	478	2254
12:00 PM	14	86	54	0	154	103	70	14	0	187	24	80	95	0	199	44	49	17	0	110	650
12:15 PM	19	66	37	0	122	99	57	14	0	170	15	74	77	0	166	53	53	17	0	123	581
12:30 PM	37	81	58	0	176	115	50	15	0	180	12	90	114	0	216	59	48	20	0	127	699
12:45 PM	24	88	47	0	159	96	50	20	0	166	21	72	75	0	168	44	61	21	0	126	619
Total	94	321	196	0	611	413	227	63	0	703	72	316	361	0	749	200	211	75	0	486	2549
01:00 PM	23	81	42	0	146	95	43	14	0	152	16	63	92	0	171	48	54	11	0	113	582
01:15 PM	22	83	39	0	144	109	47	14	0	170	21	78	100	0	199	55	74	15	0	144	657
01:30 PM	17	91	58	0	166	77	45	25	0	147	29	75	98	0	202	38	59	15	0	112	627
01:45 PM	35	59	31	0	125	90	31	29	0	150	23	83	83	0	189	22	47	24	0	93	557
Total	97	314	170	0	581	371	166	82	0	619	89	299	373	0	761	163	234	65	0	462	2423
02:00 PM	13	84	48	0	145	106	60	17	0	183	13	84	106	0	203	51	54	15	0	120	651
02:15 PM	21	69	36	0	126	93	47	17	0	157	22	98	105	0	225	42	60	17	0	119	627
02:30 PM	20	86	30	0	136	102	43	23	0	168	21	78	141	0	240	56	59	14	0	129	673
02:45 PM	17	76	46	0	139	105	44	13	0	162	19	107	123	0	249	30	53	20	0	103	653
Total	71	315	160	0	546	406	194	70	0	670	75	367	475	0	917	179	226	66	0	471	2604
03:00 PM	21	65	43	0	129	100	41	19	0	160	13	76	114	0	203	65	58	26	0	149	641
03:15 PM	16	82	36	0	134	111	53	20	0	184	17	113	131	0	261	49	59	25	0	133	712
03:30 PM	26	130	43	0	199	106	45	20	0	171	25	142	122	0	289	66	72	24	0	162	821
03:45 PM	20	100	42	0	162	92	52	23	0	167	34	148	114	0	296	55	83	30	0	168	793
Total	83	377	164	0	624	409	191	82	0	682	89	479	481	0	1049	235	272	105	0	612	2967
04:00 PM	36	90	40	0	166	91	52	32	0	175	38	147	120	0	305	57	79	28	0	164	810
04:15 PM	31	97	49	0	177	100	71	34	0	205	36	136	137	0	309	67	85	24	0	176	867
04:30 PM	19	103	36	0	158	88	70	20	0	178	28	143	141	0	312	49	80	24	0	153	801
04:45 PM	26	92	49	0	167	75	41	20	0	136	40	151	137	0	328	68	69	23	0	160	791
Total	112	382	174	0	668	354	234	106	0	694	142	577	535	0	1254	241	313	99	0	653	3269
05:00 PM	18	88	49	0	155	83	59	28	0	170	34	133	130	0	297	77	86	21	0	184	806
05:15 PM	20	71	32	0	123	99	60	30	0	189	37	130	126	0	293	74	67	33	0	174	779
05:30 PM	23	69	37	0	129	81	64	30	0	175	29	123	119	0	271	67	73	33	0	173	748
05:45 PM	13	65	34	0	112	73	52	25	0	150	25	133	111	0	269	66	56	24	0	146	677
Total	74	293	152	0	519	336	235	113	0	684	125	519	486	0	1130	284	282	111	0	677	3010
06:00 PM	19	56	39	0	114	81	36	21	0	138	28	125	93	0	246	45	51	16	0	112	610
06:15 PM	24	59	42	0	125	74	33	22	0	129	18	114	102	0	234	62	39	9	0	110	598
06:30 PM	12	71	31	0	114	86	44	24	0	154	30	82	65	0	177	42	36	10	0	88	533
06:45 PM	4	67	35	0	106	83	29	11	0	123	19	72	59	0	150	59	37	15	0	111	490
Total	59	253	147	0	459	324	142	78	0	544	95	393	319	0	807	208	163	50	0	421	2231

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 151
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY151_10-12-23
Site Code :
Start Date : 10/12/2023

Groups Printed- All Vehicles

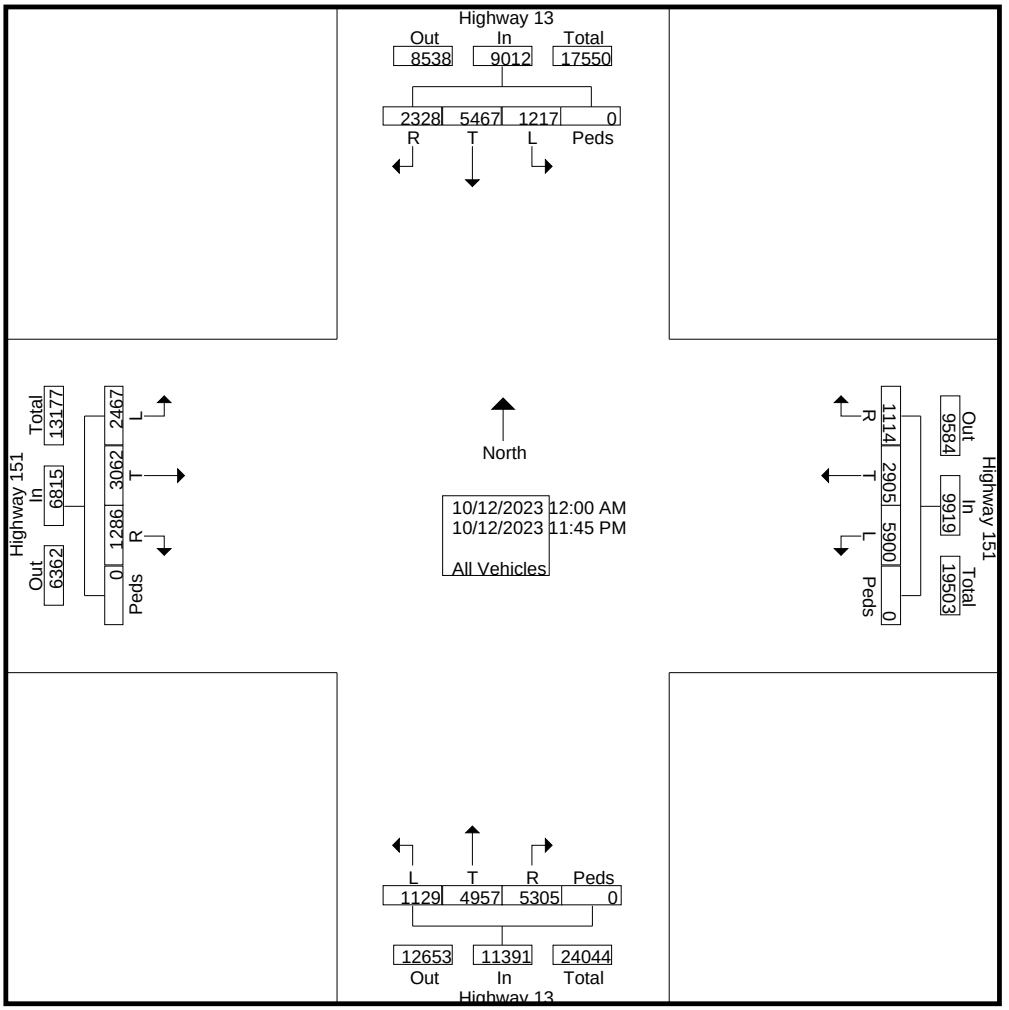
	Highway 13 Soutbound					Highway 151 Westbound					Highway 13 Northbound					Highway 151 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 PM	4	56	34	0	94	63	19	11	0	93	15	55	60	0	130	41	43	14	0	98	415
07:15 PM	13	43	25	0	81	74	17	4	0	95	17	77	41	0	135	34	49	14	0	97	408
07:30 PM	11	41	25	0	77	46	26	37	0	109	7	55	20	0	82	34	40	8	0	82	350
07:45 PM	5	46	15	0	66	47	14	8	0	69	5	44	23	0	72	27	24	11	0	62	269
Total	33	186	99	0	318	230	76	60	0	366	44	231	144	0	419	136	156	47	0	339	1442
08:00 PM	12	52	21	0	85	53	13	4	0	70	4	38	36	0	78	31	22	11	0	64	297
08:15 PM	8	42	18	0	68	30	11	6	0	47	5	36	15	0	56	22	28	11	0	61	232
08:30 PM	8	43	14	0	65	34	15	6	0	55	7	40	23	0	70	25	18	9	0	52	242
08:45 PM	6	20	10	0	36	24	12	8	0	44	7	25	17	0	49	17	9	2	0	28	157
Total	34	157	63	0	254	141	51	24	0	216	23	139	91	0	253	95	77	33	0	205	928
09:00 PM	12	30	15	0	57	37	11	1	0	49	4	31	28	0	63	16	15	8	0	39	208
09:15 PM	3	17	10	0	30	37	14	5	0	56	7	40	10	0	57	18	10	2	0	30	173
09:30 PM	1	17	10	0	28	25	7	4	0	36	3	43	24	0	70	22	13	3	0	38	172
09:45 PM	3	20	7	0	30	33	10	3	0	46	1	27	13	0	41	9	15	1	0	25	142
Total	19	84	42	0	145	132	42	13	0	187	15	141	75	0	231	65	53	14	0	132	695
10:00 PM	1	19	9	0	29	13	8	4	0	25	1	17	15	0	33	11	6	3	0	20	107
10:15 PM	3	10	13	0	26	11	3	3	0	17	4	19	4	0	27	10	7	3	0	20	90
10:30 PM	2	20	0	0	22	13	6	3	0	22	1	18	11	0	30	11	6	3	0	20	94
10:45 PM	1	11	6	0	18	13	6	2	0	21	1	15	6	0	22	3	5	3	0	11	72
Total	7	60	28	0	95	50	23	12	0	85	7	69	36	0	112	35	24	12	0	71	363
11:00 PM	2	8	0	0	10	16	6	5	0	27	3	8	6	0	17	1	3	2	0	6	60
11:15 PM	2	7	4	0	13	10	2	4	0	16	3	17	7	0	27	2	5	1	0	8	64
11:30 PM	1	2	7	0	10	10	4	2	0	16	2	17	7	0	26	1	9	0	0	10	62
11:45 PM	0	4	2	0	6	12	7	1	0	20	1	18	7	0	26	4	4	0	0	8	60
Total	5	21	13	0	39	48	19	12	0	79	9	60	27	0	96	8	21	3	0	32	246
Grand Total	1217	5467	2328	0	9012	5900	2905	1114	0	9919	1129	4957	5305	0	11391	2467	3062	1286	0	6815	37137
Apprch %	13.5	60.7	25.8	0		59.5	29.3	11.2	0		9.9	43.5	46.6	0		36.2	44.9	18.9	0		
Total %	3.3	14.7	6.3	0	24.3	15.9	7.8	3	0	26.7	3	13.3	14.3	0	30.7	6.6	8.2	3.5	0	18.4	

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 151
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY151_10-12-23
Site Code :
Start Date : 10/12/2023
Page No : 4



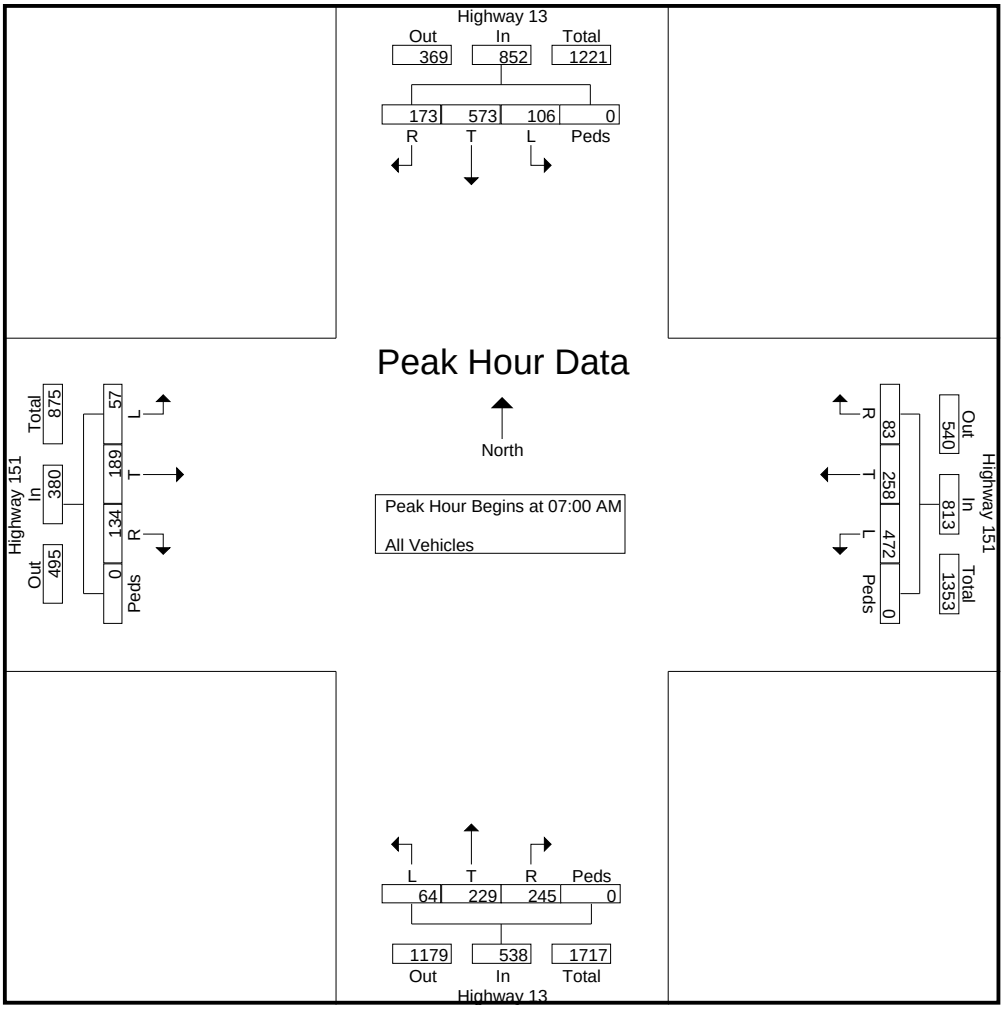
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 151
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY151_10-12-23
Site Code :
Start Date : 10/12/2023

	Highway 13 Soutbound					Highway 151 Westbound					Highway 13 Northbound					Highway 151 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	29	137	26	0	192	108	63	13	0	184	4	50	57	0	111	7	**53**	31	0	91	578
07:15 AM	21	150	45	0	216	**129**	**68**	**32**	0	**229**	**22**	**63**	**68**	0	**153**	**19**	48	36	0	**103**	**701**
07:30 AM	20	**164**	**51**	0	**235**	120	67	20	0	207	18	54	58	0	130	17	44	**42**	0	103	675
07:45 AM	**36**	122	51	0	209	115	60	18	0	193	20	62	62	0	144	14	44	25	0	83	629
Total Volume	106	573	173	0	852	472	258	83	0	813	64	229	245	0	538	57	189	134	0	380	2583
% App. Total																					
PHF	.736	.873	.848	.000	.906	.915	.949	.648	.000	.888	.727	.909	.901	.000	.879	.750	.892	.798	.000	.922	.921



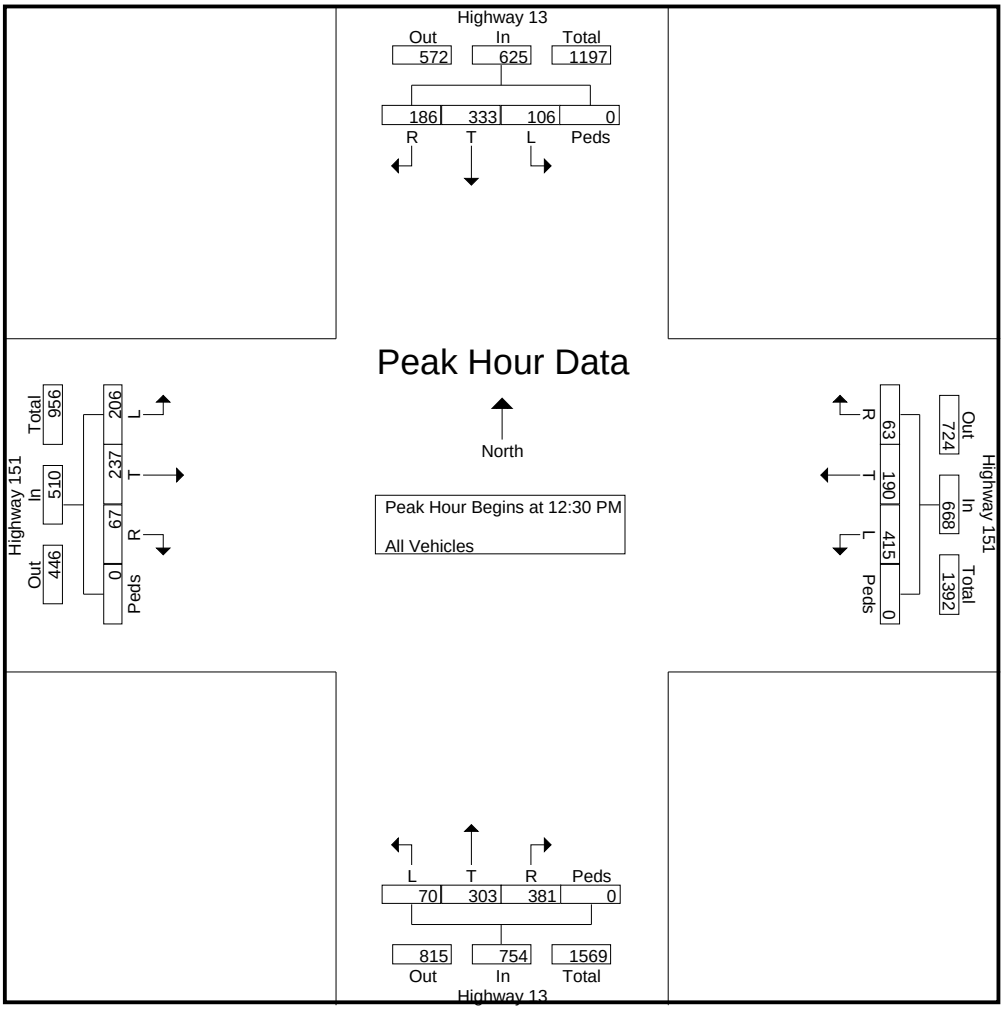
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 151
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY151_10-12-23
Site Code :
Start Date : 10/12/2023

	Highway 13 Soutbound					Highway 151 Westbound					Highway 13 Northbound					Highway 151 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:30 PM																					
12:30 PM	**37**	81	**58**	0	**176**	**115**	**50**	15	0	**180**	12	**90**	**114**	0	**216**	**59**	48	20	0	127	**699**
12:45 PM	24	**88**	47	0	159	96	50	**20**	0	166	**21**	72	75	0	168	44	61	**21**	0	126	619
01:00 PM	23	81	42	0	146	95	43	14	0	152	16	63	92	0	171	48	54	11	0	113	582
01:15 PM	22	83	39	0	144	109	47	14	0	170	21	78	100	0	199	55	**74**	15	0	**144**	657
Total Volume	106	333	186	0	625	415	190	63	0	668	70	303	381	0	754	206	237	67	0	510	2557
% App. Total																					
PHF	.716	.946	.802	.000	.888	.902	.950	.788	.000	.928	.833	.842	.836	.000	.873	.873	.801	.798	.000	.885	.915



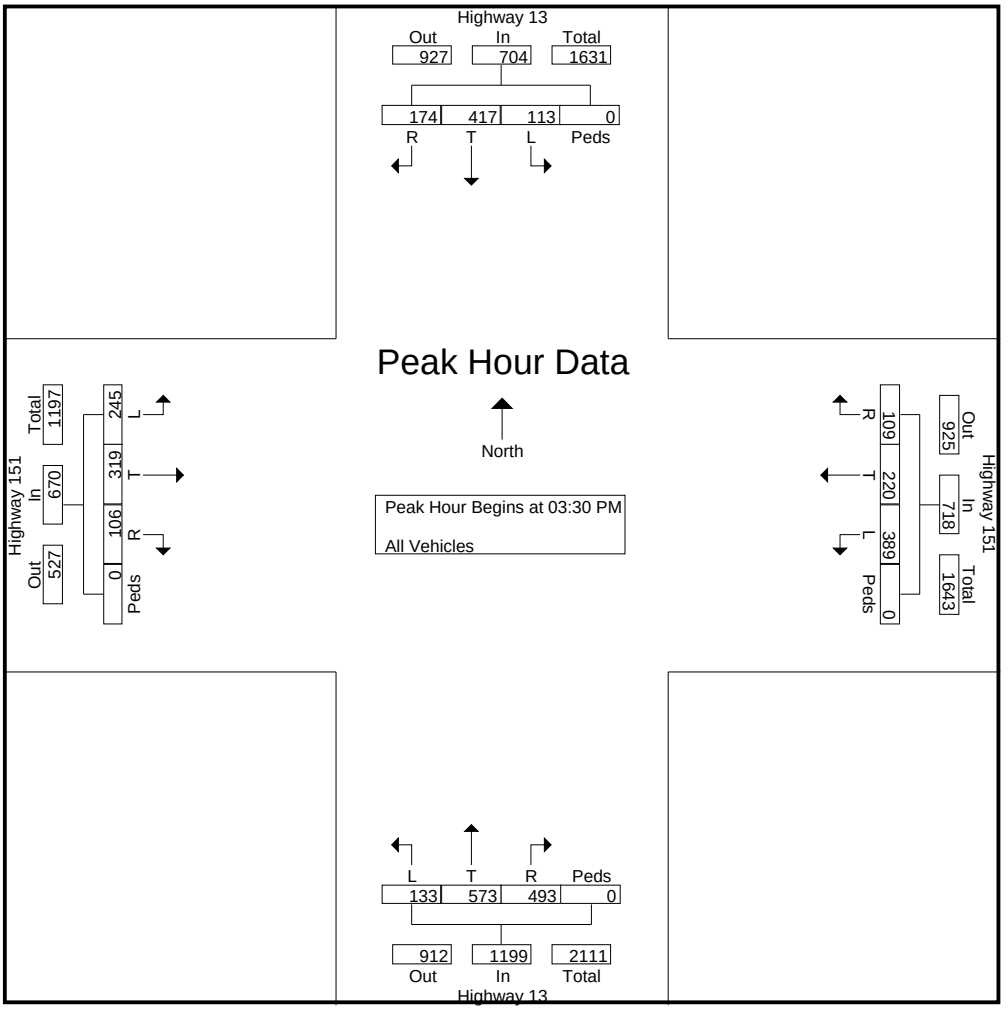
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 151
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY151_10-12-23
Site Code :
Start Date : 10/12/2023

	Highway 13 Soutbound					Highway 151 Westbound					Highway 13 Northbound					Highway 151 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	26	**130**	43	0	**199**	**106**	45	20	0	171	25	142	122	0	289	66	72	24	0	162	821
03:45 PM	20	100	42	0	162	92	52	23	0	167	34	**148**	114	0	296	55	83	**30**	0	168	793
04:00 PM	**36**	90	40	0	166	91	52	32	0	175	**38**	147	120	0	305	57	79	28	0	164	810
04:15 PM	31	97	**49**	0	177	100	**71**	**34**	0	**205**	36	136	**137**	0	**309**	**67**	**85**	24	0	**176**	**867**
Total Volume	113	417	174	0	704	389	220	109	0	718	133	573	493	0	1199	245	319	106	0	670	3291
% App. Total																					
PHF	.785	.802	.888	.000	.884	.917	.775	.801	.000	.876	.875	.968	.900	.000	.970	.914	.938	.883	.000	.952	.949



Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Linn Aire Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-LinnAire_9-20-23
Site Code :
Start Date : 9/20/2023

Groups Printed- All Vehicles

	Highway 13 Soutbound					Linn Aire Ave Westbound					Highway 13 Northbound					Linn Aire Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 AM	0	8	0	0	8	0	1	0	0	1	0	28	0	0	28	0	0	0	0	0	37
12:15 AM	0	16	0	0	16	0	0	0	0	0	0	20	0	0	20	0	1	0	0	1	37
12:30 AM	1	8	0	0	9	0	1	0	0	1	0	20	0	0	20	0	3	0	0	3	33
12:45 AM	0	9	0	0	9	0	3	0	0	3	1	11	0	0	12	0	3	0	0	3	27
Total	1	41	0	0	42	0	5	0	0	5	1	79	0	0	80	0	7	0	0	7	134
01:00 AM	0	5	0	0	5	0	0	0	0	0	0	20	0	0	20	0	6	0	0	6	31
01:15 AM	0	13	0	0	13	0	0	0	0	0	0	8	0	0	8	0	2	0	0	2	23
01:30 AM	0	5	0	0	5	0	1	0	0	1	0	12	0	0	12	0	3	0	0	3	21
01:45 AM	0	4	0	0	4	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	11
Total	0	27	0	0	27	0	1	0	0	1	0	47	0	0	47	0	11	0	0	11	86
02:00 AM	0	6	0	0	6	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	20
02:15 AM	0	11	0	0	11	0	1	0	0	1	0	12	0	0	12	0	0	0	0	0	24
02:30 AM	0	6	0	0	6	0	0	0	0	0	0	6	0	0	6	0	8	0	0	8	20
02:45 AM	0	10	0	0	10	0	0	0	0	0	0	14	0	0	14	0	1	0	0	1	25
Total	0	33	0	0	33	0	1	0	0	1	0	46	0	0	46	0	9	0	0	9	89
03:00 AM	0	15	0	0	15	0	1	0	0	1	0	13	0	0	13	0	2	0	0	2	31
03:15 AM	0	26	0	0	26	0	0	0	0	0	0	19	0	0	19	0	5	0	0	5	50
03:30 AM	0	16	0	0	16	0	0	0	0	0	1	12	0	0	13	0	4	0	0	4	33
03:45 AM	0	21	0	0	21	0	1	0	0	1	0	20	0	0	20	0	9	0	0	9	51
Total	0	78	0	0	78	0	2	0	0	2	1	64	0	0	65	0	20	0	0	20	165
04:00 AM	0	20	0	0	20	0	0	0	0	0	2	16	0	0	18	0	9	0	0	9	47
04:15 AM	0	34	0	0	34	0	1	0	0	1	0	14	0	0	14	0	5	0	0	5	54
04:30 AM	0	41	0	0	41	0	0	0	0	0	1	23	0	0	24	0	12	0	0	12	77
04:45 AM	0	62	0	0	62	0	1	0	0	1	7	20	0	0	27	0	10	0	0	10	100
Total	0	157	0	0	157	0	2	0	0	2	10	73	0	0	83	0	36	0	0	36	278
05:00 AM	0	77	0	0	77	0	1	0	0	1	1	33	0	0	34	0	9	0	0	9	121
05:15 AM	1	106	0	0	107	0	3	0	0	3	1	42	0	0	43	0	16	0	0	16	169
05:30 AM	1	142	0	0	143	0	2	0	0	2	4	61	0	0	65	0	26	0	0	26	236
05:45 AM	2	146	0	0	148	0	3	0	0	3	4	50	0	0	54	0	19	0	0	19	224
Total	4	471	0	0	475	0	9	0	0	9	10	186	0	0	196	0	70	0	0	70	750
06:00 AM	0	168	0	0	168	20	0	2	0	22	4	71	20	0	95	0	26	5	0	31	316
06:15 AM	1	261	0	0	262	26	0	0	0	26	11	84	23	0	118	0	31	7	0	38	444
06:30 AM	1	345	0	0	346	36	0	3	0	39	9	112	26	0	147	3	47	16	0	66	598
06:45 AM	2	246	0	0	248	35	0	21	0	56	21	141	33	0	195	0	91	19	0	110	609
Total	4	1020	0	0	1024	117	0	26	0	143	45	408	102	0	555	3	195	47	0	245	1967
07:00 AM	1	329	0	0	330	24	0	13	0	37	18	132	27	0	177	0	45	19	0	64	608
07:15 AM	0	346	0	0	346	49	0	2	0	51	14	170	46	0	230	1	53	18	0	72	699
07:30 AM	3	364	0	0	367	57	0	2	0	59	16	138	22	0	176	5	64	7	0	76	678
07:45 AM	4	293	0	0	297	34	0	3	0	37	16	194	27	0	237	0	48	11	0	59	630
Total	8	1332	0	0	1340	164	0	20	0	184	64	634	122	0	820	6	210	55	0	271	2615
08:00 AM	2	222	0	0	224	27	0	0	0	27	10	144	24	0	178	2	22	16	0	40	469
08:15 AM	3	235	0	0	238	32	0	4	0	36	9	141	14	0	164	3	23	20	0	46	484
08:30 AM	1	248	0	0	249	29	0	4	0	33	7	137	15	0	159	0	46	10	0	56	497
08:45 AM	1	187	0	0	188	26	0	1	0	27	16	158	23	0	197	1	17	12	0	30	442
Total	7	892	0	0	899	114	0	9	0	123	42	580	76	0	698	6	108	58	0	172	1892
09:00 AM	1	186	0	0	187	22	0	3	0	25	16	129	15	0	160	1	29	16	0	46	418

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Linn Aire Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-LinnAire_9-20-23
Site Code :
Start Date : 9/20/2023

Groups Printed- All Vehicles

	Highway 13 Soutbound					Linn Aire Ave Westbound					Highway 13 Northbound					Linn Aire Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
09:15 AM	2	175	0	0	177	23	2	1	0	26	10	139	13	0	162	4	23	21	0	48	413
09:30 AM	0	168	0	0	168	20	0	0	0	20	13	150	11	0	174	2	1	22	0	25	387
09:45 AM	0	155	0	0	155	11	3	0	0	14	13	166	13	0	192	2	16	9	0	27	388
Total	3	684	0	0	687	76	5	4	0	85	52	584	52	0	688	9	69	68	0	146	1606
10:00 AM	0	143	0	0	143	16	0	1	0	17	10	159	14	0	183	2	5	16	0	23	366
10:15 AM	0	143	0	0	143	13	2	3	0	18	13	165	14	0	192	4	13	13	0	30	383
10:30 AM	2	176	0	0	178	15	0	0	0	15	15	175	15	0	205	2	17	14	0	33	431
10:45 AM	2	164	0	0	166	12	0	0	0	12	7	154	9	0	170	1	14	8	0	23	371
Total	4	626	0	0	630	56	2	4	0	62	45	653	52	0	750	9	49	51	0	109	1551
11:00 AM	2	204	0	0	206	18	0	4	0	22	14	158	14	0	186	1	19	11	0	31	445
11:15 AM	2	149	0	0	151	16	1	3	0	20	17	189	14	0	220	3	8	20	0	31	422
11:30 AM	1	183	0	0	184	19	0	4	0	23	24	205	14	0	243	1	18	21	0	40	490
11:45 AM	2	193	0	0	195	25	0	4	0	29	18	189	22	0	229	4	17	21	0	42	495
Total	7	729	0	0	736	78	1	15	0	94	73	741	64	0	878	9	62	73	0	144	1852
12:00 PM	1	181	0	0	182	18	13	0	0	31	11	185	12	0	208	6	13	24	0	43	464
12:15 PM	1	172	0	0	173	21	2	0	0	23	10	190	18	0	218	7	15	15	0	37	451
12:30 PM	4	195	0	0	199	21	0	2	0	23	15	198	13	0	226	5	16	18	0	39	487
12:45 PM	3	163	0	0	166	17	0	7	0	24	12	186	26	0	224	3	20	18	0	41	455
Total	9	711	0	0	720	77	15	9	0	101	48	759	69	0	876	21	64	75	0	160	1857
01:00 PM	4	183	0	0	187	19	0	4	0	23	11	149	11	0	171	2	24	16	0	42	423
01:15 PM	2	183	0	0	185	16	6	2	0	24	13	196	10	0	219	1	21	13	0	35	463
01:30 PM	1	148	0	0	149	23	0	1	0	24	21	201	22	0	244	3	30	13	0	46	463
01:45 PM	2	204	0	0	206	14	0	5	0	19	19	169	19	0	207	3	8	18	0	29	461
Total	9	718	0	0	727	72	6	12	0	90	64	715	62	0	841	9	83	60	0	152	1810
02:00 PM	0	160	0	0	160	19	0	18	0	37	20	168	16	0	204	2	58	22	0	82	483
02:15 PM	0	200	0	0	200	21	0	12	0	33	20	203	17	0	240	4	38	15	0	57	530
02:30 PM	2	208	0	0	210	24	3	2	0	29	15	206	22	0	243	2	15	31	0	48	530
02:45 PM	2	162	0	0	164	22	0	2	0	24	20	235	16	0	271	3	5	19	0	27	486
Total	4	730	0	0	734	86	3	34	0	123	75	812	71	0	958	11	116	87	0	214	2029
03:00 PM	2	178	0	0	180	25	0	0	0	25	18	212	13	0	243	5	0	31	0	36	484
03:15 PM	5	187	0	0	192	26	0	1	0	27	25	247	15	0	287	2	16	18	0	36	542
03:30 PM	2	202	0	0	204	38	0	4	0	42	30	295	24	0	349	8	17	35	0	60	655
03:45 PM	3	198	0	0	201	41	0	0	0	41	19	330	21	0	370	4	10	44	0	58	670
Total	12	765	0	0	777	130	0	5	0	135	92	1084	73	0	1249	19	43	128	0	190	2351
04:00 PM	3	238	0	0	241	45	0	7	0	52	20	308	23	0	351	3	38	27	0	68	712
04:15 PM	2	219	0	0	221	32	0	5	0	37	39	319	25	0	383	5	32	16	0	53	694
04:30 PM	3	205	0	0	208	22	0	6	0	28	22	344	21	0	387	3	7	36	0	46	669
04:45 PM	2	210	0	0	212	15	12	5	0	32	24	371	18	0	413	5	0	40	0	45	702
Total	10	872	0	0	882	114	12	23	0	149	105	1342	87	0	1534	16	77	119	0	212	2777
05:00 PM	3	236	0	0	239	39	0	9	0	48	13	308	20	0	341	4	26	28	0	58	686
05:15 PM	1	196	0	0	197	18	1	5	0	24	16	319	20	0	355	2	11	20	0	33	609
05:30 PM	0	196	0	0	196	20	0	1	0	21	22	257	23	0	302	1	23	12	0	36	555
05:45 PM	2	179	0	0	181	17	3	1	0	21	14	244	21	0	279	4	6	19	0	29	510
Total	6	807	0	0	813	94	4	16	0	114	65	1128	84	0	1277	11	66	79	0	156	2360
06:00 PM	0	180	0	0	180	25	1	5	0	31	20	204	23	0	247	3	26	11	0	40	498
06:15 PM	3	157	0	0	160	11	2	1	0	14	11	167	19	0	197	5	4	10	0	19	390
06:30 PM	1	132	0	0	133	22	0	2	0	24	17	147	8	0	172	2	15	15	0	32	361
06:45 PM	1	129	0	0	130	12	0	1	0	13	9	125	5	0	139	0	15	11	0	26	308
Total	5	598	0	0	603	70	3	9	0	82	57	643	55	0	755	10	60	47	0	117	1557

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Linn Aire Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-LinnAire_9-20-23
Site Code :
Start Date : 9/20/2023

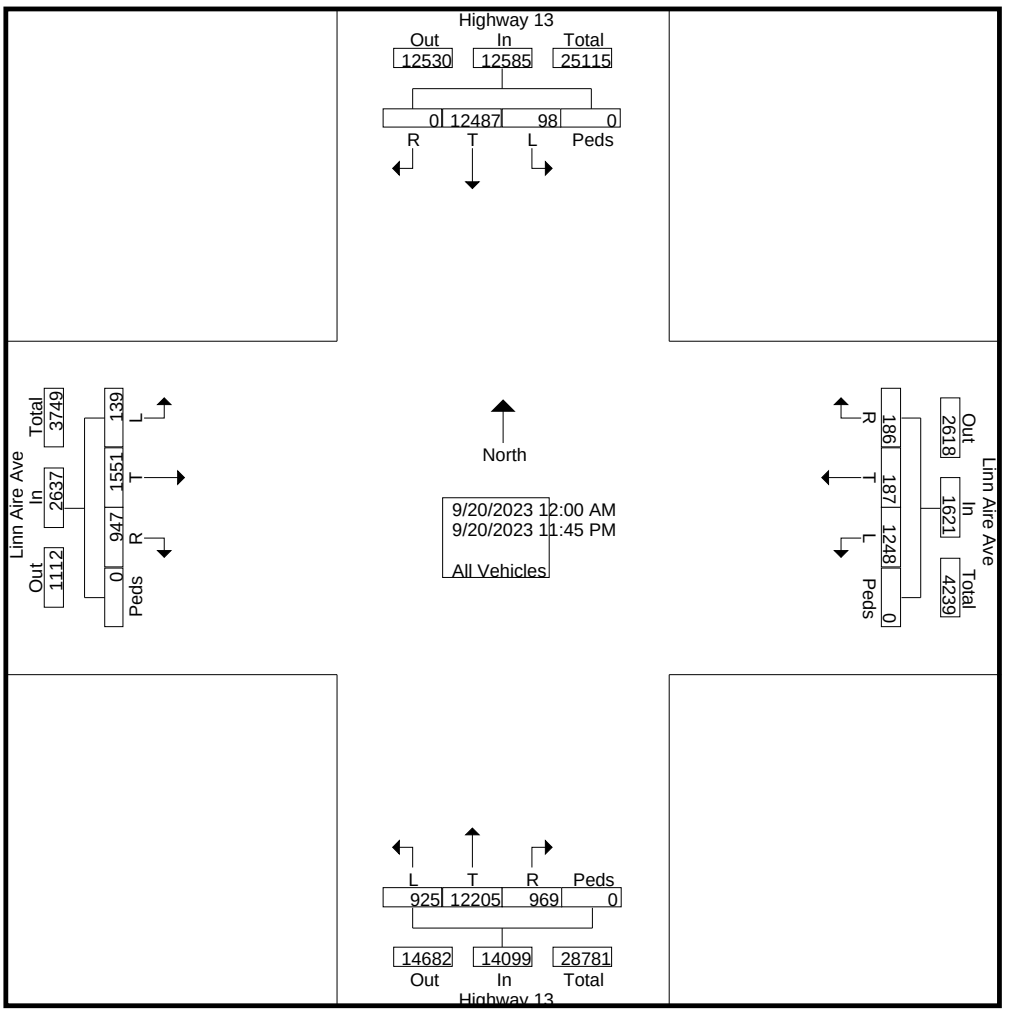
Groups Printed- All Vehicles

	Highway 13 Soutbound					Linn Aire Ave Westbound					Highway 13 Northbound					Linn Aire Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 PM	1	116	0	0	117	0	21	0	0	21	11	129	0	0	140	0	20	0	0	20	298
07:15 PM	1	113	0	0	114	0	10	0	0	10	5	137	0	0	142	0	15	0	0	15	281
07:30 PM	0	106	0	0	106	0	10	0	0	10	6	151	0	0	157	0	33	0	0	33	306
07:45 PM	0	94	0	0	94	0	10	0	0	10	9	139	0	0	148	0	11	0	0	11	263
Total	2	429	0	0	431	0	51	0	0	51	31	556	0	0	587	0	79	0	0	79	1148
08:00 PM	0	80	0	0	80	0	10	0	0	10	7	109	0	0	116	0	5	0	0	5	211
08:15 PM	0	120	0	0	120	0	10	0	0	10	4	144	0	0	148	0	4	0	0	4	282
08:30 PM	0	81	0	0	81	0	6	0	0	6	3	110	0	0	113	0	7	0	0	7	207
08:45 PM	1	62	0	0	63	0	2	0	0	2	2	91	0	0	93	0	13	0	0	13	171
Total	1	343	0	0	344	0	28	0	0	28	16	454	0	0	470	0	29	0	0	29	871
09:00 PM	1	78	0	0	79	0	5	0	0	5	3	64	0	0	67	0	6	0	0	6	157
09:15 PM	0	57	0	0	57	0	10	0	0	10	1	83	0	0	84	0	12	0	0	12	163
09:30 PM	0	47	0	0	47	0	5	0	0	5	2	68	0	0	70	0	8	0	0	8	130
09:45 PM	1	28	0	0	29	0	2	0	0	2	5	67	0	0	72	0	11	0	0	11	114
Total	2	210	0	0	212	0	22	0	0	22	11	282	0	0	293	0	37	0	0	37	564
10:00 PM	0	43	0	0	43	0	4	0	0	4	1	52	0	0	53	0	5	0	0	5	105
10:15 PM	0	30	0	0	30	0	2	0	0	2	3	44	0	0	47	0	3	0	0	3	82
10:30 PM	0	40	0	0	40	0	2	0	0	2	3	34	0	0	37	0	3	0	0	3	82
10:45 PM	0	23	0	0	23	0	1	0	0	1	5	54	0	0	59	0	1	0	0	1	84
Total	0	136	0	0	136	0	9	0	0	9	12	184	0	0	196	0	12	0	0	12	353
11:00 PM	0	27	0	0	27	0	3	0	0	3	3	49	0	0	52	0	13	0	0	13	95
11:15 PM	0	23	0	0	23	0	1	0	0	1	1	41	0	0	42	0	3	0	0	3	69
11:30 PM	0	14	0	0	14	0	1	0	0	1	1	34	0	0	35	0	23	0	0	23	73
11:45 PM	0	14	0	0	14	0	1	0	0	1	1	27	0	0	28	0	0	0	0	0	43
Total	0	78	0	0	78	0	6	0	0	6	6	151	0	0	157	0	39	0	0	39	280
Grand Total	98	12487	0	0	12585	1248	187	186	0	1621	925	12205	969	0	14099	139	1551	947	0	2637	30942
Apprch %	0.8	99.2	0	0		77	11.5	11.5	0		6.6	86.6	6.9	0		5.3	58.8	35.9	0		
Total %	0.3	40.4	0	0	40.7	4	0.6	0.6	0	5.2	3	39.4	3.1	0	45.6	0.4	5	3.1	0	8.5	

Snyder & Associates
2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Linn Aire Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-LinnAire_9-20-23
Site Code :
Start Date : 9/20/2023



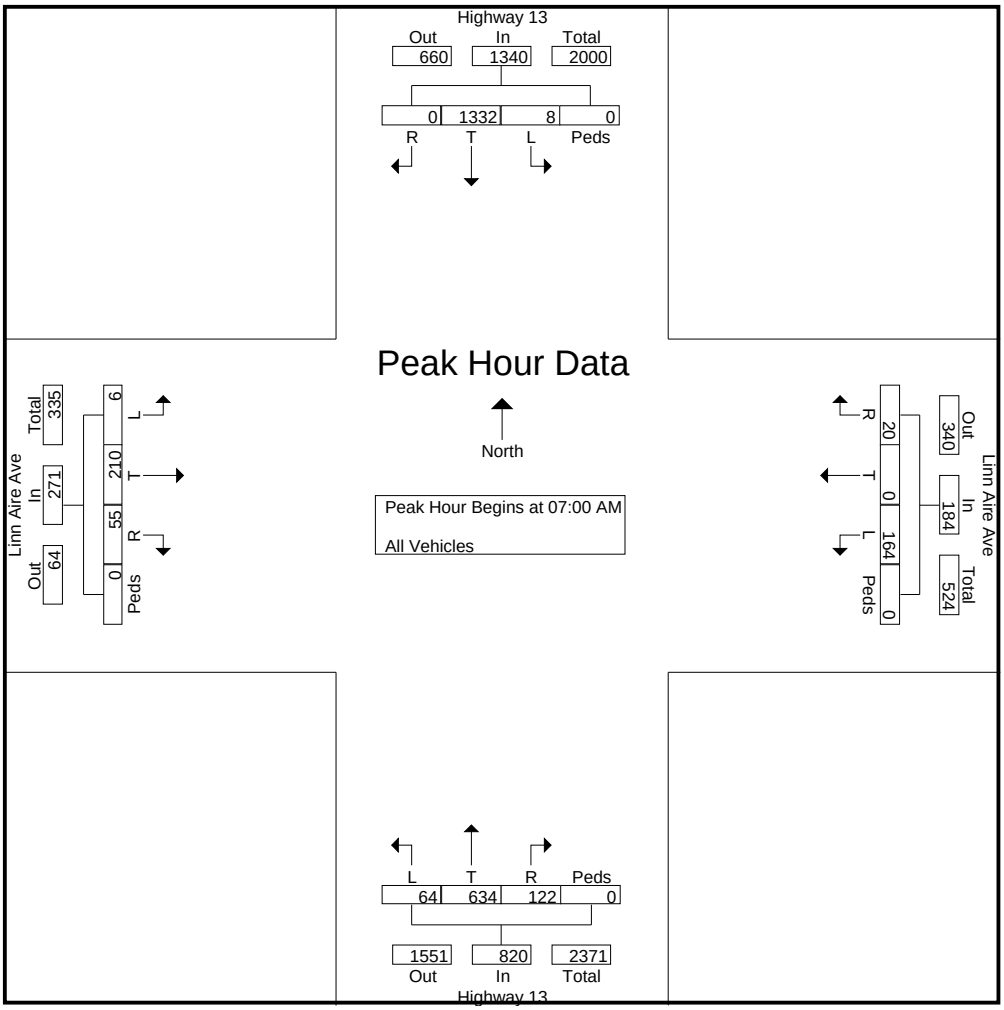
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Linn Aire Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-LinnAire_9-20-23
Site Code :
Start Date : 9/20/2023
Page No : 5

	Highway 13 Soutbound					Linn Aire Ave Westbound					Highway 13 Northbound					Linn Aire Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	1	329	0	0	330	24	0	**13**	0	37	**18**	132	27	0	177	0	45	**19**	0	64	608
07:15 AM	0	346	0	0	346	49	0	2	0	51	14	170	**46**	0	230	1	53	18	0	72	**699**
07:30 AM	3	**364**	0	0	**367**	**57**	0	2	0	**59**	16	138	22	0	176	**5**	**64**	7	0	**76**	678
07:45 AM	**4**	293	0	0	297	34	0	3	0	37	16	**194**	27	0	**237**	0	48	11	0	59	630
Total Volume	8	1332	0	0	1340	164	0	20	0	184	64	634	122	0	820	6	210	55	0	271	2615
% App. Total	0.6	99.4	0	0		89.1	0	10.9	0		7.8	77.3	14.9	0		2.2	77.5	20.3	0		
PHF	.500	.915	.000	.000	.913	.719	.000	.385	.000	.780	.889	.817	.663	.000	.865	.300	.820	.724	.000	.891	.935



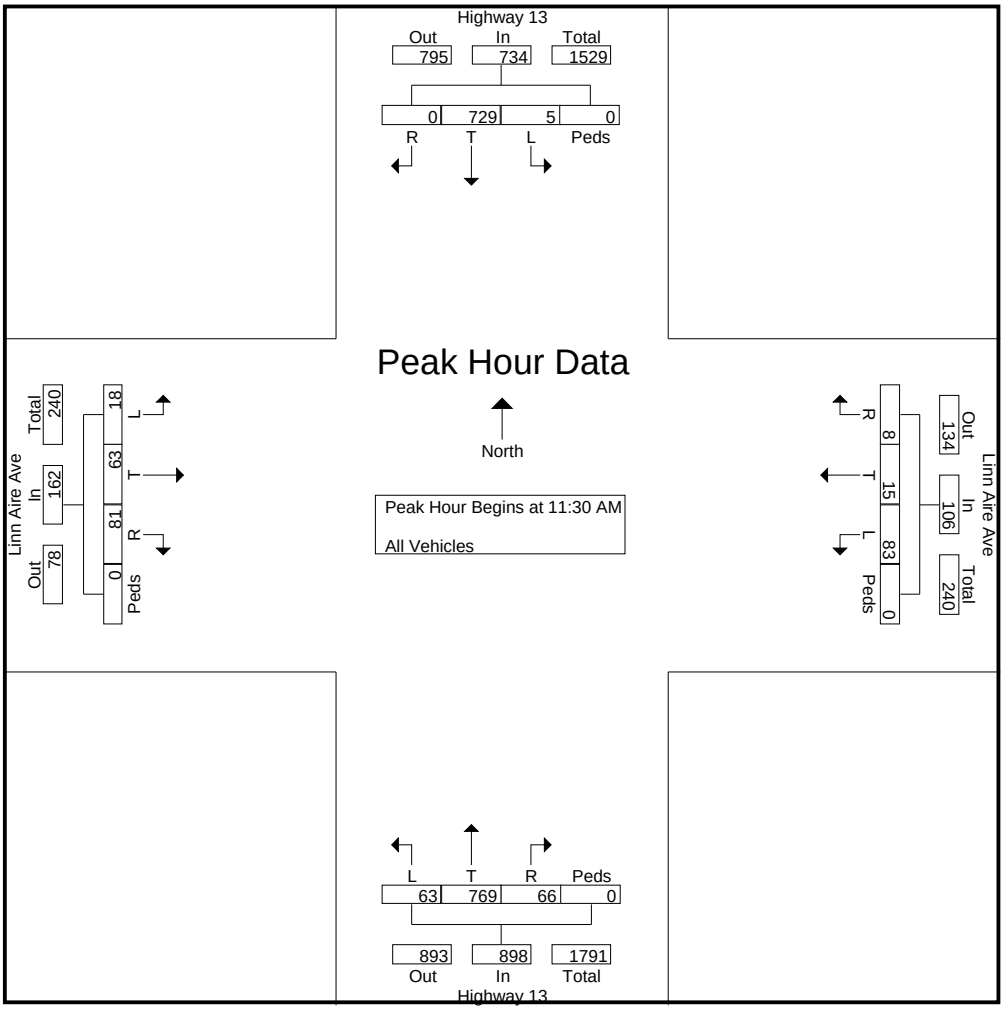
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Linn Aire Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-LinnAire_9-20-23
Site Code :
Start Date : 9/20/2023

	Highway 13 Soutbound					Linn Aire Ave Westbound					Highway 13 Northbound					Linn Aire Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	1	183	0	0	184	19	0	**4**	0	23	**24**	**205**	14	0	**243**	1	**18**	21	0	40	490
11:45 AM	**2**	**193**	0	0	**195**	**25**	0	4	0	29	18	189	**22**	0	229	4	17	21	0	42	**495**
12:00 PM	1	181	0	0	182	18	**13**	0	0	**31**	11	185	12	0	208	6	13	**24**	0	**43**	464
12:15 PM	1	172	0	0	173	21	2	0	0	23	10	190	18	0	218	**7**	15	15	0	37	451
Total Volume	5	729	0	0	734	83	15	8	0	106	63	769	66	0	898	18	63	81	0	162	1900
% App. Total																					
PHF	.625	.944	.000	.000	.941	.830	.288	.500	.000	.855	.656	.938	.750	.000	.924	.643	.875	.844	.000	.942	.960

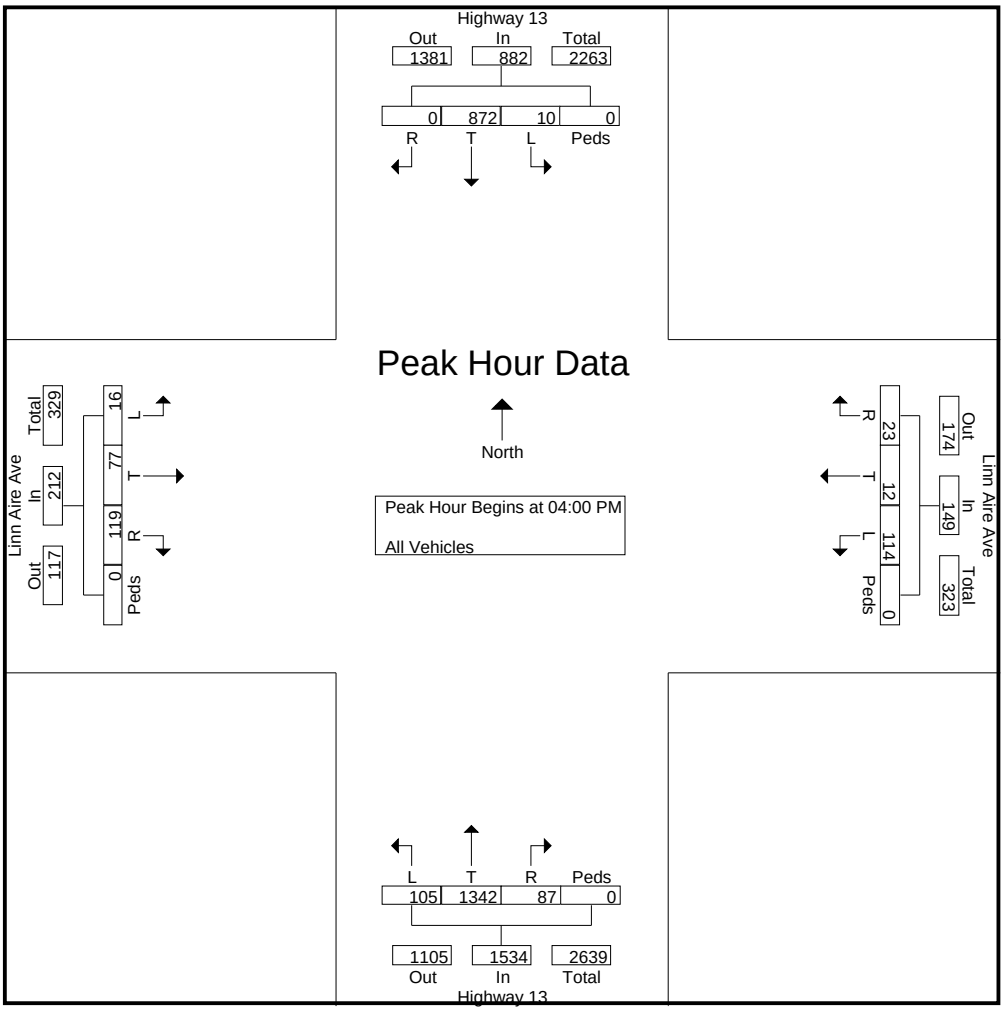


Snyder & Associates
2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & Linn Aire Ave
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-LinnAire_9-20-23
Site Code :
Start Date : 9/20/2023
Page No : 7

	Highway 13 Soutbound					Linn Aire Ave Westbound					Highway 13 Northbound					Linn Aire Ave Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	**3**	**238**	0	0	**241**	**45**	0	**7**	0	**52**	20	308	23	0	351	3	**38**	27	0	**68**	**712**
04:15 PM	2	219	0	0	221	32	0	5	0	37	**39**	319	**25**	0	383	**5**	32	16	0	53	694
04:30 PM	3	205	0	0	208	22	0	6	0	28	22	344	21	0	387	3	7	36	0	46	669
04:45 PM	2	210	0	0	212	15	**12**	5	0	32	24	**371**	18	0	**413**	5	0	**40**	0	45	702
Total Volume	10	872	0	0	882	114	12	23	0	149	105	1342	87	0	1534	16	77	119	0	212	2777
% App. Total	1.1	98.9	0	0		76.5	8.1	15.4	0		6.8	87.5	5.7	0		7.5	36.3	56.1	0		
PHF	.833	.916	.000	.000	.915	.633	.250	.821	.000	.716	.673	.904	.870	.000	.929	.800	.507	.744	.000	.779	.975



Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 100
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY100_10-17-23
Site Code :
Start Date : 10/17/2023
Page No : 1

Groups Printed- All Vehicles

	Highway 13 Soutbound					Secrist Rd Westbound					Highway 13 Northbound					Highway 100 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
12:00 AM	0	7	6	0	13	0	1	0	0	1	0	20	0	0	20	9	0	2	0	11	45
12:15 AM	0	4	0	0	4	0	1	0	0	1	0	15	0	0	15	9	0	1	0	10	30
12:30 AM	0	7	1	0	8	0	0	0	0	0	2	8	0	0	10	6	0	1	0	7	25
12:45 AM	0	11	2	0	13	0	1	0	0	1	2	12	0	0	14	2	0	1	0	3	31
Total	0	29	9	0	38	0	3	0	0	3	4	55	0	0	59	26	0	5	0	31	131
01:00 AM	0	9	3	0	12	0	0	0	0	0	0	7	0	0	7	1	0	0	0	1	20
01:15 AM	0	8	2	0	10	0	0	0	0	0	0	7	0	0	7	1	0	3	0	4	21
01:30 AM	0	2	2	0	4	0	0	0	0	0	2	10	0	0	12	1	0	0	0	1	17
01:45 AM	0	7	2	0	9	0	0	0	0	0	2	11	0	0	13	6	0	0	0	6	28
Total	0	26	9	0	35	0	0	0	0	0	4	35	0	0	39	9	0	3	0	12	86
02:00 AM	0	5	3	0	8	0	1	0	0	1	0	5	0	0	5	3	0	1	0	4	18
02:15 AM	0	2	0	0	2	1	0	0	0	1	2	6	0	0	8	1	0	4	0	5	16
02:30 AM	0	19	4	0	23	0	0	0	0	0	0	1	0	0	1	4	0	3	0	7	31
02:45 AM	0	12	3	0	15	0	0	0	0	0	1	6	0	0	7	4	0	1	0	5	27
Total	0	38	10	0	48	1	1	0	0	2	3	18	0	0	21	12	0	9	0	21	92
03:00 AM	0	6	2	0	8	1	0	0	0	1	4	8	0	0	12	3	0	2	0	5	26
03:15 AM	0	12	0	0	12	0	0	0	0	0	1	13	0	0	14	3	0	6	0	9	35
03:30 AM	0	14	5	0	19	1	1	0	0	2	5	10	0	0	15	5	0	6	0	11	47
03:45 AM	0	10	2	0	12	0	0	0	0	0	5	11	0	0	16	1	0	4	0	5	33
Total	0	42	9	0	51	2	1	0	0	3	15	42	0	0	57	12	0	18	0	30	141
04:00 AM	0	21	6	0	27	1	1	0	0	2	0	23	0	0	23	2	0	5	0	7	59
04:15 AM	0	49	9	0	58	1	0	0	0	1	2	15	0	0	17	7	0	9	0	16	92
04:30 AM	0	47	8	0	55	1	2	0	0	3	4	12	0	0	16	12	0	8	0	20	94
04:45 AM	0	51	12	0	63	0	2	0	0	2	7	25	0	0	32	9	0	8	0	17	114
Total	0	168	35	0	203	3	5	0	0	8	13	75	0	0	88	30	0	30	0	60	359
05:00 AM	0	80	6	0	86	0	0	0	0	0	5	28	0	0	33	8	0	16	0	24	143
05:15 AM	0	96	11	0	107	1	2	0	0	3	6	23	0	0	29	9	0	35	0	44	183
05:30 AM	0	145	20	0	165	3	17	0	0	20	12	46	0	0	58	12	0	52	0	64	307
05:45 AM	0	113	31	0	144	5	7	0	0	12	23	47	0	0	70	24	0	24	0	48	274
Total	0	434	68	0	502	9	26	0	0	35	46	144	0	0	190	53	0	127	0	180	907
06:00 AM	0	148	28	0	176	1	10	0	0	11	17	48	0	0	65	36	0	57	0	93	345
06:15 AM	0	210	55	0	265	5	13	2	0	20	22	72	0	0	94	49	5	44	0	98	477
06:30 AM	0	270	77	0	347	12	22	0	0	34	41	87	0	0	128	52	1	74	0	127	636
06:45 AM	0	212	63	0	275	1	19	1	0	21	46	125	0	0	171	73	1	64	0	138	605
Total	0	840	223	0	1063	19	64	3	0	86	126	332	0	0	458	210	7	239	0	456	2063
07:00 AM	0	241	83	0	324	5	15	3	0	23	35	106	1	0	142	77	1	58	0	136	625
07:15 AM	5	282	79	0	366	4	32	6	0	42	70	130	1	0	201	76	3	63	0	142	751
07:30 AM	2	290	115	0	407	8	37	1	0	46	49	98	1	0	148	65	3	83	0	151	752
07:45 AM	2	274	93	0	369	6	35	0	0	41	51	124	1	0	176	80	7	76	0	163	749
Total	9	1087	370	0	1466	23	119	10	0	152	205	458	4	0	667	298	14	280	0	592	2877
08:00 AM	1	193	82	0	276	2	36	6	0	44	44	118	4	0	166	59	6	56	0	121	607
08:15 AM	1	207	74	0	282	2	18	2	0	22	46	105	0	0	151	48	5	57	0	110	565
08:30 AM	3	220	75	0	298	3	13	2	0	18	50	106	3	0	159	44	1	43	0	88	563
08:45 AM	3	178	80	0	261	2	26	0	0	28	32	121	1	0	154	51	6	43	0	100	543
Total	8	798	311	0	1117	9	93	10	0	112	172	450	8	0	630	202	18	199	0	419	2278
09:00 AM	0	146	36	0	182	2	12	1	0	15	46	107	1	0	154	37	3	25	0	65	416

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 100
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY100_10-17-23
Site Code :
Start Date : 10/17/2023

Groups Printed- All Vehicles

	Highway 13 Soutbound					Secrist Rd Westbound					Highway 13 Northbound					Highway 100 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
09:15 AM	4	166	60	0	230	1	16	1	0	18	44	112	2	0	158	44	7	45	0	96	502
09:30 AM	2	182	59	0	243	5	6	0	0	11	36	121	0	0	157	55	4	54	0	113	524
09:45 AM	3	160	39	0	202	0	11	0	0	11	39	115	1	0	155	66	3	34	0	103	471
Total	9	654	194	0	857	8	45	2	0	55	165	455	4	0	624	202	17	158	0	377	1913
10:00 AM	3	139	57	0	199	3	11	3	0	17	44	107	0	0	151	43	8	29	0	80	447
10:15 AM	2	157	73	0	232	0	13	2	0	15	36	140	1	0	177	70	2	31	0	103	527
10:30 AM	3	153	52	0	208	3	12	1	0	16	31	125	5	0	161	64	14	41	0	119	504
10:45 AM	1	161	51	0	213	2	9	2	0	13	35	107	0	0	142	72	6	34	0	112	480
Total	9	610	233	0	852	8	45	8	0	61	146	479	6	0	631	249	30	135	0	414	1958
11:00 AM	0	137	64	0	201	2	10	3	0	15	42	115	2	0	159	58	8	34	0	100	475
11:15 AM	2	123	52	0	177	1	16	0	0	17	50	134	6	0	190	62	10	39	0	111	495
11:30 AM	5	162	66	0	233	4	8	0	0	12	49	116	2	0	167	49	6	30	0	85	497
11:45 AM	4	156	56	0	216	2	12	2	0	16	42	128	2	0	172	51	8	41	0	100	504
Total	11	578	238	0	827	9	46	5	0	60	183	493	12	0	688	220	32	144	0	396	1971
12:00 PM	2	117	64	0	183	0	14	2	0	16	44	117	4	0	165	70	9	39	0	118	482
12:15 PM	3	165	47	0	215	0	13	1	0	14	39	133	3	0	175	71	9	35	0	115	519
12:30 PM	3	158	62	0	223	0	16	0	0	16	43	106	0	0	149	47	10	42	0	99	487
12:45 PM	1	170	65	0	236	0	14	2	0	16	40	106	1	0	147	54	7	41	0	102	501
Total	9	610	238	0	857	0	57	5	0	62	166	462	8	0	636	242	35	157	0	434	1989
01:00 PM	7	156	54	0	217	1	9	2	0	12	44	115	0	0	159	79	6	55	0	140	528
01:15 PM	3	140	52	0	195	1	7	4	0	12	47	139	3	0	189	80	4	41	0	125	521
01:30 PM	1	149	61	0	211	0	10	2	0	12	50	127	2	0	179	64	12	42	0	118	520
01:45 PM	5	136	68	0	209	0	12	1	0	13	52	123	0	0	175	71	7	38	0	116	513
Total	16	581	235	0	832	2	38	9	0	49	193	504	5	0	702	294	29	176	0	499	2082
02:00 PM	1	180	55	0	236	0	5	2	0	7	33	123	0	0	156	63	2	49	0	114	513
02:15 PM	6	148	67	0	221	4	16	1	0	21	42	178	2	0	222	70	7	46	0	123	587
02:30 PM	4	176	57	0	237	2	14	0	0	16	56	126	2	0	184	95	10	51	0	156	593
02:45 PM	4	162	76	0	242	1	13	1	0	15	42	180	3	0	225	106	10	55	0	171	653
Total	15	666	255	0	936	7	48	4	0	59	173	607	7	0	787	334	29	201	0	564	2346
03:00 PM	7	137	77	0	221	2	12	2	0	16	55	161	3	0	219	97	13	50	0	160	616
03:15 PM	10	180	81	0	271	0	10	2	0	12	52	233	6	0	291	109	8	46	0	163	737
03:30 PM	6	194	84	0	284	2	14	2	0	18	74	207	1	0	282	97	18	58	0	173	757
03:45 PM	5	168	77	0	250	0	21	3	0	24	75	274	9	0	358	126	16	51	0	193	825
Total	28	679	319	0	1026	4	57	9	0	70	256	875	19	0	1150	429	55	205	0	689	2935
04:00 PM	4	169	87	0	260	2	16	5	0	23	81	273	5	0	359	109	21	56	0	186	828
04:15 PM	7	188	83	0	278	1	13	2	0	16	97	242	5	0	344	142	15	61	0	218	856
04:30 PM	2	213	103	0	318	2	12	4	0	18	88	209	11	0	308	113	21	62	0	196	840
04:45 PM	5	144	62	0	211	0	21	4	0	25	102	274	5	0	381	130	18	62	0	210	827
Total	18	714	335	0	1067	5	62	15	0	82	368	998	26	0	1392	494	75	241	0	810	3351
05:00 PM	18	182	71	0	271	1	8	5	0	14	94	227	6	0	327	109	25	67	0	201	813
05:15 PM	6	185	80	0	271	2	16	4	0	22	82	263	11	0	356	124	25	59	0	208	857
05:30 PM	5	144	58	0	207	0	7	1	0	8	74	213	3	0	290	96	23	65	0	184	689
05:45 PM	7	139	61	0	207	3	16	2	0	21	60	158	6	0	224	77	11	41	0	129	581
Total	36	650	270	0	956	6	47	12	0	65	310	861	26	0	1197	406	84	232	0	722	2940
06:00 PM	6	141	58	0	205	2	4	1	0	7	47	129	2	0	178	82	6	45	0	133	523
06:15 PM	6	108	60	0	174	3	11	1	0	15	45	114	2	0	161	85	7	29	0	121	471
06:30 PM	3	99	49	0	151	3	10	3	0	16	41	124	2	0	167	49	7	36	0	92	426
06:45 PM	2	85	41	0	128	1	7	2	0	10	31	101	1	0	133	51	12	39	0	102	373
Total	17	433	208	0	658	9	32	7	0	48	164	468	7	0	639	267	32	149	0	448	1793

Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 100
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY100_10-17-23
Site Code :
Start Date : 10/17/2023

Groups Printed- All Vehicles

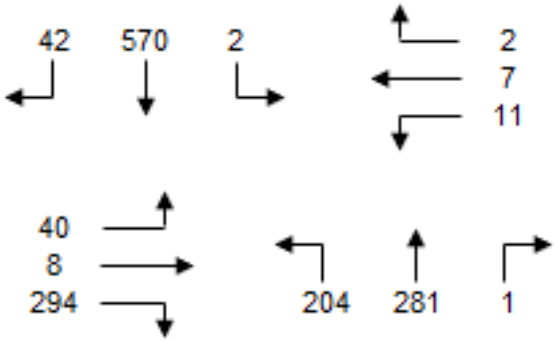
	Highway 13 Soutbound					Secrist Rd Westbound					Highway 13 Northbound					Highway 100 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:00 PM	4	100	27	0	131	1	4	0	0	5	32	102	0	0	134	55	0	29	0	84	354
07:15 PM	2	101	41	0	144	0	4	0	0	4	27	86	0	0	113	60	0	29	0	89	350
07:30 PM	3	96	41	0	140	2	5	0	0	7	25	71	0	0	96	45	0	24	0	69	312
07:45 PM	4	83	33	0	120	1	1	0	0	2	19	69	0	0	88	37	0	22	0	59	269
Total	13	380	142	0	535	4	14	0	0	18	103	328	0	0	431	197	0	104	0	301	1285
08:00 PM	5	82	31	0	118	0	6	0	0	6	13	65	0	0	78	41	0	24	0	65	267
08:15 PM	0	75	24	0	99	4	3	0	0	7	20	89	0	0	109	38	0	21	0	59	274
08:30 PM	3	49	37	0	89	1	3	0	0	4	15	63	0	0	78	40	0	20	0	60	231
08:45 PM	0	53	10	0	63	1	2	0	0	3	14	45	0	0	59	22	0	29	0	51	176
Total	8	259	102	0	369	6	14	0	0	20	62	262	0	0	324	141	0	94	0	235	948
09:00 PM	1	52	11	0	64	0	1	0	0	1	7	44	0	0	51	28	0	9	0	37	153
09:15 PM	2	35	13	0	50	0	0	0	0	0	14	37	0	0	51	16	0	11	0	27	128
09:30 PM	2	24	21	0	47	1	1	0	0	2	8	34	0	0	42	24	0	10	0	34	125
09:45 PM	0	24	17	0	41	2	5	0	0	7	12	46	0	0	58	16	0	12	0	28	134
Total	5	135	62	0	202	3	7	0	0	10	41	161	0	0	202	84	0	42	0	126	540
10:00 PM	2	31	9	0	42	0	1	0	0	1	7	42	0	0	49	17	0	7	0	24	116
10:15 PM	0	32	18	0	50	0	3	0	0	3	9	32	0	0	41	15	0	8	0	23	117
10:30 PM	1	15	5	0	21	1	0	0	0	1	6	34	0	0	40	15	0	11	0	26	88
10:45 PM	2	16	7	0	25	0	1	0	0	1	11	57	0	0	68	15	0	5	0	20	114
Total	5	94	39	0	138	1	5	0	0	6	33	165	0	0	198	62	0	31	0	93	435
11:00 PM	0	14	9	0	23	0	0	0	0	0	12	29	0	0	41	6	0	2	0	8	72
11:15 PM	1	13	7	0	21	0	0	0	0	0	6	24	0	0	30	8	0	2	0	10	61
11:30 PM	2	14	7	0	23	0	0	0	0	0	5	15	0	0	20	3	0	3	0	6	49
11:45 PM	0	11	8	0	19	0	0	0	0	0	4	17	0	0	21	8	0	2	0	10	50
Total	3	52	31	0	86	0	0	0	0	0	27	85	0	0	112	25	0	9	0	34	232
Grand Total	219	10557	3945	0	14721	138	829	99	0	1066	2978	8812	132	0	11922	4498	457	2988	0	7943	35652
Apprch %	1.5	71.7	26.8	0		12.9	77.8	9.3	0		25	73.9	1.1	0		56.6	5.8	37.6	0		
Total %	0.6	29.6	11.1	0	41.3	0.4	2.3	0.3	0	3	8.4	24.7	0.4	0	33.4	12.6	1.3	8.4	0	22.3	

Design Year 2045 Turning Movement Distribution

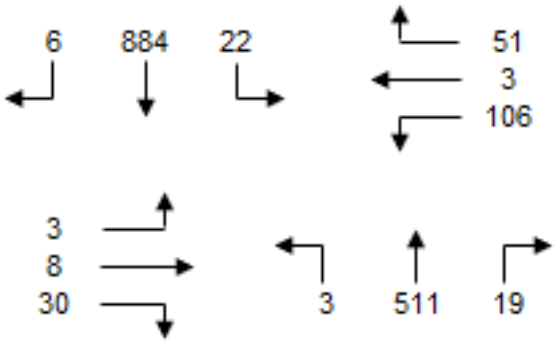
AM Peak

IA 13 & Rec Dr

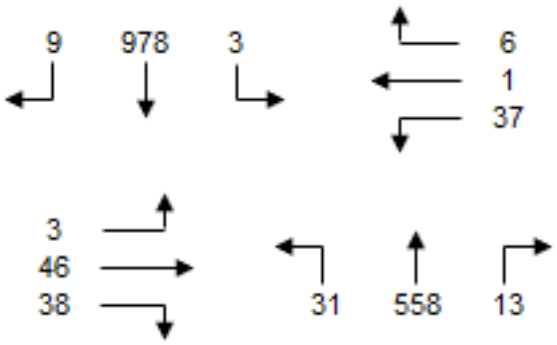
IA 13 & 29th Ave/Fernow Rd



IA 13 & Prairie Ridge Ave

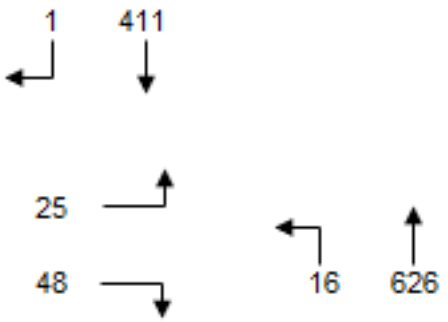


IA 13 & Kacena Ave

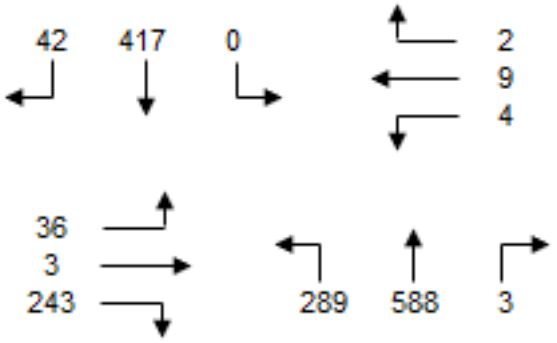


PM Peak

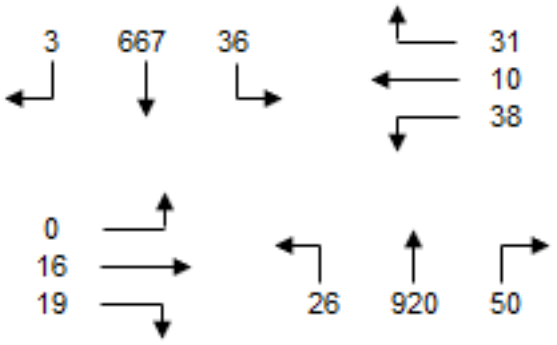
IA 13 & Rec Dr



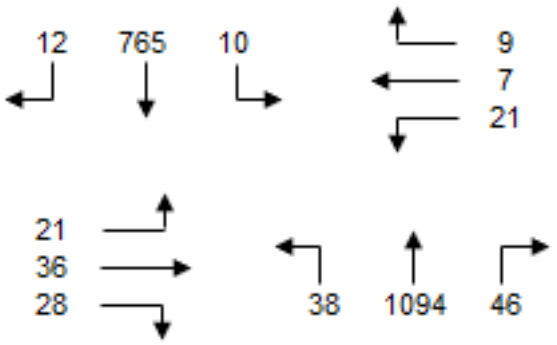
IA 13 & 29th Ave/Fernow Rd



IA 13 & Prairie Ridge Ave

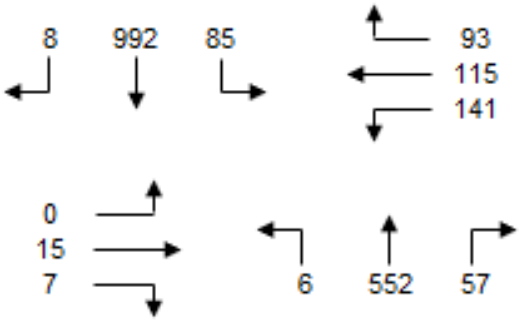


IA 13 & Kacena Ave

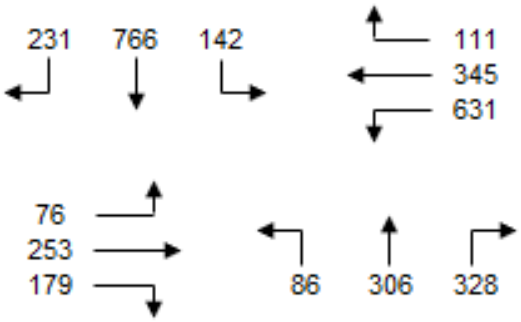


AM Peak

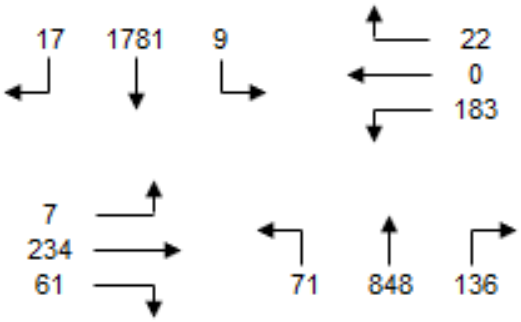
IA 13 & Pawnee Ave / Hennessey Pkwy



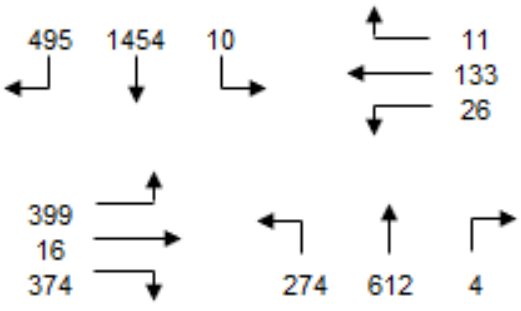
IA 13 & US 151



IA 13 & Linn Aire Ave

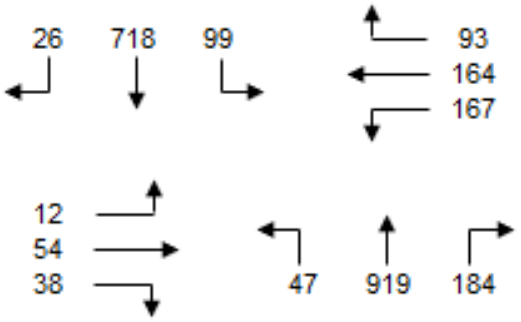


IA 13 & IA 100 / Secrist Rd

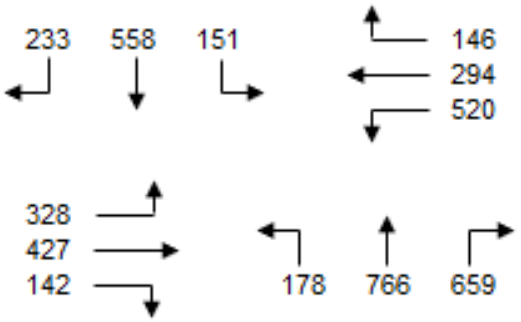


PM Peak

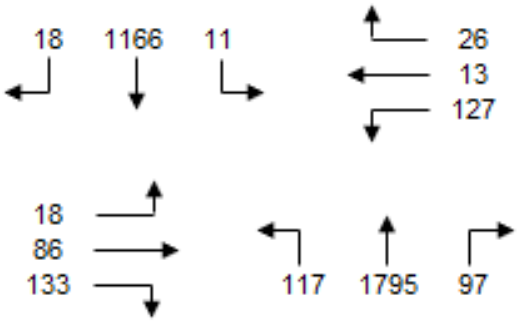
IA 13 & Pawnee Ave / Hennessey Pkwy



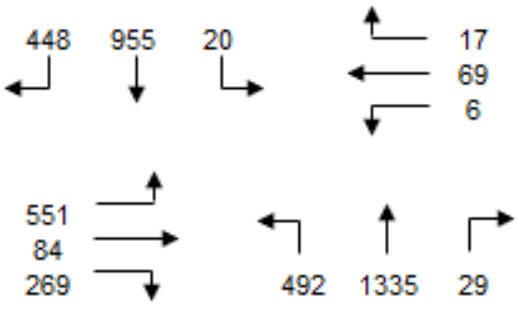
IA 13 & US 151



IA 13 & Linn Aire Ave



IA 13 & IA 100 / Secrist Rd



N

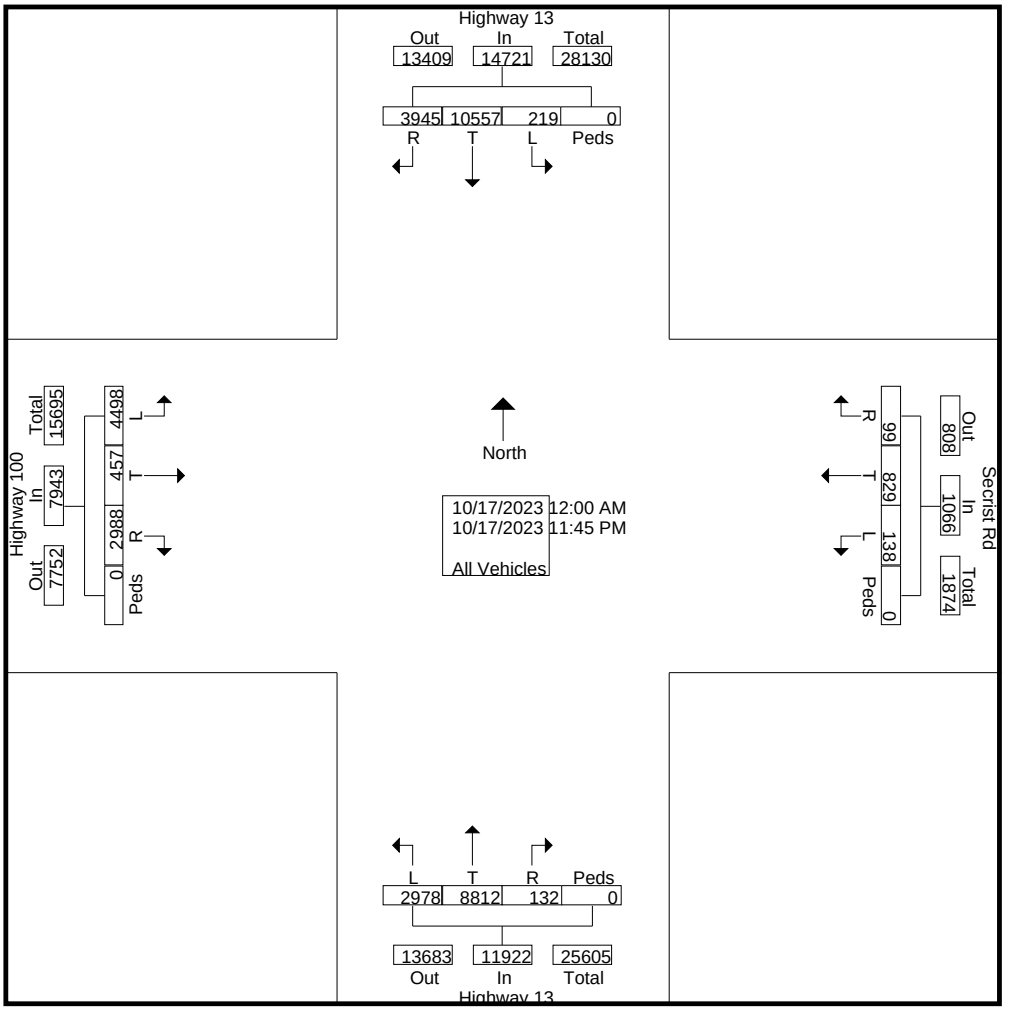
SNYDER & ASSOCIATES

Exhibit: Design Year 2045 Traffic

Snyder & Associates
2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 100
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY100_10-17-23
Site Code :
Start Date : 10/17/2023
Page No : 4



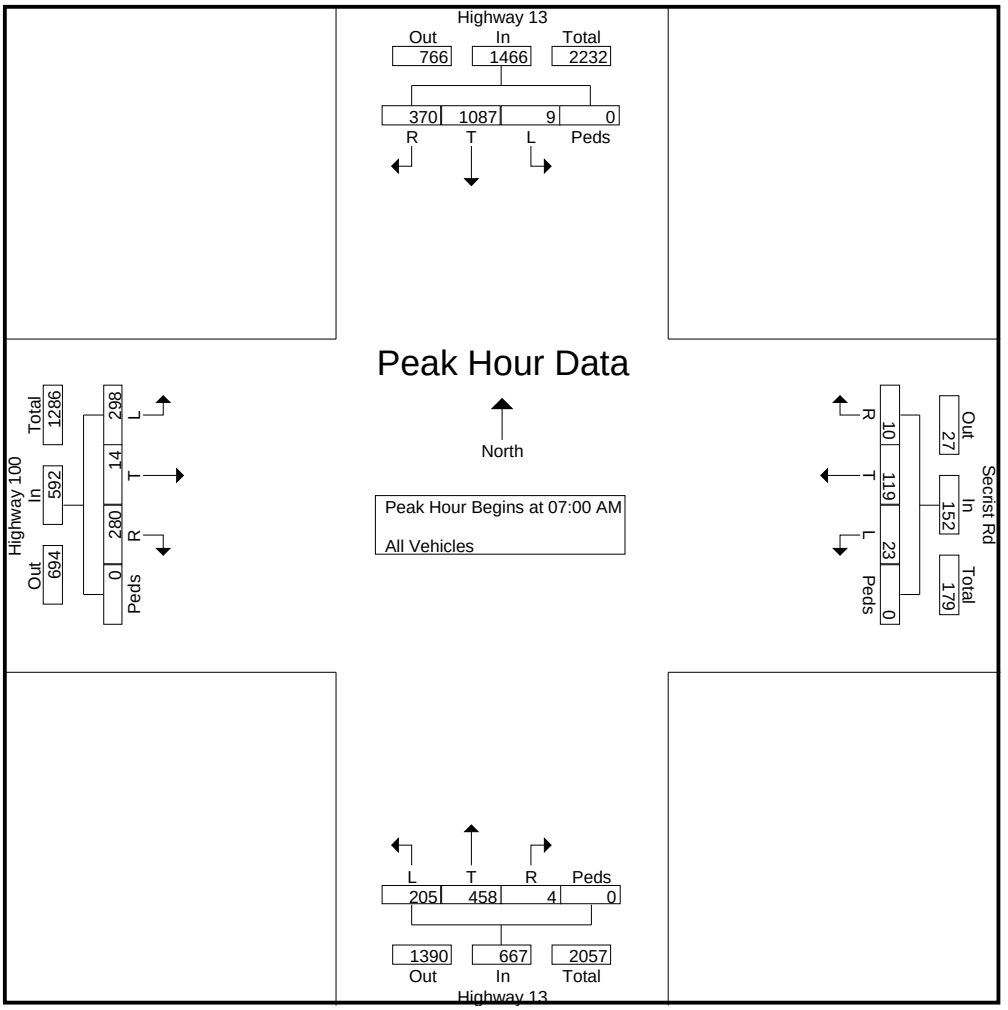
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 100
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY100_10-17-23
Site Code :
Start Date : 10/17/2023
Page No : 5

	Highway 13 Soutbound					Secrist Rd Westbound					Highway 13 Northbound					Highway 100 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	241	83	0	324	5	15	3	0	23	35	106	**1**	0	142	77	1	58	0	136	625
07:15 AM	**5**	282	79	0	366	4	32	**6**	0	42	**70**	**130**	1	0	**201**	76	3	63	0	142	751
07:30 AM	2	**290**	**115**	0	**407**	**8**	**37**	1	0	**46**	49	98	1	0	148	65	3	**83**	0	151	**752**
07:45 AM	2	274	93	0	369	6	35	0	0	41	51	124	1	0	176	**80**	**7**	76	0	**163**	749
Total Volume	9	1087	370	0	1466	23	119	10	0	152	205	458	4	0	667	298	14	280	0	592	2877
% App. Total	0.6	74.1	25.2	0		15.1	78.3	6.6	0		30.7	68.7	0.6	0		50.3	2.4	47.3	0		
PHF	.450	.937	.804	.000	.900	.719	.804	.417	.000	.826	.732	.881	1.00	.000	.830	.931	.500	.843	.000	.908	.956



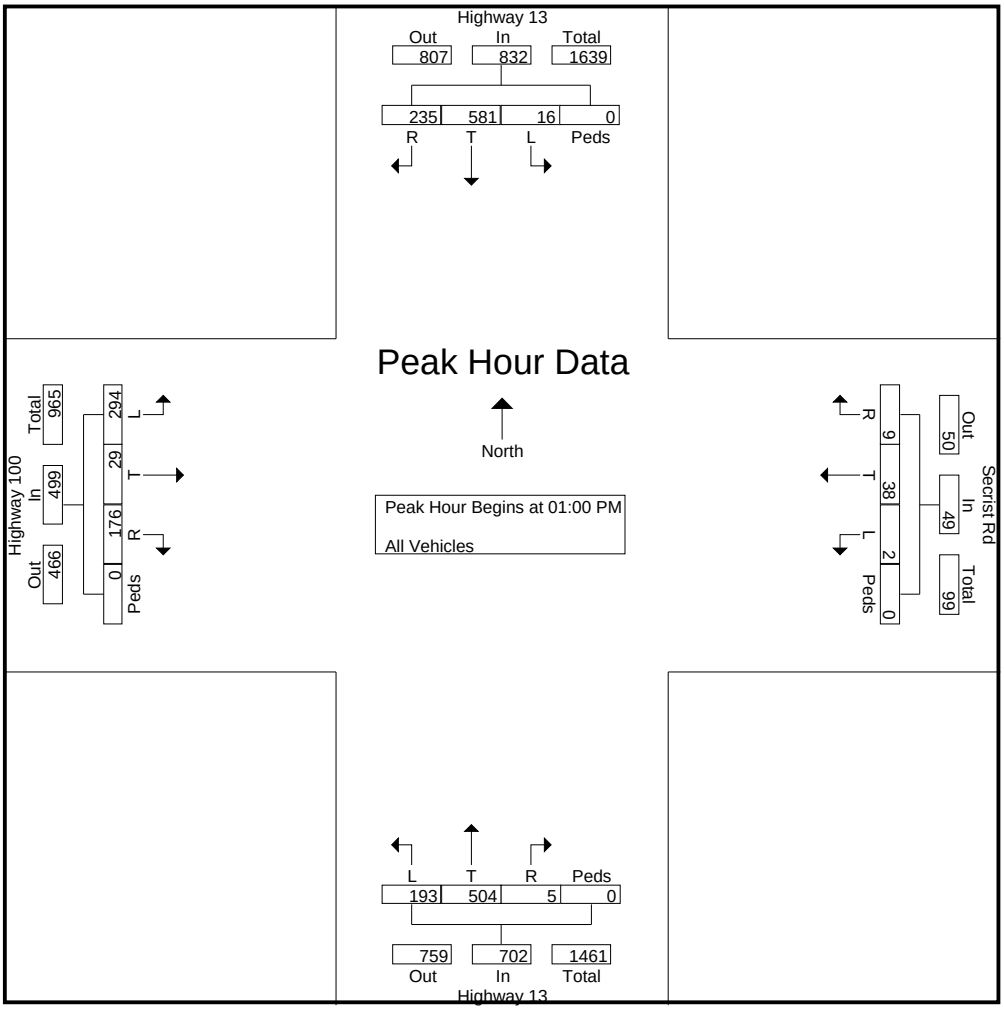
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 100
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY100_10-17-23
Site Code :
Start Date : 10/17/2023

	Highway 13 Soutbound					Secrist Rd Westbound					Highway 13 Northbound					Highway 100 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:00 PM																					
01:00 PM	**7**	**156**	54	0	**217**	**1**	9	2	0	12	44	115	0	0	159	79	6	**55**	0	**140**	**528**
01:15 PM	3	140	52	0	195	1	7	**4**	0	12	47	**139**	**3**	0	**189**	**80**	4	41	0	125	521
01:30 PM	1	149	61	0	211	0	10	2	0	12	50	127	2	0	179	64	**12**	42	0	118	520
01:45 PM	5	136	**68**	0	209	0	**12**	1	0	**13**	**52**	123	0	0	175	71	7	38	0	116	513
Total Volume	16	581	235	0	832	2	38	9	0	49	193	504	5	0	702	294	29	176	0	499	2082
% App. Total																					
PHF	.571	.931	.864	.000	.959	.500	.792	.563	.000	.942	.928	.906	.417	.000	.929	.919	.604	.800	.000	.891	.986



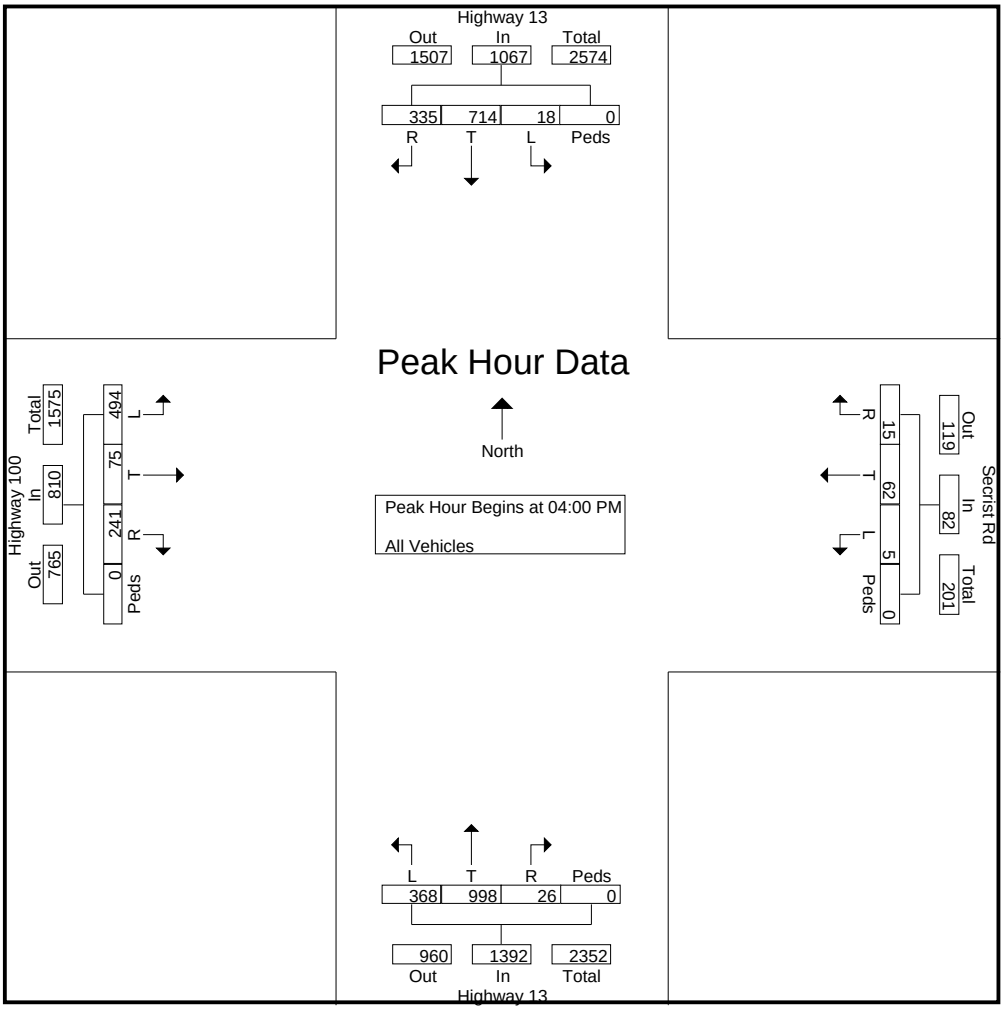
Snyder & Associates

2727 SW Snyder Blvd
Ankeny, IA 50023

IA Highway 13 & IA Highway 100
IA 13 Corridor TEAP Study
Marion, IA
122.1000.01K

File Name : TMV-City_HWY13-HWY100_10-17-23
Site Code :
Start Date : 10/17/2023

	Highway 13 Soutbound					Secrist Rd Westbound					Highway 13 Northbound					Highway 100 Eastbound					
Start Time	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	L	T	R	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	4	169	87	0	260	**2**	16	**5**	0	23	81	273	5	0	359	109	**21**	56	0	186	828
04:15 PM	**7**	188	83	0	278	1	13	2	0	16	97	242	5	0	344	**142**	15	61	0	**218**	**856**
04:30 PM	2	**213**	**103**	0	**318**	2	12	4	0	18	88	209	**11**	0	308	113	21	**62**	0	196	840
04:45 PM	5	144	62	0	211	0	**21**	4	0	**25**	**102**	**274**	5	0	**381**	130	18	62	0	210	827
Total Volume	18	714	335	0	1067	5	62	15	0	82	368	998	26	0	1392	494	75	241	0	810	3351
% App. Total																					
PHF	.643	.838	.813	.000	.839	.625	.738	.750	.000	.820	.902	.911	.591	.000	.913	.870	.893	.972	.000	.929	.979



Iowa Crash Analysis Tool
Quick Report
2018-2022

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

Injury Status Summary	0
Fatalities	0
Suspected serious/incapacitating	0
Suspected minor/non-incapacitating	0
Possible (complaint of pain/injury)	0
Uninjured	0
Unknown	0
Not Reported	0

Property/Vehicles/Occupants	
Property Damage Total (dollars):	3,000.00
Average (per crash dollars):	3,000.00
Total Vehicles:	1.00
Average (per crash):	1.00
Total Occupants:	1.00
Average (per crash):	1.00

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

Major Cause			1
Animal	1	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	0	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	0
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	0
Unknown	0	Not reported	0
Other: No improper action	0		

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	1	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0
Wednesday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thursday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0
Total	0	1	0	0	0	0	0	0	0	0	0	0	0	1

Manner of Crash Collision	1
Non-collision (single vehicle)	1
Head-on (front to front)	0
Rear-end (front to rear)	0
Angle, oncoming left turn	0
Broadside (front to side)	0
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	1
Dry	1
Wet	0
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	1		1
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)	1

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	0	0	0	0
= 20	0	0	0	0	0
>= 21 and <= 24	0	0	0	0	0
>= 25 and <= 29	0	0	0	0	0
>= 30 and <= 34	0	0	0	0	0
>= 35 and <= 39	0	0	0	0	0
>= 40 and <= 44	0	0	0	0	0
>= 45 and <= 49	0	0	0	0	0
>= 50 and <= 54	0	0	0	0	0
>= 55 and <= 59	0	0	0	0	0
>= 60 and <= 64	1	0	0	0	1
>= 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	1	0	0	0	1

Drug/Alcohol Related	**1**
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	1

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

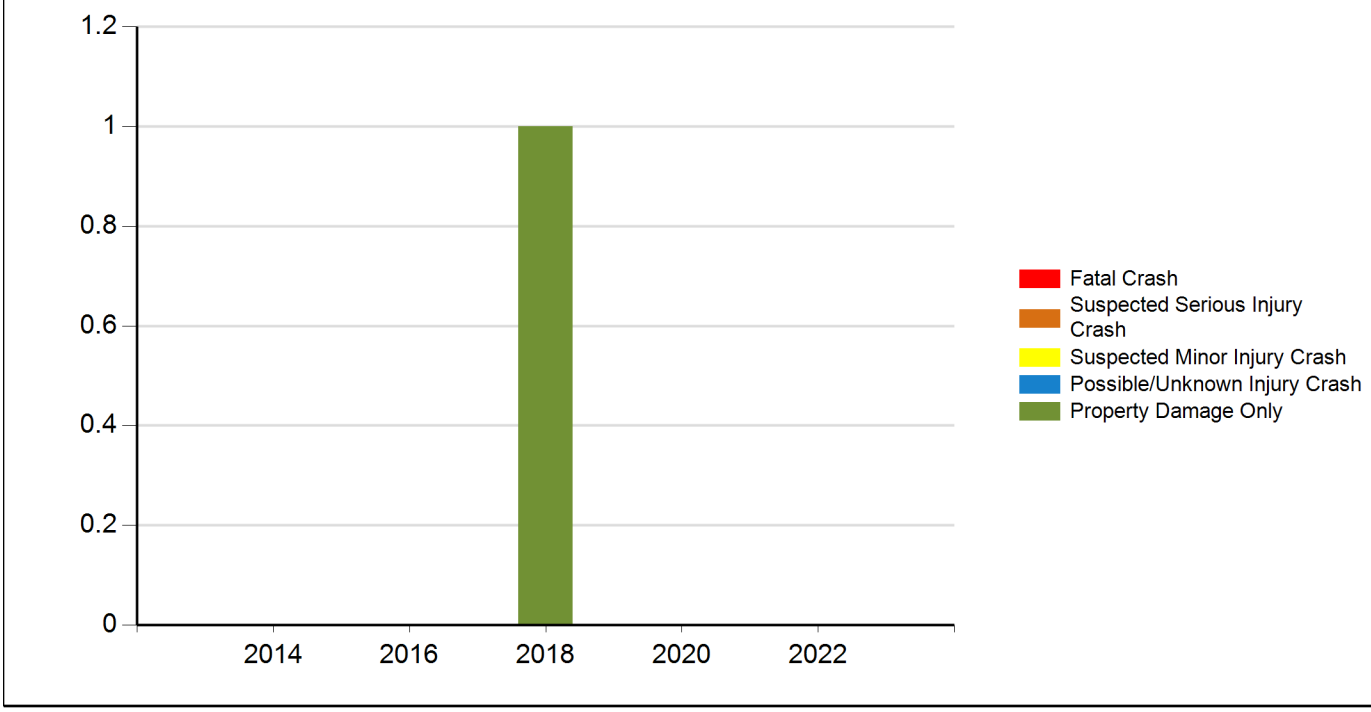
Drug Test Given	**1**
None	1
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

Drug Test Result	**1**
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	1
Other	0

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	**Total**
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	1	1
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
Total	0	0	0	0	1	1

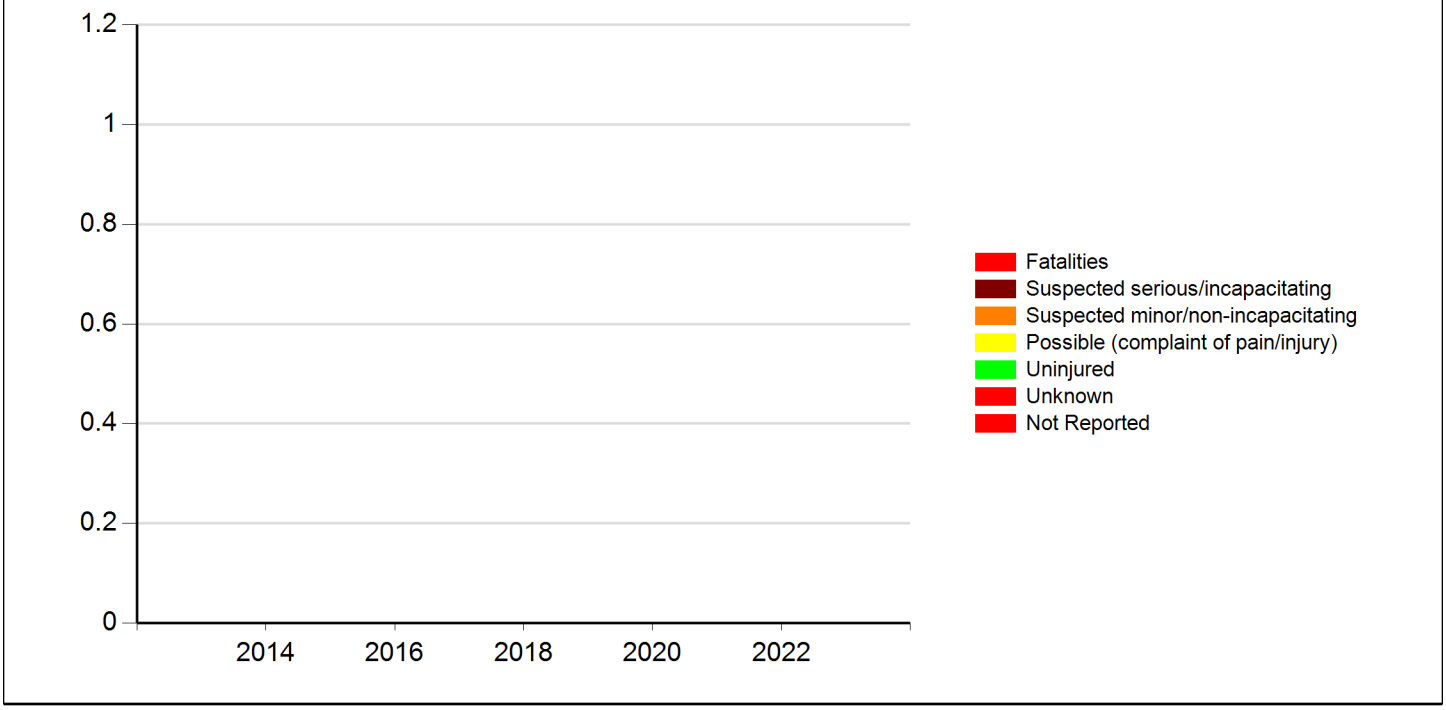
Severity/Year



Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Uninjured	Unknown	Not Reported	**Total**
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0

Injury Status/Year



Meeting the following criteria

Jurisdiction: Statewide
Year: 2018, 2019, 2020, 2021, 2022
Map Selection: Yes
Filter: None

Analyst Information

Iowa Crash Analysis Tool
Quick Report
2018-2022

Crash Severity	30
Fatal Crash	0
Suspected Serious Injury Crash	0
Suspected Minor Injury Crash	4
Possible/Unknown Injury Crash	0
Property Damage Only	26

Injury Status Summary	9
Fatalities	0
Suspected serious/incapacitating	0
Suspected minor/non-incapacitating	7
Possible (complaint of pain/injury)	2
Unknown	0

Property/Vehicles/Occupants	
Property Damage Total (dollars):	264,400.00
Average (per crash dollars):	8,813.33
Total Vehicles:	56.00
Average (per crash):	1.87
Total Occupants:	63.00
Average (per crash):	2.10

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.30
Major Injuries/Crash:	0.00
Minor Injuries/Crash:	0.23
Possible/Unknown Injuries/Crash:	0.07

Major Cause			30
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	3	FTYROW: From yield sign	5
FTYROW: Making left turn	1	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	4
Exceeded authorized speed	0	Improper or erratic lane changing	0
Operating vehicle in an reckless, erratic, ca...	0	Followed too close	10
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...	1
Driver Distraction: Exterior distraction	1	Ran off road - right	0
Ran off road - straight	0	Ran off road - left	0
Lost control	2	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	0	Not reported	0
Other: No improper action	0		

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	2	1	0	1	1	0	0	0	0	0	5
Tuesday	0	0	0	1	2	1	0	0	0	0	0	0	0	4
Wednesday	0	0	0	1	1	0	0	0	0	0	0	0	0	2
Thursday	0	0	0	3	1	0	1	1	0	0	0	1	0	7
Friday	0	0	0	2	1	1	0	2	0	0	0	0	0	6
Saturday	1	0	0	1	1	0	1	1	1	0	0	0	0	6
Total	1	0	0	10	7	2	3	5	1	0	0	1	0	30

Manner of Crash Collision	30
Non-collision (single vehicle)	5
Head-on (front to front)	0
Rear-end (front to rear)	18
Angle, oncoming left turn	0
Broadside (front to side)	7
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	30
Dry	20
Wet	5
Ice/frost	1
Snow	4
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			56
Bridge overhead structure	0	Bridge pier or support	0
Bridge/bridge rail parapet	0	Curb/island/raised median	0
Ditch	2	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	4
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	1	None (no fixed object struck)	49

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	2	1	0	0	3
= 19	0	1	0	0	1
= 20	0	3	0	0	3
>= 21 and <= 24	1	0	0	0	1
>= 25 and <= 29	3	2	0	0	5
>= 30 and <= 34	2	4	0	0	6
>= 35 and <= 39	1	3	0	0	4
>= 40 and <= 44	0	3	0	0	3
>= 45 and <= 49	2	3	0	0	5
>= 50 and <= 54	4	4	0	0	8
>= 55 and <= 59	1	2	0	0	3
>= 60 and <= 64	2	5	0	0	7
>= 65 and <= 69	2	0	0	0	2
>= 70 and <= 74	2	1	0	0	3
>= 75 and <= 79	0	0	0	0	0
>= 80 and <= 84	0	1	0	0	1
>= 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	1	0	0	0	1
Total	23	33	0	0	56

Drug/Alcohol Related	**30**
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	1
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	29

Alcohol Test Given	**56**
None	54
Blood	0
Urine	0
Breath	1
Vitreous	0
Refused	0
Not reported	1

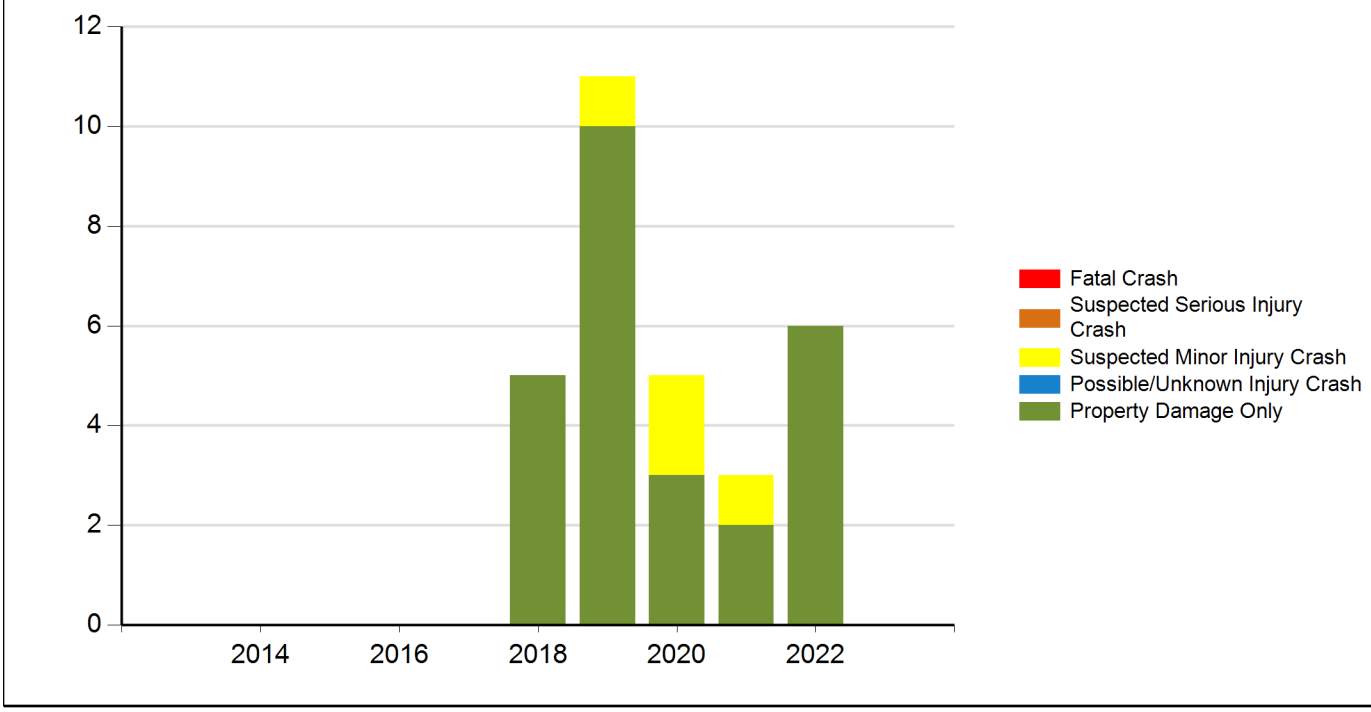
Drug Test Given	**56**
None	55
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	1

Drug Test Result	**56**
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	56
Other	0

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	**Total**
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	5	5
2019	0	0	1	0	10	11
2020	0	0	2	0	3	5
2021	0	0	1	0	2	3
2022	0	0	0	0	6	6
2023	0	0	0	0	0	0
Total	0	0	4	0	26	30

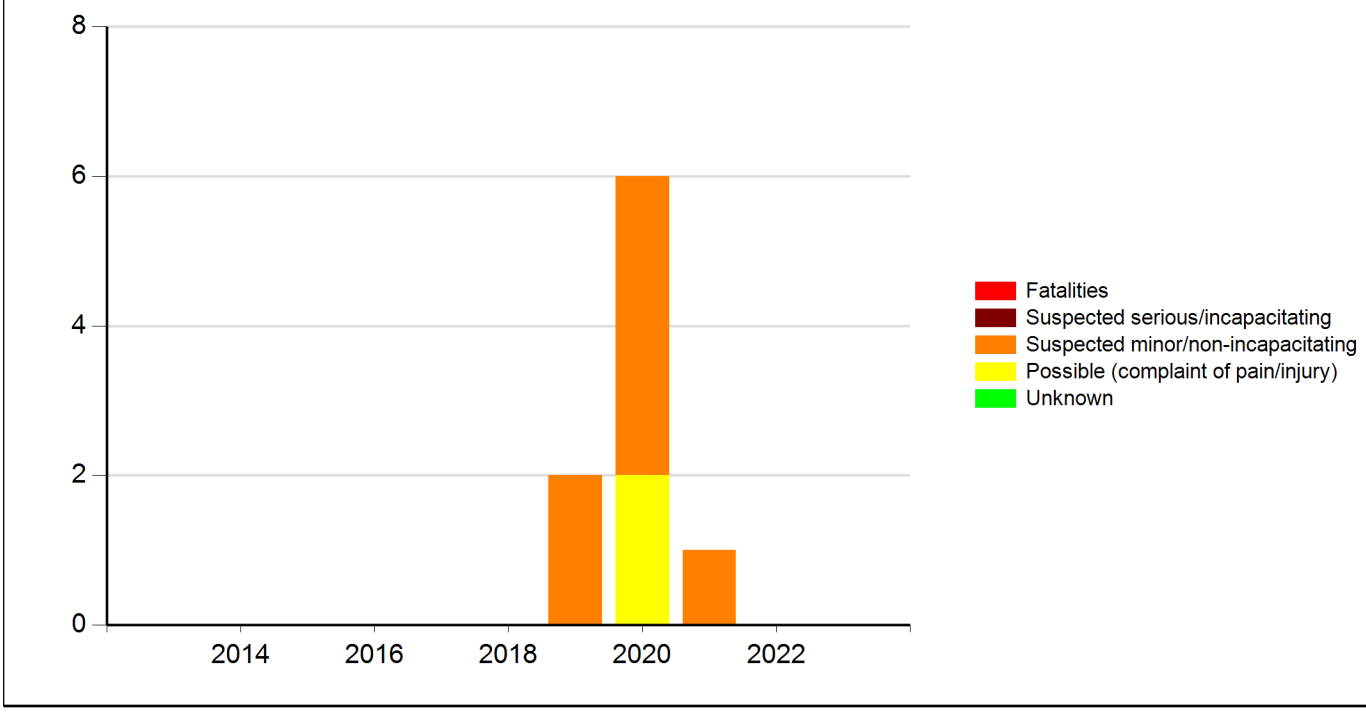
Severity/Year



Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	Total
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	2	0	0	2
2020	0	0	4	2	0	6
2021	0	0	1	0	0	1
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
Total	0	0	7	2	0	9

Injury Status/Year



Meeting the following criteria

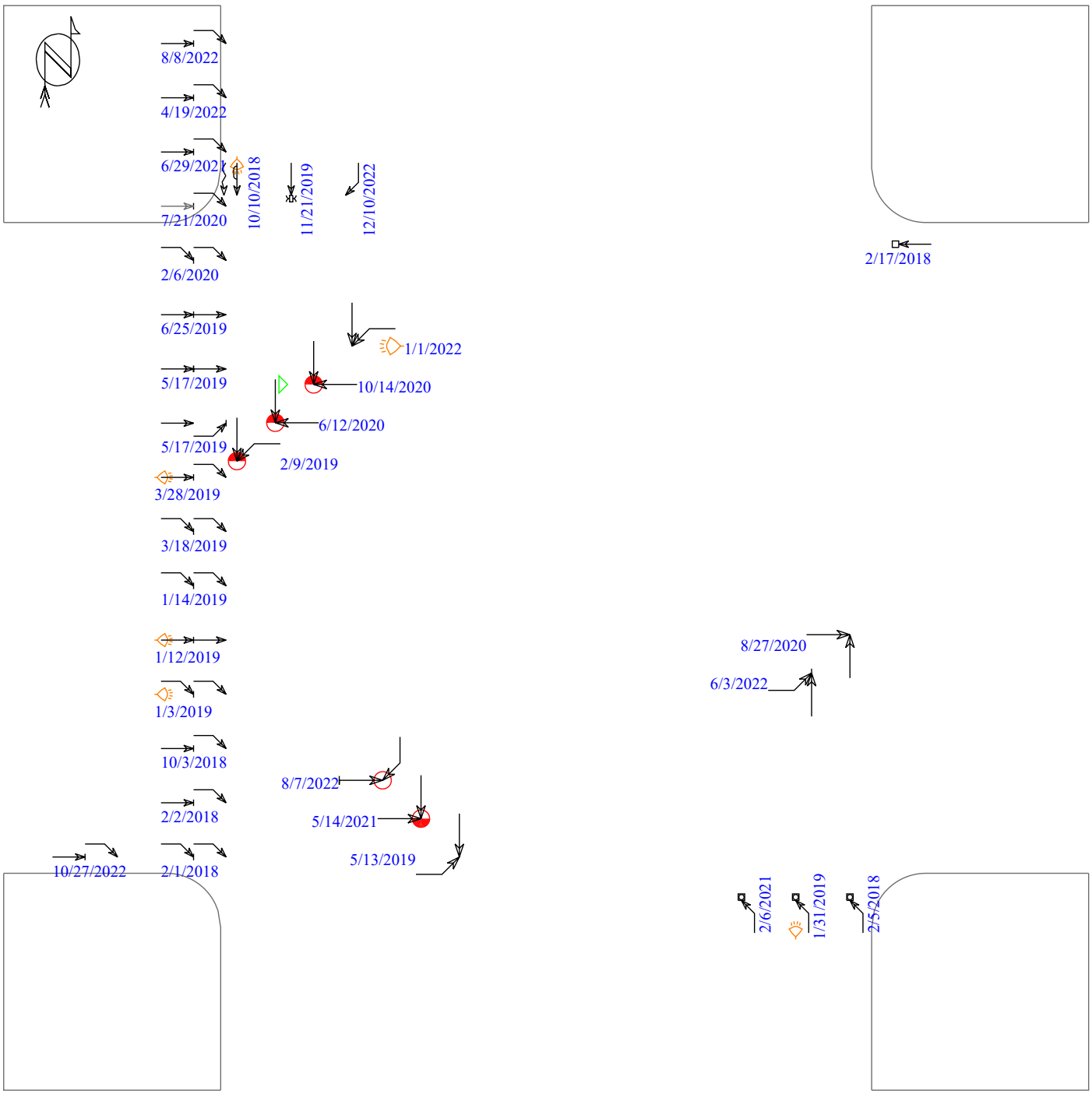
Jurisdiction: Statewide
Year: 2018, 2019, 2020, 2021, 2022
Map Selection: Yes
Filter: None

Analyst Information

Fernow

33 Crashes

Clear



Straight
Stopped
Unknown
Backing
Overtaking
Sideswipe

Parked
Erratic
Out of control
Right turn
Left turn
U-turn

Fatal
Major
Minor
Injury
Pedestrian
Bicycle

Fixed objects:
General
Signal
Tree
Pole
Curb
Animal

DUI
3rd vehicle
Nighttime

Crash Magic Online 5/24/2023

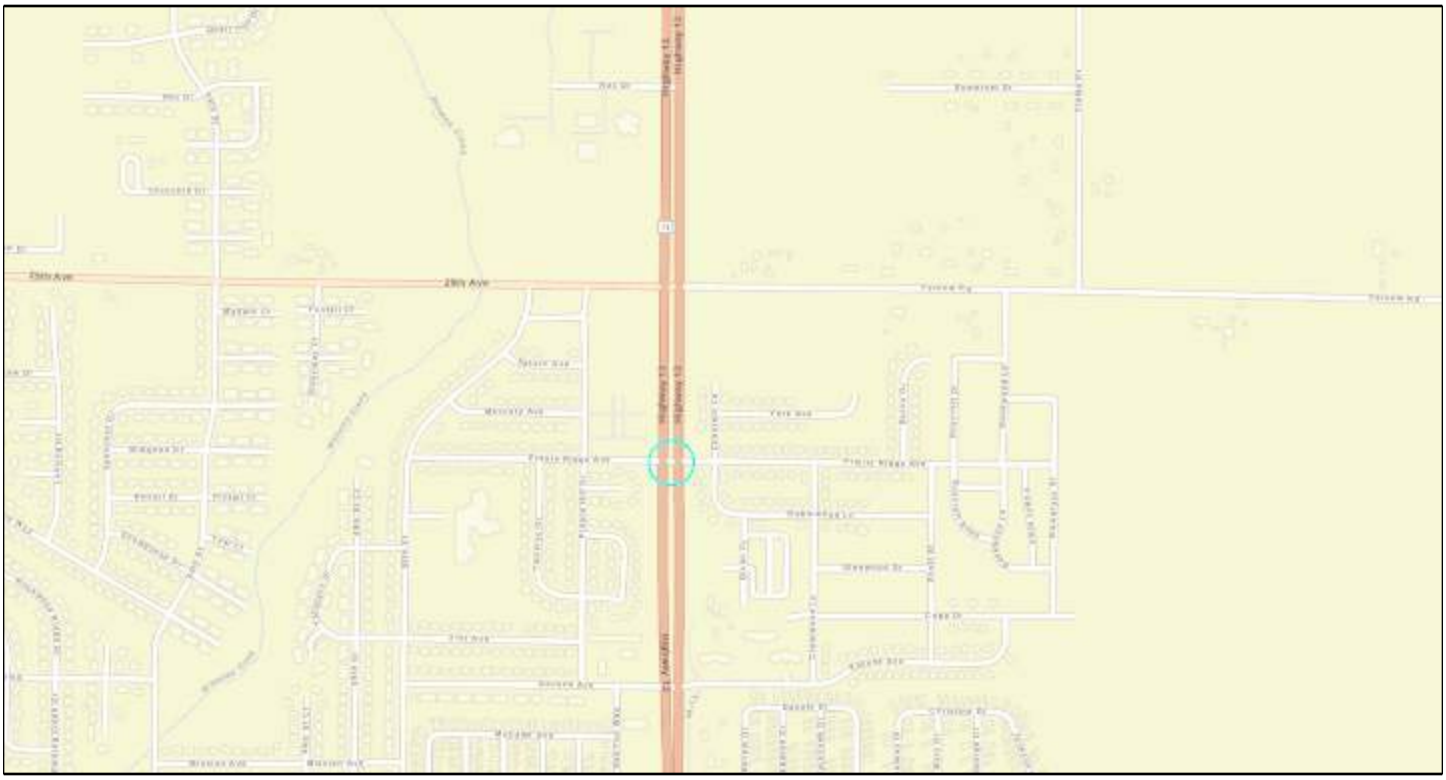
Iowa Crash Analysis Tool
Quick Report
2018-2022

Crash Severity	6
Fatal Crash	0
Suspected Serious Injury Crash	0
Suspected Minor Injury Crash	1
Possible/Unknown Injury Crash	0
Property Damage Only	5

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

Property/Vehicles/Occupants	
Property Damage Total (dollars):	44,000.00
Average (per crash dollars):	7,333.33
Total Vehicles:	12.00
Average (per crash):	2.00
Total Occupants:	14.00
Average (per crash):	2.33

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.17
Major Injuries/Crash:	0.00
Minor Injuries/Crash:	0.17
Possible/Unknown Injuries/Crash:	0.00



Major Cause			6
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	4	FTYROW: From yield sign	2
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	0
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	0
Unknown	0	Not reported	0
Other: No improper action	0		

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	1	0	0	0	0	0	1	1	0	0	0	3
Wednesday	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Thursday	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Friday	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Saturday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	1	1	1	0	1	1	0	0	0	6

Manner of Crash Collision	**6**
Non-collision (single vehicle)	0
Head-on (front to front)	0
Rear-end (front to rear)	1
Angle, oncoming left turn	0
Broadside (front to side)	4
Sideswipe, same direction	0
Sideswipe, opposite direction	1
Rear to rear	0
Rear to side	0
Not reported	0
Other	0
Unknown	0

Surface Conditions	**6**
Dry	4
Wet	1
Ice/frost	0
Snow	1
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			**12**
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)	12

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	0	0	0	0
= 20	0	1	0	0	1
>= 21 and <= 24	0	0	0	0	0
>= 25 and <= 29	1	0	0	0	1
>= 30 and <= 34	1	0	0	0	1
>= 35 and <= 39	0	2	0	0	2
>= 40 and <= 44	0	0	0	0	0
>= 45 and <= 49	0	1	0	0	1
>= 50 and <= 54	0	2	0	0	2
>= 55 and <= 59	0	0	0	0	0
>= 60 and <= 64	1	2	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	1	0	0	0	1
>= 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	4	8	0	0	12

Drug/Alcohol Related	**6**
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	6

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

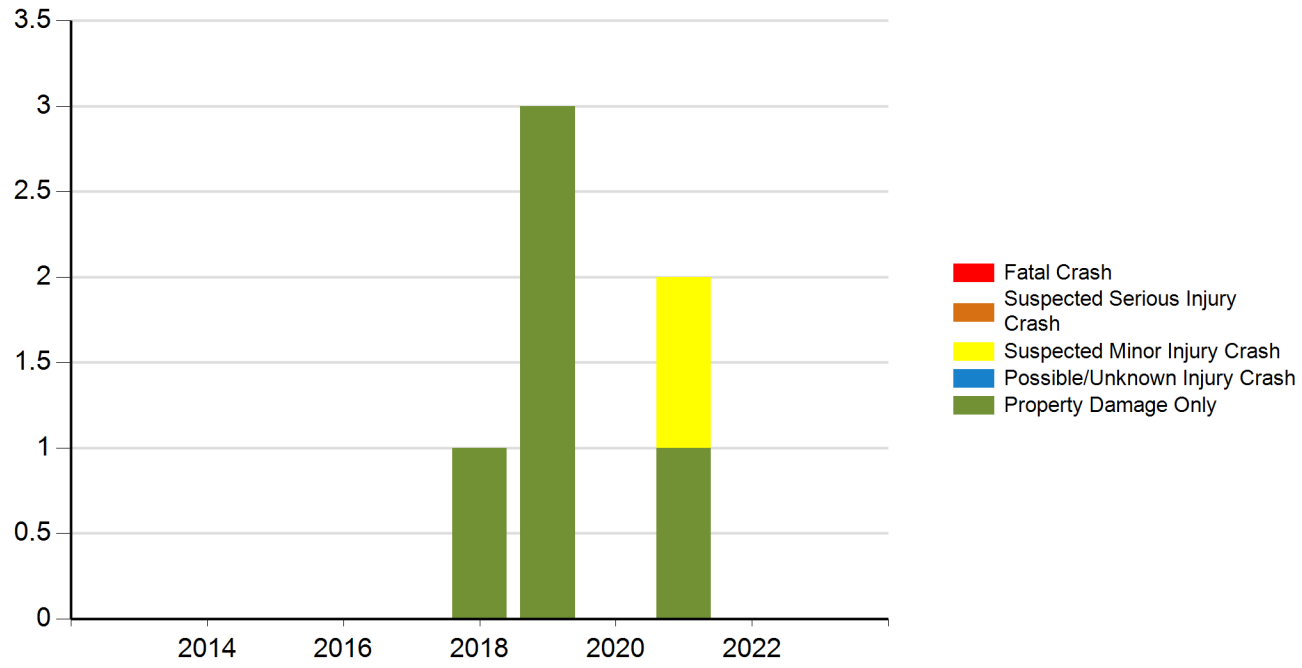
Drug Test Given	**12**
None	12
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

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

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	**Total**
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	1	1
2019	0	0	0	0	3	3
2020	0	0	0	0	0	0
2021	0	0	1	0	1	2
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
Total	0	0	1	0	5	6

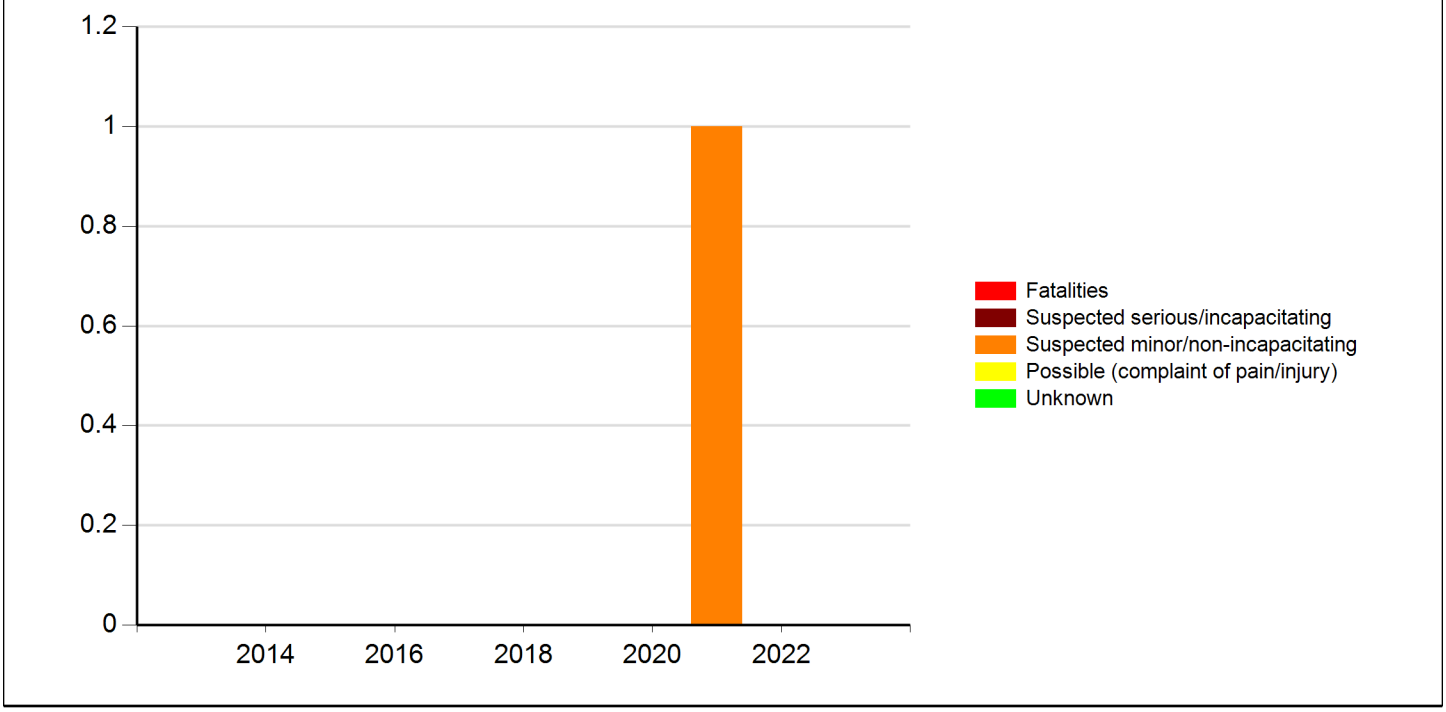
Severity/Year



Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	Total
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
2021	0	0	1	0	0	1
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
Total	0	0	1	0	0	1

Injury Status/Year



Meeting the following criteria

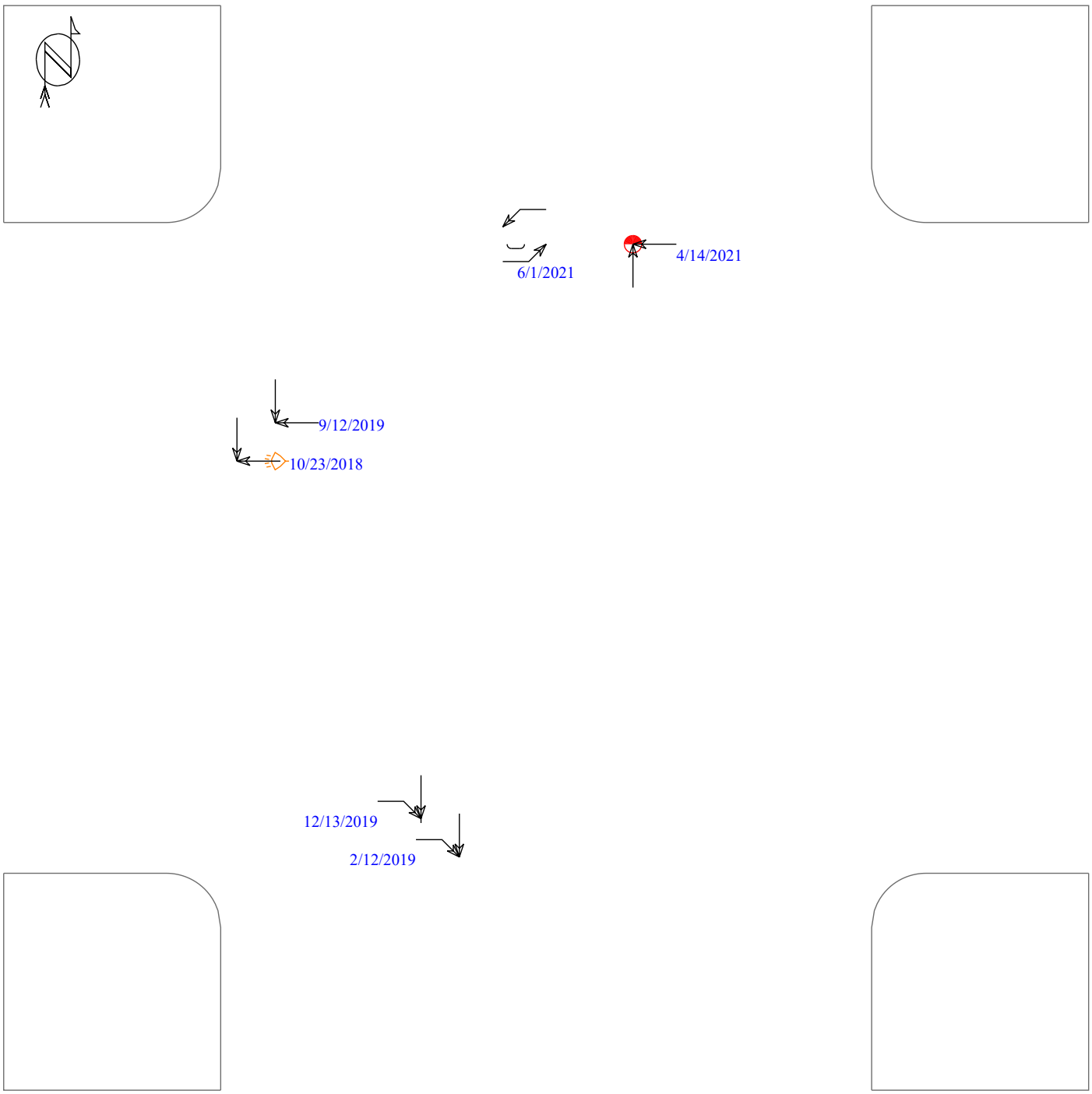
Jurisdiction: Statewide
Year: 2018, 2019, 2020, 2021, 2022
Map Selection: Yes
Filter: None

Analyst Information

Prairie Ridge

6 Crashes

Clear



Straight
Stopped
Unknown
Backing
Overtaking
Sideswipe

Parked
Erratic
Out of control
Right turn
Left turn
U-turn

Fatal
Major
Minor
Injury
Pedestrian
Bicycle

Fixed objects:
General
Signal
Tree
Pole
Curb
Animal

DUI
3rd vehicle
Nighttime

Crash Magic Online 5/24/2023

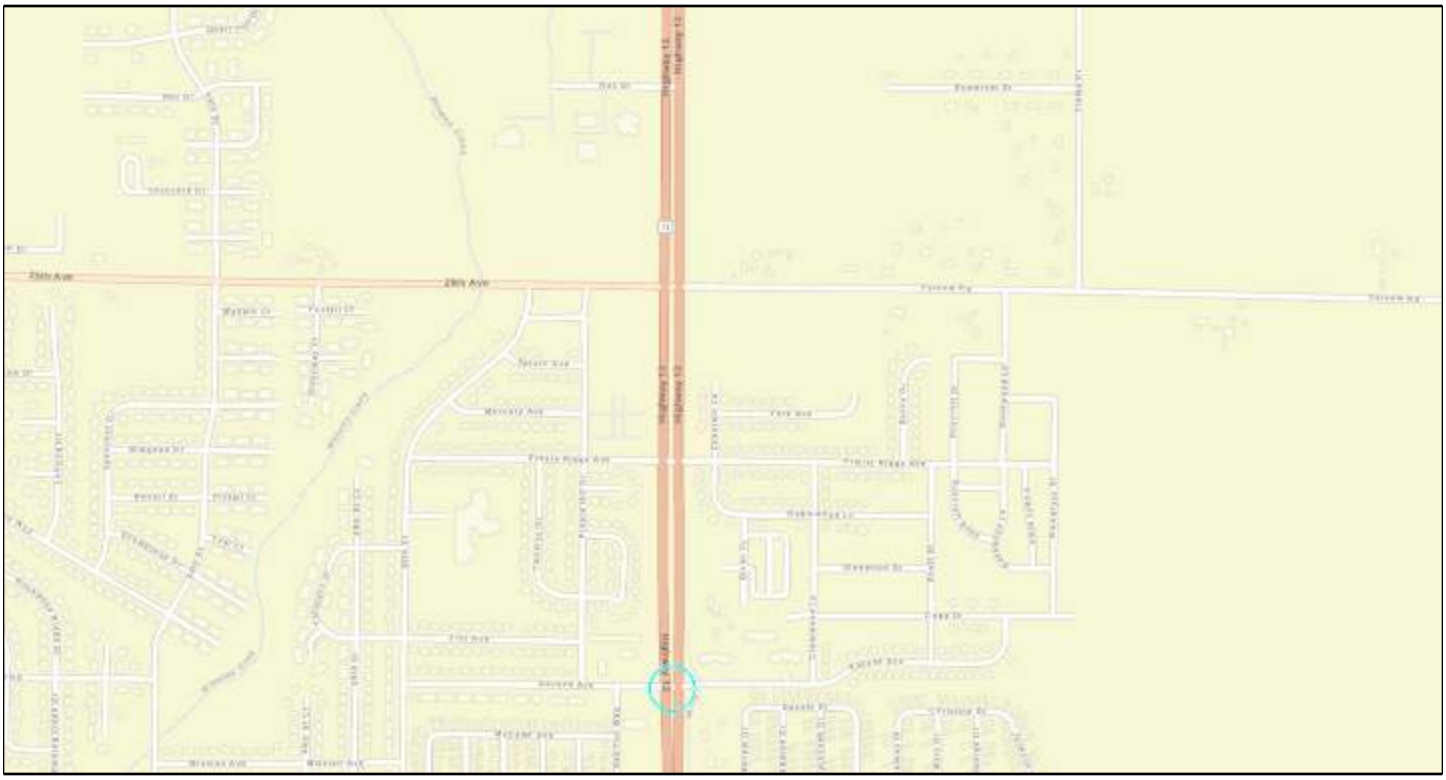
Iowa Crash Analysis Tool
Quick Report
2018-2022

Crash Severity	11
Fatal Crash	0
Suspected Serious Injury Crash	0
Suspected Minor Injury Crash	0
Possible/Unknown Injury Crash	2
Property Damage Only	9

Injury Status Summary	2
Fatalities	0
Suspected serious/incapacitating	0
Suspected minor/non-incapacitating	0
Possible (complaint of pain/injury)	2
Unknown	0

Property/Vehicles/Occupants	
Property Damage Total (dollars):	60,500.00
Average (per crash dollars):	5,500.00
Total Vehicles:	21.00
Average (per crash):	1.91
Total Occupants:	27.00
Average (per crash):	2.45

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.18
Major Injuries/Crash:	0.00
Minor Injuries/Crash:	0.00
Possible/Unknown Injuries/Crash:	0.18



Major Cause			11
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	3	FTYROW: From yield sign	4
FTYROW: Making left turn	0	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...	0	Followed too close	1
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	1
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	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		

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	1	0	0	0	0	0	1
Wednesday	0	0	0	1	2	0	0	0	0	1	0	0	0	4
Thursday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Friday	0	0	0	0	0	1	0	0	3	1	0	0	0	5
Saturday	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Total	0	0	0	1	2	2	0	1	3	2	0	0	0	11

Manner of Crash Collision	11
Non-collision (single vehicle)	1
Head-on (front to front)	0
Rear-end (front to rear)	2
Angle, oncoming left turn	0
Broadside (front to side)	7
Sideswipe, same direction	0
Sideswipe, opposite direction	1
Rear to rear	0
Rear to side	0
Not reported	0
Other	0
Unknown	0

Surface Conditions	11
Dry	10
Wet	0
Ice/frost	0
Snow	1
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			21
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)	21

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	0	0	0	0
= 20	0	1	0	0	1
>= 21 and <= 24	0	2	0	0	2
>= 25 and <= 29	1	2	0	0	3
>= 30 and <= 34	0	2	0	0	2
>= 35 and <= 39	0	1	0	0	1
>= 40 and <= 44	1	0	0	0	1
>= 45 and <= 49	1	1	0	0	2
>= 50 and <= 54	0	0	0	0	0
>= 55 and <= 59	0	1	0	0	1
>= 60 and <= 64	0	1	0	0	1
>= 65 and <= 69	0	1	0	0	1
>= 70 and <= 74	1	1	0	0	2
>= 75 and <= 79	1	1	0	0	2
>= 80 and <= 84	0	1	0	0	1
>= 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	6	15	0	0	21

Drug/Alcohol Related	**11**
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	11

Alcohol Test Given	**21**
None	21
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

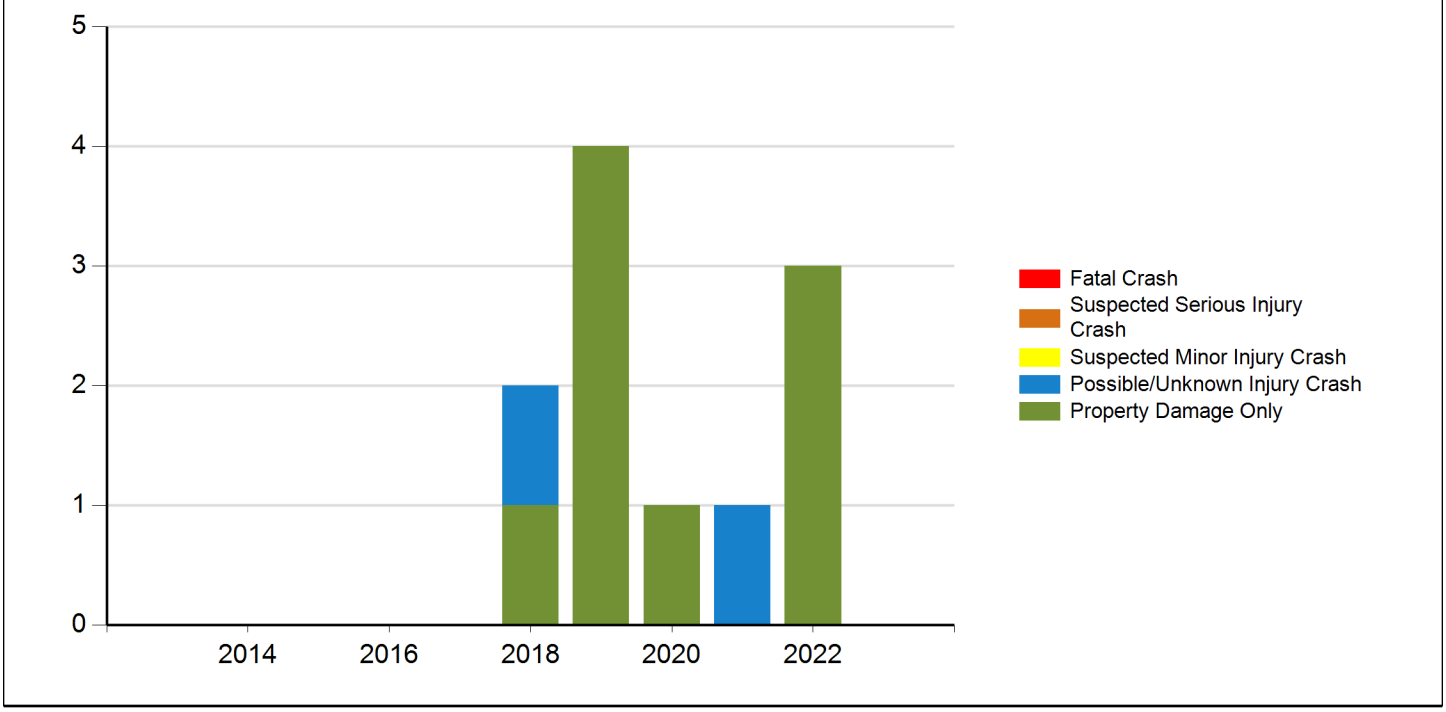
Drug Test Given	**21**
None	21
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

Drug Test Result	**21**
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	21
Other	0

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	**Total**
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	1	1	2
2019	0	0	0	0	4	4
2020	0	0	0	0	1	1
2021	0	0	0	1	0	1
2022	0	0	0	0	3	3
2023	0	0	0	0	0	0
Total	0	0	0	2	9	11

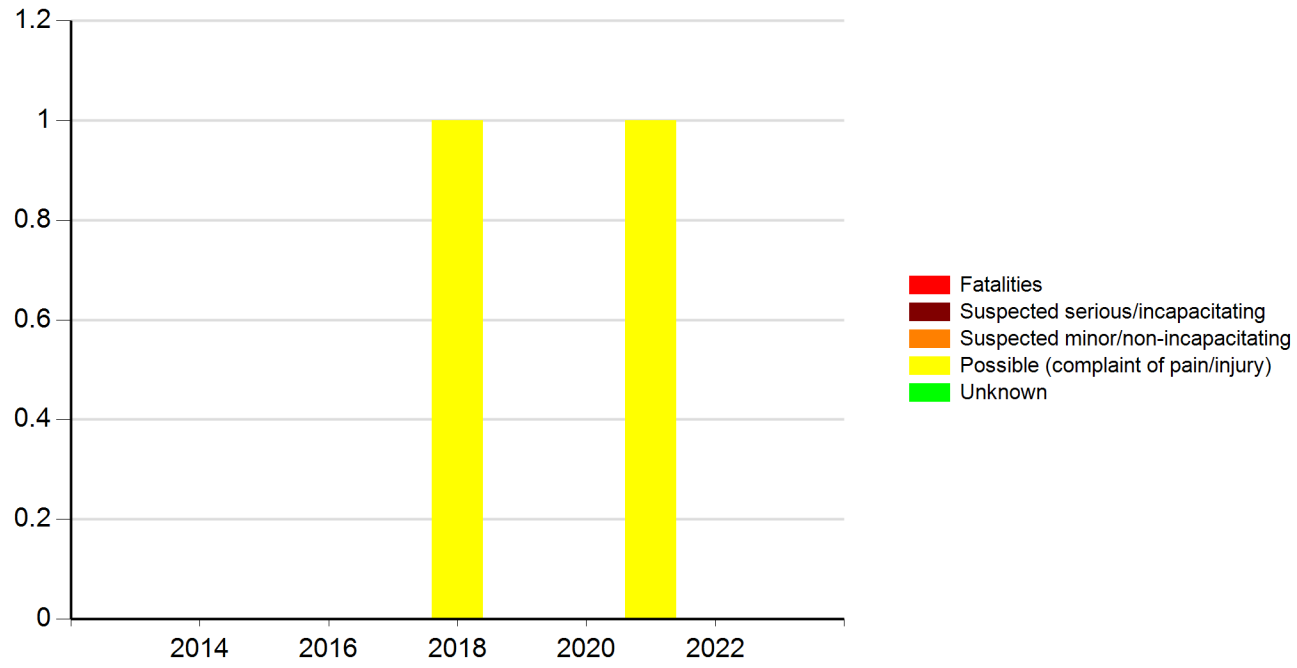
Severity/Year



Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	Total
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	1	0	1
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
2021	0	0	0	1	0	1
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
Total	0	0	0	2	0	2

Injury Status/Year



Meeting the following criteria

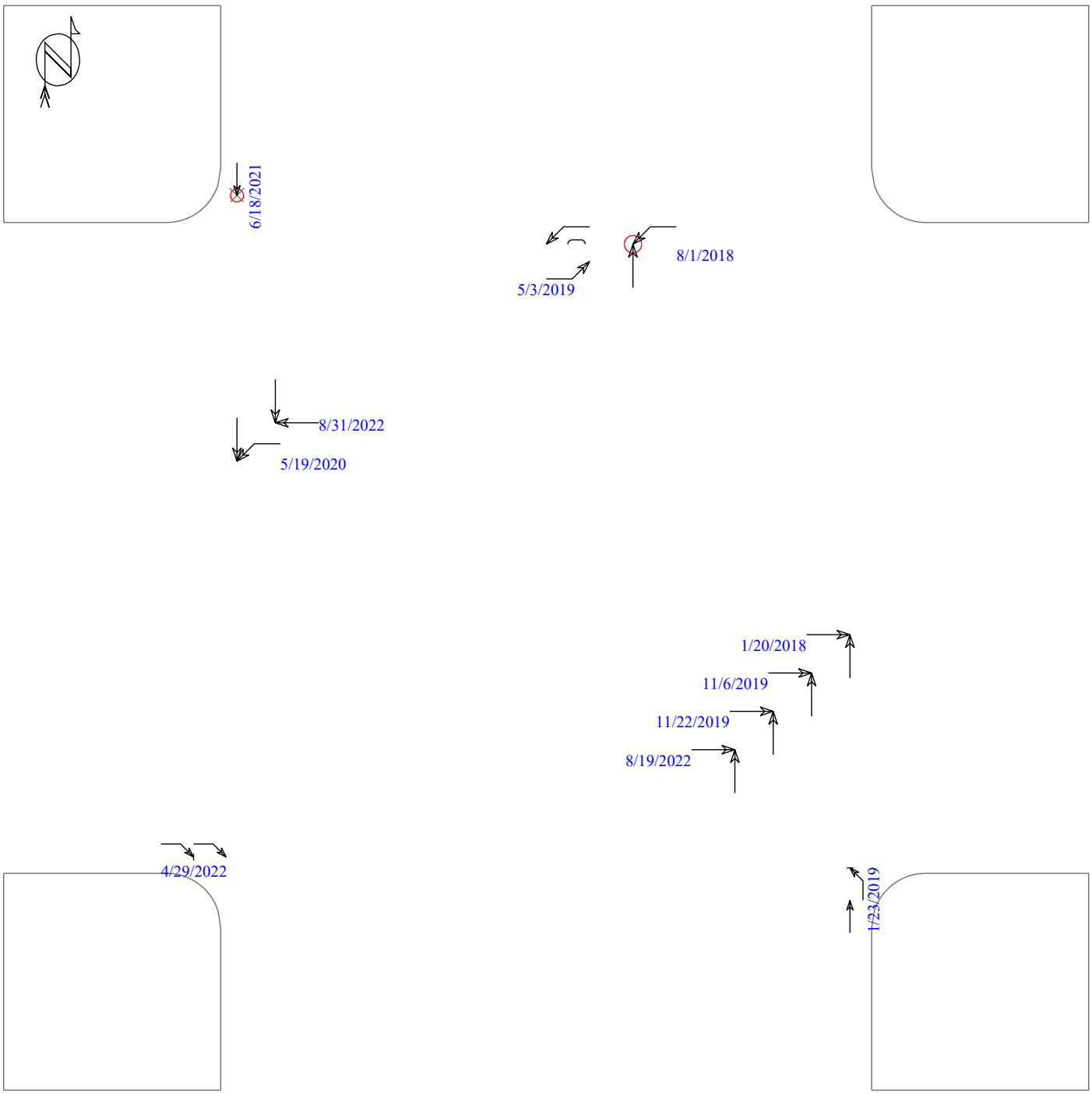
Jurisdiction: Statewide
Year: 2018, 2019, 2020, 2021, 2022
Map Selection: Yes
Filter: None

Analyst Information

Kacena

11 Crashes

Clear



- Straight
- Stopped
- Unknown
- Backing
- Overtaking
- Sideswipe
- Parked
- Erratic
- Out of control
- Right turn
- Left turn
- U-turn
- Fatal
- Major
- Minor
- Injury
- Pedestrian
- Bicycle

Fixed objects:

- General
- Signal
- Tree
- Pole
- Curb
- Animal

- DUI
- 3rd vehicle
- Nighttime

Crash Magic Online 5/24/2023

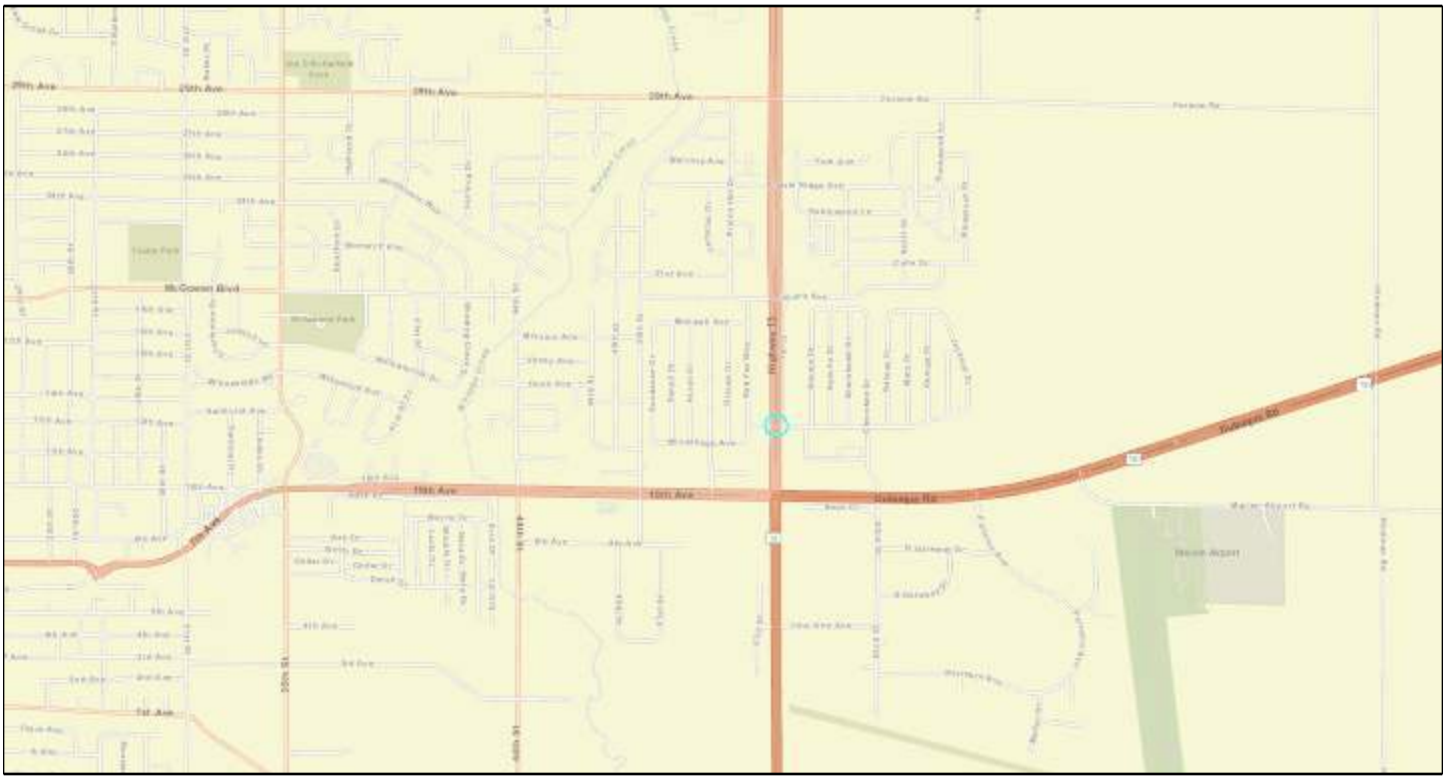
Iowa Crash Analysis Tool
Quick Report
2018-2022

Crash Severity	11
Fatal Crash	0
Suspected Serious Injury Crash	0
Suspected Minor Injury Crash	3
Possible/Unknown Injury Crash	2
Property Damage Only	6

Injury Status Summary	7
Fatalities	0
Suspected serious/incapacitating	0
Suspected minor/non-incapacitating	5
Possible (complaint of pain/injury)	2
Unknown	0

Property/Vehicles/Occupants	
Property Damage Total (dollars):	68,700.00
Average (per crash dollars):	6,245.45
Total Vehicles:	22.00
Average (per crash):	2.00
Total Occupants:	42.00
Average (per crash):	3.82

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.64
Major Injuries/Crash:	0.00
Minor Injuries/Crash:	0.45
Possible/Unknown Injuries/Crash:	0.18



Major Cause			11
Animal	0	Ran traffic signal	2
Ran stop sign	0	Failed to yield to emergency vehicle	0
FTYROW: At uncontrolled intersection	1	FTYROW: Making right turn on red signal	0
FTYROW: From stop sign	3	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	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	2
Exceeded authorized speed	0	Improper or erratic lane changing	0
Operating vehicle in an reckless, erratic, ca...	0	Followed too close	1
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	1	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		

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	1	0	0	0	0	0	1
Monday	0	0	0	0	0	1	0	0	0	1	0	0	0	2
Tuesday	0	0	0	0	1	0	0	0	0	1	0	0	0	2
Wednesday	0	0	0	0	0	0	1	1	1	0	0	0	0	3
Thursday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Friday	0	0	0	0	0	1	0	0	0	0	1	0	0	2
Saturday	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	0	0	0	0	1	2	1	2	2	2	1	0	0	11

Manner of Crash Collision	11
Non-collision (single vehicle)	1
Head-on (front to front)	0
Rear-end (front to rear)	1
Angle, oncoming left turn	2
Broadside (front to side)	5
Sideswipe, same direction	0
Sideswipe, opposite direction	0
Rear to rear	0
Rear to side	0
Not reported	0
Other	2
Unknown	0

Surface Conditions	11
Dry	6
Wet	4
Ice/frost	0
Snow	1
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	22		
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	1	None (no fixed object struck)	21

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	1	1	0	0	2
= 19	0	0	0	0	0
= 20	0	0	0	0	0
>= 21 and <= 24	0	0	0	0	0
>= 25 and <= 29	3	1	0	0	4
>= 30 and <= 34	2	1	0	0	3
>= 35 and <= 39	3	0	0	0	3
>= 40 and <= 44	0	0	0	0	0
>= 45 and <= 49	1	3	0	0	4
>= 50 and <= 54	0	0	0	0	0
>= 55 and <= 59	0	2	0	0	2
>= 60 and <= 64	0	0	0	0	0
>= 65 and <= 69	0	2	0	0	2
>= 70 and <= 74	0	0	0	0	0
>= 75 and <= 79	1	0	0	0	1
>= 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	11	10	1	0	22

Drug/Alcohol Related	**11**
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	11

Alcohol Test Given	**22**
None	21
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	1

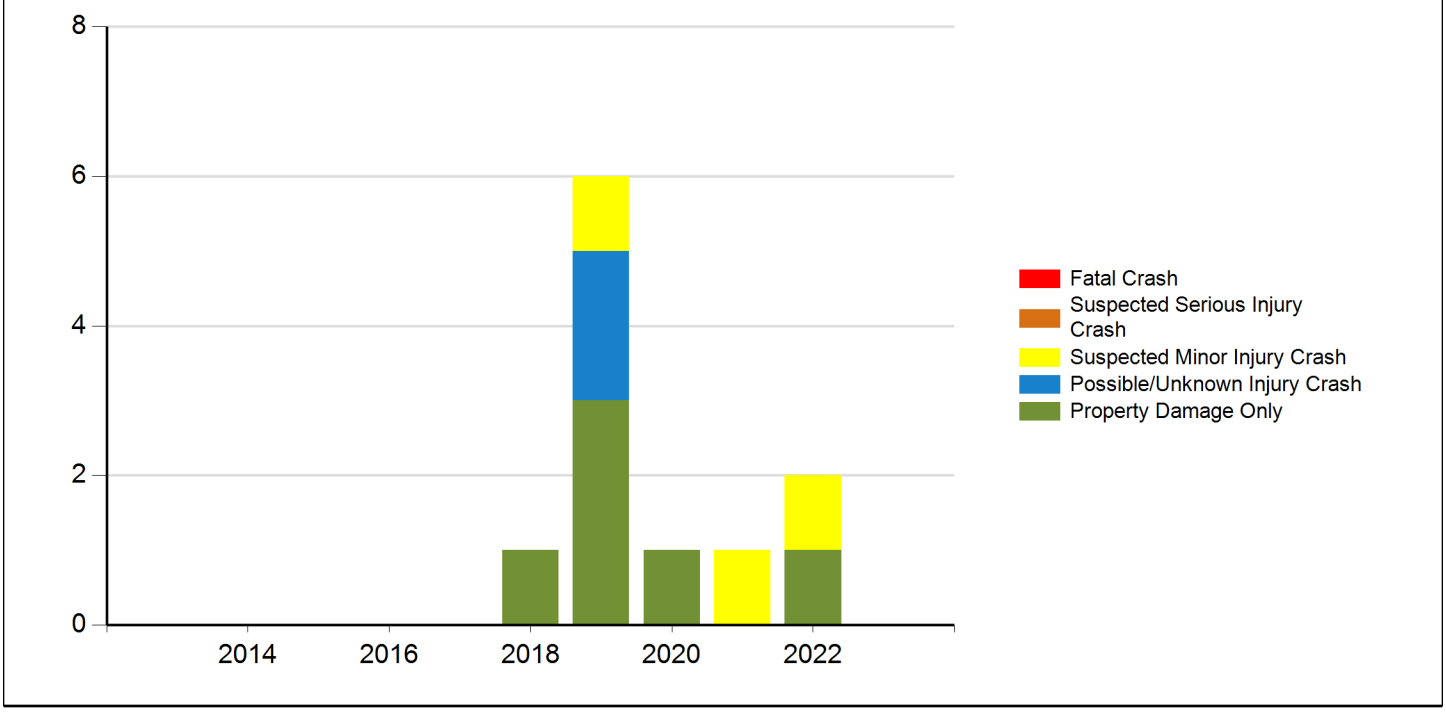
Drug Test Given	**22**
None	21
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	1

Drug Test Result	**22**
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	22
Other	0

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	**Total**
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	1	1
2019	0	0	1	2	3	6
2020	0	0	0	0	1	1
2021	0	0	1	0	0	1
2022	0	0	1	0	1	2
2023	0	0	0	0	0	0
Total	0	0	3	2	6	11

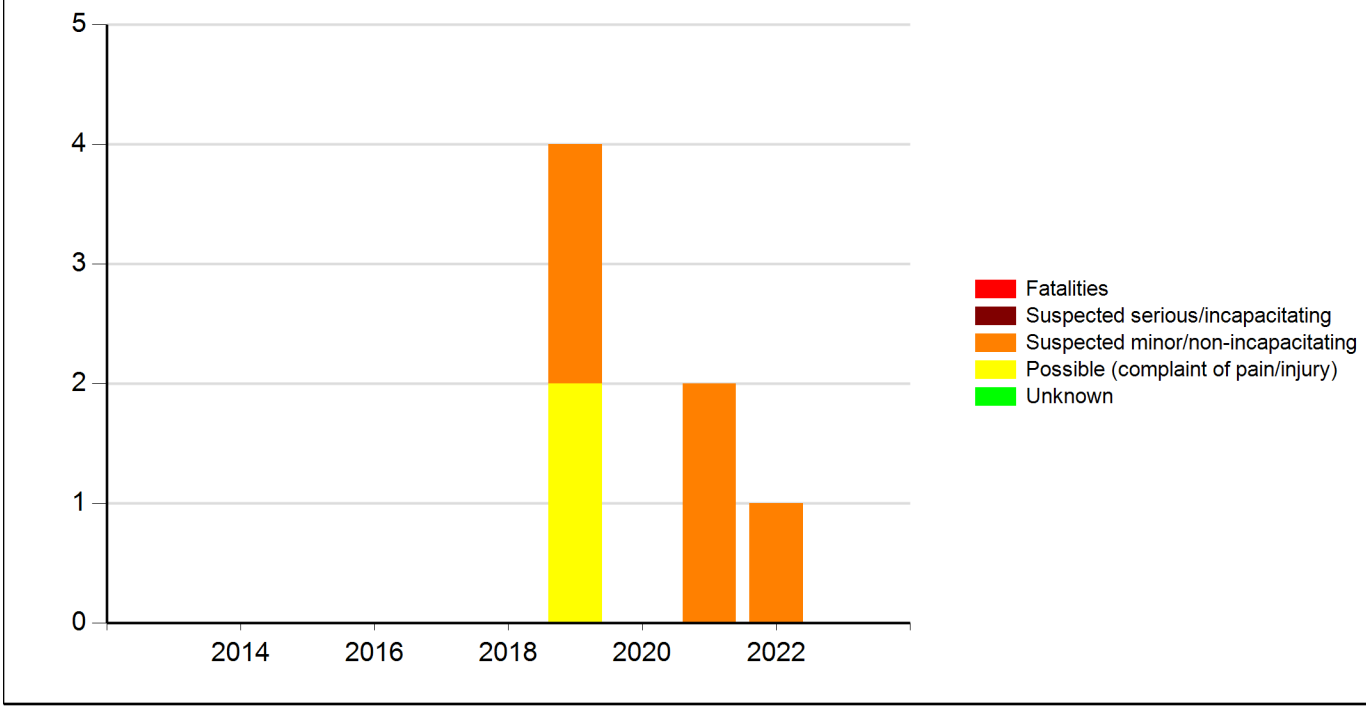
Severity/Year



Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	Total
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	2	2	0	4
2020	0	0	0	0	0	0
2021	0	0	2	0	0	2
2022	0	0	1	0	0	1
2023	0	0	0	0	0	0
Total	0	0	5	2	0	7

Injury Status/Year



Meeting the following criteria

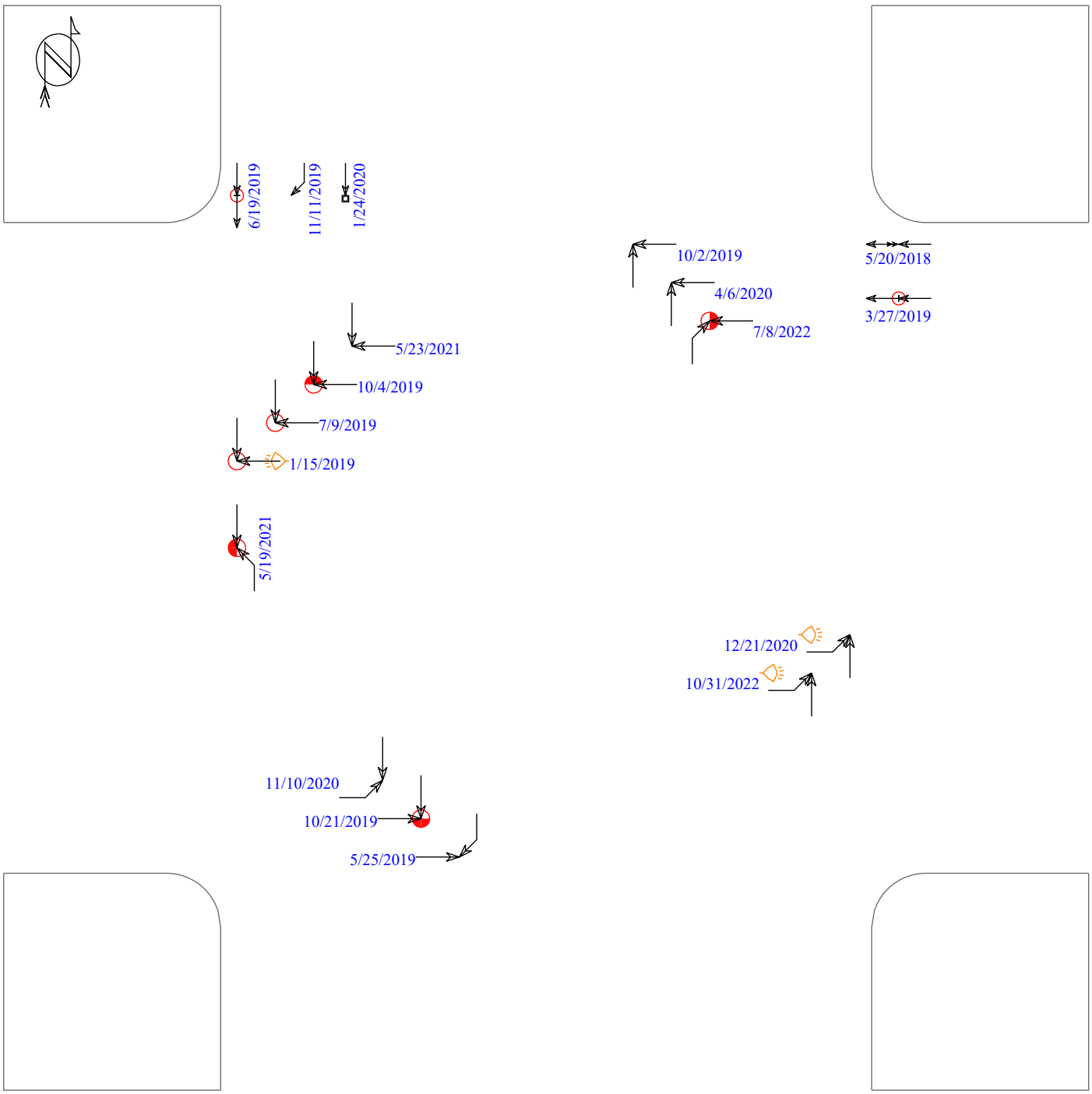
Jurisdiction: Statewide
Year: 2018, 2019, 2020, 2021, 2022
Map Selection: Yes
Filter: None

Analyst Information

Hennessey/Pawnee

18 Crashes

Clear



Straight
Stopped
Unknown
Backing
Overtaking
Sideswipe

Parked
Erratic
Out of control
Right turn
Left turn
U-turn

Fatal
Major
Minor
Injury
Pedestrian
Bicycle

Fixed objects:
General
Signal
Tree
Pole
Curb
Animal

DUI
3rd vehicle
Nighttime

Crash Magic Online 5/24/2023

Iowa Crash Analysis Tool
Quick Report
2018-2022

Crash Severity	65
Fatal Crash	0
Suspected Serious Injury Crash	1
Suspected Minor Injury Crash	6
Possible/Unknown Injury Crash	15
Property Damage Only	43

Injury Status Summary	36
Fatalities	0
Suspected serious/incapacitating	1
Suspected minor/non-incapacitating	6
Possible (complaint of pain/injury)	27
Unknown	2

Property/Vehicles/Occupants	
Property Damage Total (dollars):	494,384.00
Average (per crash dollars):	7,605.91
Total Vehicles:	132.00
Average (per crash):	2.03
Total Occupants:	188.00
Average (per crash):	2.89

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.52
Major Injuries/Crash:	0.02
Minor Injuries/Crash:	0.09
Possible/Unknown Injuries/Crash:	0.42

Major Cause			65
Animal	0	Ran traffic signal	9
Ran stop sign	0	Failed to yield to emergency vehicle	0
FTYROW: At uncontrolled intersection	0	FTYROW: Making right turn on red signal	3
FTYROW: From stop sign	0	FTYROW: From yield sign	1
FTYROW: Making left turn	1	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	3
Exceeded authorized speed	0	Improper or erratic lane changing	2
Operating vehicle in an reckless, erratic, ca...	2	Followed too close	19
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	1	Made improper turn	1
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...	3
Driver Distraction: Exterior distraction	1	Ran off road - right	1
Ran off road - straight	0	Ran off road - left	0
Lost control	2	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	1	Improper starting	0
Illegally parked/unattended	0	Driving less than the posted speed limit	0
Operator inexperience	0	Other	8
Unknown	4	Not reported	0
Other: No improper action	3		

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	1	0	0	0	1	1	1	1	3	1	0	1	0	10
Monday	0	0	0	1	0	1	4	1	0	1	0	0	0	8
Tuesday	0	0	0	3	0	1	1	1	5	0	0	0	0	11
Wednesday	0	0	0	0	1	0	3	1	2	2	0	0	0	9
Thursday	0	0	0	0	1	1	3	0	2	1	0	0	0	8
Friday	0	0	0	1	2	2	0	1	2	1	0	0	0	9
Saturday	0	0	0	0	1	1	1	3	0	1	2	0	0	9
Total	1	0	0	5	6	7	13	8	14	7	2	1	0	64

Manner of Crash Collision	65
Non-collision (single vehicle)	3
Head-on (front to front)	0
Rear-end (front to rear)	36
Angle, oncoming left turn	3
Broadside (front to side)	14
Sideswipe, same direction	7
Sideswipe, opposite direction	0
Rear to rear	0
Rear to side	0
Not reported	0
Other	2
Unknown	0

Surface Conditions	65
Dry	52
Wet	11
Ice/frost	0
Snow	2
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			132
Bridge overhead structure	0	Bridge pier or support	0
Bridge/bridge rail parapet	0	Curb/island/raised median	0
Ditch	2	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)	130

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	3	0	0	0	3
= 17	3	1	0	0	4
= 18	0	2	0	0	2
= 19	1	0	0	0	1
= 20	0	4	0	0	4
>= 21 and <= 24	3	5	0	0	8
>= 25 and <= 29	4	6	1	0	11
>= 30 and <= 34	6	3	0	0	9
>= 35 and <= 39	7	8	0	0	15
>= 40 and <= 44	2	7	0	0	9
>= 45 and <= 49	2	8	0	0	10
>= 50 and <= 54	1	8	0	0	9
>= 55 and <= 59	6	8	0	0	14
>= 60 and <= 64	2	4	0	0	6
>= 65 and <= 69	6	3	0	0	9
>= 70 and <= 74	2	1	0	0	3
>= 75 and <= 79	0	3	0	0	3
>= 80 and <= 84	1	4	0	0	5
>= 85 and <= 89	2	0	0	0	2
>= 90 and <= 94	0	0	0	0	0
>= 95	0	0	0	0	0
Not reported	0	0	0	0	0
Unknown	0	1	4	0	5
Total	51	76	5	0	132

Drug/Alcohol Related	**65**
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	2
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	1
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	62

Alcohol Test Given	**132**
None	121
Blood	0
Urine	0
Breath	2
Vitreous	0
Refused	1
Not reported	8

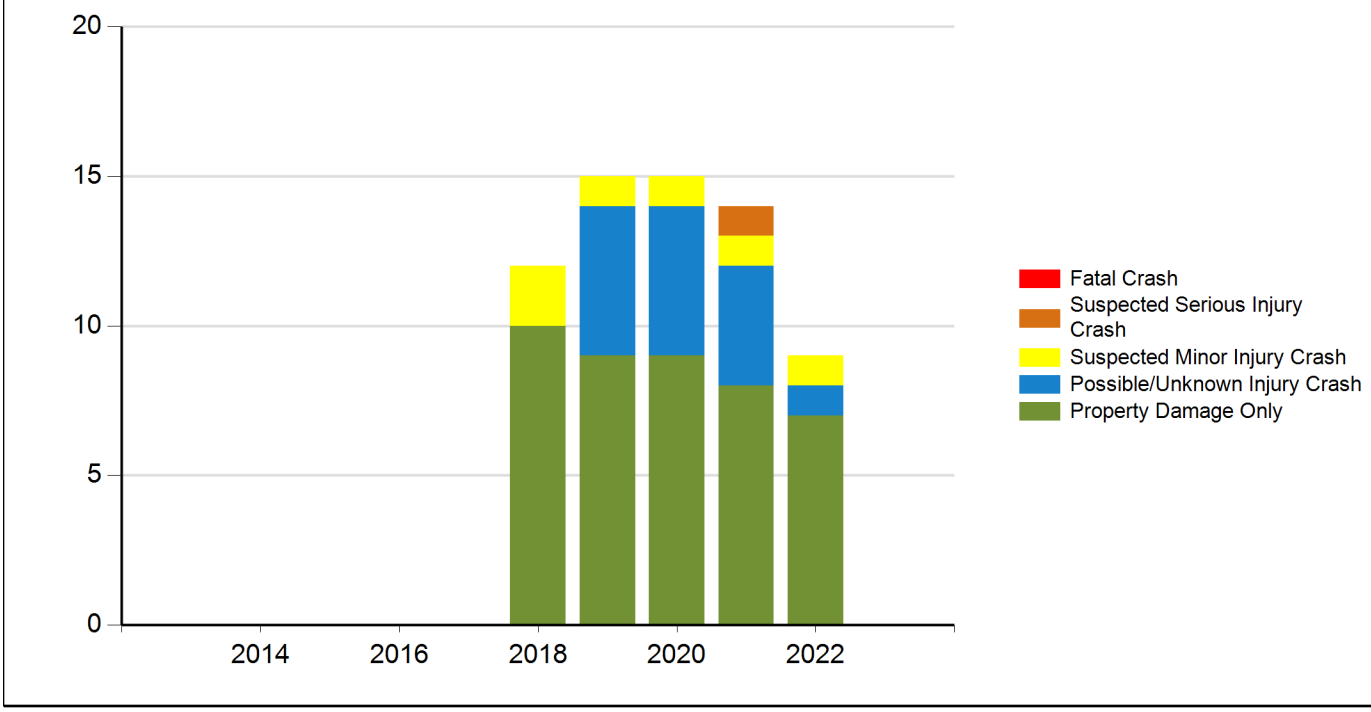
Drug Test Given	**132**
None	124
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	8

Drug Test Result	**132**
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	132
Other	0

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	**Total**
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	0	10	12
2019	0	0	1	5	9	15
2020	0	0	1	5	9	15
2021	0	1	1	4	8	14
2022	0	0	1	1	7	9
2023	0	0	0	0	0	0
Total	0	1	6	15	43	65

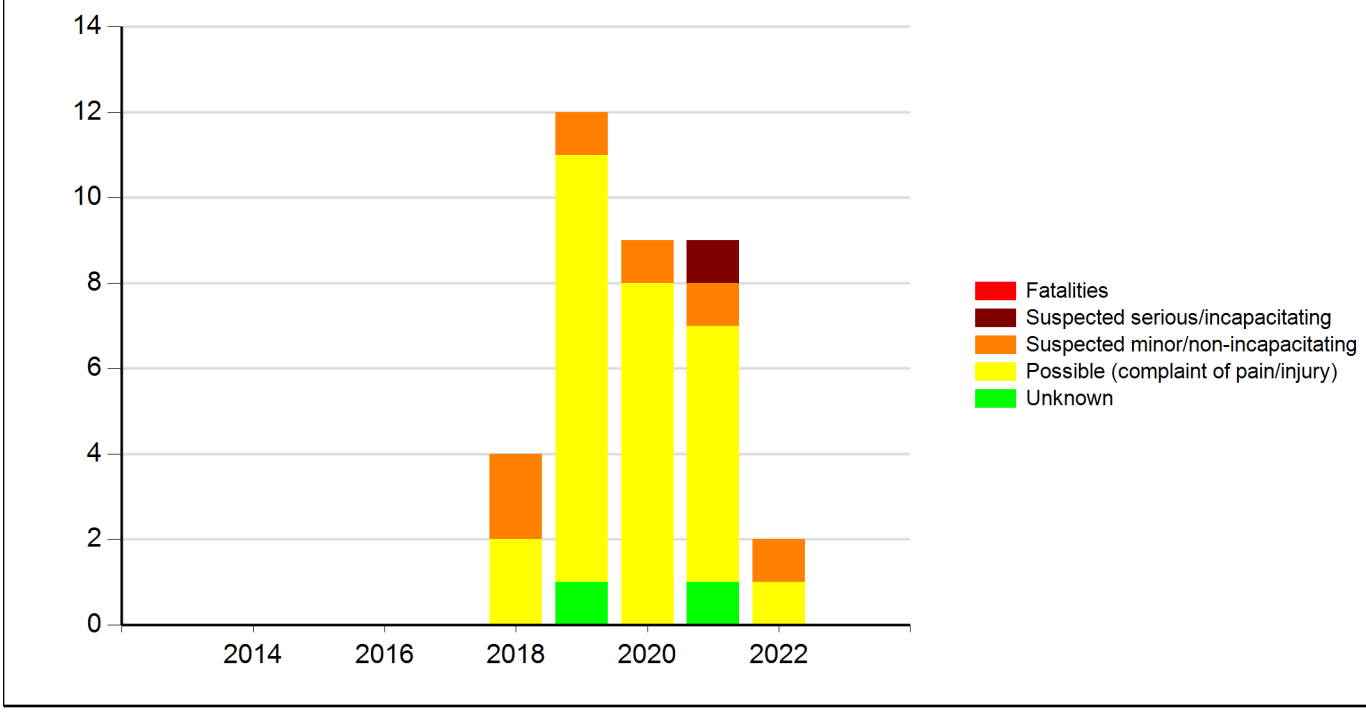
Severity/Year



Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	Total
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	2	0	4
2019	0	0	1	10	1	12
2020	0	0	1	8	0	9
2021	0	1	1	6	1	9
2022	0	0	1	1	0	2
2023	0	0	0	0	0	0
Total	0	1	6	27	2	36

Injury Status/Year



Meeting the following criteria

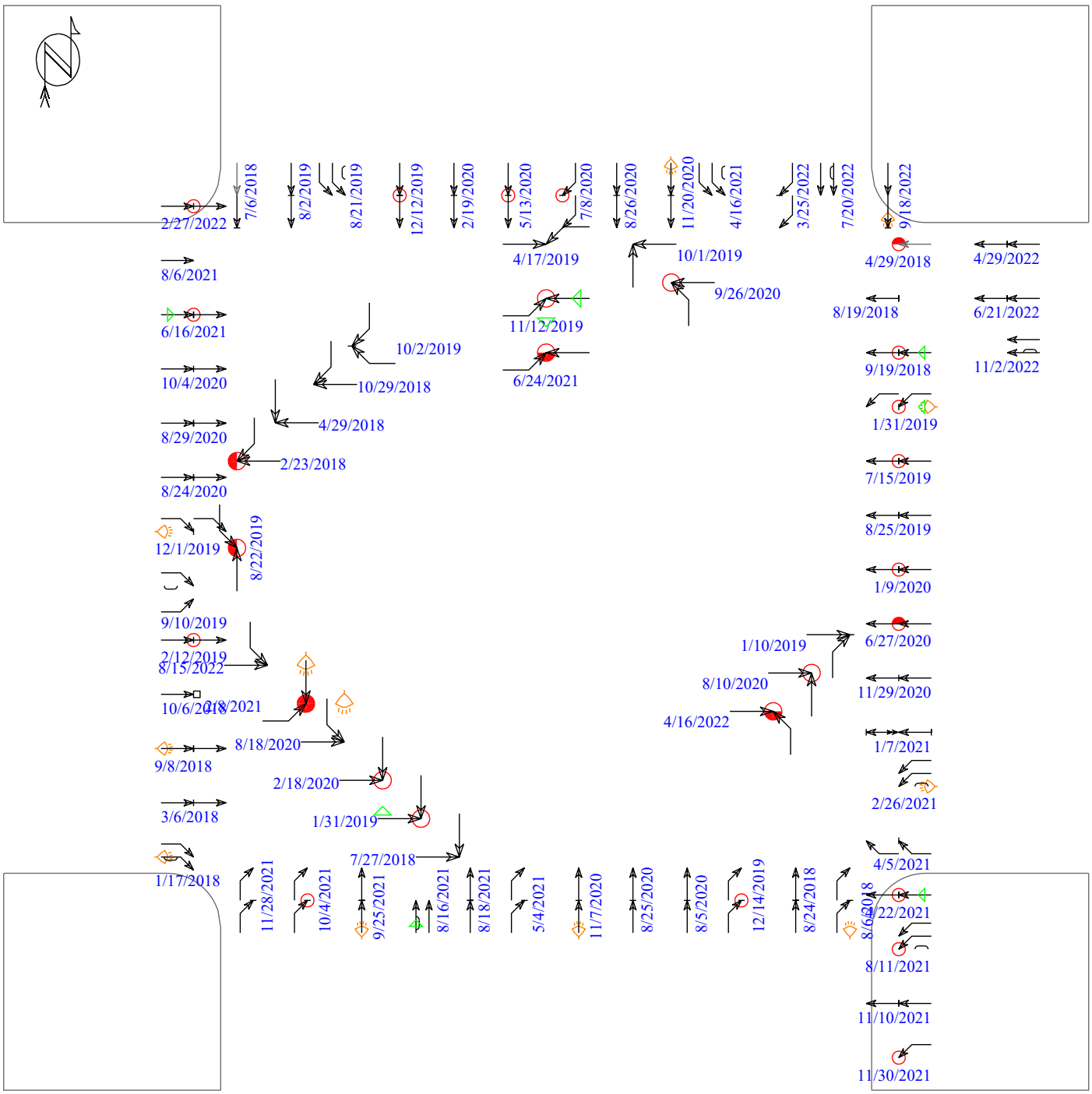
Jurisdiction: Statewide
Year: 2018, 2019, 2020, 2021, 2022
Map Selection: Yes
Filter: None

Analyst Information

US151 - Dubuque Rd - 10th Ave

76 Crashes

Clear



Straight
Stopped
Unknown
Backing
Overtaking
Sideswipe

Parked
Erratic
Out of control
Right turn
Left turn
U-turn

Fatal
Major
Minor
Injury
Pedestrian
Bicycle

Fixed objects:
General
Signal
Tree
Pole
Curb
Animal
DUI
3rd vehicle
Nighttime

Crash Magic Online 5/24/2023

Iowa Crash Analysis Tool
Quick Report
2018-2022

Crash Severity	22
Fatal Crash	0
Suspected Serious Injury Crash	0
Suspected Minor Injury Crash	1
Possible/Unknown Injury Crash	7
Property Damage Only	14

Injury Status Summary	9
Fatalities	0
Suspected serious/incapacitating	0
Suspected minor/non-incapacitating	1
Possible (complaint of pain/injury)	6
Unknown	2

Property/Vehicles/Occupants	
Property Damage Total (dollars):	119,080.00
Average (per crash dollars):	5,412.73
Total Vehicles:	43.00
Average (per crash):	1.95
Total Occupants:	51.00
Average (per crash):	2.32

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.32
Major Injuries/Crash:	0.00
Minor Injuries/Crash:	0.05
Possible/Unknown Injuries/Crash:	0.27

Major Cause			22
Animal	1	Ran traffic signal	4
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	0	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	1
Operating vehicle in an reckless, erratic, ca...	1	Followed too close	9
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	0
Lost control	0	Swerving/Evasive Action	0
Over correcting/over steering	0	Failed to keep in proper lane	1
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	2
Unknown	0	Not reported	0
Other: No improper action	1		

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	2	1	0	0	0	0	0	0	3
Monday	0	0	0	2	1	0	0	1	1	0	0	0	0	5
Tuesday	0	0	0	0	1	0	1	0	0	1	0	0	0	3
Wednesday	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Thursday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Friday	0	0	1	1	0	0	0	1	3	1	0	0	0	7
Saturday	0	0	0	0	1	1	1	0	0	0	0	0	0	3
Total	0	0	1	3	3	3	3	2	5	2	0	0	0	22

Manner of Crash Collision	22
Non-collision (single vehicle)	1
Head-on (front to front)	0
Rear-end (front to rear)	13
Angle, oncoming left turn	0
Broadside (front to side)	5
Sideswipe, same direction	3
Sideswipe, opposite direction	0
Rear to rear	0
Rear to side	0
Not reported	0
Other	0
Unknown	0

Surface Conditions	22
Dry	20
Wet	1
Ice/frost	0
Snow	1
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			43
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)	43

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	1	0	0	1
= 17	0	1	0	0	1
= 18	1	1	0	0	2
= 19	0	0	0	0	0
= 20	1	1	0	0	2
>= 21 and <= 24	3	5	0	0	8
>= 25 and <= 29	2	2	0	0	4
>= 30 and <= 34	2	3	0	0	5
>= 35 and <= 39	1	2	0	0	3
>= 40 and <= 44	2	1	0	0	3
>= 45 and <= 49	2	0	0	0	2
>= 50 and <= 54	0	0	0	0	0
>= 55 and <= 59	1	2	0	0	3
>= 60 and <= 64	1	1	0	0	2
>= 65 and <= 69	0	3	0	0	3
>= 70 and <= 74	0	1	0	0	1
>= 75 and <= 79	0	1	0	0	1
>= 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	2	0	2
Total	16	25	2	0	43

Drug/Alcohol Related	**22**
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	22

Alcohol Test Given	**43**
None	41
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	2

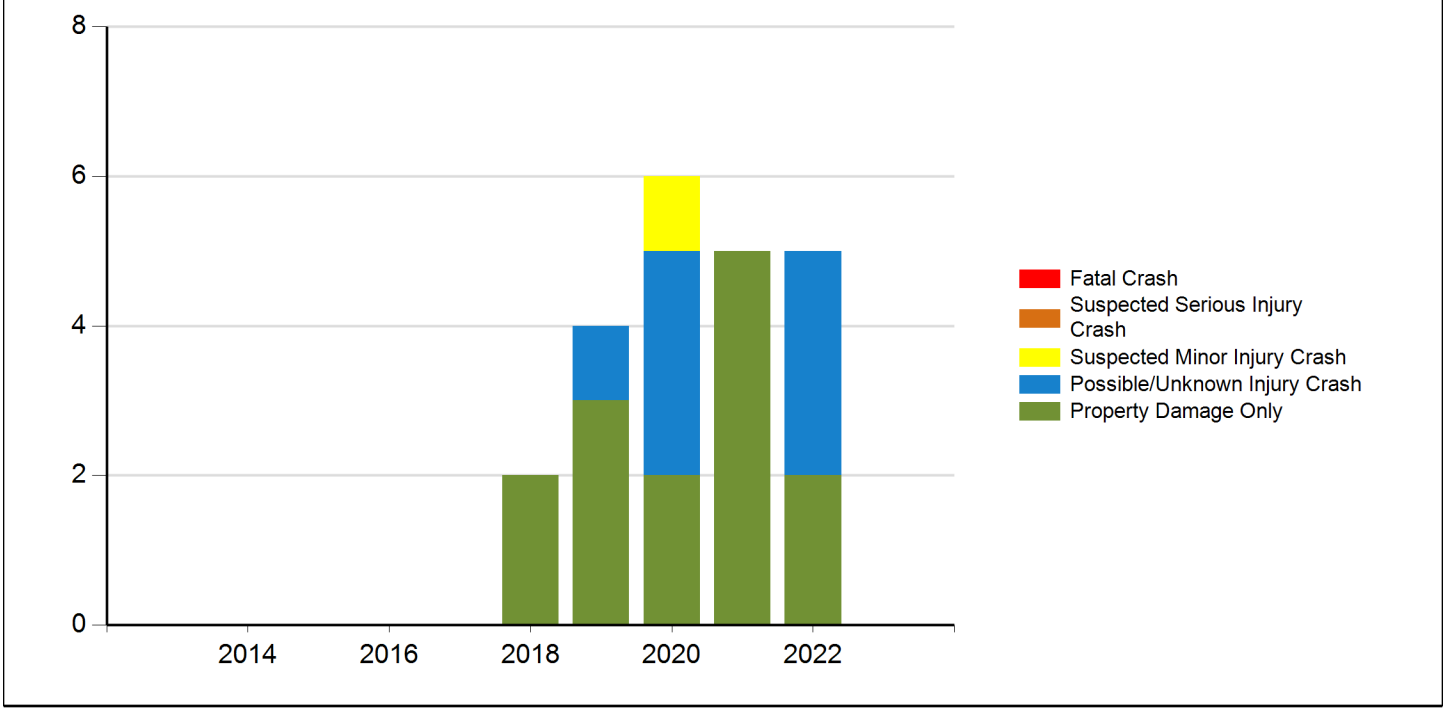
Drug Test Given	**43**
None	41
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	2

Drug Test Result	**43**
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	43
Other	0

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	**Total**
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	2	2
2019	0	0	0	1	3	4
2020	0	0	1	3	2	6
2021	0	0	0	0	5	5
2022	0	0	0	3	2	5
2023	0	0	0	0	0	0
Total	0	0	1	7	14	22

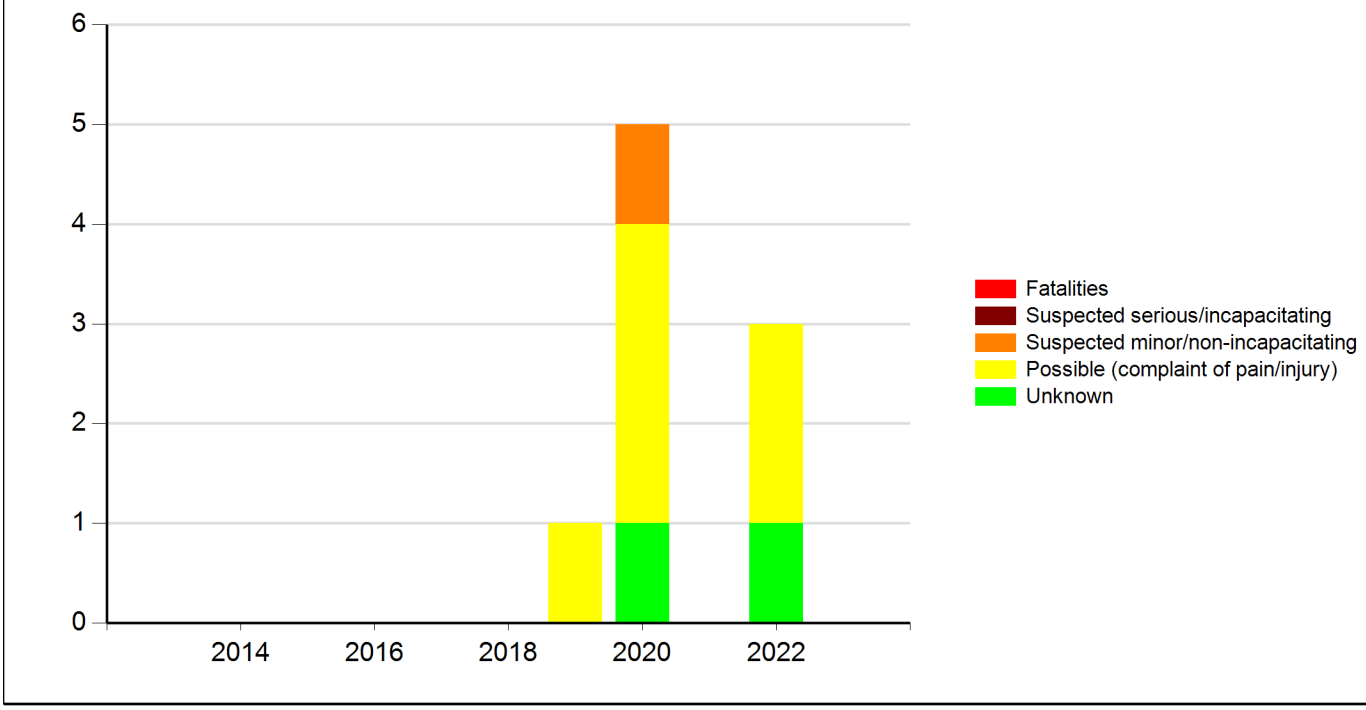
Severity/Year



Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	Total
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	1	0	1
2020	0	0	1	3	1	5
2021	0	0	0	0	0	0
2022	0	0	0	2	1	3
2023	0	0	0	0	0	0
Total	0	0	1	6	2	9

Injury Status/Year



Meeting the following criteria

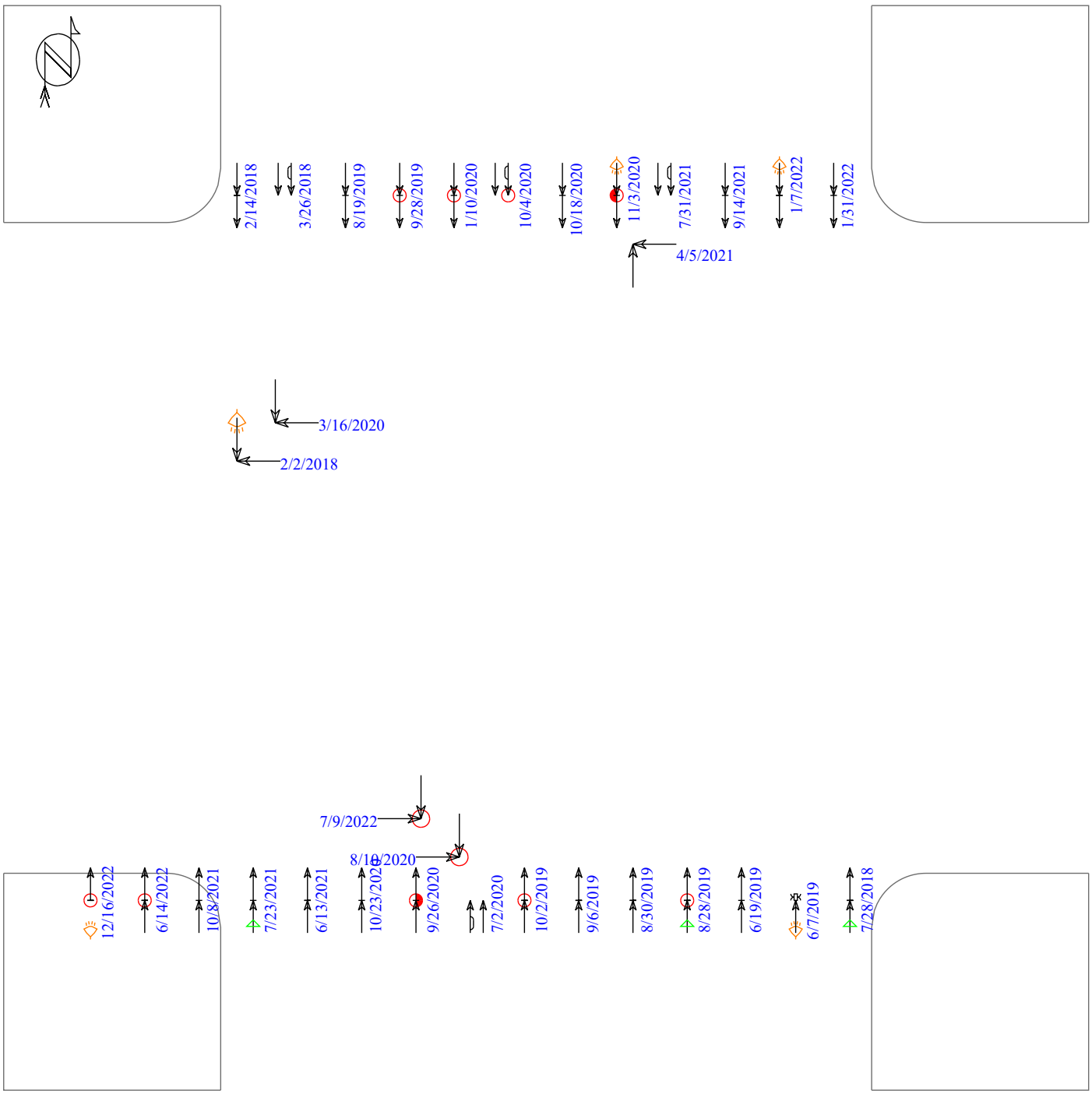
Jurisdiction: Statewide
Year: 2018, 2019, 2020, 2021, 2022
Map Selection: Yes
Filter: None

Analyst Information

Linn Aire

32 Crashes

Clear



Straight
Stopped
Unknown
Backing
Overtaking
Sideswipe

Parked
Erratic
Out of control
Right turn
Left turn
U-turn

Fatal
Major
Minor
Injury
Pedestrian
Bicycle

Fixed objects:
General
Signal
Tree
Pole
Curb
Animal
DUI
3rd vehicle
Nighttime

Crash Magic Online 5/24/2023

Iowa Crash Analysis Tool
Quick Report
2018-2022

Crash Severity	31
Fatal Crash	0
Suspected Serious Injury Crash	1
Suspected Minor Injury Crash	4
Possible/Unknown Injury Crash	6
Property Damage Only	20

Injury Status Summary	13
Fatalities	0
Suspected serious/incapacitating	1
Suspected minor/non-incapacitating	5
Possible (complaint of pain/injury)	7
Unknown	0

Property/Vehicles/Occupants	
Property Damage Total (dollars):	225,505.00
Average (per crash dollars):	7,274.35
Total Vehicles:	61.00
Average (per crash):	1.97
Total Occupants:	82.00
Average (per crash):	2.65

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.42
Major Injuries/Crash:	0.03
Minor Injuries/Crash:	0.16
Possible/Unknown Injuries/Crash:	0.23

Major Cause			31
Animal	1	Ran traffic signal	2
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	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	3
Exceeded authorized speed	0	Improper or erratic lane changing	0
Operating vehicle in an reckless, erratic, ca...	3	Followed too close	13
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	2
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	2
Ran off road - straight	0	Ran off road - left	0
Lost control	0	Swerving/Evasive Action	1
Over correcting/over steering	0	Failed to keep in proper lane	1
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	1	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	2		

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	1	0	0	2
Monday	0	0	0	1	1	0	1	1	2	0	0	0	0	6
Tuesday	0	0	0	2	2	0	0	1	1	1	0	0	0	7
Wednesday	0	0	0	0	0	1	0	1	0	0	0	0	0	2
Thursday	0	0	0	0	1	0	0	2	1	0	0	0	0	4
Friday	0	0	0	0	0	0	0	1	1	1	1	1	0	5
Saturday	0	0	0	1	0	1	1	0	1	0	0	1	0	5
Total	0	0	0	4	4	2	2	6	7	2	2	2	0	31

Manner of Crash Collision	31
Non-collision (single vehicle)	2
Head-on (front to front)	0
Rear-end (front to rear)	18
Angle, oncoming left turn	3
Broadside (front to side)	3
Sideswipe, same direction	4
Sideswipe, opposite direction	0
Rear to rear	0
Rear to side	0
Not reported	1
Other	0
Unknown	0

Surface Conditions	31
Dry	20
Wet	6
Ice/frost	1
Snow	2
Slush	1
Mud, dirt	0
Water (standing or moving)	0
Sand	0
Oil	0
Gravel	0
Not reported	1
Other	0
Unknown	0

Fixed Object Struck			61
Bridge overhead structure	0	Bridge pier or support	0
Bridge/bridge rail parapet	0	Curb/island/raised median	0
Ditch	1	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)	60

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	1	2	0	0	3
= 19	1	1	0	0	2
= 20	0	0	0	0	0
>= 21 and <= 24	2	3	0	0	5
>= 25 and <= 29	4	3	0	0	7
>= 30 and <= 34	1	5	0	0	6
>= 35 and <= 39	3	2	0	0	5
>= 40 and <= 44	2	6	0	0	8
>= 45 and <= 49	0	6	0	0	6
>= 50 and <= 54	3	3	0	0	6
>= 55 and <= 59	2	2	0	0	4
>= 60 and <= 64	0	6	0	0	6
>= 65 and <= 69	0	2	0	0	2
>= 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	19	41	1	0	61

Drug/Alcohol Related	**31**
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	31

Alcohol Test Given	**61**
None	60
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	1

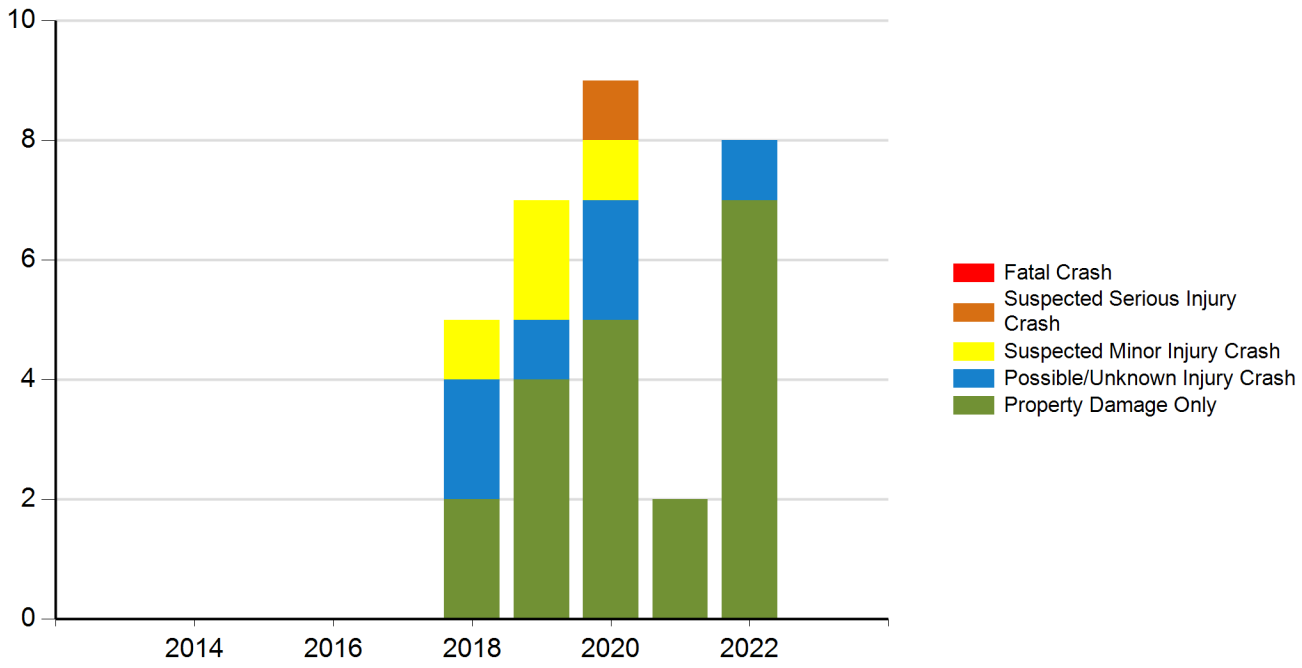
Drug Test Given	**61**
None	60
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	1

Drug Test Result	**61**
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	61
Other	0

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	**Total**
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	1	2	2	5
2019	0	0	2	1	4	7
2020	0	1	1	2	5	9
2021	0	0	0	0	2	2
2022	0	0	0	1	7	8
2023	0	0	0	0	0	0
Total	0	1	4	6	20	31

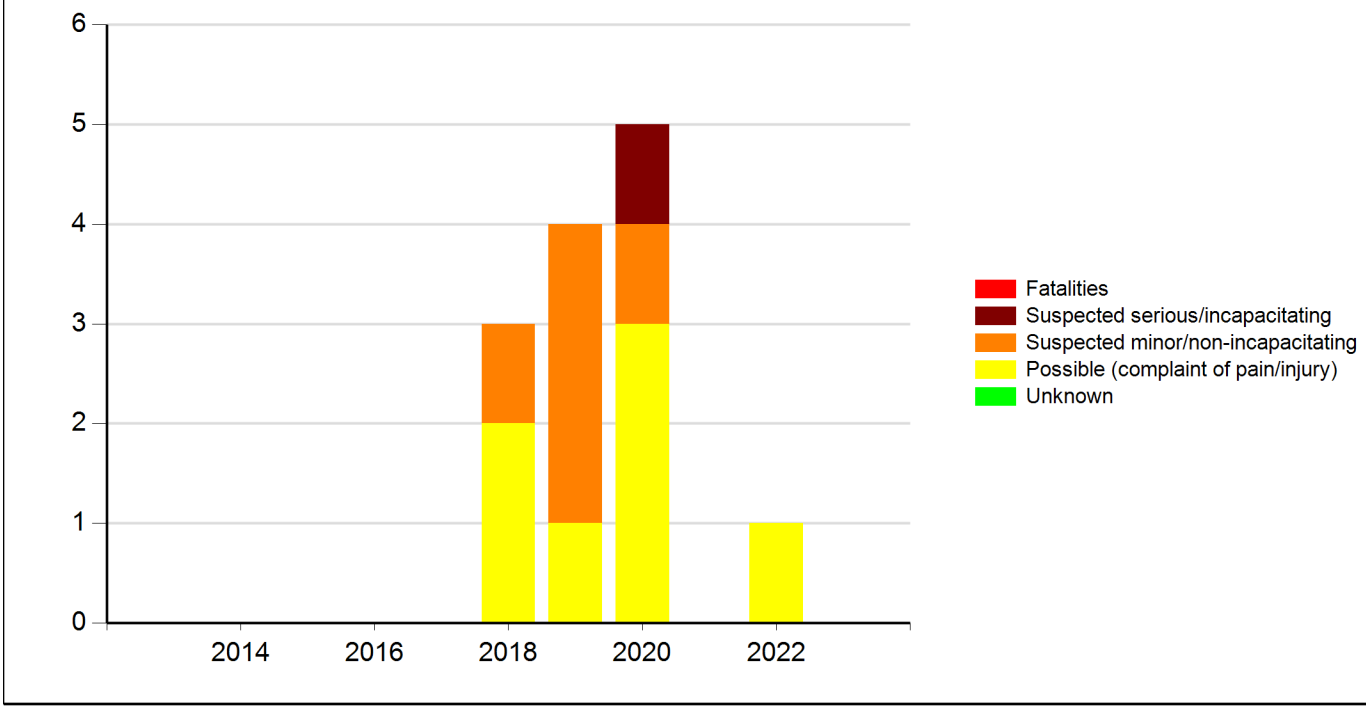
Severity/Year



Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Unknown	Total
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	1	2	0	3
2019	0	0	3	1	0	4
2020	0	1	1	3	0	5
2021	0	0	0	0	0	0
2022	0	0	0	1	0	1
2023	0	0	0	0	0	0
Total	0	1	5	7	0	13

Injury Status/Year



Meeting the following criteria

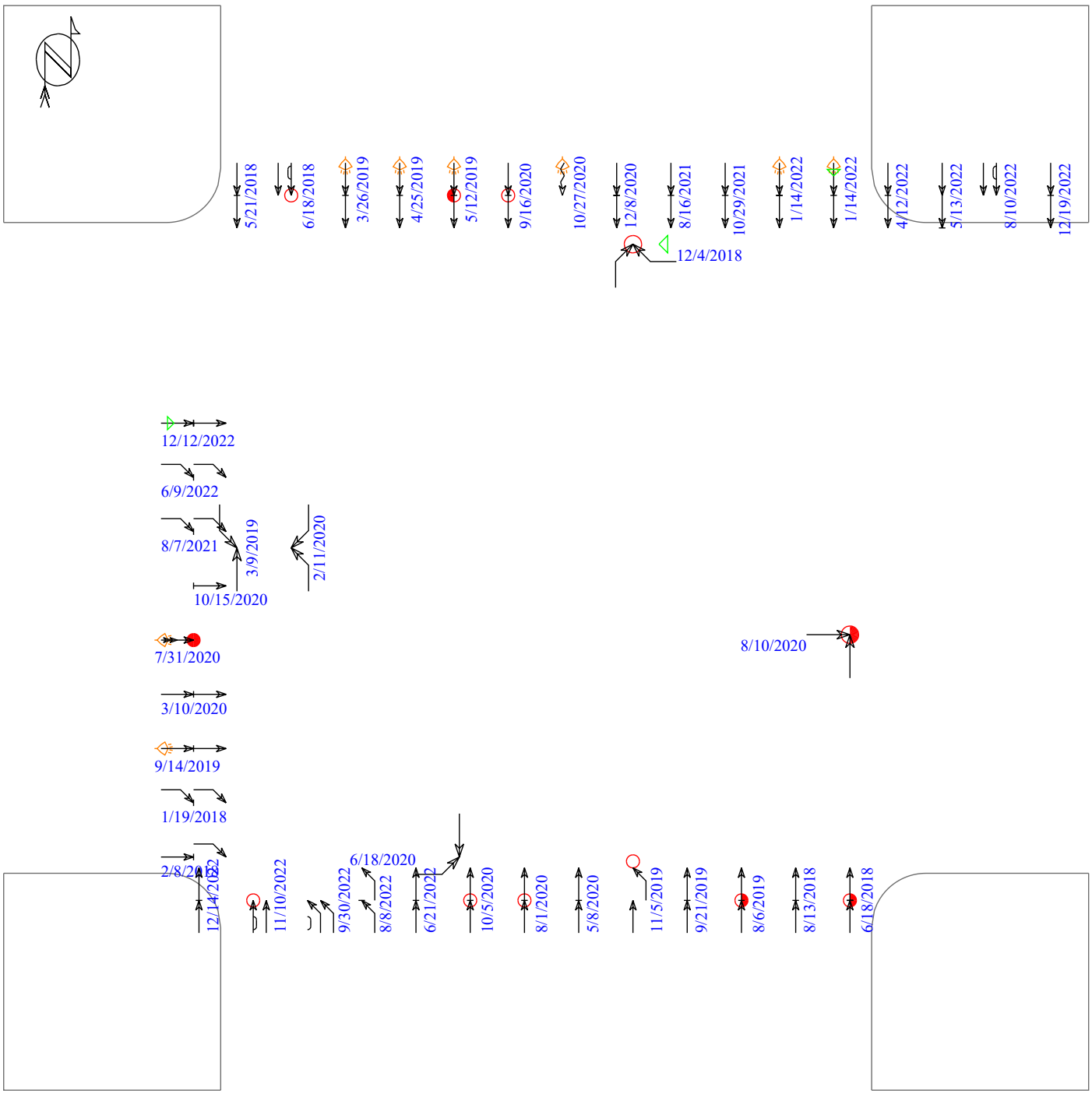
Jurisdiction: Statewide
Year: 2018, 2019, 2020, 2021, 2022
Map Selection: Yes
Filter: None

Analyst Information

Iowa 100

44 Crashes

Clear



(1) 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
- Fatal
- Major
- Minor
- Injury
- Pedestrian
- Bicycle

Fixed objects:

- General
- Signal
- Tree
- Pole
- Curb
- Animal

- DUI
- 3rd vehicle
- Nighttime

Crash Magic Online 5/24/2023

Right Turn Lane Warrants – Existing 2023 Traffic Volumes

Rec Dr – Existing AM Southbound

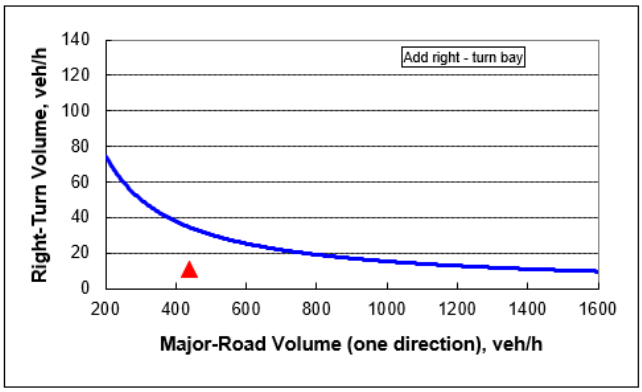
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	440
Right-turn volume, veh/h:	11

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	34
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Rec Dr – Existing PM Southbound

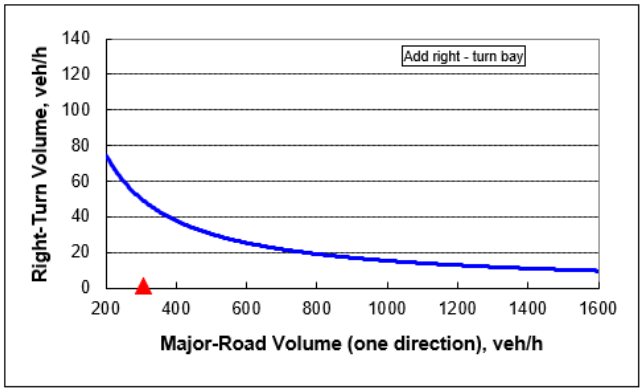
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	308
Right-turn volume, veh/h:	1

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	49
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



29th Ave/Fernow Rd – Existing AM Southbound

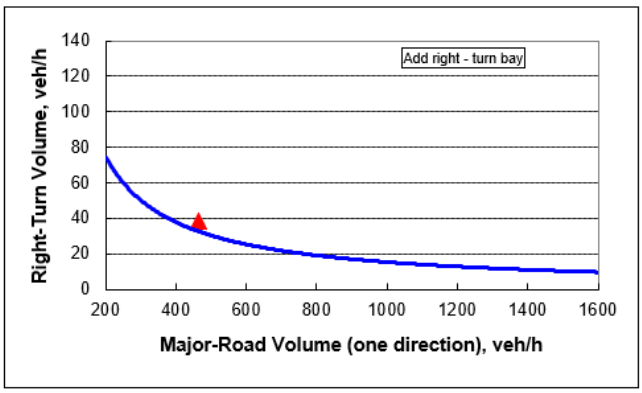
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	466
Right-turn volume, veh/h:	38

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	32
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Add right-turn bay.	



29th Ave/Fernow Rd – Existing PM Southbound

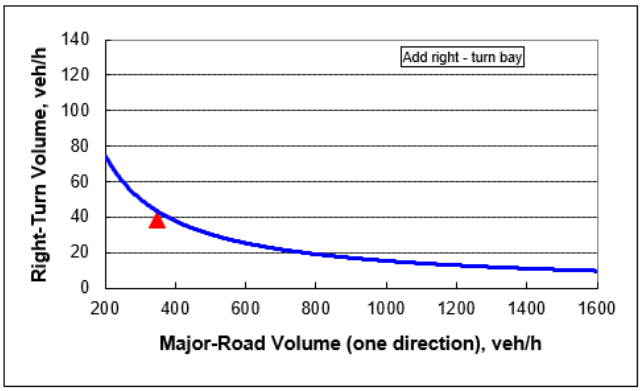
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	350
Right-turn volume, veh/h:	38

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	43
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



29th Ave/Fernow Rd – Existing AM Northbound

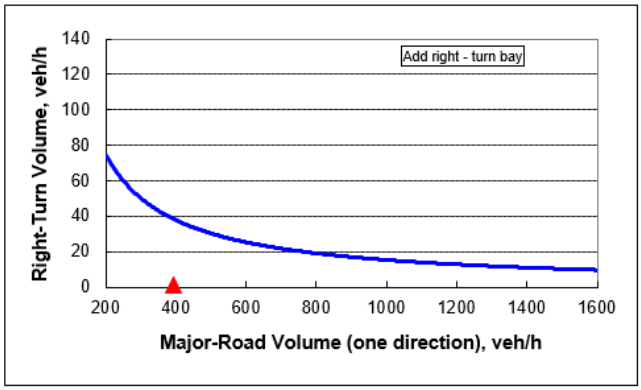
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	394
Right-turn volume, veh/h:	1

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	38
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



29th Ave/Fernow Rd – Existing PM Northbound

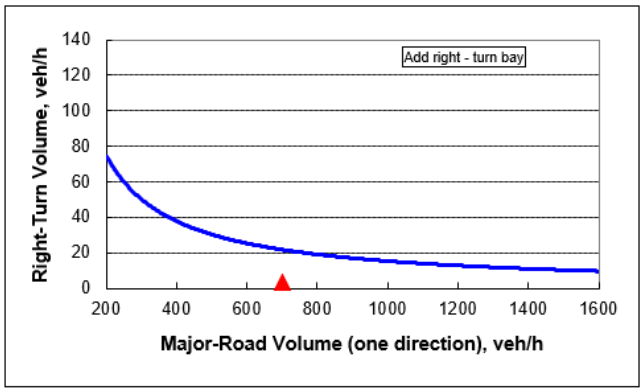
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	702
Right-turn volume, veh/h:	3

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	22
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Prairie Ridge Ave – Existing AM Southbound

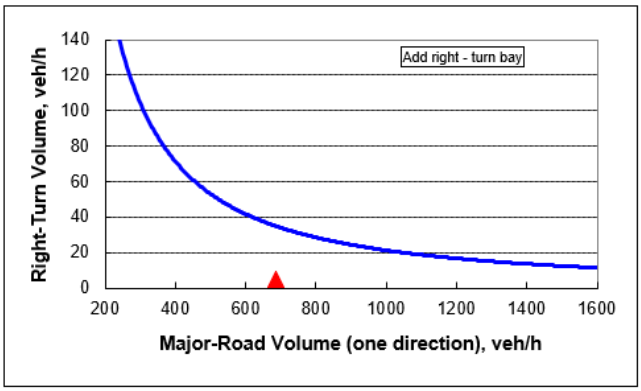
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	686
Right-turn volume, veh/h:	5

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	35
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Prairie Ridge Ave – Existing PM Southbound

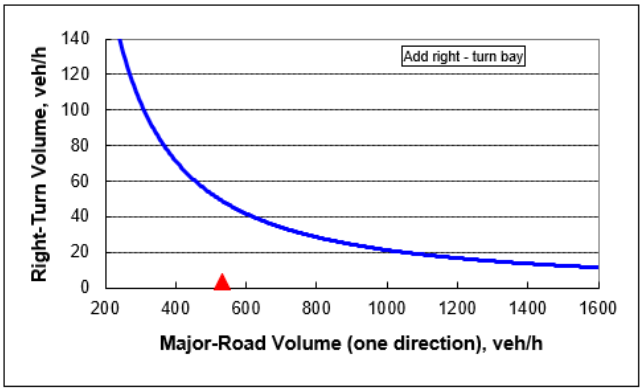
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	534
Right-turn volume, veh/h:	3

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	48
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Prairie Ridge Ave – Existing AM Northbound

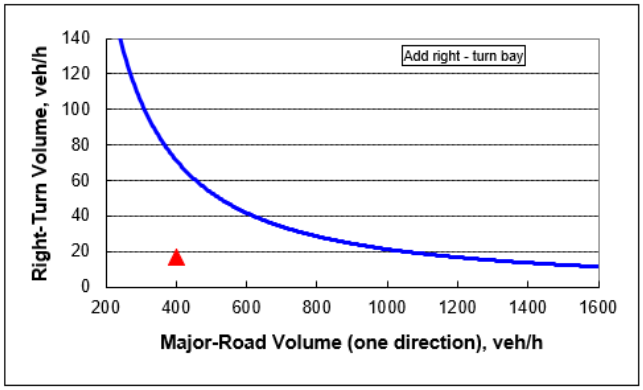
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	402
Right-turn volume, veh/h:	17

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	70
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Prairie Ridge Ave – Existing PM Northbound

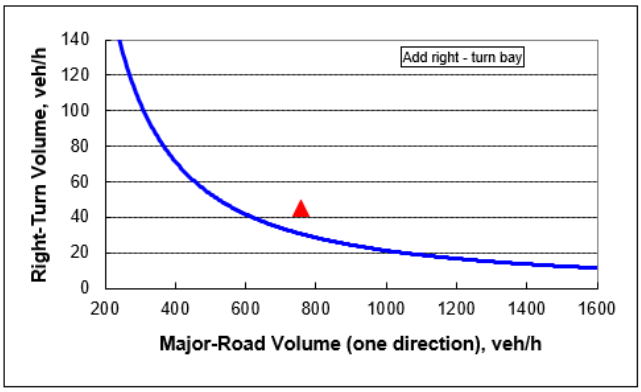
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	756
Right-turn volume, veh/h:	45

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	31
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Add right-turn bay.	



Kacena Ave – Existing AM Southbound

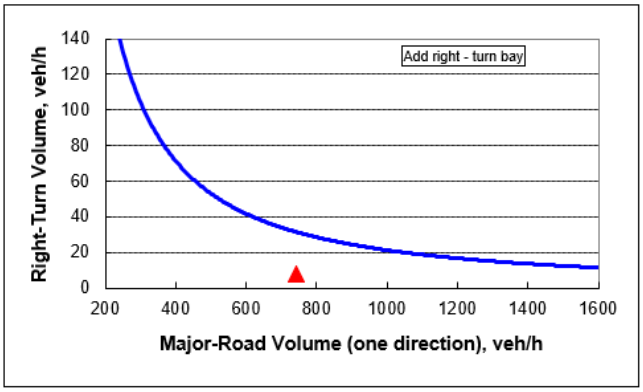
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	742
Right-turn volume, veh/h:	8

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	31
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Kacena Ave – Existing PM Southbound

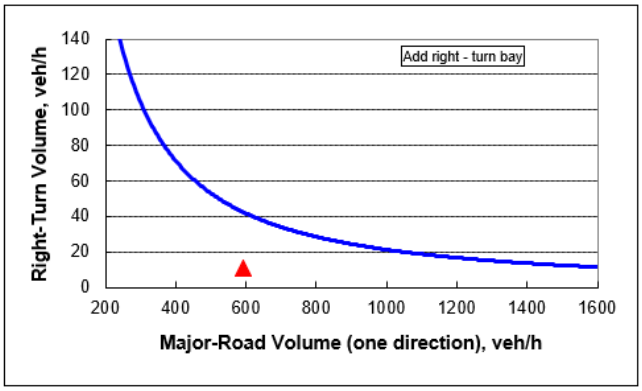
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	592
Right-turn volume, veh/h:	11

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	42
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Kacena Ave – Existing AM Northbound

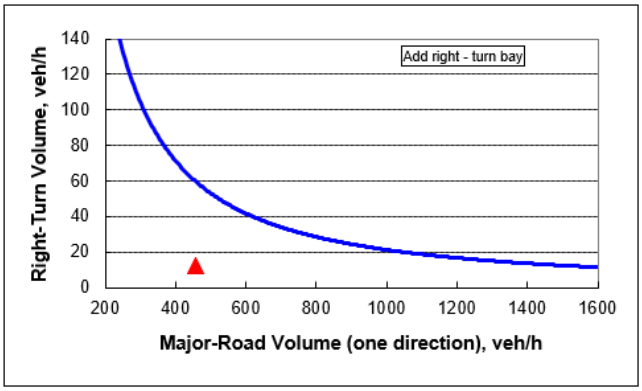
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	457
Right-turn volume, veh/h:	12

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	59
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Kacena Ave – Existing PM Northbound

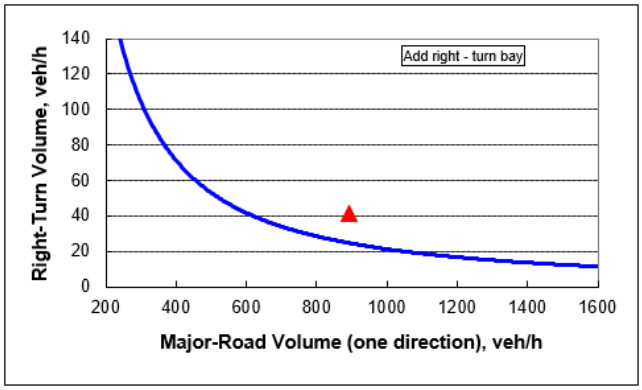
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	893
Right-turn volume, veh/h:	41

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	25
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Add right-turn bay.	



Right Turn Lane Warrants – Design Year 2045 Traffic Volumes

Rec Dr – DY AM Southbound

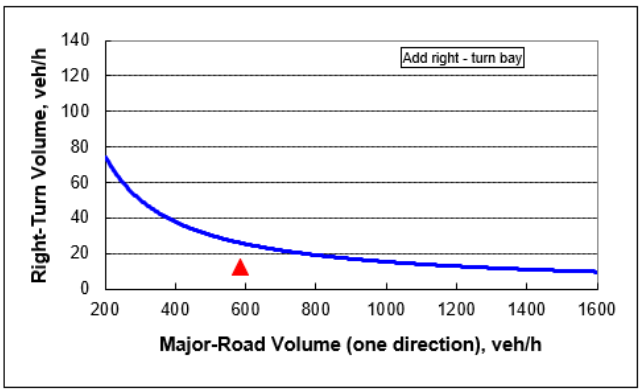
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	586
Right-turn volume, veh/h:	12

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	26
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Rec Dr – DY PM Southbound

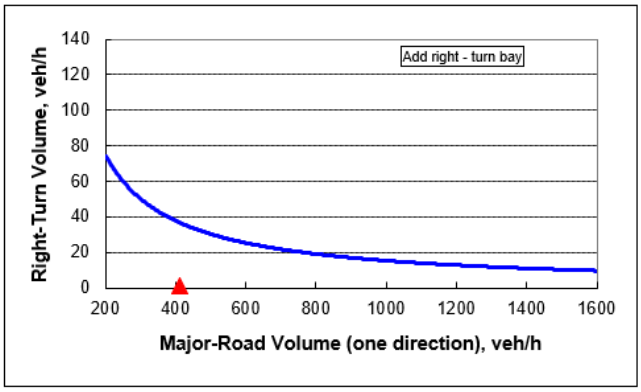
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	412
Right-turn volume, veh/h:	1

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	36
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



29th Ave/Fernow Rd – DY AM Southbound

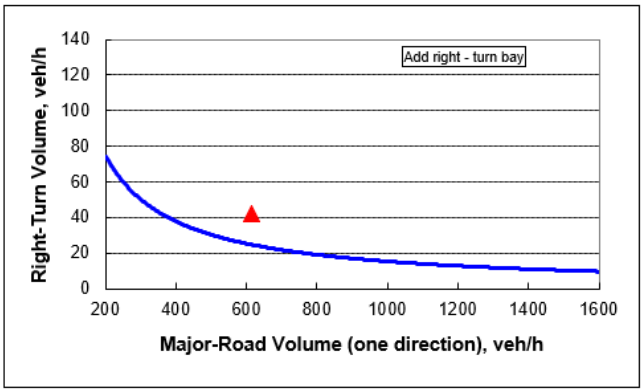
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	614
Right-turn volume, veh/h:	42

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	25
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Add right-turn bay.	



29th Ave/Fernow Rd – DY PM Southbound

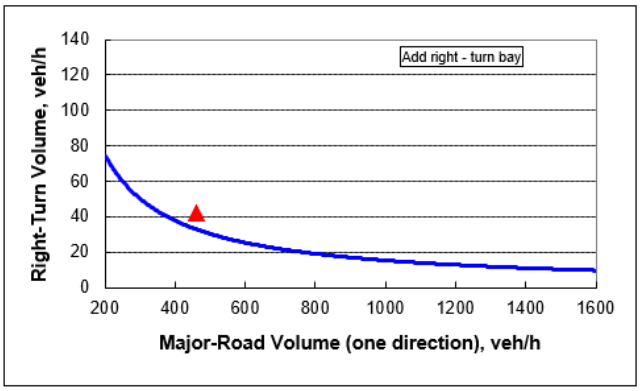
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	459
Right-turn volume, veh/h:	42

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	33
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Add right-turn bay.	



29th Ave/Fernow Rd – DY AM Northbound

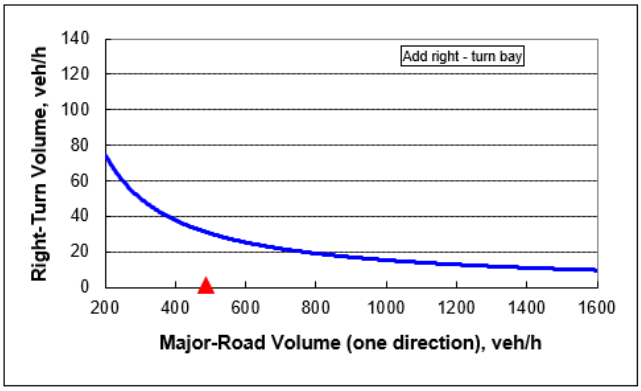
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	486
Right-turn volume, veh/h:	1

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	31
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



29th Ave/Fernow Rd – DY PM Northbound

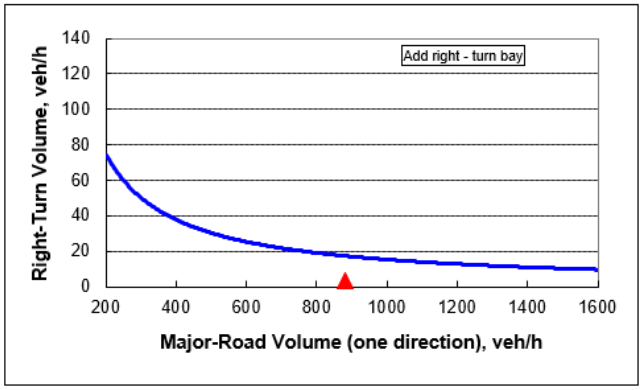
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	880
Right-turn volume, veh/h:	3

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	17
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Prairie Ridge Ave – DY AM Southbound

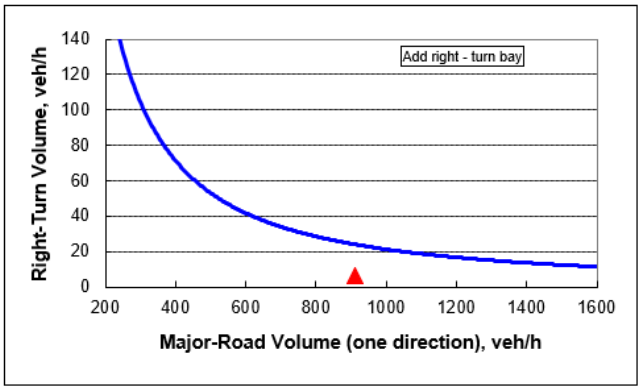
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	912
Right-turn volume, veh/h:	6

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	24
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Prairie Ridge Ave – DY PM Southbound

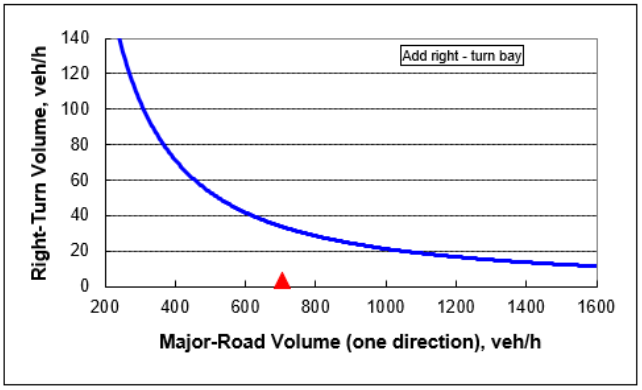
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	706
Right-turn volume, veh/h:	3

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	33
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Prairie Ridge Ave – DY AM Northbound

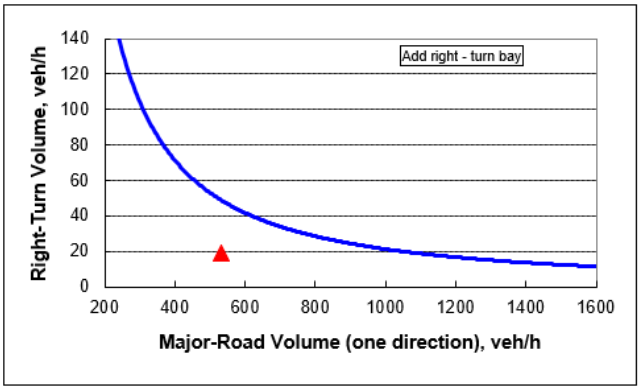
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	533
Right-turn volume, veh/h:	19

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	49
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Prairie Ridge Ave – DY PM Northbound

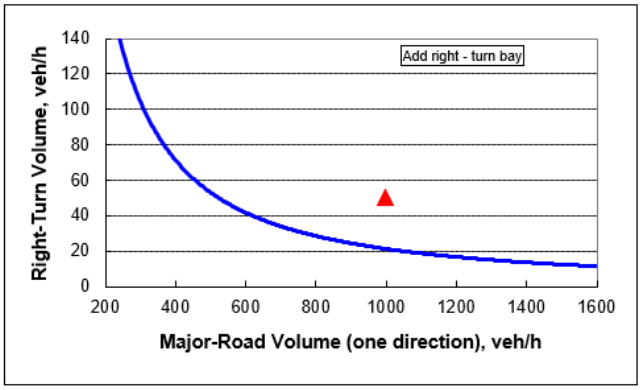
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	996
Right-turn volume, veh/h:	50

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	21
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Add right-turn bay.	



Kacena Ave – DY AM Southbound

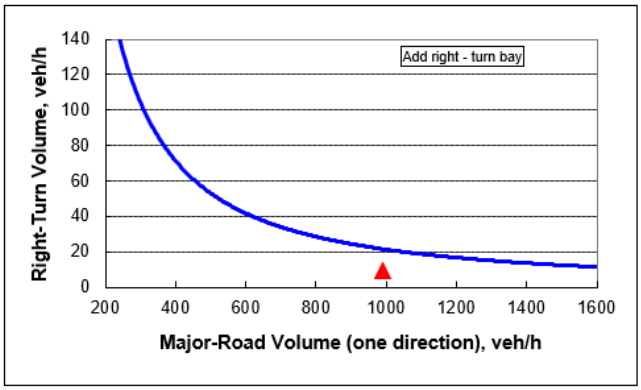
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	990
Right-turn volume, veh/h:	9

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	21
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Kacena Ave – DY PM Southbound

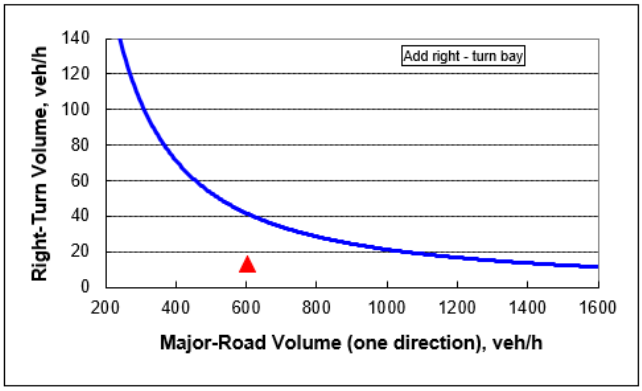
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	602
Right-turn volume, veh/h:	13

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	41
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Kacena Ave – DY AM Northbound

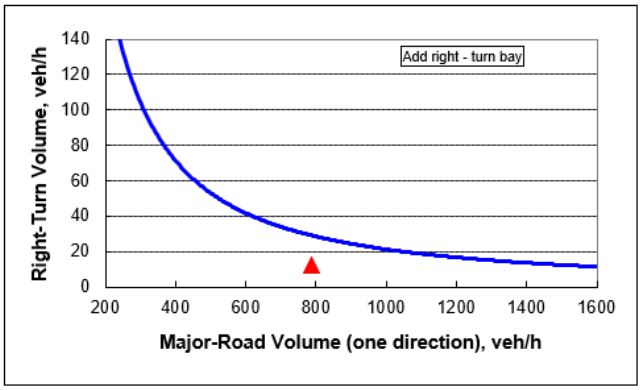
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	787
Right-turn volume, veh/h:	12

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	29
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Do NOT add right-turn bay.	



Kacena Ave – DY PM Northbound

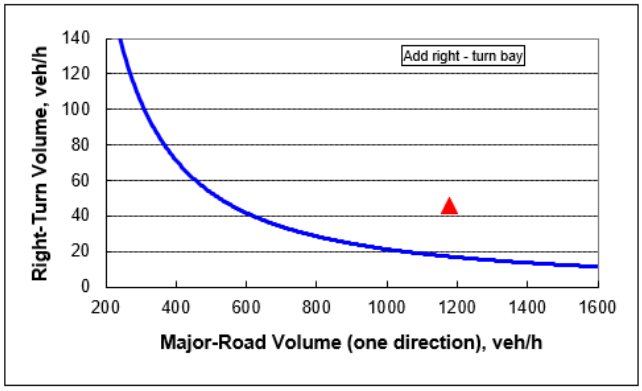
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	50
Major-road volume (one direction), veh/h:	1178
Right-turn volume, veh/h:	46

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	17
Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:	
Add right-turn bay.	



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-Fernow-29th_Existing2023
Study Date : 11/30/2023

Signal Warrants - Summary

Major Street Approaches

Northbound: IA 13
Number of Lanes : 2+

Total Approach Volume: 6,376

Southbound: IA 13
Number of Lanes :2+

Total Approach Volume: 4,708

Minor Street Approaches

Eastbound: 29th Ave
Number of Lanes :1

Total Approach Volume: 1,731

Westbound: Fernow Rd
Number of Lanes :1

Total Approach Volume: 147

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes..... **Satisfied**

Warrant 1A - Minimum Vehicular Volume..... **Satisfied**
Required volumes reached for 8 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic..... **Satisfied**
Required volumes reached for 9 hours, 8 are needed

Warrant 1C - Combination of Warrants..... **Satisfied**
Required 1A volumes reached for 12 hours, 8 are needed
Required 1B volumes reached for 14 hours, 8 are needed

Warrant 2 - Four Hour Volumes..... **Satisfied**
Number of hours (7) volumes exceed minimum >= minimum required (4).

Warrant 3 - Peak Hour..... **Satisfied**

Warrant 3A - Peak Hour Delay..... **Satisfied**
Number of one hour periods (21) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes..... **Satisfied**
Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes..... **Not Evaluated**

Warrant 5 - School Crossing..... **Not Evaluated**

Warrant 6 - Coordinated Signal System..... **Not Evaluated**

Warrant 7 - Crash Experience..... **Not Satisfied**
Number of accidents (4) is less than minimum (5). Volume minimums are met.

Warrant 8 - Roadway Network..... **Not Evaluated**

Warrant 9 - Intersection Near a Grade Crossing..... **Not Evaluated**

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-Fernow-29th_Existing2023

Study Date : 11/30/2023

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

8 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **420**

Veh/Hr Minor = **105**

	Major Road IA 13					Minor Road 29th Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
15:45 - 16:45	676	+	365	=	1041	118	15	Yes
16:45 - 17:45	678	+	328	=	1006	132	11	Yes
07:15 - 08:15	394	+	435	=	829	141	19	Yes
14:45 - 15:45	501	+	310	=	811	116	16	Yes
17:45 - 18:45	482	+	250	=	732	146	5	Yes
06:15 - 07:15	280	+	375	=	655	105	14	Yes
18:45 - 19:45	360	+	190	=	550	117	3	Yes
19:45 - 20:45	269	+	179	=	448	116	5	Yes
14:30 - 15:30	471	+	290	=	761	103	16	No
14:00 - 15:00	460	+	271	=	731	89	11	No
13:45 - 14:45	462	+	261	=	723	76	10	No
14:15 - 15:15	454	+	266	=	720	94	10	No
13:30 - 14:30	438	+	248	=	686	79	8	No
13:15 - 14:15	416	+	257	=	673	89	7	No
13:00 - 14:00	410	+	244	=	654	89	9	No
12:00 - 13:00	392	+	262	=	654	81	6	No
12:15 - 13:15	402	+	251	=	653	85	8	No
12:45 - 13:45	399	+	249	=	648	89	9	No
11:30 - 12:30	374	+	271	=	645	83	7	No
12:30 - 13:30	394	+	245	=	639	86	8	No
11:45 - 12:45	380	+	259	=	639	88	7	No
11:15 - 12:15	350	+	259	=	609	80	8	No
08:15 - 09:15	282	+	319	=	601	102	9	No
08:30 - 09:30	280	+	305	=	585	94	8	No
11:00 - 12:00	316		268		584	82	7	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-Fernow-29th_Existing2023

Study Date : 11/30/2023

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

9 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **630**

Veh/Hr Minor = **53**

	Major Road IA 13					Minor Road 29th Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
15:30 - 16:30	659	+	379	=	1038	127	16	Yes
16:30 - 17:30	695	+	332	=	1027	124	12	Yes
07:15 - 08:15	394	+	435	=	829	141	19	Yes
17:30 - 18:30	531	+	257	=	788	139	7	Yes
14:30 - 15:30	471	+	290	=	761	103	16	Yes
13:30 - 14:30	438	+	248	=	686	79	8	Yes
06:15 - 07:15	280	+	375	=	655	105	14	Yes
11:30 - 12:30	374	+	271	=	645	83	7	Yes
12:30 - 13:30	394	+	245	=	639	86	8	Yes
11:15 - 12:15	350	+	259	=	609	80	8	No
08:15 - 09:15	282	+	319	=	601	102	9	No
08:30 - 09:30	280	+	305	=	585	94	8	No
11:00 - 12:00	316	+	268	=	584	82	7	No
10:45 - 11:45	302	+	282	=	584	77	4	No
06:00 - 07:00	233	+	344	=	577	86	13	No
10:00 - 11:00	291	+	285	=	576	73	7	No
09:30 - 10:30	284	+	289	=	573	62	7	No
18:30 - 19:30	362	+	209	=	571	126	2	No
09:15 - 10:15	273	+	293	=	566	64	7	No
10:15 - 11:15	273	+	290	=	563	79	4	No
08:45 - 09:45	255	+	308	=	563	85	5	No
10:30 - 11:30	275	+	280	=	555	83	5	No
09:45 - 10:45	282	+	272	=	554	73	7	No
18:45 - 19:45	360	+	190	=	550	117	3	No
09:00 - 10:00	244		297		541	84	4	No

Study Name: SignalWarrant_IA13-Fernow-29th_Existing2023

Study Date : 11/30/2023

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

12 hours meet 1A minimums.
14 hours meet 1B minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

Volume Requirements

Rural Factor of 70% applied

Warrant	1A	1B
Veh/Hr Major =	**336**	**504**
Veh/Hr Minor =	**84**	**42**

Major Road	Minor Road
IA 13	29th Ave

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
16:00 - 17:00	689	+	359	=	1048	113	13	Yes
17:00 - 18:00	637	+	307	=	944	127	8	Yes
15:00 - 16:00	552	+	324	=	876	118	17	Yes
07:00 - 08:00	394	+	466	=	860	148	18	Yes
14:00 - 15:00	460	+	271	=	731	89	11	Yes
18:00 - 19:00	443	+	248	=	691	150	7	Yes
12:45 - 13:45	399	+	249	=	648	89	9	Yes
11:45 - 12:45	380	+	259	=	639	88	7	Yes
08:00 - 09:00	311	+	314	=	625	90	12	Yes
06:00 - 07:00	233	+	344	=	577	86	13	Yes
09:00 - 10:00	244	+	297	=	541	84	4	Yes
19:00 - 20:00	341		173		514	138	6	Yes

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:00 - 17:00	689	+	359	=	1048	113	13	Yes
17:00 - 18:00	637	+	307	=	944	127	8	Yes
15:00 - 16:00	552	+	324	=	876	118	17	Yes
07:00 - 08:00	394	+	466	=	860	148	18	Yes
14:00 - 15:00	460	+	271	=	731	89	11	Yes
18:00 - 19:00	443	+	248	=	691	150	7	Yes
13:00 - 14:00	410	+	244	=	654	89	9	Yes
12:00 - 13:00	392	+	262	=	654	81	6	Yes
08:00 - 09:00	311	+	314	=	625	90	12	Yes
11:00 - 12:00	316	+	268	=	584	82	7	Yes
06:00 - 07:00	233	+	344	=	577	86	13	Yes
10:00 - 11:00	291		285		576	73	7	Yes

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-Fernow-29th_Existing2023

Study Date : 11/30/2023

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

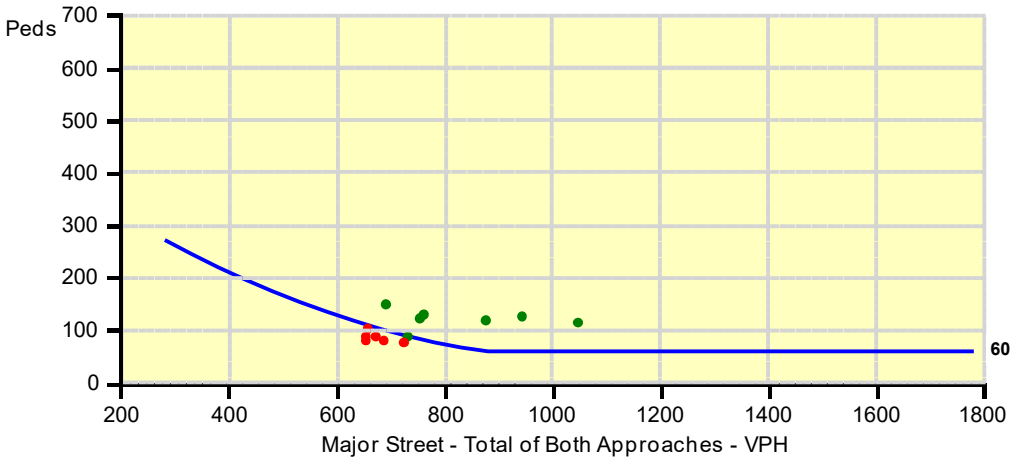
Summary

7 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

	Major Road					Minor Road		
	IA 13					29th Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:00 - 17:00	689	+	359	=	1048	113	13	Yes
17:00 - 18:00	637	+	307	=	944	127	8	Yes
15:00 - 16:00	552	+	324	=	876	118	17	Yes
07:30 - 08:30	351	+	410	=	761	130	16	Yes
06:30 - 07:30	353	+	399	=	752	124	17	Yes
14:00 - 15:00	460	+	271	=	731	89	11	Yes
18:00 - 19:00	443	+	248	=	691	150	7	Yes
13:45 - 14:45	462	+	261	=	723	76	10	No
13:30 - 14:30	438	+	248	=	686	79	8	No
13:15 - 14:15	416	+	257	=	673	89	7	No
06:15 - 07:15	280	+	375	=	655	105	14	No
							9	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-Fernow-29th_Existing2023

Study Date : 11/30/2023

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

24 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes = **1**

Volume and Delay Requirements

Veh/Hr All Approaches = **800**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

	Major Road					Minor Road			
	IA 13					29th Ave			
Time	Total of All Approaches	Met?	Minor EB	Delay EB	Met?	Minor WB	Delay WB	Met?	Warrant Met?
16:15 - 17:15	1188	Yes	122	-	Yes	14	-	---	Yes
15:30 - 16:30	1181	Yes	127	-	Yes	16	-	---	Yes
15:45 - 16:45	1174	Yes	118	-	Yes	15	-	---	Yes
16:00 - 17:00	1174	Yes	113	-	Yes	13	-	---	Yes
16:30 - 17:30	1163	Yes	124	-	Yes	12	-	---	Yes
16:45 - 17:45	1149	Yes	132	-	Yes	11	-	---	Yes
15:15 - 16:15	1116	Yes	120	-	Yes	20	-	---	Yes
17:00 - 18:00	1079	Yes	127	-	Yes	8	-	---	Yes
07:00 - 08:00	1026	Yes	148	-	Yes	18	-	---	Yes
15:00 - 16:00	1011	Yes	118	-	Yes	17	-	---	Yes
17:15 - 18:15	999	Yes	128	-	Yes	6	-	---	Yes
07:15 - 08:15	989	Yes	141	-	Yes	19	-	---	Yes
06:45 - 07:45	989	Yes	145	-	Yes	15	-	---	Yes
14:45 - 15:45	943	Yes	116	-	Yes	16	-	---	Yes
17:30 - 18:30	934	Yes	139	-	Yes	7	-	---	Yes
07:30 - 08:30	907	Yes	130	-	Yes	16	-	---	Yes
06:30 - 07:30	893	Yes	124	-	Yes	17	-	---	Yes
17:45 - 18:45	883	Yes	146	-	Yes	5	-	---	Yes
14:30 - 15:30	880	Yes	103	-	Yes	16	-	---	Yes
18:00 - 19:00	848	Yes	150	-	Yes	7	-	---	Yes
07:45 - 08:45	809	Yes	106	-	Yes	17	-	---	Yes
14:00 - 15:00	831	Yes	89	-	No	11	-	---	No
14:15 - 15:15	824	Yes	94	-	No	10	-	---	No
13:45 - 14:45	809	Yes	76	-	No	10	-	---	No
06:15 - 07:15	774	No	105	-	Yes	14	-	---	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-Fernow-29th_Existing2023

Study Date : 11/30/2023

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

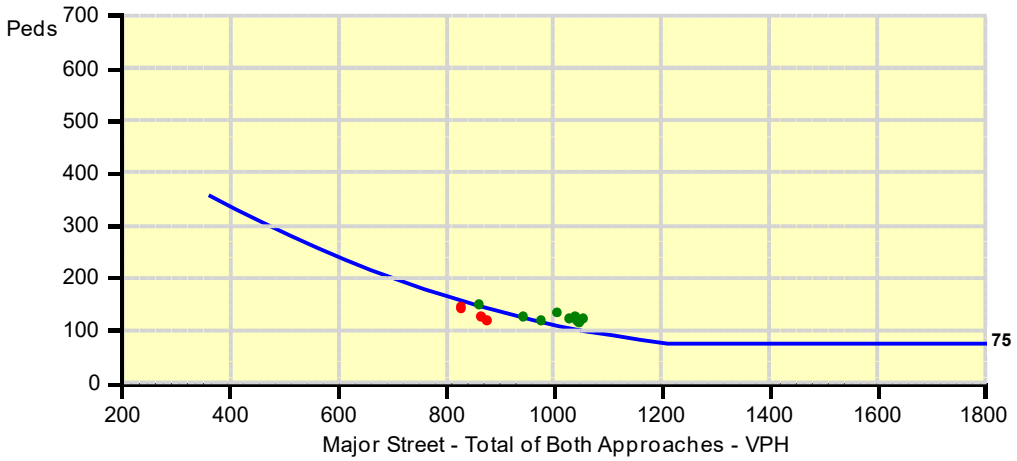
Summary

9 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

	Major Road					Minor Road		
	IA 13					29th Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	702	+	350	=	1052	122	14	Yes
16:00 - 17:00	689	+	359	=	1048	113	13	Yes
15:45 - 16:45	676	+	365	=	1041	118	15	Yes
15:30 - 16:30	659	+	379	=	1038	127	16	Yes
16:30 - 17:30	695	+	332	=	1027	124	12	Yes
16:45 - 17:45	678	+	328	=	1006	132	11	Yes
15:15 - 16:15	607	+	369	=	976	120	20	Yes
17:00 - 18:00	637	+	307	=	944	127	8	Yes
07:00 - 08:00	394	+	466	=	860	148	18	Yes
15:00 - 16:00	552	+	324	=	876	118	17	No
17:15 - 18:15	589	+	276	=	865	128	6	No
							19	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-Fernow-29th_Existing2023

Study Date : 11/30/2023

Warrant 7 - Crash Experience

Description

Intended for sites where the frequency of correctible crashes in the past 12 months is the primary motivation for installing a traffic signal.

Summary

Number of crashes does not meet minimum.
Pedestrian volumes do not meet the 80% criteria.
War 1A or 1B volumes meet the 80% criteria.
Warrant is NOT met.

Site Data Required

Number of crashes in last 12 months = **4**

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Crash and Volume Requirements

Minimum number of crashes = **5**

Rural Factor of 70 % applied

Veh/Hr Major: War 1A = **336** War 1B = **504**

Veh/Hr Minor: War 1A = **84** War 1B = **42**

Volume and Pedestrian Data

Hours data meets 80% requirements of Warrant 1A (8 needed) **12** Met? **Yes**
Hours data meets 80% requirements of Warrant 1B (8 needed) **14** Met? **Yes**
Hours data meets 80% requirements of Warrant 4 (4,1 needed) **0** **0** Met? **No**

Major Road	Minor Road
IA 13	29th Ave

Warrant 1A Details

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
16:00 - 17:00	689	+	359	=	1048	113	13	Yes
17:00 - 18:00	637	+	307	=	944	127	8	Yes
15:00 - 16:00	552	+	324	=	876	118	17	Yes
07:00 - 08:00	394	+	466	=	860	148	18	Yes
14:00 - 15:00	460	+	271	=	731	89	11	Yes
18:00 - 19:00	443	+	248	=	691	150	7	Yes
12:45 - 13:45	399	+	249	=	648	89	9	Yes
11:45 - 12:45	380	+	259	=	639	88	7	Yes
08:00 - 09:00	311	+	314	=	625	90	12	Yes
06:00 - 07:00	233	+	344	=	577	86	13	Yes
09:00 - 10:00	244	+	297	=	541	84	4	Yes
19:00 - 20:00	341		173		514	138	6	Yes

Warrant 1B Details

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:00 - 17:00	689	+	359	=	1048	113	13	Yes
17:00 - 18:00	637	+	307	=	944	127	8	Yes
15:00 - 16:00	552	+	324	=	876	118	17	Yes
07:00 - 08:00	394	+	466	=	860	148	18	Yes
14:00 - 15:00	460	+	271	=	731	89	11	Yes
18:00 - 19:00	443	+	248	=	691	150	7	Yes
13:00 - 14:00	410	+	244	=	654	89	9	Yes
12:00 - 13:00	392	+	262	=	654	81	6	Yes
08:00 - 09:00	311	+	314	=	625	90	12	Yes
11:00 - 12:00	316	+	268	=	584	82	7	Yes
06:00 - 07:00	233	+	344	=	577	86	13	Yes
10:00 - 11:00	291		285		576	73	7	Yes

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-Fernow-29th_Existing2023

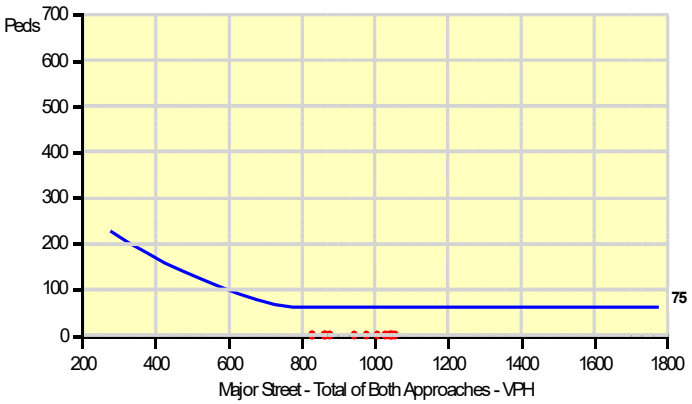
Study Date : 11/30/2023

Warrant 7 - Crash Experience

Major Road
IA 13

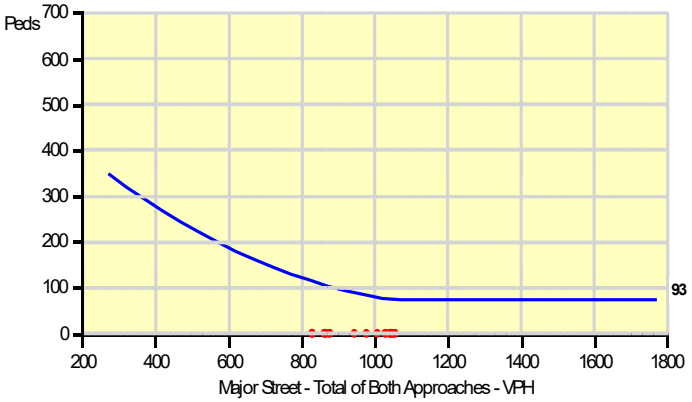
80% of Warrant 4 - 4 Hr Pedestrian Data

Time	NB Vehs	+	SB Vehs	=	Total Vehs	NB Peds	+	SB Peds	=	Ped Total	Met?
16:15 - 17:15	702	+	350	=	1052	0	+	0	=	0	No
16:00 - 17:00	689	+	359	=	1048	0	+	0	=	0	No
15:45 - 16:45	676	+	365	=	1041	0	+	0	=	0	No
15:30 - 16:30	659	+	379	=	1038	0	+	0	=	0	No
16:30 - 17:30	695	+	332	=	1027	0	+	0	=	0	No
16:45 - 17:45	678	+	328	=	1006	0	+	0	=	0	No
15:15 - 16:15	607	+	369	=	976	0	+	0	=	0	No
17:00 - 18:00	637	+	307	=	944	0	+	0	=	0	No
15:00 - 16:00	552	+	324	=	876	0	+	0	=	0	No
17:15 - 18:15	589	+	276	=	865	0	+	0	=	0	No
07:00 - 08:00	394	+	466	=	860	0	+	0	=	0	No
06:45 - 07:45	393		436		829	0		0		0	No



80% of Warrant 4 - 1 Hr Pedestrian Data

Time	NB Vehs	+	SB Vehs	=	Total Vehs	NB Peds	+	SB Peds	=	Ped Total	Met?
16:15 - 17:15	702	+	350	=	1052	0	+	0	=	0	No
16:00 - 17:00	689	+	359	=	1048	0	+	0	=	0	No
15:45 - 16:45	676	+	365	=	1041	0	+	0	=	0	No
15:30 - 16:30	659	+	379	=	1038	0	+	0	=	0	No
16:30 - 17:30	695	+	332	=	1027	0	+	0	=	0	No
16:45 - 17:45	678	+	328	=	1006	0	+	0	=	0	No
15:15 - 16:15	607	+	369	=	976	0	+	0	=	0	No
17:00 - 18:00	637	+	307	=	944	0	+	0	=	0	No
15:00 - 16:00	552	+	324	=	876	0	+	0	=	0	No
17:15 - 18:15	589	+	276	=	865	0	+	0	=	0	No
07:00 - 08:00	394	+	466	=	860	0	+	0	=	0	No
06:45 - 07:45	393		436		829	0		0		0	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_Existing2023
Study Date : 11/30/2023

Signal Warrants - Summary

Major Street Approaches

Northbound: IA 13
Number of Lanes : 2+

Total Approach Volume: 6,593

Southbound: IA 13
Number of Lanes :2+

Total Approach Volume: 6,542

Minor Street Approaches

Eastbound: Prairie Ridge Ave
Number of Lanes :1

Total Approach Volume: 255

Westbound: Prairie Ridge Ave
Number of Lanes :1

Total Approach Volume: 0

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes..... **Not Satisfied**

Warrant 1A - Minimum Vehicular Volume..... **Not Satisfied**
Required volumes reached for 0 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic..... **Not Satisfied**
Required volumes reached for 0 hours, 8 are needed

Warrant 1C - Combination of Warrants..... **Not Satisfied**
Required 1A volumes reached for 0 hours, 8 are needed
Required 1B volumes reached for 0 hours, 8 are needed

Warrant 2 - Four Hour Volumes..... **Not Satisfied**
Number of hours (0) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour..... **Not Satisfied**

Warrant 3A - Peak Hour Delay..... **Not Satisfied**
Approach volumes on minor street don't exceed minimums for any one hour period. Delay data not evaluated.

Warrant 3B - Peak Hour Volumes..... **Not Satisfied**
Volumes do not exceed minimums for any one hour period.

Warrant 4 - Pedestrian Volumes..... **Not Evaluated**

Warrant 5 - School Crossing..... **Not Evaluated**

Warrant 6 - Coordinated Signal System..... **Not Evaluated**

Warrant 7 - Crash Experience..... **Not Satisfied**
Number of accidents (3) is less than minimum (5). Volume minimums are not met.

Warrant 8 - Roadway Network..... **Not Evaluated**

Warrant 9 - Intersection Near a Grade Crossing..... **Not Evaluated**

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_Existing2023

Study Date : 11/30/2023

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **420**

Veh/Hr Minor = **105**

	Major Road IA 13					Minor Road Prairie Ridge Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	742	+	553	=	1295	21	0	No
16:30 - 17:30	756	+	534	=	1290	25	0	No
16:00 - 17:00	717	+	558	=	1275	27	0	No
15:45 - 16:45	686	+	541	=	1227	26	0	No
16:45 - 17:45	741	+	477	=	1218	25	0	No
15:30 - 16:30	657	+	518	=	1175	26	0	No
17:00 - 18:00	692	+	445	=	1137	23	0	No
15:15 - 16:15	616	+	483	=	1099	26	0	No
07:00 - 08:00	402	+	686	=	1088	21	0	No
06:45 - 07:45	398	+	673	=	1071	21	0	No
07:15 - 08:15	411	+	643	=	1054	21	0	No
17:15 - 18:15	621	+	390	=	1011	23	0	No
15:00 - 16:00	568	+	442	=	1010	18	0	No
07:30 - 08:30	380	+	597	=	977	17	0	No
06:30 - 07:30	352	+	617	=	969	20	0	No
14:45 - 15:45	516	+	445	=	961	16	0	No
17:30 - 18:30	563	+	367	=	930	19	0	No
06:15 - 07:15	301	+	601	=	902	14	0	No
14:30 - 15:30	472	+	408	=	880	15	0	No
14:15 - 15:15	478	+	394	=	872	12	0	No
07:45 - 08:45	365	+	505	=	870	15	0	No
14:00 - 15:00	475	+	390	=	865	9	0	No
17:45 - 18:45	481	+	332	=	813	19	0	No
13:45 - 14:45	448	+	364	=	812	7	0	No
06:00 - 07:00	254		545		799	12	0	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_Existing2023

Study Date : 11/30/2023

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **630**

Veh/Hr Minor = **53**

	Major Road IA 13					Minor Road Prairie Ridge Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	742	+	553	=	1295	21	0	No
16:30 - 17:30	756	+	534	=	1290	25	0	No
16:00 - 17:00	717	+	558	=	1275	27	0	No
15:45 - 16:45	686	+	541	=	1227	26	0	No
16:45 - 17:45	741	+	477	=	1218	25	0	No
15:30 - 16:30	657	+	518	=	1175	26	0	No
17:00 - 18:00	692	+	445	=	1137	23	0	No
15:15 - 16:15	616	+	483	=	1099	26	0	No
07:00 - 08:00	402	+	686	=	1088	21	0	No
06:45 - 07:45	398	+	673	=	1071	21	0	No
07:15 - 08:15	411	+	643	=	1054	21	0	No
17:15 - 18:15	621	+	390	=	1011	23	0	No
15:00 - 16:00	568	+	442	=	1010	18	0	No
07:30 - 08:30	380	+	597	=	977	17	0	No
06:30 - 07:30	352	+	617	=	969	20	0	No
14:45 - 15:45	516	+	445	=	961	16	0	No
17:30 - 18:30	563	+	367	=	930	19	0	No
06:15 - 07:15	301	+	601	=	902	14	0	No
14:30 - 15:30	472	+	408	=	880	15	0	No
14:15 - 15:15	478	+	394	=	872	12	0	No
07:45 - 08:45	365	+	505	=	870	15	0	No
14:00 - 15:00	475	+	390	=	865	9	0	No
17:45 - 18:45	481	+	332	=	813	19	0	No
13:45 - 14:45	448	+	364	=	812	7	0	No
06:00 - 07:00	254		545		799	12	0	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_Existing2023

Study Date : 11/30/2023

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

Only 0 hours meet 1A minimums.
Only 0 hours meet 1B minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

Volume Requirements

Rural Factor of 70% applied

Warrant	1A	1B
Veh/Hr Major =	**336**	**504**
Veh/Hr Minor =	**84**	**42**

Major Road	Minor Road
IA 13	Prairie Ridge Ave

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
16:15 - 17:15	742	+	553	=	1295	21	0	No
16:30 - 17:30	756	+	534	=	1290	25	0	No
16:00 - 17:00	717	+	558	=	1275	27	0	No
15:45 - 16:45	686	+	541	=	1227	26	0	No
16:45 - 17:45	741	+	477	=	1218	25	0	No
15:30 - 16:30	657	+	518	=	1175	26	0	No
17:00 - 18:00	692	+	445	=	1137	23	0	No
15:15 - 16:15	616	+	483	=	1099	26	0	No
07:00 - 08:00	402	+	686	=	1088	21	0	No
06:45 - 07:45	398	+	673	=	1071	21	0	No
07:15 - 08:15	411	+	643	=	1054	21	0	No
17:15 - 18:15	621	+	390	=	1011	23	0	No

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:15 - 17:15	742	+	553	=	1295	21	0	No
16:30 - 17:30	756	+	534	=	1290	25	0	No
16:00 - 17:00	717	+	558	=	1275	27	0	No
15:45 - 16:45	686	+	541	=	1227	26	0	No
16:45 - 17:45	741	+	477	=	1218	25	0	No
15:30 - 16:30	657	+	518	=	1175	26	0	No
17:00 - 18:00	692	+	445	=	1137	23	0	No
15:15 - 16:15	616	+	483	=	1099	26	0	No
07:00 - 08:00	402	+	686	=	1088	21	0	No
06:45 - 07:45	398	+	673	=	1071	21	0	No
07:15 - 08:15	411	+	643	=	1054	21	0	No
17:15 - 18:15	621	+	390	=	1011	23	0	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_Existing2023

Study Date : 11/30/2023

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

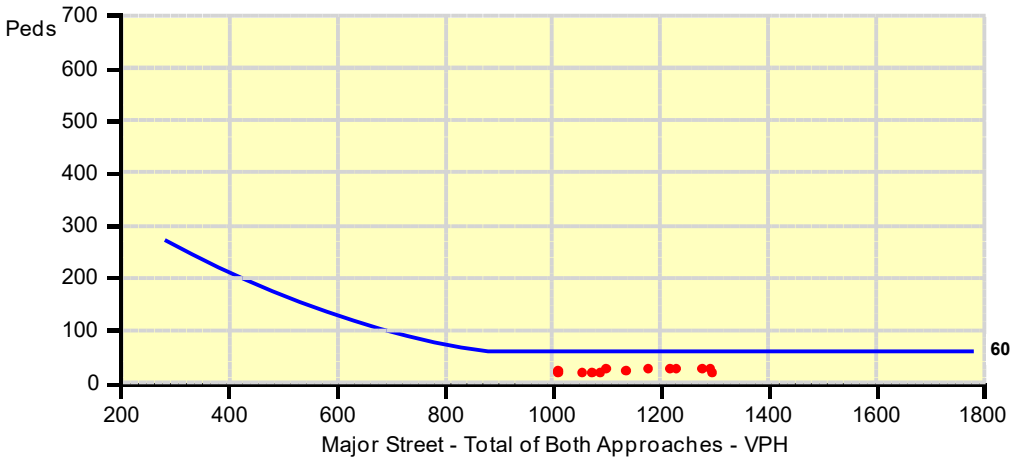
Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

	Major Road					Minor Road		
	IA 13					Prairie Ridge Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	742	+	553	=	1295	21	0	No
16:30 - 17:30	756	+	534	=	1290	25	0	No
16:00 - 17:00	717	+	558	=	1275	27	0	No
15:45 - 16:45	686	+	541	=	1227	26	0	No
16:45 - 17:45	741	+	477	=	1218	25	0	No
15:30 - 16:30	657	+	518	=	1175	26	0	No
17:00 - 18:00	692	+	445	=	1137	23	0	No
15:15 - 16:15	616	+	483	=	1099	26	0	No
07:00 - 08:00	402	+	686	=	1088	21	0	No
06:45 - 07:45	398	+	673	=	1071	21	0	No
07:15 - 08:15	411	+	643	=	1054	21	0	No
							0	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_Existing2023

Study Date : 11/30/2023

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

26 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Number of Minor Lanes = **1**

Volume and Delay Requirements

Veh/Hr All Approaches = **800**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

	Major Road					Minor Road			
	IA 13					Prairie Ridge Ave			
Time	Total of All Approaches	Met?	Minor EB	Delay EB	Met?	Minor WB	Delay WB	Met?	Warrant Met?
16:15 - 17:15	1316	Yes	21	-	No	0	-	---	No
16:30 - 17:30	1315	Yes	25	-	No	0	-	---	No
16:00 - 17:00	1302	Yes	27	-	No	0	-	---	No
15:45 - 16:45	1253	Yes	26	-	No	0	-	---	No
16:45 - 17:45	1243	Yes	25	-	No	0	-	---	No
15:30 - 16:30	1201	Yes	26	-	No	0	-	---	No
17:00 - 18:00	1160	Yes	23	-	No	0	-	---	No
15:15 - 16:15	1125	Yes	26	-	No	0	-	---	No
07:00 - 08:00	1109	Yes	21	-	No	0	-	---	No
06:45 - 07:45	1092	Yes	21	-	No	0	-	---	No
07:15 - 08:15	1075	Yes	21	-	No	0	-	---	No
17:15 - 18:15	1034	Yes	23	-	No	0	-	---	No
15:00 - 16:00	1028	Yes	18	-	No	0	-	---	No
07:30 - 08:30	994	Yes	17	-	No	0	-	---	No
06:30 - 07:30	989	Yes	20	-	No	0	-	---	No
14:45 - 15:45	977	Yes	16	-	No	0	-	---	No
17:30 - 18:30	949	Yes	19	-	No	0	-	---	No
06:15 - 07:15	916	Yes	14	-	No	0	-	---	No
14:30 - 15:30	895	Yes	15	-	No	0	-	---	No
07:45 - 08:45	885	Yes	15	-	No	0	-	---	No
14:15 - 15:15	884	Yes	12	-	No	0	-	---	No
14:00 - 15:00	874	Yes	9	-	No	0	-	---	No
17:45 - 18:45	832	Yes	19	-	No	0	-	---	No
13:45 - 14:45	819	Yes	7	-	No	0	-	---	No
06:00 - 07:00	811	Yes	12	-	No	0	-	---	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_Existing2023

Study Date : 11/30/2023

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

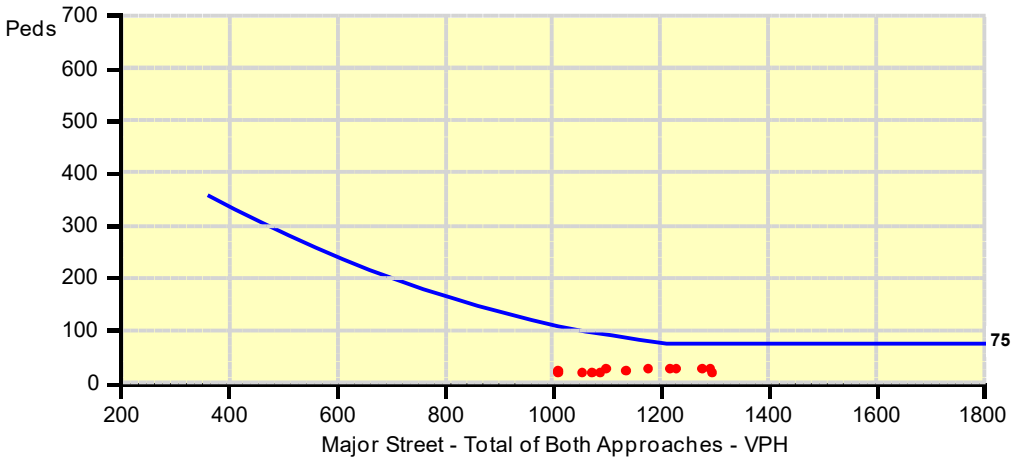
Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

	Major Road					Minor Road		
	IA 13					Prairie Ridge Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	742	+	553	=	1295	21	0	No
16:30 - 17:30	756	+	534	=	1290	25	0	No
16:00 - 17:00	717	+	558	=	1275	27	0	No
15:45 - 16:45	686	+	541	=	1227	26	0	No
16:45 - 17:45	741	+	477	=	1218	25	0	No
15:30 - 16:30	657	+	518	=	1175	26	0	No
17:00 - 18:00	692	+	445	=	1137	23	0	No
15:15 - 16:15	616	+	483	=	1099	26	0	No
07:00 - 08:00	402	+	686	=	1088	21	0	No
06:45 - 07:45	398	+	673	=	1071	21	0	No
07:15 - 08:15	411	+	643	=	1054	21	0	No
							0	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_Existing2023

Study Date : 11/30/2023

Warrant 7 - Crash Experience

Description

Intended for sites where the frequency of correctible crashes in the past 12 months is the primary motivation for installing a traffic signal.

Summary

Number of crashes does not meet minimum.
Pedestrian volumes do not meet the 80% criteria.
War 1A or 1B volumes do not meet the 80% criteria.
Warrant is NOT met.

Site Data Required

Number of crashes in last 12 months = **3**

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Crash and Volume Requirements

Minimum number of crashes = **5**

Rural Factor of 70 % applied

Veh/Hr Major: War 1A = **336** War 1B = **504**

Veh/Hr Minor: War 1A = **84** War 1B = **42**

Volume and Pedestrian Data

Hours data meets 80% requirements of Warrant 1A (8 needed) **0** Met? **No**
Hours data meets 80% requirements of Warrant 1B (8 needed) **0** Met? **No**
Hours data meets 80% requirements of Warrant 4 (4,1 needed) **0** **0** Met? **No**

Major Road	Minor Road
IA 13	Prairie Ridge Ave

Warrant 1A Details

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
16:15 - 17:15	742	+	553	=	1295	21	0	No
16:30 - 17:30	756	+	534	=	1290	25	0	No
16:00 - 17:00	717	+	558	=	1275	27	0	No
15:45 - 16:45	686	+	541	=	1227	26	0	No
16:45 - 17:45	741	+	477	=	1218	25	0	No
15:30 - 16:30	657	+	518	=	1175	26	0	No
17:00 - 18:00	692	+	445	=	1137	23	0	No
15:15 - 16:15	616	+	483	=	1099	26	0	No
07:00 - 08:00	402	+	686	=	1088	21	0	No
06:45 - 07:45	398	+	673	=	1071	21	0	No
07:15 - 08:15	411	+	643	=	1054	21	0	No
17:15 - 18:15	621		390		1011	23	0	No

Warrant 1B Details

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:15 - 17:15	742	+	553	=	1295	21	0	No
16:30 - 17:30	756	+	534	=	1290	25	0	No
16:00 - 17:00	717	+	558	=	1275	27	0	No
15:45 - 16:45	686	+	541	=	1227	26	0	No
16:45 - 17:45	741	+	477	=	1218	25	0	No
15:30 - 16:30	657	+	518	=	1175	26	0	No
17:00 - 18:00	692	+	445	=	1137	23	0	No
15:15 - 16:15	616	+	483	=	1099	26	0	No
07:00 - 08:00	402	+	686	=	1088	21	0	No
06:45 - 07:45	398	+	673	=	1071	21	0	No
07:15 - 08:15	411	+	643	=	1054	21	0	No
17:15 - 18:15	621		390		1011	23	0	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_Existing2023

Study Date : 11/30/2023

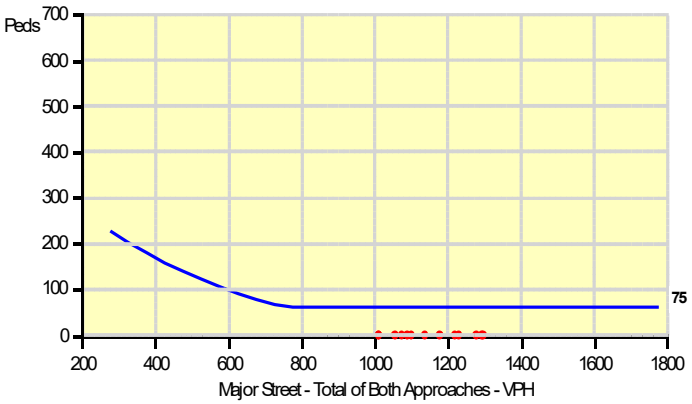
Warrant 7 - Crash Experience

Major Road

IA 13

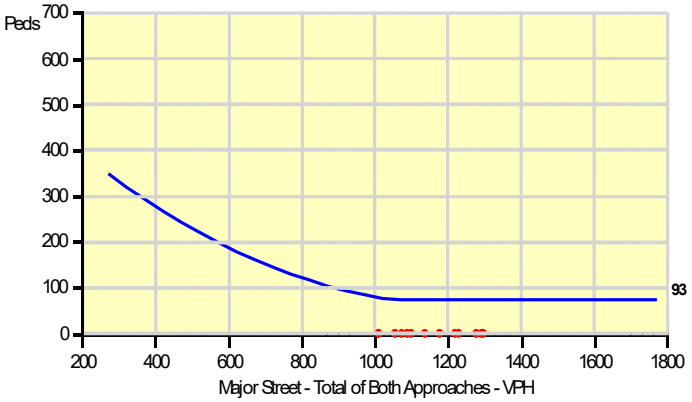
80% of Warrant 4 - 4 Hr Pedestrian Data

Time	NB Vehs	+	SB Vehs	=	Total Vehs	NB Peds	+	SB Peds	=	Ped Total	Met?
16:15 - 17:15	742	+	553	=	1295	0	+	0	=	0	No
16:30 - 17:30	756	+	534	=	1290	0	+	0	=	0	No
16:00 - 17:00	717	+	558	=	1275	0	+	0	=	0	No
15:45 - 16:45	686	+	541	=	1227	0	+	0	=	0	No
16:45 - 17:45	741	+	477	=	1218	0	+	0	=	0	No
15:30 - 16:30	657	+	518	=	1175	0	+	0	=	0	No
17:00 - 18:00	692	+	445	=	1137	0	+	0	=	0	No
15:15 - 16:15	616	+	483	=	1099	0	+	0	=	0	No
07:00 - 08:00	402	+	686	=	1088	0	+	0	=	0	No
06:45 - 07:45	398	+	673	=	1071	0	+	0	=	0	No
07:15 - 08:15	411	+	643	=	1054	0	+	0	=	0	No
17:15 - 18:15	621		390		1011	0		0		0	No



80% of Warrant 4 - 1 Hr Pedestrian Data

Time	NB Vehs	+	SB Vehs	=	Total Vehs	NB Peds	+	SB Peds	=	Ped Total	Met?
16:15 - 17:15	742	+	553	=	1295	0	+	0	=	0	No
16:30 - 17:30	756	+	534	=	1290	0	+	0	=	0	No
16:00 - 17:00	717	+	558	=	1275	0	+	0	=	0	No
15:45 - 16:45	686	+	541	=	1227	0	+	0	=	0	No
16:45 - 17:45	741	+	477	=	1218	0	+	0	=	0	No
15:30 - 16:30	657	+	518	=	1175	0	+	0	=	0	No
17:00 - 18:00	692	+	445	=	1137	0	+	0	=	0	No
15:15 - 16:15	616	+	483	=	1099	0	+	0	=	0	No
07:00 - 08:00	402	+	686	=	1088	0	+	0	=	0	No
06:45 - 07:45	398	+	673	=	1071	0	+	0	=	0	No
07:15 - 08:15	411	+	643	=	1054	0	+	0	=	0	No
17:15 - 18:15	621		390		1011	0		0		0	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_DesignYear2045
Study Date : 11/30/2023

Signal Warrants - Summary

Major Street Approaches

Northbound: IA 13
Number of Lanes : 2+

Total Approach Volume: 1,529

Southbound: IA 13
Number of Lanes :2+

Total Approach Volume: 1,618

Minor Street Approaches

Eastbound: Prairie Ridge Ave
Number of Lanes :1

Total Approach Volume: 66

Westbound: Prairie Ridge Ave
Number of Lanes :1

Total Approach Volume: 223

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes..... **Not Satisfied**

Warrant 1A - Minimum Vehicular Volume..... **Not Satisfied**
Required volumes reached for 1 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic..... **Not Satisfied**
Required volumes reached for 2 hours, 8 are needed

Warrant 1C - Combination of Warrants..... **Not Satisfied**
Required 1A volumes reached for 1 hours, 8 are needed
Required 1B volumes reached for 2 hours, 8 are needed

Warrant 2 - Four Hour Volumes..... **Not Satisfied**
Number of hours (2) volumes exceed minimum < minimum required (4).

Warrant 3 - Peak Hour..... **Satisfied**

Warrant 3A - Peak Hour Delay..... **Satisfied**
Number of one hour periods (4) volumes exceed minimum >= required (1). Delay data not evaluated.

Warrant 3B - Peak Hour Volumes..... **Satisfied**
Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes..... **Not Evaluated**

Warrant 5 - School Crossing..... **Not Evaluated**

Warrant 6 - Coordinated Signal System..... **Not Evaluated**

Warrant 7 - Crash Experience..... **Not Satisfied**
Number of accidents (0) is less than minimum (5). Volume minimums are not met.

Warrant 8 - Roadway Network..... **Not Evaluated**

Warrant 9 - Intersection Near a Grade Crossing..... **Not Evaluated**

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_DesignYear2045

Study Date : 11/30/2023

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

Only 1 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **420**

Veh/Hr Minor = **105**

	Major Road IA 13					Minor Road Prairie Ridge Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
06:15 - 07:15	533	+	912	=	1445	35	150	Yes
16:15 - 17:15	996	+	706	=	1702	31	73	No
16:30 - 17:30	996	+	706	=	1702	31	73	No
16:45 - 17:45	996	+	706	=	1702	31	73	No
17:00 - 18:00	996	+	706	=	1702	31	73	No
00:00 - 01:00	0	+	0	=	0	0	0	No
00:15 - 01:15	0	+	0	=	0	0	0	No
00:30 - 01:30	0	+	0	=	0	0	0	No
00:45 - 01:45	0	+	0	=	0	0	0	No
01:00 - 02:00	0	+	0	=	0	0	0	No
01:15 - 02:15	0	+	0	=	0	0	0	No
01:30 - 02:30	0	+	0	=	0	0	0	No
01:45 - 02:45	0	+	0	=	0	0	0	No
02:00 - 03:00	0	+	0	=	0	0	0	No
02:15 - 03:15	0	+	0	=	0	0	0	No
02:30 - 03:30	0	+	0	=	0	0	0	No
02:45 - 03:45	0	+	0	=	0	0	0	No
03:00 - 04:00	0	+	0	=	0	0	0	No
03:15 - 04:15	0	+	0	=	0	0	0	No
03:30 - 04:30	0	+	0	=	0	0	0	No
03:45 - 04:45	0	+	0	=	0	0	0	No
04:00 - 05:00	0	+	0	=	0	0	0	No
04:15 - 05:15	0	+	0	=	0	0	0	No
04:30 - 05:30	0	+	0	=	0	0	0	No
04:45 - 05:45	0		0		0	0	0	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_DesignYear2045

Study Date : 11/30/2023

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 2 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **630**

Veh/Hr Minor = **53**

	Major Road IA 13					Minor Road Prairie Ridge Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	996	+	706	=	1702	31	73	Yes
06:15 - 07:15	533	+	912	=	1445	35	150	Yes
01:15 - 02:15	0	+	0	=	0	0	0	No
01:30 - 02:30	0	+	0	=	0	0	0	No
01:45 - 02:45	0	+	0	=	0	0	0	No
02:00 - 03:00	0	+	0	=	0	0	0	No
02:15 - 03:15	0	+	0	=	0	0	0	No
02:30 - 03:30	0	+	0	=	0	0	0	No
02:45 - 03:45	0	+	0	=	0	0	0	No
03:00 - 04:00	0	+	0	=	0	0	0	No
03:15 - 04:15	0	+	0	=	0	0	0	No
03:30 - 04:30	0	+	0	=	0	0	0	No
03:45 - 04:45	0	+	0	=	0	0	0	No
04:00 - 05:00	0	+	0	=	0	0	0	No
04:15 - 05:15	0	+	0	=	0	0	0	No
04:30 - 05:30	0	+	0	=	0	0	0	No
04:45 - 05:45	0	+	0	=	0	0	0	No
05:00 - 06:00	0	+	0	=	0	0	0	No
05:15 - 06:15	0	+	0	=	0	0	0	No
05:30 - 06:30	0	+	0	=	0	0	0	No
05:45 - 06:45	0	+	0	=	0	0	0	No
06:00 - 07:00	0	+	0	=	0	0	0	No
07:15 - 08:15	0	+	0	=	0	0	0	No
00:00 - 01:00	0	+	0	=	0	0	0	No
23:15 - 00:15	0		0		0	0	0	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_DesignYear2045

Study Date : 11/30/2023

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

Only 1 hours meet 1A minimums.
Only 2 hours meet 1B minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

Volume Requirements

Rural Factor of 70% applied

Warrant	1A	1B
Veh/Hr Major =	**336**	**504**
Veh/Hr Minor =	**84**	**42**

Major Road	Minor Road
IA 13	Prairie Ridge Ave

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
06:15 - 07:15	533	+	912	=	1445	35	150	Yes
16:15 - 17:15	996	+	706	=	1702	31	73	No
16:30 - 17:30	996	+	706	=	1702	31	73	No
16:45 - 17:45	996	+	706	=	1702	31	73	No
17:00 - 18:00	996	+	706	=	1702	31	73	No
00:30 - 01:30	0	+	0	=	0	0	0	No
00:45 - 01:45	0	+	0	=	0	0	0	No
01:00 - 02:00	0	+	0	=	0	0	0	No
01:15 - 02:15	0	+	0	=	0	0	0	No
01:30 - 02:30	0	+	0	=	0	0	0	No
01:45 - 02:45	0	+	0	=	0	0	0	No
02:00 - 03:00	0		0		0	0	0	No

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:15 - 17:15	996	+	706	=	1702	31	73	Yes
06:15 - 07:15	533	+	912	=	1445	35	150	Yes
01:15 - 02:15	0	+	0	=	0	0	0	No
01:30 - 02:30	0	+	0	=	0	0	0	No
01:45 - 02:45	0	+	0	=	0	0	0	No
02:00 - 03:00	0	+	0	=	0	0	0	No
02:15 - 03:15	0	+	0	=	0	0	0	No
02:30 - 03:30	0	+	0	=	0	0	0	No
02:45 - 03:45	0	+	0	=	0	0	0	No
03:00 - 04:00	0	+	0	=	0	0	0	No
03:15 - 04:15	0	+	0	=	0	0	0	No
03:30 - 04:30	0		0		0	0	0	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_DesignYear2045

Study Date : 11/30/2023

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

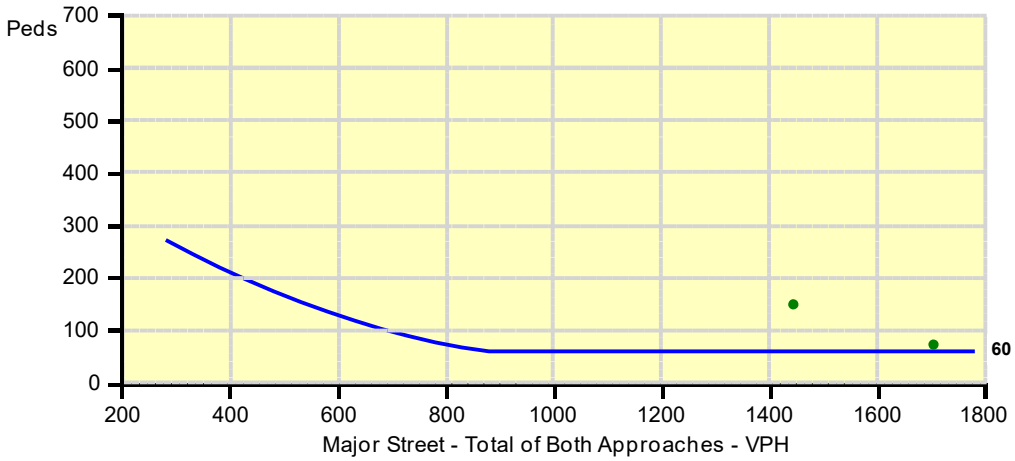
Summary

Only 2 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

	Major Road					Minor Road		
	IA 13					Prairie Ridge Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:15 - 17:15	996	+	706	=	1702	31	73	Yes
06:15 - 07:15	533	+	912	=	1445	35	150	Yes
00:30 - 01:30	0	+	0	=	0	0	0	No
00:45 - 01:45	0	+	0	=	0	0	0	No
01:00 - 02:00	0	+	0	=	0	0	0	No
01:15 - 02:15	0	+	0	=	0	0	0	No
01:30 - 02:30	0	+	0	=	0	0	0	No
01:45 - 02:45	0	+	0	=	0	0	0	No
02:00 - 03:00	0	+	0	=	0	0	0	No
02:15 - 03:15	0	+	0	=	0	0	0	No
02:30 - 03:30	0	+	0	=	0	0	0	No
							0	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_DesignYear2045

Study Date : 11/30/2023

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

8 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Number of Minor Lanes = **1**

Volume and Delay Requirements

Veh/Hr All Approaches = **800**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

	Major Road					Minor Road			
	IA 13					Prairie Ridge Ave			
Time	Total of All Approaches	Met?	Minor EB	Delay EB	Met?	Minor WB	Delay WB	Met?	Warrant Met?
06:15 - 07:15	1630	Yes	35	-	---	150	-	Yes	Yes
06:30 - 07:30	1630	Yes	35	-	---	150	-	Yes	Yes
06:45 - 07:45	1630	Yes	35	-	---	150	-	Yes	Yes
07:00 - 08:00	1630	Yes	35	-	---	150	-	Yes	Yes
16:15 - 17:15	1806	Yes	31	-	---	73	-	No	No
16:30 - 17:30	1806	Yes	31	-	---	73	-	No	No
16:45 - 17:45	1806	Yes	31	-	---	73	-	No	No
17:00 - 18:00	1806	Yes	31	-	---	73	-	No	No
02:00 - 03:00	0	No	0	-	---	0	-	No	No
02:15 - 03:15	0	No	0	-	---	0	-	No	No
02:30 - 03:30	0	No	0	-	---	0	-	No	No
02:45 - 03:45	0	No	0	-	---	0	-	No	No
03:00 - 04:00	0	No	0	-	---	0	-	No	No
03:15 - 04:15	0	No	0	-	---	0	-	No	No
03:30 - 04:30	0	No	0	-	---	0	-	No	No
03:45 - 04:45	0	No	0	-	---	0	-	No	No
04:00 - 05:00	0	No	0	-	---	0	-	No	No
04:15 - 05:15	0	No	0	-	---	0	-	No	No
04:30 - 05:30	0	No	0	-	---	0	-	No	No
04:45 - 05:45	0	No	0	-	---	0	-	No	No
05:00 - 06:00	0	No	0	-	---	0	-	No	No
05:15 - 06:15	0	No	0	-	---	0	-	No	No
05:30 - 06:30	0	No	0	-	---	0	-	No	No
05:45 - 06:45	0	No	0	-	---	0	-	No	No
06:00 - 07:00	0	No	0	-	---	0	-	No	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_DesignYear2045

Study Date : 11/30/2023

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

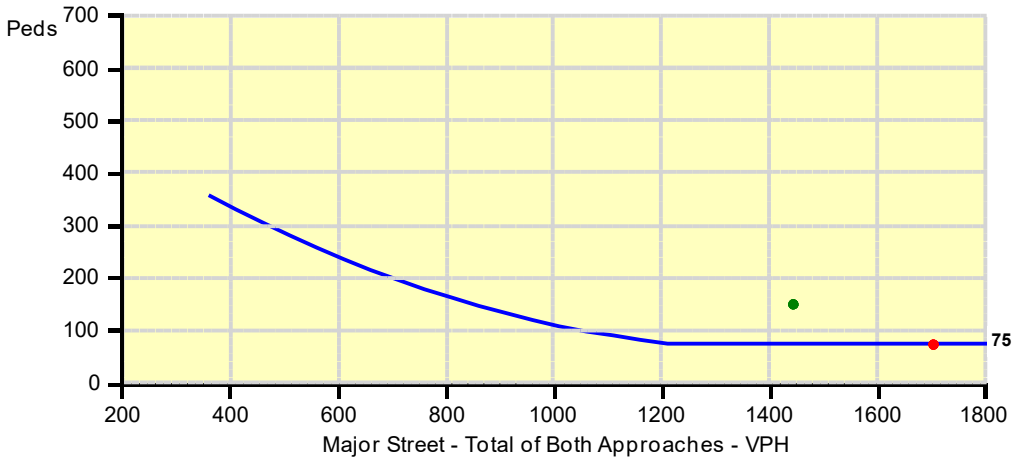
Summary

4 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

	Major Road IA 13					Minor Road Prairie Ridge Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
06:15 - 07:15	533	+	912	=	1445	35	150	Yes
06:30 - 07:30	533	+	912	=	1445	35	150	Yes
06:45 - 07:45	533	+	912	=	1445	35	150	Yes
07:00 - 08:00	533	+	912	=	1445	35	150	Yes
16:15 - 17:15	996	+	706	=	1702	31	73	No
16:30 - 17:30	996	+	706	=	1702	31	73	No
16:45 - 17:45	996	+	706	=	1702	31	73	No
17:00 - 18:00	996	+	706	=	1702	31	73	No
00:30 - 01:30	0	+	0	=	0	0	0	No
00:45 - 01:45	0	+	0	=	0	0	0	No
01:00 - 02:00	0	+	0	=	0	0	0	No
							0	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_DesignYear2045

Study Date : 11/30/2023

Warrant 7 - Crash Experience

Description

Intended for sites where the frequency of correctible crashes in the past 12 months is the primary motivation for installing a traffic signal.

Summary

Number of crashes does not meet minimum.
Pedestrian volumes do not meet the 80% criteria.
War 1A or 1B volumes do not meet the 80% criteria.
Warrant is NOT met.

Site Data Required

Number of crashes in last 12 months = **0**

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Crash and Volume Requirements

Minimum number of crashes = **5**

Rural Factor of 70 % applied

Veh/Hr Major: War 1A = **336** War 1B = **504**

Veh/Hr Minor: War 1A = **84** War 1B = **42**

Volume and Pedestrian Data

Hours data meets 80% requirements of Warrant 1A (8 needed) **1** Met? **No**
Hours data meets 80% requirements of Warrant 1B (8 needed) **2** Met? **No**
Hours data meets 80% requirements of Warrant 4 (4,1 needed) **0** **0** Met? **No**

Major Road	Minor Road
IA 13	Prairie Ridge Ave

Warrant 1A Details

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
06:15 - 07:15	533	+	912	=	1445	35	150	Yes
16:15 - 17:15	996	+	706	=	1702	31	73	No
16:30 - 17:30	996	+	706	=	1702	31	73	No
16:45 - 17:45	996	+	706	=	1702	31	73	No
17:00 - 18:00	996	+	706	=	1702	31	73	No
02:00 - 03:00	0	+	0	=	0	0	0	No
02:15 - 03:15	0	+	0	=	0	0	0	No
02:30 - 03:30	0	+	0	=	0	0	0	No
02:45 - 03:45	0	+	0	=	0	0	0	No
03:00 - 04:00	0	+	0	=	0	0	0	No
03:15 - 04:15	0	+	0	=	0	0	0	No
03:30 - 04:30	0		0		0	0	0	No

Warrant 1B Details

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:15 - 17:15	996	+	706	=	1702	31	73	Yes
06:15 - 07:15	533	+	912	=	1445	35	150	Yes
01:15 - 02:15	0	+	0	=	0	0	0	No
01:30 - 02:30	0	+	0	=	0	0	0	No
01:45 - 02:45	0	+	0	=	0	0	0	No
02:00 - 03:00	0	+	0	=	0	0	0	No
02:15 - 03:15	0	+	0	=	0	0	0	No
02:30 - 03:30	0	+	0	=	0	0	0	No
02:45 - 03:45	0	+	0	=	0	0	0	No
03:00 - 04:00	0	+	0	=	0	0	0	No
03:15 - 04:15	0	+	0	=	0	0	0	No
03:30 - 04:30	0		0		0	0	0	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-PrairieRidgeAve_DesignYear2045

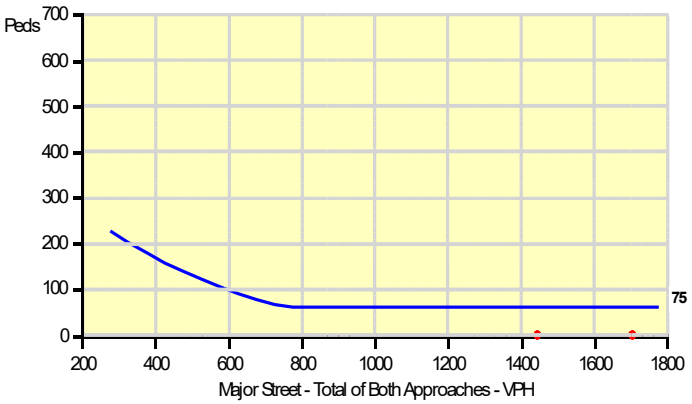
Study Date : 11/30/2023

Warrant 7 - Crash Experience

Major Road
IA 13

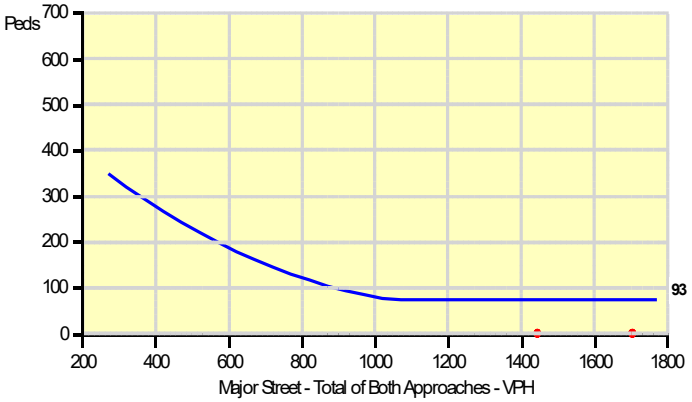
80% of Warrant 4 - 4 Hr Pedestrian Data

Time	NB Vehs	+	SB Vehs	=	Total Vehs	NB Peds	+	SB Peds	=	Ped Total	Met?
16:15 - 17:15	996	+	706	=	1702	0	+	0	=	0	No
16:30 - 17:30	996	+	706	=	1702	0	+	0	=	0	No
16:45 - 17:45	996	+	706	=	1702	0	+	0	=	0	No
17:00 - 18:00	996	+	706	=	1702	0	+	0	=	0	No
06:15 - 07:15	533	+	912	=	1445	0	+	0	=	0	No
06:30 - 07:30	533	+	912	=	1445	0	+	0	=	0	No
06:45 - 07:45	533	+	912	=	1445	0	+	0	=	0	No
07:00 - 08:00	533	+	912	=	1445	0	+	0	=	0	No
00:00 - 01:00	0	+	0	=	0	0	+	0	=	0	No
00:15 - 01:15	0	+	0	=	0	0	+	0	=	0	No
00:30 - 01:30	0	+	0	=	0	0	+	0	=	0	No
00:45 - 01:45	0		0		0	0		0		0	No



80% of Warrant 4 - 1 Hr Pedestrian Data

Time	NB Vehs	+	SB Vehs	=	Total Vehs	NB Peds	+	SB Peds	=	Ped Total	Met?
16:15 - 17:15	996	+	706	=	1702	0	+	0	=	0	No
16:30 - 17:30	996	+	706	=	1702	0	+	0	=	0	No
16:45 - 17:45	996	+	706	=	1702	0	+	0	=	0	No
17:00 - 18:00	996	+	706	=	1702	0	+	0	=	0	No
06:15 - 07:15	533	+	912	=	1445	0	+	0	=	0	No
06:30 - 07:30	533	+	912	=	1445	0	+	0	=	0	No
06:45 - 07:45	533	+	912	=	1445	0	+	0	=	0	No
07:00 - 08:00	533	+	912	=	1445	0	+	0	=	0	No
00:00 - 01:00	0	+	0	=	0	0	+	0	=	0	No
00:15 - 01:15	0	+	0	=	0	0	+	0	=	0	No
00:30 - 01:30	0	+	0	=	0	0	+	0	=	0	No
00:45 - 01:45	0		0		0	0		0		0	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-KacenaAve_Existing2023
Study Date : 11/30/2023

Signal Warrants - Summary

Major Street Approaches

Northbound: IA 13
Number of Lanes : 2+

Total Approach Volume: 7,570

Southbound: IA 13
Number of Lanes :2+

Total Approach Volume: 7,386

Minor Street Approaches

Eastbound: Kacena Ave
Number of Lanes :1

Total Approach Volume: 818

Westbound: Kacena Ave
Number of Lanes :1

Total Approach Volume: 417

Warrant Summary (Rural Values Apply)

Warrant 1 - Eight Hour Vehicular Volumes..... **Not Satisfied**

Warrant 1A - Minimum Vehicular Volume..... **Not Satisfied**
Required volumes reached for 0 hours, 8 are needed

Warrant 1B - Interruption of Continuous Traffic..... **Not Satisfied**
Required volumes reached for 7 hours, 8 are needed

Warrant 1C - Combination of Warrants..... **Not Satisfied**
Required 1A volumes reached for 1 hours, 8 are needed
Required 1B volumes reached for 10 hours, 8 are needed

Warrant 2 - Four Hour Volumes..... **Satisfied**
Number of hours (6) volumes exceed minimum >= minimum required (4).

Warrant 3 - Peak Hour..... **Satisfied**

Warrant 3A - Peak Hour Delay..... **Not Satisfied**
Approach volumes on minor street don't exceed minimums for any one hour period. Delay data not evaluated.

Warrant 3B - Peak Hour Volumes..... **Satisfied**
Volumes exceed minimums for at least one hour period.

Warrant 4 - Pedestrian Volumes..... **Not Evaluated**

Warrant 5 - School Crossing..... **Not Evaluated**

Warrant 6 - Coordinated Signal System..... **Not Evaluated**

Warrant 7 - Crash Experience..... **Not Satisfied**
Number of accidents (4) is less than minimum (5). Volume minimums are met.

Warrant 8 - Roadway Network..... **Not Evaluated**

Warrant 9 - Intersection Near a Grade Crossing..... **Not Evaluated**

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-KacenaAve_Existing2023

Study Date : 11/30/2023

Warrant 1A - Minimum Volumes

Description

Intended for sites where the volume of intersecting traffic is the principal reason for consideration of a signal installation.

Summary

Only 0 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **420**

Veh/Hr Minor = **105**

	Major Road IA 13					Minor Road Kacena Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:45 - 17:45	893	+	592	=	1485	72	32	No
16:30 - 17:30	844	+	588	=	1432	68	32	No
16:15 - 17:15	846	+	557	=	1403	70	30	No
17:00 - 18:00	829	+	564	=	1393	62	29	No
16:00 - 17:00	813	+	580	=	1393	72	26	No
15:45 - 16:45	767	+	578	=	1345	68	20	No
15:30 - 16:30	751	+	577	=	1328	71	18	No
17:15 - 18:15	764	+	517	=	1281	52	24	No
15:15 - 16:15	673	+	586	=	1259	80	22	No
07:00 - 08:00	457	+	742	=	1199	71	38	No
06:45 - 07:45	468	+	720	=	1188	65	39	No
07:15 - 08:15	436	+	714	=	1150	70	35	No
17:30 - 18:30	674	+	469	=	1143	48	26	No
15:00 - 16:00	607	+	511	=	1118	69	23	No
06:30 - 07:30	418	+	678	=	1096	59	34	No
07:30 - 08:30	401	+	673	=	1074	83	34	No
14:45 - 15:45	589	+	466	=	1055	62	23	No
07:45 - 08:45	377	+	609	=	986	78	32	No
14:30 - 15:30	547	+	434	=	981	55	25	No
17:45 - 18:45	581	+	398	=	979	40	22	No
06:15 - 07:15	339	+	634	=	973	49	37	No
08:00 - 09:00	385	+	579	=	964	72	33	No
14:15 - 15:15	540	+	411	=	951	37	22	No
14:00 - 15:00	538	+	406	=	944	34	23	No
13:45 - 14:45	505		409		914	34	29	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-KacenaAve_Existing2023

Study Date : 11/30/2023

Warrant 1B - Interruption of Continuous Traffic

Description

Intended for sites where the volume of the major street is so heavy that traffic on the minor street suffers excessive delay or hazard.

Summary

Only 7 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Volume Requirements

Rural Factor of 70 % applied
Veh/Hr Major = **630**

Veh/Hr Minor = **53**

	Major Road IA 13					Minor Road Kacena Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:30 - 17:30	844	+	588	=	1432	68	32	Yes
15:30 - 16:30	751	+	577	=	1328	71	18	Yes
06:30 - 07:30	418	+	678	=	1096	59	34	Yes
07:30 - 08:30	401	+	673	=	1074	83	34	Yes
14:30 - 15:30	547	+	434	=	981	55	25	Yes
10:00 - 11:00	389	+	369	=	758	82	23	Yes
09:00 - 10:00	356	+	369	=	725	53	36	Yes
17:30 - 18:30	674	+	469	=	1143	48	26	No
17:45 - 18:45	581	+	398	=	979	40	22	No
06:15 - 07:15	339	+	634	=	973	49	37	No
14:15 - 15:15	540	+	411	=	951	37	22	No
14:00 - 15:00	538	+	406	=	944	34	23	No
13:45 - 14:45	505	+	409	=	914	34	29	No
13:30 - 14:30	511	+	385	=	896	36	26	No
18:00 - 19:00	542	+	347	=	889	41	19	No
13:15 - 14:15	488	+	381	=	869	34	25	No
13:00 - 14:00	490	+	373	=	863	32	23	No
11:30 - 12:30	371	+	486	=	857	32	37	No
11:15 - 12:15	356	+	495	=	851	33	42	No
12:00 - 13:00	413	+	437	=	850	29	23	No
11:45 - 12:45	394	+	455	=	849	30	28	No
12:45 - 13:45	465	+	382	=	847	28	16	No
12:15 - 13:15	447	+	399	=	846	29	21	No
08:30 - 09:30	361	+	485	=	846	43	34	No
12:30 - 13:30	456		389		845	23	20	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-KacenaAve_Existing2023

Study Date : 11/30/2023

Warrant 1C Combination of Warrants

Description

Intended for sites where the traffic volumes don't meet individual warrants but where Warrants 1A and 1B are both met to 80% of their stated values.

Summary

Only 1 hours meet 1A minimums.
10 hours meet 1B minimums.
Warrant is NOT met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

Volume Requirements

Rural Factor of 70% applied

Warrant	1A	1B
Veh/Hr Major =	**336**	**504**
Veh/Hr Minor =	**84**	**42**

Major Road	Minor Road
IA 13	Kacena Ave

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
09:45 - 10:45	402	+	346	=	748	97	30	Yes
16:45 - 17:45	893	+	592	=	1485	72	32	No
16:30 - 17:30	844	+	588	=	1432	68	32	No
16:15 - 17:15	846	+	557	=	1403	70	30	No
16:00 - 17:00	813	+	580	=	1393	72	26	No
17:00 - 18:00	829	+	564	=	1393	62	29	No
15:45 - 16:45	767	+	578	=	1345	68	20	No
15:30 - 16:30	751	+	577	=	1328	71	18	No
17:15 - 18:15	764	+	517	=	1281	52	24	No
15:15 - 16:15	673	+	586	=	1259	80	22	No
07:00 - 08:00	457	+	742	=	1199	71	38	No
06:45 - 07:45	468	+	720	=	1188	65	39	No

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:30 - 17:30	844	+	588	=	1432	68	32	Yes
15:30 - 16:30	751	+	577	=	1328	71	18	Yes
07:15 - 08:15	436	+	714	=	1150	70	35	Yes
17:30 - 18:30	674	+	469	=	1143	48	26	Yes
14:30 - 15:30	547	+	434	=	981	55	25	Yes
06:15 - 07:15	339	+	634	=	973	49	37	Yes
08:15 - 09:15	360	+	551	=	911	63	36	Yes
11:15 - 12:15	356	+	495	=	851	33	42	Yes
10:15 - 11:15	366	+	398	=	764	82	30	Yes
09:15 - 10:15	389	+	352	=	741	70	27	Yes
14:15 - 15:15	540	+	411	=	951	37	22	No
14:00 - 15:00	538	+	406	=	944	34	23	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-KacenaAve_Existing2023

Study Date : 11/30/2023

Warrant 2 - Four Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during any four hours of the day is the principal reason for consideration of a signal installation.

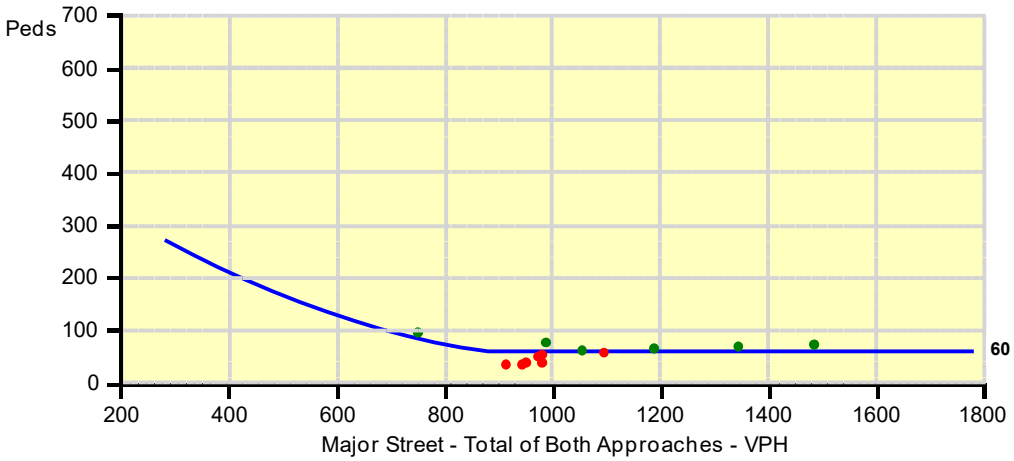
Summary

6 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

	Major Road					Minor Road		
	IA 13					Kacena Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
16:45 - 17:45	893	+	592	=	1485	72	32	Yes
15:45 - 16:45	767	+	578	=	1345	68	20	Yes
06:45 - 07:45	468	+	720	=	1188	65	39	Yes
14:45 - 15:45	589	+	466	=	1055	62	23	Yes
07:45 - 08:45	377	+	609	=	986	78	32	Yes
09:45 - 10:45	402	+	346	=	748	97	30	Yes
06:30 - 07:30	418	+	678	=	1096	59	34	No
14:30 - 15:30	547	+	434	=	981	55	25	No
17:45 - 18:45	581	+	398	=	979	40	22	No
06:15 - 07:15	339	+	634	=	973	49	37	No
14:15 - 15:15	540	+	411	=	951	37	22	No
							23	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-KacenaAve_Existing2023

Study Date : 11/30/2023

Warrant 3A - Peak Hour Delay

Description

Intended for sites where for one hour of the day minor street traffic suffers undue traffic delay entering or crossing the major street.

Summary

50 one hour periods meet minimums.
Warrant is NOT met.

Site Data Required

Number of Minor Lanes = **1**

Volume and Delay Requirements

Veh/Hr All Approaches = **800**
Veh/Hr Minor = **100**
Total Delay (Veh-Hrs) = **4**

Major Road	Minor Road
IA 13	Kacena Ave

Time	Total of All Approaches	Met?	Minor EB	Delay EB	Met?	Minor WB	Delay WB	Met?	Warrant Met?
16:45 - 17:45	1589	Yes	72	-	No	32	-	---	No
16:30 - 17:30	1532	Yes	68	-	No	32	-	---	No
16:15 - 17:15	1503	Yes	70	-	No	30	-	---	No
16:00 - 17:00	1491	Yes	72	-	No	26	-	---	No
17:00 - 18:00	1484	Yes	62	-	No	29	-	---	No
15:45 - 16:45	1433	Yes	68	-	No	20	-	---	No
15:30 - 16:30	1417	Yes	71	-	No	18	-	---	No
15:15 - 16:15	1361	Yes	80	-	No	22	-	---	No
17:15 - 18:15	1357	Yes	52	-	No	24	-	---	No
07:00 - 08:00	1308	Yes	71	-	No	38	-	---	No
06:45 - 07:45	1292	Yes	65	-	No	39	-	---	No
07:15 - 08:15	1255	Yes	70	-	No	35	-	---	No
17:30 - 18:30	1217	Yes	48	-	No	26	-	---	No
15:00 - 16:00	1210	Yes	69	-	No	23	-	---	No
07:30 - 08:30	1191	Yes	83	-	No	34	-	---	No
06:30 - 07:30	1189	Yes	59	-	No	34	-	---	No
14:45 - 15:45	1140	Yes	62	-	No	23	-	---	No
07:45 - 08:45	1096	Yes	78	-	No	32	-	---	No
08:00 - 09:00	1069	Yes	72	-	No	33	-	---	No
14:30 - 15:30	1061	Yes	55	-	No	25	-	---	No
06:15 - 07:15	1059	Yes	49	-	No	37	-	---	No
17:45 - 18:45	1041	Yes	40	-	No	22	-	---	No
08:15 - 09:15	1010	Yes	63	-	No	36	-	---	No
14:15 - 15:15	1010	Yes	37	-	No	22	-	---	No
14:00 - 15:00	1001	Yes	34	-	No	23	-	---	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-KacenaAve_Existing2023

Study Date : 11/30/2023

Warrant 3B - Peak Hour Volumes

Description

Intended for sites where the volume of intersecting traffic during one hour of the day is the principal reason for consideration of a signal installation.

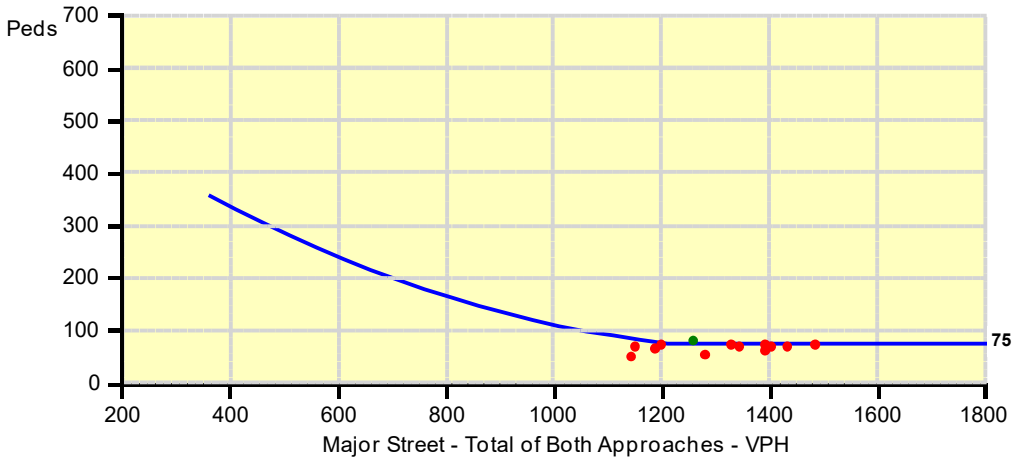
Summary

1 one hour periods meet minimums.
Warrant IS met.

Site Data Required

Rural Settings Apply =	**True**
Number of Major Lanes =	**2 or more**
Number of Minor Lanes =	**1**

	Major Road					Minor Road		
	IA 13					Kacena Ave		
Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met?
15:15 - 16:15	673	+	586	=	1259	80	22	Yes
16:45 - 17:45	893	+	592	=	1485	72	32	No
16:30 - 17:30	844	+	588	=	1432	68	32	No
16:15 - 17:15	846	+	557	=	1403	70	30	No
17:00 - 18:00	829	+	564	=	1393	62	29	No
16:00 - 17:00	813	+	580	=	1393	72	26	No
15:45 - 16:45	767	+	578	=	1345	68	20	No
15:30 - 16:30	751	+	577	=	1328	71	18	No
17:15 - 18:15	764	+	517	=	1281	52	24	No
07:00 - 08:00	457	+	742	=	1199	71	38	No
06:45 - 07:45	468	+	720	=	1188	65	39	No
							35	No



Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-KacenaAve_Existing2023

Study Date : 11/30/2023

Warrant 7 - Crash Experience

Description

Intended for sites where the frequency of correctible crashes in the past 12 months is the primary motivation for installing a traffic signal.

Summary

Number of crashes does not meet minimum.
Pedestrian volumes do not meet the 80% criteria.
War 1A or 1B volumes meet the 80% criteria.
Warrant is NOT met.

Site Data Required

Number of crashes in last 12 months = **4**

Rural Settings Apply = **True**
Number of Major Lanes = **2 or more**
Number of Minor Lanes = **1**

Crash and Volume Requirements

Minimum number of crashes = **5**

Rural Factor of 70 % applied

Veh/Hr Major: War 1A = **336** War 1B = **504**

Veh/Hr Minor: War 1A = **84** War 1B = **42**

Volume and Pedestrian Data

Hours data meets 80% requirements of Warrant 1A (8 needed) **1** Met? **No**
Hours data meets 80% requirements of Warrant 1B (8 needed) **10** Met? **Yes**
Hours data meets 80% requirements of Warrant 4 (4,1 needed) **0** **0** Met? **No**

Major Road	Minor Road
IA 13	Kacena Ave

Warrant 1A Details

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1A?
09:45 - 10:45	402	+	346	=	748	97	30	Yes
16:45 - 17:45	893	+	592	=	1485	72	32	No
16:30 - 17:30	844	+	588	=	1432	68	32	No
16:15 - 17:15	846	+	557	=	1403	70	30	No
16:00 - 17:00	813	+	580	=	1393	72	26	No
17:00 - 18:00	829	+	564	=	1393	62	29	No
15:45 - 16:45	767	+	578	=	1345	68	20	No
15:30 - 16:30	751	+	577	=	1328	71	18	No
17:15 - 18:15	764	+	517	=	1281	52	24	No
15:15 - 16:15	673	+	586	=	1259	80	22	No
07:00 - 08:00	457	+	742	=	1199	71	38	No
06:45 - 07:45	468	+	720	=	1188	65	39	No

Warrant 1B Details

Time	Major NB	+	Major SB	=	Total	Minor EB	Minor WB	Met1B?
16:30 - 17:30	844	+	588	=	1432	68	32	Yes
15:30 - 16:30	751	+	577	=	1328	71	18	Yes
07:15 - 08:15	436	+	714	=	1150	70	35	Yes
17:30 - 18:30	674	+	469	=	1143	48	26	Yes
14:30 - 15:30	547	+	434	=	981	55	25	Yes
06:15 - 07:15	339	+	634	=	973	49	37	Yes
08:15 - 09:15	360	+	551	=	911	63	36	Yes
11:15 - 12:15	356	+	495	=	851	33	42	Yes
10:15 - 11:15	366	+	398	=	764	82	30	Yes
09:15 - 10:15	389	+	352	=	741	70	27	Yes
14:15 - 15:15	540	+	411	=	951	37	22	No
14:00 - 15:00	538	+	406	=	944	34	23	No

Report Title 1
Report Title 2
Report Title 3

Study Name: SignalWarrant_IA13-KacenaAve_Existing2023

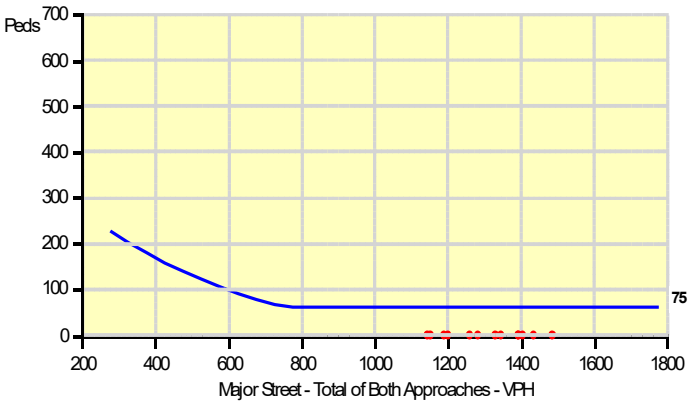
Study Date : 11/30/2023

Warrant 7 - Crash Experience

Major Road
IA 13

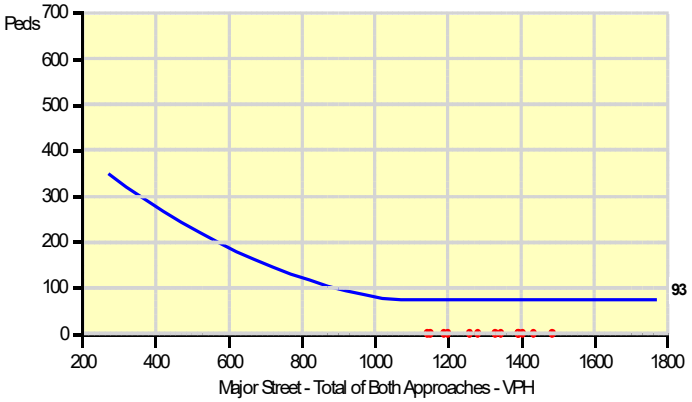
80% of Warrant 4 - 4 Hr Pedestrian Data

Time	NB Vehs	+	SB Vehs	=	Total Vehs	NB Peds	+	SB Peds	=	Ped Total	Met?
16:45 - 17:45	893	+	592	=	1485	0	+	0	=	0	No
16:30 - 17:30	844	+	588	=	1432	0	+	0	=	0	No
16:15 - 17:15	846	+	557	=	1403	0	+	0	=	0	No
16:00 - 17:00	813	+	580	=	1393	0	+	0	=	0	No
17:00 - 18:00	829	+	564	=	1393	0	+	0	=	0	No
15:45 - 16:45	767	+	578	=	1345	0	+	0	=	0	No
15:30 - 16:30	751	+	577	=	1328	0	+	0	=	0	No
17:15 - 18:15	764	+	517	=	1281	0	+	0	=	0	No
15:15 - 16:15	673	+	586	=	1259	0	+	0	=	0	No
07:00 - 08:00	457	+	742	=	1199	0	+	0	=	0	No
06:45 - 07:45	468	+	720	=	1188	0	+	0	=	0	No
07:15 - 08:15	436		714		1150	0		0		0	No



80% of Warrant 4 - 1 Hr Pedestrian Data

Time	NB Vehs	+	SB Vehs	=	Total Vehs	NB Peds	+	SB Peds	=	Ped Total	Met?
16:45 - 17:45	893	+	592	=	1485	0	+	0	=	0	No
16:30 - 17:30	844	+	588	=	1432	0	+	0	=	0	No
16:15 - 17:15	846	+	557	=	1403	0	+	0	=	0	No
16:00 - 17:00	813	+	580	=	1393	0	+	0	=	0	No
17:00 - 18:00	829	+	564	=	1393	0	+	0	=	0	No
15:45 - 16:45	767	+	578	=	1345	0	+	0	=	0	No
15:30 - 16:30	751	+	577	=	1328	0	+	0	=	0	No
17:15 - 18:15	764	+	517	=	1281	0	+	0	=	0	No
15:15 - 16:15	673	+	586	=	1259	0	+	0	=	0	No
07:00 - 08:00	457	+	742	=	1199	0	+	0	=	0	No
06:45 - 07:45	468	+	720	=	1188	0	+	0	=	0	No
07:15 - 08:15	436		714		1150	0		0		0	No



Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	11	43	214	429	11
Future Vol, veh/h	2	11	43	214	429	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	170	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	65	65	77	77	92	92
Heavy Vehicles, %	2	2	15	15	15	2
Mvmt Flow	3	17	56	278	466	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	723	239	478	0	-	0
Stage 1	472	-	-	-	-	-
Stage 2	251	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.4	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.35	-	-	-
Pot Cap-1 Maneuver	361	762	994	-	-	-
Stage 1	594	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	341	762	994	-	-	-
Mov Cap-2 Maneuver	341	-	-	-	-	-
Stage 1	561	-	-	-	-	-
Stage 2	768	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	1.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	994	-	640	-	-
HCM Lane V/C Ratio	0.056	-	0.031	-	-
HCM Control Delay (s)	8.8	-	10.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	43	14	468	307	1
Future Vol, veh/h	22	43	14	468	307	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	170	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	37	37	94	94	90	90
Heavy Vehicles, %	2	2	1	15	15	15
Mvmt Flow	59	116	15	498	341	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	621	171	342	0	-	0
Stage 1	342	-	-	-	-	-
Stage 2	279	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.12	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.21	-	-	-
Pot Cap-1 Maneuver	419	843	1221	-	-	-
Stage 1	691	-	-	-	-	-
Stage 2	743	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	414	843	1221	-	-	-
Mov Cap-2 Maneuver	414	-	-	-	-	-
Stage 1	683	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1221	-	624	-	-
HCM Lane V/C Ratio	0.012	-	0.282	-	-
HCM Control Delay (s)	8	-	13	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-

Intersection	
Int Delay, s/veh	12.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	7	263	10	6	2	183	210	1	2	426	38
Future Vol, veh/h	36	7	263	10	6	2	183	210	1	2	426	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	570	-	-	160	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	75	75	75	88	88	88	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	9	9	9	15	15	2
Mvmt Flow	44	9	321	13	8	3	208	239	1	2	501	45

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1068	1184	273	915	1206	120	546	0	0	240	0	0
Stage 1	528	528	-	656	656	-	-	-	-	-	-	-
Stage 2	540	656	-	259	550	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.28	-	-	4.4	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.29	-	-	2.35	-	-
Pot Cap-1 Maneuver	176	188	725	228	182	909	972	-	-	1234	-	-
Stage 1	502	526	-	421	460	-	-	-	-	-	-	-
Stage 2	494	460	-	723	514	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	140	147	725	101	143	909	972	-	-	1234	-	-
Mov Cap-2 Maneuver	140	147	-	101	143	-	-	-	-	-	-	-
Stage 1	395	525	-	331	362	-	-	-	-	-	-	-
Stage 2	379	362	-	396	513	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	39.1	40.2	4.5	0
HCM LOS	E	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	972	-	-	458	126	1234	-	-
HCM Lane V/C Ratio	0.214	-	-	0.815	0.19	0.002	-	-
HCM Control Delay (s)	9.7	-	-	39.1	40.2	7.9	-	-
HCM Lane LOS	A	-	-	E	E	A	-	-
HCM 95th %tile Q(veh)	0.8	-	-	7.7	0.7	0	-	-

Intersection	
Int Delay, s/veh	8.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	3	218	4	8	2	259	440	3	0	312	38
Future Vol, veh/h	32	3	218	4	8	2	259	440	3	0	312	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	570	-	-	160	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	70	70	70	94	94	94	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	9	9	9	15	15	2
Mvmt Flow	37	3	253	6	11	3	276	468	3	0	355	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1169	1400	199	1201	1420	236	398	0	0	471	0	0
Stage 1	377	377	-	1022	1022	-	-	-	-	-	-	-
Stage 2	792	1023	-	179	398	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.28	-	-	4.4	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.29	-	-	2.35	-	-
Pot Cap-1 Maneuver	148	139	809	140	135	766	1109	-	-	1001	-	-
Stage 1	616	614	-	253	312	-	-	-	-	-	-	-
Stage 2	349	311	-	805	601	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	109	104	809	76	101	766	1109	-	-	1001	-	-
Mov Cap-2 Maneuver	109	104	-	76	101	-	-	-	-	-	-	-
Stage 1	463	614	-	190	234	-	-	-	-	-	-	-
Stage 2	248	234	-	550	601	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	30.1	47.7	3.4	0
HCM LOS	D	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1109	-	-	427	104	1001	-	-
HCM Lane V/C Ratio	0.248	-	-	0.689	0.192	-	-	-
HCM Control Delay (s)	9.3	-	-	30.1	47.7	0	-	-
HCM Lane LOS	A	-	-	D	E	A	-	-
HCM 95th %tile Q(veh)	1	-	-	5.1	0.7	0	-	-

Intersection	
Int Delay, s/veh	6.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	7	27	95	3	46	3	382	17	20	661	5
Future Vol, veh/h	3	7	27	95	3	46	3	382	17	20	661	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	135	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	66	66	66	77	77	77	85	85	85	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	9	9	9	9	9
Mvmt Flow	5	11	41	123	4	60	4	449	20	24	787	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1073	1315	397	914	1308	235	793	0	0	469	0	0
Stage 1	838	838	-	467	467	-	-	-	-	-	-	-
Stage 2	235	477	-	447	841	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.28	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.29	-	-
Pot Cap-1 Maneuver	175	157	602	228	158	767	824	-	-	1041	-	-
Stage 1	327	380	-	545	560	-	-	-	-	-	-	-
Stage 2	747	554	-	560	379	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	155	153	602	197	154	767	824	-	-	1041	-	-
Mov Cap-2 Maneuver	155	153	-	197	154	-	-	-	-	-	-	-
Stage 1	325	371	-	542	557	-	-	-	-	-	-	-
Stage 2	681	551	-	495	370	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.8	49.5	0.1	0.2
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	824	-	-	336	256	1041	-	-
HCM Lane V/C Ratio	0.004	-	-	0.167	0.731	0.023	-	-
HCM Control Delay (s)	9.4	-	-	17.8	49.5	8.5	-	-
HCM Lane LOS	A	-	-	C	E	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.6	5.1	0.1	-	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	14	17	34	9	28	23	688	45	32	499	3
Future Vol, veh/h	0	14	17	34	9	28	23	688	45	32	499	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	135	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	71	71	77	77	77	93	93	93	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	9	9	9	9	9	2
Mvmt Flow	0	20	24	44	12	36	25	740	48	39	609	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1115	1527	307	1207	1505	394	613	0	0	788	0	0
Stage 1	689	689	-	814	814	-	-	-	-	-	-	-
Stage 2	426	838	-	393	691	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.28	-	-	4.28	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	163	116	689	139	120	605	916	-	-	783	-	-
Stage 1	402	445	-	338	390	-	-	-	-	-	-	-
Stage 2	577	380	-	603	444	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	133	107	689	109	111	605	916	-	-	783	-	-
Mov Cap-2 Maneuver	133	107	-	109	111	-	-	-	-	-	-	-
Stage 1	391	423	-	329	379	-	-	-	-	-	-	-
Stage 2	511	370	-	527	422	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	28.1	53.1	0.3	0.6
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	916	-	-	199	162	783	-	-
HCM Lane V/C Ratio	0.027	-	-	0.219	0.569	0.05	-	-
HCM Control Delay (s)	9	-	-	28.1	53.1	9.8	-	-
HCM Lane LOS	A	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.8	3	0.2	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	41	34	33	1	5	28	417	12	3	731	8
Future Vol, veh/h	3	41	34	33	1	5	28	417	12	3	731	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	145	-	-	145	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	81	81	81	87	87	87	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	9	2	2	9	2
Mvmt Flow	4	48	40	41	1	6	32	479	14	4	860	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1177	1430	435	1012	1427	247	869	0	0	493	0	0
Stage 1	873	873	-	550	550	-	-	-	-	-	-	-
Stage 2	304	557	-	462	877	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	146	133	569	193	134	753	771	-	-	1067	-	-
Stage 1	311	366	-	487	514	-	-	-	-	-	-	-
Stage 2	681	510	-	549	364	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	139	127	569	122	128	753	771	-	-	1067	-	-
Mov Cap-2 Maneuver	139	127	-	122	128	-	-	-	-	-	-	-
Stage 1	298	365	-	467	492	-	-	-	-	-	-	-
Stage 2	646	489	-	441	363	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	39.5	44.9	0.6	0
HCM LOS	E	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	771	-	-	193	137	1067	-	-
HCM Lane V/C Ratio	0.042	-	-	0.475	0.351	0.003	-	-
HCM Control Delay (s)	9.9	-	-	39.5	44.9	8.4	-	-
HCM Lane LOS	A	-	-	E	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	2.3	1.4	0	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	32	25	19	6	8	34	818	41	9	572	11
Future Vol, veh/h	19	32	25	19	6	8	34	818	41	9	572	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	145	-	-	145	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	92	92	92	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	39	30	21	7	9	35	843	42	9	590	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1109	1569	301	1267	1553	443	601	0	0	885	0	0
Stage 1	614	614	-	934	934	-	-	-	-	-	-	-
Stage 2	495	955	-	333	619	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	164	110	695	126	112	562	972	-	-	760	-	-
Stage 1	446	481	-	286	343	-	-	-	-	-	-	-
Stage 2	525	335	-	654	478	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	148	105	695	83	107	562	972	-	-	760	-	-
Mov Cap-2 Maneuver	148	105	-	83	107	-	-	-	-	-	-	-
Stage 1	430	475	-	276	331	-	-	-	-	-	-	-
Stage 2	488	323	-	568	472	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	52.8	52.8	0.3	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	972	-	-	162	110	760	-	-
HCM Lane V/C Ratio	0.036	-	-	0.565	0.326	0.012	-	-
HCM Control Delay (s)	8.8	-	-	52.8	52.8	9.8	-	-
HCM Lane LOS	A	-	-	F	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	2.9	1.3	0	-	-

Lanes, Volumes, Timings
24: IA 13 & Pawnee Ave/Hennessey Pkwy

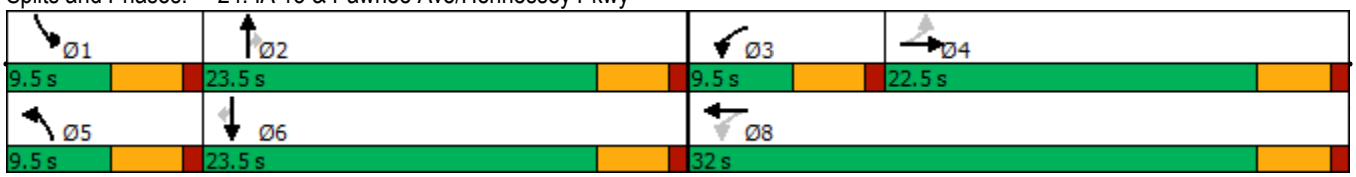
11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	13	6	126	103	83	5	413	51	76	742	7
Future Volume (vph)	0	13	6	126	103	83	5	413	51	76	742	7
Satd. Flow (prot)	0	1783	0	1770	1738	0	1770	3312	1482	1656	3312	1482
Flt Permitted				0.571			0.950			0.950		
Satd. Flow (perm)	0	1783	0	1064	1738	0	1770	3312	1482	1656	3312	1482
Satd. Flow (RTOR)		9			77				176			176
Peak Hour Factor	0.68	0.68	0.68	0.94	0.94	0.94	0.83	0.83	0.83	0.78	0.78	0.78
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%
Adj. Flow (vph)	0	19	9	134	110	88	6	498	61	97	951	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	28	0	134	198	0	6	498	61	97	951	9
Turn Type		NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Total Split (s)	22.5	22.5		9.5	32.0		9.5	23.5	23.5	9.5	23.5	23.5
Total Lost Time (s)		4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		6.2		9.5	9.5		5.0	21.7	21.7	5.0	27.6	27.6
Actuated g/C Ratio		0.13		0.20	0.20		0.10	0.45	0.45	0.10	0.58	0.58
v/c Ratio		0.12		0.42	0.49		0.03	0.33	0.08	0.56	0.50	0.01
Control Delay		17.2		20.0	14.5		21.6	11.0	0.2	37.8	10.0	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		17.2		20.0	14.5		21.6	11.0	0.2	37.8	10.0	0.0
LOS		B		C	B		C	B	A	D	B	A
Approach Delay		17.2			16.7			9.9			12.5	
Approach LOS		B			B			A			B	
Queue Length 50th (ft)		5		32	28		2	45	0	25	56	0
Queue Length 95th (ft)		17		67	70		10	88	0	#72	168	0
Internal Link Dist (ft)		494			759			838			1628	
Turn Bay Length (ft)				180			230		130	235		135
Base Capacity (vph)		680		318	1038		186	1503	768	174	1912	930
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.04		0.42	0.19		0.03	0.33	0.08	0.56	0.50	0.01

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 47.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 12.5 — Intersection LOS: B
Intersection Capacity Utilization 49.6% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: IA 13 & Pawnee Ave/Hennessey Pkwy



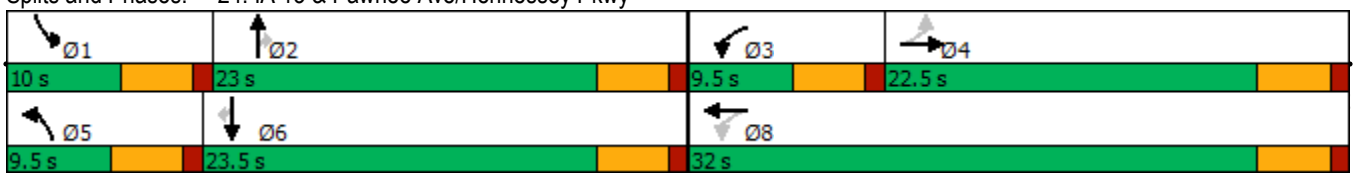
Lanes, Volumes, Timings
24: IA 13 & Pawnee Ave/Hennessey Pkwy 11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	48	34	150	147	83	42	678	165	89	537	23
Future Volume (vph)	11	48	34	150	147	83	42	678	165	89	537	23
Satd. Flow (prot)	0	1759	0	1770	1762	0	1656	3312	1482	1656	3312	1583
Flt Permitted		0.930		0.494			0.950			0.950		
Satd. Flow (perm)	0	1646	0	920	1762	0	1656	3312	1482	1656	3312	1583
Satd. Flow (RTOR)		44			54				181			176
Peak Hour Factor	0.73	0.73	0.73	0.89	0.89	0.89	0.91	0.91	0.91	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%	2%
Adj. Flow (vph)	15	66	47	169	165	93	46	745	181	92	554	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	128	0	169	258	0	46	745	181	92	554	24
Turn Type	Perm	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Total Split (s)	22.5	22.5		9.5	32.0		9.5	23.0	23.0	10.0	23.5	23.5
Total Lost Time (s)		4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		8.6		15.6	15.6		5.2	19.4	19.4	5.7	23.4	23.4
Actuated g/C Ratio		0.17		0.30	0.30		0.10	0.37	0.37	0.11	0.45	0.45
v/c Ratio		0.41		0.47	0.45		0.28	0.60	0.27	0.51	0.37	0.03
Control Delay		19.3		18.6	14.1		29.2	17.9	4.2	37.2	12.7	0.1
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		19.3		18.6	14.1		29.2	17.9	4.2	37.2	12.7	0.1
LOS		B		B	B		C	B	A	D	B	A
Approach Delay		19.3			15.9			15.9			15.6	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)		25		41	51		14	107	0	30	50	0
Queue Length 95th (ft)		49		79	100		43	177	37	#89	124	0
Internal Link Dist (ft)		494			759			838			1628	
Turn Bay Length (ft)				180			230		130	235		135
Base Capacity (vph)		623		362	997		166	1240	668	182	1495	811
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.21		0.47	0.26		0.28	0.60	0.27	0.51	0.37	0.03

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 51.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 16.0 Intersection LOS: B
Intersection Capacity Utilization 49.9% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: IA 13 & Pawnee Ave/Hennessey Pkwy



Lanes, Volumes, Timings
9: IA 13 & US 151

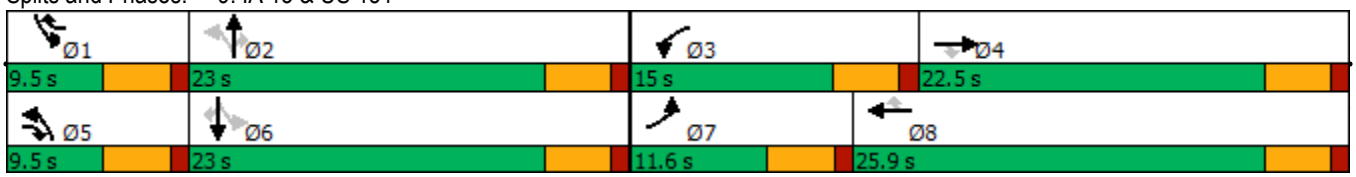
11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	189	134	472	258	83	64	229	245	106	573	173
Future Volume (vph)	57	189	134	472	258	83	64	229	245	106	573	173
Satd. Flow (prot)	1641	3282	1468	3183	3282	1468	1597	3195	1482	1656	3312	1482
Flt Permitted	0.950			0.950			0.296			0.591		
Satd. Flow (perm)	1641	3282	1468	3183	3282	1468	498	3195	1482	1030	3312	1482
Satd. Flow (RTOR)			94			94			278			190
Peak Hour Factor	0.92	0.92	0.92	0.89	0.89	0.89	0.88	0.88	0.88	0.91	0.91	0.91
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	13%	13%	9%	9%	9%	9%
Adj. Flow (vph)	62	205	146	530	290	93	73	260	278	116	630	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	205	146	530	290	93	73	260	278	116	630	190
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	11.6	22.5	9.5	15.0	25.9	9.5	9.5	23.0	23.0	9.5	23.0	23.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	6.7	9.0	18.6	10.6	17.5	27.1	22.5	18.7	18.7	22.5	18.7	18.7
Actuated g/C Ratio	0.11	0.15	0.31	0.18	0.30	0.46	0.38	0.32	0.32	0.38	0.32	0.32
v/c Ratio	0.34	0.41	0.28	0.93	0.30	0.13	0.26	0.26	0.42	0.26	0.60	0.32
Control Delay	31.0	25.9	8.5	52.6	19.8	3.9	12.6	17.2	5.0	12.2	21.1	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	25.9	8.5	52.6	19.8	3.9	12.6	17.2	5.0	12.2	21.1	4.9
LOS	C	C	A	D	B	A	B	B	A	B	C	A
Approach Delay		20.5			37.2			11.1			16.7	
Approach LOS		C			D			B			B	
Queue Length 50th (ft)	22	36	14	101	49	0	14	37	0	24	104	0
Queue Length 95th (ft)	55	64	49	#197	80	23	36	66	45	54	162	40
Internal Link Dist (ft)		644			986			1671			838	
Turn Bay Length (ft)	250		330	340		140	275		340	290		290
Base Capacity (vph)	198	1006	526	569	1216	723	282	1007	657	444	1044	597
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.20	0.28	0.93	0.24	0.13	0.26	0.26	0.42	0.26	0.60	0.32

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 59.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 22.6 — Intersection LOS: C
Intersection Capacity Utilization 53.7% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: IA 13 & US 151



Lanes, Volumes, Timings
9: IA 13 & US 151

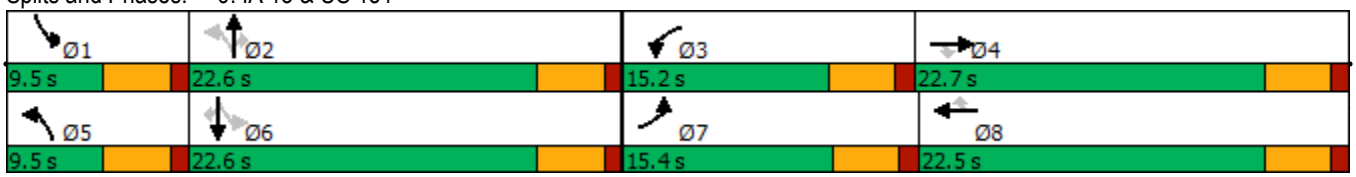
11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	245	319	106	389	220	109	133	573	493	113	417	174
Future Volume (vph)	245	319	106	389	220	109	133	573	493	113	417	174
Satd. Flow (prot)	1641	3282	1468	3183	3282	1468	1597	3195	1429	1656	3312	1482
Flt Permitted	0.950			0.950			0.412			0.317		
Satd. Flow (perm)	1641	3282	1468	3183	3282	1468	693	3195	1429	553	3312	1482
Satd. Flow (RTOR)			164			164			508			198
Peak Hour Factor	0.95	0.95	0.95	0.88	0.88	0.88	0.97	0.97	0.97	0.88	0.88	0.88
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	13%	13%	13%	9%	9%	9%
Adj. Flow (vph)	258	336	112	442	250	124	137	591	508	128	474	198
Shared Lane Traffic (%)												
Lane Group Flow (vph)	258	336	112	442	250	124	137	591	508	128	474	198
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	15.4	22.7	22.7	15.2	22.5	22.5	9.5	22.6	22.6	9.5	22.6	22.6
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	11.0	11.7	11.7	10.8	11.5	11.5	22.1	18.3	18.3	22.1	18.3	18.3
Actuated g/C Ratio	0.18	0.19	0.19	0.18	0.19	0.19	0.36	0.30	0.30	0.36	0.30	0.30
v/c Ratio	0.88	0.54	0.27	0.79	0.41	0.30	0.43	0.62	0.65	0.44	0.48	0.34
Control Delay	60.4	26.4	3.4	38.7	24.6	4.3	17.3	23.5	6.8	18.0	21.1	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.4	26.4	3.4	38.7	24.6	4.3	17.3	23.5	6.8	18.0	21.1	5.4
LOS	E	C	A	D	C	A	B	C	A	B	C	A
Approach Delay		35.2			29.2			16.0			16.7	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	99	62	0	86	45	0	31	104	0	29	79	0
Queue Length 95th (ft)	#244	98	17	#165	73	21	71	170	74	64	129	41
Internal Link Dist (ft)		644			986			1671			838	
Turn Bay Length (ft)	250		330	340		140	275		340	290		290
Base Capacity (vph)	293	978	552	557	967	548	322	947	780	288	981	578
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.34	0.20	0.79	0.26	0.23	0.43	0.62	0.65	0.44	0.48	0.34

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 61.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 23.0 — Intersection LOS: C
Intersection Capacity Utilization 57.0% — ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: IA 13 & US 151



Lanes, Volumes, Timings
6: IA 13 & Linn Aire Ave

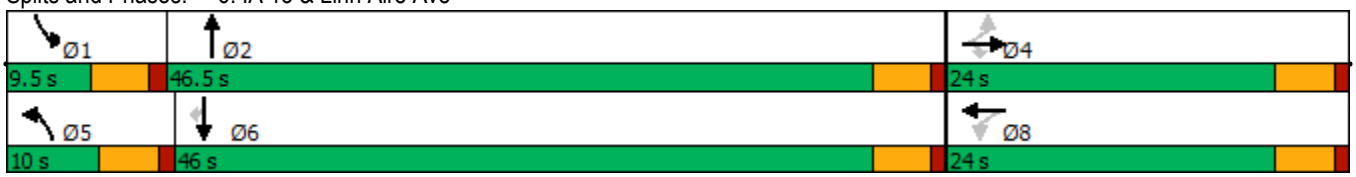
11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	210	55	164	0	20	64	634	122	8	1332	15
Future Volume (vph)	6	210	55	164	0	20	64	634	122	8	1332	15
Satd. Flow (prot)	0	1861	1583	0	1756	0	1597	3118	0	1597	3195	1429
Flt Permitted		0.990			0.423		0.950			0.950		
Satd. Flow (perm)	0	1844	1583	0	776	0	1597	3118	0	1597	3195	1429
Satd. Flow (RTOR)			82		82			42				82
Peak Hour Factor	0.89	0.89	0.89	0.78	0.78	0.78	0.87	0.87	0.87	0.91	0.91	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	13%	13%	13%
Adj. Flow (vph)	7	236	62	210	0	26	74	729	140	9	1464	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	243	62	0	236	0	74	869	0	9	1464	16
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	24.0	24.0	24.0	24.0	24.0		10.0	46.5		9.5	46.0	46.0
Total Lost Time (s)		4.5	4.5		4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		18.3	18.3		18.3		5.5	47.8		5.0	41.9	41.9
Actuated g/C Ratio		0.24	0.24		0.24		0.07	0.62		0.07	0.54	0.54
v/c Ratio		0.56	0.14		0.96		0.65	0.45		0.09	0.84	0.02
Control Delay		31.8	4.9		70.5		64.3	8.8		37.4	21.9	0.1
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		31.8	4.9		70.5		64.3	8.8		37.4	21.9	0.1
LOS		C	A		E		E	A		D	C	A
Approach Delay		26.3			70.5			13.2			21.8	
Approach LOS		C			E			B			C	
Queue Length 50th (ft)		106	0		79		37	93		4	321	0
Queue Length 95th (ft)		175	20		#170		#97	174		19	#452	0
Internal Link Dist (ft)		525			794			3953			1671	
Turn Bay Length (ft)			25				175			155		225
Base Capacity (vph)		470	464		259		114	1952		104	1740	815
Starvation Cap Reductn		0	0		0		0	0		0	0	0
Spillback Cap Reductn		0	0		0		0	0		0	0	0
Storage Cap Reductn		0	0		0		0	0		0	0	0
Reduced v/c Ratio		0.52	0.13		0.91		0.65	0.45		0.09	0.84	0.02

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 76.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 23.4 — Intersection LOS: C
Intersection Capacity Utilization 77.7% — ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: IA 13 & Linn Aire Ave



Lanes, Volumes, Timings
6: IA 13 & Linn Aire Ave

11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	77	119	114	12	23	105	1342	87	10	872	16
Future Volume (vph)	16	77	119	114	12	23	105	1342	87	10	872	16
Satd. Flow (prot)	0	1846	1583	0	1756	0	1597	3166	0	1597	3195	1583
Flt Permitted		0.939			0.700		0.950			0.950		
Satd. Flow (perm)	0	1749	1583	0	1277	0	1597	3166	0	1597	3195	1583
Satd. Flow (RTOR)			148		11			13				143
Peak Hour Factor	0.78	0.78	0.78	0.72	0.72	0.72	0.93	0.93	0.93	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	13%	13%	2%
Adj. Flow (vph)	21	99	153	158	17	32	113	1443	94	11	948	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	120	153	0	207	0	113	1537	0	11	948	17
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	22.6	22.6	22.6	22.6	22.6		17.3	47.9		9.5	40.1	40.1
Total Lost Time (s)		4.5	4.5		4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		15.2	15.2		15.2		10.1	48.4		5.0	38.0	38.0
Actuated g/C Ratio		0.20	0.20		0.20		0.14	0.65		0.07	0.51	0.51
v/c Ratio		0.34	0.35		0.77		0.52	0.75		0.10	0.58	0.02
Control Delay		28.5	7.8		47.0		39.9	13.4		37.5	16.6	0.1
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		28.5	7.8		47.0		39.9	13.4		37.5	16.6	0.1
LOS		C	A		D		D	B		D	B	A
Approach Delay		16.9			47.0			15.3			16.6	
Approach LOS		B			D			B			B	
Queue Length 50th (ft)		48	2		87		51	222		5	175	0
Queue Length 95th (ft)		82	31		123		101	#505		21	255	0
Internal Link Dist (ft)		525			794			3953			1671	
Turn Bay Length (ft)			25				175			155		225
Base Capacity (vph)		428	499		321		276	2062		108	1633	879
Starvation Cap Reductn		0	0		0		0	0		0	0	0
Spillback Cap Reductn		0	0		0		0	0		0	0	0
Storage Cap Reductn		0	0		0		0	0		0	0	0
Reduced v/c Ratio		0.28	0.31		0.64		0.41	0.75		0.10	0.58	0.02

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 74.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 17.9 — Intersection LOS: B
Intersection Capacity Utilization 70.3% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: IA 13 & Linn Aire Ave

Lanes, Volumes, Timings
3: IA 13 & IA 100/Secrist Rd

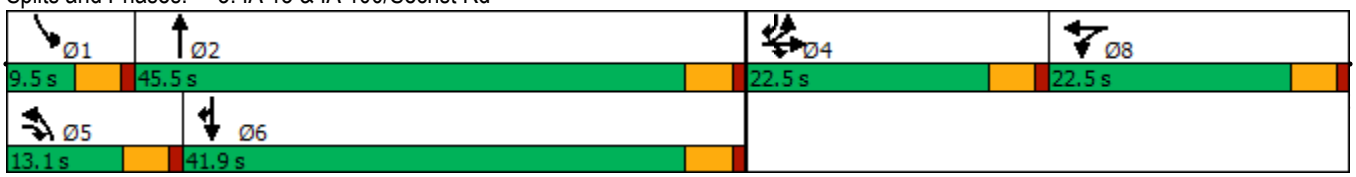
11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	298	14	280	23	119	10	205	458	4	9	1087	370
Future Volume (vph)	298	14	280	23	119	10	205	458	4	9	1087	370
Satd. Flow (prot)	1618	1628	1524	1770	1840	0	3072	3163	0	1597	3195	1429
Flt Permitted	0.950	0.956		0.950			0.950			0.950		
Satd. Flow (perm)	1618	1628	1524	1770	1840	0	3072	3163	0	1597	3195	1429
Satd. Flow (RTOR)			300		4			1				311
Peak Hour Factor	0.91	0.91	0.91	0.83	0.83	0.83	0.83	0.83	0.83	0.90	0.90	0.90
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	14%	14%	14%	13%	13%	13%
Adj. Flow (vph)	327	15	308	28	143	12	247	552	5	10	1208	411
Shared Lane Traffic (%)	48%											
Lane Group Flow (vph)	170	172	308	28	155	0	247	557	0	10	1208	411
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	4	4	4 5	8	8		5	2		1	6	6 4
Permitted Phases												
Total Split (s)	22.5	22.5		22.5	22.5		13.1	45.5		9.5	41.9	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Act Effct Green (s)	12.1	12.1	20.5	9.6	9.6		8.4	49.0		5.0	37.8	54.4
Actuated g/C Ratio	0.14	0.14	0.24	0.11	0.11		0.10	0.57		0.06	0.44	0.63
v/c Ratio	0.75	0.75	0.52	0.14	0.74		0.83	0.31		0.11	0.86	0.40
Control Delay	56.3	56.5	5.5	37.0	58.1		63.6	12.4		45.2	31.5	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	56.3	56.5	5.5	37.0	58.1		63.6	12.4		45.2	31.5	3.4
LOS	E	E	A	D	E		E	B		D	C	A
Approach Delay		32.3			54.8			28.1			24.5	
Approach LOS		C			D			C			C	
Queue Length 50th (ft)	93	94	2	14	81		68	72		5	301	19
Queue Length 95th (ft)	173	176	42	37	138		#133	153		23	#538	66
Internal Link Dist (ft)		878			856			854			3953	
Turn Bay Length (ft)	200			125			413			145		385
Base Capacity (vph)	341	343	682	373	391		309	1802		93	1402	1096
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.50	0.50	0.45	0.08	0.40		0.80	0.31		0.11	0.86	0.38

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 86
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 28.7 — Intersection LOS: C
Intersection Capacity Utilization 66.4% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: IA 13 & IA 100/Secrist Rd



Lanes, Volumes, Timings
3: IA 13 & IA 100/Secrist Rd

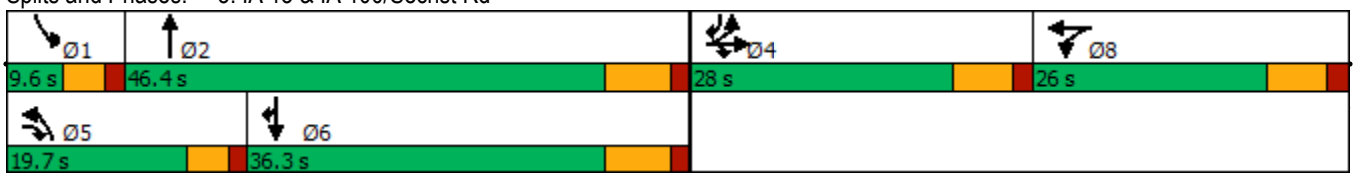
11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	494	75	241	5	62	15	368	998	26	18	714	335
Future Volume (vph)	494	75	241	5	62	15	368	998	26	18	714	335
Satd. Flow (prot)	1618	1642	1524	1770	1809	0	3072	3154	0	1597	3195	1583
Flt Permitted	0.950	0.964		0.950			0.950			0.950		
Satd. Flow (perm)	1618	1642	1524	1770	1809	0	3072	3154	0	1597	3195	1583
Satd. Flow (RTOR)			259		9			3				399
Peak Hour Factor	0.93	0.93	0.93	0.82	0.82	0.82	0.91	0.91	0.91	0.84	0.84	0.84
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	14%	14%	14%	13%	13%	2%
Adj. Flow (vph)	531	81	259	6	76	18	404	1097	29	21	850	399
Shared Lane Traffic (%)	43%											
Lane Group Flow (vph)	303	309	259	6	94	0	404	1126	0	21	850	399
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	4	4	4 5	8	8		5	2		1	6	6 4
Permitted Phases												
Total Split (s)	28.0	28.0		26.0	26.0		19.7	46.4		9.6	36.3	
Total Lost Time (s)	6.6	6.6		6.9	6.9		5.0	7.1		5.0	7.1	
Act Effct Green (s)	20.6	20.6	35.1	6.9	6.9		14.6	45.5		4.6	29.5	56.7
Actuated g/C Ratio	0.22	0.22	0.37	0.07	0.07		0.15	0.48		0.05	0.31	0.60
v/c Ratio	0.87	0.87	0.36	0.05	0.68		0.86	0.74		0.27	0.86	0.36
Control Delay	62.1	62.4	3.1	42.2	63.4		59.3	26.7		55.3	42.4	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	62.1	62.4	3.1	42.2	63.4		59.3	26.7		55.3	42.4	2.1
LOS	E	E	A	D	E		E	C		E	D	A
Approach Delay		44.7			62.1			35.3			29.9	
Approach LOS		D			E			D			C	
Queue Length 50th (ft)	192	195	0	4	53		128	274		13	265	0
Queue Length 95th (ft)	#368	#374	32	15	94		#224	#503		36	#355	29
Internal Link Dist (ft)		878			856			854			3953	
Turn Bay Length (ft)	200			125			413			145		385
Base Capacity (vph)	368	373	723	359	374		480	1512		78	991	1119
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.82	0.83	0.36	0.02	0.25		0.84	0.74		0.27	0.86	0.36

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 94.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 36.4 — Intersection LOS: D
Intersection Capacity Utilization 69.7% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: IA 13 & IA 100/Secrist Rd



Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	12	48	286	574	12
Future Vol, veh/h	2	12	48	286	574	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	170	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	65	65	77	77	92	92
Heavy Vehicles, %	2	2	15	15	15	2
Mvmt Flow	3	18	62	371	624	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	941	319	637	0	-	0
Stage 1	631	-	-	-	-	-
Stage 2	310	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.4	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.35	-	-	-
Pot Cap-1 Maneuver	262	677	860	-	-	-
Stage 1	492	-	-	-	-	-
Stage 2	717	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	243	677	860	-	-	-
Mov Cap-2 Maneuver	243	-	-	-	-	-
Stage 1	457	-	-	-	-	-
Stage 2	717	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	860	-	539	-	-
HCM Lane V/C Ratio	0.072	-	0.04	-	-
HCM Control Delay (s)	9.5	-	12	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	48	16	626	411	1
Future Vol, veh/h	25	48	16	626	411	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	170	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	37	37	94	94	90	90
Heavy Vehicles, %	2	2	15	15	15	15
Mvmt Flow	68	130	17	666	457	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	825	229	458	0	-	0
Stage 1	458	-	-	-	-	-
Stage 2	367	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.4	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.35	-	-	-
Pot Cap-1 Maneuver	311	774	1013	-	-	-
Stage 1	604	-	-	-	-	-
Stage 2	671	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	306	774	1013	-	-	-
Mov Cap-2 Maneuver	306	-	-	-	-	-
Stage 1	594	-	-	-	-	-
Stage 2	671	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.5	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1013	-	508	-	-
HCM Lane V/C Ratio	0.017	-	0.388	-	-
HCM Control Delay (s)	8.6	-	16.5	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.8	-	-

Intersection	
Int Delay, s/veh	46.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	8	294	11	7	2	204	281	1	2	570	42
Future Vol, veh/h	40	8	294	11	7	2	204	281	1	2	570	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	570	-	-	160	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	75	75	75	88	88	88	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	9	9	2	15	15	15
Mvmt Flow	49	10	359	15	9	3	232	319	1	2	671	49

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1328	1484	360	1129	1508	160	720	0	0	320	0	0
Stage 1	700	700	-	784	784	-	-	-	-	-	-	-
Stage 2	628	784	-	345	724	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.28	-	-	4.4	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.29	-	-	2.35	-	-
Pot Cap-1 Maneuver	113	124	637	159	120	857	832	-	-	1148	-	-
Stage 1	396	440	-	352	402	-	-	-	-	-	-	-
Stage 2	437	402	-	644	429	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	81	89	637	50	86	857	832	-	-	1148	-	-
Mov Cap-2 Maneuver	81	89	-	50	86	-	-	-	-	-	-	-
Stage 1	286	439	-	254	290	-	-	-	-	-	-	-
Stage 2	304	290	-	275	428	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	178.8	92.5	4.6	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	832	-	-	327	66	1148	-	-
HCM Lane V/C Ratio	0.279	-	-	1.275	0.404	0.002	-	-
HCM Control Delay (s)	11	-	-	178.8	92.5	8.1	-	-
HCM Lane LOS	B	-	-	F	F	A	-	-
HCM 95th %tile Q(veh)	1.1	-	-	19.3	1.5	0	-	-

Intersection	
Int Delay, s/veh	27.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	3	243	4	9	2	289	588	3	0	417	42
Future Vol, veh/h	36	3	243	4	9	2	289	588	3	0	417	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	570	-	-	160	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	70	70	70	94	94	94	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	9	9	9	15	15	2
Mvmt Flow	42	3	283	6	13	3	307	626	3	0	474	48

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1432	1741	261	1481	1764	315	522	0	0	629	0	0
Stage 1	498	498	-	1242	1242	-	-	-	-	-	-	-
Stage 2	934	1243	-	239	522	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.28	-	-	4.4	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.29	-	-	2.35	-	-
Pot Cap-1 Maneuver	95	86	738	87	83	681	993	-	-	866	-	-
Stage 1	523	543	-	185	245	-	-	-	-	-	-	-
Stage 2	286	245	-	743	529	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	59	738	39	57	681	993	-	-	866	-	-
Mov Cap-2 Maneuver	60	59	-	39	57	-	-	-	-	-	-	-
Stage 1	361	543	-	128	169	-	-	-	-	-	-	-
Stage 2	182	169	-	456	529	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	134.6	102.1	3.4	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	993	-	-	288	57	866	-	-
HCM Lane V/C Ratio	0.31	-	-	1.139	0.376	-	-	-
HCM Control Delay (s)	10.2	-	-	134.6	102.1	0	-	-
HCM Lane LOS	B	-	-	F	F	A	-	-
HCM 95th %tile Q(veh)	1.3	-	-	13.9	1.4	0	-	-

Intersection	
Int Delay, s/veh	29.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	8	30	106	3	51	3	511	19	22	884	6
Future Vol, veh/h	3	8	30	106	3	51	3	511	19	22	884	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	135	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	66	66	66	77	77	77	85	85	85	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	9	9	9	9	2	9
Mvmt Flow	5	12	45	138	4	66	4	601	22	26	1052	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1419	1739	530	1204	1731	312	1059	0	0	623	0	0
Stage 1	1108	1108	-	620	620	-	-	-	-	-	-	-
Stage 2	311	631	-	584	1111	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.28	-	-	4.28	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	97	86	493	140	87	684	613	-	-	908	-	-
Stage 1	224	284	-	442	478	-	-	-	-	-	-	-
Stage 2	674	473	-	465	283	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	82	83	493	~ 110	84	684	613	-	-	908	-	-
Mov Cap-2 Maneuver	82	83	-	~ 110	84	-	-	-	-	-	-	-
Stage 1	222	276	-	439	475	-	-	-	-	-	-	-
Stage 2	600	470	-	392	275	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	28.9	269.7	0.1	0.2
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	613	-	-	212	149	908	-	-
HCM Lane V/C Ratio	0.006	-	-	0.293	1.395	0.029	-	-
HCM Control Delay (s)	10.9	-	-	28.9	269.7	9.1	-	-
HCM Lane LOS	B	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1.2	13.2	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	19.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	16	19	38	10	31	26	920	50	36	667	3
Future Vol, veh/h	0	16	19	38	10	31	26	920	50	36	667	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	135	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	71	71	77	77	77	93	93	93	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	9	9	9	9	9	9
Mvmt Flow	0	23	27	49	13	40	28	989	54	44	813	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1460	2002	409	1578	1977	522	817	0	0	1043	0	0
Stage 1	903	903	-	1072	1072	-	-	-	-	-	-	-
Stage 2	557	1099	-	506	905	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.28	-	-	4.28	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	90	59	592	74	61	499	763	-	-	622	-	-
Stage 1	299	354	-	235	295	-	-	-	-	-	-	-
Stage 2	482	287	-	517	353	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	62	53	592	~ 44	55	499	763	-	-	622	-	-
Mov Cap-2 Maneuver	62	53	-	~ 44	55	-	-	-	-	-	-	-
Stage 1	288	329	-	226	284	-	-	-	-	-	-	-
Stage 2	407	276	-	427	328	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	66.5	$ 363.2	0.3	0.6
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	763	-	-	105	71	622	-	-
HCM Lane V/C Ratio	0.037	-	-	0.469	1.445	0.071	-	-
HCM Control Delay (s)	9.9	-	-	66.5	$ 363.2	11.2	-	-
HCM Lane LOS	A	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	2.1	8.5	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	23.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	46	38	37	1	6	31	558	13	3	978	9
Future Vol, veh/h	3	46	38	37	1	6	31	558	13	3	978	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	145	-	-	145	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	81	81	81	87	87	87	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	54	45	46	1	7	36	641	15	4	1151	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1558	1893	581	1332	1891	328	1162	0	0	656	0	0
Stage 1	1165	1165	-	721	721	-	-	-	-	-	-	-
Stage 2	393	728	-	611	1170	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	76	69	457	112	69	668	597	-	-	927	-	-
Stage 1	206	267	-	385	430	-	-	-	-	-	-	-
Stage 2	603	427	-	448	265	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	70	65	457	~ 29	65	668	597	-	-	927	-	-
Mov Cap-2 Maneuver	70	65	-	~ 29	65	-	-	-	-	-	-	-
Stage 1	194	266	-	362	404	-	-	-	-	-	-	-
Stage 2	559	401	-	321	264	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	159.9	$ 552.3	0.6	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	597	-	-	104	34	927	-	-
HCM Lane V/C Ratio	0.06	-	-	0.984	1.598	0.004	-	-
HCM Control Delay (s)	11.4	-	-	159.9	$ 552.3	8.9	-	-
HCM Lane LOS	B	-	-	F	F	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	6.1	6	0	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	25.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	36	28	21	7	9	38	1094	46	10	765	12
Future Vol, veh/h	21	36	28	21	7	9	38	1094	46	10	765	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	145	-	-	145	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	92	92	92	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	9	9	9	9	9	9
Mvmt Flow	25	43	34	23	8	10	39	1128	47	10	789	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1461	2068	401	1666	2051	588	801	0	0	1175	0	0
Stage 1	815	815	-	1230	1230	-	-	-	-	-	-	-
Stage 2	646	1253	-	436	821	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.28	-	-	4.28	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	90	54	599	63	55	452	774	-	-	552	-	-
Stage 1	338	389	-	188	248	-	-	-	-	-	-	-
Stage 2	427	242	-	569	387	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	74	50	599	~ 15	51	452	774	-	-	552	-	-
Mov Cap-2 Maneuver	74	50	-	~ 15	51	-	-	-	-	-	-	-
Stage 1	321	382	-	179	236	-	-	-	-	-	-	-
Stage 2	384	230	-	467	380	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	278.7	$ 676.1	0.3	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	774	-	-	81	24	552	-	-
HCM Lane V/C Ratio	0.051	-	-	1.264	1.676	0.019	-	-
HCM Control Delay (s)	9.9	-	-	278.7	$ 676.1	11.6	-	-
HCM Lane LOS	A	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	7.7	5	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	15	7	141	115	93	6	552	57	85	992	8
Future Volume (vph)	0	15	7	141	115	93	6	552	57	85	992	8
Satd. Flow (prot)	0	1785	0	1770	1738	0	1656	3312	1583	1656	3312	1482
Flt Permitted				0.455			0.950			0.950		
Satd. Flow (perm)	0	1785	0	848	1738	0	1656	3312	1583	1656	3312	1482
Satd. Flow (RTOR)		10			56				205			143
Peak Hour Factor	0.68	0.68	0.68	0.94	0.94	0.94	0.83	0.83	0.83	0.78	0.78	0.78
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	2%	9%	9%	9%
Adj. Flow (vph)	0	22	10	150	122	99	7	665	69	109	1272	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	0	150	221	0	7	665	69	109	1272	10
Turn Type		NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Total Split (s)	22.5	22.5		9.6	32.1		9.5	32.3	32.3	15.6	38.4	38.4
Total Lost Time (s)		4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		6.7		11.9	11.9		5.1	30.0	30.0	9.0	39.3	39.3
Actuated g/C Ratio		0.11		0.19	0.19		0.08	0.48	0.48	0.15	0.63	0.63
v/c Ratio		0.16		0.55	0.58		0.05	0.42	0.08	0.46	0.61	0.01
Control Delay		23.6		30.8	23.5		30.7	13.7	0.2	32.4	10.1	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		23.6		30.8	23.5		30.7	13.7	0.2	32.4	10.1	0.0
LOS		C		C	C		C	B	A	C	B	A
Approach Delay		23.6			26.5			12.6			11.8	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		8		51	57		2	85	0	38	108	0
Queue Length 95th (ft)		23		101	119		13	141	0	75	242	0
Internal Link Dist (ft)		494			759			838			1628	
Turn Bay Length (ft)				180			230		130	235		135
Base Capacity (vph)		532		271	815		135	1601	871	300	2096	990
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.06		0.55	0.27		0.05	0.42	0.08	0.36	0.61	0.01

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 62	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 14.3	Intersection LOS: B
Intersection Capacity Utilization 57.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 24: IA 13 & Pawnee Ave/Hennessey Pkwy

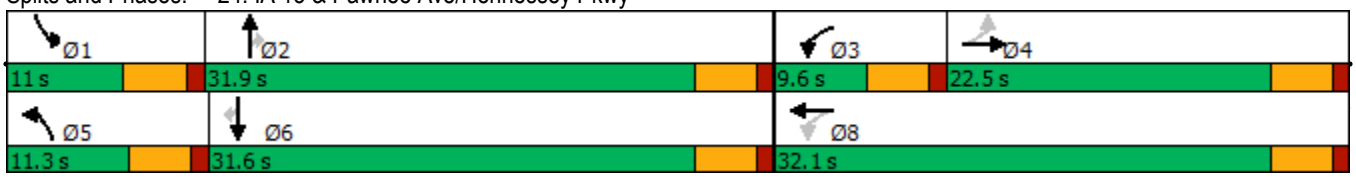
Lanes, Volumes, Timings
24: IA 13 & Pawnee Ave/Hennessey Pkwy 11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	54	38	167	164	93	47	919	184	99	718	26
Future Volume (vph)	12	54	38	167	164	93	47	919	184	99	718	26
Satd. Flow (prot)	0	1761	0	1770	1762	0	1656	3312	1482	1656	3312	1482
Flt Permitted		0.932		0.442			0.950			0.950		
Satd. Flow (perm)	0	1651	0	823	1762	0	1656	3312	1482	1656	3312	1482
Satd. Flow (RTOR)		36			43				178			153
Peak Hour Factor	0.73	0.73	0.73	0.89	0.89	0.89	0.91	0.91	0.91	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	16	74	52	188	184	104	52	1010	202	102	740	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	142	0	188	288	0	52	1010	202	102	740	27
Turn Type	Perm	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Total Split (s)	22.5	22.5		9.6	32.1		11.3	31.9	31.9	11.0	31.6	31.6
Total Lost Time (s)		4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		10.2		17.3	17.3		6.6	28.2	28.2	6.7	30.2	30.2
Actuated g/C Ratio		0.16		0.27	0.27		0.10	0.45	0.45	0.11	0.48	0.48
v/c Ratio		0.48		0.62	0.56		0.30	0.68	0.27	0.58	0.47	0.03
Control Delay		26.0		28.6	21.1		34.1	19.2	4.6	46.4	14.8	0.1
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		26.0		28.6	21.1		34.1	19.2	4.6	46.4	14.8	0.1
LOS		C		C	C		C	B	A	D	B	A
Approach Delay		26.0			24.1			17.5			18.1	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		40		61	82		20	176	6	41	116	0
Queue Length 95th (ft)		67		108	147		54	275	45	#115	186	0
Internal Link Dist (ft)		494			759			838			1628	
Turn Bay Length (ft)				180			230		130	235		135
Base Capacity (vph)		511		305	818		184	1483	762	176	1587	790
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.28		0.62	0.35		0.28	0.68	0.27	0.58	0.47	0.03

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 63
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 19.3 Intersection LOS: B
Intersection Capacity Utilization 58.1% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: IA 13 & Pawnee Ave/Hennessey Pkwy



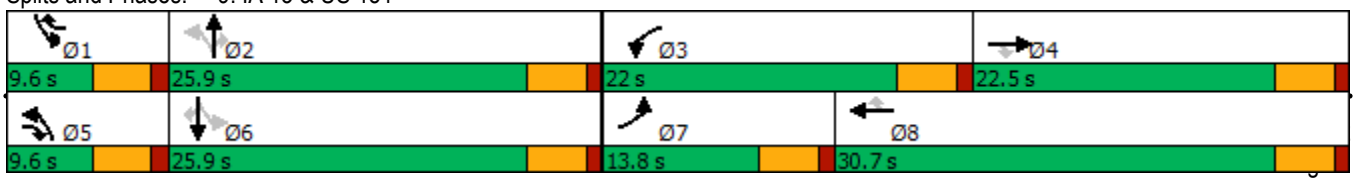
Lanes, Volumes, Timings
9: IA 13 & US 151

11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	253	179	631	345	111	86	306	328	142	766	231
Future Volume (vph)	76	253	179	631	345	111	86	306	328	142	766	231
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.187			0.507		
Satd. Flow (perm)	1770	3539	1583	3433	3539	1583	348	3539	1583	944	3539	1583
Satd. Flow (RTOR)			143			125			373			254
Peak Hour Factor	0.92	0.92	0.92	0.89	0.89	0.89	0.88	0.88	0.88	0.91	0.91	0.91
Adj. Flow (vph)	83	275	195	709	388	125	98	348	373	156	842	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	275	195	709	388	125	98	348	373	156	842	254
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	13.8	22.5	9.6	22.0	30.7	9.6	9.6	25.9	25.9	9.6	25.9	25.9
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	8.0	10.9	20.5	17.4	22.4	32.0	26.5	21.4	21.4	26.5	21.4	21.4
Actuated g/C Ratio	0.11	0.15	0.28	0.24	0.31	0.44	0.36	0.29	0.29	0.36	0.29	0.29
v/c Ratio	0.43	0.52	0.36	0.86	0.36	0.16	0.43	0.33	0.51	0.39	0.81	0.39
Control Delay	37.6	32.2	8.7	39.9	21.9	3.5	19.9	21.7	5.4	17.7	31.9	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	32.2	8.7	39.9	21.9	3.5	19.9	21.7	5.4	17.7	31.9	5.2
LOS	D	C	A	D	C	A	B	C	A	B	C	A
Approach Delay		24.7			30.5			14.1			24.7	
Approach LOS		C			C			B			C	
Queue Length 50th (ft)	35	61	17	158	75	0	26	64	0	43	183	0
Queue Length 95th (ft)	78	96	63	#260	112	28	56	101	55	86	#293	51
Internal Link Dist (ft)		644			986			1671			838	
Turn Bay Length (ft)	250		330	340		140	275		340	290		290
Base Capacity (vph)	226	875	547	825	1307	765	226	1040	728	401	1040	644
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.31	0.36	0.86	0.30	0.16	0.43	0.33	0.51	0.39	0.81	0.39

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 72.9	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 24.3	Intersection LOS: C
Intersection Capacity Utilization 65.9%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 9: IA 13 & US 151

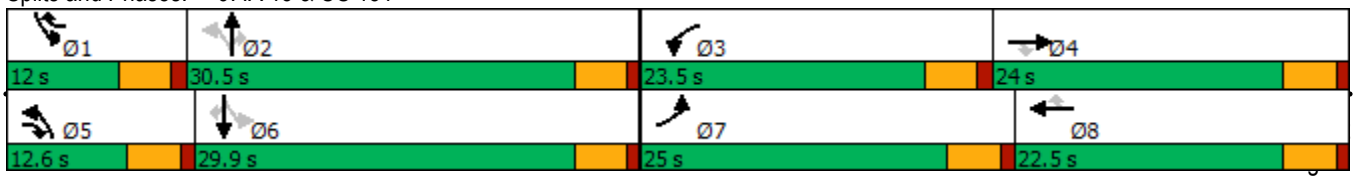


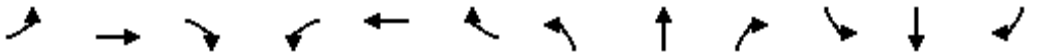
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	328	427	142	520	294	146	178	766	659	151	558	233
Future Volume (vph)	328	427	142	520	294	146	178	766	659	151	558	233
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.263			0.177		
Satd. Flow (perm)	1770	3539	1583	3433	3539	1583	490	3539	1583	330	3539	1583
Satd. Flow (RTOR)			73			79			528			265
Peak Hour Factor	0.95	0.95	0.95	0.88	0.88	0.88	0.97	0.97	0.97	0.88	0.88	0.88
Adj. Flow (vph)	345	449	149	591	334	166	184	790	679	172	634	265
Shared Lane Traffic (%)												
Lane Group Flow (vph)	345	449	149	591	334	166	184	790	679	172	634	265
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	25.0	24.0	12.6	23.5	22.5	12.0	12.6	30.5	30.5	12.0	29.9	29.9
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	19.3	15.7	28.2	17.8	14.2	26.2	34.0	26.1	26.1	33.2	25.7	25.7
Actuated g/C Ratio	0.23	0.18	0.33	0.21	0.17	0.31	0.40	0.31	0.31	0.39	0.30	0.30
v/c Ratio	0.86	0.69	0.26	0.82	0.57	0.31	0.59	0.73	0.80	0.67	0.60	0.40
Control Delay	54.1	38.5	12.4	43.6	36.8	13.8	24.5	31.8	15.1	31.5	28.9	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.1	38.5	12.4	43.6	36.8	13.8	24.5	31.8	15.1	31.5	28.9	5.4
LOS	D	D	B	D	D	B	C	C	B	C	C	A
Approach Delay		40.1			37.0			24.2			23.5	
Approach LOS		D			D			C			C	
Queue Length 50th (ft)	179	121	29	157	88	35	61	203	63	56	155	0
Queue Length 95th (ft)	#338	171	71	#234	127	79	112	284	#290	#122	217	51
Internal Link Dist (ft)		644			986			1671			838	
Turn Bay Length (ft)	250		330	340		140	275		340	290		290
Base Capacity (vph)	427	812	575	768	749	542	318	1083	850	255	1065	661
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.55	0.26	0.77	0.45	0.31	0.58	0.73	0.80	0.67	0.60	0.40

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 85.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 30.1 Intersection LOS: C
Intersection Capacity Utilization 72.2% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: IA 13 & US 151





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	234	61	183	0	22	71	848	136	9	1781	17
Future Volume (vph)	7	234	61	183	0	22	71	848	136	9	1781	17
Satd. Flow (prot)	0	1861	1583	0	1758	0	1597	3170	0	1597	3195	1429
Flt Permitted		0.989			0.369		0.950			0.950		
Satd. Flow (perm)	0	1842	1583	0	678	0	1597	3170	0	1597	3195	1429
Satd. Flow (RTOR)			55		55			25				55
Peak Hour Factor	0.89	0.89	0.89	0.78	0.78	0.78	0.87	0.87	0.87	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	2%	13%	13%	13%
Adj. Flow (vph)	8	263	69	235	0	28	82	975	156	10	1957	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	271	69	0	263	0	82	1131	0	10	1957	19
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	37.0	37.0	37.0	37.0	37.0		10.0	73.5		9.5	73.0	73.0
Total Lost Time (s)		4.5	4.5		4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		32.5	32.5		32.5		5.5	76.6		5.0	68.5	68.5
Actuated g/C Ratio		0.27	0.27		0.27		0.05	0.64		0.04	0.57	0.57
v/c Ratio		0.54	0.15		1.18		1.12	0.56		0.15	1.07	0.02
Control Delay		42.3	12.6		149.1		194.3	13.6		60.8	70.2	0.1
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		42.3	12.6		149.1		194.3	13.6		60.8	70.2	0.1
LOS		D	B		F		F	B		E	E	A
Approach Delay		36.2			149.1			25.8			69.5	
Approach LOS		D			F			C			E	
Queue Length 50th (ft)		180	8		~211		~73	222		8	~886	0
Queue Length 95th (ft)		265	43		#303		#172	331		26	#1024	0
Internal Link Dist (ft)		525			794			3953			1671	
Turn Bay Length (ft)			25				175			155		225
Base Capacity (vph)		498	468		223		73	2032		66	1823	839
Starvation Cap Reductn		0	0		0		0	0		0	0	0
Spillback Cap Reductn		0	0		0		0	0		0	0	0
Storage Cap Reductn		0	0		0		0	0		0	0	0
Reduced v/c Ratio		0.54	0.15		1.18		1.12	0.56		0.15	1.07	0.02

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 1.18		
Intersection Signal Delay: 58.1	Intersection LOS: E	
Intersection Capacity Utilization 92.6%	ICU Level of Service F	
Analysis Period (min) 15		

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: IA 13 & Linn Aire Ave

Lanes, Volumes, Timings
6: IA 13 & Linn Aire Ave

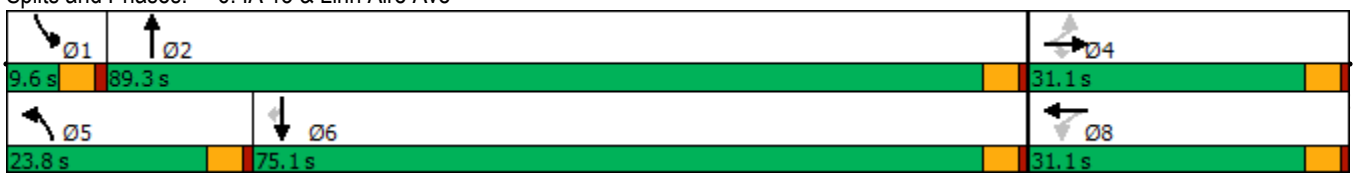
11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	86	133	127	13	26	117	1795	97	11	1166	18
Future Volume (vph)	18	86	133	127	13	26	117	1795	97	11	1166	18
Satd. Flow (prot)	0	1846	1583	0	1756	0	1597	3169	0	1597	3195	1583
Flt Permitted		0.936			0.597		0.950			0.950		
Satd. Flow (perm)	0	1744	1583	0	1089	0	1597	3169	0	1597	3195	1583
Satd. Flow (RTOR)			90		6			9				88
Peak Hour Factor	0.78	0.78	0.78	0.72	0.72	0.72	0.93	0.93	0.93	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	13%	13%	2%
Adj. Flow (vph)	23	110	171	176	18	36	126	1930	104	12	1267	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	133	171	0	230	0	126	2034	0	12	1267	20
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	31.1	31.1	31.1	31.1	31.1		23.8	89.3		9.6	75.1	75.1
Total Lost Time (s)		4.5	4.5		4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		26.6	26.6		26.6		14.7	86.5		5.1	71.0	71.0
Actuated g/C Ratio		0.21	0.21		0.21		0.12	0.69		0.04	0.56	0.56
v/c Ratio		0.36	0.42		0.98		0.68	0.93		0.19	0.70	0.02
Control Delay		46.6	24.5		103.0		71.3	27.3		66.8	23.0	0.1
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		46.6	24.5		103.0		71.3	27.3		66.8	23.0	0.1
LOS		D	C		F		E	C		E	C	A
Approach Delay		34.2			103.0			29.8			23.0	
Approach LOS		C			F			C			C	
Queue Length 50th (ft)		93	55		184		99	611		10	377	0
Queue Length 95th (ft)		137	100		#253		167	#1056		32	497	0
Internal Link Dist (ft)		525			794			3953			1671	
Turn Bay Length (ft)			25				175			155		225
Base Capacity (vph)		368	405		234		245	2181		64	1803	931
Starvation Cap Reductn		0	0		0		0	0		0	0	0
Spillback Cap Reductn		0	0		0		0	0		0	0	0
Storage Cap Reductn		0	0		0		0	0		0	0	0
Reduced v/c Ratio		0.36	0.42		0.98		0.51	0.93		0.19	0.70	0.02

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 125.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 32.2 — Intersection LOS: C
Intersection Capacity Utilization 84.1% — ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: IA 13 & Linn Aire Ave



Lanes, Volumes, Timings
3: IA 13 & IA 100/Secrist Rd

11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	399	16	374	26	133	11	274	612	4	10	1454	495
Future Volume (vph)	399	16	374	26	133	11	274	612	4	10	1454	495
Satd. Flow (prot)	1618	1628	1583	1770	1842	0	3072	3163	0	1597	3195	1429
Flt Permitted	0.950	0.956		0.950			0.950			0.950		
Satd. Flow (perm)	1618	1628	1583	1770	1842	0	3072	3163	0	1597	3195	1429
Satd. Flow (RTOR)			161		2			1				121
Peak Hour Factor	0.91	0.91	0.91	0.83	0.83	0.83	0.83	0.83	0.83	0.90	0.90	0.90
Heavy Vehicles (%)	6%	6%	2%	2%	2%	2%	14%	14%	14%	13%	13%	13%
Adj. Flow (vph)	438	18	411	31	160	13	330	737	5	11	1616	550
Shared Lane Traffic (%)	48%											
Lane Group Flow (vph)	228	228	411	31	173	0	330	742	0	11	1616	550
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	4	4	4 5	8	8		5	2		1	6	6 4
Permitted Phases												
Total Split (s)	26.0	26.0		22.5	22.5		21.0	92.0		9.5	80.5	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Act Effct Green (s)	21.5	21.5	38.0	15.3	15.3		16.5	93.3		5.0	76.0	102.0
Actuated g/C Ratio	0.15	0.15	0.26	0.10	0.10		0.11	0.63		0.03	0.52	0.69
v/c Ratio	0.97	0.96	0.78	0.17	0.90		0.96	0.37		0.20	0.98	0.54
Control Delay	112.8	111.1	32.2	62.0	107.4		103.9	14.4		79.4	53.0	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	112.8	111.1	32.2	62.0	107.4		103.9	14.4		79.4	53.0	10.7
LOS	F	F	C	E	F		F	B		E	D	B
Approach Delay		74.1			100.5			42.0			42.5	
Approach LOS		E			F			D			D	
Queue Length 50th (ft)	235	235	176	28	165		167	162		11	800	190
Queue Length 95th (ft)	#425	#423	280	57	#243		#236	220		34	#1000	287
Internal Link Dist (ft)		878			856			854			3953	
Turn Bay Length (ft)	200			125			413			145		385
Base Capacity (vph)	236	237	528	216	226		344	2003		54	1648	1027
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.97	0.96	0.78	0.14	0.77		0.96	0.37		0.20	0.98	0.54

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 147.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 51.4 — Intersection LOS: D
Intersection Capacity Utilization 82.3% — ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: IA 13 & IA 100/Secrist Rd

Lanes, Volumes, Timings
3: IA 13 & IA 100/Secrist Rd

11/28/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	551	84	269	6	69	17	492	1335	29	20	955	448
Future Volume (vph)	551	84	269	6	69	17	492	1335	29	20	955	448
Satd. Flow (prot)	1618	1642	1524	1770	1807	0	3072	3157	0	1597	3195	1429
Flt Permitted	0.950	0.964		0.950			0.950			0.950		
Satd. Flow (perm)	1618	1642	1524	1770	1807	0	3072	3157	0	1597	3195	1429
Satd. Flow (RTOR)			280		7			2				208
Peak Hour Factor	0.93	0.93	0.93	0.82	0.82	0.82	0.91	0.91	0.91	0.84	0.84	0.84
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	14%	14%	14%	13%	13%	13%
Adj. Flow (vph)	592	90	289	7	84	21	541	1467	32	24	1137	533
Shared Lane Traffic (%)	43%											
Lane Group Flow (vph)	337	345	289	7	105	0	541	1499	0	24	1137	533
Turn Type	Split	NA	Prot	Split	NA		Prot	NA		Prot	NA	pt+ov
Protected Phases	4	4	4	8	8		5	2		1	6	6 4
Permitted Phases												
Total Split (s)	36.0	36.0	36.0	22.5	22.5		31.0	81.9		9.6	60.5	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	
Act Effct Green (s)	31.5	31.5	31.5	10.1	10.1		26.5	81.4		5.1	56.0	92.0
Actuated g/C Ratio	0.22	0.22	0.22	0.07	0.07		0.19	0.57		0.04	0.39	0.65
v/c Ratio	0.94	0.95	0.52	0.06	0.78		0.95	0.83		0.42	0.90	0.53
Control Delay	89.1	90.6	9.6	61.2	95.5		83.3	31.2		90.5	51.9	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	89.1	90.6	9.6	61.2	95.5		83.3	31.2		90.5	51.9	10.2
LOS	F	F	A	E	F		F	C		F	D	B
Approach Delay		65.9			93.4			45.0			39.3	
Approach LOS		E			F			D			D	
Queue Length 50th (ft)	325	333	7	6	91		257	611		22	516	145
Queue Length 95th (ft)	#555	#569	91	20	140		#392	793		53	590	223
Internal Link Dist (ft)		878			856			854			3953	
Turn Bay Length (ft)	200			125			413			145		385
Base Capacity (vph)	358	363	555	224	235		572	1807		57	1258	998
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.94	0.95	0.52	0.03	0.45		0.95	0.83		0.42	0.90	0.53

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 142.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 48.3 — Intersection LOS: D
Intersection Capacity Utilization 77.4% — ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: IA 13 & IA 100/Secrist Rd

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	11	43	214	429	11
Future Vol, veh/h	2	11	43	214	429	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	170	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	65	65	77	77	92	92
Heavy Vehicles, %	2	2	15	15	15	2
Mvmt Flow	3	17	56	278	466	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	723	239	478	0	-	0
Stage 1	472	-	-	-	-	-
Stage 2	251	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.4	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.35	-	-	-
Pot Cap-1 Maneuver	361	762	994	-	-	-
Stage 1	594	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	341	762	994	-	-	-
Mov Cap-2 Maneuver	341	-	-	-	-	-
Stage 1	561	-	-	-	-	-
Stage 2	768	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	1.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	994	-	640	-	-
HCM Lane V/C Ratio	0.056	-	0.031	-	-
HCM Control Delay (s)	8.8	-	10.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	43	14	468	307	1
Future Vol, veh/h	22	43	14	468	307	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	170	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	37	37	94	94	90	90
Heavy Vehicles, %	2	2	1	15	15	15
Mvmt Flow	59	116	15	498	341	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	621	171	342	0	-	0
Stage 1	342	-	-	-	-	-
Stage 2	279	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.12	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.21	-	-	-
Pot Cap-1 Maneuver	419	843	1221	-	-	-
Stage 1	691	-	-	-	-	-
Stage 2	743	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	414	843	1221	-	-	-
Mov Cap-2 Maneuver	414	-	-	-	-	-
Stage 1	683	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	0.2	0
HCM LOS	B		

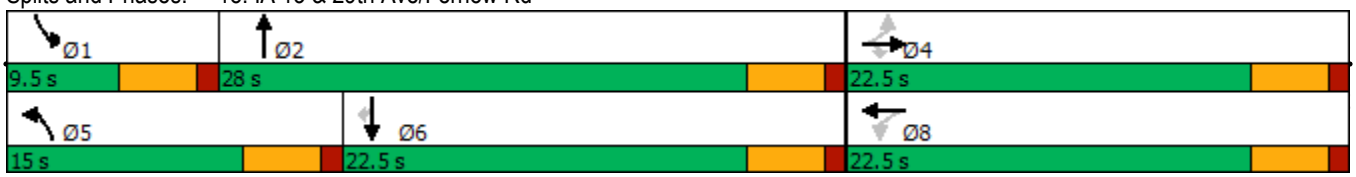
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1221	-	624	-	-
HCM Lane V/C Ratio	0.012	-	0.282	-	-
HCM Control Delay (s)	8	-	13	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	7	263	10	6	2	183	210	1	2	426	38
Future Volume (vph)	36	7	263	10	6	2	183	210	1	2	426	38
Satd. Flow (prot)	0	1788	1583	1770	1786	0	1656	3309	0	1570	3139	1583
Flt Permitted		0.755		0.722			0.950			0.950		
Satd. Flow (perm)	0	1406	1583	1345	1786	0	1656	3309	0	1570	3139	1583
Satd. Flow (RTOR)			321		3			1				191
Peak Hour Factor	0.82	0.82	0.82	0.75	0.75	0.75	0.88	0.88	0.88	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	15%	15%	2%
Adj. Flow (vph)	44	9	321	13	8	3	208	239	1	2	501	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	53	321	13	11	0	208	240	0	2	501	45
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	22.5	22.5	22.5	22.5	22.5		15.0	28.0		9.5	22.5	22.5
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		8.2	8.2	8.2	8.2		9.7	25.3		5.1	12.4	12.4
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.22	0.57		0.12	0.28	0.28
v/c Ratio		0.20	0.58	0.05	0.03		0.57	0.13		0.01	0.57	0.08
Control Delay		18.3	7.4	16.3	14.2		25.9	6.1		22.0	16.9	0.3
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		18.3	7.4	16.3	14.2		25.9	6.1		22.0	16.9	0.3
LOS		B	A	B	B		C	A		C	B	A
Approach Delay		8.9			15.4			15.3			15.6	
Approach LOS		A			B			B			B	
Queue Length 50th (ft)		11	0	3	2		43	9		1	54	0
Queue Length 95th (ft)		33	37	12	10		#144	44		6	103	0
Internal Link Dist (ft)		510			548			1079			1243	
Turn Bay Length (ft)			100	100			570			160		100
Base Capacity (vph)		588	849	563	749		404	1958		182	1315	774
Starvation Cap Reductn		0	0	0	0		0	0		0	0	0
Spillback Cap Reductn		0	0	0	0		0	0		0	0	0
Storage Cap Reductn		0	0	0	0		0	0		0	0	0
Reduced v/c Ratio		0.09	0.38	0.02	0.01		0.51	0.12		0.01	0.38	0.06

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 44.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 13.7 — Intersection LOS: B
Intersection Capacity Utilization 43.5% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: IA 13 & 29th Ave/Fernow Rd

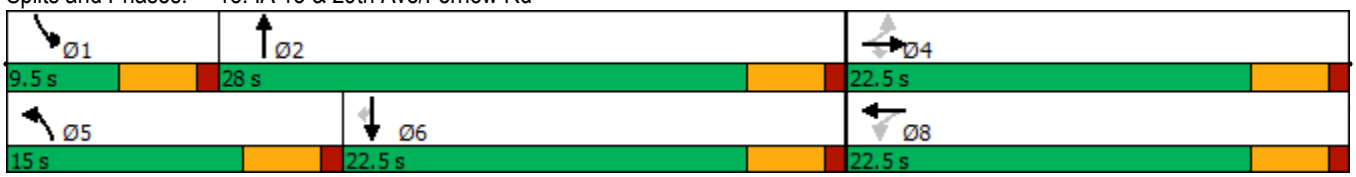


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	3	218	4	8	2	259	440	3	0	312	38
Future Volume (vph)	32	3	218	4	8	2	259	440	3	0	312	38
Satd. Flow (prot)	0	1781	1583	1770	1803	0	1656	3309	0	1652	3139	1583
Flt Permitted		0.732		0.731			0.950					
Satd. Flow (perm)	0	1364	1583	1362	1803	0	1656	3309	0	1652	3139	1583
Satd. Flow (RTOR)			253		3			1				191
Peak Hour Factor	0.86	0.86	0.86	0.70	0.70	0.70	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	15%	15%	2%
Adj. Flow (vph)	37	3	253	6	11	3	276	468	3	0	355	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	253	6	14	0	276	471	0	0	355	43
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	22.5	22.5	22.5	22.5	22.5		15.0	28.0		9.5	22.5	22.5
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		7.3	7.3	7.3	7.3		10.6	25.3			10.1	10.1
Actuated g/C Ratio		0.18	0.18	0.18	0.18		0.25	0.61			0.24	0.24
v/c Ratio		0.17	0.52	0.03	0.04		0.65	0.23			0.47	0.08
Control Delay		16.9	7.2	15.0	13.8		26.6	4.4			16.0	0.3
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay		16.9	7.2	15.0	13.8		26.6	4.4			16.0	0.3
LOS		B	A	B	B		C	A			B	A
Approach Delay		8.5			14.2			12.6			14.3	
Approach LOS		A			B			B			B	
Queue Length 50th (ft)		8	0	1	2		55	18			35	0
Queue Length 95th (ft)		27	39	7	10		#184	48			72	0
Internal Link Dist (ft)		510			548			1079			1243	
Turn Bay Length (ft)			100	100			570					100
Base Capacity (vph)		596	834	595	789		422	2027			1371	799
Starvation Cap Reductn		0	0	0	0		0	0			0	0
Spillback Cap Reductn		0	0	0	0		0	0			0	0
Storage Cap Reductn		0	0	0	0		0	0			0	0
Reduced v/c Ratio		0.07	0.30	0.01	0.02		0.65	0.23			0.26	0.05

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 41.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 12.3 — Intersection LOS: B
Intersection Capacity Utilization 42.8% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

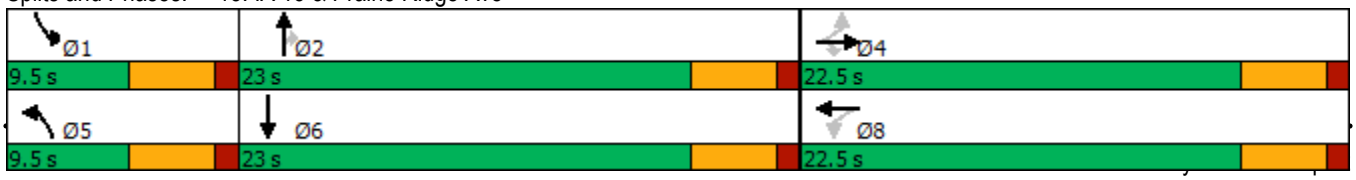
Splits and Phases: 18: IA 13 & 29th Ave/Fernow Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	7	27	95	3	46	3	382	17	20	661	5
Future Volume (vph)	3	7	27	95	3	46	3	382	17	20	661	5
Satd. Flow (prot)	0	1835	1583	1770	1600	0	1770	3312	1482	1656	3309	0
Flt Permitted		0.905		0.747			0.950			0.950		
Satd. Flow (perm)	0	1686	1583	1391	1600	0	1770	3312	1482	1656	3309	0
Satd. Flow (RTOR)			119		60				119		1	
Peak Hour Factor	0.66	0.66	0.66	0.77	0.77	0.77	0.85	0.85	0.85	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%
Adj. Flow (vph)	5	11	41	123	4	60	4	449	20	24	787	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	16	41	123	64	0	4	449	20	24	793	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.5	22.5	22.5	22.5	22.5		9.5	23.0	23.0	9.5	23.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		8.9	8.9	8.9	8.9		5.2	20.2	20.2	5.2	20.2	
Actuated g/C Ratio		0.25	0.25	0.25	0.25		0.14	0.56	0.56	0.14	0.56	
v/c Ratio		0.04	0.09	0.36	0.15		0.02	0.24	0.02	0.10	0.43	
Control Delay		11.7	0.3	15.5	5.8		17.3	7.5	0.1	17.9	8.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		11.7	0.3	15.5	5.8		17.3	7.5	0.1	17.9	8.7	
LOS		B	A	B	A		B	A	A	B	A	
Approach Delay		3.5			12.2			7.3			9.0	
Approach LOS		A			B			A			A	
Queue Length 50th (ft)		2	0	15	1		1	21	0	3	43	
Queue Length 95th (ft)		11	0	54	17		8	74	0	22	135	
Internal Link Dist (ft)		715			754			1408			1079	
Turn Bay Length (ft)			100	100			135		100	150		
Base Capacity (vph)		886	888	731	869		258	2031	955	241	2030	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.02	0.05	0.17	0.07		0.02	0.22	0.02	0.10	0.39	

Intersection Summary			
Cycle Length: 55			
Actuated Cycle Length: 35.9			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.43			
Intersection Signal Delay: 8.6		Intersection LOS: A	
Intersection Capacity Utilization 39.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 15: IA 13 & Prairie Ridge Ave

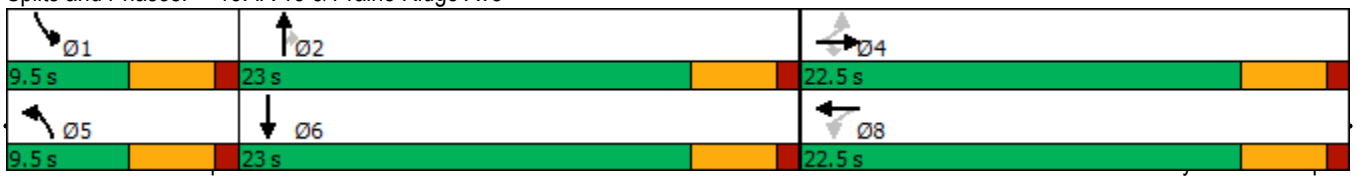


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	14	17	34	9	28	23	688	45	32	499	3
Future Volume (vph)	0	14	17	34	9	28	23	688	45	32	499	3
Satd. Flow (prot)	0	1863	1583	1770	1652	0	1656	3312	1482	1656	3310	0
Flt Permitted				0.976			0.950			0.950		
Satd. Flow (perm)	0	1863	1583	1818	1652	0	1656	3312	1482	1656	3310	0
Satd. Flow (RTOR)			119		36				119		1	
Peak Hour Factor	0.71	0.71	0.71	0.77	0.77	0.77	0.93	0.93	0.93	0.82	0.82	0.82
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%	2%
Adj. Flow (vph)	0	20	24	44	12	36	25	740	48	39	609	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	24	44	48	0	25	740	48	39	613	0
Turn Type		NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.5	22.5	22.5	22.5	22.5		9.5	23.0	23.0	9.5	23.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		6.9	6.9	7.0	7.0		5.3	22.9	22.9	5.3	24.4	
Actuated g/C Ratio		0.20	0.20	0.20	0.20		0.15	0.66	0.66	0.15	0.70	
v/c Ratio		0.05	0.06	0.12	0.13		0.10	0.34	0.05	0.16	0.26	
Control Delay		14.7	0.3	15.0	9.1		18.1	7.4	0.3	18.5	5.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		14.7	0.3	15.0	9.1		18.1	7.4	0.3	18.5	5.5	
LOS		B	A	B	A		B	A	A	B	A	
Approach Delay		6.8			11.9			7.3			6.3	
Approach LOS		A			B			A			A	
Queue Length 50th (ft)		3	0	6	2		3	33	0	5	26	
Queue Length 95th (ft)		13	0	25	18		23	116	2	28	82	
Internal Link Dist (ft)		715			754			1408			1079	
Turn Bay Length (ft)			100	100			135		100	150		
Base Capacity (vph)		1017	918	993	918		251	2276	1055	251	2402	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.02	0.03	0.04	0.05		0.10	0.33	0.05	0.16	0.26	

Intersection Summary

Cycle Length: 55
Actuated Cycle Length: 34.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.34
Intersection Signal Delay: 7.1 — Intersection LOS: A
Intersection Capacity Utilization 42.6% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 15: IA 13 & Prairie Ridge Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	41	34	33	1	5	28	417	12	3	731	8
Future Volume (vph)	3	41	34	33	1	5	28	417	12	3	731	8
Satd. Flow (prot)	0	1855	1583	1770	1622	0	1770	3312	1583	1770	3308	0
Flt Permitted		0.971		0.976			0.950			0.950		
Satd. Flow (perm)	0	1809	1583	1818	1622	0	1770	3312	1583	1770	3308	0
Satd. Flow (RTOR)			119		6				119		2	
Peak Hour Factor	0.85	0.85	0.85	0.81	0.81	0.81	0.87	0.87	0.87	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	9%	2%	2%	9%	2%
Adj. Flow (vph)	4	48	40	41	1	6	32	479	14	4	860	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	52	40	41	7	0	32	479	14	4	869	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.5	22.5	22.5	22.5	22.5		9.5	23.0	23.0	9.5	23.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		6.9	6.9	6.9	6.9		5.2	23.7	23.7	5.2	23.7	
Actuated g/C Ratio		0.20	0.20	0.20	0.20		0.15	0.70	0.70	0.15	0.70	
v/c Ratio		0.14	0.10	0.11	0.02		0.12	0.21	0.01	0.01	0.38	
Control Delay		14.2	0.5	14.0	10.0		17.0	5.4	0.0	16.3	6.3	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		14.2	0.5	14.0	10.0		17.0	5.4	0.0	16.3	6.3	
LOS		B	A	B	A		B	A	A	B	A	
Approach Delay		8.3			13.4			6.0			6.4	
Approach LOS		A			B			A			A	
Queue Length 50th (ft)		8	0	6	0		5	19	0	1	41	
Queue Length 95th (ft)		31	0	25	7		26	68	0	7	128	
Internal Link Dist (ft)		488			792			1628			1408	
Turn Bay Length (ft)			100	100			145		100	145		
Base Capacity (vph)		988	918	993	888		268	2302	1136	268	2300	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.05	0.04	0.04	0.01		0.12	0.21	0.01	0.01	0.38	

Intersection Summary			
Cycle Length: 55			
Actuated Cycle Length: 34.1			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.38			
Intersection Signal Delay: 6.6		Intersection LOS: A	
Intersection Capacity Utilization 40.0%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 12: IA 13 & Kacena Ave/E Kacena Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	32	25	19	6	8	34	818	41	9	572	11
Future Volume (vph)	19	32	25	19	6	8	34	818	41	9	572	11
Satd. Flow (prot)	0	1829	1583	1770	1706	0	1770	3539	1583	1770	3529	0
Flt Permitted		0.871		0.952			0.950			0.950		
Satd. Flow (perm)	0	1622	1583	1773	1706	0	1770	3539	1583	1770	3529	0
Satd. Flow (RTOR)			119		9				119		4	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	23	39	30	21	7	9	35	843	42	9	590	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	30	21	16	0	35	843	42	9	601	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.5	22.5	22.5	22.5	22.5		9.9	23.0	23.0	9.5	22.6	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		7.0	7.0	6.9	6.9		5.6	22.7	22.7	5.2	22.7	
Actuated g/C Ratio		0.21	0.21	0.21	0.21		0.17	0.68	0.68	0.16	0.68	
v/c Ratio		0.18	0.07	0.06	0.04		0.12	0.35	0.04	0.03	0.25	
Control Delay		14.1	0.3	13.2	10.2		16.1	6.2	0.1	16.0	5.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		14.1	0.3	13.2	10.2		16.1	6.2	0.1	16.0	5.7	
LOS		B	A	B	B		B	A	A	B	A	
Approach Delay		9.6			11.9			6.3			5.9	
Approach LOS		A			B			A			A	
Queue Length 50th (ft)		9	0	3	1		5	39	0	1	25	
Queue Length 95th (ft)		35	0	18	13		28	132	1	12	91	
Internal Link Dist (ft)		488			792			1628			1408	
Turn Bay Length (ft)			100	100			145		100	145		
Base Capacity (vph)		911	941	996	962		298	2496	1151	276	2467	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.07	0.03	0.02	0.02		0.12	0.34	0.04	0.03	0.24	

Intersection Summary	
Cycle Length: 55	
Actuated Cycle Length: 33.3	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.35	
Intersection Signal Delay: 6.5	Intersection LOS: A
Intersection Capacity Utilization 45.2%	ICU Level of Service A
Analysis Period (min) 15	

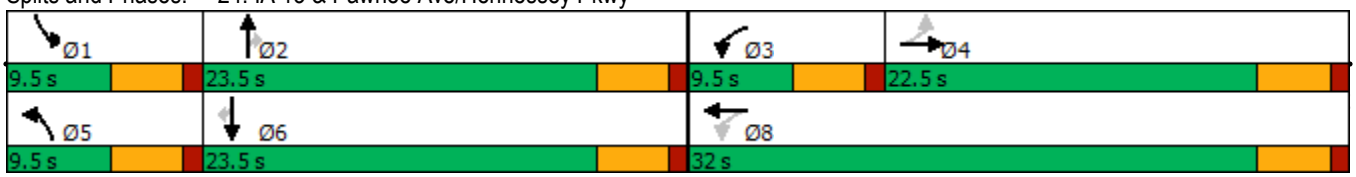
Splits and Phases: 12: IA 13 & Kacena Ave/E Kacena Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	13	6	126	103	83	5	413	51	76	742	7
Future Volume (vph)	0	13	6	126	103	83	5	413	51	76	742	7
Satd. Flow (prot)	0	1783	0	1770	1738	0	1770	3312	1482	1656	3312	1482
Flt Permitted				0.571			0.950			0.950		
Satd. Flow (perm)	0	1783	0	1064	1738	0	1770	3312	1482	1656	3312	1482
Satd. Flow (RTOR)		9			77				176			176
Peak Hour Factor	0.68	0.68	0.68	0.94	0.94	0.94	0.83	0.83	0.83	0.78	0.78	0.78
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%
Adj. Flow (vph)	0	19	9	134	110	88	6	498	61	97	951	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	28	0	134	198	0	6	498	61	97	951	9
Turn Type		NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Total Split (s)	22.5	22.5		9.5	32.0		9.5	23.5	23.5	9.5	23.5	23.5
Total Lost Time (s)		4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		6.2		9.5	9.5		5.0	21.7	21.7	5.0	27.6	27.6
Actuated g/C Ratio		0.13		0.20	0.20		0.10	0.45	0.45	0.10	0.58	0.58
v/c Ratio		0.12		0.42	0.49		0.03	0.33	0.08	0.56	0.50	0.01
Control Delay		17.2		20.0	14.5		21.6	11.0	0.2	37.8	10.0	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		17.2		20.0	14.5		21.6	11.0	0.2	37.8	10.0	0.0
LOS		B		C	B		C	B	A	D	B	A
Approach Delay		17.2			16.7			9.9			12.5	
Approach LOS		B			B			A			B	
Queue Length 50th (ft)		5		32	28		2	45	0	25	56	0
Queue Length 95th (ft)		17		67	70		10	88	0	#72	168	0
Internal Link Dist (ft)		494			759			838			1628	
Turn Bay Length (ft)				180			230		130	235		135
Base Capacity (vph)		680		318	1038		186	1503	768	174	1912	930
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.04		0.42	0.19		0.03	0.33	0.08	0.56	0.50	0.01

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 47.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 12.5 — Intersection LOS: B
Intersection Capacity Utilization 49.6% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: IA 13 & Pawnee Ave/Hennessey Pkwy

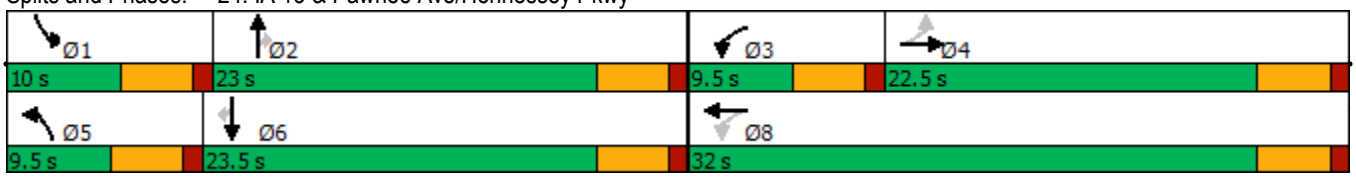


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	48	34	150	147	83	42	678	165	89	537	23
Future Volume (vph)	11	48	34	150	147	83	42	678	165	89	537	23
Satd. Flow (prot)	0	1759	0	1770	1762	0	1656	3312	1482	1656	3312	1583
Flt Permitted		0.930		0.494			0.950			0.950		
Satd. Flow (perm)	0	1646	0	920	1762	0	1656	3312	1482	1656	3312	1583
Satd. Flow (RTOR)		44			54				181			176
Peak Hour Factor	0.73	0.73	0.73	0.89	0.89	0.89	0.91	0.91	0.91	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%	2%
Adj. Flow (vph)	15	66	47	169	165	93	46	745	181	92	554	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	128	0	169	258	0	46	745	181	92	554	24
Turn Type	Perm	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Total Split (s)	22.5	22.5		9.5	32.0		9.5	23.0	23.0	10.0	23.5	23.5
Total Lost Time (s)		4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		8.6		15.6	15.6		5.2	19.4	19.4	5.7	23.4	23.4
Actuated g/C Ratio		0.17		0.30	0.30		0.10	0.37	0.37	0.11	0.45	0.45
v/c Ratio		0.41		0.47	0.45		0.28	0.60	0.27	0.51	0.37	0.03
Control Delay		19.3		18.6	14.1		29.2	17.9	4.2	37.2	12.7	0.1
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		19.3		18.6	14.1		29.2	17.9	4.2	37.2	12.7	0.1
LOS		B		B	B		C	B	A	D	B	A
Approach Delay		19.3			15.9			15.9			15.6	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)		25		41	51		14	107	0	30	50	0
Queue Length 95th (ft)		49		79	100		43	177	37	#89	124	0
Internal Link Dist (ft)		494			759			838			1628	
Turn Bay Length (ft)				180			230		130	235		135
Base Capacity (vph)		623		362	997		166	1240	668	182	1495	811
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.21		0.47	0.26		0.28	0.60	0.27	0.51	0.37	0.03

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 51.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 16.0 — Intersection LOS: B
Intersection Capacity Utilization 49.9% — ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: IA 13 & Pawnee Ave/Hennessey Pkwy

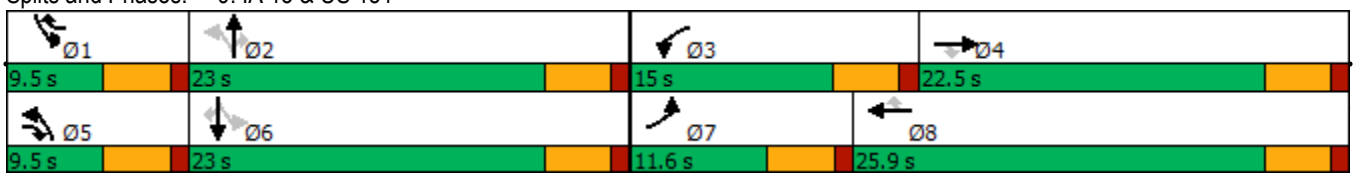


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	189	134	472	258	83	64	229	245	106	573	173
Future Volume (vph)	57	189	134	472	258	83	64	229	245	106	573	173
Satd. Flow (prot)	1641	3282	1468	3183	3282	1468	1597	3195	1482	1656	3312	1482
Flt Permitted	0.950			0.950			0.296			0.591		
Satd. Flow (perm)	1641	3282	1468	3183	3282	1468	498	3195	1482	1030	3312	1482
Satd. Flow (RTOR)			94			94			278			190
Peak Hour Factor	0.92	0.92	0.92	0.89	0.89	0.89	0.88	0.88	0.88	0.91	0.91	0.91
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	13%	13%	9%	9%	9%	9%
Adj. Flow (vph)	62	205	146	530	290	93	73	260	278	116	630	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	205	146	530	290	93	73	260	278	116	630	190
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	11.6	22.5	9.5	15.0	25.9	9.5	9.5	23.0	23.0	9.5	23.0	23.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	6.7	9.0	18.6	10.6	17.5	27.1	22.5	18.7	18.7	22.5	18.7	18.7
Actuated g/C Ratio	0.11	0.15	0.31	0.18	0.30	0.46	0.38	0.32	0.32	0.38	0.32	0.32
v/c Ratio	0.34	0.41	0.28	0.93	0.30	0.13	0.26	0.26	0.42	0.26	0.60	0.32
Control Delay	31.0	25.9	8.5	52.6	19.8	3.9	12.6	17.2	5.0	12.2	21.1	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	25.9	8.5	52.6	19.8	3.9	12.6	17.2	5.0	12.2	21.1	4.9
LOS	C	C	A	D	B	A	B	B	A	B	C	A
Approach Delay		20.5			37.2			11.1			16.7	
Approach LOS		C			D			B			B	
Queue Length 50th (ft)	22	36	14	101	49	0	14	37	0	24	104	0
Queue Length 95th (ft)	55	64	49	#197	80	23	36	66	45	54	162	40
Internal Link Dist (ft)		644			986			1671			838	
Turn Bay Length (ft)	250		330	340		140	275		340	290		290
Base Capacity (vph)	198	1006	526	569	1216	723	282	1007	657	444	1044	597
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.20	0.28	0.93	0.24	0.13	0.26	0.26	0.42	0.26	0.60	0.32

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 59.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 22.6 — Intersection LOS: C
Intersection Capacity Utilization 53.7% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: IA 13 & US 151

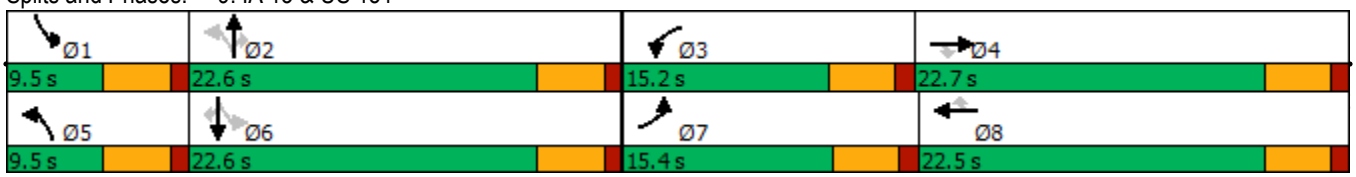


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	245	319	106	389	220	109	133	573	493	113	417	174
Future Volume (vph)	245	319	106	389	220	109	133	573	493	113	417	174
Satd. Flow (prot)	1641	3282	1468	3183	3282	1468	1597	3195	1429	1656	3312	1482
Flt Permitted	0.950			0.950			0.412			0.317		
Satd. Flow (perm)	1641	3282	1468	3183	3282	1468	693	3195	1429	553	3312	1482
Satd. Flow (RTOR)			164			164			508			198
Peak Hour Factor	0.95	0.95	0.95	0.88	0.88	0.88	0.97	0.97	0.97	0.88	0.88	0.88
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	13%	13%	13%	9%	9%	9%
Adj. Flow (vph)	258	336	112	442	250	124	137	591	508	128	474	198
Shared Lane Traffic (%)												
Lane Group Flow (vph)	258	336	112	442	250	124	137	591	508	128	474	198
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	15.4	22.7	22.7	15.2	22.5	22.5	9.5	22.6	22.6	9.5	22.6	22.6
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	11.0	11.7	11.7	10.8	11.5	11.5	22.1	18.3	18.3	22.1	18.3	18.3
Actuated g/C Ratio	0.18	0.19	0.19	0.18	0.19	0.19	0.36	0.30	0.30	0.36	0.30	0.30
v/c Ratio	0.88	0.54	0.27	0.79	0.41	0.30	0.43	0.62	0.65	0.44	0.48	0.34
Control Delay	60.4	26.4	3.4	38.7	24.6	4.3	17.3	23.5	6.8	18.0	21.1	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.4	26.4	3.4	38.7	24.6	4.3	17.3	23.5	6.8	18.0	21.1	5.4
LOS	E	C	A	D	C	A	B	C	A	B	C	A
Approach Delay		35.2			29.2			16.0			16.7	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	99	62	0	86	45	0	31	104	0	29	79	0
Queue Length 95th (ft)	#244	98	17	#165	73	21	71	170	74	64	129	41
Internal Link Dist (ft)		644			986			1671			838	
Turn Bay Length (ft)	250		330	340		140	275		340	290		290
Base Capacity (vph)	293	978	552	557	967	548	322	947	780	288	981	578
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.34	0.20	0.79	0.26	0.23	0.43	0.62	0.65	0.44	0.48	0.34

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 61.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 23.0 — Intersection LOS: C
Intersection Capacity Utilization 57.0% — ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: IA 13 & US 151

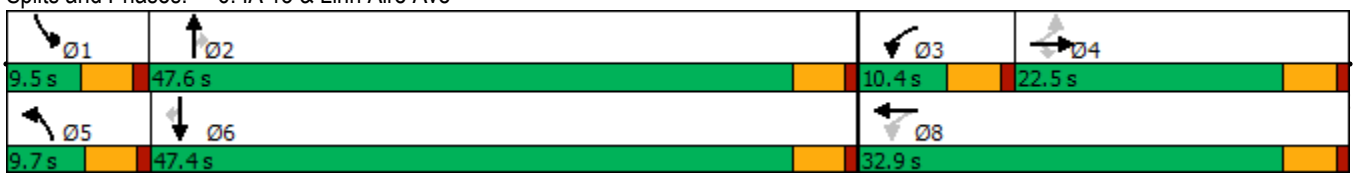


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	210	55	164	0	20	64	634	122	8	1332	15
Future Volume (vph)	6	210	55	164	0	20	64	634	122	8	1332	15
Satd. Flow (prot)	0	1861	1583	1770	1583	0	1597	3195	1429	1597	3195	1429
Flt Permitted		0.994		0.253			0.950			0.950		
Satd. Flow (perm)	0	1852	1583	471	1583	0	1597	3195	1429	1597	3195	1429
Satd. Flow (RTOR)			127		246				140			127
Peak Hour Factor	0.89	0.89	0.89	0.78	0.78	0.78	0.87	0.87	0.87	0.91	0.91	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	13%	13%	13%
Adj. Flow (vph)	7	236	62	210	0	26	74	729	140	9	1464	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	243	62	210	26	0	74	729	140	9	1464	16
Turn Type	Perm	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Total Split (s)	22.5	22.5	22.5	10.4	32.9		9.7	47.6	47.6	9.5	47.4	47.4
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		15.1	15.1	25.6	25.6		5.2	48.9	48.9	5.0	43.2	43.2
Actuated g/C Ratio		0.18	0.18	0.30	0.30		0.06	0.57	0.57	0.06	0.51	0.51
v/c Ratio		0.74	0.16	0.91	0.04		0.76	0.40	0.16	0.10	0.91	0.02
Control Delay		48.1	0.9	68.9	0.1		86.8	11.8	2.7	42.8	30.5	0.1
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		48.1	0.9	68.9	0.1		86.8	11.8	2.7	42.8	30.5	0.1
LOS		D	A	E	A		F	B	A	D	C	A
Approach Delay		38.5			61.3			16.4			30.2	
Approach LOS		D			E			B			C	
Queue Length 50th (ft)		128	0	92	0		42	104	0	5	393	0
Queue Length 95th (ft)		205	0	#162	0		#115	181	27	20	#575	0
Internal Link Dist (ft)		471			794			3953			1671	
Turn Bay Length (ft)			140	150			175		150	155		225
Base Capacity (vph)		393	436	231	693		97	1830	878	94	1617	786
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.62	0.14	0.91	0.04		0.76	0.40	0.16	0.10	0.91	0.02

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 85.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 29.1 — Intersection LOS: C
Intersection Capacity Utilization 76.5% — ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: IA 13 & Linn Aire Ave

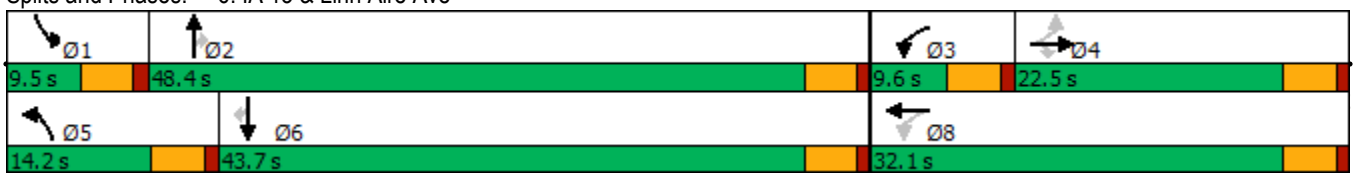


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	77	119	114	12	23	105	1342	87	10	872	16
Future Volume (vph)	16	77	119	114	12	23	105	1342	87	10	872	16
Satd. Flow (prot)	0	1846	1583	1770	1680	0	1597	3195	1429	1597	3195	1583
Flt Permitted		0.939		0.447			0.950			0.950		
Satd. Flow (perm)	0	1749	1583	833	1680	0	1597	3195	1429	1597	3195	1583
Satd. Flow (RTOR)			182		32				127			182
Peak Hour Factor	0.78	0.78	0.78	0.72	0.72	0.72	0.93	0.93	0.93	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	13%	13%	2%
Adj. Flow (vph)	21	99	153	158	17	32	113	1443	94	11	948	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	120	153	158	49	0	113	1443	94	11	948	17
Turn Type	Perm	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Total Split (s)	22.5	22.5	22.5	9.6	32.1		14.2	48.4	48.4	9.5	43.7	43.7
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		10.8	10.8	20.5	20.5		9.1	49.8	49.8	5.0	40.6	40.6
Actuated g/C Ratio		0.13	0.13	0.25	0.25		0.11	0.61	0.61	0.06	0.50	0.50
v/c Ratio		0.52	0.41	0.59	0.11		0.63	0.74	0.10	0.11	0.59	0.02
Control Delay		41.3	7.0	35.4	12.8		52.8	15.6	1.4	41.0	17.9	0.1
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		41.3	7.0	35.4	12.8		52.8	15.6	1.4	41.0	17.9	0.1
LOS		D	A	D	B		D	B	A	D	B	A
Approach Delay		22.1			30.1			17.3			17.8	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		59	0	68	7		57	225	0	6	185	0
Queue Length 95th (ft)		94	19	93	23		#133	#523	13	22	275	0
Internal Link Dist (ft)		471			794			3953			1671	
Turn Bay Length (ft)			140	150			175		150	155		225
Base Capacity (vph)		390	495	269	596		192	1960	925	99	1598	883
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.31	0.31	0.59	0.08		0.59	0.74	0.10	0.11	0.59	0.02

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 81.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 18.8 — Intersection LOS: B
Intersection Capacity Utilization 65.5% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: IA 13 & Linn Aire Ave

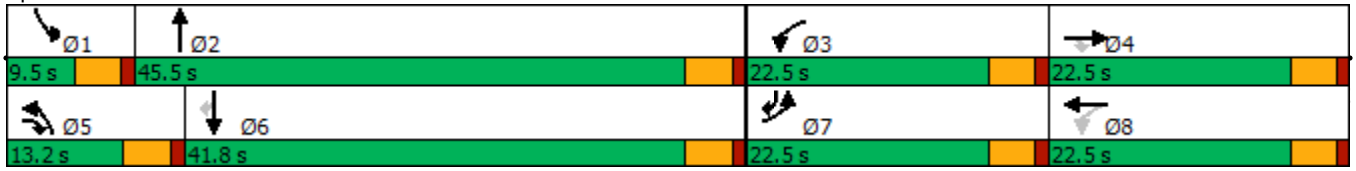


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	298	14	280	23	119	10	205	458	4	9	1087	370
Future Volume (vph)	298	14	280	23	119	10	205	458	4	9	1087	370
Satd. Flow (prot)	3303	1792	1524	1770	1840	0	3072	3163	0	1597	3195	1429
Flt Permitted	0.950			0.748			0.950			0.950		
Satd. Flow (perm)	3303	1792	1524	1393	1840	0	3072	3163	0	1597	3195	1429
Satd. Flow (RTOR)			308		4			1				311
Peak Hour Factor	0.91	0.91	0.91	0.83	0.83	0.83	0.83	0.83	0.83	0.90	0.90	0.90
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	14%	14%	14%	13%	13%	13%
Adj. Flow (vph)	327	15	308	28	143	12	247	552	5	10	1208	411
Shared Lane Traffic (%)												
Lane Group Flow (vph)	327	15	308	28	155	0	247	557	0	10	1208	411
Turn Type	Prot	NA	pm+ov	pm+pt	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4	5	3	8		5	2		1	6	7
Permitted Phases			4	8								6
Total Split (s)	22.5	22.5	13.2	22.5	22.5		13.2	45.5		9.5	41.8	22.5
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)	13.9	23.8	36.8	16.2	9.7		8.5	48.8		5.0	37.6	56.0
Actuated g/C Ratio	0.16	0.27	0.42	0.18	0.11		0.10	0.56		0.06	0.43	0.64
v/c Ratio	0.62	0.03	0.38	0.10	0.75		0.83	0.32		0.11	0.88	0.40
Control Delay	40.6	26.1	3.8	21.3	59.4		65.1	12.9		45.6	34.0	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	40.6	26.1	3.8	21.3	59.4		65.1	12.9		45.6	34.0	3.4
LOS	D	C	A	C	E		E	B		D	C	A
Approach Delay		22.8			53.6			29.0			26.3	
Approach LOS		C			D			C			C	
Queue Length 50th (ft)	87	6	0	11	82		70	76		5	313	19
Queue Length 95th (ft)	139	23	51	26	138		#132	153		23	#539	66
Internal Link Dist (ft)		878			856			854			3953	
Turn Bay Length (ft)	400		300	125			400			130		385
Base Capacity (vph)	681	485	821	501	382		306	1760		91	1366	1077
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.48	0.03	0.38	0.06	0.41		0.81	0.32		0.11	0.88	0.38

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 87.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 27.8 — Intersection LOS: C
Intersection Capacity Utilization 66.3% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: IA 13 & IA 100/Secrist Rd

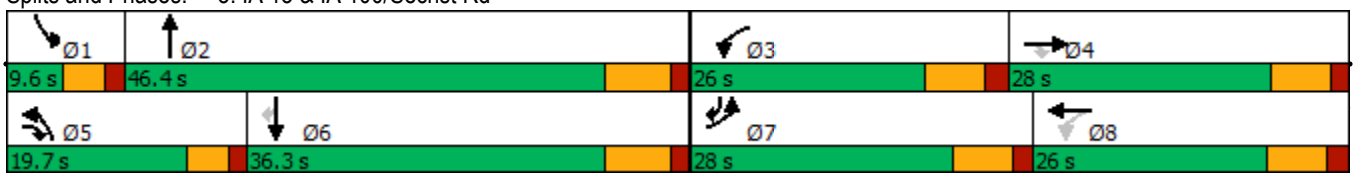


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	494	75	241	5	62	15	368	998	26	18	714	335
Future Volume (vph)	494	75	241	5	62	15	368	998	26	18	714	335
Satd. Flow (prot)	3303	1792	1524	1770	1809	0	3072	3154	0	1597	3195	1583
Flt Permitted	0.950			0.704			0.950			0.950		
Satd. Flow (perm)	3303	1792	1524	1311	1809	0	3072	3154	0	1597	3195	1583
Satd. Flow (RTOR)			259		9			3				399
Peak Hour Factor	0.93	0.93	0.93	0.82	0.82	0.82	0.91	0.91	0.91	0.84	0.84	0.84
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	14%	14%	14%	13%	13%	2%
Adj. Flow (vph)	531	81	259	6	76	18	404	1097	29	21	850	399
Shared Lane Traffic (%)												
Lane Group Flow (vph)	531	81	259	6	94	0	404	1126	0	21	850	399
Turn Type	Prot	NA	pm+ov	pm+pt	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4	5	3	8		5	2		1	6	7
Permitted Phases			4	8								6
Total Split (s)	28.0	28.0	19.7	26.0	26.0		19.7	46.4		9.6	36.3	28.0
Total Lost Time (s)	6.6	6.6	5.0	6.9	6.9		5.0	7.1		5.0	7.1	6.6
Act Effct Green (s)	19.3	28.2	49.4	11.9	6.8		14.5	45.6		4.7	29.5	56.0
Actuated g/C Ratio	0.21	0.30	0.53	0.13	0.07		0.15	0.49		0.05	0.32	0.60
v/c Ratio	0.78	0.15	0.28	0.03	0.67		0.85	0.73		0.27	0.84	0.36
Control Delay	45.0	25.3	2.7	22.6	62.7		57.8	26.0		54.9	40.9	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	45.0	25.3	2.7	22.6	62.7		57.8	26.0		54.9	40.9	2.1
LOS	D	C	A	C	E		E	C		D	D	A
Approach Delay		30.6			60.3			34.4			28.9	
Approach LOS		C			E			C			C	
Queue Length 50th (ft)	159	33	0	2	53		128	274		13	265	0
Queue Length 95th (ft)	229	81	42	10	94		#224	#503		36	#355	28
Internal Link Dist (ft)		878			856			854			3953	
Turn Bay Length (ft)	400		300	125			400			130		385
Base Capacity (vph)	764	574	931	450	380		488	1536		79	1008	1137
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.70	0.14	0.28	0.01	0.25		0.83	0.73		0.27	0.84	0.35

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 93.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 32.4 — Intersection LOS: C
Intersection Capacity Utilization 68.1% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: IA 13 & IA 100/Secrist Rd



Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	12	48	286	574	12
Future Vol, veh/h	2	12	48	286	574	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	170	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	65	65	77	77	92	92
Heavy Vehicles, %	2	2	15	15	15	2
Mvmt Flow	3	18	62	371	624	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	941	319	637	0	-	0
Stage 1	631	-	-	-	-	-
Stage 2	310	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.4	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.35	-	-	-
Pot Cap-1 Maneuver	262	677	860	-	-	-
Stage 1	492	-	-	-	-	-
Stage 2	717	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	243	677	860	-	-	-
Mov Cap-2 Maneuver	243	-	-	-	-	-
Stage 1	457	-	-	-	-	-
Stage 2	717	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	860	-	539	-	-
HCM Lane V/C Ratio	0.072	-	0.04	-	-
HCM Control Delay (s)	9.5	-	12	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	48	16	626	411	1
Future Vol, veh/h	25	48	16	626	411	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	170	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	37	37	94	94	90	90
Heavy Vehicles, %	2	2	15	15	15	15
Mvmt Flow	68	130	17	666	457	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	825	229	458	0	-	0
Stage 1	458	-	-	-	-	-
Stage 2	367	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.4	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.35	-	-	-
Pot Cap-1 Maneuver	311	774	1013	-	-	-
Stage 1	604	-	-	-	-	-
Stage 2	671	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	306	774	1013	-	-	-
Mov Cap-2 Maneuver	306	-	-	-	-	-
Stage 1	594	-	-	-	-	-
Stage 2	671	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.5	0.2	0
HCM LOS	C		

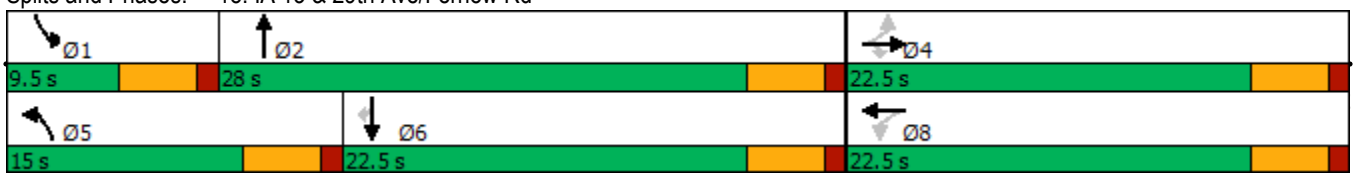
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1013	-	508	-	-
HCM Lane V/C Ratio	0.017	-	0.388	-	-
HCM Control Delay (s)	8.6	-	16.5	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.8	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	8	294	11	7	2	204	281	1	2	570	42
Future Volume (vph)	40	8	294	11	7	2	204	281	1	2	570	42
Satd. Flow (prot)	0	1788	1583	1770	1792	0	1656	3313	0	1570	3139	1404
Flt Permitted		0.756		0.719			0.950			0.950		
Satd. Flow (perm)	0	1408	1583	1339	1792	0	1656	3313	0	1570	3139	1404
Satd. Flow (RTOR)			314		3			1				191
Peak Hour Factor	0.82	0.82	0.82	0.75	0.75	0.75	0.88	0.88	0.88	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	2%	15%	15%	15%
Adj. Flow (vph)	49	10	359	15	9	3	232	319	1	2	671	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	59	359	15	12	0	232	320	0	2	671	49
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	22.5	22.5	22.5	22.5	22.5		15.0	28.0		9.5	22.5	22.5
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		9.1	9.1	9.1	9.1		10.2	28.1		5.1	14.8	14.8
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.21	0.59		0.11	0.31	0.31
v/c Ratio		0.22	0.65	0.06	0.03		0.66	0.17		0.01	0.69	0.09
Control Delay		18.8	9.9	16.5	14.4		31.9	6.7		24.0	19.7	0.3
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		18.8	9.9	16.5	14.4		31.9	6.7		24.0	19.7	0.3
LOS		B	A	B	B		C	A		C	B	A
Approach Delay		11.2			15.6			17.3			18.4	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)		14	11	4	2		57	13		1	78	0
Queue Length 95th (ft)		36	50	13	10		#177	62		6	151	0
Internal Link Dist (ft)		510			548			1079			1243	
Turn Bay Length (ft)			100	100			570			160		100
Base Capacity (vph)		541	802	515	691		371	1948		167	1208	657
Starvation Cap Reductn		0	0	0	0		0	0		0	0	0
Spillback Cap Reductn		0	0	0	0		0	0		0	0	0
Storage Cap Reductn		0	0	0	0		0	0		0	0	0
Reduced v/c Ratio		0.11	0.45	0.03	0.02		0.63	0.16		0.01	0.56	0.07

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 48
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 16.2 — Intersection LOS: B
Intersection Capacity Utilization 49.4% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: IA 13 & 29th Ave/Fernow Rd

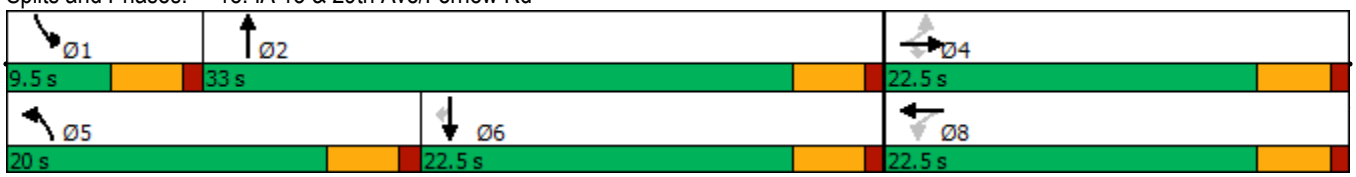


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	3	243	4	9	2	289	588	3	0	417	42
Future Volume (vph)	36	3	243	4	9	2	289	588	3	0	417	42
Satd. Flow (prot)	0	1779	1583	1770	1811	0	1656	3309	0	1652	3139	1583
Flt Permitted		0.729		0.728			0.950					
Satd. Flow (perm)	0	1358	1583	1356	1811	0	1656	3309	0	1652	3139	1583
Satd. Flow (RTOR)			283		3			1				176
Peak Hour Factor	0.86	0.86	0.86	0.70	0.70	0.70	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	15%	15%	2%
Adj. Flow (vph)	42	3	283	6	13	3	307	626	3	0	474	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	283	6	16	0	307	629	0	0	474	48
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	22.5	22.5	22.5	22.5	22.5		20.0	33.0		9.5	22.5	22.5
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		7.8	7.8	7.8	7.8		13.4	30.8			12.7	12.7
Actuated g/C Ratio		0.16	0.16	0.16	0.16		0.28	0.64			0.27	0.27
v/c Ratio		0.20	0.57	0.03	0.05		0.66	0.30			0.57	0.09
Control Delay		21.3	8.4	18.8	17.4		25.5	4.3			18.8	0.3
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay		21.3	8.4	18.8	17.4		25.5	4.3			18.8	0.3
LOS		C	A	B	B		C	A			B	A
Approach Delay		10.1			17.7			11.3			17.1	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)		11	0	1	3		70	27			60	0
Queue Length 95th (ft)		35	45	8	13		#207	68			111	0
Internal Link Dist (ft)		510			548			1079			1243	
Turn Bay Length (ft)			100	100			570					100
Base Capacity (vph)		526	786	525	703		552	2260			1215	721
Starvation Cap Reductn		0	0	0	0		0	0			0	0
Spillback Cap Reductn		0	0	0	0		0	0			0	0
Storage Cap Reductn		0	0	0	0		0	0			0	0
Reduced v/c Ratio		0.09	0.36	0.01	0.02		0.56	0.28			0.39	0.07

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 47.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 12.8 — Intersection LOS: B
Intersection Capacity Utilization 47.6% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: IA 13 & 29th Ave/Fernow Rd

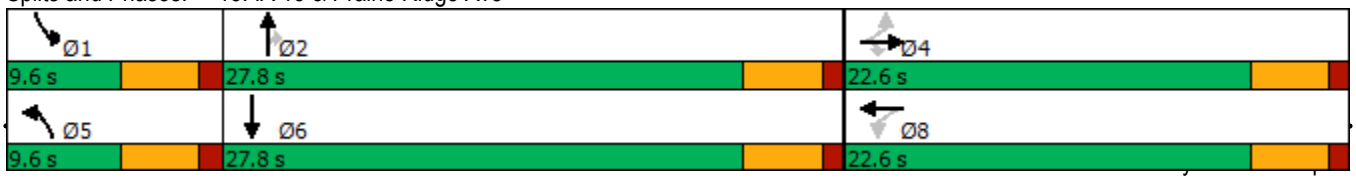


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	8	30	106	3	51	3	511	19	22	884	6
Future Volume (vph)	3	8	30	106	3	51	3	511	19	22	884	6
Satd. Flow (prot)	0	1837	1583	1770	1600	0	1656	3312	1482	1656	3534	0
Flt Permitted		0.915		0.746			0.950			0.950		
Satd. Flow (perm)	0	1704	1583	1390	1600	0	1656	3312	1482	1656	3534	0
Satd. Flow (RTOR)			109		66				109		1	
Peak Hour Factor	0.66	0.66	0.66	0.77	0.77	0.77	0.85	0.85	0.85	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	2%	9%
Adj. Flow (vph)	5	12	45	138	4	66	4	601	22	26	1052	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	45	138	70	0	4	601	22	26	1059	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.6	22.6	22.6	22.6	22.6		9.6	27.8	27.8	9.6	27.8	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		9.7	9.7	9.9	9.9		5.4	23.9	23.9	5.4	23.9	
Actuated g/C Ratio		0.24	0.24	0.25	0.25		0.13	0.59	0.59	0.13	0.59	
v/c Ratio		0.04	0.10	0.41	0.16		0.02	0.31	0.02	0.12	0.51	
Control Delay		13.7	0.7	18.3	6.3		20.7	7.7	0.1	21.3	9.3	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		13.7	0.7	18.3	6.3		20.7	7.7	0.1	21.3	9.3	
LOS		B	A	B	A		C	A	A	C	A	
Approach Delay		4.2			14.3			7.5			9.6	
Approach LOS		A			B			A			A	
Queue Length 50th (ft)		2	0	22	1		1	33	0	5	68	
Queue Length 95th (ft)		12	0	67	19		9	105	0	26	197	
Internal Link Dist (ft)		715			754			1408			1079	
Turn Bay Length (ft)			100	100			135		100	150		
Base Capacity (vph)		807	807	658	792		220	2132	993	220	2276	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.02	0.06	0.21	0.09		0.02	0.28	0.02	0.12	0.47	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 40.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 9.2 — Intersection LOS: A
Intersection Capacity Utilization 45.9% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 15: IA 13 & Prairie Ridge Ave

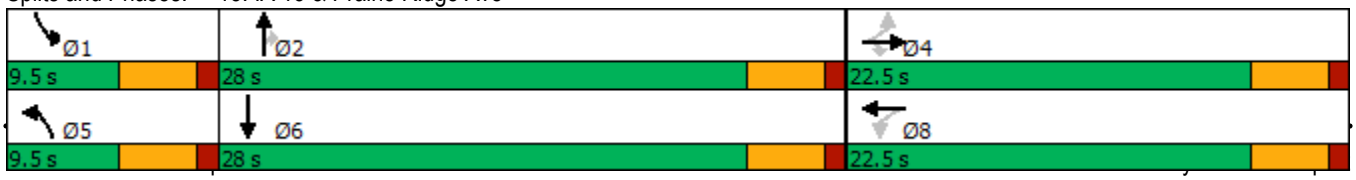


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	16	19	38	10	31	26	920	50	36	667	3
Future Volume (vph)	0	16	19	38	10	31	26	920	50	36	667	3
Satd. Flow (prot)	0	1863	1583	1770	1652	0	1656	3312	1482	1656	3309	0
Flt Permitted				0.952			0.950			0.950		
Satd. Flow (perm)	0	1863	1583	1773	1652	0	1656	3312	1482	1656	3309	0
Satd. Flow (RTOR)			109		40				109		1	
Peak Hour Factor	0.71	0.71	0.71	0.77	0.77	0.77	0.93	0.93	0.93	0.82	0.82	0.82
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	0	23	27	49	13	40	28	989	54	44	813	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	23	27	49	53	0	28	989	54	44	817	0
Turn Type		NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.5	22.5	22.5	22.5	22.5		9.5	28.0	28.0	9.5	28.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		7.2	7.2	7.3	7.3		5.3	26.8	26.8	5.3	28.2	
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.14	0.69	0.69	0.14	0.73	
v/c Ratio		0.07	0.07	0.15	0.15		0.12	0.43	0.05	0.19	0.34	
Control Delay		17.1	0.4	17.5	10.0		21.1	7.6	0.7	21.7	5.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		17.1	0.4	17.5	10.0		21.1	7.6	0.7	21.7	5.5	
LOS		B	A	B	B		C	A	A	C	A	
Approach Delay		8.1			13.6			7.6			6.4	
Approach LOS		A			B			A			A	
Queue Length 50th (ft)		3	0	7	2		5	51	0	7	38	
Queue Length 95th (ft)		16	0	30	21		27	168	5	34	114	
Internal Link Dist (ft)		715			754			1408			1079	
Turn Bay Length (ft)			100	100			135		100	150		
Base Capacity (vph)		925	841	880	841		228	2395	1102	228	2518	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.02	0.03	0.06	0.06		0.12	0.41	0.05	0.19	0.32	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 38.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.43
Intersection Signal Delay: 7.4 — Intersection LOS: A
Intersection Capacity Utilization 46.2% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 15: IA 13 & Prairie Ridge Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	46	38	37	1	6	31	558	13	3	978	9
Future Volume (vph)	3	46	38	37	1	6	31	558	13	3	978	9
Satd. Flow (prot)	0	1857	1583	1770	1619	0	1770	3539	1583	1770	3536	0
Flt Permitted		0.974		0.952			0.950			0.950		
Satd. Flow (perm)	0	1814	1583	1773	1619	0	1770	3539	1583	1770	3536	0
Satd. Flow (RTOR)			109		7				109		2	
Peak Hour Factor	0.85	0.85	0.85	0.81	0.81	0.81	0.87	0.87	0.87	0.85	0.85	0.85
Adj. Flow (vph)	4	54	45	46	1	7	36	641	15	4	1151	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	58	45	46	8	0	36	641	15	4	1162	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.6	22.6	22.6	22.6	22.6		9.6	27.8	27.8	9.6	27.8	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		7.2	7.2	7.2	7.2		5.4	29.8	29.8	5.4	28.2	
Actuated g/C Ratio		0.18	0.18	0.18	0.18		0.13	0.74	0.74	0.13	0.70	
v/c Ratio		0.18	0.12	0.15	0.03		0.15	0.25	0.01	0.02	0.47	
Control Delay		18.2	1.2	18.0	12.2		21.4	4.9	0.0	20.3	7.8	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		18.2	1.2	18.0	12.2		21.4	4.9	0.0	20.3	7.8	
LOS		B	A	B	B		C	A	A	C	A	
Approach Delay		10.8			17.1			5.7			7.8	
Approach LOS		B			B			A			A	
Queue Length 50th (ft)		10	0	8	0		7	27	0	1	62	
Queue Length 95th (ft)		38	2	30	8		31	92	0	8	184	
Internal Link Dist (ft)		488			792			1628			1408	
Turn Bay Length (ft)			100	100			145		100	145		
Base Capacity (vph)		855	804	836	767		235	2638	1208	235	2500	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.07	0.06	0.06	0.01		0.15	0.24	0.01	0.02	0.46	

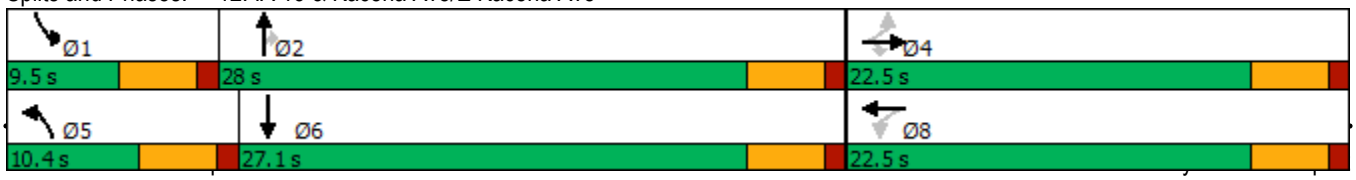
Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 40.3			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.47			
Intersection Signal Delay: 7.5		Intersection LOS: A	
Intersection Capacity Utilization 46.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 12: IA 13 & Kacena Ave/E Kacena Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	36	28	21	7	9	38	1094	46	10	765	12
Future Volume (vph)	21	36	28	21	7	9	38	1094	46	10	765	12
Satd. Flow (prot)	0	1829	1583	1770	1708	0	1656	3312	1482	1656	3305	0
Flt Permitted		0.871		0.930			0.950			0.950		
Satd. Flow (perm)	0	1622	1583	1732	1708	0	1656	3312	1482	1656	3305	0
Satd. Flow (RTOR)			109		10				109		3	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	25	43	34	23	8	10	39	1128	47	10	789	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	68	34	23	18	0	39	1128	47	10	801	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.5	22.5	22.5	22.5	22.5		10.4	28.0	28.0	9.5	27.1	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		7.4	7.4	7.2	7.2		6.0	29.4	29.4	5.2	27.5	
Actuated g/C Ratio		0.18	0.18	0.18	0.18		0.15	0.74	0.74	0.13	0.69	
v/c Ratio		0.23	0.09	0.07	0.06		0.16	0.46	0.04	0.05	0.35	
Control Delay		18.5	0.5	17.0	12.8		20.4	6.5	0.4	20.4	7.4	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		18.5	0.5	17.0	12.8		20.4	6.5	0.4	20.4	7.4	
LOS		B	A	B	B		C	A	A	C	A	
Approach Delay		12.5			15.2			6.7			7.5	
Approach LOS		B			B			A			A	
Queue Length 50th (ft)		13	0	4	2		8	62	0	2	38	
Queue Length 95th (ft)		41	0	21	15		34	204	3	14	133	
Internal Link Dist (ft)		488			792			1628			1408	
Turn Bay Length (ft)			100	100			145		100	145		
Base Capacity (vph)		763	802	815	809		255	2437	1119	216	2325	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.09	0.04	0.03	0.02		0.15	0.46	0.04	0.05	0.34	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 40			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 7.5		Intersection LOS: A	
Intersection Capacity Utilization 48.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 12: IA 13 & Kacena Ave/E Kacena Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	15	7	141	115	93	6	552	57	85	992	8
Future Volume (vph)	0	15	7	141	115	93	6	552	57	85	992	8
Satd. Flow (prot)	0	1785	0	1770	1738	0	1656	3312	1583	1656	3312	1482
Flt Permitted				0.455			0.950			0.950		
Satd. Flow (perm)	0	1785	0	848	1738	0	1656	3312	1583	1656	3312	1482
Satd. Flow (RTOR)		10			56				205			143
Peak Hour Factor	0.68	0.68	0.68	0.94	0.94	0.94	0.83	0.83	0.83	0.78	0.78	0.78
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	2%	9%	9%	9%
Adj. Flow (vph)	0	22	10	150	122	99	7	665	69	109	1272	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	0	150	221	0	7	665	69	109	1272	10
Turn Type		NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Total Split (s)	22.5	22.5		9.6	32.1		9.5	32.3	32.3	15.6	38.4	38.4
Total Lost Time (s)		4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		6.7		11.9	11.9		5.1	30.0	30.0	9.0	39.3	39.3
Actuated g/C Ratio		0.11		0.19	0.19		0.08	0.48	0.48	0.15	0.63	0.63
v/c Ratio		0.16		0.55	0.58		0.05	0.42	0.08	0.46	0.61	0.01
Control Delay		23.6		30.8	23.5		30.7	13.7	0.2	32.4	10.1	0.0
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		23.6		30.8	23.5		30.7	13.7	0.2	32.4	10.1	0.0
LOS		C		C	C		C	B	A	C	B	A
Approach Delay		23.6			26.5			12.6			11.8	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		8		51	57		2	85	0	38	108	0
Queue Length 95th (ft)		23		101	119		13	141	0	75	242	0
Internal Link Dist (ft)		494			759			838			1628	
Turn Bay Length (ft)				180			230		130	235		135
Base Capacity (vph)		532		271	815		135	1601	871	300	2096	990
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.06		0.55	0.27		0.05	0.42	0.08	0.36	0.61	0.01

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 62
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 14.3 — Intersection LOS: B
Intersection Capacity Utilization 57.3% — ICU Level of Service B
Analysis Period (min) 15

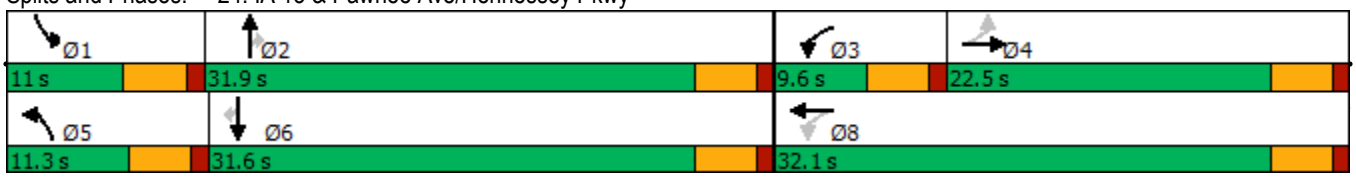
Splits and Phases: 24: IA 13 & Pawnee Ave/Hennessey Pkwy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	54	38	167	164	93	47	919	184	99	718	26
Future Volume (vph)	12	54	38	167	164	93	47	919	184	99	718	26
Satd. Flow (prot)	0	1761	0	1770	1762	0	1656	3312	1482	1656	3312	1482
Flt Permitted		0.932		0.442			0.950			0.950		
Satd. Flow (perm)	0	1651	0	823	1762	0	1656	3312	1482	1656	3312	1482
Satd. Flow (RTOR)		36			43				178			153
Peak Hour Factor	0.73	0.73	0.73	0.89	0.89	0.89	0.91	0.91	0.91	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	16	74	52	188	184	104	52	1010	202	102	740	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	142	0	188	288	0	52	1010	202	102	740	27
Turn Type	Perm	NA		pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4			8					2			6
Total Split (s)	22.5	22.5		9.6	32.1		11.3	31.9	31.9	11.0	31.6	31.6
Total Lost Time (s)		4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		10.2		17.3	17.3		6.6	28.2	28.2	6.7	30.2	30.2
Actuated g/C Ratio		0.16		0.27	0.27		0.10	0.45	0.45	0.11	0.48	0.48
v/c Ratio		0.48		0.62	0.56		0.30	0.68	0.27	0.58	0.47	0.03
Control Delay		26.0		28.6	21.1		34.1	19.2	4.6	46.4	14.8	0.1
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		26.0		28.6	21.1		34.1	19.2	4.6	46.4	14.8	0.1
LOS		C		C	C		C	B	A	D	B	A
Approach Delay		26.0			24.1			17.5			18.1	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		40		61	82		20	176	6	41	116	0
Queue Length 95th (ft)		67		108	147		54	275	45	#115	186	0
Internal Link Dist (ft)		494			759			838			1628	
Turn Bay Length (ft)				180			230		130	235		135
Base Capacity (vph)		511		305	818		184	1483	762	176	1587	790
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.28		0.62	0.35		0.28	0.68	0.27	0.58	0.47	0.03

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 63
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 19.3 — Intersection LOS: B
Intersection Capacity Utilization 58.1% — ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

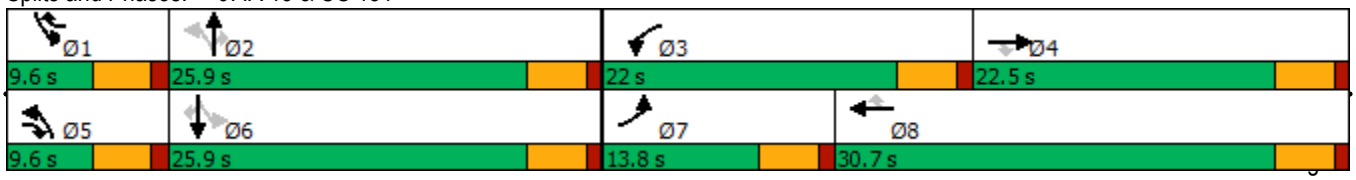
Splits and Phases: 24: IA 13 & Pawnee Ave/Hennessey Pkwy



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	253	179	631	345	111	86	306	328	142	766	231
Future Volume (vph)	76	253	179	631	345	111	86	306	328	142	766	231
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.187			0.507		
Satd. Flow (perm)	1770	3539	1583	3433	3539	1583	348	3539	1583	944	3539	1583
Satd. Flow (RTOR)			143			125			373			254
Peak Hour Factor	0.92	0.92	0.92	0.89	0.89	0.89	0.88	0.88	0.88	0.91	0.91	0.91
Adj. Flow (vph)	83	275	195	709	388	125	98	348	373	156	842	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	275	195	709	388	125	98	348	373	156	842	254
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	13.8	22.5	9.6	22.0	30.7	9.6	9.6	25.9	25.9	9.6	25.9	25.9
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	8.0	10.9	20.5	17.4	22.4	32.0	26.5	21.4	21.4	26.5	21.4	21.4
Actuated g/C Ratio	0.11	0.15	0.28	0.24	0.31	0.44	0.36	0.29	0.29	0.36	0.29	0.29
v/c Ratio	0.43	0.52	0.36	0.86	0.36	0.16	0.43	0.33	0.51	0.39	0.81	0.39
Control Delay	37.6	32.2	8.7	39.9	21.9	3.5	19.9	21.7	5.4	17.7	31.9	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	32.2	8.7	39.9	21.9	3.5	19.9	21.7	5.4	17.7	31.9	5.2
LOS	D	C	A	D	C	A	B	C	A	B	C	A
Approach Delay		24.7			30.5			14.1			24.7	
Approach LOS		C			C			B			C	
Queue Length 50th (ft)	35	61	17	158	75	0	26	64	0	43	183	0
Queue Length 95th (ft)	78	96	63	#260	112	28	56	101	55	86	#293	51
Internal Link Dist (ft)		644			986			1671			838	
Turn Bay Length (ft)	250		330	340		140	275		340	290		290
Base Capacity (vph)	226	875	547	825	1307	765	226	1040	728	401	1040	644
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.31	0.36	0.86	0.30	0.16	0.43	0.33	0.51	0.39	0.81	0.39

Intersection Summary	
Cycle Length: 80	
Actuated Cycle Length: 72.9	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 24.3	Intersection LOS: C
Intersection Capacity Utilization 65.9%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

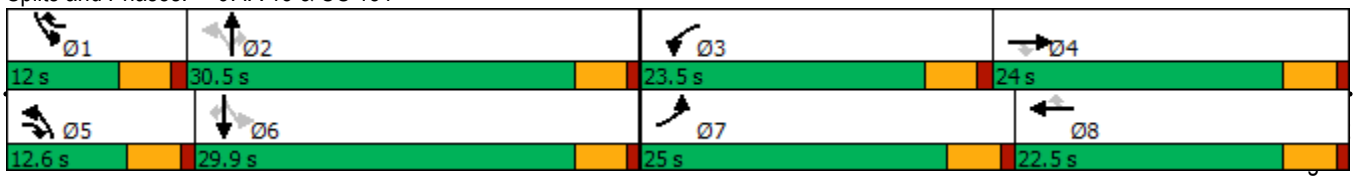
Splits and Phases: 9: IA 13 & US 151

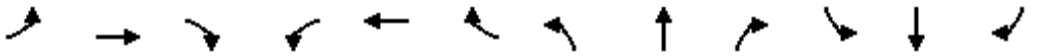


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	328	427	142	520	294	146	178	766	659	151	558	233
Future Volume (vph)	328	427	142	520	294	146	178	766	659	151	558	233
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.950			0.950			0.263			0.177		
Satd. Flow (perm)	1770	3539	1583	3433	3539	1583	490	3539	1583	330	3539	1583
Satd. Flow (RTOR)			73			79			528			265
Peak Hour Factor	0.95	0.95	0.95	0.88	0.88	0.88	0.97	0.97	0.97	0.88	0.88	0.88
Adj. Flow (vph)	345	449	149	591	334	166	184	790	679	172	634	265
Shared Lane Traffic (%)												
Lane Group Flow (vph)	345	449	149	591	334	166	184	790	679	172	634	265
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Total Split (s)	25.0	24.0	12.6	23.5	22.5	12.0	12.6	30.5	30.5	12.0	29.9	29.9
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)	19.3	15.7	28.2	17.8	14.2	26.2	34.0	26.1	26.1	33.2	25.7	25.7
Actuated g/C Ratio	0.23	0.18	0.33	0.21	0.17	0.31	0.40	0.31	0.31	0.39	0.30	0.30
v/c Ratio	0.86	0.69	0.26	0.82	0.57	0.31	0.59	0.73	0.80	0.67	0.60	0.40
Control Delay	54.1	38.5	12.4	43.6	36.8	13.8	24.5	31.8	15.1	31.5	28.9	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.1	38.5	12.4	43.6	36.8	13.8	24.5	31.8	15.1	31.5	28.9	5.4
LOS	D	D	B	D	D	B	C	C	B	C	C	A
Approach Delay		40.1			37.0			24.2			23.5	
Approach LOS		D			D			C			C	
Queue Length 50th (ft)	179	121	29	157	88	35	61	203	63	56	155	0
Queue Length 95th (ft)	#338	171	71	#234	127	79	112	284	#290	#122	217	51
Internal Link Dist (ft)		644			986			1671			838	
Turn Bay Length (ft)	250		330	340		140	275		340	290		290
Base Capacity (vph)	427	812	575	768	749	542	318	1083	850	255	1065	661
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.55	0.26	0.77	0.45	0.31	0.58	0.73	0.80	0.67	0.60	0.40

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 85.2	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 30.1	Intersection LOS: C
Intersection Capacity Utilization 72.2%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 9: IA 13 & US 151





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	234	61	183	0	22	71	848	136	9	1781	17
Future Volume (vph)	7	234	61	183	0	22	71	848	136	9	1781	17
Satd. Flow (prot)	0	1861	1583	1770	1583	0	1597	3195	1583	1597	3195	1429
Flt Permitted		0.993		0.166			0.950			0.950		
Satd. Flow (perm)	0	1850	1583	309	1583	0	1597	3195	1583	1597	3195	1429
Satd. Flow (RTOR)			47		184				137			82
Peak Hour Factor	0.89	0.89	0.89	0.78	0.78	0.78	0.87	0.87	0.87	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	2%	13%	13%	13%
Adj. Flow (vph)	8	263	69	235	0	28	82	975	156	10	1957	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	271	69	235	28	0	82	975	156	10	1957	19
Turn Type	Perm	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Total Split (s)	24.1	24.1	12.0	17.8	41.9		12.0	88.6	88.6	9.5	86.1	86.1
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		19.6	31.6	37.4	37.4		7.5	91.7	91.7	5.0	81.6	81.6
Actuated g/C Ratio		0.14	0.23	0.27	0.27		0.05	0.66	0.66	0.04	0.58	0.58
v/c Ratio		1.05	0.18	1.06	0.05		0.96	0.47	0.14	0.18	1.05	0.02
Control Delay		125.5	18.9	121.2	0.2		153.0	13.3	2.5	72.7	64.9	0.1
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		125.5	18.9	121.2	0.2		153.0	13.3	2.5	72.7	64.9	0.1
LOS		F	B	F	A		F	B	A	E	E	A
Approach Delay		103.9			108.3			21.3			64.3	
Approach LOS		F			F			C			E	
Queue Length 50th (ft)		~267	16	~184	0		76	207	5	9	~1020	0
Queue Length 95th (ft)		#441	57	#274	0		#178	295	33	29	#1155	0
Internal Link Dist (ft)		471			794			3953			1671	
Turn Bay Length (ft)			140	150			175		150	155		225
Base Capacity (vph)		259	393	221	557		85	2093	1083	57	1862	867
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio		1.05	0.18	1.06	0.05		0.96	0.47	0.14	0.18	1.05	0.02

Intersection Summary		
Cycle Length: 140		
Actuated Cycle Length: 140		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 1.06		
Intersection Signal Delay: 57.2	Intersection LOS: E	
Intersection Capacity Utilization 91.2%	ICU Level of Service F	
Analysis Period (min) 15		

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

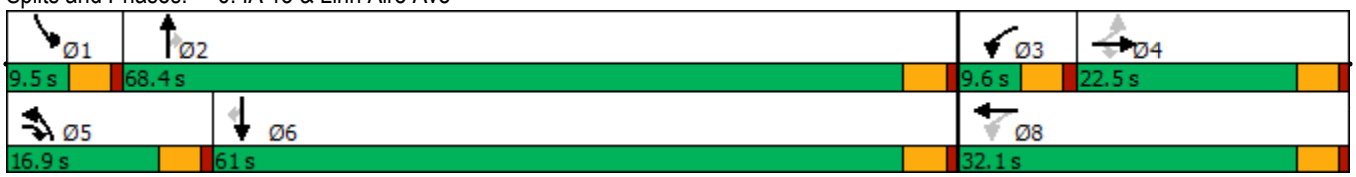
Splits and Phases: 6: IA 13 & Linn Aire Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	86	133	127	13	26	117	1795	97	11	1166	18
Future Volume (vph)	18	86	133	127	13	26	117	1795	97	11	1166	18
Satd. Flow (prot)	0	1846	1583	1770	1676	0	1597	3195	1429	1597	3195	1583
Flt Permitted		0.939		0.382			0.950			0.950		
Satd. Flow (perm)	0	1749	1583	712	1676	0	1597	3195	1429	1597	3195	1583
Satd. Flow (RTOR)			60		36				104			149
Peak Hour Factor	0.78	0.78	0.78	0.72	0.72	0.72	0.93	0.93	0.93	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	13%	13%	13%	13%	13%	2%
Adj. Flow (vph)	23	110	171	176	18	36	126	1930	104	12	1267	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	133	171	176	54	0	126	1930	104	12	1267	20
Turn Type	Perm	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Total Split (s)	22.5	22.5	16.9	9.6	32.1		16.9	68.4	68.4	9.5	61.0	61.0
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Act Effct Green (s)		13.0	28.9	22.6	22.6		11.4	70.8	70.8	5.0	56.6	56.6
Actuated g/C Ratio		0.12	0.28	0.22	0.22		0.11	0.68	0.68	0.05	0.54	0.54
v/c Ratio		0.61	0.35	0.85	0.14		0.72	0.89	0.10	0.16	0.73	0.02
Control Delay		55.6	20.9	72.6	16.4		68.9	21.6	2.0	54.5	21.9	0.1
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		55.6	20.9	72.6	16.4		68.9	21.6	2.0	54.5	21.9	0.1
LOS		E	C	E	B		E	C	A	D	C	A
Approach Delay		36.1			59.4			23.4			21.9	
Approach LOS		D			E			C			C	
Queue Length 50th (ft)		86	57	104	10		82	460	0	8	327	0
Queue Length 95th (ft)		127	92	131	29		#175	#915	22	29	456	0
Internal Link Dist (ft)		471			794			3953			1671	
Turn Bay Length (ft)			140	150			175		150	155		225
Base Capacity (vph)		302	497	206	471		190	2170	1003	76	1736	928
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.44	0.34	0.85	0.11		0.66	0.89	0.10	0.16	0.73	0.02

Intersection Summary

Cycle Length: 110
Actuated Cycle Length: 104.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 26.0 — Intersection LOS: C
Intersection Capacity Utilization 78.7% — ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: IA 13 & Linn Aire Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	399	16	374	26	133	11	274	612	4	10	1454	495
Future Volume (vph)	399	16	374	26	133	11	274	612	4	10	1454	495
Satd. Flow (prot)	3303	1792	1583	1770	1842	0	3072	3163	0	1597	3195	1429
Flt Permitted	0.950			0.746			0.950			0.950		
Satd. Flow (perm)	3303	1792	1583	1390	1842	0	3072	3163	0	1597	3195	1429
Satd. Flow (RTOR)			184		2			1				121
Peak Hour Factor	0.91	0.91	0.91	0.83	0.83	0.83	0.83	0.83	0.83	0.90	0.90	0.90
Heavy Vehicles (%)	6%	6%	2%	2%	2%	2%	14%	14%	14%	13%	13%	13%
Adj. Flow (vph)	438	18	411	31	160	13	330	737	5	11	1616	550
Shared Lane Traffic (%)												
Lane Group Flow (vph)	438	18	411	31	173	0	330	742	0	11	1616	550
Turn Type	Prot	NA	pm+ov	pm+pt	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4	5	3	8		5	2		1	6	7
Permitted Phases			4	8								6
Total Split (s)	25.0	25.0	21.0	22.5	22.5		21.0	93.0		9.5	81.5	25.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)	20.5	32.6	53.7	22.7	15.3		16.5	94.3		5.0	77.0	102.0
Actuated g/C Ratio	0.14	0.22	0.36	0.15	0.10		0.11	0.64		0.03	0.52	0.69
v/c Ratio	0.95	0.05	0.59	0.13	0.90		0.96	0.37		0.20	0.97	0.54
Control Delay	94.3	48.8	25.0	41.5	107.4		103.9	13.9		79.4	49.8	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	94.3	48.8	25.0	41.5	107.4		103.9	13.9		79.4	49.8	10.7
LOS	F	D	C	D	F		F	B		E	D	B
Approach Delay		60.5			97.4			41.6			40.1	
Approach LOS		E			F			D			D	
Queue Length 50th (ft)	221	14	185	22	165		167	158		11	787	190
Queue Length 95th (ft)	#335	39	312	46	#243		#236	216		34	#988	287
Internal Link Dist (ft)		878			856			854			3953	
Turn Bay Length (ft)	400		300	125			400			130		385
Base Capacity (vph)	459	397	693	360	226		344	2025		54	1670	1027
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.95	0.05	0.59	0.09	0.77		0.96	0.37		0.20	0.97	0.54

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 147.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 47.3 — Intersection LOS: D
Intersection Capacity Utilization 82.1% — ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

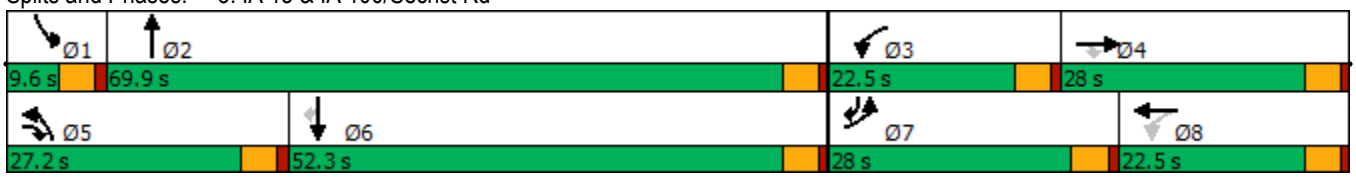
Splits and Phases: 3: IA 13 & IA 100/Secrist Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	551	84	269	6	69	17	492	1335	29	20	955	448
Future Volume (vph)	551	84	269	6	69	17	492	1335	29	20	955	448
Satd. Flow (prot)	3303	1792	1524	1770	1807	0	3072	3157	0	1597	3195	1429
Flt Permitted	0.950			0.699			0.950			0.950		
Satd. Flow (perm)	3303	1792	1524	1302	1807	0	3072	3157	0	1597	3195	1429
Satd. Flow (RTOR)			289		8			2				257
Peak Hour Factor	0.93	0.93	0.93	0.82	0.82	0.82	0.91	0.91	0.91	0.84	0.84	0.84
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	14%	14%	14%	13%	13%	13%
Adj. Flow (vph)	592	90	289	7	84	21	541	1467	32	24	1137	533
Shared Lane Traffic (%)												
Lane Group Flow (vph)	592	90	289	7	105	0	541	1499	0	24	1137	533
Turn Type	Prot	NA	pm+ov	pm+pt	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4	5	3	8		5	2		1	6	7
Permitted Phases			4	8								6
Total Split (s)	28.0	28.0	27.2	22.5	22.5		27.2	69.9		9.6	52.3	28.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)	23.5	34.9	62.1	15.0	9.1		22.7	69.4		5.1	47.8	75.8
Actuated g/C Ratio	0.19	0.29	0.51	0.12	0.08		0.19	0.57		0.04	0.39	0.63
v/c Ratio	0.92	0.17	0.31	0.04	0.74		0.94	0.83		0.36	0.90	0.54
Control Delay	69.6	34.4	3.0	31.0	79.5		74.3	27.6		72.8	45.8	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	69.6	34.4	3.0	31.0	79.5		74.3	27.6		72.8	45.8	8.6
LOS	E	C	A	C	E		E	C		E	D	A
Approach Delay		46.5			76.4			40.0			34.5	
Approach LOS		D			E			D			C	
Queue Length 50th (ft)	236	51	0	4	75		216	515		19	432	103
Queue Length 95th (ft)	#364	106	49	14	122		#344	#708		46	510	177
Internal Link Dist (ft)		878			856			854			3953	
Turn Bay Length (ft)	400		300	125			400			130		385
Base Capacity (vph)	641	516	922	360	275		576	1809		67	1261	990
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.92	0.17	0.31	0.02	0.38		0.94	0.83		0.36	0.90	0.54

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 121.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 40.2 — Intersection LOS: D
Intersection Capacity Utilization 75.6% — ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

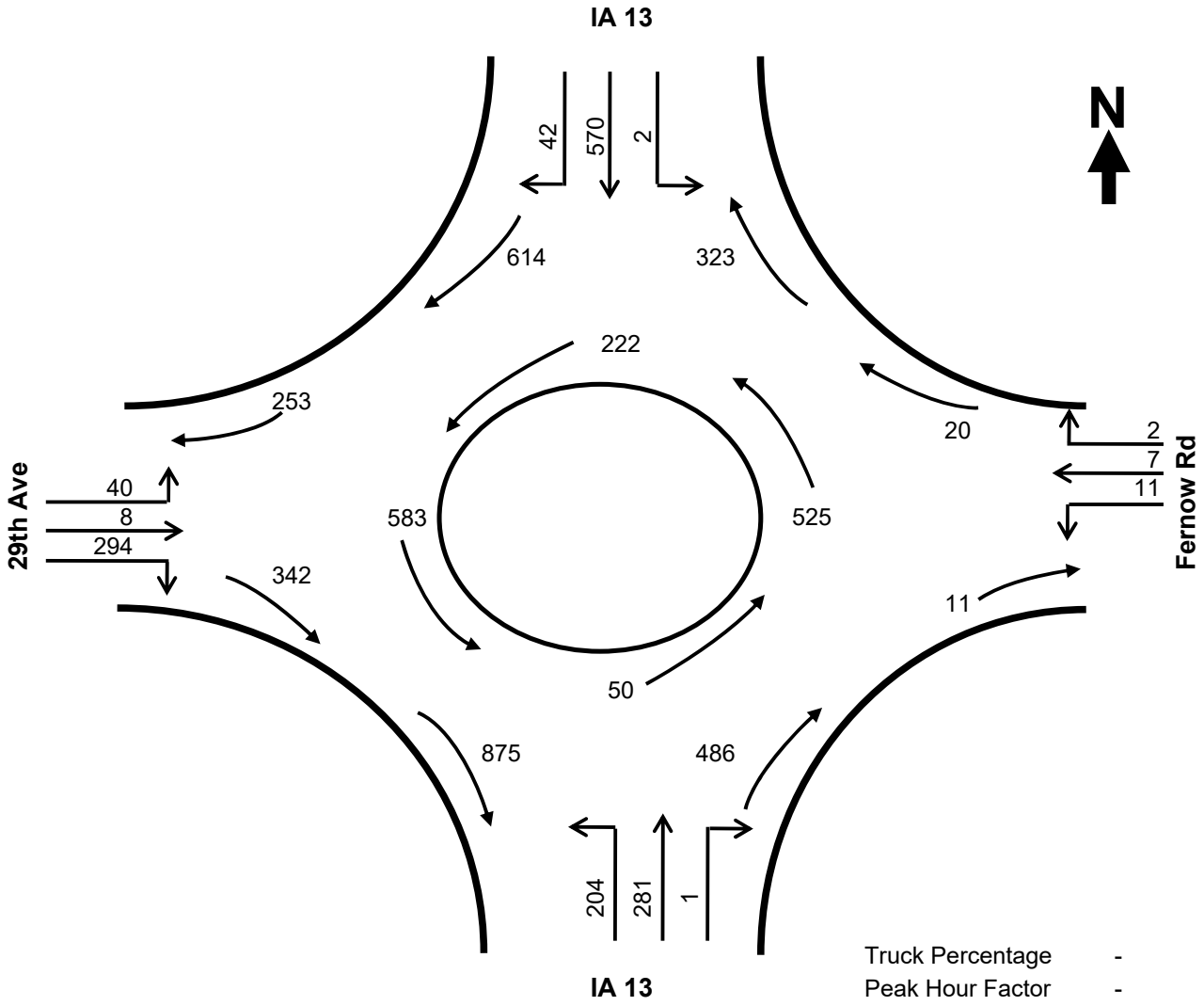
Splits and Phases: 3: IA 13 & IA 100/Secrist Rd



PEAK HOUR TRAFFIC
ROUNDABOUT VEHICULAR MOVEMENTS

Intersection: IA 13 & 29th Ave / Fernow Rd - DY AM
City: Marion

Date: 12/19/2023
Project No: 122.1000.01K
Analysis Period: 2045 AM



Truck Percentage -
Peak Hour Factor -

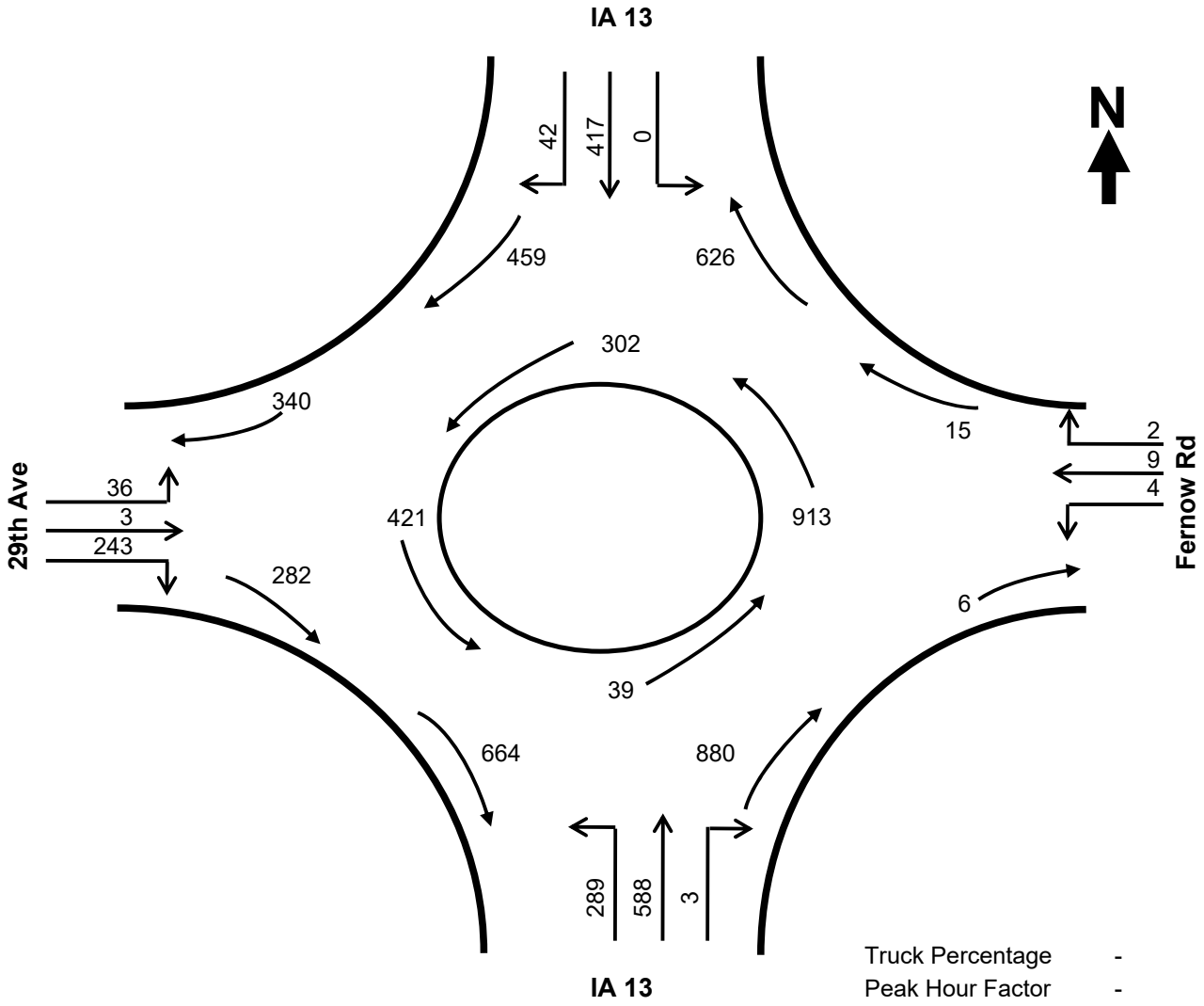
Calculations

	Entering Volume	+	Circulating Volume			
SW	342	+	583	=	925	< 1,000 Single Lane OK
SE	486	+	50	=	536	< 1,000 Single Lane OK
NE	20	+	525	=	545	< 1,000 Single Lane OK
NW	614	+	222	=	836	< 1,000 Single Lane OK

PEAK HOUR TRAFFIC
ROUNDABOUT VEHICULAR MOVEMENTS

Intersection: IA 13 & 29th Ave / Fernow Rd - DY PM
City: Marion

Date: 12/19/2023
Project No: 122.1000.01K
Analysis Period: 2045 PM



Truck Percentage -
Peak Hour Factor -

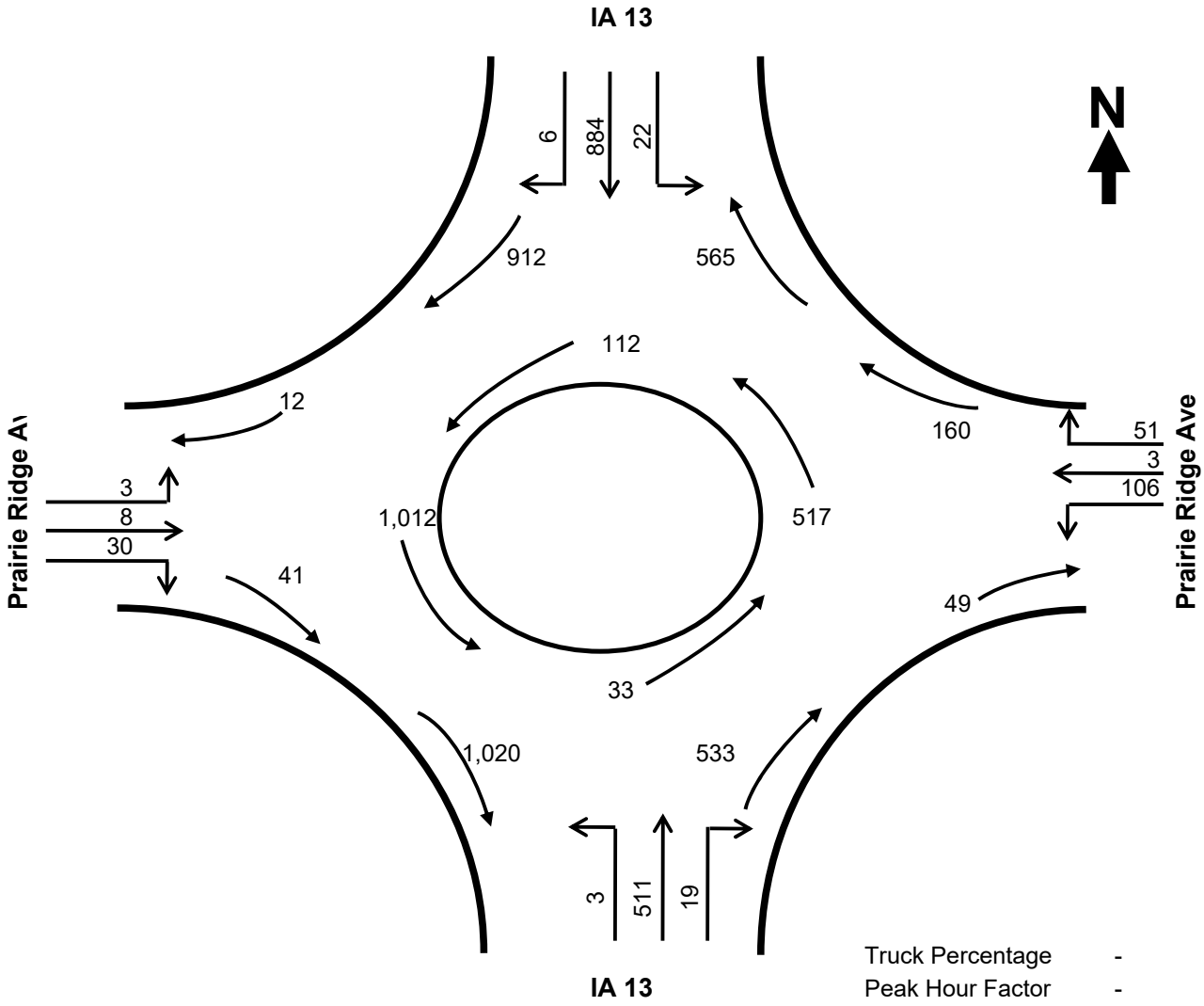
Calculations

	Entering Volume	+	Circulating Volume			
SW	282	+	421	=	703	< 1,000 Single Lane OK
SE	880	+	39	=	919	< 1,000 Single Lane OK
NE	15	+	913	=	928	< 1,000 Single Lane OK
NW	459	+	302	=	761	< 1,000 Single Lane OK

PEAK HOUR TRAFFIC
ROUNDABOUT VEHICULAR MOVEMENTS

Intersection: IA 13 & Prairie Ridge Ave - DY AM
City: Marion

Date: 12/19/2023
Project No: 122.1000.01K
Analysis Period: 2045 AM



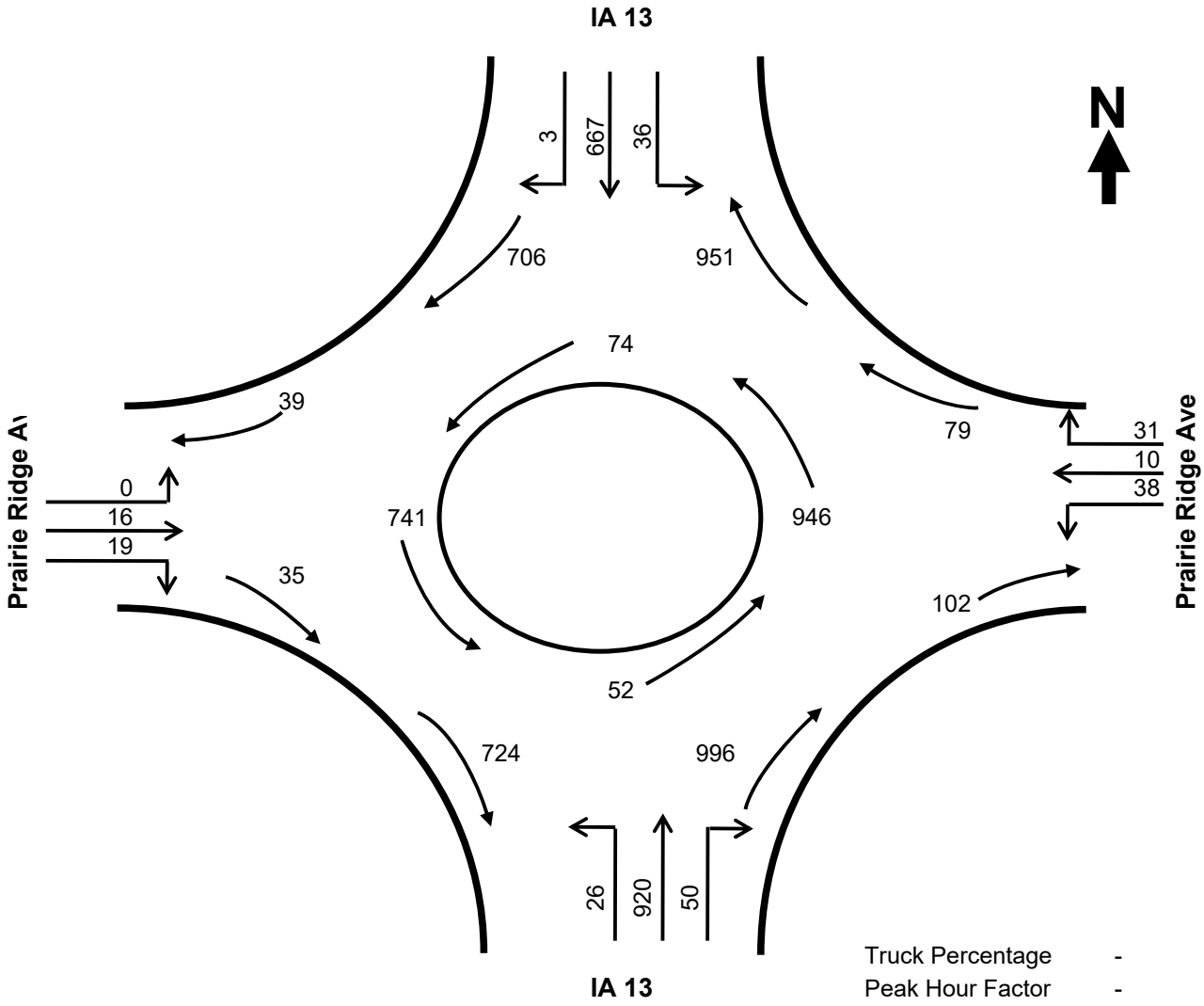
Calculations

	Entering Volume	+	Circulating Volume			
SW	41	+	1,012	=	1,053	1,000 to 1,300 Single Lane or Two Lane
SE	533	+	33	=	566	< 1,000 Single Lane OK
NE	160	+	517	=	677	< 1,000 Single Lane OK
NW	912	+	112	=	1,024	1,000 to 1,300 Single Lane or Two Lane

PEAK HOUR TRAFFIC
ROUNDABOUT VEHICULAR MOVEMENTS

Intersection: IA 13 & Prairie Ridge Ave - DY PM
City: Marion

Date: 12/19/2023
Project No: 122.1000.01K
Analysis Period: 2045 PM



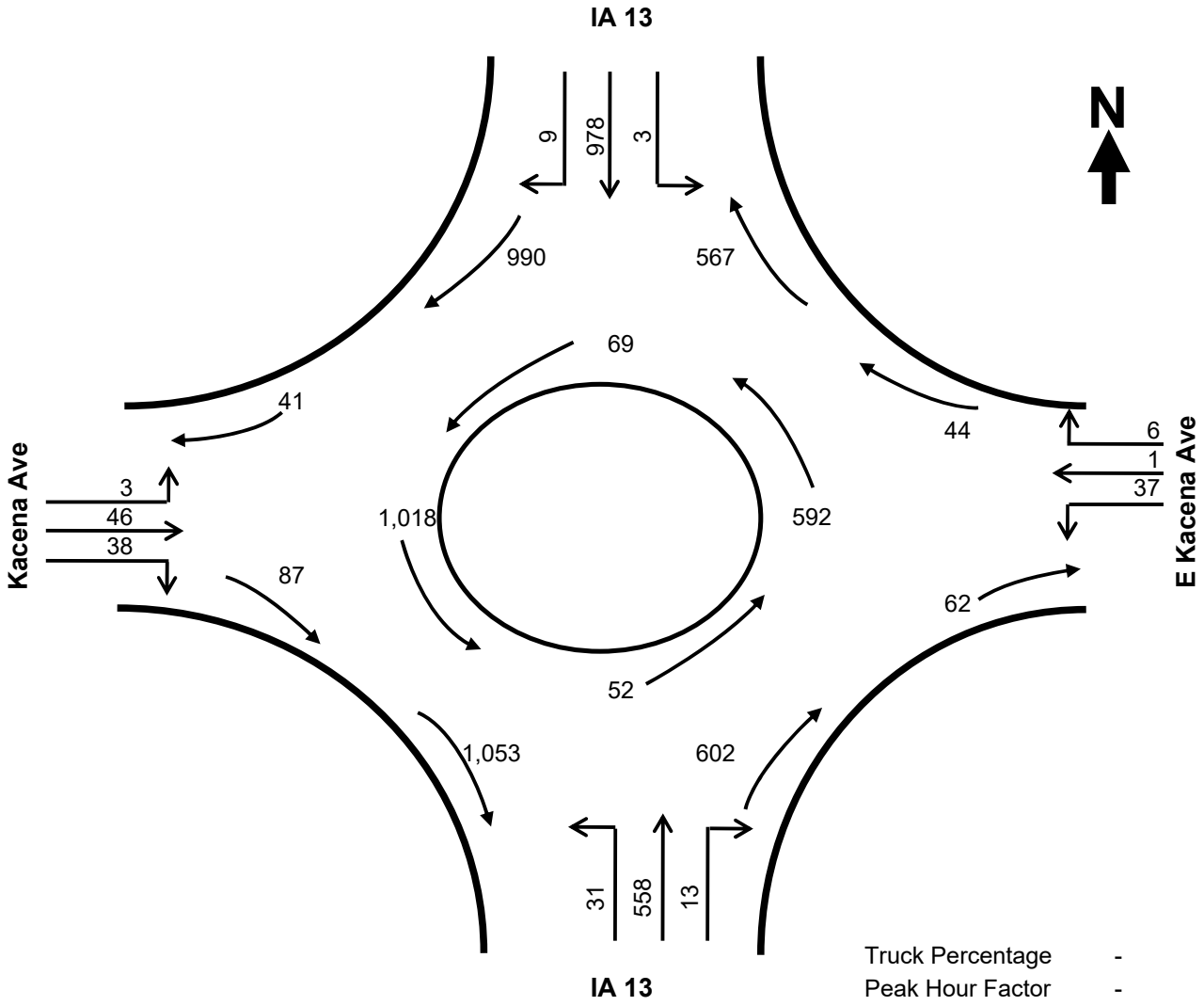
Calculations

	Entering Volume	+	Circulating Volume	=		
SW	35	+	741	=	776	< 1,000 Single Lane OK
SE	996	+	52	=	1,048	1,000 to 1,300 Single Lane or Two Lane
NE	79	+	946	=	1,025	1,000 to 1,300 Single Lane or Two Lane
NW	706	+	74	=	780	< 1,000 Single Lane OK

PEAK HOUR TRAFFIC
ROUNDABOUT VEHICULAR MOVEMENTS

Intersection: IA 13 & Kacena Ave - DY AM
City: Marion

Date: 12/19/2023
Project No: 122.1000.01K
Analysis Period: 2045 AM



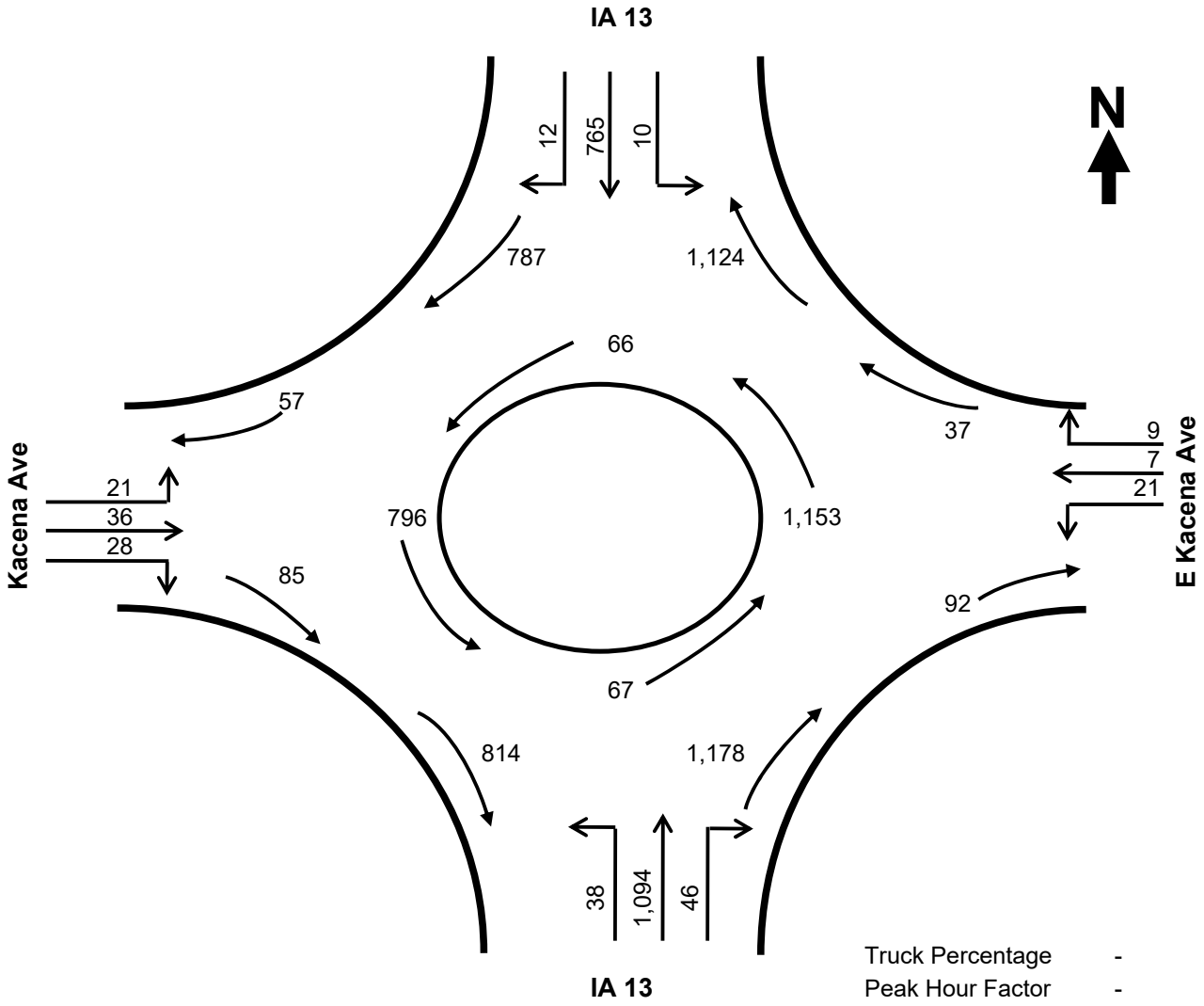
Calculations

	Entering Volume	+	Circulating Volume			
SW	87	+	1,018	=	1,105	1,000 to 1,300 Single Lane or Two Lane
SE	602	+	52	=	654	< 1,000 Single Lane OK
NE	44	+	592	=	636	< 1,000 Single Lane OK
NW	990	+	69	=	1,059	1,000 to 1,300 Single Lane or Two Lane

PEAK HOUR TRAFFIC
ROUNDABOUT VEHICULAR MOVEMENTS

Intersection: IA 13 & Kacena Ave - DY PM
City: Marion

Date: 12/19/2023
Project No: 122.1000.01K
Analysis Period: 2045 PM



Calculations

	Entering Volume	+	Circulating Volume			
SW	85	+	796	=	881	< 1,000 Single Lane OK
SE	1,178	+	67	=	1,245	1,000 to 1,300 Single Lane or Two Lane
NE	37	+	1,153	=	1,190	1,000 to 1,300 Single Lane or Two Lane
NW	787	+	66	=	853	< 1,000 Single Lane OK

Intersection	
Intersection Delay, s/veh	6.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	374	24	448	548
Demand Flow Rate, veh/h	381	24	489	624
Vehicles Circulating, veh/h	591	533	56	248
Vehicles Exiting, veh/h	281	12	916	309
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.8	4.3	4.6	6.5
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	381	24	230	259	293	331
Cap Entry Lane, veh/h	859	903	1282	1354	1074	1150
Entry HV Adj Factor	0.981	0.993	0.916	0.918	0.879	0.877
Flow Entry, veh/h	374	24	211	238	257	290
Cap Entry, veh/h	843	897	1175	1243	944	1009
V/C Ratio	0.443	0.027	0.179	0.191	0.273	0.288
Control Delay, s/veh	9.8	4.3	4.6	4.5	6.6	6.4
LOS	A	A	A	A	A	A
95th %tile Queue, veh	2	0	1	1	1	1

Intersection	
Intersection Delay, s/veh	6.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	293	20	747	398
Demand Flow Rate, veh/h	299	20	814	452
Vehicles Circulating, veh/h	414	849	41	318
Vehicles Exiting, veh/h	356	6	672	551
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.7	5.6	5.7	6.1
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.471	0.529	0.469	0.531
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	299	20	383	431	212	240
Cap Entry Lane, veh/h	999	690	1300	1371	1007	1084
Entry HV Adj Factor	0.980	0.989	0.917	0.918	0.882	0.878
Flow Entry, veh/h	293	20	351	396	187	211
Cap Entry, veh/h	979	683	1191	1260	888	952
V/C Ratio	0.299	0.029	0.295	0.314	0.210	0.221
Control Delay, s/veh	6.7	5.6	5.8	5.7	6.2	6.0
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	0	1	1	1	1

Intersection	
Intersection Delay, s/veh	6.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	57	187	473	817
Demand Flow Rate, veh/h	58	190	515	891
Vehicles Circulating, veh/h	1009	498	42	133
Vehicles Exiting, veh/h	15	59	1025	555
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.2	6.0	4.6	6.8
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	58	190	242	273	419	472
Cap Entry Lane, veh/h	602	930	1299	1370	1194	1268
Entry HV Adj Factor	0.979	0.984	0.918	0.918	0.917	0.918
Flow Entry, veh/h	57	187	222	250	384	433
Cap Entry, veh/h	590	915	1192	1257	1095	1164
V/C Ratio	0.096	0.204	0.186	0.199	0.351	0.372
Control Delay, s/veh	7.2	6.0	4.6	4.6	6.8	6.8
LOS	A	A	A	A	A	A
95th %tile Queue, veh	0	1	1	1	2	2

Intersection	
Intersection Delay, s/veh	6.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	44	92	813	652
Demand Flow Rate, veh/h	44	94	886	711
Vehicles Circulating, veh/h	752	834	63	84
Vehicles Exiting, veh/h	43	115	733	844
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.4	6.8	6.2	5.6
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	44	94	416	470	334	377
Cap Entry Lane, veh/h	749	699	1274	1346	1249	1322
Entry HV Adj Factor	0.991	0.976	0.919	0.917	0.918	0.917
Flow Entry, veh/h	44	92	382	431	307	346
Cap Entry, veh/h	743	682	1171	1235	1147	1212
V/C Ratio	0.059	0.135	0.327	0.349	0.267	0.285
Control Delay, s/veh	5.4	6.8	6.2	6.2	5.6	5.6
LOS	A	A	A	A	A	A
95th %tile Queue, veh	0	0	1	2	1	1

Intersection	
Intersection Delay, s/veh	6.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	92	48	525	873
Demand Flow Rate, veh/h	94	49	569	950
Vehicles Circulating, veh/h	983	559	57	76
Vehicles Exiting, veh/h	43	67	1020	532
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.8	4.7	4.9	6.6
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.469	0.531	0.469	0.531
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	94	49	267	302	446	504
Cap Entry Lane, veh/h	616	883	1281	1353	1259	1331
Entry HV Adj Factor	0.979	0.979	0.924	0.921	0.920	0.918
Flow Entry, veh/h	92	48	247	278	410	462
Cap Entry, veh/h	603	865	1184	1246	1157	1222
V/C Ratio	0.153	0.055	0.208	0.223	0.354	0.379
Control Delay, s/veh	7.8	4.7	4.9	4.8	6.6	6.6
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	0	1	1	2	2

Intersection	
Intersection Delay, s/veh	5.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	92	37	920	610
Demand Flow Rate, veh/h	94	37	939	622
Vehicles Circulating, veh/h	632	919	72	64
Vehicles Exiting, veh/h	54	92	654	892
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.6	6.2	6.2	4.9
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.470	0.530	0.469	0.531
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	94	37	441	498	292	330
Cap Entry Lane, veh/h	830	650	1263	1336	1273	1345
Entry HV Adj Factor	0.981	0.996	0.981	0.979	0.982	0.980
Flow Entry, veh/h	92	37	432	488	287	323
Cap Entry, veh/h	814	648	1239	1308	1250	1318
V/C Ratio	0.113	0.057	0.349	0.373	0.229	0.245
Control Delay, s/veh	5.6	6.2	6.2	6.2	4.9	4.8
LOS	A	A	A	A	A	A
95th %tile Queue, veh	0	0	2	2	1	1

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	418	27	552	722
Demand Flow Rate, veh/h	426	27	602	830
Vehicles Circulating, veh/h	789	651	62	277
Vehicles Exiting, veh/h	318	13	1153	401
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	14.9	4.8	5.0	8.1
Approach LOS	B	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	426	27	283	319	390	440
Cap Entry Lane, veh/h	726	817	1275	1347	1046	1122
Entry HV Adj Factor	0.981	0.993	0.917	0.918	0.870	0.870
Flow Entry, veh/h	418	27	260	293	339	383
Cap Entry, veh/h	712	811	1169	1236	911	976
V/C Ratio	0.587	0.033	0.222	0.237	0.373	0.392
Control Delay, s/veh	14.9	4.8	5.1	5.0	8.1	8.0
LOS	B	A	A	A	A	A
95th %tile Queue, veh	4	0	1	1	2	2

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	328	22	936	522
Demand Flow Rate, veh/h	335	22	1020	594
Vehicles Circulating, veh/h	551	1060	46	354
Vehicles Exiting, veh/h	397	6	840	728
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.5	6.8	6.7	7.2
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	335	22	479	541	279	315
Cap Entry Lane, veh/h	889	577	1294	1366	975	1051
Entry HV Adj Factor	0.979	0.988	0.918	0.917	0.879	0.878
Flow Entry, veh/h	328	22	440	496	245	277
Cap Entry, veh/h	870	570	1188	1252	857	923
V/C Ratio	0.377	0.038	0.370	0.396	0.286	0.300
Control Delay, s/veh	8.5	6.8	6.7	6.7	7.3	7.1
LOS	A	A	A	A	A	A
95th %tile Queue, veh	2	0	2	2	1	1

Intersection	
Intersection Delay, s/veh	7.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	62	208	627	1085
Demand Flow Rate, veh/h	63	212	683	1109
Vehicles Circulating, veh/h	1242	664	45	149
Vehicles Exiting, veh/h	16	64	1260	727
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.2	7.5	5.2	7.8
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	63	212	321	362	521	588
Cap Entry Lane, veh/h	494	808	1295	1367	1177	1251
Entry HV Adj Factor	0.980	0.981	0.918	0.918	0.979	0.978
Flow Entry, veh/h	62	208	295	332	510	575
Cap Entry, veh/h	484	792	1189	1255	1152	1224
V/C Ratio	0.128	0.263	0.248	0.265	0.443	0.470
Control Delay, s/veh	9.2	7.5	5.3	5.2	7.8	7.9
LOS	A	A	A	A	A	A
95th %tile Queue, veh	0	1	1	1	2	3

Intersection	
Intersection Delay, s/veh	7.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	50	102	1071	861
Demand Flow Rate, veh/h	51	104	1168	938
Vehicles Circulating, veh/h	984	1109	71	94
Vehicles Exiting, veh/h	48	130	964	1119
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.0	9.1	7.7	6.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	51	104	549	619	441	497
Cap Entry Lane, veh/h	615	553	1264	1337	1238	1311
Entry HV Adj Factor	0.972	0.978	0.917	0.917	0.917	0.918
Flow Entry, veh/h	50	102	503	568	405	456
Cap Entry, veh/h	598	541	1159	1226	1136	1204
V/C Ratio	0.083	0.188	0.434	0.463	0.356	0.379
Control Delay, s/veh	7.0	9.1	7.6	7.8	6.7	6.7
LOS	A	A	A	A	A	A
95th %tile Queue, veh	0	1	2	3	2	2

Intersection	
Intersection Delay, s/veh	6.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	103	54	692	1166
Demand Flow Rate, veh/h	105	55	706	1189
Vehicles Circulating, veh/h	1225	695	63	85
Vehicles Exiting, veh/h	49	74	1267	665
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.3	5.4	5.2	7.6
Approach LOS	B	A	A	A

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	105	55	332	374	559	630
Cap Entry Lane, veh/h	501	787	1274	1346	1248	1321
Entry HV Adj Factor	0.980	0.981	0.980	0.981	0.980	0.981
Flow Entry, veh/h	103	54	325	367	548	618
Cap Entry, veh/h	491	772	1248	1320	1224	1296
V/C Ratio	0.209	0.070	0.261	0.278	0.448	0.477
Control Delay, s/veh	10.3	5.4	5.2	5.2	7.5	7.7
LOS	B	A	A	A	A	A
95th %tile Queue, veh	1	0	1	1	2	3

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	102	41	1214	811
Demand Flow Rate, veh/h	105	41	1324	884
Vehicles Circulating, veh/h	894	1298	80	74
Vehicles Exiting, veh/h	64	106	918	1265
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.4	8.8	8.8	6.3
Approach LOS	A	A	A	A

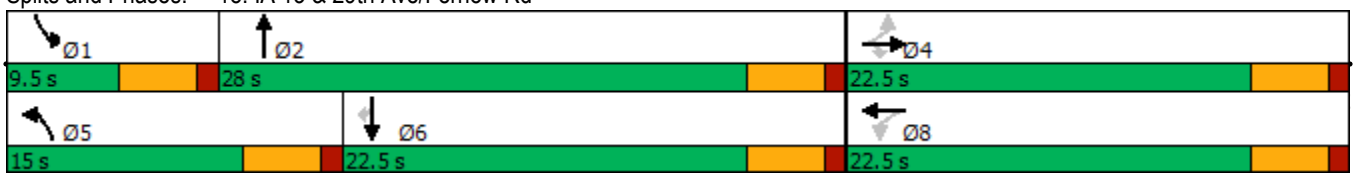
Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	LT	TR	LT	TR
Assumed Moves	LTR	LTR	LT	TR	LT	TR
RT Channelized						
Lane Util	1.000	1.000	0.470	0.530	0.469	0.531
Follow-Up Headway, s	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	105	41	622	702	415	469
Cap Entry Lane, veh/h	664	471	1254	1327	1261	1334
Entry HV Adj Factor	0.973	0.996	0.918	0.917	0.918	0.916
Flow Entry, veh/h	102	41	571	644	381	430
Cap Entry, veh/h	646	469	1151	1216	1158	1222
V/C Ratio	0.158	0.087	0.496	0.529	0.329	0.352
Control Delay, s/veh	7.4	8.8	8.6	8.9	6.3	6.3
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	0	3	3	1	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	11	263	10	7	2	183	210	1	22	426	38
Future Volume (vph)	39	11	263	10	7	2	183	210	1	22	426	38
Satd. Flow (prot)	0	1792	1583	1770	1792	0	1656	3309	0	1570	3139	1583
Flt Permitted		0.764		0.717			0.950			0.950		
Satd. Flow (perm)	0	1423	1583	1336	1792	0	1656	3309	0	1570	3139	1583
Satd. Flow (RTOR)			321		3			1				191
Peak Hour Factor	0.82	0.82	0.82	0.75	0.75	0.75	0.88	0.88	0.88	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	15%	15%	2%
Adj. Flow (vph)	48	13	321	13	9	3	208	239	1	26	501	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	61	321	13	12	0	208	240	0	26	501	45
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	22.5	22.5	22.5	22.5	22.5		15.0	28.0		9.5	22.5	22.5
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		8.3	8.3	8.3	8.3		9.8	25.4		5.1	12.5	12.5
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.22	0.57		0.11	0.28	0.28
v/c Ratio		0.23	0.58	0.05	0.04		0.57	0.13		0.14	0.57	0.08
Control Delay		18.6	7.3	16.3	14.3		26.1	6.2		23.5	17.0	0.3
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		18.6	7.3	16.3	14.3		26.1	6.2		23.5	17.0	0.3
LOS		B	A	B	B		C	A		C	B	A
Approach Delay		9.1			15.4			15.4			16.0	
Approach LOS		A			B			B			B	
Queue Length 50th (ft)		13	0	3	2		44	9		6	54	0
Queue Length 95th (ft)		37	37	12	10		#144	44		26	103	0
Internal Link Dist (ft)		510			548			1079			1243	
Turn Bay Length (ft)			100	100			570			160		100
Base Capacity (vph)		593	847	557	748		402	1955		181	1308	771
Starvation Cap Reductn		0	0	0	0		0	0		0	0	0
Spillback Cap Reductn		0	0	0	0		0	0		0	0	0
Storage Cap Reductn		0	0	0	0		0	0		0	0	0
Reduced v/c Ratio		0.10	0.38	0.02	0.02		0.52	0.12		0.14	0.38	0.06

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 44.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 13.9 — Intersection LOS: B
Intersection Capacity Utilization 43.5% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: IA 13 & 29th Ave/Fernow Rd

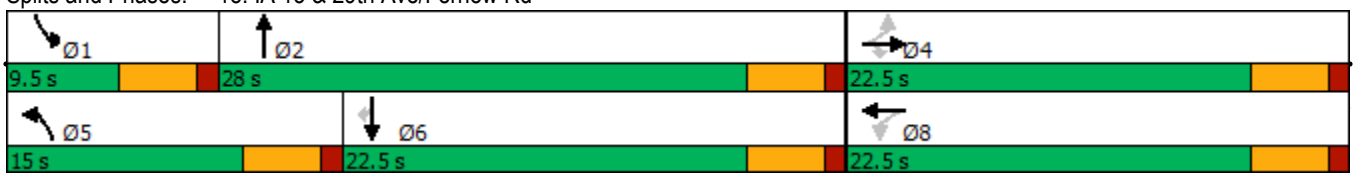


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	10	218	4	12	2	259	440	3	32	312	38
Future Volume (vph)	32	10	218	4	12	2	259	440	3	32	312	38
Satd. Flow (prot)	0	1796	1583	1770	1820	0	1656	3309	0	1570	3139	1583
Flt Permitted		0.766		0.725			0.950			0.950		
Satd. Flow (perm)	0	1427	1583	1350	1820	0	1656	3309	0	1570	3139	1583
Satd. Flow (RTOR)			253		3			1				191
Peak Hour Factor	0.86	0.86	0.86	0.70	0.70	0.70	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	15%	15%	2%
Adj. Flow (vph)	37	12	253	6	17	3	276	468	3	36	355	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	49	253	6	20	0	276	471	0	36	355	43
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	22.5	22.5	22.5	22.5	22.5		15.0	28.0		9.5	22.5	22.5
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		7.4	7.4	7.4	7.4		10.6	23.7		5.1	10.1	10.1
Actuated g/C Ratio		0.18	0.18	0.18	0.18		0.25	0.57		0.12	0.24	0.24
v/c Ratio		0.19	0.52	0.03	0.06		0.66	0.25		0.19	0.47	0.08
Control Delay		17.1	7.2	15.0	14.2		26.7	6.3		21.4	16.0	0.3
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		17.1	7.2	15.0	14.2		26.7	6.3		21.4	16.0	0.3
LOS		B	A	B	B		C	A		C	B	A
Approach Delay		8.8			14.4			13.9			14.9	
Approach LOS		A			B			B			B	
Queue Length 50th (ft)		10	0	1	3		55	19		8	36	0
Queue Length 95th (ft)		31	39	7	13		#184	78		31	72	0
Internal Link Dist (ft)		510			548			1079			1243	
Turn Bay Length (ft)			100	100			570			160		100
Base Capacity (vph)		622	833	589	795		421	1944		190	1369	798
Starvation Cap Reductn		0	0	0	0		0	0		0	0	0
Spillback Cap Reductn		0	0	0	0		0	0		0	0	0
Storage Cap Reductn		0	0	0	0		0	0		0	0	0
Reduced v/c Ratio		0.08	0.30	0.01	0.03		0.66	0.24		0.19	0.26	0.05

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 41.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 13.2 — Intersection LOS: B
Intersection Capacity Utilization 43.2% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: IA 13 & 29th Ave/Fernow Rd



Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	27	0	0	46	0	382	17	0	661	5
Future Vol, veh/h	0	0	27	0	0	46	0	382	17	0	661	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	66	66	66	77	77	77	85	85	85	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	9	9	9	9	9
Mvmt Flow	0	0	41	0	0	60	0	449	20	0	787	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	397	-	-	225	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	602	0	0	778	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	602	-	-	778	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.4	10	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	602	778	-	-
HCM Lane V/C Ratio	-	-	0.068	0.077	-	-
HCM Control Delay (s)	-	-	11.4	10	-	-
HCM Lane LOS	-	-	B	B	-	-
HCM 95th %tile Q(veh)	-	-	0.2	0.2	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	17	0	0	28	0	688	45	0	499	3
Future Vol, veh/h	0	0	17	0	0	28	0	688	45	0	499	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	71	71	77	77	77	93	93	93	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	9	9	9	9	9	2
Mvmt Flow	0	0	24	0	0	36	0	740	48	0	609	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	307	-	-	370	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	689	0	0	627	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	689	-	-	627	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	11.1	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	689	627	-	-
HCM Lane V/C Ratio	-	-	0.035	0.058	-	-
HCM Control Delay (s)	-	-	10.4	11.1	-	-
HCM Lane LOS	-	-	B	B	-	-
HCM 95th %tile Q(veh)	-	-	0.1	0.2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	44	61	128	3	5	31	417	12	3	731	8
Future Volume (vph)	3	44	61	128	3	5	31	417	12	3	731	8
Satd. Flow (prot)	0	1855	1583	1770	1695	0	1770	3312	1583	1770	3308	0
Flt Permitted		0.983		0.720			0.950			0.950		
Satd. Flow (perm)	0	1831	1583	1341	1695	0	1770	3312	1583	1770	3308	0
Satd. Flow (RTOR)			119		6				119		2	
Peak Hour Factor	0.85	0.85	0.85	0.81	0.81	0.81	0.87	0.87	0.87	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	9%	2%	2%	9%	2%
Adj. Flow (vph)	4	52	72	158	4	6	36	479	14	4	860	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	56	72	158	10	0	36	479	14	4	869	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.5	22.5	22.5	22.5	22.5		9.5	23.0	23.0	9.5	23.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		10.2	10.2	10.4	10.4		5.3	22.7	22.7	5.3	21.2	
Actuated g/C Ratio		0.26	0.26	0.26	0.26		0.13	0.57	0.57	0.13	0.53	
v/c Ratio		0.12	0.15	0.45	0.02		0.15	0.25	0.01	0.02	0.49	
Control Delay		13.4	2.1	18.4	10.1		21.6	8.1	0.0	20.7	11.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		13.4	2.1	18.4	10.1		21.6	8.1	0.0	20.7	11.7	
LOS		B	A	B	B		C	A	A	C	B	
Approach Delay		7.0			17.9			8.8			11.7	
Approach LOS		A			B			A			B	
Queue Length 50th (ft)		8	0	23	1		6	25	0	1	53	
Queue Length 95th (ft)		31	9	71	8		32	88	0	8	168	
Internal Link Dist (ft)		488			792			1628			1408	
Turn Bay Length (ft)			100	100			145		100	145		
Base Capacity (vph)		887	828	649	824		238	1982	995	238	1854	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.06	0.09	0.24	0.01		0.15	0.24	0.01	0.02	0.47	

Intersection Summary

Cycle Length: 55
Actuated Cycle Length: 39.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 11.1 — Intersection LOS: B
Intersection Capacity Utilization 47.0% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 12: IA 13 & Kacena Ave/E Kacena Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	39	25	53	11	8	57	818	41	9	572	11
Future Volume (vph)	19	39	25	53	11	8	57	818	41	9	572	11
Satd. Flow (prot)	0	1833	1583	1770	1744	0	1770	3539	1583	1770	3529	0
Flt Permitted		0.882		0.889			0.950			0.950		
Satd. Flow (perm)	0	1643	1583	1656	1744	0	1770	3539	1583	1770	3529	0
Satd. Flow (RTOR)			119		9				119		4	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	23	47	30	58	12	9	59	843	42	9	590	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	70	30	58	21	0	59	843	42	9	601	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.5	22.5	22.5	22.5	22.5		9.9	23.0	23.0	9.5	22.6	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		7.4	7.4	7.4	7.4		5.7	23.6	23.6	5.3	21.9	
Actuated g/C Ratio		0.22	0.22	0.22	0.22		0.17	0.69	0.69	0.15	0.64	
v/c Ratio		0.20	0.07	0.16	0.05		0.20	0.35	0.04	0.03	0.27	
Control Delay		14.9	0.3	14.5	11.4		18.0	6.3	0.1	17.3	7.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		14.9	0.3	14.5	11.4		18.0	6.3	0.1	17.3	7.5	
LOS		B	A	B	B		B	A	A	B	A	
Approach Delay		10.5			13.7			6.8			7.6	
Approach LOS		B			B			A			A	
Queue Length 50th (ft)		9	0	7	1		8	41	0	1	26	
Queue Length 95th (ft)		38	0	36	16		41	137	1	12	94	
Internal Link Dist (ft)		488			792			1628			1408	
Turn Bay Length (ft)			100	100			145		100	145		
Base Capacity (vph)		903	924	910	963		292	2542	1170	270	2424	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.08	0.03	0.06	0.02		0.20	0.33	0.04	0.03	0.25	

Intersection Summary	
Cycle Length: 55	
Actuated Cycle Length: 34.4	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.35	
Intersection Signal Delay: 7.6	Intersection LOS: A
Intersection Capacity Utilization 47.8%	ICU Level of Service A
Analysis Period (min) 15	

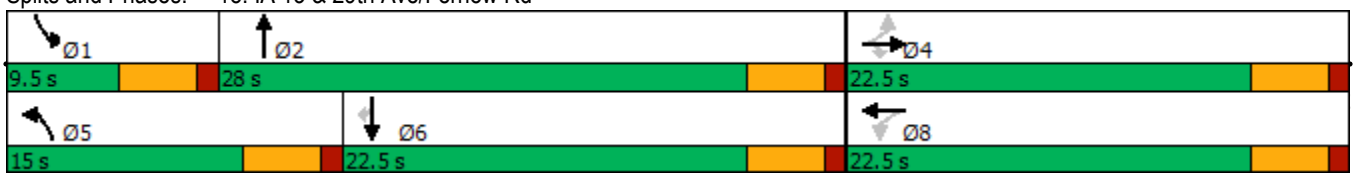
Splits and Phases: 12: IA 13 & Kacena Ave/E Kacena Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	12	294	11	8	2	204	281	1	24	570	42
Future Volume (vph)	43	12	294	11	8	2	204	281	1	24	570	42
Satd. Flow (prot)	0	1794	1583	1770	1803	0	1656	3313	0	1570	3139	1404
Flt Permitted		0.765		0.713			0.950			0.950		
Satd. Flow (perm)	0	1425	1583	1328	1803	0	1656	3313	0	1570	3139	1404
Satd. Flow (RTOR)			314		3			1				191
Peak Hour Factor	0.82	0.82	0.82	0.75	0.75	0.75	0.88	0.88	0.88	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	2%	15%	15%	15%
Adj. Flow (vph)	52	15	359	15	11	3	232	319	1	28	671	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	67	359	15	14	0	232	320	0	28	671	49
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	22.5	22.5	22.5	22.5	22.5		15.0	28.0		9.5	22.5	22.5
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		9.2	9.2	9.2	9.2		10.2	28.1		5.1	14.8	14.8
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.21	0.58		0.11	0.31	0.31
v/c Ratio		0.25	0.64	0.06	0.04		0.66	0.17		0.17	0.70	0.09
Control Delay		19.2	9.9	16.5	14.6		32.0	6.7		25.9	19.7	0.3
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		19.2	9.9	16.5	14.6		32.0	6.7		25.9	19.7	0.3
LOS		B	A	B	B		C	A		C	B	A
Approach Delay		11.3			15.6			17.3			18.7	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)		16	11	4	3		57	13		7	79	0
Queue Length 95th (ft)		39	50	13	11		#177	62		29	151	0
Internal Link Dist (ft)		510			548			1079			1243	
Turn Bay Length (ft)			100	100			570			160		100
Base Capacity (vph)		547	801	509	694		370	1945		167	1205	656
Starvation Cap Reductn		0	0	0	0		0	0		0	0	0
Spillback Cap Reductn		0	0	0	0		0	0		0	0	0
Storage Cap Reductn		0	0	0	0		0	0		0	0	0
Reduced v/c Ratio		0.12	0.45	0.03	0.02		0.63	0.16		0.17	0.56	0.07

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 48.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 16.4 — Intersection LOS: B
Intersection Capacity Utilization 49.4% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: IA 13 & 29th Ave/Fernow Rd

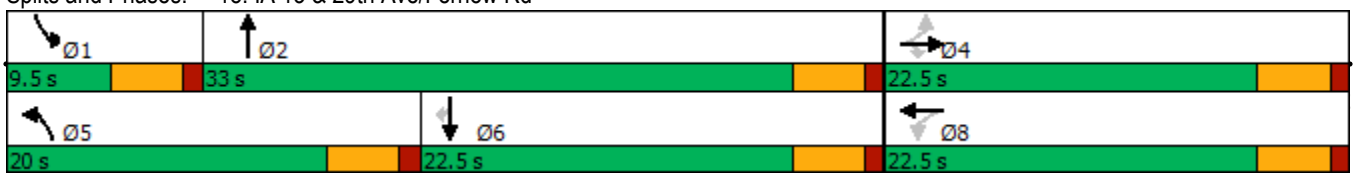


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	11	243	4	14	2	289	588	3	36	417	42
Future Volume (vph)	36	11	243	4	14	2	289	588	3	36	417	42
Satd. Flow (prot)	0	1794	1583	1770	1825	0	1656	3309	0	1570	3139	1583
Flt Permitted		0.762		0.721			0.950			0.950		
Satd. Flow (perm)	0	1419	1583	1343	1825	0	1656	3309	0	1570	3139	1583
Satd. Flow (RTOR)			283		3			1				176
Peak Hour Factor	0.86	0.86	0.86	0.70	0.70	0.70	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	15%	15%	2%
Adj. Flow (vph)	42	13	283	6	20	3	307	626	3	41	474	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	55	283	6	23	0	307	629	0	41	474	48
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Total Split (s)	22.5	22.5	22.5	22.5	22.5		20.0	33.0		9.5	22.5	22.5
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5		4.5	4.5	4.5
Act Effct Green (s)		7.9	7.9	7.9	7.9		13.5	27.6		5.1	12.8	12.8
Actuated g/C Ratio		0.16	0.16	0.16	0.16		0.28	0.57		0.11	0.27	0.27
v/c Ratio		0.24	0.57	0.03	0.08		0.66	0.33		0.25	0.57	0.09
Control Delay		21.7	8.3	18.8	18.0		25.7	7.4		27.4	18.9	0.3
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		21.7	8.3	18.8	18.0		25.7	7.4		27.4	18.9	0.3
LOS		C	A	B	B		C	A		C	B	A
Approach Delay		10.5			18.2			13.4			17.9	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)		14	0	1	5		71	28		11	60	0
Queue Length 95th (ft)		40	45	8	16		#207	108		39	111	0
Internal Link Dist (ft)		510			548			1079			1243	
Turn Bay Length (ft)			100	100			570			160		100
Base Capacity (vph)		546	783	517	704		549	2065		167	1209	718
Starvation Cap Reductn		0	0	0	0		0	0		0	0	0
Spillback Cap Reductn		0	0	0	0		0	0		0	0	0
Storage Cap Reductn		0	0	0	0		0	0		0	0	0
Reduced v/c Ratio		0.10	0.36	0.01	0.03		0.56	0.30		0.25	0.39	0.07

Intersection Summary

Cycle Length: 65
Actuated Cycle Length: 48.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 14.3 — Intersection LOS: B
Intersection Capacity Utilization 48.0% — ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 18: IA 13 & 29th Ave/Fernow Rd



Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	30	0	0	51	0	511	19	0	884	6
Future Vol, veh/h	0	0	30	0	0	51	0	511	19	0	884	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	66	66	66	77	77	77	85	85	85	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	9	9	9	9	2	9
Mvmt Flow	0	0	45	0	0	66	0	601	22	0	1052	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	530	-	-	301	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	493	0	0	695	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	493	-	-	695	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13	10.7	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	493	695	-	-
HCM Lane V/C Ratio	-	-	0.092	0.095	-	-
HCM Control Delay (s)	-	-	13	10.7	-	-
HCM Lane LOS	-	-	B	B	-	-
HCM 95th %tile Q(veh)	-	-	0.3	0.3	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	19	0	0	31	0	920	50	0	667	3
Future Vol, veh/h	0	0	19	0	0	31	0	920	50	0	667	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	71	71	77	77	77	93	93	93	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	9	9	9	9	9	9
Mvmt Flow	0	0	27	0	0	40	0	989	54	0	813	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	409	-	-	495	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	592	0	0	520	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	592	-	-	520	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.4	12.5	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	592	520	-	-
HCM Lane V/C Ratio	-	-	0.045	0.077	-	-
HCM Control Delay (s)	-	-	11.4	12.5	-	-
HCM Lane LOS	-	-	B	B	-	-
HCM 95th %tile Q(veh)	-	-	0.1	0.3	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	50	38	143	3	6	34	558	13	3	978	9
Future Volume (vph)	3	50	38	143	3	6	34	558	13	3	978	9
Satd. Flow (prot)	0	1857	1583	1770	1686	0	1770	3539	1583	1770	3536	0
Flt Permitted		0.985		0.716			0.950			0.950		
Satd. Flow (perm)	0	1835	1583	1334	1686	0	1770	3539	1583	1770	3536	0
Satd. Flow (RTOR)			109		7				109		2	
Peak Hour Factor	0.85	0.85	0.85	0.81	0.81	0.81	0.87	0.87	0.87	0.85	0.85	0.85
Adj. Flow (vph)	4	59	45	177	4	7	39	641	15	4	1151	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	63	45	177	11	0	39	641	15	4	1162	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.6	22.6	22.6	22.6	22.6		9.6	27.8	27.8	9.6	27.8	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		11.3	11.3	11.7	11.7		5.4	27.6	27.6	5.4	26.1	
Actuated g/C Ratio		0.25	0.25	0.26	0.26		0.12	0.61	0.61	0.12	0.57	
v/c Ratio		0.14	0.09	0.52	0.03		0.19	0.30	0.01	0.02	0.57	
Control Delay		15.6	0.6	22.3	11.1		25.5	8.1	0.0	24.0	12.9	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		15.6	0.6	22.3	11.1		25.5	8.1	0.0	24.0	12.9	
LOS		B	A	C	B		C	A	A	C	B	
Approach Delay		9.3			21.6			8.9			13.0	
Approach LOS		A			C			A			B	
Queue Length 50th (ft)		11	0	35	1		8	39	0	1	87	
Queue Length 95th (ft)		38	1	89	9		38	123	0	9	246	
Internal Link Dist (ft)		488			792			1628			1408	
Turn Bay Length (ft)			100	100			145		100	145		
Base Capacity (vph)		776	732	564	717		210	2208	1028	210	2087	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.08	0.06	0.31	0.02		0.19	0.29	0.01	0.02	0.56	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 45.6			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 12.2		Intersection LOS: B	
Intersection Capacity Utilization 50.7%		ICU Level of Service A	
Analysis Period (min) 15			

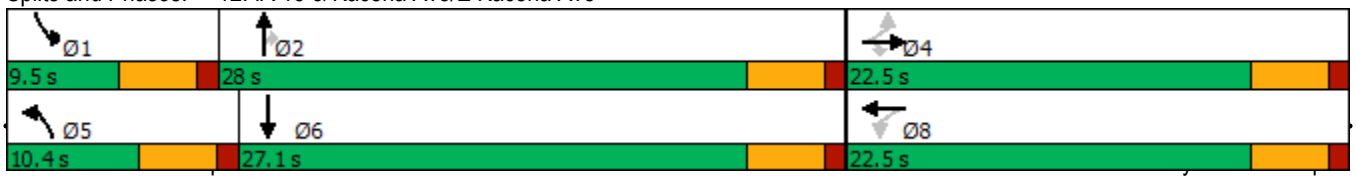
Splits and Phases: 12: IA 13 & Kacena Ave/E Kacena Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	44	28	59	12	9	64	1094	46	10	765	12
Future Volume (vph)	21	44	28	59	12	9	64	1094	46	10	765	12
Satd. Flow (prot)	0	1833	1583	1770	1742	0	1656	3312	1482	1656	3305	0
Flt Permitted		0.884		0.851			0.950			0.950		
Satd. Flow (perm)	0	1647	1583	1585	1742	0	1656	3312	1482	1656	3305	0
Satd. Flow (RTOR)			109		10				109		3	
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	25	53	34	64	13	10	66	1128	47	10	789	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	78	34	64	23	0	66	1128	47	10	801	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			
Total Split (s)	22.5	22.5	22.5	22.5	22.5		10.4	28.0	28.0	9.5	27.1	
Total Lost Time (s)		4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Act Effct Green (s)		7.9	7.9	7.9	7.9		6.1	30.4	30.4	5.3	26.5	
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.15	0.74	0.74	0.13	0.64	
v/c Ratio		0.25	0.09	0.21	0.07		0.27	0.46	0.04	0.05	0.38	
Control Delay		18.7	0.4	18.4	13.5		22.6	6.9	0.4	21.1	9.1	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		18.7	0.4	18.4	13.5		22.6	6.9	0.4	21.1	9.1	
LOS		B	A	B	B		C	A	A	C	A	
Approach Delay		13.2			17.1			7.5			9.2	
Approach LOS		B			B			A			A	
Queue Length 50th (ft)		17	0	14	3		15	66	0	2	81	
Queue Length 95th (ft)		46	0	43	18		50	214	3	14	140	
Internal Link Dist (ft)		488			792			1628			1408	
Turn Bay Length (ft)			100	100			145		100	145		
Base Capacity (vph)		757	786	728	806		249	2443	1121	211	2258	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.10	0.04	0.09	0.03		0.27	0.46	0.04	0.05	0.35	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 41.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.46
Intersection Signal Delay: 8.8 — Intersection LOS: A
Intersection Capacity Utilization 55.8% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 12: IA 13 & Kacena Ave/E Kacena Ave



A

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** August 2, 2024

Location / Title of Project: Improving Safety in Martelle Iowa

Applicant: City of Martelle

Contact Person: Diane Fountain Title: City Council Member

Complete Mailing Address: PO Box 96
Martelle IA 52305

Phone: 319-482-3381 (Area Code) E-Mail: Martelle.master@gmail.com

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: (Area Code) E-Mail:

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	
Total Project Cost	$	$4466
Safety Funds Requested	$	**$4466**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the City of Martelle

Signed: Diane Fountain 8/10/2024
Signature Date Signed

Diane Fountain
Printed Name

Attest: Dave Fountain 8/10/24
Signature Date Signed

Dave Fountain - Mayor
Printed Name

PROPOSAL FOR GRANT FUNDING: IMPROVING SAFETY IN MARTELLE, IOWA

B

NARRATIVE

I am writing on behalf of the City of Martelle to request grant funding to address significant safety concerns on Military Street. This critical road is a shortcut for drivers using E45 to travel between Jones County and Cedar Rapids. Although E45 does not run through Martelle, it is treated as such by many drivers. As a designated farm to market route,E45 traffic is not only cars, but includes farm equipment and semis. The resulting traffic volume and excessive speeding through our small community have raised safety concerns from residents, pedestrians and cyclists alike.

Martelle is a small community in Jones County, Iowa, with a population of 249 (2020 Census) residents. Currently, the speed limit on Military Street is 20 mph. While this is a reasonable speed limit, many drivers do not adhere to it, endangering pedestrians, cyclists and other road users. There have been multiple incidents involving speeding vehicles which have created hazardous conditions and endangered pedestrians, cyclists, golf carts and other road users. The current stop signs posted at Military Street and Marion Street are insufficient to address these issues, and without intervention, the likelihood of a serious accident will only increase.

Military Street intersects with Highway 1 at both the North and South end of town, and is frequently used as a through road traveling from Cedar Rapids to the eastern part of Jones County, Although E45 is designated to flow through Highway 1, travelers choose to drive through Martelle as a shortcut to continue on E45. As illustrated in the Iowa DOT traffic flow map (2021), the annual average daily traffic on Military Street exceeds 1000 cars per day.

Military Street passes through residential neighborhoods and the high speed of traffic is a constant worry for parents, the elderly, and anyone walking or cycling near the road. Many residents have expressed their concern about speeding traffic on Military Street

Martelle does not have local law enforcement to continuously monitor traffic. Despite efforts to collaborate with the Jones County Sheriff's Department to deter speeding, it remains an ongoing concern. Even with the existing stop signs, drivers often run the stop sign and continue speeding through town, posing a significant risk to residents, especially children. Our proposal seeks to protect vulnerable pedestrians and cyclists and to deter drivers from speeding.

To address this issue, we propose:

1. **Enhanced Traffic Calming Measures:**

- In collaboration with the Jones County engineer, we propose Installing a solar powered speed feedback radar sign strategically along Military Street where the speed limit reduces to 20 miles per hour. This is the north entrance to town directly off of Highway 1 and E45. The radar sign would be placed on top of the existing speed limit sign. The road has no curb, so the sign would have a clear zone of 5 feet. This physical intervention will alert drivers and encourage them to slow down, making the area safer for pedestrians, cyclists and other road users. (APPENDIX E-SPEED FEEDBACK RADAR SIGN).
- Installation of a solar powered flashing stop sign at the intersection of Military Street and Marion Street for northbound traffic on Military Street. This is the south entrance to town directly off of Highway 1. This sign would replace the current stop sign at that intersection. With no curb, the sign will have a clear zone of 5 feet and be 30 in H and 30 in W.(APPENDIX F-FLASHING STOP SIGN)

We are submitting this grant proposal to request funding for a speed feedback radar sign and a flashing stop sign along Military Street. This proposal has been reviewed and endorsed by the Martelle City Council at the July 10, 2024 and August 14, 2024 city council meeting.

Grant funding from the Iowa DOT would be instrumental in implementing these safety measures. We believe that these enhancements will create a safer environment for all road users and help prevent serious accidents.

Thank you for your consideration.

ITEMIZED BREAKDOWN OF COST

C

Contingency funds of 10% has been added to the cost of the project. Any additional unforeseen project costs and ongoing maintenance costs will be assumed by the city. The proposed budget includes:

DEVICE	COST
Solar Traffic Speed Feedback Radar Sign	$2435
Solar Flashing stop sign	$1625
Contingency 10%	406
TOTAL	$4466

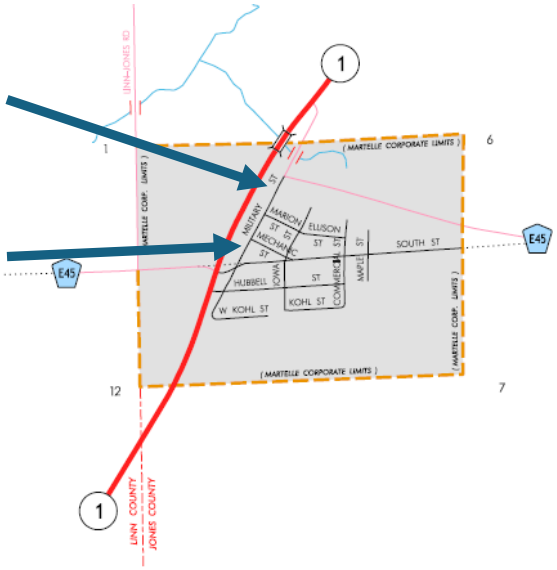
TIME SCHEDULE

If Martelle were to receive this grant, we would plan to erect the signs along Military Street within 120 days of receiving the funds.

D

MAP

E



N

09–02–16

LEGEND

INTERSTATE ROUTE	35
FREEWAY OR EXPRESSWAY ROUTE	30
U.S. NUMBERED ROUTE	6
BUSINESS ROUTE	61
STATE NUMBERED ROUTE	44
UNSIGNED ROUTE	461
COUNTY NUMBERED ROUTE	P38
SECONDARY ROAD OR ADJOINING CITY STREET	
CITY STREET	
PARK, INSTITUTION, OR FEDERAL ROAD	
RAILROAD	
CORPORATION LINE	
SECTION LINE	
CUL-DE-SAC	
SECTION, TOWNSHIP & RANGE NUMBERS	9, T-81N, R-30W

SCALE IN MILES

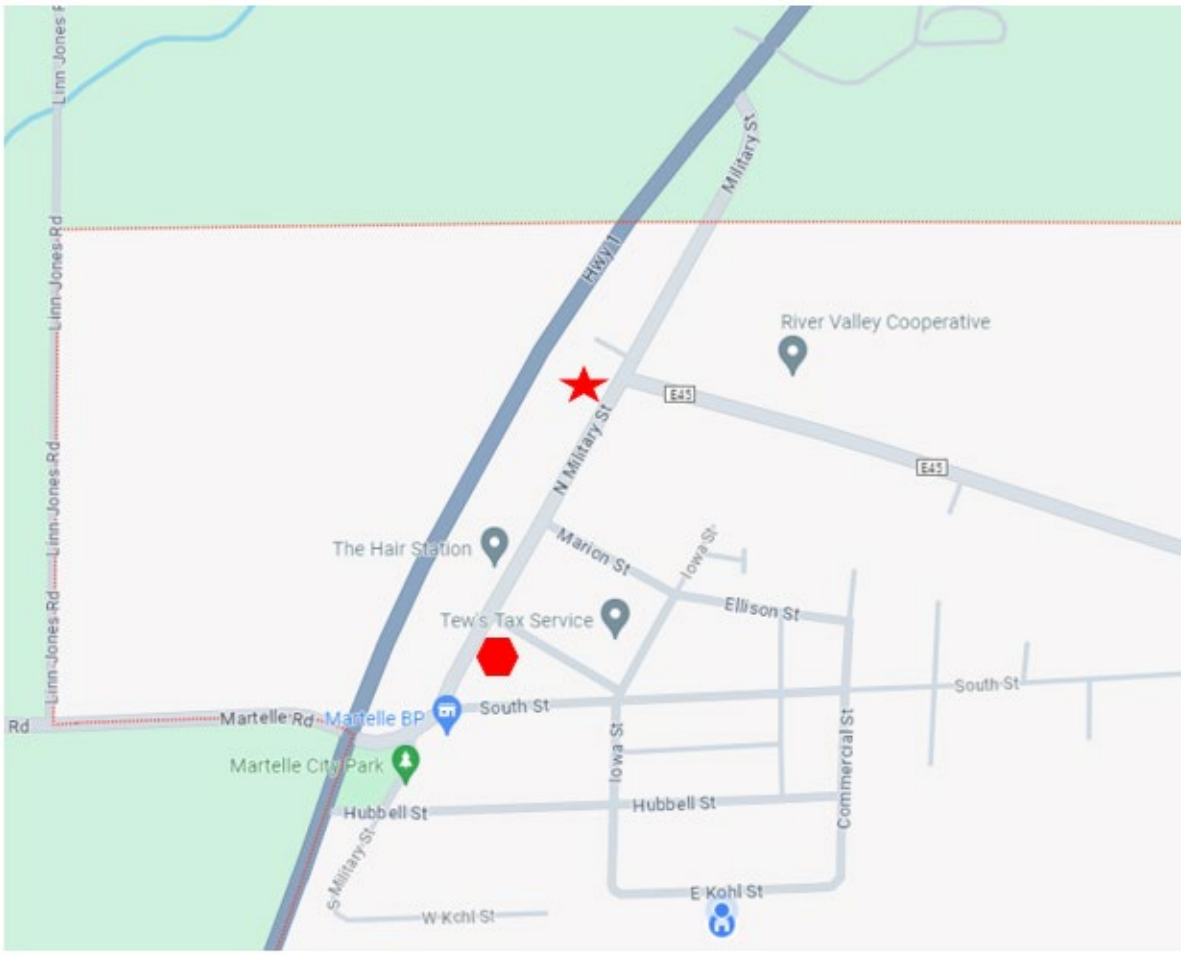
0 0.1 0.2 0.3 0.4 0.5 0.75 1.0

0 0.1 0.2 0.3 0.4 0.5 1.0 1.5

SCALE IN KILOMETERS

HIGHWAY AND STREET MAP OF

MARTELLE IOWA



¶

¶

¶

Speed·Feedback·Radar·Sign·location¶

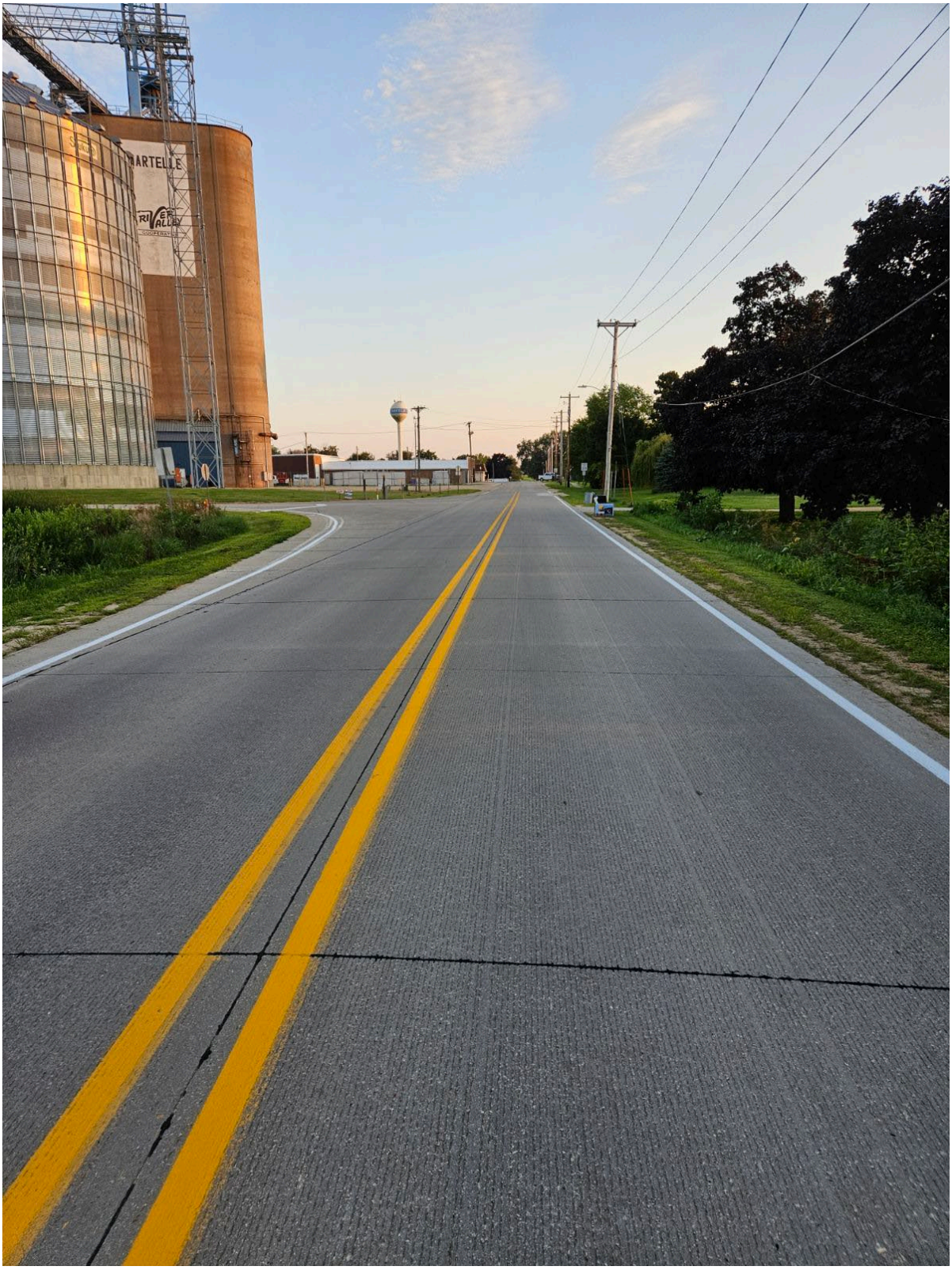
¶

Flashing·stoplight·location¶

COLOR PICTURES

F

LONG VIEW OF MILITARY STREET – NORTH ENTRACE

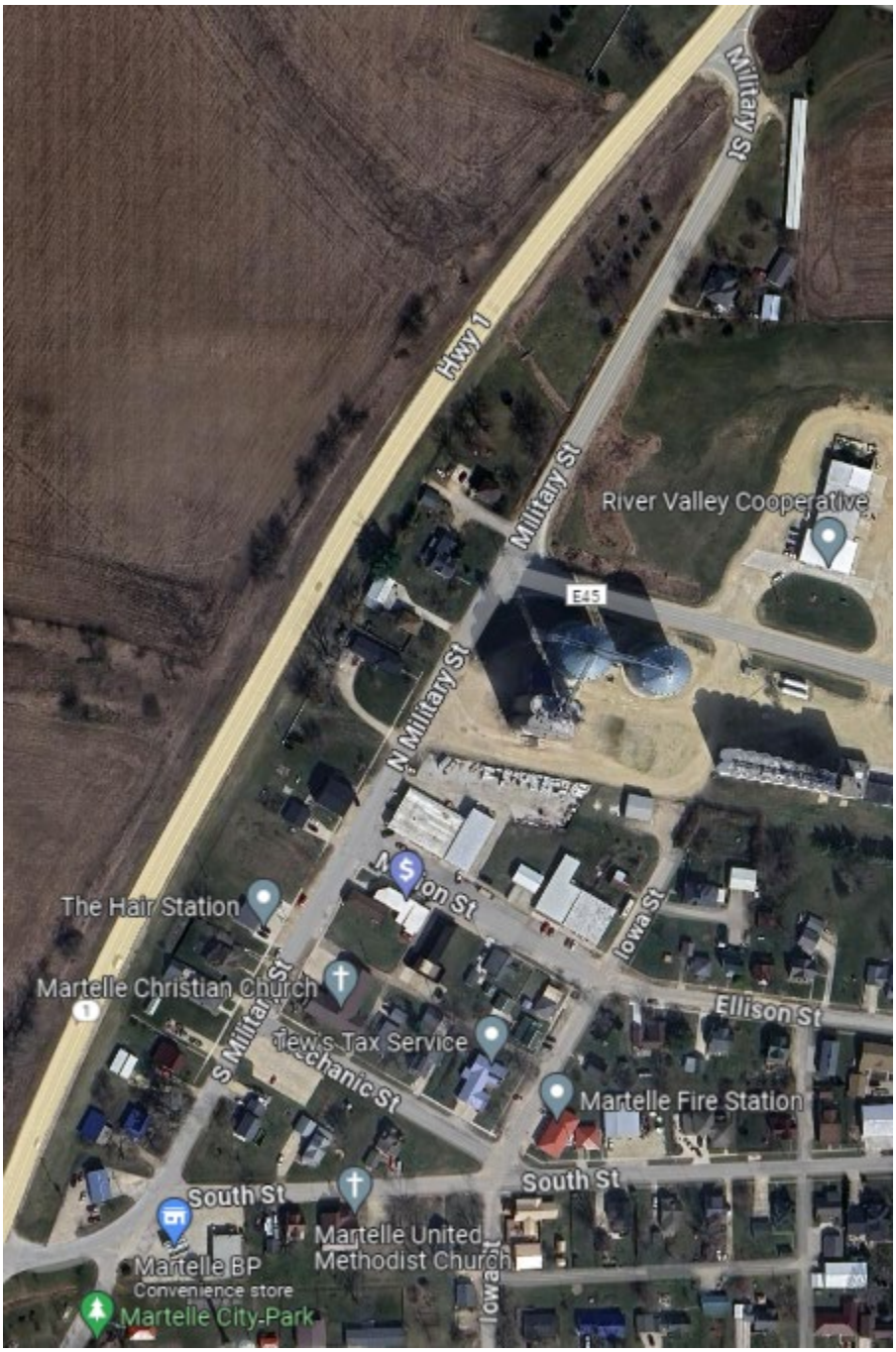


COLOR PICTURES

LONGVIEW OF MILITARY STREET-SOUTH ENTRANCE

PLAN VIEW

G


Military St
Hwy 1
Military St
River Valley Cooperative
E45
N Military St
The Hair Station
Martelle Christian Church
S Military St
Iowa St
Ellison St
Lewis Tax Service
Martelle Fire Station
South St
South St
Martelle United Methodist Church
Martelle BP
Convenience store
Martelle City-Park

TRAFFIC VOLUMES

H

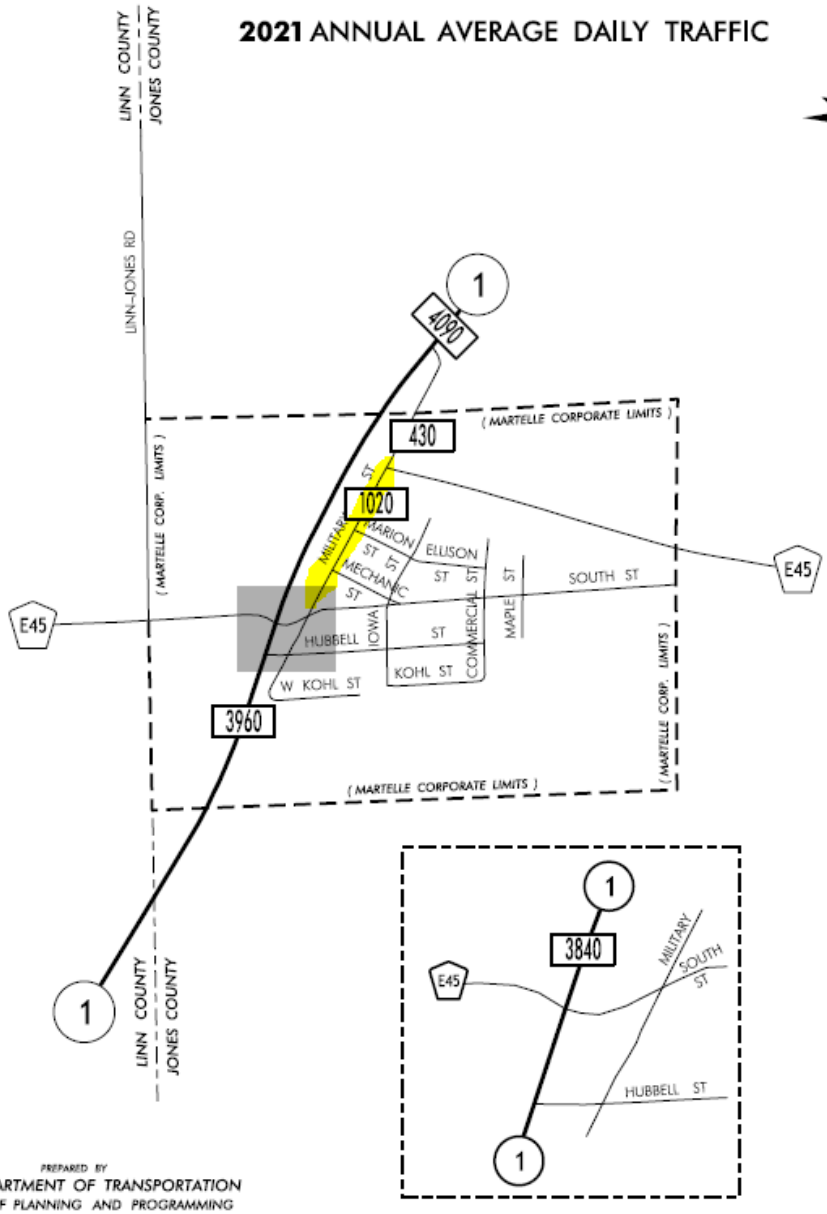
IOWADOT

TRAFFIC FLOW MAP OF

MARTELLE

JONES COUNTY

2021 ANNUAL AVERAGE DAILY TRAFFIC



PREPARED BY
IOWA DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING AND PROGRAMMING
OFFICE OF SYSTEM PLANNING
PHONE (515) 239-1289

LEGEND

RECORDER ONLY
MANUAL COUNT

TRAFFIC SIGN LAYOUT

H

Order subtotal **$1,625.00** - Your cart contains 1 item Continue Shopping VIEW CART

BlinkerStop® Flashing LED STOP Sign (R1-1)

TAPCO

1 × $1,625.00

Size 30 in H x 30 in W

Power Source Solar

LED Color Red

Sheeting Color Red

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** 7/30/2024

Location / Title of Project: Willis Avenue & 8th Street

Applicant: City of Perry

Contact Person: Josh Wuebker Title: Public Works Director

Complete Mailing Address: 1102 Willis Avenue, PO Box 545

Perry, IA 50220

Phone: 515-465-2481 (Area Code) E-Mail: Josh.wuebker@perryia.org

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: _____ (Area Code) E-Mail: _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	59,285
Total Project Cost	$	59,285
Safety Funds Requested	**$**	**59,285**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
2017021895	Willis Ave and 8th St	☐	☐	-0.08	
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the City of Perry

Signed: _____ 8-6-24
Signature Date Signed

Dirk Cavanaugh, Mayor
Printed Name

Attest: _____ 8/6/2024
Signature Date Signed

Elizabeth Hix, City Clerk
Printed Name

RESOLUTION NO. 080524D

RESOLUTION APPROVING THE SUBMISSION OF AN APPLICATION TO THE IOWA DEPARTMENT OF TRANSPORTATION FOR A TRAFFIC SAFETY IMPROVEMENT PROGRAM (TSIP) GRANT BY THE CITY OF PERRY, IOWA

WHEREAS, the Iowa Department of Transportation is accepting applications under the Traffic Safety Improvement Program (TSIP), which provides for site-specific traffic safety and operations improvements, traffic control devices, safety research, safety studies, or public information initiatives; and

WHEREAS, the City of Perry plans to request funding for eligible costs related to the traffic control devices at Willis Avenue and 8th Street under the Traffic Safety Improvement Program for 100% funding of an amount of $59,285.

NOW, THEREFORE BE IT RESOLVED that the Perry City Council hereby approves the submittal of an application to the Iowa Department of Transportation for a Traffic Safety Improvement Program (TSIP) Grant for 100% funding in the amount of $59,285 (Fifty-nine thousand two hundred eighty-five dollars).

BE IT FURTHER RESOLVED that the Perry City Council authorizes the Mayor to sign all documents necessary to submit such a grant to the Iowa Department of Transportation.

PASSED AND APPROVED this 5th day of August, 2024.

Dirk Cavanaugh, Mayor

ATTEST:

Elizabeth Hix, City Clerk

Traffic Control Device equipment upgrades are requested for Willis Avenue and 8th Street in Perry, Iowa. Information supporting this request follows:

Roadway Geometrics: Willis Avenue runs the entirety of the city east-west and intersects Hwy 141 and Hwy 144 within the city limits. Willis Avenue, in the project area, is classified as a Minor Arterial and connects downtown Perry to the main residential area to the east. Willis Avenue is a two-lane roadway with curb and gutter and a speed limit of 25 mph in the area of 8th Street. No parking is allowed in the area of 8th Street. There is a sidewalk on both sides of Willis Avenue in this area.

8th Street runs north-south through the city of Perry passing in front of Perry Elementary School, the McCreary Community Center and Wiese Park, north of Willis Avenue. It has parking on the west side of the road during non-school hours and is classified as a Minor Arterial. 8th Street is a two-lane roadway with a curb and gutter and a speed limit of 25 mph. There is a sidewalk on both sides of 8th Street in this area.

25- foot wide boulevard areas on Willis Avenue and 8th Street allow for a larger clear zone. Street trees are set back 10 to 15-feet. Utility poles are set back 5 to 10-feet. The existing signal poles are set back 3-feet from the face of curb at the intersection. An assessment of sight distance at the two study intersections was conducted in the field for all directions. Using the AASHTO Green Book, adequate intersection sight distance is available for all approaches.

Pedestrian Activity: High visibility crosswalks are present on all legs. This intersection is an established school crossing. Available pedestrian count data is summarized in **Table 1** below. This data shows that there is pedestrian activity across Willis Avenue not only during school arrival and dismissal but also throughout the middle of the day.

Table 1: Pedestrian Count Information

Time Period	East Leg	West Leg
AM	6	0
MID*	15	1
PM	7	5
13-Hr Total	46	6

*2:00 PM-3:00 PM

Crash Activity: Crash trends were reviewed for Willis Avenue and 8th Street for May 2019 to May 2024. Two crashes occurred at the intersection. One was Property Damage Only and one was possible injury. Both were rear-end crashes related to vehicles following to close. The PCR ranking is negligible.

Traffic Controls: 8th Street and Willis Avenue is a signalized intersection. All approaches are shared approaches. The existing signal consists of side mounted signal heads with 12-inch lenses. Pedestrian heads and buttons are present to cross Willis Avenue only. The crosswalks set 25-feet back from Willis Avenue on 8th Street.

In May 2021, signal warrants were completed for the intersection signal. Notably Warrant 5 – Pedestrian Crossing Warrant met 15 out of the required 20 hours for school age pedestrians. This showed the signal was close to meeting Warrant 5 based on current pedestrian activity at the intersection. Per the 11th edition of the MUTCD December 2023, "The satisfaction of a warrant (or warrants) is one of the relevant factors in the engineering study, but it is not intended to be the only factor or even the overriding

consideration." The need to get pedestrians across Willis Avenue safely remains a top priority for the city. The city plans for this important signal to remain in place, along with upgrades to improve the safety for both vehicles as well as pedestrians. The city recently upgraded the pedestrian ramps to meet the latest ADA standards.

Transportation Access: This intersection serves as a school crossing to Perry Elementary School and provides access to residential areas to the south and to the McCreary Community Center and Wiese Park to the north. In addition, the High Trestle Trail Connector is planned to extend and loop northwest, enhancing trail connections and making the area a bike hub, see **Attachment E**. The Willis Avenue and 8th Street intersection will be a key crossing for this new trail connector for this very popular trail. The trail connector will connect Perry's downtown and other planned local trails. With the increase that will come as this new trail connector is built, it is anticipated that midday pedestrian and bicyclist volumes will increase at the signal and Warrant 5 will be met.

The City of Perry is in the 69% percentile for transportation insecurity in regard to access according to the USDOT Equitable Transportation Community Explorer, resulting in a disadvantaged community rating. Transportation Insecurity occurs when people are unable to get to where they need to go to meet the needs of their daily life regularly, reliably, and safely. Nationally, there are well-established policies and programs that aim to address food insecurity and housing insecurity, but not transportation insecurity. Communities with higher scores in transportation access may experience difficulty traveling where they want to go via cars, walking and transit. Limited access to personal vehicles or transit can create significant barriers to employment and resources.

To help improve transportation access it is important to maintain good multi-modal crossings at intersections like Willis Avenue and 8th Street within Perry. With the expected increased pedestrians and bicyclists using the area to access the High Trestle Trail Connector, safety is a key factor to consider.

Proposed Project

The requested signal equipment upgrades at Willis Avenue and 8th Street include the installation of four pedestrian pedestals, eight APS push buttons, eight LED pedestrian countdown timers, a new 356I ATC cabinet, and a Battery backup system - 1400VA. The city of Perry will install a new controller and conflict monitor as part of these upgrades.

The project will address:

1. Upgrade aging infrastructure
2. Ensure reliability as the signal will stay up and running during a power outage
3. Help enhance walkability and improve pedestrian safety in an area that has low transportation access by providing up to date pedestrian crossing equipment for all intersection legs
4. Accommodate for increased crossing activity at Willis Avenue and 8th Street with the High Trestle Trail Connector regional trail

The installation of LED countdown pedestrian heads will bring the intersection up to the latest MUTCD standard. The APS push buttons will bring the intersection up to compliance with the PROWAG.

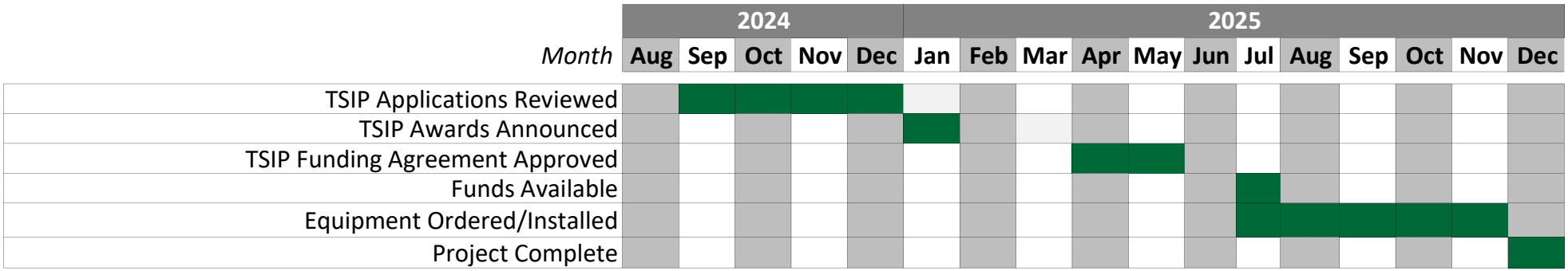
City of Perry
8th Street and Willis Avenue Signal Equipment Upgrades
Preliminary Cost Breakdown

Line No.	Description	No. of Units	Total Cost
1	16" Pedestrian Heads	8	**$1,531**
2	Countdown LED Insert	8	**$2,323**
3	Pole Mounts for Ped Heads	8	**$1,659**
4	APS Push Buttons	8	**$13,860**
5	Pedestrian Pedestal Poles	4	**$4,187**
6	356I ATC Cabinet	1	**$27,625**
7	Battery Back Up System: 1400VA	1	**$8,100**
ESTIMATED TOTAL COST FOR EQUIPMENT			**$59,285**

City of Perry

Willis Avenue & 8th Street

Time Schedule



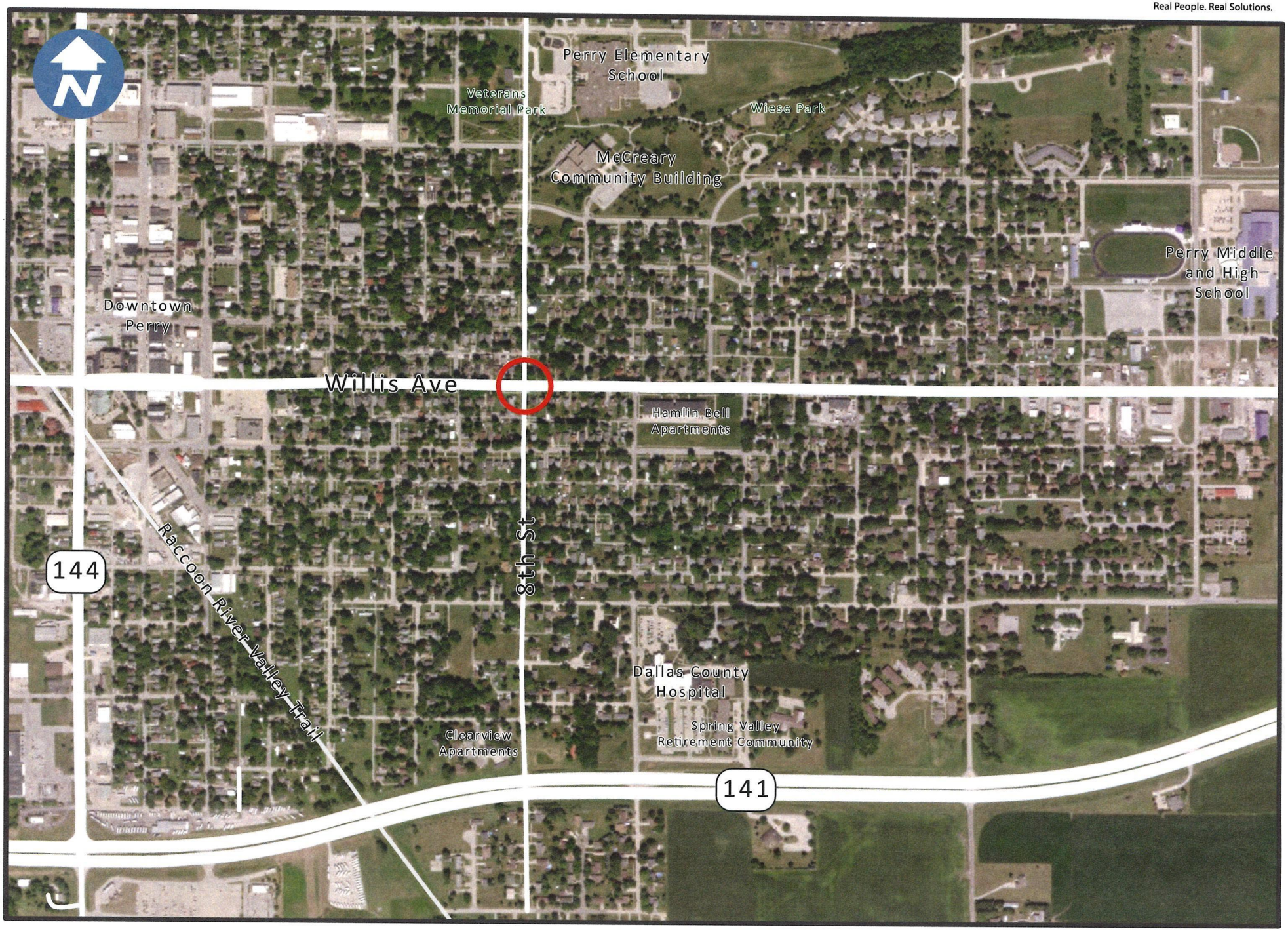
PERRY
CULTURE & COMMUNITY THRIVE HERE.

Willis Avenue & 8th Street Signal Improvements

City of Perry, Iowa

Document E: Project Location

BOLTON & MENK
Real People. Real Solutions.



Document E - Map

GALLOPING GOOSE REGIONAL TRAIL

RACCOON RIVER VALLEY TRAIL

HIGH TRESTLE TRAIL

HIGH TRESTLE TRAIL CONNECTOR

PARK STREET

8TH STREET

2ND AVENUE

BATEMAN STREET

NORTH STREET

18TH STREET

WILLIS AVENUE

1ST AVENUE

IOWA STREET

141

PARKS AND OPEN SPACE

- A PATTEE PARK
- B PERKINS PARK
- C DOG PARK
- D WIESE PARK
- E PERRY SOCCER COMPLEX
- F CABOOSE PARK / RACOON RIVER VALLEY TRAILHEAD / WELCOME DEPOT
- G JOSH DAVIS PLAZA / SOUMAS COURT
- H VETERAN'S MEMORIAL
- I VIOLET HILL CEMETERY
- J IOWA STREET STORMWATER WETLAND
- K FOREST PARK MUSEUM & ARBORETUM (DCCB)
- L PERRY BOAT RAMP/ NORTH RACCOON RIVER TRAIL ACCESS (DCCB)

CITY FACILITIES

- 1 MIDDLE / HIGH SCHOOL
- 2 ELEMENTARY SCHOOL
- 3 DALLAS COUNTY HOSPITAL

TRAILS AND BIKEWAYS

- EXISTING LOCAL TRAILS
- PLANNED LOCAL TRAILS
- EXISTING REGIONAL TRAILS
- PLANNED REGIONAL TRAILS
- ON-STREET BIKE ROUTE

8th Street, Perry, IA

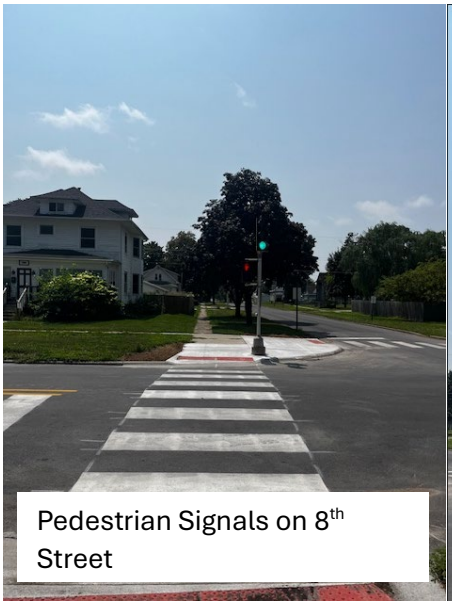
Intersection of 8th Street & Willis Avenue – Looking North

Intersection of 8th Street & Willis Avenue – Looking East

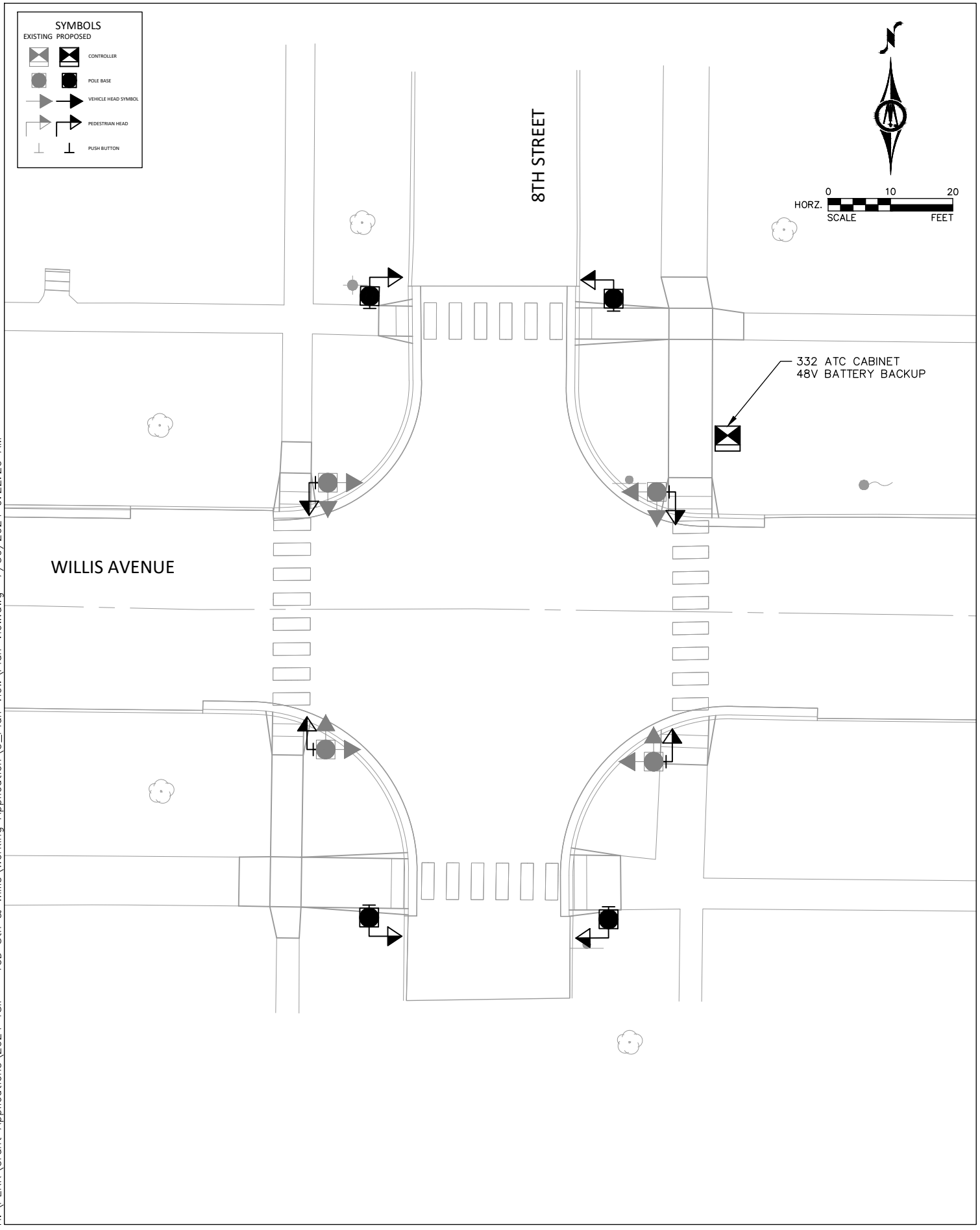
Intersection of 8th Street & Willis Avenue – Looking South

Intersection of 8th Street & Willis Avenue – Looking West

Cabinet box on 8th Street



Pedestrian Signals on 8th Street



H:\PERR\Grant Applications\2024 TSIP - TCD 8th & Willis\Working Application\G_Plan View\Plan View.dwg 7/30/2024 9:22:20 AM

8th St and Willis Ave
Perry Iowa
Tuesday, May 11, 2021

Time	Southbound 8th St						Westbound Willis Ave						Northbound 8th St						Eastbound Willis Ave						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
12:00 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
12:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
12:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
12:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
1:00 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
1:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
1:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
1:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
2:00 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
2:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
2:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
2:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
3:00 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
3:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
3:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
3:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
4:00 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
4:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
4:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
4:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
5:00 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
5:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
5:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
5:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
6:00 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
6:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
6:30 AM	0	0	2	0	0	*2*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	0	0	5	0	0	*5*	**10**
6:45 AM	0	3	2	1	0	*6*	0	2	18	1	0	*21*	0	1	1	2	0	*4*	0	2	22	5	0	*29*	**60**
Hourly Total	0	3	4	1	0	*8*	0	2	21	1	0	*24*	0	1	1	2	0	*4*	0	2	27	5	0	*34*	**70**
7:00 AM	0	2	3	1	0	*6*	0	1	19	2	0	*22*	0	1	3	0	0	*4*	0	4	25	3	0	*32*	**64**
7:15 AM	0	3	2	3	0	*8*	0	0	27	6	2	*33*	0	0	3	2	2	*5*	0	1	41	5	0	*47*	**93**
7:30 AM	0	7	5	2	0	*14*	0	2	33	7	4	*42*	0	2	4	7	0	*13*	0	8	53	7	0	*68*	**137**
7:45 AM	0	11	12	6	0	*29*	0	4	44	19	0	*67*	0	1	8	5	0	*14*	0	8	46	5	0	*59*	**169**
Hourly Total	0	23	22	12	0	*57*	0	7	123	34	6	*164*	0	4	18	14	2	*36*	0	21	165	20	0	*206*	**463**

8th St and Willis Ave
Perry Iowa
Tuesday, May 11, 2021

Time	Southbound 8th St						Westbound Willis Ave						Northbound 8th St						Eastbound Willis Ave						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 AM	0	13	10	14	0	*37*	0	0	21	17	0	*38*	0	0	5	2	0	*7*	0	5	21	4	0	*30*	**112**
8:15 AM	0	2	4	2	0	*8*	0	2	24	2	0	*28*	0	0	1	0	0	*1*	0	2	20	1	0	*23*	**60**
8:30 AM	0	4	0	1	0	*5*	0	1	30	4	0	*35*	0	0	0	1	0	*1*	0	1	15	1	0	*17*	**58**
8:45 AM	0	0	2	0	0	*2*	0	1	28	1	1	*30*	0	0	1	5	1	*6*	0	0	25	1	0	*26*	**64**
Hourly Total	0	19	16	17	0	*52*	0	4	103	24	1	*131*	0	0	7	8	1	*15*	0	8	81	7	0	*96*	**294**
9:00 AM	0	3	2	1	0	*6*	0	0	23	2	0	*25*	0	0	0	2	0	*2*	0	1	25	0	0	*26*	**59**
9:15 AM	0	2	3	2	0	*7*	0	0	23	1	1	*24*	0	1	1	1	1	*3*	0	0	20	0	0	*20*	**54**
9:30 AM	0	0	3	0	0	*3*	0	1	23	1	0	*25*	0	0	1	0	0	*1*	0	1	23	1	0	*25*	**54**
9:45 AM	0	5	3	1	0	*9*	0	0	23	3	0	*26*	0	1	0	2	1	*3*	0	0	28	2	0	*30*	**68**
Hourly Total	0	10	11	4	0	*25*	0	1	92	7	1	*100*	0	2	2	5	2	*9*	0	2	96	3	0	*101*	**235**
10:00 AM	0	1	0	2	0	*3*	0	0	36	2	0	*38*	0	0	0	1	0	*1*	0	0	21	1	0	*22*	**64**
10:15 AM	0	0	2	2	0	*4*	0	1	35	1	1	*37*	0	1	0	0	1	*1*	0	2	20	4	0	*26*	**68**
10:30 AM	0	1	0	0	0	*1*	0	2	31	2	0	*35*	0	2	0	0	0	*2*	0	2	21	1	0	*24*	**62**
10:45 AM	0	1	1	3	0	*5*	0	2	35	0	0	*37*	0	0	1	0	0	*1*	0	1	24	4	0	*29*	**72**
Hourly Total	0	3	3	7	0	*13*	0	5	137	5	1	*147*	0	3	1	1	1	*5*	0	5	86	10	0	*101*	**266**
11:00 AM	0	0	0	1	1	*1*	0	2	35	2	0	*39*	0	2	3	1	0	*6*	0	1	33	0	0	*34*	**80**
11:15 AM	0	1	3	3	0	*7*	0	1	43	3	0	*47*	0	0	1	0	0	*1*	0	2	27	3	0	*32*	**87**
11:30 AM	0	4	1	2	0	*7*	0	1	42	0	0	*43*	0	1	0	1	0	*2*	0	3	30	3	0	*36*	**88**
11:45 AM	0	2	3	3	0	*8*	0	2	38	3	0	*43*	0	0	0	0	0	*0*	0	2	31	2	0	*35*	**86**
Hourly Total	0	7	7	9	1	*23*	0	6	158	8	0	*172*	0	3	4	2	0	*9*	0	8	121	8	0	*137*	**341**
12:00 PM	0	0	3	3	0	*6*	0	2	34	1	0	*37*	0	0	2	1	0	*3*	0	2	28	5	0	*35*	**81**
12:15 PM	0	1	1	1	0	*3*	0	3	36	2	0	*41*	0	2	2	2	0	*6*	0	5	31	1	0	*37*	**87**
12:30 PM	0	0	2	0	0	*2*	0	4	33	3	1	*40*	0	1	0	2	1	*3*	0	2	27	2	0	*31*	**76**
12:45 PM	0	6	1	0	0	*7*	0	1	24	4	0	*29*	0	0	0	0	0	*0*	0	2	38	1	0	*41*	**77**
Hourly Total	0	7	7	4	0	*18*	0	10	127	10	1	*147*	0	3	4	5	1	*12*	0	11	124	9	0	*144*	**321**
1:00 PM	0	2	2	2	1	*6*	0	2	32	0	0	*34*	0	1	1	2	0	*4*	0	2	33	3	0	*38*	**82**
1:15 PM	0	0	1	2	0	*3*	0	1	36	3	0	*40*	0	0	0	0	0	*0*	0	2	28	6	0	*36*	**79**
1:30 PM	0	2	0	0	0	*2*	0	1	36	8	0	*45*	0	0	4	2	0	*6*	0	4	37	4	0	*45*	**98**
1:45 PM	0	2	1	0	0	*3*	0	4	61	7	0	*72*	0	1	4	1	0	*6*	0	2	38	5	0	*45*	**126**
Hourly Total	0	6	4	4	1	*14*	0	8	165	18	0	*191*	0	2	9	5	0	*16*	0	10	136	18	0	*164*	**385**
2:00 PM	0	11	10	15	1	*36*	0	1	49	11	10	*61*	0	4	3	2	0	*9*	0	7	38	3	0	*48*	**154**
2:15 PM	0	2	3	4	0	*9*	0	2	32	4	5	*38*	0	1	4	1	2	*6*	0	3	52	1	0	*56*	**109**
2:30 PM	0	3	5	2	2	*10*	0	4	42	7	0	*53*	0	2	2	1	0	*5*	0	2	38	4	0	*44*	**112**
2:45 PM	0	1	5	3	3	*9*	0	1	50	4	0	*55*	0	1	1	3	0	*5*	0	2	34	4	0	*40*	**109**
Hourly Total	0	17	23	24	6	*64*	0	8	173	26	15	*207*	0	8	10	7	2	*25*	0	14	162	12	0	*188*	**484**
3:00 PM	0	3	1	1	0	*5*	0	1	59	5	0	*65*	0	1	4	2	0	*7*	0	5	40	4	1	*49*	**126**
3:15 PM	0	2	5	7	0	*14*	0	2	43	3	3	*48*	0	2	3	0	0	*5*	0	3	42	5	0	*50*	**117**
3:30 PM	0	4	3	3	0	*10*	0	2	50	3	3	*55*	0	2	1	2	0	*5*	0	1	43	6	0	*50*	**120**
3:45 PM	0	5	7	3	2	*15*	0	2	56	3	0	*61*	0	0	3	0	0	*3*	0	2	40	7	0	*49*	**128**
Hourly Total	0	14	16	14	2	*44*	0	7	208	14	6	*229*	0	5	11	4	0	*20*	0	11	165	22	1	*198*	**491**

8th St and Willis Ave
Perry Iowa
Tuesday, May 11, 2021

Time	Southbound 8th St						Westbound Willis Ave						Northbound 8th St						Eastbound Willis Ave						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	2	5	3	0	*10*	0	1	37	8	0	*46*	0	2	1	0	0	*3*	0	0	40	4	0	*44*	**103**
4:15 PM	0	6	5	3	0	*14*	0	3	50	4	0	*57*	0	0	0	0	0	*0*	0	1	33	3	0	*37*	**108**
4:30 PM	0	1	5	0	0	*6*	0	0	43	3	1	*46*	0	3	1	3	1	*7*	0	1	48	3	0	*52*	**111**
4:45 PM	0	2	3	3	0	*8*	0	0	53	4	3	*57*	0	2	1	5	3	*8*	0	1	45	1	0	*47*	**120**
Hourly Total	0	11	18	9	0	*38*	0	4	183	19	4	*206*	0	7	3	8	4	*18*	0	3	166	11	0	*180*	**442**
5:00 PM	0	4	6	2	0	*12*	0	1	57	1	0	*59*	0	4	1	1	0	*6*	0	4	44	10	1	*58*	**135**
5:15 PM	0	0	7	3	2	*10*	0	1	53	4	2	*58*	0	3	3	1	0	*7*	0	5	47	3	0	*55*	**130**
5:30 PM	0	3	6	2	0	*11*	0	2	46	7	0	*55*	0	2	2	0	0	*4*	0	1	54	2	4	*57*	**127**
5:45 PM	0	3	2	3	0	*8*	0	0	29	2	0	*31*	0	2	3	1	0	*6*	0	2	48	2	0	*52*	**97**
Hourly Total	0	10	21	10	2	*41*	0	4	185	14	2	*203*	0	11	9	3	0	*23*	0	12	193	17	5	*222*	**489**
6:00 PM	0	3	4	1	0	*8*	0	2	40	2	5	*44*	0	0	2	3	0	*5*	0	1	32	3	0	*36*	**93**
6:15 PM	0	0	0	3	0	*3*	0	1	44	3	1	*48*	0	2	0	1	2	*3*	0	2	36	1	0	*39*	**93**
6:30 PM	0	1	2	0	0	*3*	0	3	32	2	1	*37*	0	2	0	4	0	*6*	0	0	36	1	0	*37*	**83**
6:45 PM	0	0	0	0	0	*0*	0	0	31	4	1	*35*	0	2	2	2	0	*6*	0	0	32	1	0	*33*	**74**
Hourly Total	0	4	6	4	0	*14*	0	6	147	11	8	*164*	0	6	4	10	2	*20*	0	3	136	6	0	*145*	**343**
7:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
7:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
7:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
7:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
8:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
8:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
8:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
8:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
9:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
9:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
9:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
9:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
10:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
10:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
10:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
10:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
11:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
11:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
11:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
11:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
DAILY TOTAL	**0**	**134**	**158**	**119**	**12**	***411***	**0**	**72**	**1822**	**191**	**45**	***2085***	**0**	**55**	**83**	**74**	**15**	***212***	**0**	**110**	**1658**	**148**	**6**	***1916***	**4624**
Cars	0	132	156	118	12	*406*	0	71	1815	189	14	*2075*	0	55	80	73	7	*208*	0	109	1647	147	6	*1903*	**4592**
Heavy Vehicles	0	2	2	1	0	*5*	0	1	7	2	31	*10*	0	0	3	1	8	*4*	0	1	11	1	0	*13*	**32**
Heavy Vehicle %	0.00%	1.49%	1.27%	0.84%	0.00%	*1.22%*	0.00%	1.39%	0.38%	1.05%	68.89%	*0.48%*	0.00%	0.00%	3.61%	1.35%	53.33%	*1.89%*	0.00%	0.91%	0.66%	0.68%	0.00%	*0.68%*	**0.69%**

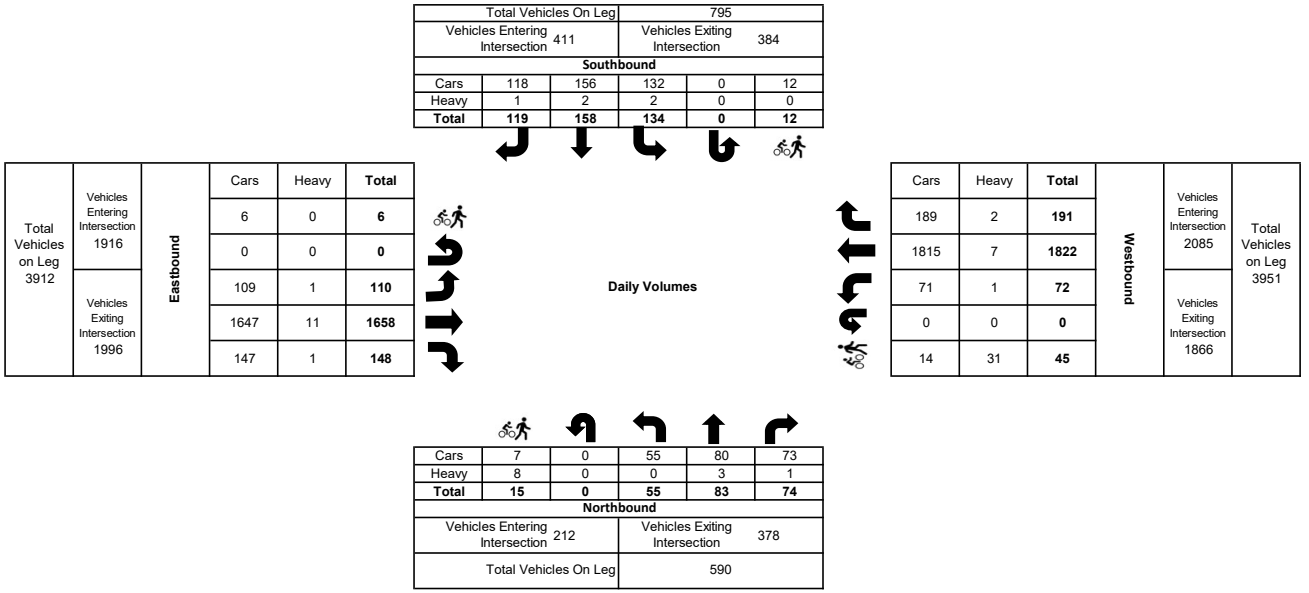
8th St and Willis Ave
Perry Iowa
Tuesday, May 11, 2021

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
7:15 AM	0	3	2	3	0	*8*	8	0	0	27	6	*35*	2	33	0	0	3	*35*	2	2	5	0	1	*9*	**41**
7:30 AM	0	7	5	2	0	*14*	14	0	2	33	7	*49*	4	42	0	2	4	*48*	7	0	13	0	8	*20*	**53**
7:45 AM	0	11	12	6	0	*29*	29	0	4	44	19	*77*	0	67	0	1	8	*68*	5	0	14	0	8	*19*	**46**
8:00 AM	0	13	10	14	0	*37*	37	0	0	21	17	*58*	0	38	0	0	5	*38*	2	0	7	0	5	*9*	**21**
Peak Hour Total	0	34	29	25	0	*88*	88	0	6	125	49	*219*	6	180	0	3	20	*189*	16	2	39	0	22	*57*	**161**
PHF	0.000	0.654	0.604	0.446	0.000	*0.595*	0.595	0.000	0.375	0.710	0.645	*0.711*	0.375	0.672	0.000	0.375	0.625	*0.695*	0.571	0.250	0.696	0.000	0.688	*0.713*	**0.759**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:45 PM	0	2	3	3	0	*8*	8	0	0	53	4	*61*	3	57	0	2	1	*62*	5	3	8	0	1	*16*	**45**
5:00 PM	0	4	6	2	0	*12*	12	0	1	57	1	*70*	0	59	0	4	1	*63*	1	0	6	0	4	*7*	**44**
5:15 PM	0	0	7	3	2	*10*	10	0	1	53	4	*64*	2	58	0	3	3	*63*	1	0	7	0	5	*8*	**47**
5:30 PM	0	3	6	2	0	*11*	11	0	2	46	7	*59*	0	55	0	2	2	*57*	0	0	4	0	1	*4*	**54**
Peak Hour Total	0	9	22	10	2	*41*	41	0	4	209	16	*254*	5	229	0	11	*7*	*245*	7	3	25	0	11	*35*	**190**
PHF	0.000	0.563	0.786	0.833	0.250	*0.854*	0.854	0.000	0.500	0.917	0.571	*0.907*	0.417	0.970	0.000	0.688	0.583	*0.972*	0.350	0.250	0.781	0.000	0.550	*0.547*	**0.880**



APPLICATION FOR IOWA DEPARTMENT OF TRANSPORTATION TRAFFIC SAFETY IMPROVEMENT PROGRAM

CITY OF SIOUX CITY

2025 Traffic Signal Upgrades

Table of Contents

A

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE
TSIP FUNDS

GENERAL INFORMATION **DATE:** 7/29/2024

Location / Title of Project 2025 Traffic Signal Safety Upgrades

Applicant City of Sioux City

Contact Person Katie Eickholt Title Civil Engineer

Complete Mailing Address PO Box 447

Sioux City, IA 51102

Phone 712-279-6324 (Area Code) E-Mail keickholt@sioux-city.org

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 _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	31,581.00
Total Project Cost	$	31,581.00
Safety Funds Requested	**$**	**31,581.00**

Additional Project Safety Documentation (when available):

☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan

☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan

☐ Iowa DOT TEAP Study or similar analysis and concept

☒ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information

Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
2017086531	6TH Street and Nebraska Street	☒	☐	3.61	0.449668
2017086501	5th Street and Wesley Parkway	☒	☐	5.05	0.273631
2017146589	Floyd Boulevard and Outer Drive N	☒	☐	3.71	0.161819
2017086851	6th Street and Hoeven Drive	☐	☒	0.92	0.346071

A

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the City of Sioux City

Signed: _____ AUG 12 2024
Signature Date Signed

Robert K. Padmore, City Manager
Printed Name

Attest: _____ AUG 12 2024
Signature Date Signed

Heidi Farrens, City Clerk
Printed Name

A

RESOLUTION NO. 2024 - 0818
with attachments

RESOLUTION AUTHORIZING AND APPROVING THE SUBMISSION OF A GRANT APPLICATION TO THE IOWA DEPARTMENT OF TRANSPORTATION TRAFFIC SAFETY IMPROVEMENT PROGRAM FOR FY2026 TO ASSIST WITH THE PURCHASE OF SIGNAL HEADS IN CONNECTION WITH THE 2025 TRAFFIC SIGNAL SAFETY UPGRADES PROJECT.

WHEREAS, the Iowa Department of Transportation Traffic Safety Improvement Program operates under the rules of the Iowa Administrative Code 761 – Chapter 164; and

WHEREAS, said program allows for the distribution of traffic safety funds to cities, counties, and the Iowa Department of Transportation for roadway safety improvements, research, studies, or public information initiatives; and

WHEREAS, the City of Sioux City has determined that making upgrades to the signal heads for the traffic signals at the intersections of 6th Street and Nebraska Street, 5th Street and Wesley Parkway, Floyd Boulevard and Outer Drive N, and 6th Street and Hoeven Drive will improve the safety of the intersections by increasing the visibility of the signals; and

WHEREAS, there is attached hereto and by this reference made a part hereof, a Grant Application to the Iowa Department of Transportation Traffic Safety Improvement Program, which Grant Application should be approved as to form and content.

NOW, THEREFORE, BE IT HEREBY RESOLVED BY THE CITY COUNCIL OF THE CITY OF SIOUX CITY, IOWA that the Engineering Division is hereby authorized and directed to submit a Grant Application to the Iowa Department of Transportation Traffic Safety Improvement Program to request funding for upgrades to the signal heads for the traffic signals at the intersections of 6th Street and Nebraska Street, 5th Street and Wesley Parkway, Floyd Boulevard and Outer Drive N, and 6th Street and Hoeven Drive.

BE IT FURTHER RESOLVED, that the City Manager and City Clerk are hereby authorized and directed to execute said Grant Application for and on behalf of the City.

PASSED AND APPROVED: August 12, 2024

Robert E. Scott, Mayor

ATTEST: Heidi Farrens

Heidi Farrens, City Clerk

B. NARRATIVE

The City of Sioux City is submitting this application for Traffic Safety Improvement Program funds under the Traffic Control Device category. This funding request will allow the City to purchase the materials necessary to upgrade signals to 12-inch lenses and add retroreflective sheeting to signal backplates at four (4) intersections identified by City Staff. The upgrade to 12-inch lenses will also require the replacement of the signal head. The City of Sioux City is responsible for the operation and maintenance of the signals identified below. These intersections have been identified to be upgraded to signals with 12-inch lenses and retroreflective sheeting on the backplates to reduce the crashes at these intersections by making the signals more visible and up to the current MUTCD standards.

Intersections

- 6th Street and Nebraska Street
- 5th Street and Wesley Parkway
- Floyd Boulevard and Outer Drive N
- 6th Street and Hoeven Drive

Improving signal visibility by adding retroreflective sheeting to signal backplates (SI-10) has a crash reduction factor (CRF) of 5 for all crash types and severity. Improving signal visibility by upgrading to 12-iunch lenses (SI-11) has a CRF of 3 for all crash types and severity. Crash data referenced for each intersection below was gathered from Iowa DOT's *Iowa Crash Analysis Tool* (ICAT).

6th Street and Nebraska Street Intersection – *PCR Level Severe Crashes: HIGH*

The intersection of 6th Street and Nebraska Street is located in downtown Sioux City and is comprised of a 3-lane, one-way only, westbound and a 3-lane, one-way only, northbound. Thirty-three (33) intersection-related crashes were reported at this intersection from 2019-2023. Eighteen (18) of the crashes were due to ran traffic signal.

5th Street and Wesley Parkway Intersection – *PCR Level Severe Crashes: HIGH*

The intersection of 5th Street and Wesley Parkway is located in downtown Sioux City and is comprised of 4-lanes of two-way traffic northbound and southbound on Wesley Parkway. 2-lane two-way traffic on the west-leg, and 3 lane one-way traffic directed eastbound from the intersection. Forty-two (42) intersection-related crashes were reported at this intersection from 2019-2023. 10 of these crashes were due to ran traffic signal and ten (10) were from FTYROW: Making left turn.

Floyd Boulevard and Outer Drive North Intersection – *PCR Level Severe Crashes: HIGH*

The intersection of Floyd Boulevard and Outer Drive North is located on the northside of Sioux City and serves as a connection to the Northern Valley Crossing economic area and the Leeds and Indian Hills neighborhoods. Seventy-four (74) intersection-related crashes were reported at this intersection from 2019-2023. Ten (10) of these crashes were due to ran traffic signal and twenty-two (22) were from FTYROW: Making left turn.

6th Street and Hoeven Drive – PCR Level Severe Crashes: MEDIUM

The intersection of 6th Street and Hoeven Drive is located on the east side of downtown Sioux City and serves as a connection to the Hoeven Valley economic area, downtown, and residential neighborhoods. Seventeen (17) intersection-related crashes were reported from 2019-2023. Eight (8) of these crashes were due to ran traffic signal and three (3) were from FTYROW: Making left turn.

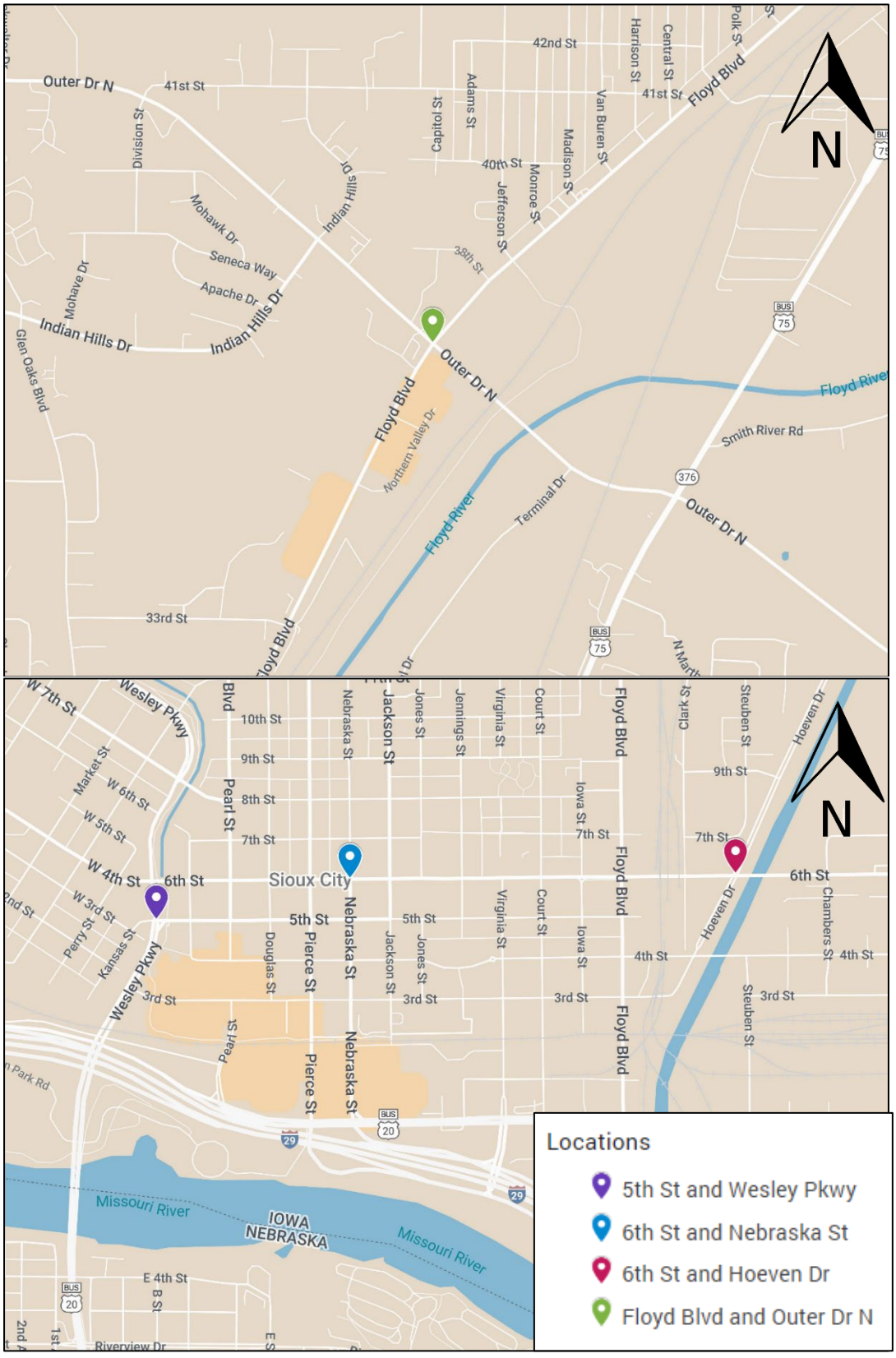
C. ITEMIZED BREAKDOWN OF COSTS

6th Street & Nebraska Street		
Upgrade to 12-inch lenses, add retroreflective sheeting to signal backplates.		
Equipment	Cost	
6 - 3 section heads MAM	$	2,475.00
TOTAL	**$**	**2,475.00**
5th Street & Wesley Parkway		
Upgrade to 12-inch lenses, add retroreflective sheeting to signal backplates.		
Equipment	Cost	
2 - 5 section heads MAM	$	3,825.00
5 - 3 section MAM	$	4,125.00
1 - 3 section head SOP (side of pole)	$	705.00
TOTAL	**$**	**8,655.00**
Floyd Boulevard and Outer Drive North		
Upgrade to 12-inch lenses, add retroreflective sheeting to signal backplates, remove permissive left		
Equipment	Cost	
4 - 4 section heads MAM	$	4,380.00
8 - 3 section heads MAM	$	6,600.00
TOTAL	**$**	**10,980.00**
6th Street and Hoeven Drive		
Upgrade to 12-inch lenses, add retroreflective sheeting to signal backplates		
Equipment	Cost	
8 - 3 section heads MAM	$	6,600.00
TOTAL	**$**	**6,600.00**
TOTAL (for all locations)	**$**	**28,710.00**
CONTIGENCY (10%)	**$**	**2,871.00**
TOTAL (with contingency)	**$**	**31,581.00**

D. TIME SCHEDULE

TSIP Application Due	August 15, 2024
TSIP Award Notification	Mid-January 2025
TSIP Funding Available	July 1, 2025
Project Letting	July 15, 2025
Project Construction	July – November 2025
Project Completion	November 2025

E. MAP


Outer Dr N
41st St
42nd St
Division St
Adams St
Capitol St
Harrison St
Central St
Van Buren St
Madison St
Monroe St
Jefferson St
Floyd Blvd
40th St
38th St
Indian Hills Dr
Mohawk Dr
Seneca Way
Apache Dr
Mohave Dr
Glen Oaks Blvd
Northern Valley Dr
Floyd River
Smith River Rd
Terminal Dr
33rd St
BUS 75
376
N
W 7th St
Wesley Pkwy
10th St
9th St
8th St
7th St
6th St
5th St
4th St
3rd St
W 6th St
W 5th St
W 4th St
W 3rd St
Market St
Perry St
Kansas St
Pearl St
Douglas St
Pierce St
Nebraska St
Jackson St
Jones St
Jennings St
Virginia St
Court St
Iowa St
Clark St
Steuben St
Hoeven Dr
Chambers St
Sioux City
Park Rd
Missouri River
IOWA
NEBRASKA
E 4th St
B St
Riverview Dr
BUS 20
29
Locations
5th St and Wesley Pkwy
6th St and Nebraska St
6th St and Hoeven Dr
Floyd Blvd and Outer Dr N

F. COLOR PICTURES

6th Street and Nebraska Street Intersection


6TH ST & NEBRASKA ST (LOOKING NORTH)
Nebraska St
Google
Image capture: Sep 2022 © 2024 Google United States


6TH ST & NEBRASKA ST (LOOKING SOUTH)
Nebraska St
Google
Image capture: Sep 2022 © 2024 Google

5th Street and Wesley Parkway Intersection


5TH ST & WESLEY PKWY
(LOOKING SOUTH)
Google
Image capture: May 2024 © 2024 Google


5TH ST & WESLEY PKWY (LOOKING WEST)
5th St
Google
Image capture: Sep 2022 © 2024 Google

Floyd Boulevard and Outer Drive North Intersection


FLOYD BLVD & OUTER DR N (LOOKING SOUTH)
Google
Image capture: Jun 2024 © 2024 Google


FLOYD BLVD & OUTER DR N (LOOKING WEST)
Google
Image capture: Sep 2022 © 2024 Google

6th Street and Hoeven Drive

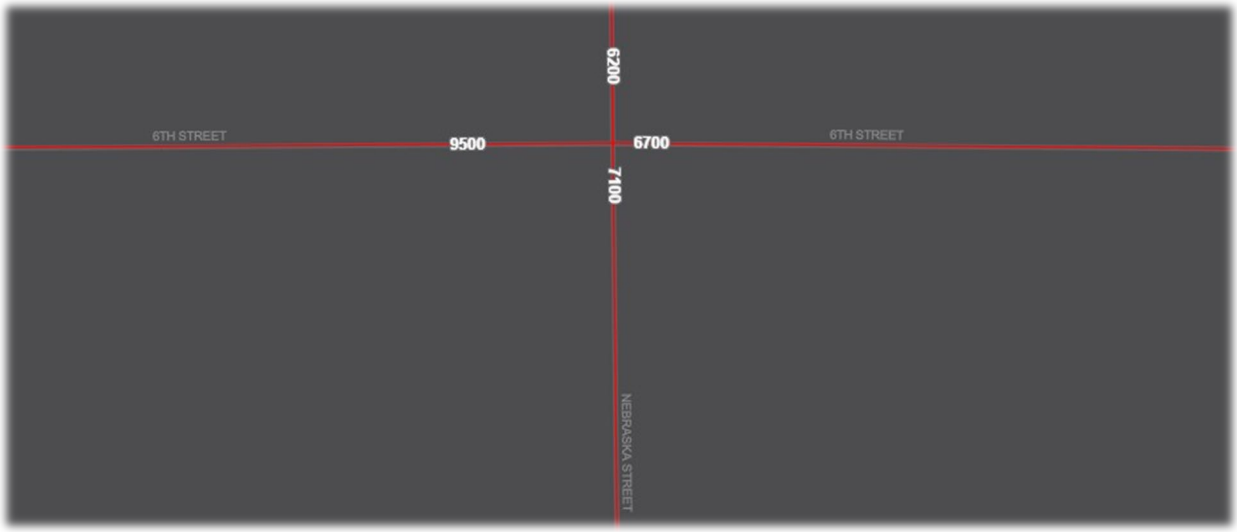
G. PLAN VIEW

Not Applicable

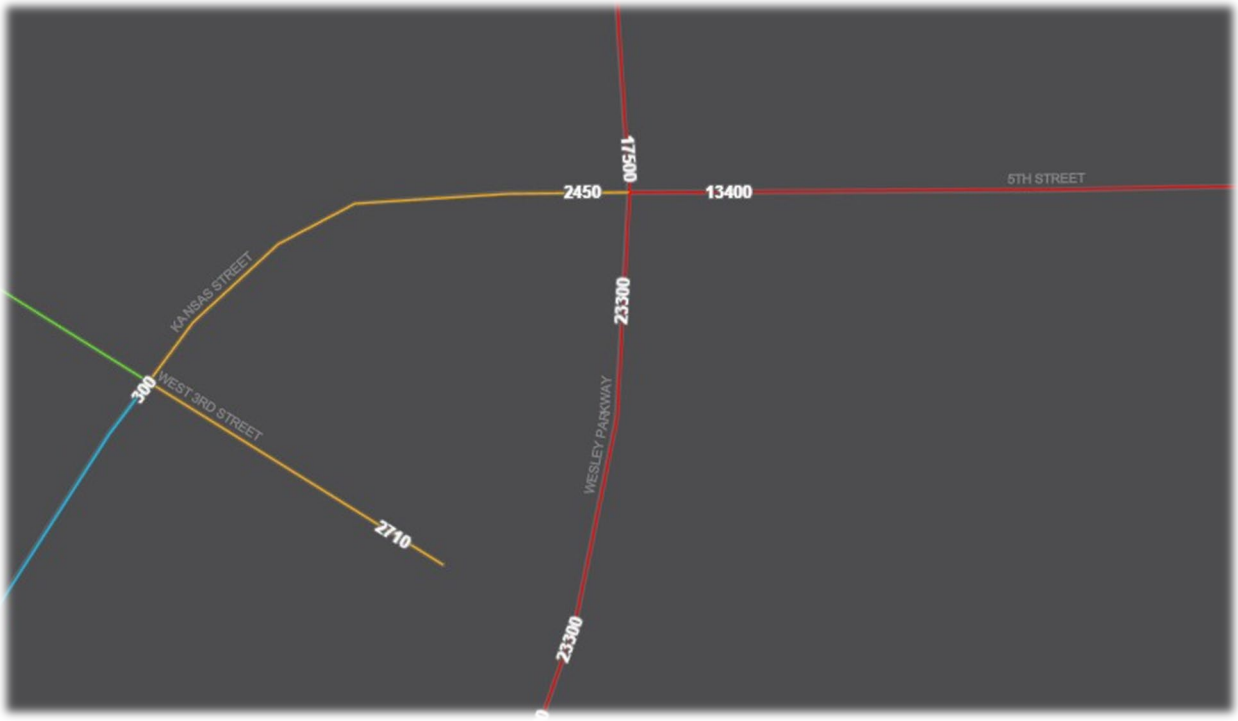
H. TRAFFIC VOLUMES

Annual average daily traffic (AADT) volumes in the area of the proposed improvements are given below per the Iowa DOT Iowa Traffic Data tool:

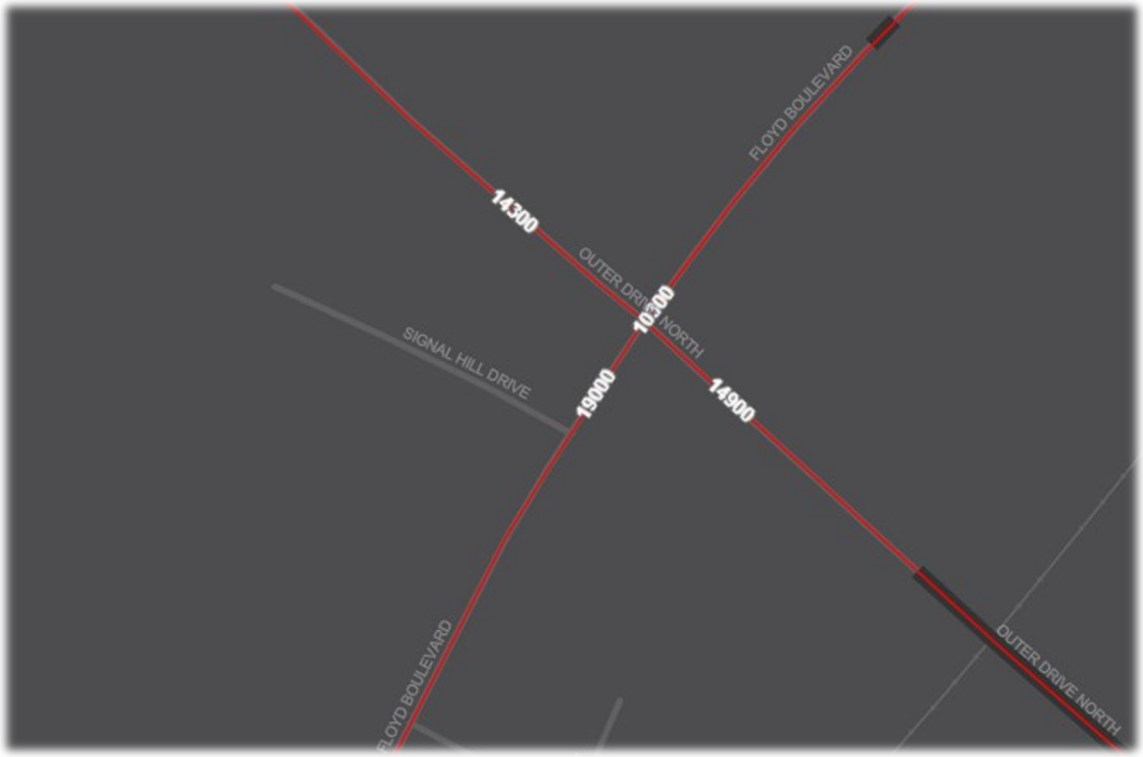
6th Street and Nebraska Street Intersection



5th Street and Wesley Parkway Intersection



Floyd Boulevard and Outer Drive North Intersection



6th Street and Hoeven Drive

I. TRAFFIC SIGNAL LAYOUT, TYPE, PROPOSED PHASING, AND DETECTOR LOCAITONS

Not Applicable

J. BENEFIT/COST WORKSHEET

Not Applicable

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** 08/15/2024

Location / Title of Project Beaverdale Road Traffic Signal Replacement

Applicant City of West Burlington

Contact Person Chase Williams Title Public Works Director

Complete Mailing Address Public Works Facility, 2000 W. Mt. Pleasant Street

West Burlington, IA, 52655

Phone 319-752-5451 (Area Code) E-Mail williamscw@WestBurlington.org

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 _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	71,602.96
Total Project Cost	$	71,602.96
Safety Funds Requested	**$**	**58,766.46**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

[A.]

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the City of West Burlington

Signed: _____ 8/13/24
Signature Date Signed

Gregg Mandsager, City Administrator
Printed Name

Attest: _____ 8/13/24
Signature Date Signed

Kelly Fry, City Clerk
Printed Name

B. NARRATIVE

Existing Conditions:

This grant request is for the improvement of the intersection of Beaverdale Road and Mt. Pleasant Street (Old U.S. Highway 34), in the City of West Burlington. The Iowa Department of Transportation transferred their jurisdiction of this intersection to the City of West Burlington approximately 20 years ago. This occurred in tandem with the completion of the new stretch of Highway 34, that bypasses Danville, Middletown, and the nearby Iowa Army Ammunition Plant (IAAAP). The traffic signals at this intersection are over 30 years old and have accrued significant wear and tear over their use, leading them to be difficult to see in poor visibility conditions. Out of 20 total ground loops 9 no longer work as shown on the existing signal configuration in attachment G and furthermore, the electrical panel's motherboard has burnt out, causing the traffic lights to flash red instead of properly cycling through their standard pattern causing confusion amongst motorists, resulting in a slow and inefficient flow of traffic. The current condition of this intersection leaves much to be desired; the safety of the intersection could be greatly improved by the addition of new traffic control devices.

The IAAAP is set to undergo a major expansion of its facilities and production output, resulting in more munitions being produced and shipped from the plant. This will result in a significant burden on the intersection in its current state. With the expansion of the IAAAP more workers will be hired, resulting in greater use of this intersection, and therefore greater deterioration, greater property damage, and greater accidents are bound to occur. In addition, the increased output from the plant will result in more semi traffic ferrying materials, supplies, and finished products in and out of the facility, causing more strain on the intersection.

The Federal Functional Classification System lists Mt. Pleasant Street, which is a 4-lane divided highway travelling east to west, as a minor arterial road. The eastbound Average Annual Daily Traffic (AADT) on Mt Pleasant Street is 3,440 and a westbound AADT of 4,740. Beaverdale Road, which is a two-lane highway travelling north to south, is classified as a major collector roadway. Beaverdale Road just north of the intersection has an AADT of 1,960. This intersection serves many residents, approaching from any direction, in several ways. Primarily this intersection is used to access the variety of industrial manufacturers along Mt. Pleasant Street, like the IAAAP, Big River Resources Ethanol Plant, and Riley Industrial Painting. On the other hand, it serves Des Moines County residents travelling to and from Burlington and West Burlington for their many shops, restaurants, and local businesses.

The Iowa Crash Analyst Tool shows that there have been 9 crashes at this intersection in the past decade, primarily due to speeding, inattentiveness, or failure to yield right of way. These accidents have affected motorists of all ages and varieties and have resulted only in one serious life-threatening injury due to a vehicle rolling over after losing control. The total property damage has so far amounted to $48,917. The safety and wellbeing of the commuters who utilize this roadway to get to and from work, school, or just running errands will be vastly improved by the completion of this project, benefiting the greater Burlington community.

Proposed Concepts:

The proposed improvements for this intersection include new traffic cameras to replace the current loop system, new traffic signal heads, and new housing for the signals. These new modern digital traffic signals will meet the latest Manual on Uniform Traffic Control Devices (MUTCD) standards and requirements outlined in Chapter 4. Locations of signal heads will mimic the existing layout as shown in attachment G, with the cameras to be mounted to the existing mast.

Safety Justification:

New traffic cameras, signals, and signal housings will significantly improve the safety of this intersection. In turn this will reduce property damage, reduce injuries, and potentially save lives. The new traffic cameras are desperately needed to replace the broken loop and pad system, with nearly half of the detection pads currently broken. Replacing this worn-out system will allow for a smoother and more efficient traffic pattern to take place. The new signals will retain greater visibility in harsh conditions, allowing motorists to have an easier time responding to changing signals they're approaching. Additionally, the new signal housing will protect the signals from harsh weather and prolong their service. With these new traffic control devices, the intersection of Beaverdale Road and Mt. Pleasant Street will become much safer to the benefit of many motorists. Property, money, and lives will be saved by funding this grant request. With the addition of new traffic cameras confusion, congestion, and delays experienced by drivers will be reduced, in turn creating safer driving behaviors among motorists. The current state of this intersection is not adequate for traffic and use that takes place in a given day. Having the traffic pattern return to a normal cycle rather than a steady flash will greatly improve the safety of this intersection.

Dave Bessine Electric
715 Valley Street
Burlington, IA 52601

319-752-6046 office
dhoward@bessineelectric.com

Name / Address
City of West Burlington 122 Broadway st West Burlington, IA 52655

Quote

Date	Estimate #
6/26/2024	3322
Project	
Old 34 Traffic Cameras	

Description	Total
****City Of West Burlington****	
****Traffic control upgrade at Old 34 and Beaverdale Rd****	
Scope of work: Install new video detection system	
-This will include all material, labor, programming, traffic control and man lifts to complete the project	
Material	34,364.98
Bucket Truck Rental	1,800.00
Traffic Control	4,000.00
Labor	4,676.50

Quote is good for 30days? please sign 1 copy and send the other copy back. thanks

Total $44,841.48

Dave Bessine Electric
715 Valley Street
Burlington, IA 52601

319-752-6046 office
dhoward@bessineelectric.com

Name / Address
City of West Burlington 122 Broadway st West Burlington, IA 52655

Quote

Date	Estimate #
6/26/2024	3367
Project	
Old 34 traffic heads	

Description	Total
****City Of West Burlington**** ****Traffic light fixture replacement at Old 34 and Beaverdale Rd****	
Scope of work: Install traffic light fixtures -This will include labor, material, traffic control and man lifts to complete the project -Remove existing and install contractor furnished traffic light fixtures and mounting brackets (Quantity of 10 fixtures)	
Material	12,801.48
Bucket Truck Rental	1,800.00
Traffic Control	4,000.00
Labor	8,160.00

Quote is good for 30days? please sign 1 copy and send the other copy back. thanks

Total $26,761.48

Estimated Time Schedule for Completion

August 2024	**Grant Application Submitted**
January 2025	**Funds Awarded**
February 2025	**Contract Approval with IDOT**
March 2025	**Submit Plans**
April/May 2025	**Bid Letting, Award, and Contract**
June/July 2025	**Construction Begins**
August 2025	**Construction Ends**
September	**Project Closeout**

City of West Burlington - TSIP Project Location: Mount Pleasant/Beaverdale Signal

[E.]

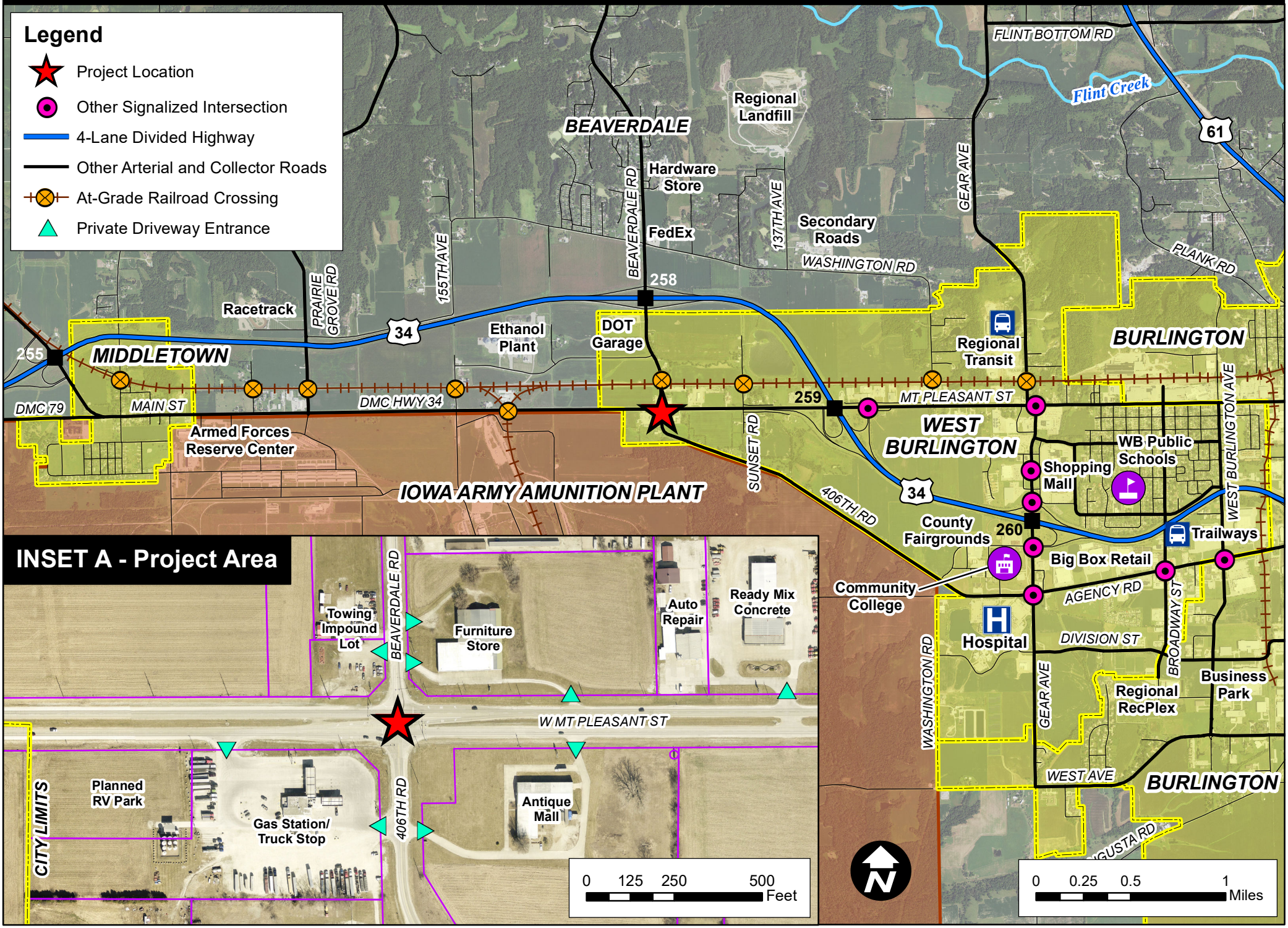


Figure 1: Approaching the intersection from the East along Mt. Pleasant Street (Old U.S. Highway 34).

Figure 2: Approaching the intersection from the north along North Beaverdale Road.

Figure 3: Approaching North Beaverdale & Mt. Pleasant Street intersection from the West.

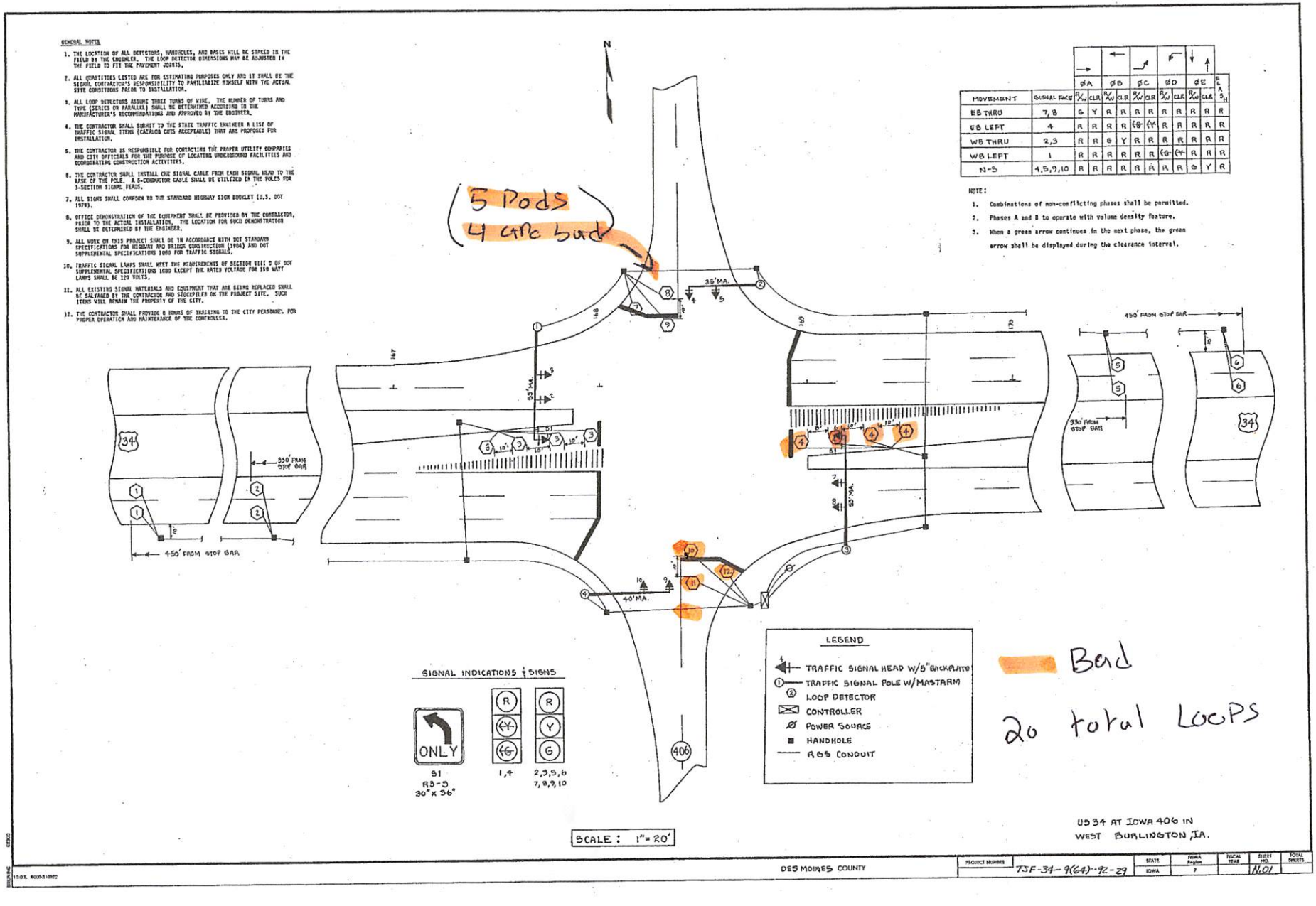
Figure 4: Eastern view from within the North Beaverdale Road & Mt. Pleasant Street intersection.

Figure 5: North facing view from within the intersection.

Figure 6: South facing view from within the intersection.

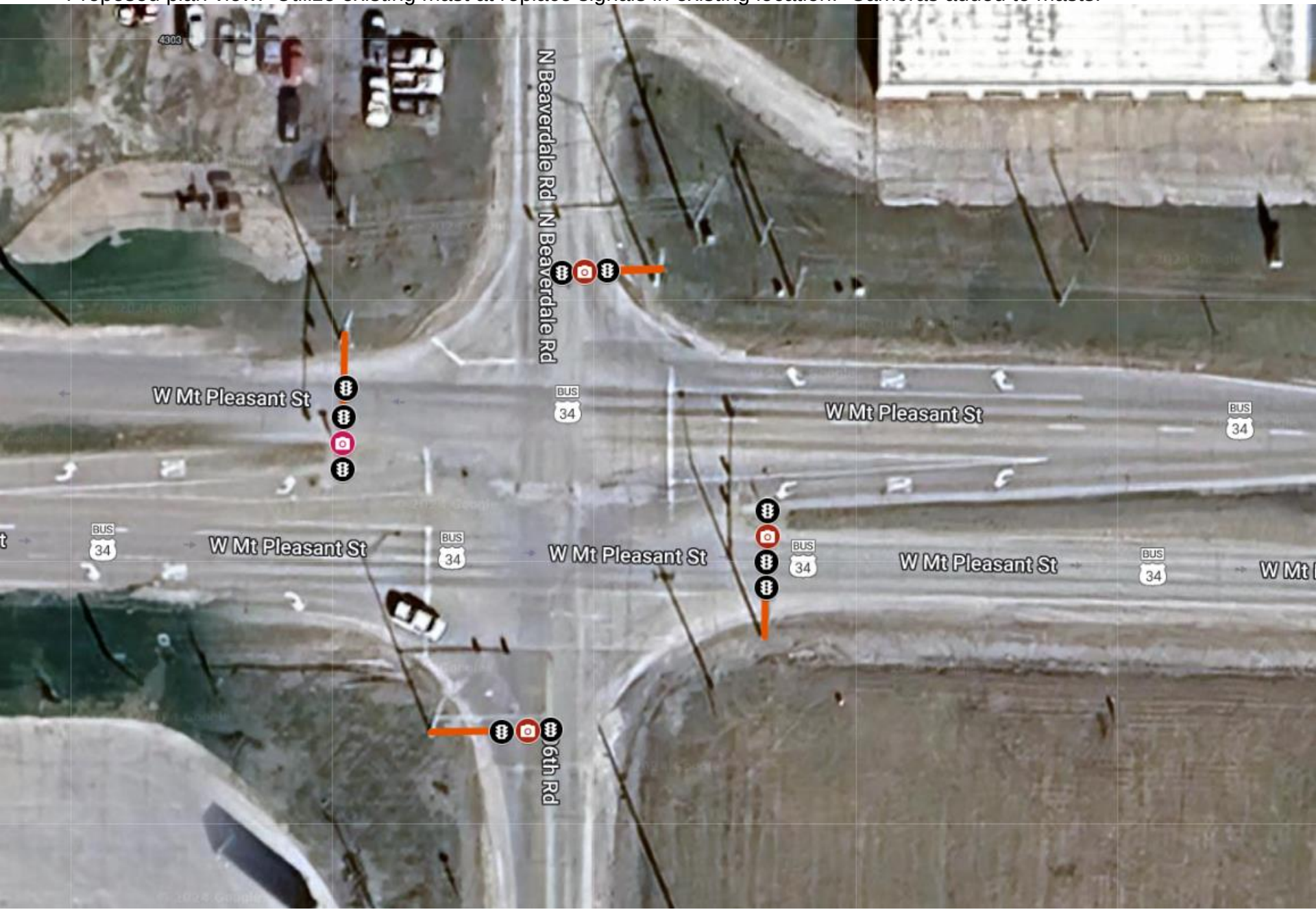
Figure 7: West facing view from within the intersection.

Existing intersection plan view. Highlighted loops are no longer operational.



Proposed plan view. Utilize existing mast at replace signals in existing location. Cameras added to masts.

[G.]



Turn Count Summary

Location: Beaverdale road at Mt. Pleasant St., West Burlington

GPS Coordinates: Lat=40.826435, Lon=-91.207674

Date: 2024-08-07

Day of week: Wednesday

Weather: Sunny

Analyst: Zach James

Peak hour: 16:30 - 17:30

Total vehicle traffic

Interval starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00	0	9	3	7	29	3	15	4	1	0	19	20	110
07:15	1	12	2	4	18	5	8	3	3	3	24	23	106
07:30	2	17	2	3	20	4	5	5	1	4	34	21	118
07:45	6	21	1	4	15	7	11	3	2	1	28	27	126
08:00	4	16	1	1	8	3	9	6	3	4	23	23	101
08:15	7	14	2	2	15	4	11	5	6	1	24	26	117
08:30	0	8	3	2	6	5	10	7	1	3	16	18	79
08:45	4	20	2	5	10	3	5	6	6	2	12	15	90
09:00	9	10	0	6	8	4	13	10	9	0	13	11	93
09:15	2	13	1	3	12	4	9	9	1	2	19	14	89
09:30	5	11	1	5	9	5	9	10	1	2	14	14	86
09:45	4	9	0	5	12	4	11	13	3	3	17	12	93
10:00	0	0	0	0	0	1	0	0	0	0	0	0	1
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	2	14	0	1	11	2	12	2	2	1	16	27	90
11:15	4	14	1	4	18	3	23	5	2	3	15	14	106
11:30	6	10	0	1	9	5	13	8	2	0	15	15	84
11:45	4	13	2	3	20	6	9	8	3	6	17	11	102
12:00	5	6	1	8	17	10	25	4	6	2	21	8	113
12:15	5	3	0	6	23	3	14	8	1	3	15	16	97
12:30	2	8	3	1	23	3	18	11	2	0	20	11	102
12:45	4	14	2	6	16	5	15	14	2	1	16	13	108
13:00	3	16	2	1	13	3	17	10	5	2	19	11	102
13:15	5	10	2	3	17	6	15	9	4	4	14	18	107
13:30	4	13	0	2	16	3	14	9	3	2	16	13	95
13:45	3	7	1	2	22	5	25	11	2	0	23	7	108
14:00	0	0	0	0	1	0	0	0	2	0	1	0	4
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0

14:30	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	4	3	0	3	12	5	13	6	0	1	9	10	66
15:00	6	9	2	4	33	5	20	6	0	4	29	16	134
15:15	6	12	2	2	25	3	26	9	3	1	35	23	147
15:30	4	11	2	2	30	5	30	6	6	1	36	9	142
15:45	3	10	2	2	25	5	20	12	3	1	25	12	120
16:00	4	13	1	5	27	2	15	14	4	1	34	18	138
16:15	5	12	0	4	13	3	19	12	4	3	47	16	138
16:30	4	9	2	4	25	5	33	16	0	2	68	24	192
16:45	2	10	2	3	16	3	20	16	3	2	57	24	158
17:00	7	11	0	1	38	8	22	5	3	3	57	28	183
17:15	2	7	1	2	26	7	21	7	6	1	50	23	153
17:30	2	4	2	2	15	8	15	10	3	2	42	15	120
17:45	3	7	1	3	12	4	16	5	3	2	18	11	85
18:00	0	0	0	0	1	0	1	0	0	0	0	0	2

Car traffic

Interval starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00	0	9	3	7	29	3	15	4	1	0	19	20	110
07:15	1	12	2	4	18	5	8	3	3	3	24	23	106
07:30	2	17	2	3	20	4	5	5	1	4	34	21	118
07:45	6	21	1	4	15	7	11	3	2	1	28	27	126
08:00	4	16	1	1	8	3	9	6	3	4	23	23	101
08:15	7	14	2	2	15	4	11	5	6	1	24	26	117
08:30	0	8	3	2	6	5	10	7	1	3	16	18	79
08:45	4	18	1	5	9	3	5	6	6	2	12	14	85
09:00	9	10	0	5	6	4	11	6	7	0	10	11	79
09:15	1	9	1	1	10	3	7	9	0	2	16	14	73
09:30	2	10	1	3	8	5	9	6	0	2	12	11	69
09:45	4	8	0	2	11	2	10	8	3	1	15	12	76
10:00	0	0	0	0	0	1	0	0	0	0	0	0	1
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	2	14	0	1	10	2	12	2	1	1	15	27	87
11:15	4	12	1	3	18	3	20	5	0	1	13	14	94
11:30	4	8	0	1	6	3	10	8	1	0	14	14	69
11:45	2	12	0	2	18	4	8	7	1	3	14	11	82
12:00	5	5	1	4	15	9	24	4	4	1	19	8	99
12:15	5	3	0	4	21	0	13	8	0	3	12	16	85
12:30	1	6	2	0	21	2	18	7	1	0	19	10	87
12:45	4	12	1	3	14	3	12	12	0	0	13	11	85
13:00	2	14	2	0	13	2	16	9	2	0	18	11	89

13:15	3	7	2	2	15	5	15	7	3	3	11	17	90
13:30	4	11	0	1	16	3	13	6	1	2	12	12	81
13:45	2	4	1	2	20	4	24	11	2	0	18	7	95
14:00	0	0	0	0	1	0	0	0	2	0	1	0	4
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	4	2	0	1	12	4	12	5	0	1	7	9	57
15:00	5	8	2	3	30	4	18	5	0	2	29	15	121
15:15	6	11	1	2	24	3	25	9	3	1	32	22	139
15:30	4	10	2	2	29	5	28	6	4	1	34	9	134
15:45	2	8	2	1	23	4	17	10	2	1	25	12	107
16:00	3	11	1	4	25	2	13	14	3	1	34	18	129
16:15	5	12	0	2	13	3	19	10	3	2	45	15	129
16:30	4	9	2	3	25	5	33	15	0	2	67	23	188
16:45	2	10	2	3	16	3	20	15	3	2	56	24	156
17:00	6	10	0	1	38	8	22	4	3	3	57	28	180
17:15	2	5	1	1	26	7	21	7	5	1	49	23	148
17:30	2	4	2	2	15	8	15	10	0	2	41	15	116
17:45	3	7	1	1	12	4	16	5	2	2	16	11	80
18:00	0	0	0	0	1	0	1	0	0	0	0	0	2

Type 1 traffic

Interval starts	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	2	1	0	1	0	0	0	0	0	0	1	5
09:00	0	0	0	1	2	0	2	4	2	0	3	0	14
09:15	1	4	0	2	2	1	2	0	1	0	3	0	16
09:30	3	1	0	2	1	0	0	4	1	0	2	3	17
09:45	0	1	0	3	1	2	1	5	0	2	2	0	17
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	1	0	0	0	1	0	1	0	3
11:15	0	2	0	1	0	0	3	0	2	2	2	0	12
11:30	2	2	0	0	3	2	3	0	1	0	1	1	15
11:45	2	1	2	1	2	2	1	1	2	3	3	0	20

12:00	0	1	0	4	2	1	1	0	2	1	2	0	14
12:15	0	0	0	2	2	3	1	0	1	0	3	0	12
12:30	1	2	1	1	2	1	0	4	1	0	1	1	15
12:45	0	2	1	3	2	2	3	2	2	1	3	2	23
13:00	1	2	0	1	0	1	1	1	3	2	1	0	13
13:15	2	3	0	1	2	1	0	2	1	1	3	1	17
13:30	0	2	0	1	0	0	1	3	2	0	4	1	14
13:45	1	3	0	0	2	1	1	0	0	0	5	0	13
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	1	0	2	0	1	1	1	0	0	2	1	9
15:00	1	1	0	1	3	1	2	1	0	2	0	1	13
15:15	0	1	1	0	1	0	1	0	0	0	3	1	8
15:30	0	1	0	0	1	0	2	0	2	0	2	0	8
15:45	1	2	0	1	2	1	3	2	1	0	0	0	13
16:00	1	2	0	1	2	0	2	0	1	0	0	0	9
16:15	0	0	0	2	0	0	0	2	1	1	2	1	9
16:30	0	0	0	1	0	0	0	1	0	0	1	1	4
16:45	0	0	0	0	0	0	0	1	0	0	1	0	2
17:00	1	1	0	0	0	0	0	1	0	0	0	0	3
17:15	0	2	0	1	0	0	0	0	1	0	1	0	5
17:30	0	0	0	0	0	0	0	0	3	0	1	0	4
17:45	0	0	0	2	0	0	0	0	1	0	2	0	5
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian volumes

Interval starts	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0

10:45	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	15	37	5	10	105	23	96	44	12	8	232	99	686
Factor	0.54	0.84	0.62	0.62	0.69	0.72	0.73	0.69	0.50	0.67	0.85	0.88	0.89
Approach Factor			0.79			0.73			0.78			0.90	

Peak Hour Vehicle Summary

Vehicle	Southbound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	14	34	5	8	105	23	96	41	11	8	229	98	672
Type 1	1	3	0	2	0	0	0	3	1	0	3	1	14

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

16:30 - 17:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	15	37	5	10	105	23	96	44	12	8	232	99	686
Factor	0.54	0.84	0.62	0.62	0.69	0.72	0.73	0.69	0.50	0.67	0.85	0.88	0.89
Approach Factor	0.79			0.73			0.78			0.90			

Peak Hour Vehicle Summary

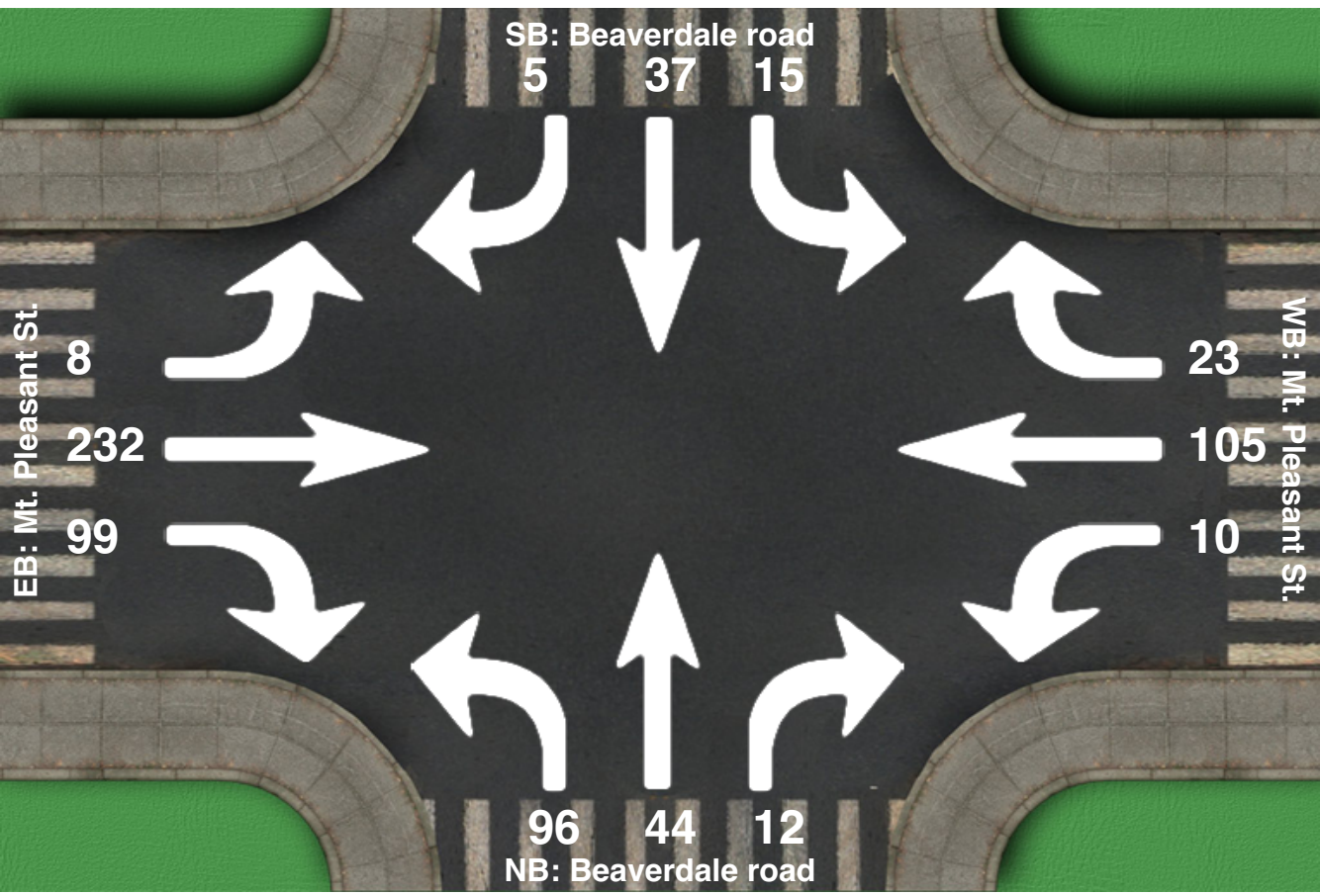
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	14	34	5	8	105	23	96	41	11	8	229	98	672
Type 1	1	3	0	2	0	0	0	3	1	0	3	1	14

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Beaverdale road at Mt. Pleasant St., West Burlington
GPS Coordinates: Lat=40.826435, Lon=-91.207674
Date: 2024-08-07
Day of week: Wednesday
Weather: Sunny
Analyst: Zach James



Intersection Peak Hour

16:30 - 17:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	15	37	5	10	105	23	96	44	12	8	232	99	686
Factor	0.54	0.84	0.62	0.62	0.69	0.72	0.73	0.69	0.50	0.67	0.85	0.88	0.89
Approach Factor	0.79			0.73			0.78			0.90			

Mt. Pleasant St & Beaverdale Rd	Total Cycle length in seconds			110				
FREE PLAN ALL DAY	Offset in seconds		0					
Direction	EBLT	WB	n/u	SB - NB	WBLT	EB	n/u	n/u
Phase #	1	2	3	4	5	6	7	8
Min Green (example 10 s)	7	10		10	7	10		
Gap, Passage or Ext. (example 1.5 s)	3.0	3.0		3.0	3.0	3.0		
Max Green (example 10 s)	25	50		35	25	50		
Yellow Clearance (example 3.5 s)	4.0	4.0		4.0	4.0	4.0		
Red Clearance (example 3.5 s)	3.0	3.0		3.0	3.0	3.0		
Walk (example 10 s)								
Ped Clear (example 10 s)								
Recall phase(s)		min				min		
Split Time - Coord (example 10 s)								
Coord Phase(s) recall (min, max)								
Coordinated phase(s)		x						
Lead Lag phase(s) (Lead, Lag)	lead				lead			

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** 8/12/2024

Location / Title of Project Intersection of F-12 and Z-36

Applicant Clinton County

Contact Person Todd Kinney Title Engineer

Complete Mailing Address 1900 N. 3rd Street Clinton, Iowa 52732

Phone 563-244-0564 E-Mail tkinney@clintoncounty-ia.gov
(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	$	$8,260.00
Total Project Cost	$	$8,260.00
Safety Funds Requested	**$**	**$8,260.00**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the Clinton County Secondary Road Department

Signed: Todd Kinney 8/12/24

Signature Date Signed

Todd Kinney

Printed Name

Attest: 8/12/24

Signature Date Signed

Jacob Cline

Printed Name

A APPLICATION CERTIFICATION(S) OR RESOLUTION(S)

See Attachment A for the Resolution.

B NARRATIVE

See next page for Item B.

C ITEMIZED BREAKDOWN OF COSTS

Clinton County received two quotes for the flashing beacons. **Figure C-1** shows the breakdown of costs for each quote received. Unit Quotes and Specifications can be found in the application attachments C.1, C.2, and C.3.

Figure C-1

Company	Quantity	Unit Cost	Total Cost
TAPCO – Traffic and parking Control Co.,Inc	4	$2,065.00	$8,260.00
Carmanah Technologies and mobotrex	4	$2,414.00	$9,656.00

D TIME SCHEDULE

Figure D-1 shows the time schedule for purchasing and installing the Flashing Warning Beacons.

Figure D-1

Action Item	Date
TSIP Application Due	August 15, 2024
TSIP Award Notification	Mid-January, 2025
TSIP Funding Available	July 1, 2025
Quote Review	July 31, 2025
Place Order	July 31, 2025
Delivery and Installation	September 1, 2025

B NARRATIVE

Clinton County is applying for Transportation Safety Improvement Program (TSIP) funds for the purchase of four mountable solar flashing beacons for the Intersection of F-12 (220th Street) and Z36 (380th Avenue). The primary purpose of the flashing beacons would be to enhance the visibility of all four stop signs and increase the safety of the intersection for both traveling public and the residents that live near and around the intersection.

Chapter 4K of the MUTCD provides standards, guidance and support for the use of flashing beacons. Section 4K.05 of the MUTCD provides specific details for stop beacons. The flashing beacons will be placed atop all four stop signs that are located at the intersection.

The Elvira Intersection is one of Clinton County's busier intersections. According to the 2022 Iowa DOT Annual Average Daily Traffic Map, average daily traffic volumes range from 1010 to 1660. This is due in part to Z-36 connecting HWY 67, 30, and 136 and F-12 connecting the cities of Clinton and DeWitt. This intersection has the highest risk factor points (12) of all the intersections in the county according to the county CRSP (see attachment B.1).

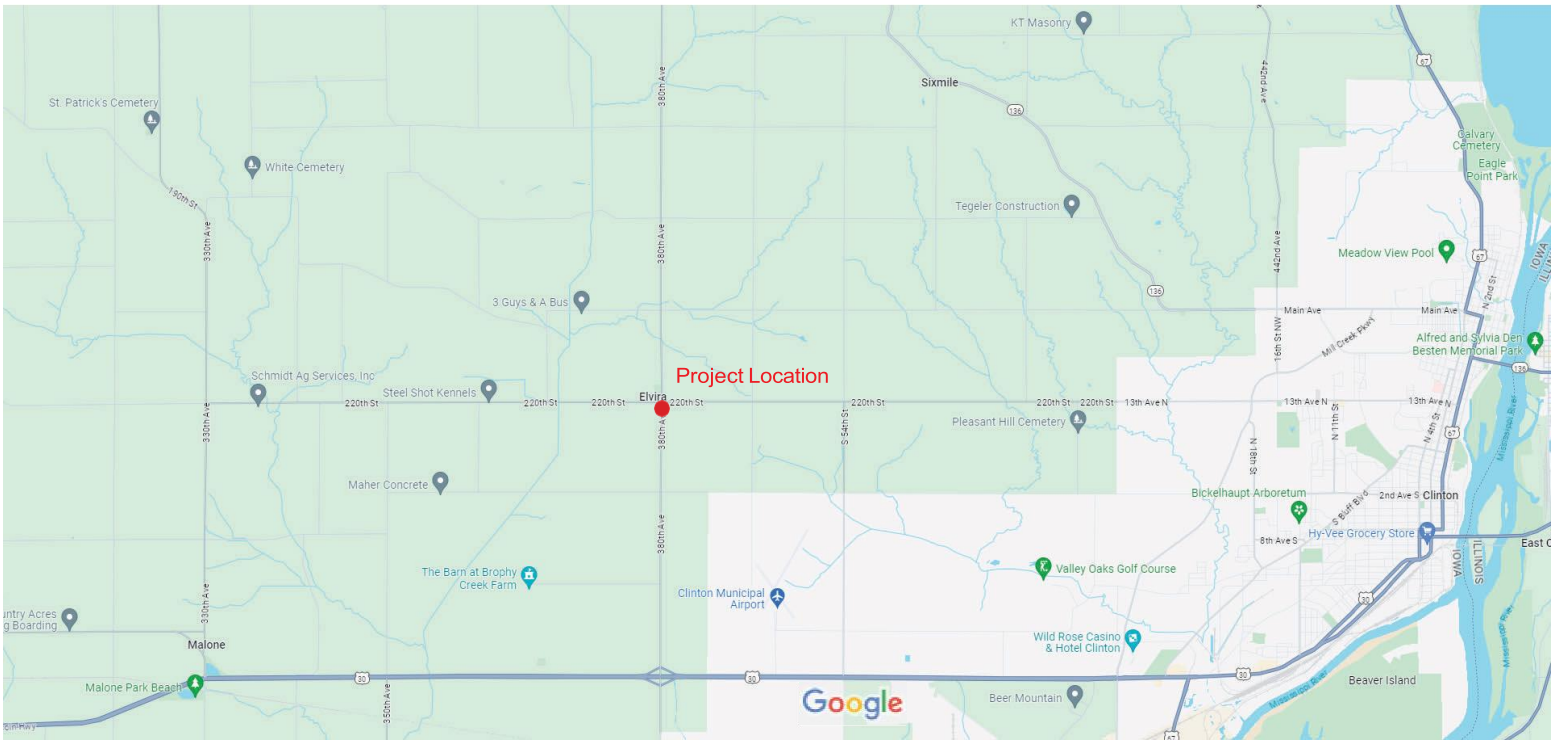
The Clinton County Secondary Roads Department and Sheriff's Office routinely receive calls and complaints, from residents that live near the intersection, that motorists either do not stop or break suddenly at the intersection.

Clinton County has taken measures to improve the safety of the intersection. A speed zone is in place for the intersection that brings the speed limit down to 30 MPH, and there are "Stop Ahead" warning signs located on Z-36 and F-12. The Sheriff's Office has also placed their speed trailer on each approach several times in response to complaints and comments about the intersection's safety. The County plans to install rumble strip panels as part of an upcoming rehabilitation project on F-12.

Even with these measures in place there are still problems with the visibility of the Stop Signs. The Secondary Roads Department has still received complaints from the public regarding this intersection. According to the Iowa DOT's Crash Analysis Tool, in the years 2023-2024 there have been four accidents at this intersection (see attachment B.2). Three of which were the result of a ran stop sign and the fourth was listed as making an improper turn.

Shown in section F of this application, from all 4 directions, drivers must crest a hill shortly before arriving at the intersection. The role of the flashing beacons will make it so that drivers will be able to see the Stop Signs well before their visibility is obscured by the hills. These flashing beacons will also provide better visibility of the Stop Signs at night and during inclement weather.

E LOCATION MAP



Proposed Safety Project Is located at the intersection of F-12 (220th Street) and Z-36 (380th Avenue)

F COLOR PICTURES

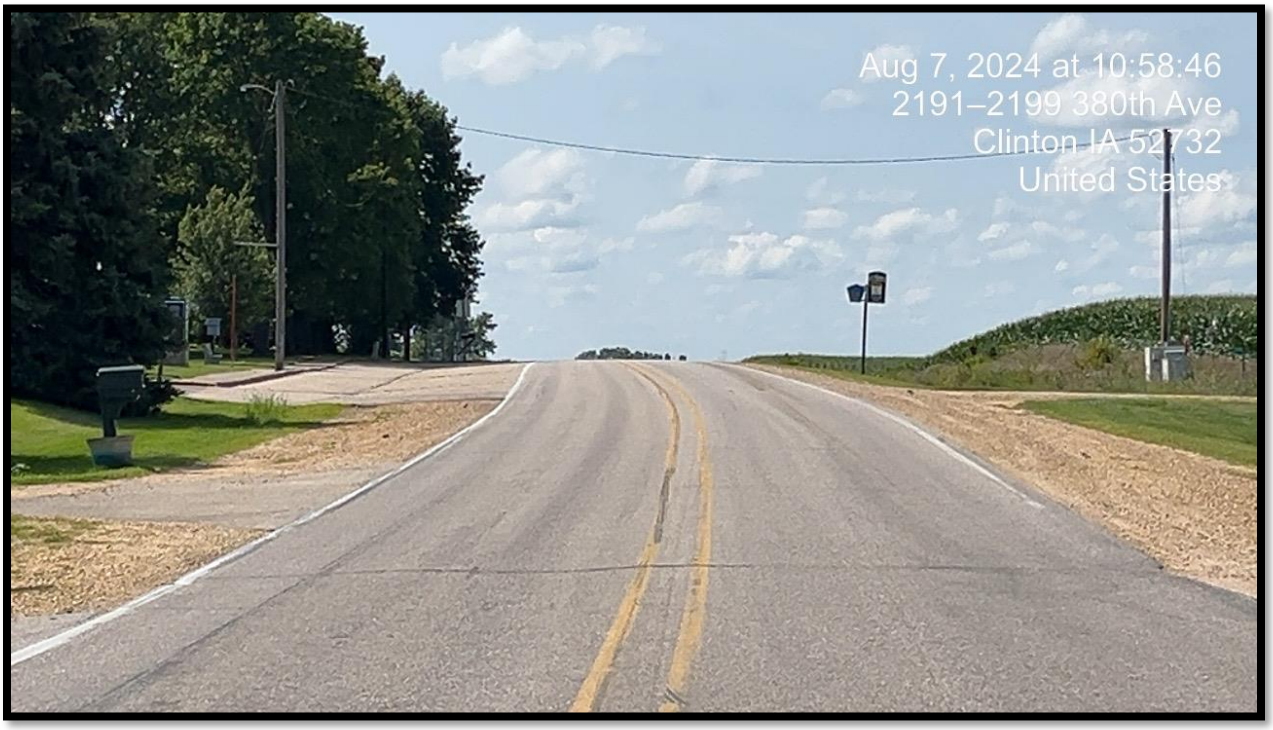
Figure F-1: Z-36 Facing North Away from the Intersection.

Figure F-2: Z-36 Facing North Away from the Intersection.

F COLOR PICTURES

Figure F-3: Z-36 Facing South Away from the Intersection.

Figure F-4: Z-36 Facing South Away from the Intersection.



F COLOR PICTURES

Figure F-5: F-12 Facing West Away from the Intersection.

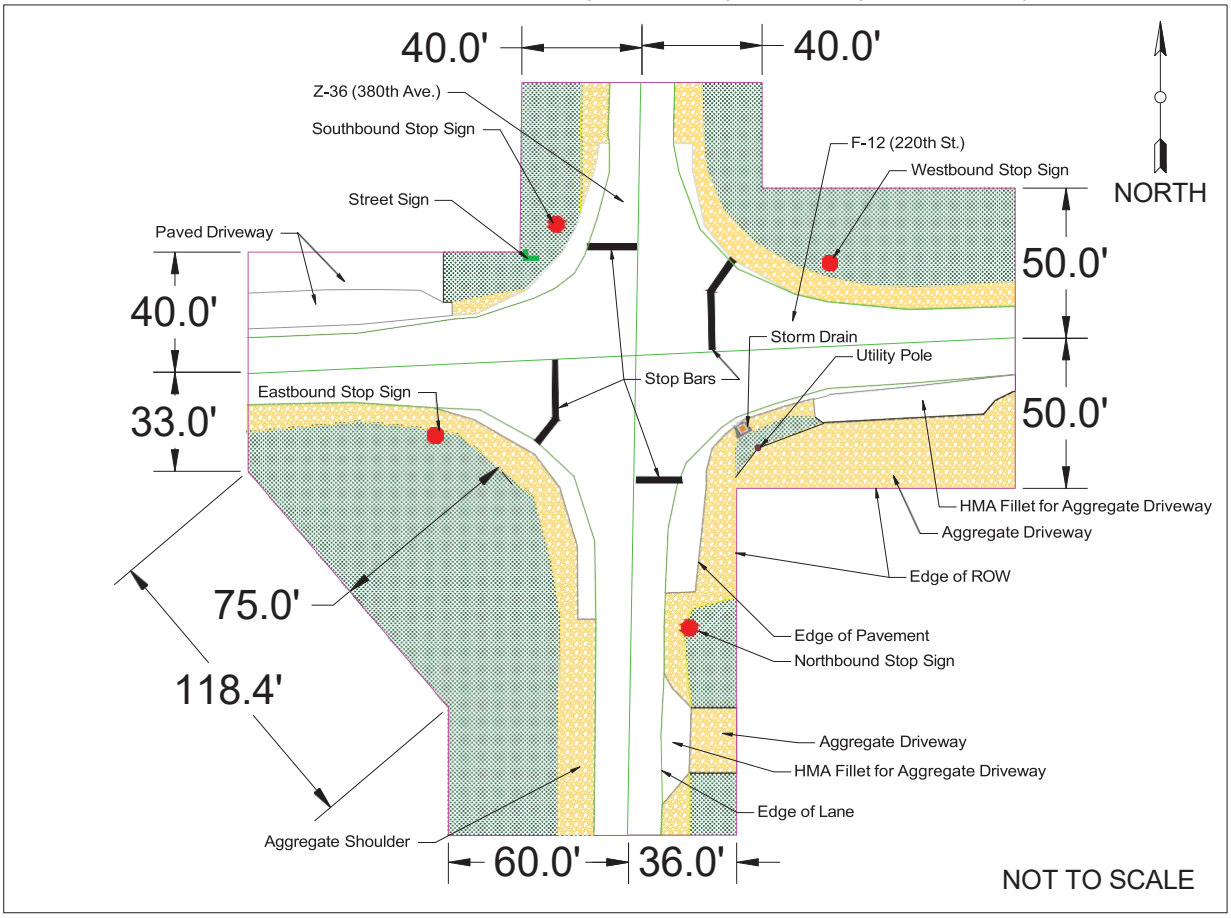
Figure F-6: F-12 Facing West Away from the Intersection.

Figure F-7: F-12 Facing East Away from the Intersection.

Figure F-8: F-12 Facing East Away from the Intersection.

G PLAN VIEW

Elvira Intersection F-12(220th St.) & Z-36 (380th Ave.)

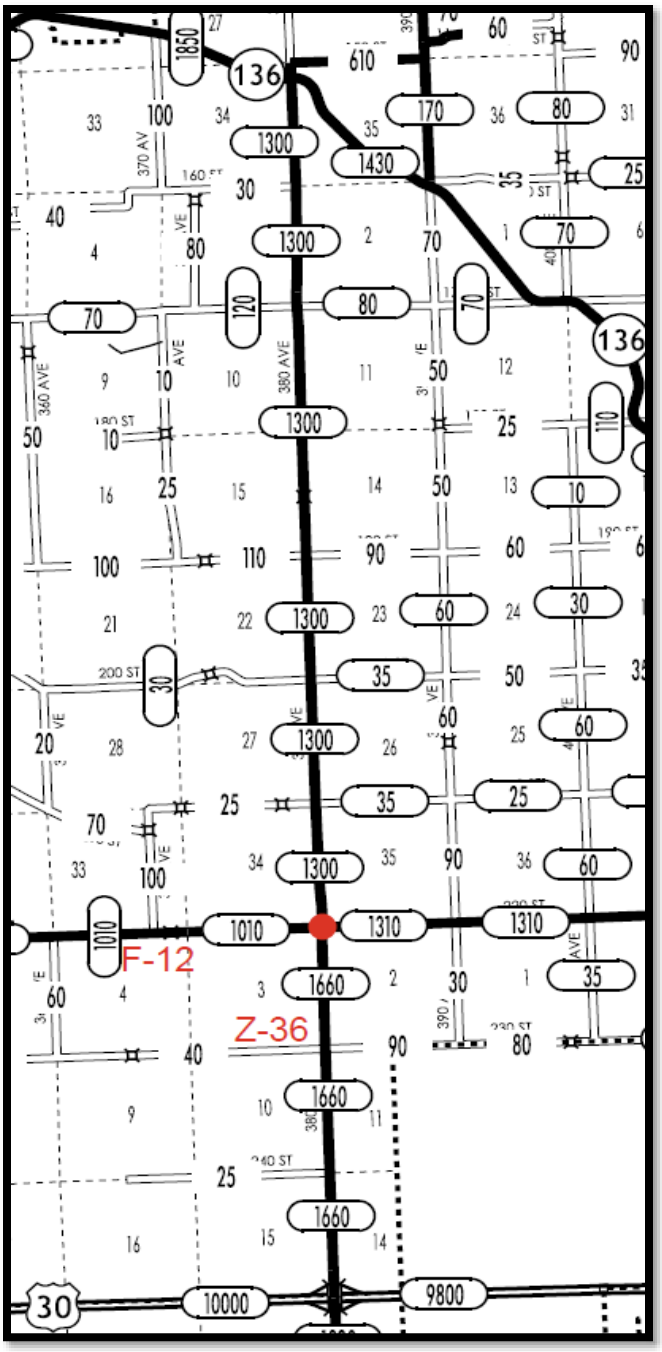


Elvira Intersection Plan View.dwg 8/6/2024 By: JMC

H TRAFFIC VOLUMES AND/OR TURNING MOVEMENT

The most recent available IDOT Traffic Volume Map for Clinton County is the 2022 Map. **Figure H-1**, on this page shows the Traffic Volumes for the Elvira Intersection of F-12 and Z-36.

Figure H-1



Attachment A - Application Resolution

August 19, 2024

RESOLUTION # 2024-_____

RESOLUTION TO AUTHORIZE THE SUBMITTAL OF A TRAFFIC SAFETY IMPROVEMENT PLAN APPLICATION

WHEREAS: The Iowa Department of Transportation has adopted Administrative Rule 761-Chapter 164, which created the Traffic Safety Improvement Plan (TSIP) to allow for funding to be provided to local jurisdictions for eligible traffic safety improvements and,

WHEREAS: Clinton County has determined that providing mountable solar flashing beacons on the stop signs located at the Elvira four-way intersection of F-12 (220th St) and Z-36 (380th Ave) will improve safety for the traveling public and residents of Elvira and,

WHEREAS: Clinton County recommends a TSIP application be submitted to the Iowa Department of Transportation for possible reimbursement of safety funds of the above-mentioned traffic-control devices.

THEREFORE BE IT RESOLVED by the Board of Supervisors of Clinton County, Iowa that Todd Kinney, County Engineer of Clinton County, Iowa, be and is hereby designated, authorized, and empowered on behalf of the Board of Supervisors of said County to submit a TSIP Application to the Iowa Department of Transportation for mountable solar flashing beacons; and

BE IT FURTHER RESOLVED by the Board of Supervisors of Clinton County, Iowa that the chairperson be authorized to sign the grant application and should funding be awarded that Clinton County will assume responsibility and ensure proper maintenance of any new or improved installations.

Roll Call:

Irwin: Yes No

George: Yes No

Srp: Yes No

_____
Chairperson,

ATTEST:

_____
County Auditor, Eric Van Lancker

Attachment B.1- Local Road Safety Plan

Local Road Safety Plan
Project Description for Intersection Improvements

Risk Factor Points: 12

Project Name: Co Rd F12/220 ST and Co Rd Z36/380 AVE Intersection
Agency Name: Clinton County
Contact Name: Kinney, Todd
E-mail: tkinney@clintoncounty-ia.gov

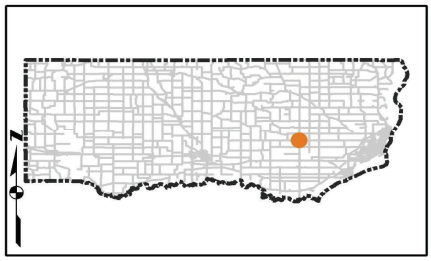
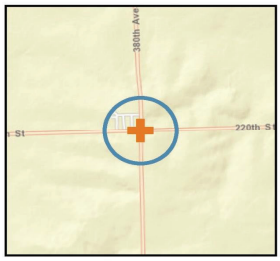
Date: 8/24/15
Prepared By: DJG/DVM
Checked By: MMO

Location Description

Paved Road: Co Rd F12/220 ST
Intersecting Road: Co Rd Z36/380 AVE

GPS ID: 123542

Project Location

Intersection Information and Systemic Ranking Summary

Systemic Ranking Summary	Value	Points	
Daily Entering Vehicles	2665	6	
Approach Angle (Degrees)	86	0	
Distance from Previous Stop	> 5 mi	4	
K or A Crash	No	0	
Distance from Driveway or Intersection	< 250 ft	2	**
Total Risk Factor Points (16 max)		12	

Other Information	
Number of Approaches	4
Number of Paved Approaches	4
Major ADT	1520
Minor ADT	1010
Destination Lighting	Yes
Transverse Rumble Strips	No
Control Type	All-way stop

	Key Emphasis Areas
	Younger Drivers
	Older Drivers
	Speed-Related
	Impaired Driving
	Inattentive/Distracted Driving
	Unprotected Persons
	Lane Departures
	Roadside Collisions
X	Intersections
X	Local Roads

Crash Data, 2004-2013	
Total Crashes	3
K and A Crashes	0
Right angle, rear-end, or turning crashes	3

Opinion of Probable Cost

Item No.	Item Description	Quantity	Unit	Unit Price	Item Cost
	Roundabout (Single-Lane, Cost Includes Design and Construction, but No ROW)	0	EA	$ 1,250,000	$ -
	Install Destination Lighting	0	EA	$ 8,000	$ -
	Upgrade Signs and Pavement Markings	4	LEG	$ 2,200	$ 8,800
	Upgrade Signs and Stop Bar	0	LEG	$ 1,000	$ -
	Install Second Stop Sign and Stop Ahead Sign	4	LEG	$ 1,200	$ 4,800
	Install Solar-Powered Flashing Beacon on Stop Sign	0	EA	$ 2,500	$ -
	Install Solar-Powered Flashing Beacon on Yield Sign	0	EA	$ 2,500	$ -
	Install Transverse Rumble Strips	4	LEG	$ 1,000	$ 4,000
	Clear and Grub within Sight Triangle	4	LEG	$ 1,500	$ 6,000
	All-way Stop Warrant Analysis	0	EA	$ 5,000	$ -
	Install New Signs and Pavement Markings	0	LEG	$ 2,600	$ -
				Subtotal:	$ 23,600
				Engineering: (% +/-) 15%	$ 3,713
				Mobilization: (% +/-)* 10%	$ 2,500
				Traffic Control: (% +/-) 5%	$ 1,238
				Contingency:(% +/-) 20%	$ 4,950
				Estimated Project Cost:	**$ 36,000**

Basis for Cost Projection
- ☑ No Design Completed
- ❑ Preliminary Design
- ❑ Final Design

* Mobilization is 10% +/- of the subtotal with a minimum of $2,500 and a maximum of $75,000.
** The 911 database is not available in GIS format; therefore, calculations are based on intersection distance only.

Opinion of Probable Construction Cost Disclaimer:
Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only the Kimley-Horn's judgment as a design professional familiar with the construction industry. The Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Project Description Form Disclaimer:
The recommended improvements contained in this project description form were developed through a Geographic Information System (GIS) database risk assessment and project decision tree selection process, as specifically stated in our scope of services. Kimley-Horn has no control over the accuracy of the GIS databases nor the suitability of the specific improvements for the location, and has provided recommended improvements for consideration by the County Engineer. The County Engineer may use this project description form to aid in the selection and development of projects, but this project description form should not be used as the sole basis for the County Engineer's decision making process. We endeavored to research issues and constraints to the extent practical given the scope, budget, and schedule agreed to with the Client. Our assessment is based in large part on information provided to us by others (DOT, county staff, etc.) and therefore is only as accurate and complete as the information provided to us. This project description form is based on our knowledge as of August 2015.

Project Location Map Sources:
Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013, DigitalGlobe, GeoEye, i-cubed, USDA, AEX, Getmapping, Aerogrip, IGN, IGP, swisstopo, and the GIS User Community

End of Project Description

Kimley»Horn

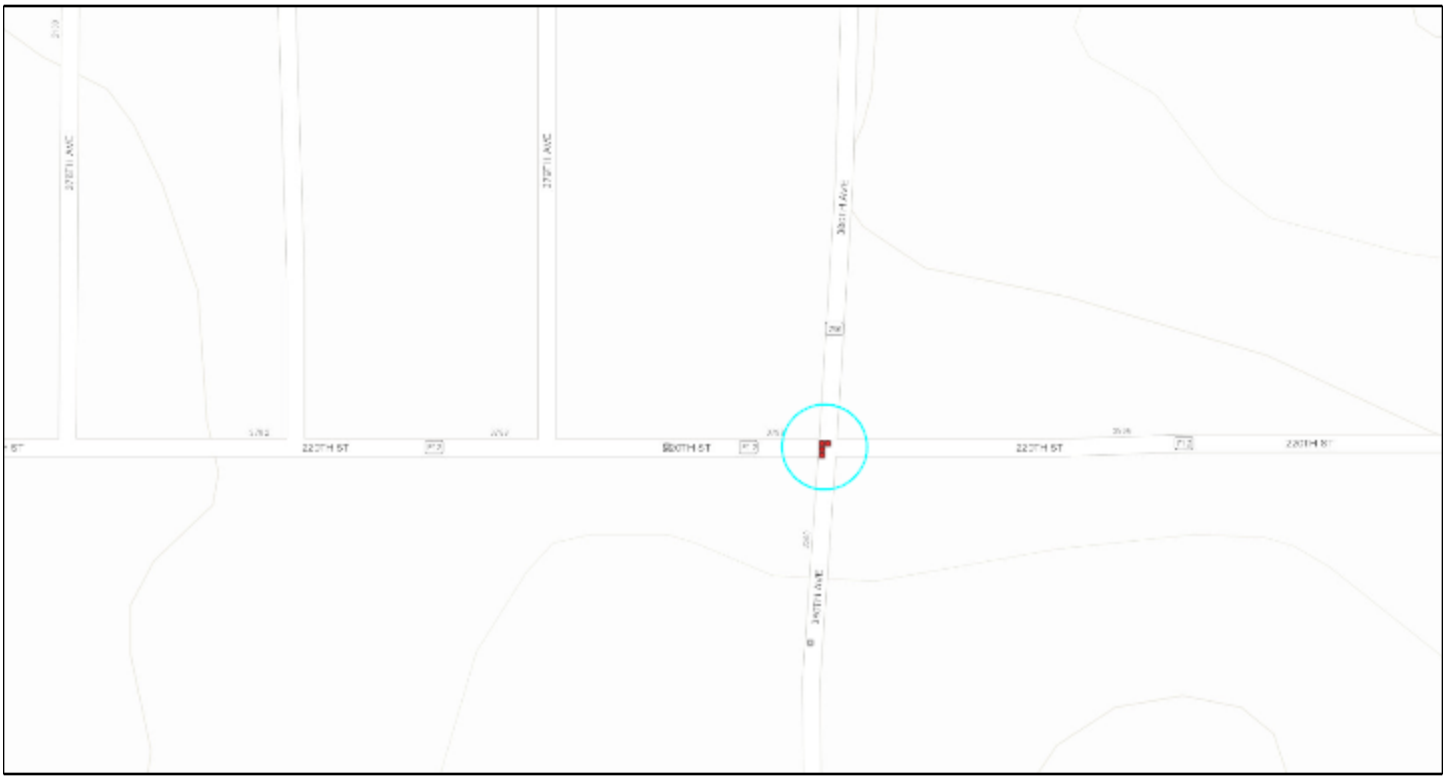
Iowa Crash Analysis Tool
Quick Report
2023-2024

Crash Severity	4
Fatal Crash	0
Suspected Serious Injury Crash	0
Suspected Minor Injury Crash	1
Possible/Unknown Injury Crash	0
Property Damage Only	3

Injury Status Summary	1
Fatalities	0
Suspected serious/incapacitating	0
Suspected minor/non-incapacitating	1
Possible (complaint of pain/injury)	0
Uninjured	0
Unknown	0
Not Reported	0

Property/Vehicles/Occupants	
Property Damage Total (dollars):	32,250.00
Average (per crash dollars):	8,062.50
Total Vehicles:	8.00
Average (per crash):	2.00
Total Occupants:	13.00
Average (per crash):	3.25

Average Severity	
Fatalities/Fatal Crash:	0.00
Fatalities/Crash:	0.00
Injuries/Crash:	0.25
Major Injuries/Crash:	0.00
Minor Injuries/Crash:	0.25
Possible/Unknown Injuries/Crash:	0.00



Iowa Crash Analysis Tool
Quick Report
2023-2024

Major Cause			4
Animal	0	Ran traffic signal	0
Ran stop sign	3	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	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/care...	0	Followed too close	0
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	1
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	0
Unknown	0	Not reported	0
Other: No improper action	0		

Iowa Crash Analysis Tool
Quick Report
2023-2024

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	1	0	0	1	0	0	0	0	2
Tuesday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wednesday	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thursday	0	0	1	0	0	0	0	0	1	0	0	0	0	2
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	0	0	0	0
Total	0	0	1	0	0	1	0	0	2	0	0	0	0	4

Manner of Crash Collision	4
Non-collision (single vehicle)	0
Head-on (front to front)	0
Rear-end (front to rear)	0
Angle (oncoming left turn)	1
Broadside (front to side)	3
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	4
Dry	3
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			8
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)	8

Iowa Crash Analysis Tool
Quick Report
2023-2024

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	0	0	0	0
= 20	0	0	0	0	0
>= 21 and <= 24	0	0	0	0	0
>= 25 and <= 29	1	0	0	0	1
>= 30 and <= 34	2	0	0	0	2
>= 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	2	0	0	0	2
>= 55 and <= 59	0	1	0	0	1
>= 60 and <= 64	1	0	0	0	1
>= 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	6	2	0	0	8

Drug/Alcohol Related	**4**
Drug	0
Alcohol (< Statutory)	0
Alcohol (Statutory)	0
Drug and Alcohol (< Statutory)	0
Drug and Alcohol (Statutory)	0
Refused	0
Under Influence of Alcohol/Drugs/Medications	0
None Indicated	4

Alcohol Test Given	**8**
None	8
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

Drug Test Given	**8**
None	8
Blood	0
Urine	0
Breath	0
Vitreous	0
Refused	0
Not reported	0

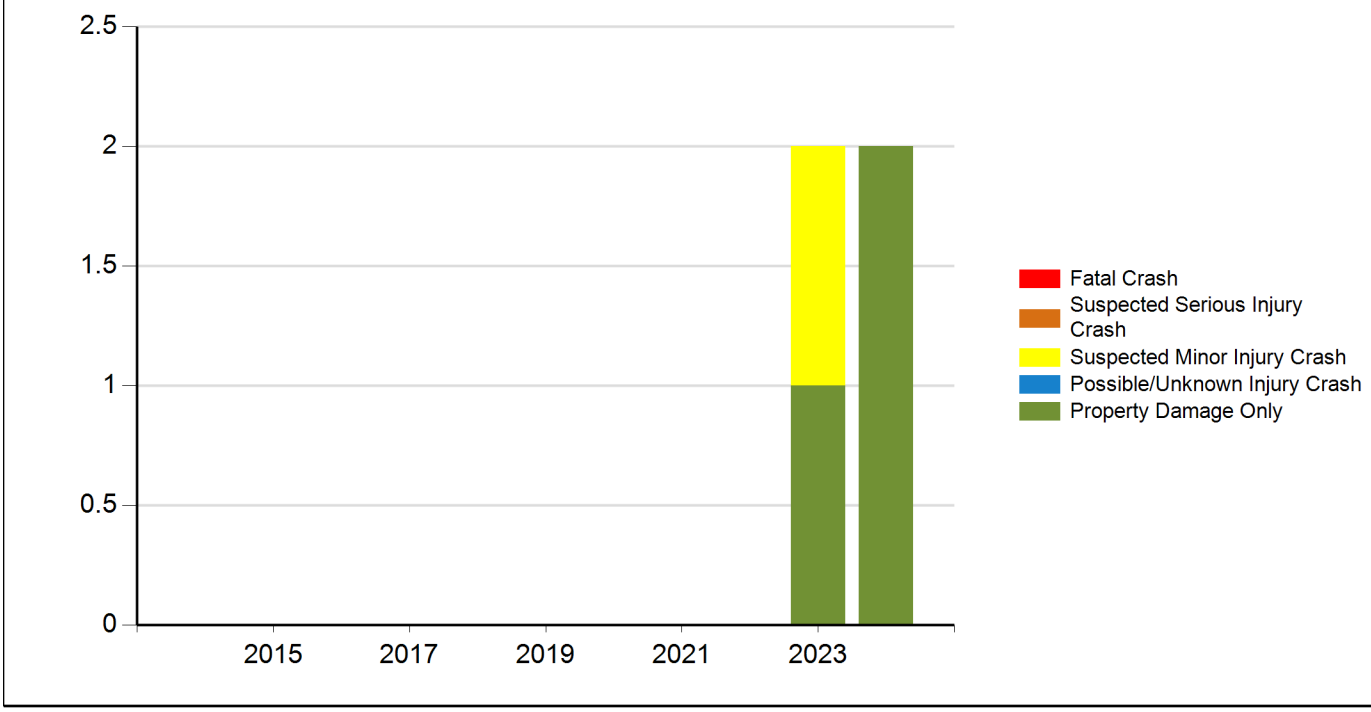
Drug Test Result	**8**
Negative	0
Cannabis	0
Central Nervous System depressants	0
Central Nervous System stimulants	0
Hallucinogens	0
Inhalants	0
Narcotic Analgesics	0
Dissociative Anesthetic (PCP)	0
Prescription Drug	0
Not reported	8
Other	0

Iowa Crash Analysis Tool
Quick Report
2023-2024

Crash Severity - Annual

Crash Year	Fatal Crash	Suspected Serious Injury Crash	Suspected Minor Injury Crash	Possible/Unknown Injury Crash	Property Damage Only	**Total**
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
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0
2023	0	0	1	0	1	2
2024	0	0	0	0	2	2
Total	0	0	1	0	3	4

Severity/Year

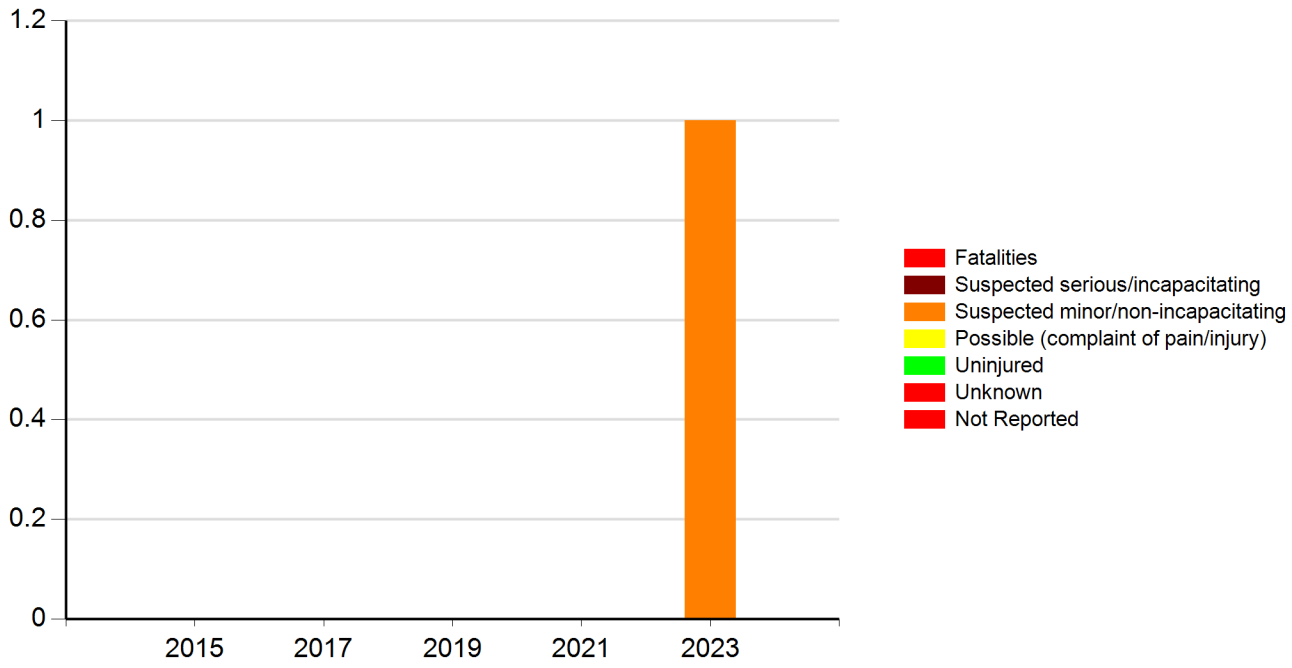


Iowa Crash Analysis Tool
Quick Report
2023-2024

Injury Status - Annual

Crash Year	Fatalities	Suspected serious/incapacitating	Suspected minor/non-incapacitating	Possible (complaint of pain/injury)	Uninjured	Unknown	Not Reported	**Total**
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0
2023	0	0	1	0	0	0	0	1
2024	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	0	1

Injury Status/Year



Iowa Crash Analysis Tool
Quick Report
2023-2024

Meeting the following criteria

Jurisdiction: Counties (Clinton)
Year: 2023, 2024
Map Selection: Yes
Filter: None

Analyst Information

Elvira Intersection

Your Cart (4 items)

TAPCO

24/7 Flashing LED BlinkerBeacon™

SKU: 2180-BBSRBS2
Lens Color: Red
Housing Color: Black
Post/Pole Type: Square

Price: $2,065.00

Quantity: 4

Total: $8,260.00

- **Are you tax exempt?**

  Before you place your order please create account and/or notify us of your existing account and we will apply your tax exempt status once we recieve or confirm your tax exemption status.

Subtotal:	$8,260.00
Shipping:	**$826.00** (CHANGE)
Tax:	$495.60
Coupon Code:	**ADD COUPON**
Total:	$9,581.60

DESCRIPTION | SHIPPING & RETURNS

TAPCO's BlinkerBeacon™ solar LED beacons are time-tested, durable warning enhancements that alert drivers and pedestrians of busy crossings and high-traffic areas. This standalone system comes standard with a 12" beacon, cut visor and 24/7 flashing operation (alternating on-off). Select your beacon color, housing color and pole type above.

Features & Advantages:

- Energy-efficient package; 13W solar panel combined with 14Ah battery power
- Easily place on existing poles; standard mounting to 4.5" round poles or 2" square posts (for other pole sizes, purchase adapters separately)
- Virtually maintenance-free
- Rugged polycarbonate housing
- Patented AutoBright™ circuitry automatically adjusts brightness levels, maintaining optimal LED output and extending battery life
- Proudly made in the USA

Applications:

- School crossings
- Pedestrian crossings
- Roadway warnings
- Construction zones
- Military facilities
- Industrial facilities

mobotrex™
MOBILITY & TRAFFIC EXPERTS

Quote

Quote Number: 1936323

109 West 55th Street | Davenport, IA 52806 | (563) 323-0009

Date: 08/07/2024
Expire Date: 9/6/2024
Prepared By: Zank, Justin D.

Customer: CLINT

Cline, Jacob
Clinton County Iowa
1900 N 3rd St
Clinton IA 52732-2534
United States

Contact: Cline, Jacob
Phone: 563-244-0564
Email: jcline@clintoncounty-ia.gov

Description: 24 Hour Flashing beacon

Part #	Description	Quantity	Price	Extended
R247-MX	24 Hour Flashing beacon	4	$2,414.00	$9,656.00
PBL13059-001	BEACON MODULE:12"RED LED,SGNL&VISR,YLW	4	$0.00	$0.00
PZA12716-001	POLE MNT:FLSHR MOD,MX BEACON,2"-2.5"sq	4	$0.00	$0.00
PZA12682-001	FLASHER MODULE HARNESS:4',R247-E,BEACON	4	$0.00	$0.00
PPS12402-001	MX SERIES,MX100 SOLAR PWR MOD,W/ 15W PNL	4	$0.00	$0.00
PZA12717-001	PWR MOD MNT:TOP OF BEACON,MX PWR,R247-E	4	$0.00	$0.00
CAR-67620	BATTERY:7A/HR,STAND,(E SERIES)	8	$0.00	$0.00
PBU12404-001	SOFTWARE,MX LITE SUBSCRIPTION,3YR	4	$0.00	$0.00

Sale Amount:	**$9,656.00**
Sales Tax:	675.92
Misc Charges:	0.00
Total Amount:	**$10,331.92**

Notes:

Shipping included

Quote

Quote Number: **1936323**

109 West 55th Street | Davenport, IA 52806 | (563) 323-0009

Terms:

THIS QUOTE IS BASED ON THE ENTIRE VALUE AND VOLUME OF ALL LINE ITEMS - Prices listed on this quote are valid only in the event of purchase of all line items in the quantities listed, in their entirety. Purchases of individual line items will require a new quote prior to acceptance of any purchase orders.

PAYMENT TERMS ARE NET 30 DAYS with prior approved credit. MoboTrex, Inc. retains title to material until paid in full. A service charge of 1.5% per month (18% annual rate) will be assessed against all past due accounts. Prices and delivery quoted are firm for 30 days from the data of bid. The above quote does not include installation of the products quoted. On-Site technical assistance is available and will be quoted upon request.

Quotation does not include sales tax. Sales tax will be added at time of invoice unless a valid Sales Tax Exempt certificate has been provided. Sales tax exempt certificate should accompany customer Purchase Order.

Limited Warranty: MoboTrex, Inc. only obligations shall be to replace such quantity of the product proven to be defective.

Warranty Period: The length of warranty manufacturers have conveyed to the seller and which can be passed on to the buyer.

Additional terms and conditions apply - See MoboTrex, Inc. Terms & Conditions document at our website: www.mobotrex.com.

Thank you for the opportunity to provide this quote.

R247-MX

Customized Data Sheet and Solar Power Report

Attachment C.3 - Carmanah/Mobotrex Specifications

carmanah®
MX Series

Increase compliance and safety across a range of roadway applications with high-intensity, connected beacons and signs.

- ✓ Every system ships with **3 years of free remote connectivity**
- ✓ Actionable email and text alerts
- ✓ Remote system access via MX Cloud™
- ✓ Quick setup and local access with MX Field App™ (iOS®/Android™)
- ✓ 'Smart module' design for simple installation and richer data
- ✓ Solar Power Report (SPR) prepared for every location

MX Lite Subscription

Buy America/ BABA compliant

3-year limited warranty

Elvira Intersection Beacon Lights
Region: 3807 Co Hwy F12, Clinton, IA 52732, USA
ID: CMH389DFE7D | Model: R247-MX

SYSTEM OPERATING PROFILE	
Power Source	Solar
Solar Panel	15 W
Battery Capacity	14 amp hours (2 batteries)
MX Subscription	MX Lite

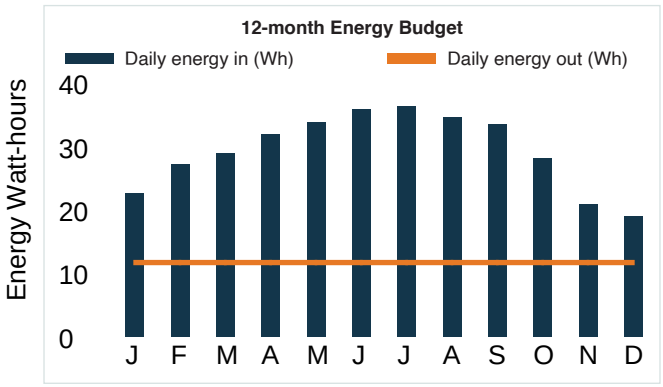
PROJECT LOCATION PROFILE	
Shading	30% reduction applied to insolation to account for typical site shading
Min. Average Temperature	24.7 °F (-4.0 °C)
Min. Peak Sun Hours	2.7

SOLAR POWER REPORT (based on your project location profile)

This custom report demonstrates that our solar-powered system is sustainable and reliable year-round at your project location.

Battery Autonomy (recommended > 7 days)	10.0 Days
Array-To-Load Ratio (recommended > 1.2)	1.6

✓ Your system will be sustainable year-round!



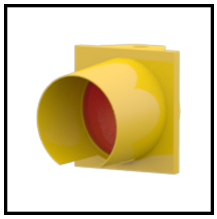
R247-MX

Customized Data Sheet and Solar Power Report

carmanah® MX Series

carmanah.com | traffic@carmanah.com | 1-844-412-8395

MX FLASHER MODULES



MX Beacon Module

MX LED Sign Module

Flasher Module	MX Beacon Module
Size/Quantity	12" Beacon, Single
Housing Color	Yellow
Optical	Meets MUTCD Standards: Chapter 4L, Flashing Beacons
	Meets ITE recommendations for signal intensity and distribution
Construction	UV-resistant polycarbonate or aluminum
	Hard coated lenses for abrasion resistance
Mounts	Top of Pole Integrated

MX POWER MODULES

MX 100

Type	Solar Power Module
Housing Dimensions & Weight (w/o batteries)	12.6 x 13.6 x 5.3”, 320 x 345 x 135 mm, 5 lb (2.3 kg)
Housing Color	Natural
Construction	Weatherproof, gasketed enclosure with vents for ambient air transfer (NEMA 3R)
	Lockable door Cabinet systems include Type II lock option (standard for MX 400)
	Corrosion-resistant aluminum with stainless steel hardware
Solar	15 W at 45-degree tilt for optimal energy collection
	12 VDC operation, solar sized to specific geographic location Includes 12-month Solar Power Report to ensure sustainability
	System designed for 5+ year battery life
	Replaceable, recyclable, sealed, maintenance-free AGM batteries offer the widest temperature range and longest life
Solar Dimensions & Weights	

MX FLASHER MODULE MOUNTING (others available)

Top of Pole Integrated

SOLAR MOUNT

Mount Color	Natural
Pole Size	2" - 2.5" Square

2.0-2.5" Perforated Square Pole

2.38-2.88" Diameter Round Pole

3.5-4.5" Diameter Round Pole

Side of Pole

WIRELESS COMMUNICATION AND DATA COLLECTION

Local	MX Field App (Bluetooth®) for on-site setup, local access to default settings, system health status and more Download on the App Store · GET IT ON Google Play
System-To-System	Linked MX systems flash in sync up to 1,000 ft (305 m) away
Remote Connectivity	MX Cloud (cellular) for remote health status monitoring, email/SMS alerts, scheduling, asset management, programming and more
	Subscription: MX Lite See all MX subscriptions
Location & Time	GPS

INCLUDED WITH EVERY SYSTEM

Warranty	3-year limited warranty on MX system
	1-year limited warranty on batteries
Support	Carmanah’s North American product support technologists available for solution building, solar sizing and troubleshooting
	24/7 access to Carmanah’s online Product Support Center

CMH389DFE7D

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** July 16, 2024

Location / Title of Project Fremont County – Temporary Traffic Signals

Applicant Fremont County Secondary Road Department

Contact Person Dan Davis Title County Engineer

Complete Mailing Address 2014 290th ave Sidney IA, 51652

Phone 712-374-2613 (Area Code) E-Mail ddavis@co.fremont.ia.us

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 _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	56,900
Total Project Cost	$	56,900
Safety Funds Requested	**$**	**56,900**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the Fremont Secondary Road Department

Signed: Daniel R. Davis — 7/17/24
Signature — Date Signed

DANIEL R. DAVIS
Printed Name

Attest: Robbie Kromminga — 7/17/24
Signature — Date Signed

Robbie Kromminga
Printed Name

RESOLUTION FOR TRAFFIC SAFETY IMPROVEMENT PROGRAM
Grant Application for PORTABLE TEMPORARY TRAFFIC SIGNALS

FREMONT COUNTY RESOLUTION No. 2024-50

WHEREAS, the Iowa Department of Transportation Traffic Safety Improvement Program operates under the rules of Iowa Administrative Code 761-Chapter 164; and

WHEREAS, said program allows for the distribution of traffic safety funds to cities, counties, and the Iowa DOT for eligible traffic safety improvement projects; and

WHEREAS, Fremont County has determined that providing portable temporary traffic signals will aid in improving the safety of flaggers, road crews, and the traveling public during road maintenance activities; and

WHEREAS, the County Engineer recommends a TSIP application for funding of the above mentioned traffic control devices.

NOW THEREFORE, BE IT RESOLVED, that we, the Board of Supervisors of Fremont County do hereby declare support for and endorsement of the Grant Application for the said portable temporary traffic signals. The Board further endorses the submittal of such application for grant funding and assures that the County will adequately maintain such improvements within the Fremont County Secondary Road System; and directs the County Engineer to pursue available funding for said project.

Passed and Adopted this 24th day of July 2024

Chairman Board of Supervisors
Fremont County, Iowa

ATTEST:

Dee Owen
Fremont County Auditor

Narrative

The Fremont County Secondary Road Department is applying for the Traffic Safety Improvement Program with the intent to purchase a set of Portable Traffic Signals with the funds. If the county maintenance crew had these available, we would have safer work zones by reducing exposure of flagging personnel and be more visible to traffic.

Fremont County Secondary Road Department is responsible for the engineering, construction and maintenance of the county's secondary road system. The secondary road system in Fremont County consists of 783 total miles with 203 of those miles being hard surface. In addition, there are over 170 bridges maintained by Fremont County. The traffic volumes on a typical road range from 25 vehicles per day on local roads to 1100 on Farm to Market, with posted speed limits ranging from 35 mph to 55 mph.

During various points of the year, many roads traffic volumes increase two and three times the state AADT due to traffic related to numerous DNR owned parks, Sidney Rodeo, and other rodeo related events. Currently, when county maintenance crews are on a brush cutting project, a spotter is used to let the operators know of traffic. This tool would remove that spotter from the shoulder and allow them to assist with the labor workload of the maintenance project. This would also hold true on numerous other projects around the county. Most of our crews consist of 3 individuals, the traffic signals would increase their productivity by adding additional people to the work needed to be completed.

We plan to utilize the temporary traffic signals in many maintenance options such as brush cutting, patching, bridge repair, guardrail etc. The primary use of the temporary traffic signals would be in a work zone with a temporary lane closure, two-way traffic project. MUTCD Standard Part 6 has guidance and standards for the use of traffic signals in these types of work zones.

In addition to providing safer work zones for County maintenance crews, below are few more examples of the benefits of the temporary traffic signal:

- Signals provide a better visual for motorists than a flagger
- Eliminates a having a worker in the clear zone or in traffic lanes • Being understaffed, it frees the traffic control flaggers to have them work on the labor crew of the project
- Allows for the option to have overnight lane closures for road and bridge repairs

In conclusion, Fremont County is requesting TSIP funding to purchase Pop-Up LD Traffic Signals in the amount equal to the cost of one set. The referenced traffic signals are MUTCD approved with two signals, solar charging, multiday batteries, and on a towable trailer. These features will provide a safer and more efficient traffic operations in work zones day and night. Additionally, these signals would benefit other County Departments, local cities and surrounding counties if requested.

OMJCSignal
PO Box 1594
Waterloo, IA 50704
403 Chestnut St.
Waterloo, IA 50703
800.776.5999
Fax: 319.236.1554
Email: sales@omjcsignal.com
omjcsignal.com

Quotation

Quote Number
9191

Quote Date
July 16, 2024

Page:
1

Quoted to:
ATTN: Robbie Kromminga
Fremont County, IA
506 Filmore Street
Sidney, IA 51652

PH: 712-374-2613
FAX:

SHIP TO:

Fremont County
506 Filmore Street
Sidney, IA 51652

Customer ID	Good Thru	Payment Terms	Sales Rep Name
fremontcountyia	8/15/24	Net 30 Days	Kane Shimp

Quantity	Item	Description	Unit Price	Extension
1.00	LDPTS	ONE PAIR OF POP-UP LIGHT DUTY TRAILERS (ONE MASTER, ONE SECONDARY) W/ WIRELESS TRAFFIC CONTROL AND SOLAR POWER	54,900.00	54,900.00
2.00	MISC	MICROWAVE DETECTION FREIGHT NOT INCLUDED* BACKPLATES REQUIRED*	1,000.00	2,000.00

Freight & handling are in addition to the prices quoted above unless otherwise specified. All parts, materials and components are new unless otherwise specifi
OMJC has been in business since July of 1985 to serve you.

Subtota	56,900.00
Sales Ta	
Freight	
Tota	56,900.00

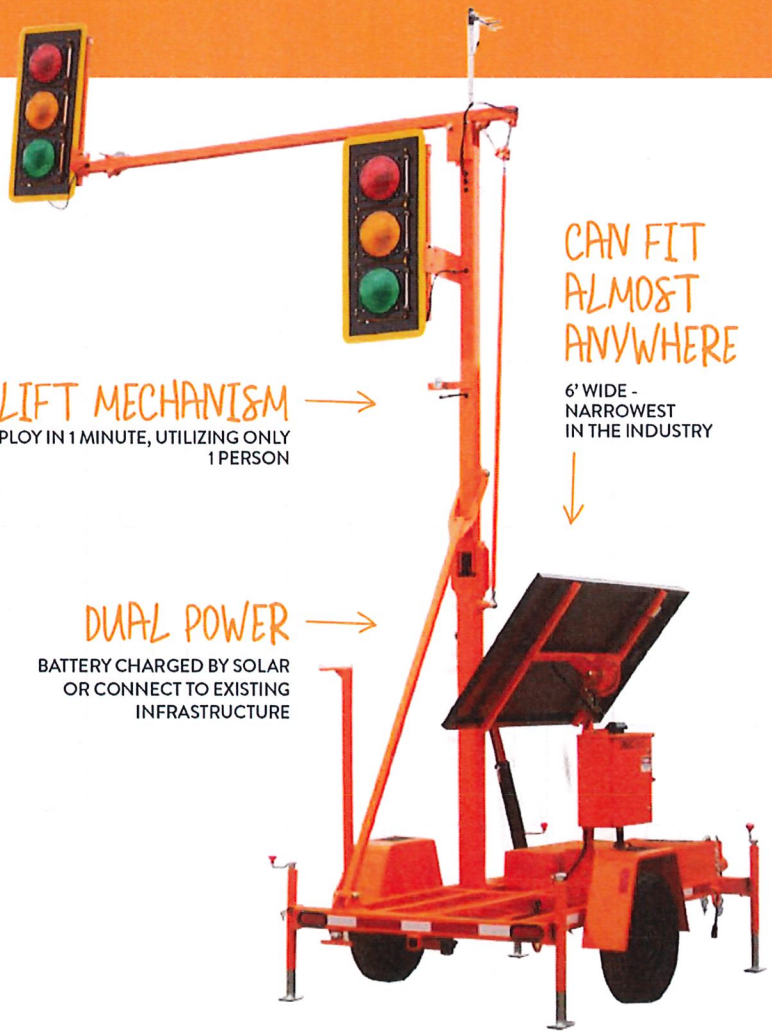
OMJC INTEGRITY AT THE CORE

Pop-Up LD

QPNW-234-2070

1 PERSON, **1 MINUTE**

The Pop-Up LD is designed to control a single lane closure, but it is capable of far more. The 9' arm meets MUTCD requirements. Two, 3 section signal heads with 12" RYG that comply with ITE standards, can quickly be in positions mandated by the MUTCD at the mere push of a button. Because the footprint is only 6' wide (the narrowest in the industry), it can fit almost anywhere. The LD features the Intelight 2070 ATC Controller running MAXTIME software. The custom radio system allows wireless communication between OMJC Pop-Up units along with complex phasing ability. The LD comes standard with a 385 watt solar panel (adjustable on 2 axes) and 440-660Ah of AGM batteries.



MAXIMUM VISIBILITY →
180° SIGNAL ROTATION STANDARD

HYDRAULIC LIFT MECHANISM →
DEPLOY IN 1 MINUTE, UTILIZING ONLY 1 PERSON

CAN FIT ALMOST ANYWHERE
6' WIDE - NARROWEST IN THE INDUSTRY

DUAL POWER →
BATTERY CHARGED BY SOLAR OR CONNECT TO EXISTING INFRASTRUCTURE

A TRUSTED ALTERNATIVE **TO THE "FLAGGER"**

1.800.776.5999 sales@omjcsignal.com

Pop-Up LD

QPNW-234-2070

Pop-Up LD • STANDARD FEATURES

DEPLOYMENT	
	Vertical | Hydraulic with remote pendant
	Horizontal | Manual slide out
ARM EXTENSION	
	9'
SIGNAL HEADS	
	3 section overhead
	3 section side of mast
	12" RYG LED's, ITE compliant
	180° rotation
TRAFFIC CONTROL EQUIPMENT	
	Intelight 2070 ATC with MAXTIME software
	Actuated 8 phase, dual ring, with pedestrian movements
	Encrypted wireless connection between master and secondaries
	EDI real time conflict monitor
CHARGING SOURCE	
	DC | MPPT solar charge controller
	AC | 120V plug-in charger

Pop-Up LD • ADDITIONAL OPTIONS

DETECTION

- ☐ Microwave
- ☐ Video
- ☐ Loop

KNOCKDOWN AVAILABILITY (EMERGENCY POLE REPLACEMENT)

- ☐ Wireless Knockdown Kit (AC to DC from existing infrastructure)
- ☐ Wired Knockdown Kit (AC to DC from existing infrastructure)

PREEMPTION

- ☐ Audible
- ☐ Strobe
- ☐ GPS

COORDINATION

- ☐ GPS time based

REMOTE MANAGEMENT & ALERTING

- ☐ Cellular wireless router (Verizon, AT&T, or Sprint Certified Device)

WIRELESS MANUAL CONTROL

- ☐ Push button control with long range antenna (pilot car remote)

ADDITIONAL ADD-ONS

- ☐ Pedestrian signalization
- ☐ Auto-start generator for on-board ancillary power
- ☐ Work zone lighting
- ☐ Countdown timer

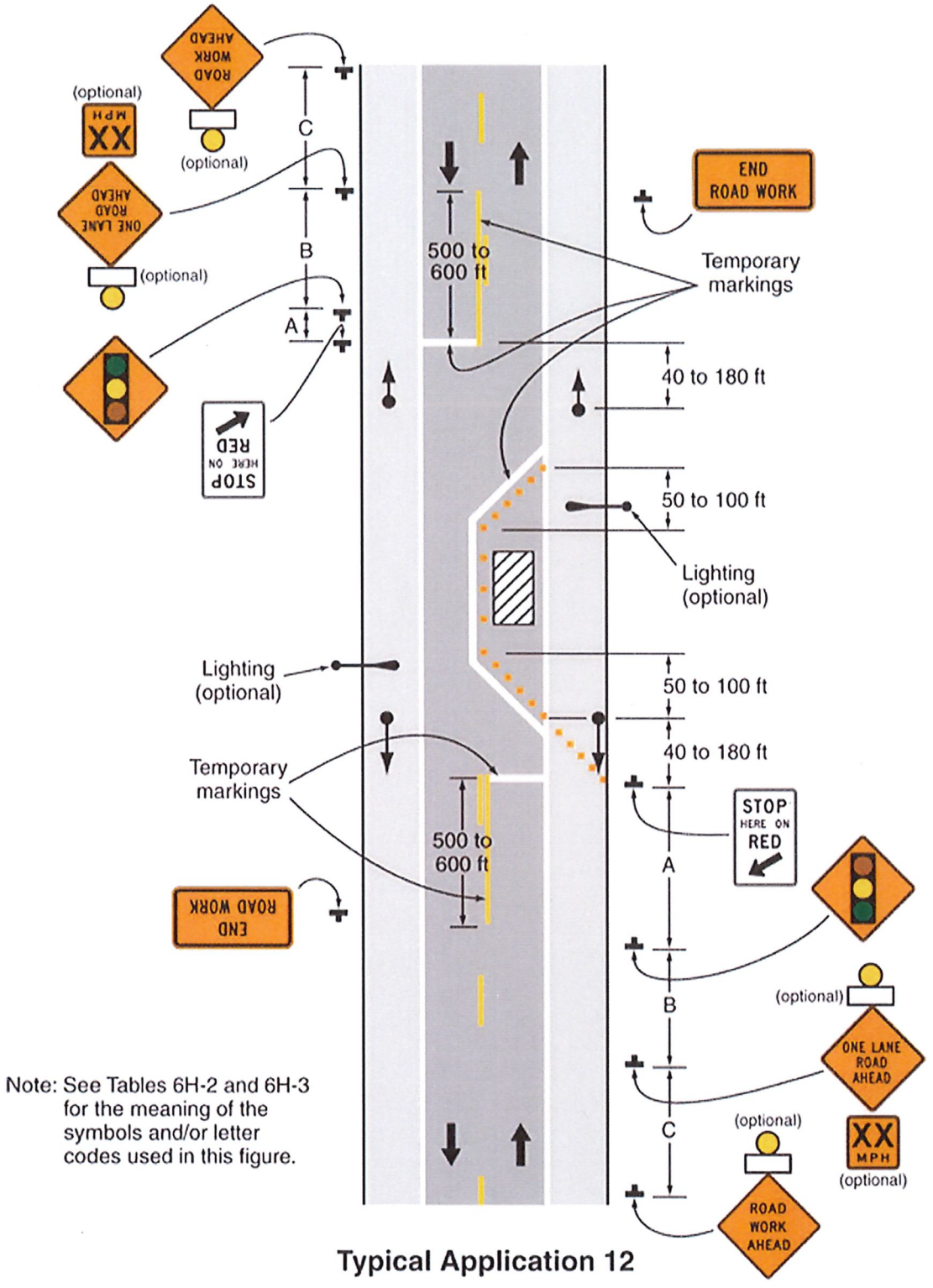
SPECIFICATIONS

CHASSIS LENGTH	112.0" (removable hitch adds 56" for 168" total)
CHASSIS WIDTH	72.0" (narrowest in the industry)
TRAVEL HEIGHT	114.0" w/ solar
STANDARD WEIGHT	2,700lbs.
CLEARANCE (UNDER ARM)	17' (meets MUTCD requirements)
BATTERIES	440-660 Ah of AGM batteries, no-spill, no-maintenance
SOLAR	(1) - 385 watt solar panel, adjustable on 2 axes

OMJC

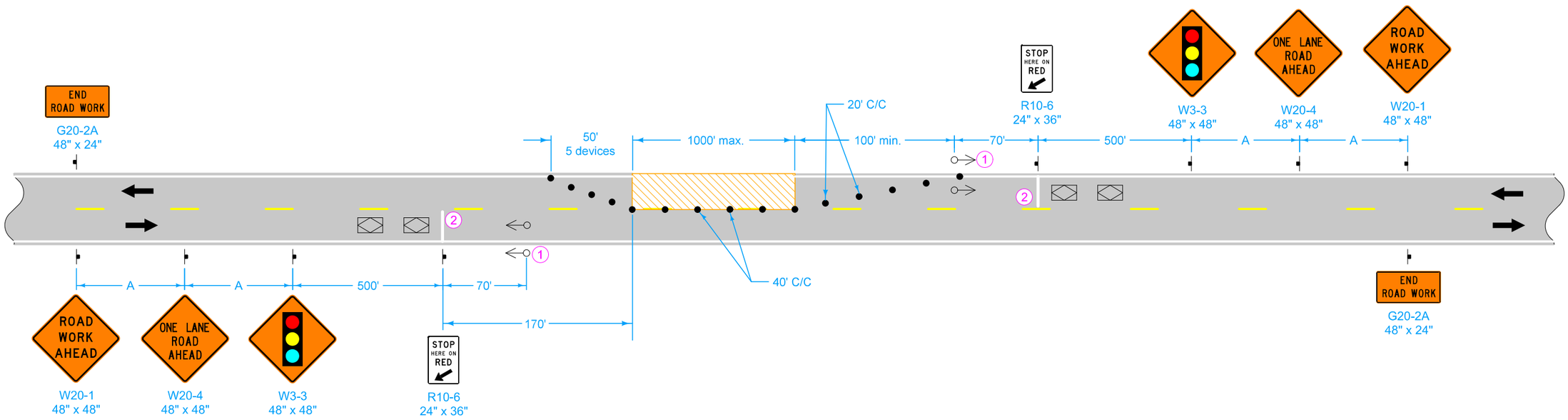
1.800.776.5999 sales@omjcsignal.com
omjcsignal.com 403 Chestnut Street, Waterloo, IA 50703

Figure 6H-12. Lane Closure on a Two-Lane Road Using Traffic Control Signals (TA-12)

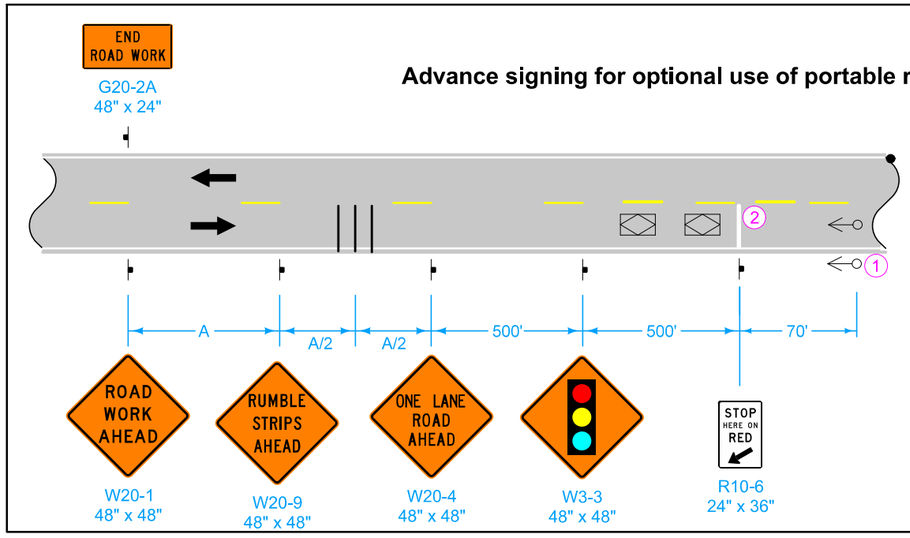


Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 12



Advance signing for optional use of portable rumble strips



LEGEND

- Vehicle Detection Area
- Temporary Traffic Signal
- Traffic Sign
- 42" Channelizer
- Work Area
- Direction of Traffic
- Portable rumble strips

TIMING FOR ACTUATED SIGNALS
Recommended Settings (secs)

Initial = 12.0
Extension = 2.5
Max. Green = 45.0
Yellow = 4.0
All Red = (see table)

Distance between stop lines	All Red* (secs)	Distance between stop lines	All Red* (secs)
450'	9 - 15	950'	19 - 33
550'	11 - 19	1050'	21 - 36
650'	13 - 22	1150'	23 - 39
750'	15 - 26	1250'	25 - 43
850'	17 - 29	1350'	27 - 46

* All Red values based on operating speeds between 20 mph and 35 mph

SPEED LIMIT (mph)*	A
35 or less	250'
40-45	350'
50 or greater	500'

* Speed Limit refers to regulatory speed limit before road work.

This layout is for conditions lasting up to three calendar days. For situations lasting longer than three days refer to TC-216.

(1) For Temporary Traffic Signals, meet the requirements of Section 2528.03 of the Standard Specifications except for the following:
In lieu of a trailer or span-wire mounted system, signal heads may be located on the shoulders, one on each side of the roadway. Mount shoulder signal heads a minimum of 8 feet from the bottom of the signal head to the top of the ground surface.

(2) 24-inch stop lines required during nighttime operation.

Possible Contract Items:
- Pavement Marking Items
- Pavement Markings Removed
- Temporary Traffic Signals
- Traffic Control

Possible Tabulations:
- 108-22
- 108-28

IOWA DOT

STANDARD ROAD PLAN

REVISION	
6	4-16-24

TC-215

SHEET 1 of 1

REVISIONS: Added option for portable rumble strips.

APPROVED BY DESIGN METHODS ENGINEER

LANE CLOSURE WITH SIGNALS (UP TO THREE DAYS)

TRAFFIC FLOW MAP OF
FREMONT COUNTY
IOWA

Prepared By

IOWADOT

OFFICE OF SYSTEMS PLANNING
Phone: (515) 239-1664
WWW.IOWADOT.GOV/MAPS

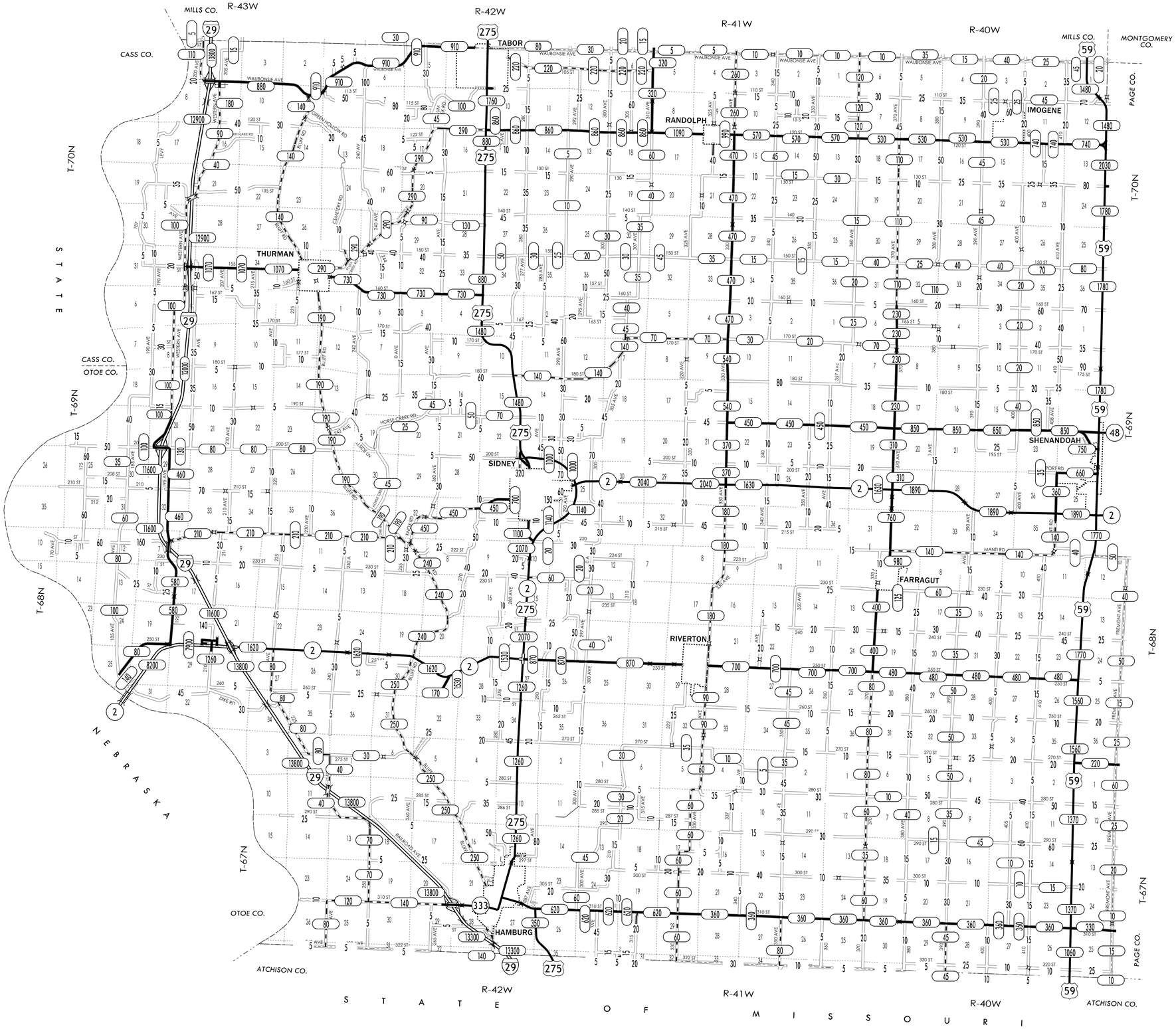
In Cooperation With
United States
Department of Transportation

JANUARY 1, 2016

MILES
0 1 2 3 4
0 1 2 3 4 5 6
KILOMETERS

6 - 1 - 16

2016 ANNUAL AVERAGE DAILY TRAFFIC
2012 ANNUAL AVERAGE DAILY TRAFFIC



LEGEND

- DIVIDED HIGHWAY
- PAVED ROAD
- BITUMINOUS ROAD
- GRAVEL ROAD
- EARTHEN ROAD
- LEGAL NOT OPEN ROAD

2016

36

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE
TSIP FUNDS

GENERAL INFORMATION **DATE:** 8/14/24

Location / Title of Project: Changeable Message Signs Hamilton County

Applicant: Hamilton County Secondary Roads

Contact Person: Ryan Weidemann Title: County Engineer

Complete Mailing Address: 2300 Superior Street, Suite 4
Webster City, IA 50595

Phone: 515-832-9520 (Area Code) E-Mail: rweidemann@hamiltoncounty.org

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: (Area Code) E-Mail:

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	39,300.00
Total Project Cost	$	39,300.00
Safety Funds Requested	$	39,300.00

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the Hamilton County

Signed: Daniel J Campidelli 8-13-24

Signature Date Signed

Daniel J Campidelli

Printed Name

Attest: Kim Schaa 8-13-24

Signature Date Signed

Kim Schaa

Printed Name

RESOLUTION NO. 2024-29

APPROVAL OF TRAFFIC SAFETY IMPROVEMENT PROGRAM APPLICATION FOR CHANGEABLE MESSAGE SIGNS

WHEREAS, The Iowa Department of Transportation has adopted Administrative Rule 761-Chapter 164, which created the Traffic Safety Improvement Program (TSIP) to allow funding to be provided to local jurisdictions for eligible traffic safety improvement projects; and

WHEREAS, Hamilton County has determined that providing information to the traveling public using changeable message signs at the below listed sites would enhance safety:

- Any county road used as a detour when a State route is closed due to maintenance, construction, or emergency road closure.
- Any road that requires temporary use of a changeable message signs due to detours, natural disasters, or maintenance/construction projects.
- Other related traffic incident management events within the County.

WHEREAS, the Hamilton County Engineer recommends a TSIP application be submitted to the Iowa Department of Transportation for possible safety funding of the above mentioned traffic control devices.

NOW THEREFORE BE IT RESOLVED, that the Hamilton County Board of Supervisors,

1. Supports the application for Iowa Department of Transportation Traffic Improvement Program Funding.
2. Certifies that Hamilton County will provide continuous maintenance to these changeable message signs.
3. Authorize the Board of Supervisors Chairperson to sign application and supporting documents in relation to the TSIP funding.

Dated at Hamilton County, Iowa, this 13th day of August, 2024.

Board of Supervisors of Hamilton County, Iowa

ATTEST:

By Kim Schaa

County Auditor

SEAL

B. NARRATIVE

Hamilton County Secondary Road Department is applying for Transportation Safety Improvement (TSIP) funds for two of changeable message sign traffic signals. The primary purpose of the message sign would be warn the traveling public of upcoming work zones, changes in traffic patterns or access, or relay messages of special concern.

Hamilton County Secondary Roads is responsible for the engineering, construction, and maintenance of the county's Secondary Road System. This system includes 933 miles of rural roads, of which 215 miles are hard surfaced. Located on these roads are 106 bridges over 20 feet in length, and hundreds of smaller drainage structures.

Changeable message signs would be used at the following sites:

- Any county road used as a detour when a State route is closed due to maintenance, construction, or emergency road closure.
- Any road that require temporary use of a changeable message sign due to detours, natural disasters, or maintenance/construction projects.
- Other related traffic incident management events within the County.

A recent example of the need for these signs occurred in the spring of 2024. A large grain elevator caught fire just west of the Canadian National Railroad Crossing of Route R38. Visibility at the crossing was reduced to near zero for the next week due to smoke from the debris drifting towards the intersection. Hamilton County was able to borrow two CMS units from a neighboring county and install them in advance of the railroad crossing to warn motorists of the upcoming hazard.

CN Railroad Crossing at Hamilton County R38 – April 11, 2024

C. ITEMIZED BREAKDOWN OF COSTS

Below is a cost quotation from Street Smart for the PCMS-548 Hydraulic Trailer-Mounted message sign from StreetSmart.com.

Street Smart

Sale Quote

Street Smart Rentals, LLC
6811 137th Ave NE
Columbus, MN 55025

PREPARED FOR

Travis Elmore
Hamilton County Engineers Office
(515) 835-3036
telmore@hamiltoncounty.org

Quote #	Q-38611-1
Date	7/19/2024
Expires On	11/30/2024
Rep Name	Ryan Kilpatrick
Rep Phone	(612) 597-5547
Rep Email	rkilpatrick@streetsmartrental.com

Billing Address

Hamilton County Engineers Office
Hamilton County Courthouse
2300 Superior Street
Webster City, IA 50595

Shipping/Pick Up Address

Hamilton County Engineers Office
Hamilton County Courthouse 2300 Superior Street
Webster City, IA 50595

Pricing provided on this quote is valid for up to 30 days after the printed date. Thank you for your business!

PRODUCT CODE	DESCRIPTION	QTY	UNIT PRICE	TOTAL
PCMS-548/HYD	Mini Full-Matrix CMS	2	$16,500.00	$33,000.00
OPT-2-BALL	2" Ball Hitch	2	$0.00	$0.00
OPT-7-PIN-RV	7-Pin Flat RV Plug	2	$0.00	$0.00
OPT-MS-Modem	Modem for New Build CMS at Factory	2	$1,400.00	$2,800.00
OPT-MS-STEALTH CHARGER	15-Amp Charger for Stealth Batteries	2	$500.00	$1,000.00
OPT-MS-Tilt-Rotate	Tilt & Rotate	2	$500.00	$1,000.00
OPT-JACK-01	Tongue Jack w/wheel	2	$250.00	$500.00

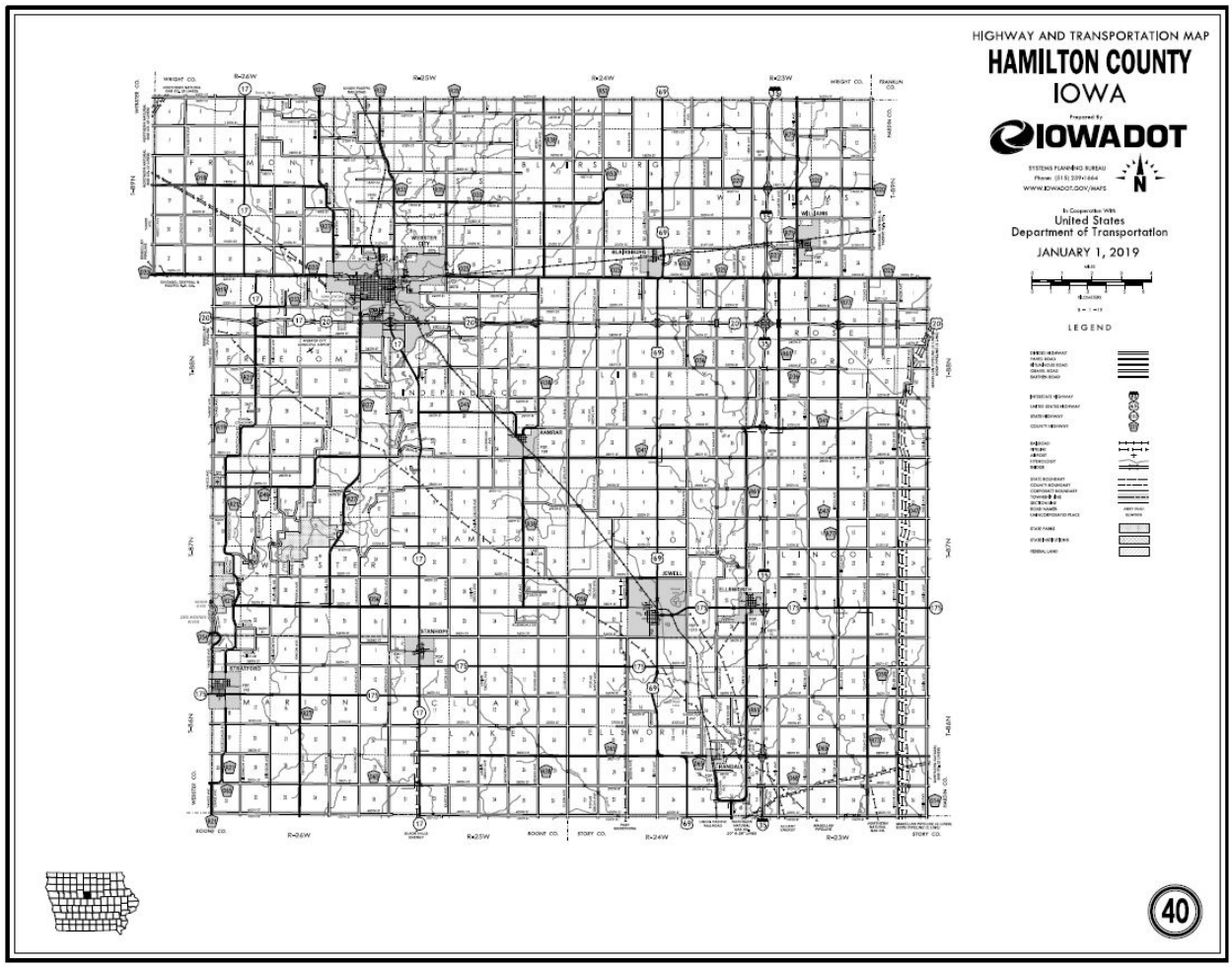
Subtotal*	$38,300.00
Est. Freight*	$1,000.00
Total*	$39,300.00

***Totals do not include Tax.** Taxes are applied on invoices if your account is not exempt.

D. TIME SCHEDULE

- TSIP Application Due — August 15, 2024
- TSIP Award Notification — January, 2025
- TSIP Funding Available — July 1, 2025
- Purchase of CMS — July, 2025
- Implementation of CMS — August, 2025

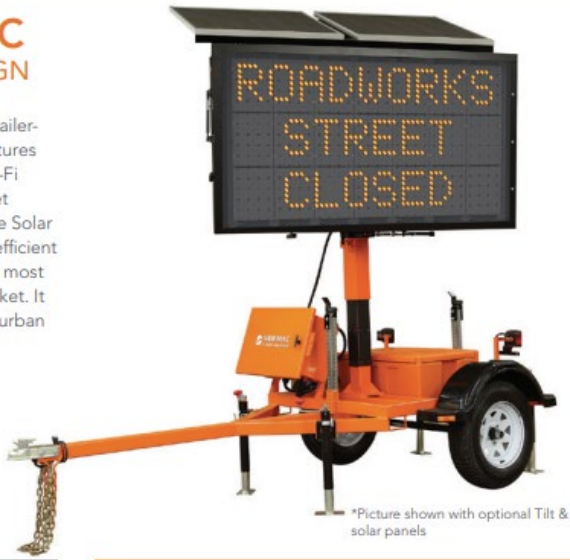
E. Map


HIGHWAY AND TRANSPORTATION MAP
HAMILTON COUNTY
IOWA
Prepared by
IOWADOT
SYSTEMS PLANNING BUREAU
WWW.IOWADOT.GOV/MAPS
In Cooperation With
United States
Department of Transportation
JANUARY 1, 2019
LEGEND
40

F. Pictures

PCMS-548 HYDRAULIC
TRAILER-MOUNTED MESSAGE SIGN

Ver-Mac's PCMS-548 hydraulic is a mini full-matrix trailer-mounted portable changeable message sign. It features the NTCIP-compliant V-Touch Controller, V-Sync Wi-Fi Communication, Stealth Technology, JamLogic Fleet Management Software, and optional Tilt-and-Rotate Solar Panels. The PCMS-548 hydraulic combines energy-efficient design and high-quality construction to provide the most reliable and cost-effective message sign on the market. It is the perfect model for lower speed roadways and urban areas.



*Picture shown with optional Tilt & Rotate solar panels

V-TOUCH CONTROLLER

4 WAYS TO CHANGE A MESSAGE

AT THE SIGN
Using our V-Touch Controller

NEAR THE SIGN
Using our V-SYNC Wi-Fi

REMOTELY
Using JamLogic on your PC or Laptop

REMOTELY
Using JamLogic Web on your Smartphone or Tablet

PCMS-548 HYDRAULIC

JAMLOGIC® FLEET MANAGEMENT SOFTWARE

The PCMS-548 hydraulic is equipped with Ver-Mac's high-speed modem with GPS which maximizes your productivity, efficiency and profitability all remotely from your office or home! The JamLogic software is FREE and you get all the updates at no charge!

- Monitor, maintain and manage your signs from any PC, laptop, tablet or smartphone
- View your equipment in a list and GPS map view
- Change a message on one or more signs simultaneously with a simple click
- View your messages and battery voltages
- Group your signs in folders (by customer, location, project… you choose!)
- Receive e-mail or text alerts – optional (low battery cellular failure, etc.)

APPLICATIONS

- City and county (urban areas)
- School zones
- Special events

POWER SUPPLY CONFIGURATION

SOLAR PANELS
Provide maximum solar recharging during all four seasons.

- Designed to run 12 months in most regions without manual charging
- Various configurations of solar panels and batteries are available to meet your needs.

HIGH-QUALITY CONSTRUCTION

POWDER COATING SUPERIOR FINISH
Impact, humidity, salt spray and rust resistant

4 LEVELING JACKS
For stabilization and easy transportation

ELECTRO-HYDRAULIC LIFT MECHANISM
For a quick and effortless deployment

HEAVY-DUTY PLASTIC FENDERS
For durability and easy replacement

PLASTIC BATTERY BOX
To minimize battery corrosion

LOCKABLE CONTROL BOX
For security

2-IN. (51 MM) COUPLER OR 3-IN. (76 MM) PINTLE EYE
For easy towing

STEALTH TECHNOLOGY

Ver-Mac's innovative Stealth Technology design will help you significantly reduce your battery maintenance and repair costs. This technology combines two great innovations:

CLEVERLY HIDDEN BATTERY COMPARTMENT
Deter thieves from stealing batteries

LONG-LASTING SEALED BATTERIES
No maintenance required

DISPLAY

- Display panel: 45 x 80 in. (1146 x 2027 mm)
- Full matrix of 30 x 56 pixels
- 2 LEDs per pixel
- 5 x 7 pixels (8.75 in.) characters (default)
- 3 lines of 9 characters per line (default 5x7 font)
- Up to 3 lines of 12 characters per line (3 x 7 font)
- Display sign rotates 360 degrees for perfect setting
- Plug-and-play display modules for simplified maintenance

DIMENSIONS AND WEIGHTS

- Overall length: 131 in. (3338 mm)
- Overall width: 71 in. (1791 mm)
- Traveling height: 94 in. (2393 mm)
- Operating height: 164 in. (4162 mm)
- Weight (approx.): 570 kg (1255 lb.)
- Axle/suspension: 909 kg (2000 lb.)

WARRANTY

- 1 year on complete trailer
- 2 years on electronic components manufactured by Ver-Mac

OPTIONS

- Battery charger
- Tongue wheel jack
- Radar
- Data logger (requires radar)
- Tilt-and-Rotate Solar Panels
- Fixed Camera
- PTZ Camera

Other options are available to meet your needs.


LANES
CHANGE
AHEAD

G. Plan View

Iowa Department of Transportation
Office of Design

9B-8

Changeable Message Sign

Design Manual
Chapter 9
Traffic Control

Originally Issued: 09-01-95

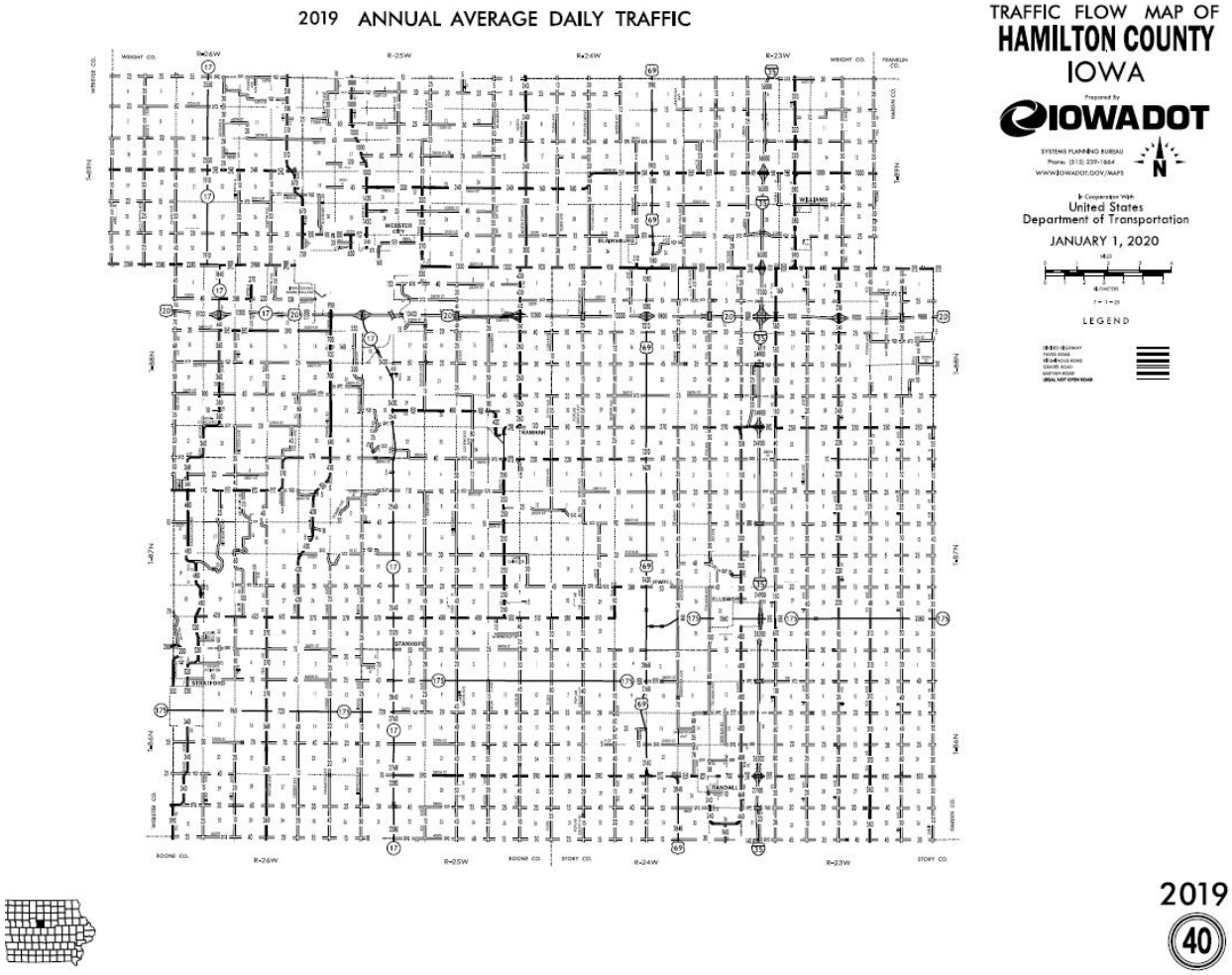
A changeable message sign (CMS) is a traffic control device with the flexibility to display a variety of messages. Thus a CMS can be adapted to the needs of work zone traffic control as conditions change. The CMS should be used in conjunction with conventional signs, pavement markings, and lighting. CMS's have a wide variety of applications in work zones, some of which are:

- Speed control,
- Warning of road closures,
- Accident management,
- Notice of width restrictions,
- Advisories on construction scheduling,
- Advisories on traffic delays, and
- Warning of adverse conditions.

A CMS should be used only when a conventional post-mounted or skid-mounted sign would not be adequate. Frequent and prolonged use of a CMS will diminish its effectiveness.

The message panels on the CMS usually contain room for 3 lines of eight characters each. The message panel is visible from about one-half mile. Individual characters can be seen from 850 feet (260 meters) under normal conditions. Drivers need approximately one second per word to comprehend a message.

H. Traffic volumes and/or turning movements – See 2019 IDOT Traffic Volumes for Hamilton County



I. SIGNAL DATA – N/A

J. B/C WORKSHEET – N/A

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** August 15, 2024

Location / Title of Project J-20 (Jackson Street)

Applicant Henry County

Contact Person Jake Hotchkiss Title County Engineer

Complete Mailing Address P O Box 655

Mt. Pleasant, IA 52641

Phone 319 385-0762 E-Mail jhotchkiss@henrycountyiowa.us

(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	$	31,092
Total Project Cost	$	31,092
Safety Funds Requested	**$**	**10,962**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the Henry County

Signed: _____ 8/14/24
Signature Date Signed

Jake Hotchkiss
Printed Name

Attest: Tracy Sammons 8/14/2024
Signature Date Signed

Tracy Sammons
Printed Name

A

RESOLUTION
27-2024-20
APPROVAL OF
TRANSPORTATION SAFETY IMPROVEMENT PROGRAM APPLICATION
FOR J20 (Jackson Street)

WHEREAS, the Iowa Department of Transportation has adopted Administrative Code 761 – Chapter 164, which created the Traffic Safety Improvement Program (TSIP) to allow for funding to be provided to local jurisdictions for eligible traffic control devices; and

WHEREAS, Henry County promotes the reduction of traffic related incidents and safety for the traveling public/pedestrians; and

WHEREAS, possible safety improvements have been identified:
Two (2) LED solar stop signs and Two (2) solar feedback solar speed sign.

WHEREAS, the Henry County Engineer recommends the Traffic Control Device TSIP funds application be submitted to the Iowa Department of Transportation for possible safety funding of the above-mentioned project.

IT IS THEREFORE RESOLVED, by the Henry County Board of Supervisors to endorse the above-mentioned project and authorize the maintenance of the improvement after construction is complete.

NOW THEREFORE BE IT RESOLVED, by the Henry County Board of Supervisors in session this **15th day of August, 2024,** that the Henry County Board of Supervisors hereby authorizes the County Engineer to execute and submit the application to the Iowa Department of Transportation for Traffic Control Device TSIP funding.

ATTEST:

Shelly Barber
Henry County Auditor

HENRY COUNTY BOARD OF SUPERVISORS

Greg Moeller, Chairman

Marc B. Lindeen, Member

Chad White, Member

A

Mt. Pleasant Community School District

"Learning for a Lifetime"

Central Office
Mailing Address: 400 E. Madison Street
Physical Address: 1010 E. Washington Street, Suite 102
Mt. Pleasant, IA 52641

Mr. John Henriksen, Superintendent
Angie Butler, Director of Instruction
W. Edward Chabal, Business Manager
Phone: 319-385-7750, Ext. 6
Fax: 319-385-7788

August 15, 2024

Office of Traffic & Safety
Iowa DOT
800 Lincoln Way
Ames, IA 50010

RE: Henry County Application for Traffic Control Device TSIP funds
Salem Elementary School Cross Walk Safety Improvements

At its meeting on August 12, 2024, the Mount Pleasant Community School Board discussed and favorably supports Henry County applying for TSIP funds for the improvement of the cross walk located near Salem Elementary School.

The proposed LED solar stop signs and solar feedback speed signs, along with the sidewalk improvements and tree removal, will improve safety for all pedestrians in Salem, especially our school children and staff.

Thank you for your consideration.

Sincerely,

John Henriksen, Superintendent
Mount Pleasant Community School District

HENRY COUNTY, IOWA

Engineering & Road Department

1510 E. Washington Street
P O Box 655
Mt. Pleasant, Iowa 52641

Phone: 319 385-0762
Fax: 319 385-0777
e-mail: engineer@henrycountyiowa.us

B

August 15, 2024

Office of Traffic & Safety
Iowa DOT
800 Lincoln Way
Ames, IA 50010

RE: Henry County Application for Traffic Control Device TSIP funds
Salem Elementary School Cross Walk Safety Improvements

Narrative:

Proposed Project
Henry County is applying for the Traffic Control Device - Traffic Safety Improvement Program funds to improve the safety and signage at the Salem Elementary school cross walk on J20 (Jackson Street). **We are seeking safety funds for two (2)-LED solar stop lights to be used at the cross walk during school hours; and two (2)-solar speed feedback signs to be placed east & west of the cross walk.** Henry County is requesting $10,962 for the three traffic control devices. Henry County plans to relocate the cross walk to the west and install ADA ramps. Two existing large walnut trees will be removed to enhance visibility for students and drivers. Please reference Exhibit G.

Existing Conditions
This is a Farm to Market road that connects Salem to HWY 218. Currently, the road is paved 22 feet wide with no shoulders. The existing cross walk is at the intersection of South Hoover St. and J20 (Jackson St.) with 2-stop signs controlling traffic during school hours. The existing cross walk is located at the best location currently, but the cross walk is in poor condition as sidewalks leading up to and off J20 are in disrepair. The road is posted 25 mph and 20 mph during school hours and has a moderate traffic count of 890 ADT.

LRSP Safety Plan
This location is not listed in the current LRSP safety plan.

The County wishes to improve the current cross walk by removing trees, repairing/replacing sidewalks, adding ADA ramps and adding the requested solar stop lights. I have been utilizing staff from the IDOT Traffic and Safety office to help review and talk through different options. We feel this is the best option to secure movement of pedestrians and increase safety.

Sincerely,

Jake Hotchkiss, PE
Henry County Engineer

ENGINEER'S ESTIMATE J20 School Crossing

C

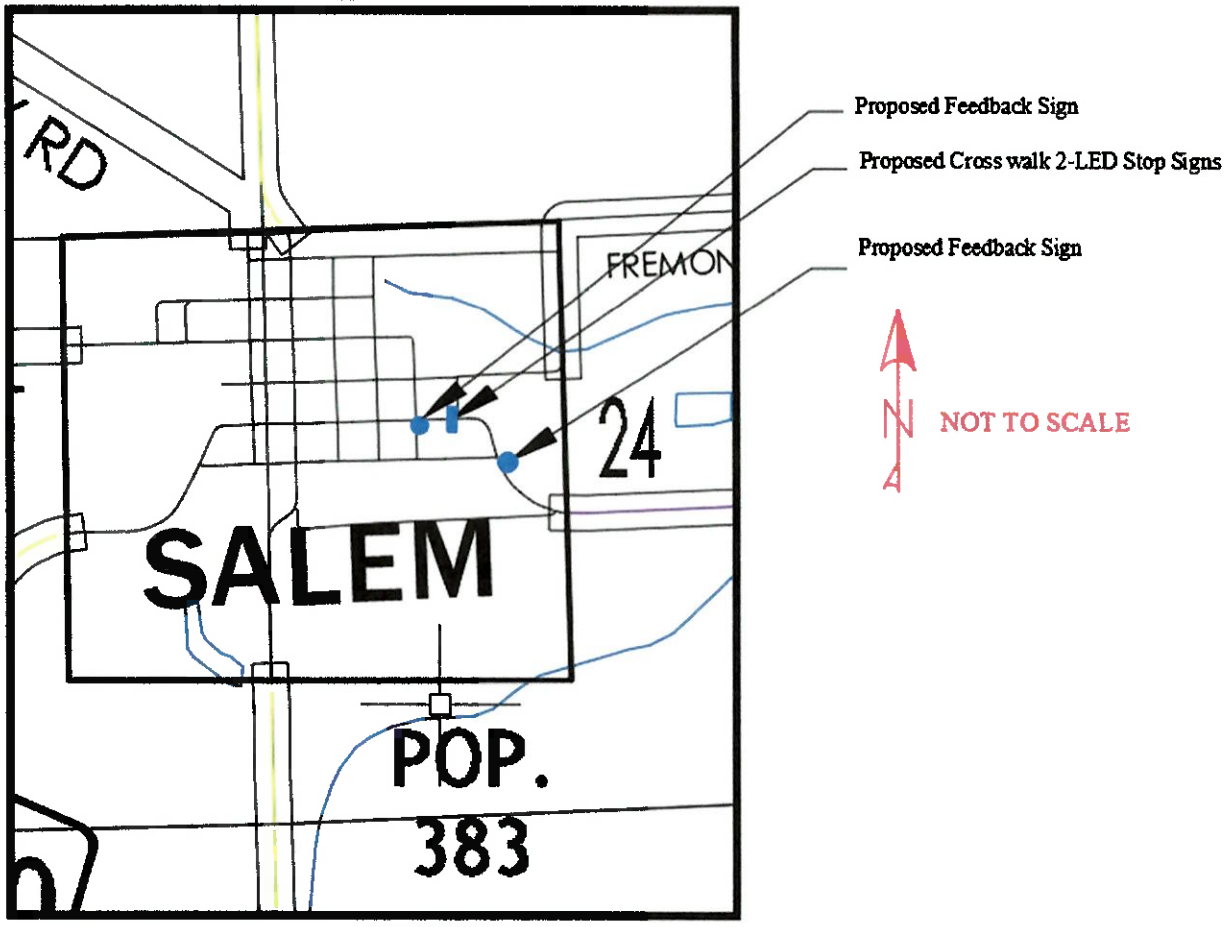
ITEM NO.	ITEM CODE	ITEM	UNIT	DIVISION I QTY	DIVISION II (Safety) QTY	UNIT PRICE	DIVISION I	DIVISION II (SAFETY)
1	2101-0850001	Clearing & Grubbing	LS	1		$3,000.00	$3,000.00	$0.00
2	2511-6745900	Removal of Sidewalk	SY	33		$25.00	$825.00	$0.00
3	2511-7526004	Sidewalk, P.C. Concrete 4 IN.	SY	68.7		$150.00	$10,305.00	$0.00
4	2511-7528101	Dectable Warnings	SF	20		$60.00	$1,200.00	$0.00
5		Solar Powered LED Stop Lights	Each		2	$2,973.00	$0.00	$5,946.00
6		Solar Powered Feed Back radar sign 12" display	Each		2	$2,508.00	$0.00	$5,016.00
7		Installation & Post Materials	Each	4		$1,200.00	$4,800.00	$0.00
						ENGINEER ESTIMATED TOTAL =	$20,130.00	$10,962.00

Total Traffic Control Device request of $10,962

D. Schedule

- [x] July 2024 ……Data Collection and Analysis of School Cross Walks
- [x] August 2024……...TCD TSIP application submitted
- [ ] January 2024……Iowa DOT approval
- [ ] Spring 2024……..TSIP Agreement
- [ ] Summer 2024……...Purchase & install equipment
- [ ] Spring 2025……..Completion

E. Map



F. Pictures

Proposed Location for
Solar Feedback Sign.
Driving West Bound into Salem

Next Curve - Current signage.
Driving West Bound into Salem

Current Cross Walk -
Driving West Bound into Salem

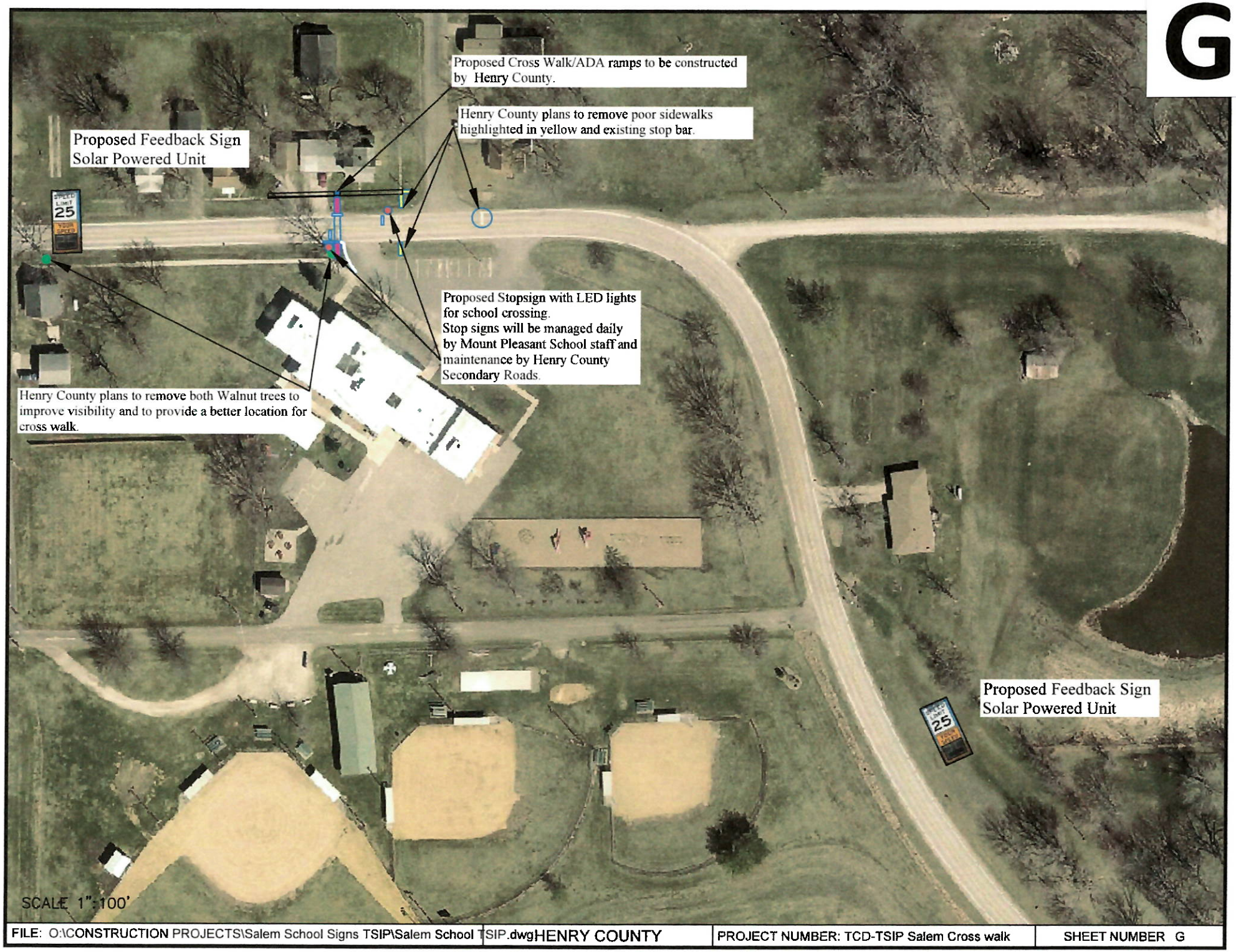
Current Cross Walk -
Looking North

Sidewalk in poor condition.

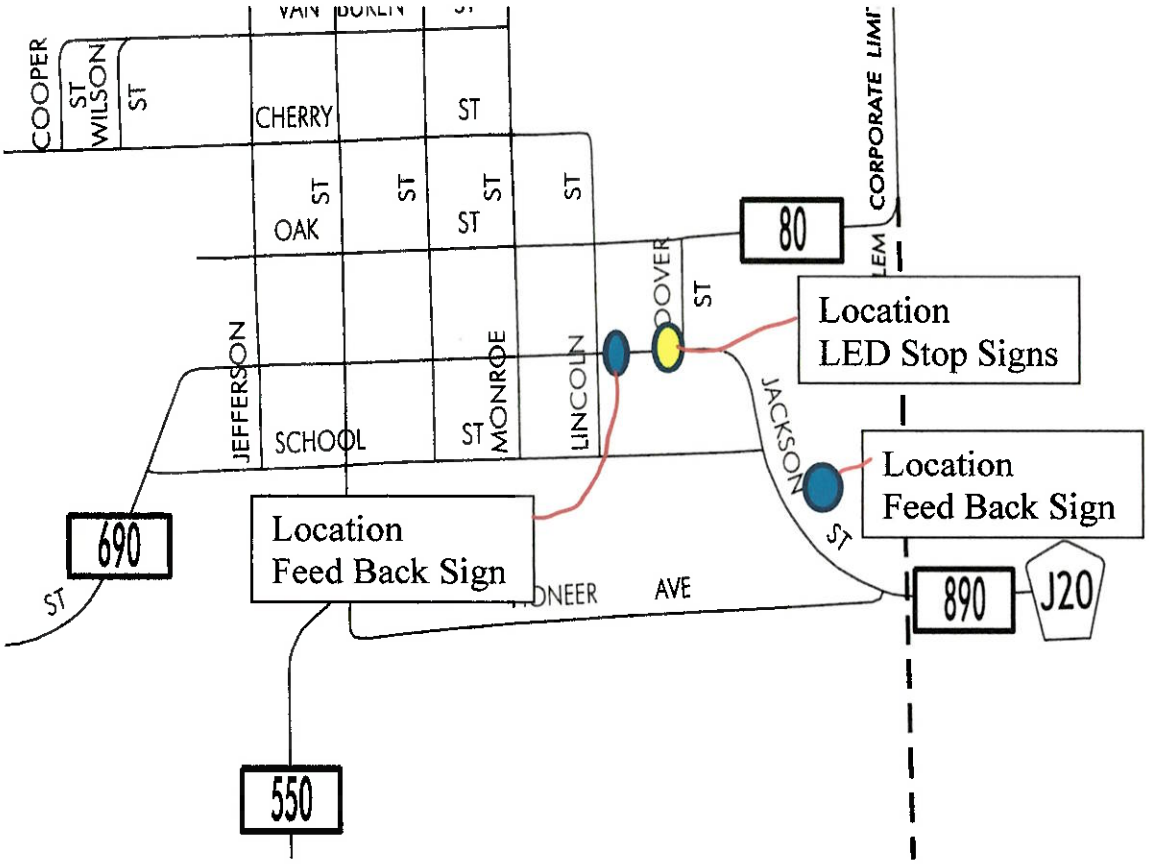
Proposed Cross Walk looking West

Walnut tree will be removed by County and ADA ramps constructed on both sides of street.

Proposed Location for
Solar Feed Back Sign
Tree will be removed.
Driving East Bound from Salem.


G
Proposed Cross Walk/ADA ramps to be constructed by Henry County.
Henry County plans to remove poor sidewalks highlighted in yellow and existing stop bar.
Proposed Feedback Sign
Solar Powered Unit
Proposed Stopsign with LED lights for school crossing.
Stop signs will be managed daily by Mount Pleasant School staff and maintenance by Henry County Secondary Roads.
Henry County plans to remove both Walnut trees to improve visibility and to provide a better location for cross walk.
Proposed Feedback Sign
Solar Powered Unit
SCALE 1":100'
FILE: O:\CONSTRUCTION PROJECTS\Salem School Signs TSIP\Salem School TSIP.dwg
HENRY COUNTY
PROJECT NUMBER: TCD-TSIP Salem Cross walk
SHEET NUMBER G

H


COOPER
ST
WILSON
ST
CHERRY
ST
OAK
ST
ST
ST
ST
ST
80
CORPORATE LIMI
JEFFERSON
SCHOOL
ST
MONROE
LINCOLN
DOVER
ST
Location
LED Stop Signs
JACKSON
ST
Location
Feed Back Sign
690
Location
Feed Back Sign
AVE
890
J20
550

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** August 6, 2024

Location / Title of Project Humboldt County / Solar flashing beacons

Applicant Humboldt County

Contact Person Ben Loots Title County Engineer

Complete Mailing Address 2221 220th street

Humboldt IA 50548

Phone 515-332-2366 (Area Code) E-Mail bloots@humboldtcounty.iowa.gov

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 _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$ 24,716
Total Project Cost	$ 24,716
Safety Funds Requested	$ 24,716

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

☒Yes – Explain A High five study was conducted in 2023 stating beacons as a low cost enhancement option

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the Humboldt County Engineer's Office

Signed: Ben Loots — 8/14/2024
Signature — Date Signed

Ben Loots
Printed Name

Attest: David Powell — 8/14/24
Signature — Date Signed

DAVID POWELL
Printed Name

HUMBOLDT COUNTY BOARD OF SUPERVISORS

Resolution #2024-0812

A RESOLUTION ENDORSING A GRANT APPLICATION FOR TRAFFIC SAFETY IMPROVEMENT PROGRAM FUNDING (TSIP).

WHEREAS, the Iowa Department of Transportation through the Traffic Safety Improvement Program provides funding for various TSIP eligible projects; and

WHEREAS, the Board of Supervisors of Humboldt County hereby endorses the proposed project Flashing Stop sign beacons at multiple locations in Humboldt County, Iowa and;

NOW, THEREFORE BE IT RESOLVED BY THE BOARD OF SUPERVISORS THAT:

1. The County hereby commits initial funds as required by the Iowa Department of Transportation Traffic Safety Improvement Program.
2. The County hereby commits to adequately maintain the completed project for its intended public use for a minimum of 10 years following project completion.
3. The County Board of Supervisors hereby authorizes Ben Loots, Humboldt County Engineer to sign the project agreement on behalf of Humboldt County and carry the project to completion.

PASSED AND APPROVED THIS 12 DAY OF August, 2024

AYES: Erik Bruce Sandy Dave

NAYS: _____

OTHER: Rick (Absent)

Chairman

Humboldt County Board of Supervisors

Attest: Trish Erickson, Humboldt County Auditor

B. Narrative

Humboldt County Secondary Road Department is applying for Transportation Safety Improvement (TSIP) funds for eighteen solar powered flashing beacons. The proposed installation locations are (8) stop sign locations, and one major curve with (10) chevrons with multiple accidents, fatalities, as well as major and minor injuries. The primary purpose of the beacons is to enhance visibility and draw more attention to the driver.

Humboldt County Secondary Roads is responsible for the engineering, construction, and maintenance of the county's Secondary Road System. This system includes 721 miles of rural roads, of which 205 miles are hard surfaced. Located on these roads are 73 bridges over 20 feet in length, and hundreds of smaller drainage structures.

Humboldt County is requesting TSIP funding for the cost of fifteen solar powered flashing beacons. Humboldt County staff will install the signs at their own expense. The flashing red lights would help facilitate safe and efficient stopping conditions. Most importantly would improve visibility and draw more attention to the driver.

C. Cost breakdown (see attachment)

D. Time Schedule

- TSIP Application Due — August 15, 2024
- TSIP Award Notification — January, 2025
- TSIP Funding Available — July 1, 2025
- Purchase of Beacons — July, 2025
- Implementation of Beacons — August, 2025

Sign	Name	Quantity	Cost	Total
R1-1 Beacon	Stop sign Beacon	8	$ 1,228.50	$ 9,828.00
W1-8 Beacon	Chevron Beacon	10	$ 1,488.85	$ 14,888.50
				$ 24,716.50

QUOTATION

525 N. Great Southwest Pkwy.
Arlington, TX 76011
817-640-0992

Q 24 -55130

Quoted to David Powell **Cust Code** 703570
P 515-332-2366 **F** ~~515-332-5142~~
Email dpowell@humboldtcounty.iowa.gov
Company **HUMBOLDT COUNTY ENGINEER**
2221 220TH STREET
HUMBOLDT IA 50548

Date 05/07/2024
Quoted by KyleHessler
Lead Time 2-3 weeks
Terms Net 30

	Part # / Size	Description	Qty	UM	Unit Price	Total Price
1	hd302R	12" Red Solar Powered Flashing Beacon Includes 30 watt solar panel, 20.8AH battery, 24/7 flashing standard Black Housing (HARDWARE FOR 2" SQUARE POSTS INCLUDED)	8	EA	1228.50	9828.00
2	FREIGHT	** FREIGHT ESTIMATES ARE *ESTIMATES* ONLY ** CHARGES MAY INCREASE IF RECEIVING ADDRESS REQUIRES LIFT GATE LIMITED ACCESS FOR ENTRY OR CALL AHEAD TO CUSTOMER				

SHIP TO ADDRESS

Company: Same as above
Attention:
Address only:
Inst. Ste, etc:
Ship To Phone:
Ship To City:
Ship to State: **Zip**

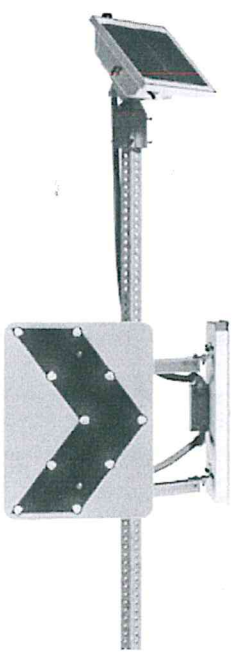
Subtotal	**$9,828.00**
Freight Estimate	**$596.00**
Sales Tax Estimate	
Total Quote	**$10,424.00**

Ship to for Freight Estimate

Shipping Via Best way
Shipping Terms PREPAY & ADD
Transit Time

Freight estimates are only valid for 14 days.
A quote not accepted within thirty (30) days is subject to review.
Custom products are NOT returnable, refundable or cancelable.
By purchasing from ACP, customer agrees to accept the terms and conditions as stated on our website at the following link: www.https://acpinternational.com/terms-conditions

DAWN



CHEVRON MX FLASHING BEACONS

The Chevron MX Flashing Beacons are cutting-edge LED road safety signs designed to enhance driver awareness and reduce road departures. Featuring free MX Cloud™ connectivity for easy remote management, automated alerts for system issues, customizable radar detection, and durable, weatherproof construction, these beacons are optimized for longevity and efficiency. With user-friendly interface options and a comprehensive 3-year warranty, they are an ideal solution for improving roadway safety.

Sign Type

Double

Power Type

Solar

Sign Size

18" x 24"

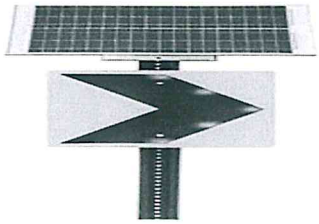
Qty: 1

This product is already in quote request list

Browse the list

Part #/SKU N/A

Category Flashing Beacons



Optional Accessories

2" Square Sign Post
TSCN-435

$1488.85 ea

As low as Save 16% (65)

Qty

− 1 +

ADD TO CART

Description Specifications Documents and Instructions Reviews /Q&A

Specifications

SKU	3FA3484
Model Name	18" x 24" LED Chevron Sign
Solar Panel Wattage	30W
Overall Dimensions	18"W x 24"H
Number Of Leds	5
LED Color	Amber
Weight	33.0

Description

Warn drivers of dangerous curves ahead

- 18" x 24" aluminum chevron sign features 5 built-in LEDs
- Alerts motorists to dangerous upcoming curves to reduce accidents
- Ideal for new construction areas, sharp curves, rural and winding roads, and more
- Curves are more likely to have crashes than any other highway segment
- All-weather visibility from extra-bright LEDs with a visual range of up to 2 miles at night
- Offers 24-hour use, smart controller with auto-dimming to save battery life, and a super-slim design
- Fully enclosed housing helps protect the wiring and LEDs
- Federally accepted MUTCD compliant design with High Intensity Prismatic Sheeting
- Environmentally friendly solar-powered system can be placed virtually anywhere
- Easy installation on u-channel, square, round and wood posts
- Kit includes a reflective aluminum sign with built in LEDs, solar panel and mounting hardware for sign and solar panel
- **Sign post sold separately. 10' post is recommended to fit both the sign and solar panel.**

Users Also Viewed

★★★★ (1)
As low as $1998.85
Value Bus / Smoking Shelter

★★★★★ (166)
As low as $998.85
Northgate Bench with Arched Back

★★★★★ (4)
As low as $98.85
Portable Crowd Barriers

★★★★★ (35)
As low as $788.85
SuperSaver™ Commercial Rectangular Picnic Tables

★★★★★ (61)
As low as $868.85
Madiron Benches

★★★★★ (3)
As low as $548.85
Commercial Steel Waste Receptacles

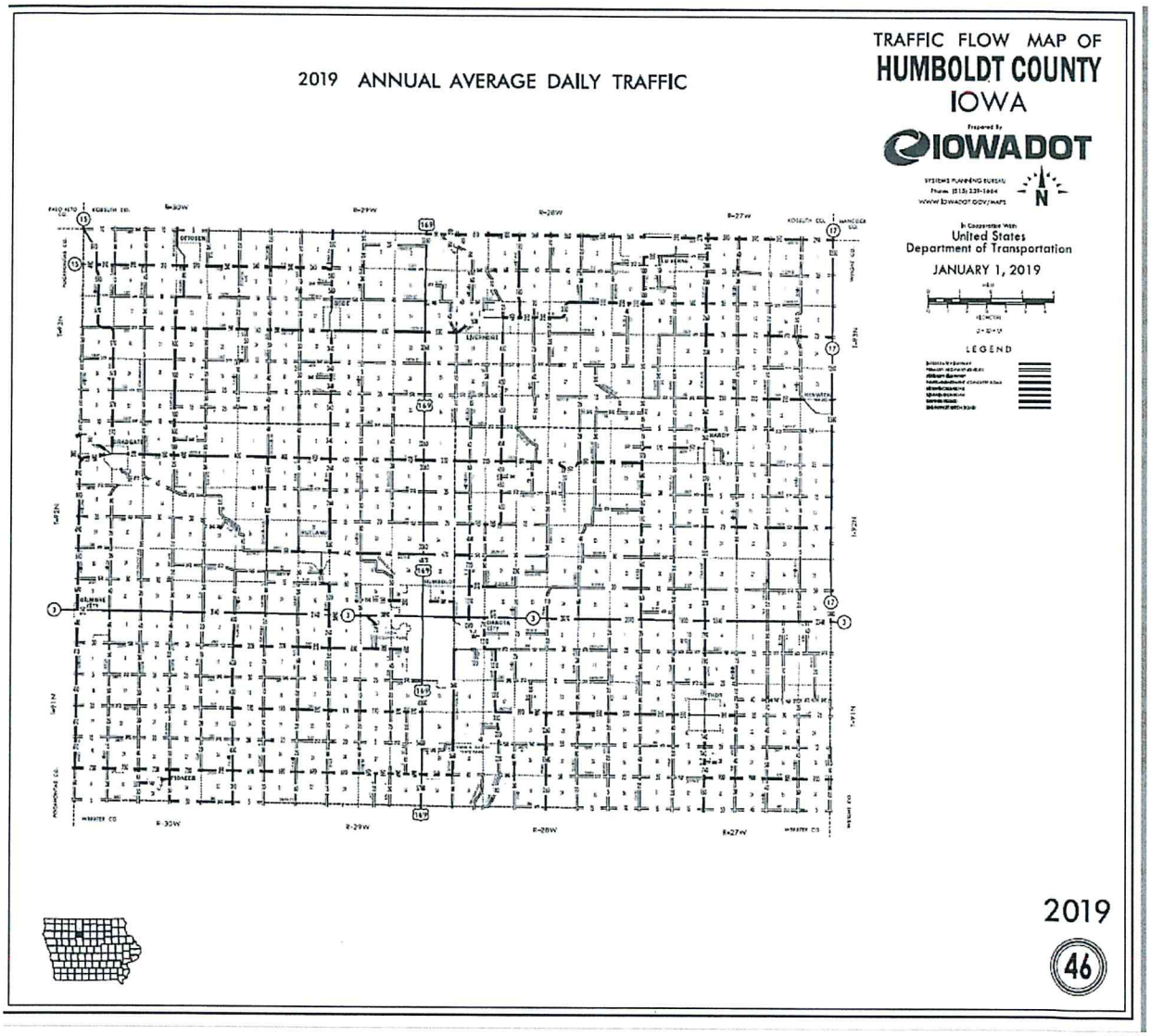
★★★★★ (59)
As low as $178.85
Park-It Powder-Coated Steel Bike Racks

Customer Reviews

Documents and Instructions

Reviews Q&A

E. Map



G. Plan View (See TC-215)

H. Aerial Photograph – N/A

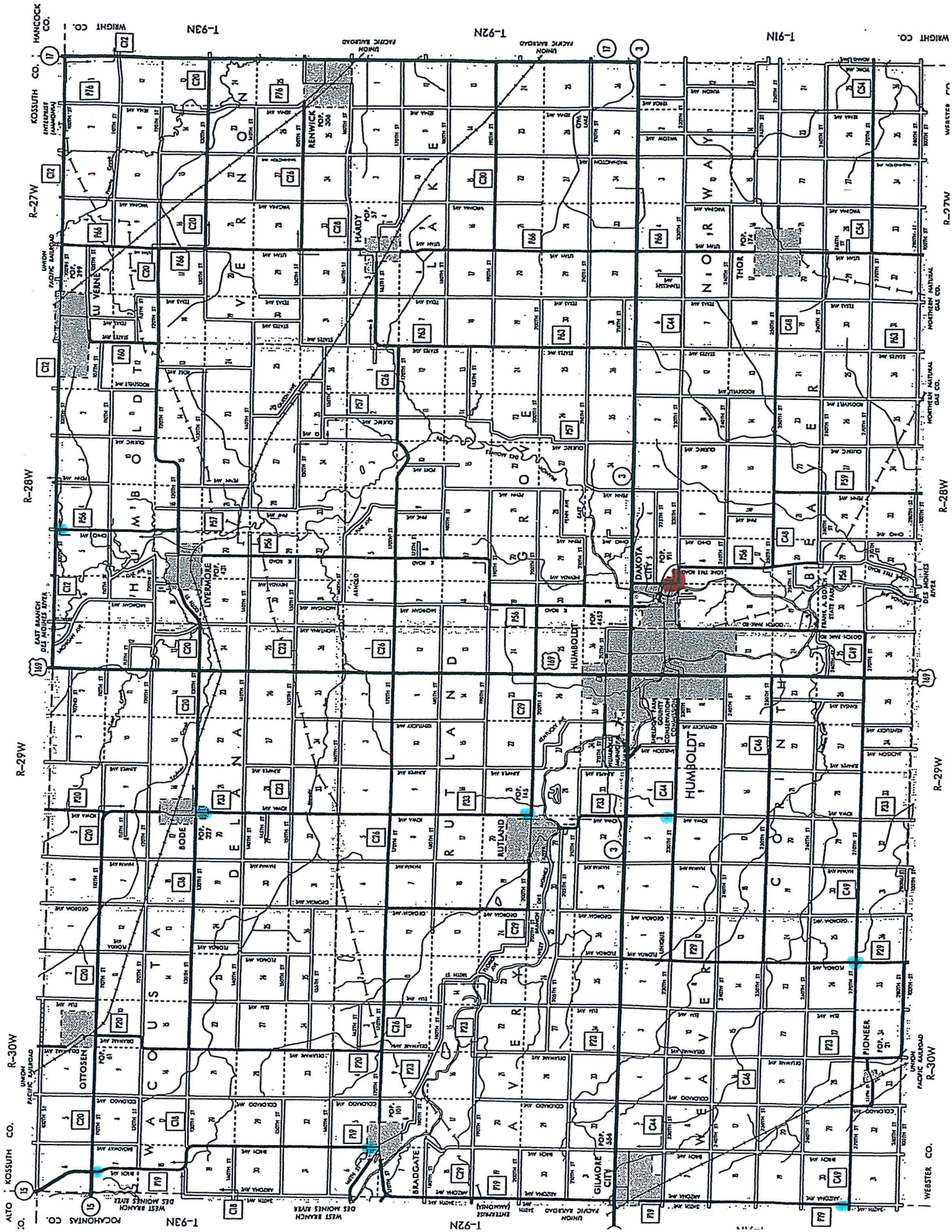
I. ICAT Crash Summary – (See Attachment)

J. Traffic Volumes – See 2019 IDOT Traffic Volumes for Humboldt County (next page)

K. Traffic Sign Layout – N/A

L. Benefit/Cost Ratio – Not required as per instructions

E. MAP


T-93N
T-92N
T-91N
R-27W
R-28W
R-29W
R-30W
WRIGHT CO.
HANCOCK CO.
KOSSUTH CO.
WEBSTER CO.
POCAHONTAS CO.
ALTO
RENWICK
HARDY
LU VERNE
LIVERMORE
DAKOTA CITY
HUMBOLDT
RUTLAND
BODE
OTTOSEN
BRADGATE
GILMORE CITY
PIONEER
THOR
UNION PACIFIC RAILROAD
NORTHERN NATURAL GAS CO.
DES MOINES RIVER
EAST BRANCH DES MOINES RIVER
WEST BRANCH DES MOINES RIVER

I. ICAT

Intersection		Owner	# accidents	Fatality	Major Injury	Minor Injury	property Only	Ran Stop Sign	Failure to Yield	B/C Ratio	# signs needed	Installed
P33	C26	County	6		1	1	2	2	2		2	Installing 8-2024
P56	Lone Tree Rd	County	4			1	3				1	installed
P29	C49	County	3		1		2		2		2	
P33	C20 in Bode	County	3		1		1				1	
C48	P59	County	3			1	1	1			1	installed
P66	C54	County	2	2	3						1	installed
P29	C44	County	2		1	3		2			1	Installing 8-2024
P33	C44	County	2		1				1		1	
C48	Lone Tree Rd	County	2				1	2			1	Installing 8-2024
P56	C26	County	2			2		1	1		2	Installing 8-2024
P19	C20/ HWY15	County	2				2				1	
P56	C12	County	1	1							1	recent fatality
P20	C20	County	1			3		1			2	Installing 8-2024
P19	C26	County	1				1				1	
P19	C49	County	1				1				1	
P23	C49	County	1						1		1	
P33	C29	County	1								1	
P56	C20	County	1				1				1	
P56	C29	County	1				1				1	
P60	C20	County	1				1				1	
P66	C12	County	1				1				1	
P66	C20 E	County	1								1	
P66	C48	County	1				1				4	
P20	C26	County	0								1	
P29	280th st	County	0								1	
P29	C46	County	0								1	
P30	C20	County	0								1	
P33	C18	County	0								1	
P33	C29 in rutland	County	0									
Gotch Park Rd	C49	County	0								1	
P56	C20 Livermore	County	0								1	
p56	210th st	County	0								1	
P60	C12	County	0								1	
P63	C26	County	0								1	
P66	C20 W	County	0								1	
P66	C26 E	County	0								1	
P66	C26 W	County	0								1	
P66	C30	County	0								1	
Colorado	C49	County	0								1	
P19	C26 Bradgate	County	0									
P23	274th st	County	0									
P20	C18	County	0									
Hwy 169	Hwy 3	State	29			1	27	2	3			
Hwy 169	C44	State	21			2	15	3	4			
P56 N	Hwy 3	State	13			3	10					
Hwy 169	C29	State	8		1	3	2		2			
Hwy 169	C46	State	5			1	4		2			
P19	Hwy 3	State	4		1		3		3			
P33	Hwy 3	State	4				4					
P66	Hwy 3	State	4			1	3					
P56 S	Hwy 3	State	3			2	1	1				
Hwy 169	C20	State	3				1					
Hwy 169	C49	State	3				3					
Hwy 169	C26	State	2			1	1	1				
P29	Hwy 3	State	2				2					
Hwy 169	C12	State	1				1					
P63	Hwy 3	State	1				1					

Nevada	230th st	County	9	2	2	2	3				10	

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** 07/29/2024

Location / Title of Project: Jackson County – Temporary Traffic Control Devices

Applicant: Jackson County Secondary Roads Department

Contact Person: Jayden Scheckel Title: Assistant County Engineer

Complete Mailing Address: 201 West Platt Street
Maquoketa, Iowa 52060

Phone: (563)-652-4872 (Area Code) E-Mail: jscheckel@jacksoncounty.iowa.gov

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): Cedar County & Jones County

Contact Person: Rob Fangmann (Cedar Co.), Derek Snead (Jones Co.) Title: County Engineers

Complete Mailing Address: 400 Cedar Street, Tipton, Iowa 52722 (Cedar Co)
19501 Hwy 64, Anamosa, Iowa 52205 (Jones Co)

Phone: (563)886-6102 (Cedar) (319)462-3785 (Jones) (Area Code) E-Mail: engineer@cedarcounty.iowa.gov engineer@jonescountyiowa.gov

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	60,300
Total Project Cost	$	60,300
Safety Funds Requested	**$**	**60,300**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the Jackson County Board of Supervisors

Signed: Mike Steines 7-30-2024
Signature Date Signed

Mike Steines, Board Chair
Printed Name

Attest: Alisa Smith 7-30-24
Signature Date Signed

Alisa Smith, Jackson County Auditor
Printed Name

RESOLUTION #1055-07-09-2024

RESOLUTION TO AUTHORIZE THE SUBMITTAL OF A TRAFFIC SAFETY FUND APPLICATION

WHEREAS, the Traffic Safety Fund program allows for the award of traffic safety funds to cities, counties and the IDOT for roadway safety improvements, research studies and traffic control devices; and

WHEREAS, Jackson County has determined that providing temporary traffic control signals at work zone sites will improve safety to Jackson County employees and to the traveling public; and

WHEREAS, Jackson County has determined that sharing the traffic control signals with nearby counties (Cedar and Jones) is in the best interest of all counties.

THEREFORE BE IT RESOLVED by the Board of Supervisors of Jackson County, Iowa that Todd Kinney, County Engineer of Jackson County, Iowa, be and is hereby designated, authorized, and empowered on behalf of the Board of Supervisors of said County to submit a Traffic Safety Improvement Program Application to the Iowa Department of Transportation for portable traffic signal trailers for use by all three counties; and

BE IT FURTHER RESOLVED by the Board of Supervisors of Jackson County, Iowa that the chairperson be authorized to sign the grant application and should funding be awarded that Jackson County will assume responsibility and ensure proper maintenance of any new or improved installations.

The above and foregoing resolution was adopted by the Board of Supervisors of Jackson County, Iowa on the 9th day of July, 2024, with the vote thereon being as follows:

AYE: Mike Steines
Mike Steines, Chair

NAY: _____

Nin Flagel, Member

ATTEST: Alisa Smith
Alisa Smith
Jackson County Auditor

Don Schwenker, Member

RESOLUTION

RESOLUTION TO AUTHORIZE THE SUBMITTAL OF A TRAFFIC SAFETY FUND APPLICATION

WHEREAS, the Traffic Safety Fund program allows for the award of traffic safety funds to cities, counties and the IaDOT for roadway safety improvements, research studies and traffic control devices; and

WHEREAS, Cedar County has determined that providing temporary traffic control signals at work zone sites will improve safety to Cedar County employees and to the traveling public; and

WHEREAS, Cedar County has determined that sharing the traffic control signals with nearby counties (Jackson and Jones) is in the best interest of all counties; now

THEREFORE BE IT RESOLVED by the Board of Supervisors of Cedar County, Iowa that Robert D. Fangmann, County Engineer of Cedar County, Iowa, be and is hereby designated, authorized, and empowered on behalf of the Board of Supervisors of said County to submit a joint Traffic Safety Improvement Program Application to the Iowa Department of Transportation for portable traffic signal trailers for use by all three counties; and

BE IT FURTHER RESOLVED by the Board of Supervisors of Cedar County, Iowa that the chairperson be authorized to sign the grant application and should funding be awarded that Cedar County will assume shared responsibility and ensure proper maintenance of any new or improved installations.

Passed and approved this 9th day of July, 2024.

Chairperson, Cedar County
Board of Supervisors

Recommended:

Cedar County Engineer

Attest:

County Auditor

N:\MANAGE\Traffic Safety Funds\2025 traffic control signals\Cedar TSF App resolution.docx

Resolution to Authorize the Submittal of a Traffic Safety Fund Application

Whereas, the Traffic Safety Fund program allows for the award of traffic safety funds to cities, counties and the IDOT for roadway safety improvements, research studies and traffic control devices; and

Whereas, Jones County has determined that providing temporary traffic control signals at work zone sites will improve safety to Jones County employees and to the traveling public; and

Whereas, Jones County has determined that sharing the traffic control signals with nearby counties (Cedar and Jackson) is in the best interest of all counties; now

Therefore, be it resolved, by the Board of Supervisors of Jones County, Iowa that Derek Snead, County Engineer of Jones County, Iowa, be and is hereby designated, authorized, and empowered on behalf of the Board of Supervisors of said County to submit a Traffic Safety Improvement Program Application to the Iowa Department of Transportation for portable traffic signal trailers for use by all three counties; and

Be it further resolved, by the Board of Supervisors of Jones County, Iowa that the chairperson be authorized to sign the grant application and should funding be awarded that Jones County will assume responsibility and ensure proper maintenance of any new or improved installations.

Passed and approved this 9th day of July, 2024.

NED ROHWEDDER

Ned Rohwedder, Chairman, Jones County Board of Supervisors

Attest: Whitney Hein

Whitney Hein, Jones County Auditor

201 West Platt Street
Maquoketa, Iowa 52060
Todd Kinney, P.E. Jackson County Engineer

P 563-652-4782
F 563-652-4244

JACKSON COUNTY SECONDARY ROADS

B. Narrative

The Jackson County Secondary Road Department, along with Cedar County and Jones County Secondary Road Departments, are applying for the Traffic Safety Improvement Program (TSIP) funds to be used for the purpose of purchasing a Portable Traffic Signal System. This system would be shared between all three counties to control traffic through maintenance work zones. The primary purpose of the temporary traffic signals would be to replace flagging operations in work zones and to allow lane closure areas in overnight closure situations.

The Jackson, Cedar, and Jones County's Secondary Road Departments are responsible for the engineering, construction, and maintenance of each County's secondary road system. The secondary road system collectively in Jackson, Cedar, and Jones Counties consists of 2,651 total miles with 512 of those miles being hard surfaced. In addition, there are over 625 bridges maintained collectively by these counties. The traffic volumes on a typical road range from 20 vehicles per day on local roads to over 2,000 on Farm-to-Market roads with posted speed limits ranging from 35 mph to 55 mph.

The primary use of the temporary traffic signals would be a work zone with a temporary lane closure, two-way traffic project. MUTCD Standard Part 6 has guidance and standards for the use of traffic signals in these type of work zones. Jackson County Secondary Road crews temporarily close lanes for PCC patching, clearing of vegetation, culvert repair and replacement, guardrail repair and replacement, and slope repairs. The safety benefits of the temporary traffic signals would be:

- Increased visibility to approaching motorists
- Elimination of two positions from work zone with the highest risk exposure
- Allows for overnight lane closures
- Allows additional staff to perform labor work of work operation rather than flagging

In conclusion, Jackson County is requesting TSIP funding to purchase JTI PTS-2000 Traffic Signals in the amount equal to the cost of one set. The referenced traffic signals are MUTCD approved with two signals, solar charging, multiday batteries, and on a towable trailer. These features will provide safer and more efficient traffic operations in work zones day and night. Additionally, these signals would equally benefit the staff of Cedar County Secondary Road Department and Jones County Secondary Road Department.

C. Itemized Breakdown of Costs

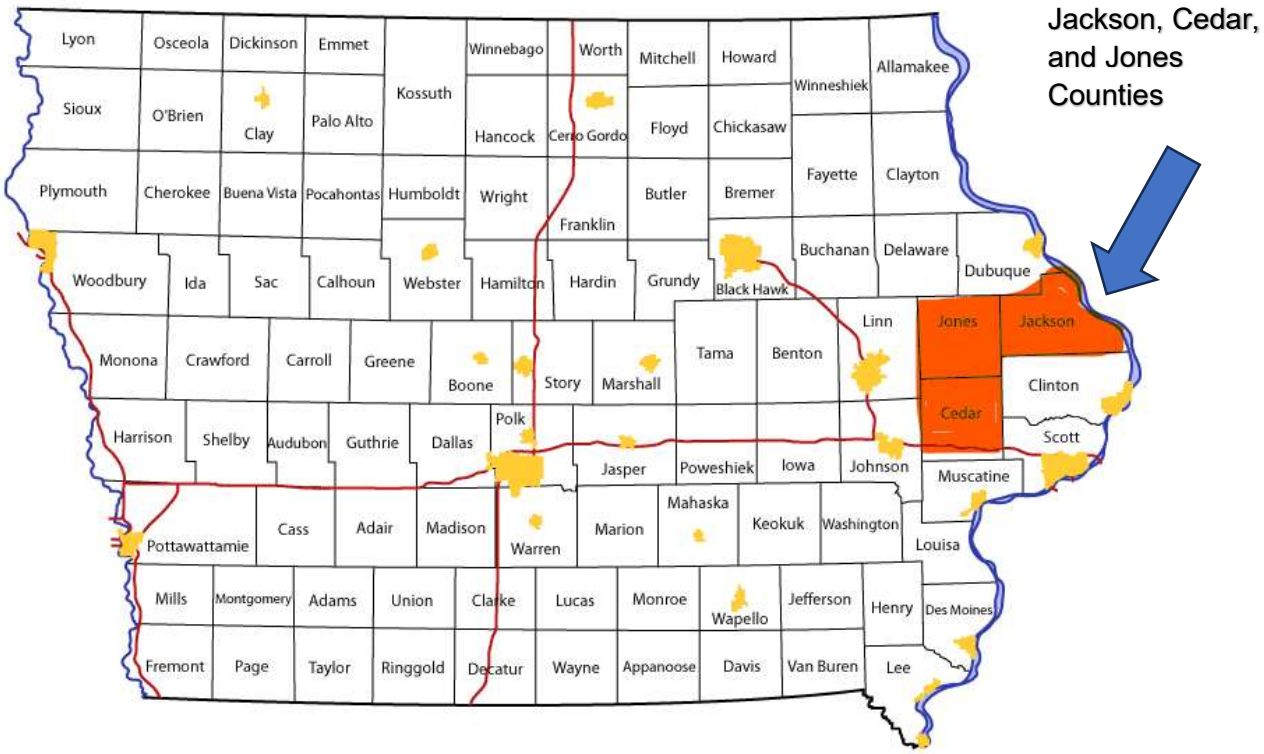
The quote listed here is for a set of two signals/trailer, vehicle detection and remote.

Item	Cost
PTS-2000 from JTI Traffic	$58,500
Contingency for calendar year 2025 purchase	$1,800
Total Cost	$60,300

D. Time Schedule

TSIP Application Due	8/15/2024
TSIP Award Notification	1/15/2025
TSIP Funding Available	7/1/2025
Place Order	7/31/2025
Delivery and Use	9/15/2025

E. Map


Jackson, Cedar, and Jones Counties
Lyon
Osceola
Dickinson
Emmet
Kossuth
Winnebago
Worth
Mitchell
Howard
Winneshiek
Allamakee
Sioux
O'Brien
Clay
Palo Alto
Hancock
Cerro Gordo
Floyd
Chickasaw
Fayette
Clayton
Plymouth
Cherokee
Buena Vista
Pocahontas
Humboldt
Wright
Franklin
Butler
Bremer
Buchanan
Delaware
Dubuque
Woodbury
Ida
Sac
Calhoun
Webster
Hamilton
Hardin
Grundy
Black Hawk
Linn
Jones
Jackson
Monona
Crawford
Carroll
Greene
Boone
Story
Marshall
Tama
Benton
Clinton
Cedar
Harrison
Shelby
Audubon
Guthrie
Dallas
Polk
Jasper
Poweshiek
Iowa
Johnson
Scott
Muscatine
Pottawattamie
Cass
Adair
Madison
Warren
Marion
Mahaska
Keokuk
Washington
Louisa
Mills
Montgomery
Adams
Union
Clarke
Lucas
Monroe
Wapello
Jefferson
Henry
Des Moines
Fremont
Page
Taylor
Ringgold
Decatur
Wayne
Appanoose
Davis
Van Buren
Lee

Jackson County Secondary Roads Department
Portable Temporary Traffic Signals
Quote Sheet

Base Item

Item	Unit Price	Quantity*	Sub-Total
Portable Temporary Traffic Signal	$ 55,950	1 set	$ 55,950
		TOTAL	$ 55,950

*Vendor to enter quantity required based on specifications on page one

Optional Items

Item	Unit Price	Quantity*	Sub-Total
Pilot Car Remote	$ 2,550	1	$ 2,550
Back Plates	$ Included		$ Included
		TOTAL	$ 58,500

*Vendor to enter quantity required based on specifications on page one

Specify the dimensions of the trailer:

Deployed Height – clearance to bottom of signal head: __17' 6"____
Transport Height: _8' 3 3/4"___
Trailer Length Deployed: ___16' 6 1/4"_
Length in Towed Tandem Configuration: __29' 2"_

Trailer Width: __6' 11 1/2"_
Trailer Length Stored: _12' 10"_
Gross Weight: ___3,020 lbs_

Manufacturer, Year, & Model Number: _JTI PTS2000_____
(If available, please attach manufacturer specification sheet for system being quoted.)

Estimated Delivery Date: ___8-10 weeks ARO_____

List Standard Warranty Details: _See attached Warranty document_____

Name: _John Thomas, Inc_____

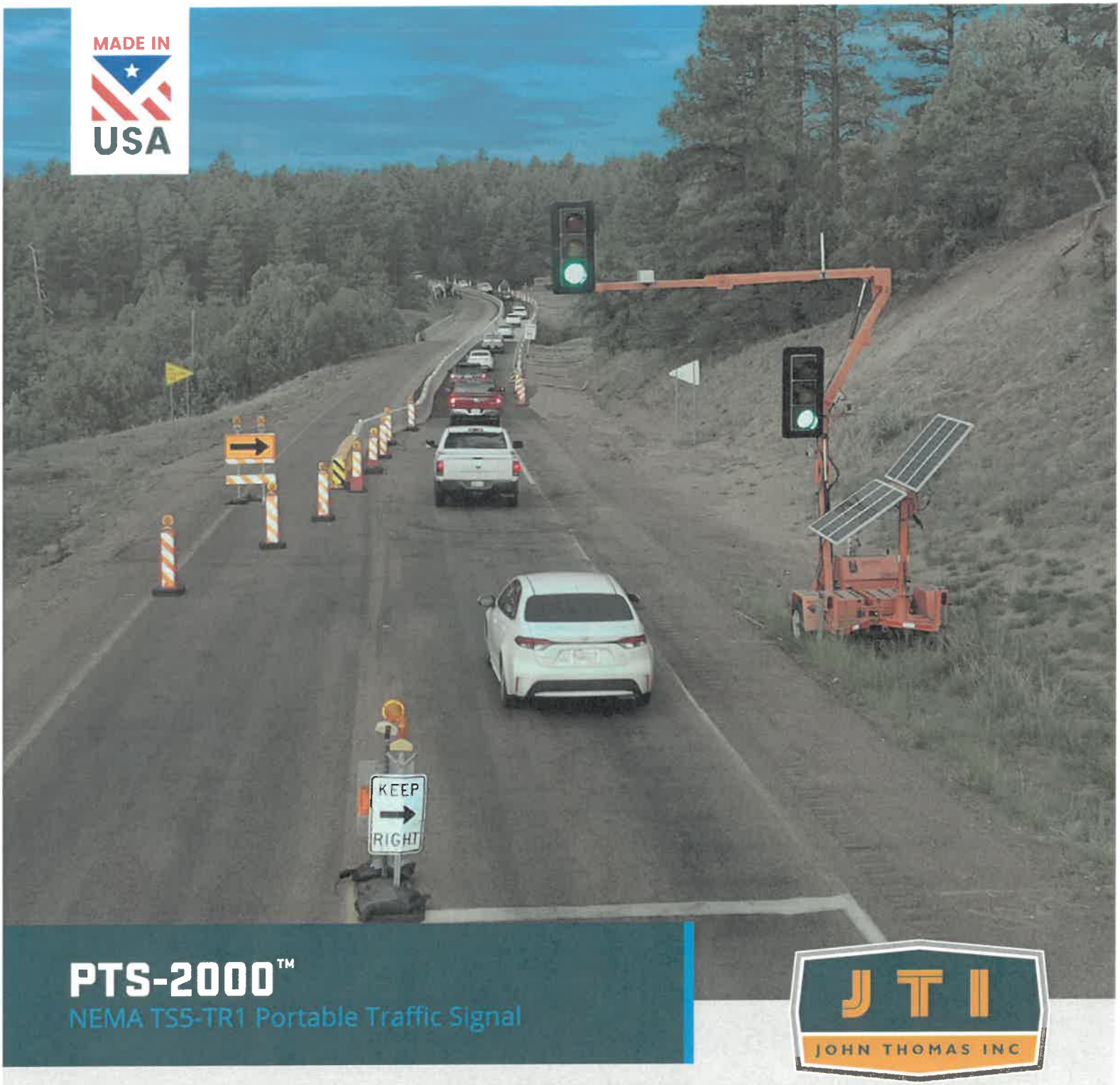
Address/City/State: _1560 Lovett Drive, Dixon, IL 61021_____

Phone: _815-288-2343 X 111 **Fax:** ____N/A_____

Email: _kbook@jtitraffic.com_____

Contact Person: _Kathy Book **Title:** ____**Inside Sales**_____

SIGNATURE: _____ 7/5/24



PTS-2000™

NEMA TS5-TR1 Portable Traffic Signal

JTI
JOHN THOMAS INC

MODEL: Trailer

SIMPLIFYING TEMPORARY TRAFFIC CONTROL

The PTS-2000 is one of the most advanced and easiest-to-use portable traffic signals available. It combines the cutting-edge Galaxy® signal controller technology with quality USA-MADE construction. The PTS-2000 can be used for simple lane closures to complex work zones and complete intersection control.

REQUEST A QUOTE

CONTACT JTI TODAY!
888.447.7263

JTItraffic.com

STANDARD FEATURES & SPECIFCATIONS

PTS-2000

NEMA TS5-TR1 Portable Traffic Signal

The PTS-2000 combines advanced Galaxy® signal controller technology with quality USA-MADE construction.

JTI can build an ADDCO PTS-2000 to fit your exact specifications.

STANDARD FEATURES

TRAILER

- » Heavy-duty, ASTM A500B, structural steel tubing
- » Fenders bolt-on heavy-duty 12-gauge steel
- » 2 5/16" ball hitch
- » Drop axle and electric brakes
- » Heavy-duty drop leg jacks
- » Hydraulic actuators for mast/arm
- » 9' overhead signal arm
- » Retractable and lockable tongue
- » Lifting eye for trailer placement
- » Designed to tow in tandem or individually
- » Non-slip treads

POWER

- » Completely self-contained power supply
- » Eight (8) 6-volt batteries standard (one battery box)
- » Approximately 900 Amp-hours capacity at 12V
- » Two (2) 160W solar panels standard (320W total)
- » External battery voltage meter
- » Onboard auxiliary 110/120V AC charger
- » Weatherproof and lockable battery enclosure

SIGNAL HEADS

- » Two signal heads per trailer (one high and one low)
- » 3-section polycarbonate signal heads
- » Fixed arm support
- » 12" diameter, standard ITE approved LEDs
- » Signal heads rotate 180° in 10° increments

CONTROLLER

- » Includes the Galaxy® Controller
- » Wireless programming and operation
- » Run up to 16 traffic phases
- » Radio-interconnect up to 30 signal trailers
- » Embedded conflict monitor
- » Store up to 10 pre-set signal programs
- » Weatherproof and lockable metal control cabinet

AVAILABLE OPTIONS

- ☐ Custom colors
- ☐ Galvanized finish
- ☐ Hitch style and size (2" Ball Hitch or Pintle Hitch)
- ☐ 15' extended overhead signal arm
- ☐ Upper auxiliary swivel mount (for extension arm)
- ☐ Toolbox (with single battery box configuration only)
- ☐ External security light

- ☐ Additional battery box with eight (8) 6v batteries
- ☐ AGM batteries
- ☐ Additional solar configurations from 320W to 640W

- ☐ Back plates
- ☐ Countdown timer
- ☐ Signal head visor/color/material

Signal head configuration to fit your specification:

- ☐ Third signal head with static arm mount
- ☐ 3-Section Head
- ☐ 5-Section Doghouse Head
- ☐ 5-Section Signal Head

- ☐ Galaxy G16 Advanced Controller
- ☐ Galaxy Intersection Controller
- ☐ Galaxy Flagger Remote
- ☐ Galaxy Station Controller

JTI JOHN THOMAS INC

WE'VE GOT YOUR BACK

MADE IN USA

JTItraffic.com

LEE COUNTY

TSIP APPLICATION FOR TEMPORARY TRAFFIC SIGNALS

FY 2026

Table of Contents

Rev. 07/23
A.

Application for TRAFFIC CONTROL DEVICE TSIP FUNDS

GENERAL INFORMATION **DATE:** August 7, 2024

Location / Title of Project: Lee County Temporary Traffic Signals

Applicant: Lee County Secondary Roads

Contact Person: Benjamin Hull Title: County Engineer

Complete Mailing Address: 933 Avenue H, P.O. Box 158
Fort Madison, Iowa 52627

Phone: (319)372-2541 (Area Code) E-Mail: bhull@leecountyiowa.gov

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): To be determined

Contact Person: _____ Title: _____

Complete Mailing Address: _____

_____

Phone: _____ (Area Code) E-Mail: _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	65,000
Total Project Cost	$	65,000
Safety Funds Requested	**$**	**65,000**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23
A.

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the Lee County Secondary Roads

Signed: Benjamin J Hull 8/12/24
Signature Date Signed

Benjamin J. Hull, P.E.
Printed Name

Attest: Denise Fraise 8/12/24
Signature Date Signed

Denise Fraise
Printed Name

RESOLUTION 2024-91

WHEREAS, the Iowa Department of Transportation Traffic Safety Improvement Program operates under the rules of the Iowa Administrative Code 761 – Ch. 164; and

WHEREAS, said program allows for the distribution of safety funds to cities, counties, and the Iowa DOT for roadway safety improvements, research studies, or public information initiatives; and

WHEREAS, Lee County has determined that providing temporary traffic signals will improve the safety of drivers, flaggers, and road crews during road maintenance; and

WHEREAS, State Traffic Safety Improvement Program funding is available through the Iowa Department of Transportation to partially fund roadway safety improvements;

BE IT THEREFORE RESOLVED, that the Board of Supervisors of Lee County supports and approves the attached application for Iowa Department of Transportation Traffic Safety Improvement Program funding and hereby commits to accepting and maintaining these improvements.

BE IT FURTHER RESOLVED, that Lee County Board of Supervisors maintain the traffic signals in a manner acceptable to Iowa Department of Transportation.

Dated at Lee County, Iowa, this 12th day of August, 2024.

Board of Supervisors of (Lee County), Iowa

ATTEST:

By _____
County Auditor

SEAL

B. NARRATIVE

The Lee County Secondary Roads System consists of 737 miles including 196 miles which are hard surface roads, according to the Iowa Department of Transportation's IOWA MILES OF RURAL SECONDARY ROADS AS OF JANUARY 1, 2024. Lee County consists of two county seats—Fort Madison and Keokuk. Both Fort Madison and Keokuk have populations over 10,000 people. Iowa Counties that border Lee County are Van Buren, Henry, and Des Moines.

Lee County is applying for Transportation Safety Improvement Program (TSIP) funds in the amount estimated to be 100% of the cost of a pair of portable temporary traffic signals. At the time of this application submission, Lee County is determining a partner to share the temporary signals with. Viable partner options included the cities of Fort Madison and Keokuk who currently do not own portable temporary traffic signals, or one of our 3 neighboring Iowa counties—all of whom partially own one set of temporary signals but would benefit by access to a second set.

The temporary traffic signals would include pilot car remote and vehicle detection options. Signals with these options would facilitate safe and efficient traffic flow in and around various work zones on Lee County's Secondary Road System. By replacing personnel flagging operations, the temporary traffic signals will provide safer work zones for the maintenance crews and move traffic through the work zone more efficiently and safely, even in overnight closure situations.

Portable traffic signals would primarily be used on two lane paved roads during construction projects that require one lane to be closed. Potential safety benefits include:

- Increased visibility for approaching motorists during day and nighttime operations
- Improved traffic flow efficiency through construction/ maintenance zones
- Elimination of two human flaggers from highest risk areas in work zones
- Relief of the physical demands associated with human flaggers such as fatigue, stress, heat exposure, and longevity

C. ITEMIZED BREAKDOWN OF COST

Lee County Secondary Roads is asking for $60,000 for one set of two Temporary Traffic Signals with vehicle detection and pilot car remote.

Preliminary Quotes:

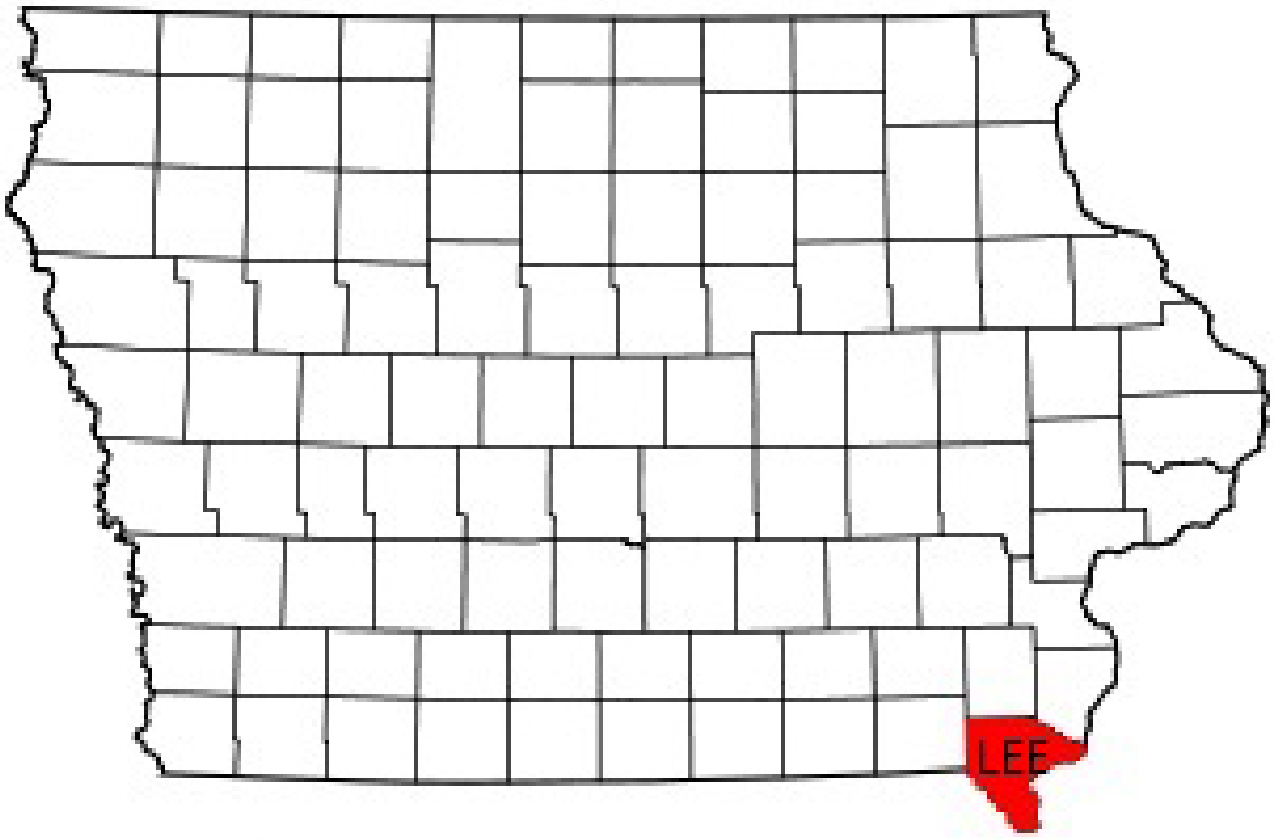
Option 1: OMJC Signal	**$58,500.00** (Price includes delivery and training)
Option 2: Horizon Signal	**$54,775.00** (Price includes delivery, training and warranty)

D. TIME SCHEDULE

TSIP APPLICATION DUE	August 15, 2024
TSIP Award Notification	Mid-January 2025
TSIP Funding Available	July 1, 2025
Final Quote Comparison	August 2025 (est.)
Purchase of Traffic Signals	October 2025 (est.)
Usage of Temporary Traffic Signals	December 2025 (est.)

E. MAP

Location of devices to be used



F. COLOR PICTURES

Temporary Traffic Signal Devices

Option 1: OMJC Signal

Benefits

- Lift Mechanism - electric over hydraulic with remote pendant, single
- cylinder both lifts and extends in a single movement
- Arm Extension from side of trailer - 9'
- 12" RYG LED signals - ITE compliant, 1 overhead, 1 side of mast
- 180 degree signal rotation
- Traffic control equipment - Intelight Controller - ATC w/ Maxtime 2070 software – EZ Interface (Just answer 4 questions) - actuated 8 phase, dual ring, with pedestrian movements, preemption and coordination capable, knock-down capable, encrypted wireless connection between master and secondaries, real time monitoring
- Vehicle detection option - microwave, video, loop
- Red clearance extender option
- Green recycle option
- Preemption system option
- Pilot Car remote detection
- Optional remote monitoring & programming with on-board GPS
- Auto-start generator option

Specs

- **Chassis length** - 112", removable hitch adds 56" for a 168" total
- **Chassis Width** - 72" - narrowest in industry
- **Travel Height** - 114" with solar
- **Weight with solar, batteries, and controls** - 2700#
- **Clearance under arm** - 17'
- **Batteries** — 440-660 Ah of AGM batteries, no-spill, no-maintenance
- **Solar –** 385 watt solar panel, adjustable on 2 axes

Temporary Traffic Signal Devices

Option 2: SQ3TS Horizon Signal

Benefits

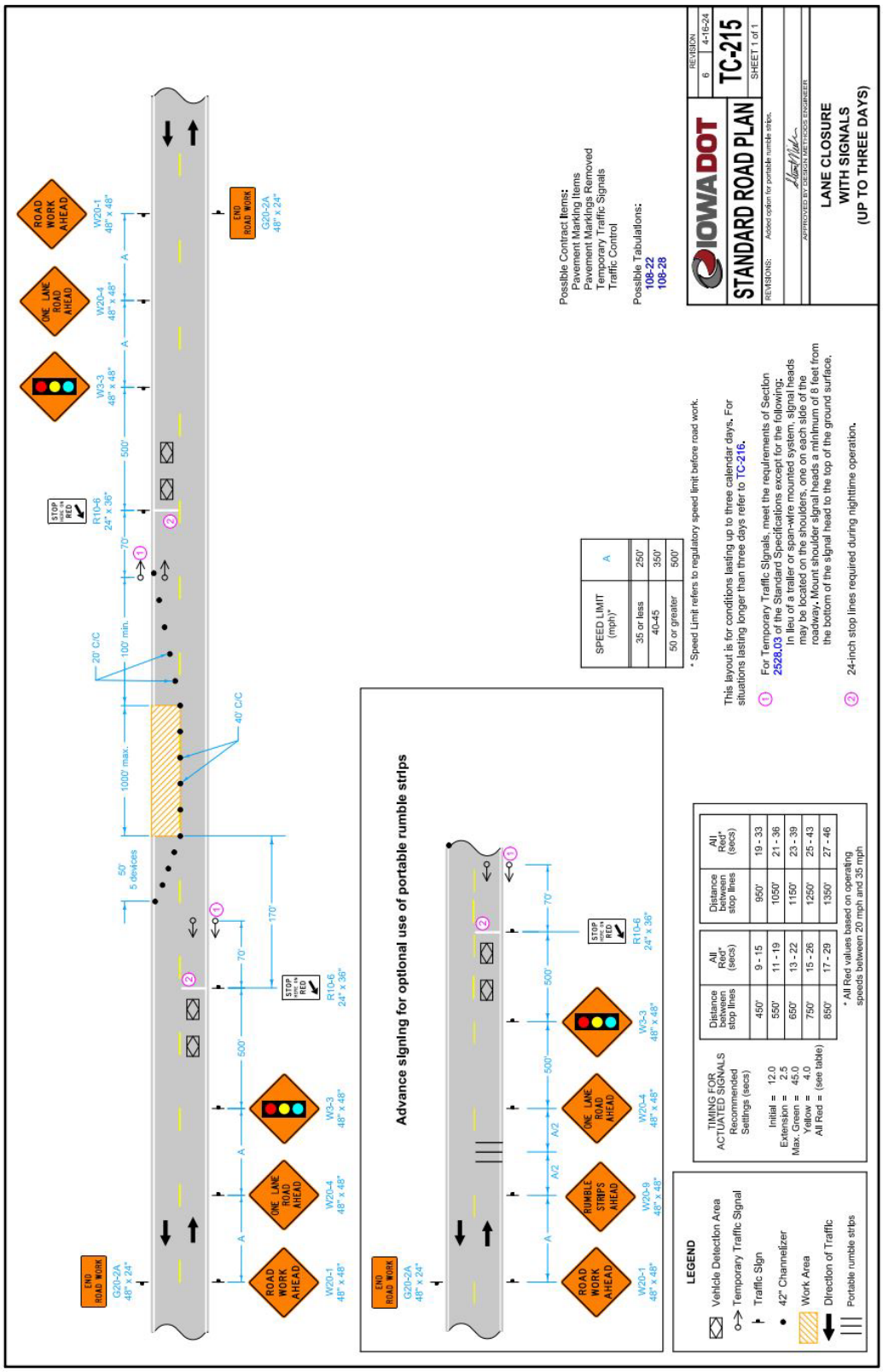
- **25 YEAR DESIGN LIFE**
  The SQ3TS trailer is built with only the highest-quality materials to ensure your signals function at the highest level year after year. No other PTS comes close.
- **100 MPH WIND LOAD**
  Independent 3rd-party analyses have concluded that the SQ3TS can withstand sustained winds of 100 MPH, and gusts of 110 MPH.
- **10 YEAR STRUCTURAL WARRANTY**
  The SQ3TS comes backed by an industry-leading 10-year structural warranty.
- **DUAL-PROCESSOR MMS**
  Each Horizon PTS features the built-in redundancy of TWO conflict monitors -- the most secure system in the industry.
- **LIFTING RING**
  Facilitates placement of the SQ3TS behind guardrail, fences, barriers, or other work zone obstacles
- **HYDRAULIC LIFTING SYSTEM**
  Simple pushbutton activation lifts the overhead mast arm into the operating position with no failure-prone cables or winches.
- **(16) 6-VOLT BATTERIES STANDARD**
  30+ days of runtime on every SQ3TS system
- **MUTCD COMPLIANT**

Specs

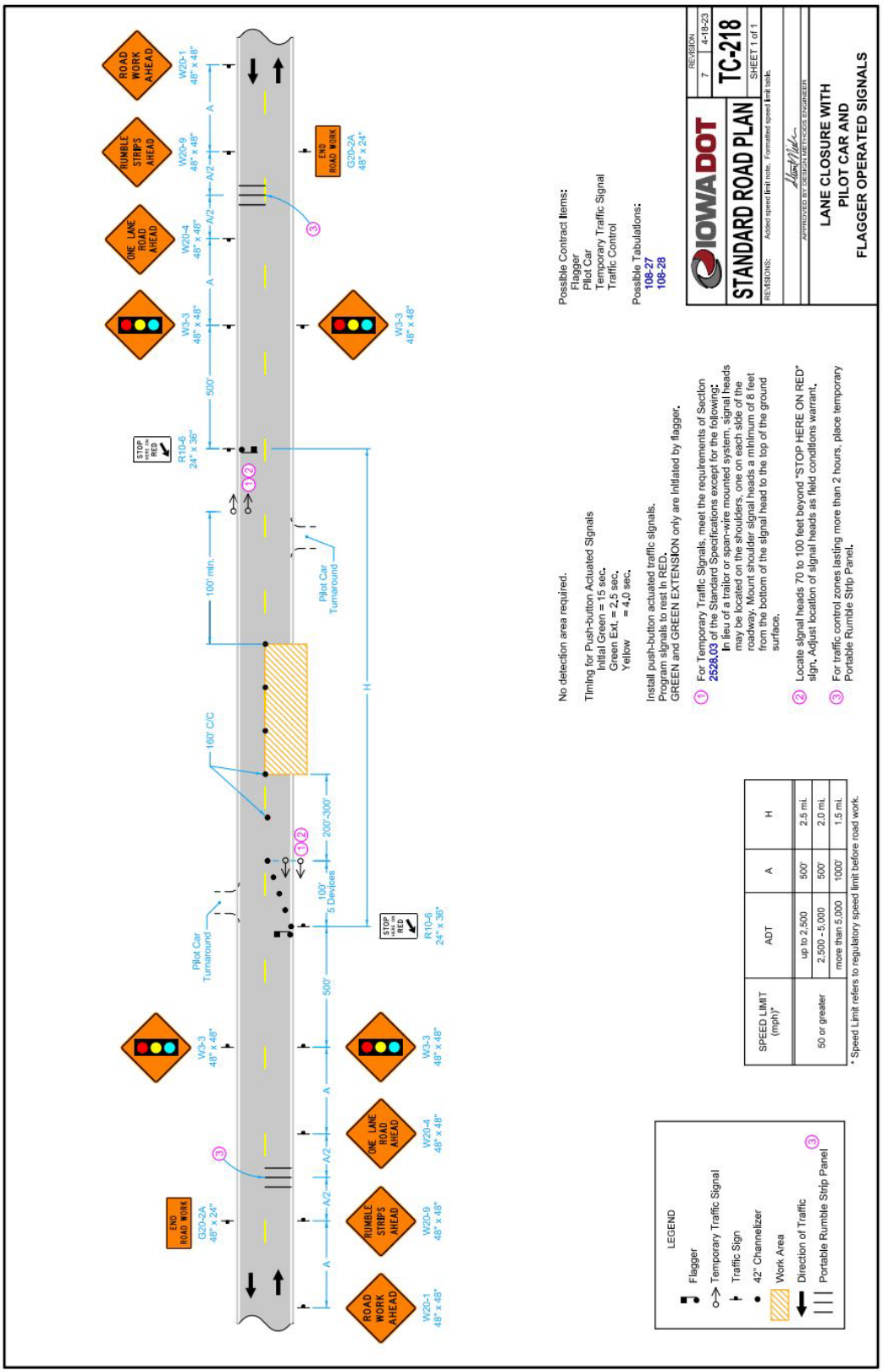
- **Signal Lamp –** 12" (300m mm) diameter LED
- **Signal Arm Extension –** 68" to 180" (173 to 457 cm)
- **Solar Charge –** 600w minimum
- **Power –** 12V / (16) 6-volt batteries
- **Tow Height –** 89" (226 cm)
- **Trailer Width –** 85" (216 cm)
- **Trailer Weight –** 3500 lb. (1361 kg)

G. PLAN VIEW

TC-215

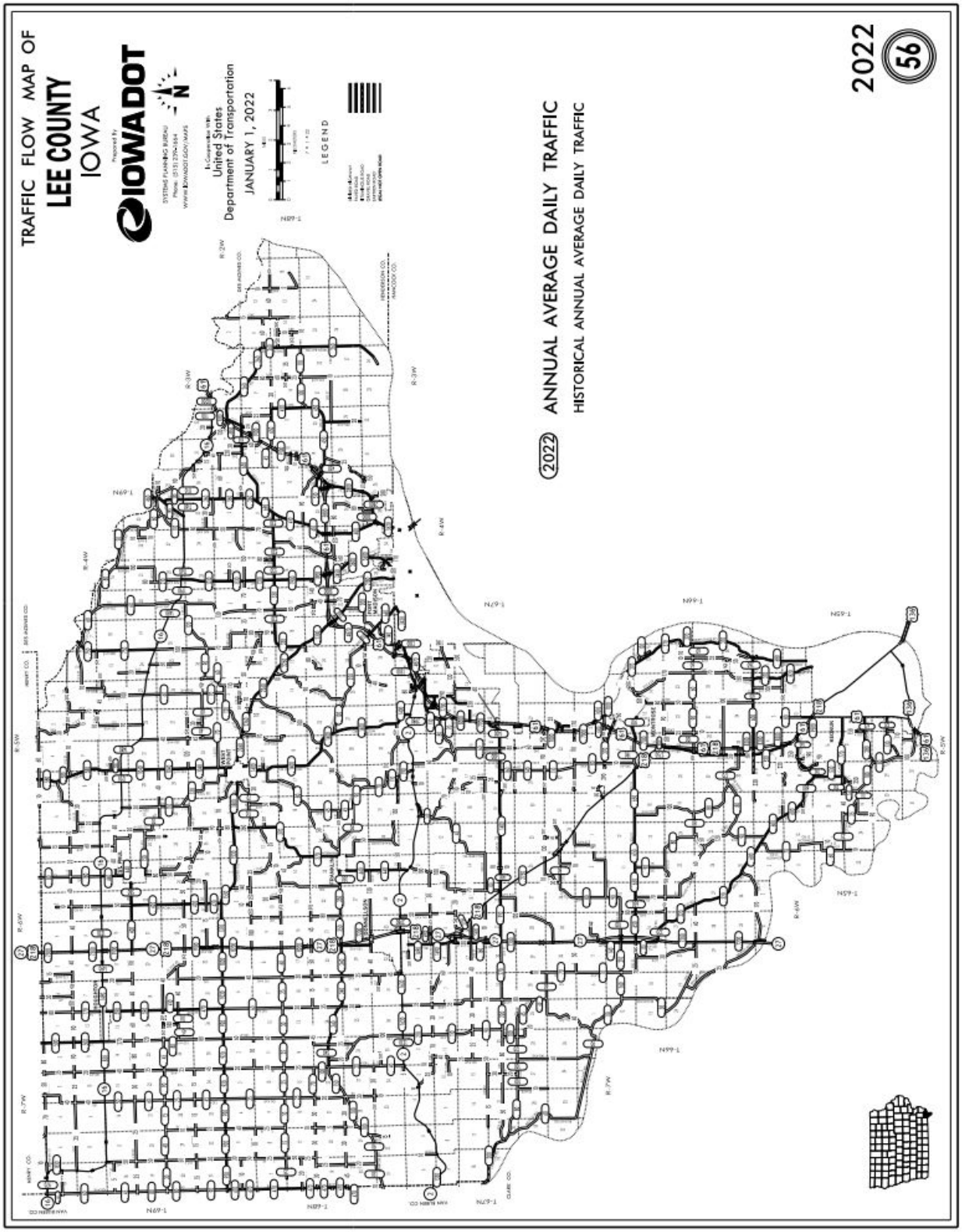


TC-218


ROAD WORK AHEAD
W20-1
48" x 48"
RUMBLE STRIPS AHEAD
W20-9
48" x 48"
ONE LANE ROAD AHEAD
W20-4
48" x 48"
W3-3
48" x 48"
STOP HERE ON RED
R10-6
24" x 36"
500'
A
A/2
100' min.
160' C/C
100'
5 Devices
200'-300'
H
Pilot Car Turnaround
END ROAD WORK
G20-2A
48" x 24"
LEGEND
Flagger
Temporary Traffic Signal
Traffic Sign
42" Channelizer
Work Area
Direction of Traffic
Portable Rumble Strip Panel
SPEED LIMIT (mph)*
ADT
A
H
up to 2,500
500'
2.5 mi.
2,500 - 5,000
500'
2.0 mi.
50 or greater
more than 5,000
1000'
1.5 mi.
* Speed Limit refers to regulatory speed limit before road work.
No detection area required.
Timing for Push-button Actuated Signals
Initial Green = 15 sec.
Green Ext. = 2.5 sec.
Yellow = 4.0 sec.
Install push-button actuated traffic signals.
Program signals to rest in RED.
GREEN and GREEN EXTENSION only are initiated by flagger.
1 For Temporary Traffic Signals, meet the requirements of Section 2528.03 of the Standard Specifications except for the following: In lieu of a trailor or span-wire mounted system, signal heads may be located on the shoulders, one on each side of the roadway. Mount shoulder signal heads a minimum of 8 feet from the bottom of the signal head to the top of the ground surface.
2 Locate signal heads 70 to 100 feet beyond "STOP HERE ON RED" sign. Adjust location of signal heads as field conditions warrant.
3 For traffic control zones lasting more than 2 hours, place temporary Portable Rumble Strip Panel.
Possible Contract Items:
Flagger
Pilot Car
Temporary Traffic Signal
Traffic Control
Possible Tabulations:
108-27
108-28
IOWA DOT
STANDARD ROAD PLAN
TC-218
SHEET 1 of 1
REVISION
7 4-18-23
REVISIONS: Added speed limit note. Formatted speed limit table.
APPROVED BY DESIGN METHODS ENGINEER
LANE CLOSURE WITH
PILOT CAR AND
FLAGGER OPERATED SIGNALS

H. TRAFFIC VOLUMES

Source: https://iowadot.gov/maps/msp/traffic/2022/counties/LEE.pdf



I. TRAFFIC SIGNAL LAYOUT

Refer to Section G (Plan View)

J. COST/BENEFIT ANALYSIS

Per Traffic Control Device application instructions, a Benefit/Cost worksheet is not required for consideration in the Traffic Control Device category.

Rev. 5/18

Application for TRAFFIC CONTROL DEVICE
TSIP FUNDS

GENERAL INFORMATION **DATE:** 08/02/2024

Location / Title of Project Sign Replacement Program for Cities/Counties

Applicant Iowa Department of Transportation

Contact Person Mary Beth Sprouse Title Reports Specialist

Complete Mailing Address 800 Lincoln Way

Ames, IA 50010

Phone 515-290-5431 E-Mail marybeth.sprouse@iowadot.us
(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	$ 200,000
Total Project Cost	$ 200,000
Safety Funds Requested	$ 200,000

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

☐ Yes – Explain _____

☒ No

A. APPLICATION CERTIFICATION OR RESOLUTION - Not applicable

B. NARRATIVE

Continued funding of the Department's Sign Replacement Program for Cities and Counties (SRPFCC) is being sought. This program is operated by the Local Systems Bureau and provides funding for the replacement of damaged, worn out, obsolete, or substandard signs and signposts by cities and counties in Iowa. Under the current program, replacement sign eligibility is limited to regulatory, warning, and school area signs. These signs are critical to providing a safe environment for both motorists and pedestrians.

Each city/county is allowed to submit one application per year for the replacement of signs eligible within the program guidelines. Recipients with recent awards will be given lower priority to allow more cities and counties to benefit from this program. The applications are limited to a maximum of $10,000 per county and $5,000 per city. The popularity of this program is demonstrated by the consistent and continual receipt of applications each year from a large number of county and city jurisdictions.

The 2024 grant (for payment in FY 25) received almost $450,000 in requests in just the first 12 hours that it is was open. Having much less than that available, we closed the application window at just noon on the first application day. We received many more inquiries after that which, if allowed, would have pushed our request to well over a half-million this year alone. We were able to fund 32 counties and 5 cities in this cycle. Eighteen additional counties have applications waiting if any funding becomes available. Continued funding is needed to meet the expected demand for this program. To date, over $1.3M has been awarded providing cities and counties much needed assistance in improving the safety of the transportation system.

C. ITEMIZED BREAKDOWN OF COST

Approval of this application will provide funding that will allow the program to continue next fiscal year.

D. TIME SCHEDULE

If awarded funding, applications will be accepted from cities/counties starting on January 2nd with funds being dispersed after July 1st.

E. MAP

This program will be applicable to all counties and cities in Iowa.

F. COLOR PICTURES

Example of replacement signs

G. PLAN VIEW

This program will be applicable to all counties and cities in Iowa.

H. TRAFFIC VOLUMES AND/OR TURNING MOVEMENT

This program applies to signs on routes with a wide variety of traffic volumes and movement patterns.

I. SIGNALS - Not applicable

J. B/C WORKSHEET - Not applicable

Marion County Road Department
402 Willets Drive, Knoxville, IA 50138
Tel (641) 828-2225
Fax (641) 828-7349

MARION COUNTY TSIP APPLICATION – FY '26 SOLAR FLASHING BEACONS

FY 2026

Marion County will be applying for Traffic Safety Improvement Program funds for solar flashing stop beacons in the category of traffic control devices for various secondary/secondary paved road intersections.

TABLE OF CONTENTS

Contents

A. APPLICATION & CERTIFICATION

A. Application & Certification

APPLICATION

Rev. 07/23

IOWA DOT

Application for TRAFFIC CONTROL DEVICE
TSIP FUNDS

GENERAL INFORMATION **DATE:** 8/13/24

Location / Title of Project: Intersection Flashing Beacons

Applicant: Marion County

Contact Person: Tyler Christian, P.E. Title: Marion County Engineer

Complete Mailing Address: 402 Willetts Dr.
Knoxville, IA 50138

Phone: 641-828-2225 (Area Code) E-Mail: tchristian@marioncountyiowa.gov

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: _____ (Area Code) E-Mail: _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	10,000
Total Project Cost	$	10,000
Safety Funds Requested	**$**	**10,000**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

A. APPLICATION & CERTIFICATION

CERTIFICATION

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the Marion County Road Department

Signed: _____ 8/13/24
Signature Date Signed

Tyler Christian, P.E.
Printed Name

Attest: _____ 8/13/24
Signature Date Signed

Mark Raymie, Board Chair
Printed Name

B. NARRATIVE

B. Narrative

Marion County is applying for the Transportation Safety Improvement Program (TSIP) funds in an amount estimated to be 100% of the cost for purchase of solar flashing stop beacons. The primary purpose of the beacons would be to reduce crash potential by increasing the conspicuity, enhance visibility, and reinforce the stop-controlled condition for approaching motorists.

Stop sign locations throughout Marion County for which we are applying exist at various secondary/secondary paved road intersections, many of which have high volumes of stopping and turning traffic. These intersections are all located in areas with 45-55 mph approaches to the stop condition, which includes rumbles, but without geometric features or otherwise to naturally slow the approaching traffic. Therefore, Marion County is proposing the installation of solar powered red flashing beacons in accordance with MUTCD Chapter 4L to reduce the potential for crashes at these intersections and enhance the visibility in all lighting and weather conditions.

Location 1: The first location is 'T' intersection of Co. Rd. G46 and T17, just south of the Pella corporate limit approximately 4 miles. Only one approach is controlled with G46 as the stop condition for EB traffic and T17 being the through route. This location has experienced one 'ran stop sign' crash, resulting in no injuries in the last five years. Proposal is for one flashing beacon for the EB traffic at the stop condition. The following conditions exist at this proposed site:

- G46:
  - SL = 55 mph
  - AADT = 950 (2022)
  - EB 'Stop Ahead' present.
  - Reflective strips on 'Stop' & 'Stop Ahead' signposts.
- T17:
  - SL = 55 mph
  - AADT = 3270 (2022)

Location 2: This location is 'T' intersection of Co. Rd. G5T and Old Hwy 163, just east of the Pella corporate limit. Only the Old Hwy 163 approach is controlled as the stop condition for EB traffic and G5T being the through route. This location has experienced three crashes, with one intersection related crash, resulting in no injuries in the last five years. Proposal is for one flashing beacon for the EB traffic at the stop condition. The following conditions exist at this proposed site:

B. NARRATIVE

- Old Hwy 163:
  - SL = 45 mph
  - AADT = 3300 (2022)
  - EB double 'Stop Ahead' present.
  - Reflective strips on 'Stop' & 'Stop Ahead' signposts.
- G5T:
  - SL = 55 mph
  - AADT = 4040/6100 (2022)

Location3: This location is '4-way' intersection of Co. Rd. G5T and Vermeer Rd, just east of the Pella corporate limit. All 4 legs of the intersection are controlled as the stop condition. Mahaska County has already installed flashing red beacons for the WB and NB traffic. This location has experienced eight total crashes, with one 'ran stop sign' and one 'FTYROW: from stop sign', resulting in one possible minor injury in the last five years. Proposal is for two flashing beacon for the EB and SB traffic at the stop conditions. The following conditions exist at this proposed site:

- Vermeer Rd.:
  - SL = 45 mph
  - AADT = 5800 W (2022)
  - EB 'Stop Ahead' present.
  - Reflective strips on 'Stop' & 'Stop Ahead' signposts.
- G5T:
  - SL = 55 mph
  - Double 'Stop Ahead' signs present for NB & WB
  - Red Flashing Beacon for NB & WB with red reflective strips on 'All Way' plaque
  - AADT = 2340 E/4040 S (2022)
- 250th/Adams Ave.:
  - SL = 55 mph
  - AADT = 1540 N (2022)
  - SB 'Stop Ahead' present.
  - Reflective strips on 'Stop' & 'Stop Ahead' signposts.

C. ITEMIZED BREAKDOWN OF COST

C. Itemized Breakdown of Cost

Marion County solicited a quote from Mobotrex Mobility & Traffic Experts (previously Brown Traffic Products, Inc.) as they sell Carmanah Solar 24-hour Flashing Beacons. Marion County has had one of these beacons installed for 15 years and others for 4 years with no issues and is very pleased with the product. Marion County will perform the installation of the devices once purchased and will budget adequately for subsequent reimbursement following successful award of TSIP funding. Total cost would be $2,500 x 4 total beacons or $10,000.

mobotrex™
MOBILITY & TRAFFIC EXPERTS

Quote

Quote Number: 1936448

109 West 55th Street | Davenport, IA 52806 | (563) 323-0009

Date: 08/12/2024
Expire Date: 9/11/2024
Prepared By: Zank, Justin D.

Customer: CONTRR4
Contractor Quote - Region 4
General Delivery
Davenport IA 52806-9999
United States

Description: Marion County, Iowa / tchristian@marioncountyiowa.gov

Part #	Description	Quantity	Price	Extended
R247-E	24-Hour Beacons	1	$2,467.00	$2,467.00
PMT10285-002	ENGINE:R247-E,SOL,BLK	1	$0.00	$0.00
PMR10677-002	TOP MT:2-2.25"SQ,2.38-2.88"OD,R920,BLK	1	$0.00	$0.00
CAR-67620	BATTERY:7A/HR,STAND,(E SERIES)	2	$0.00	$0.00
PMR10286-001	LED MOD:12",RED	1	$0.00	$0.00
PMR09044-002	SIG-HEAD:12",POLY,VISR,STIFF PLT,BLK	1	$0.00	$0.00
PBW10287-002	MOD HARNESS:4',LED,(INTEGRATED HEAD)	1	$0.00	$0.00

Sale Amount:	**$2,467.00**
Sales Tax:	0.00
Misc Charges:	0.00
Total Amount:	**$2,467.00**

Notes:
Shipping included

Terms:
THIS QUOTE IS BASED ON THE ENTIRE VALUE AND VOLUME OF ALL LINE ITEMS - Prices listed on this quote are valid only in the event of purchase of all line items in the quantities listed, in their entirety. Purchases of individual line items will require a new quote prior to acceptance of any purchase orders.

PAYMENT TERMS ARE NET 30 DAYS with prior approved credit. MoboTrex, Inc. retains title to material until paid in full. A service charge of 1.5% per month (18% annual rate) will be assessed against all past due accounts. Prices and delivery quoted are firm for 30 days from the data of bid. The above quote does not include installation of the products quoted. On-Site technical assistance is available and will be quoted upon request.

Quotation does not include sales tax. Sales tax will be added at time of invoice unless a valid Sales Tax Exempt certificate has been provided. Sales tax exempt certificate should accompany customer Purchase Order.

Limited Warranty: MoboTrex, Inc. only obligations shall be to replace such quantity of the product proven to be defective.

Warranty Period: The length of warranty manufacturers have conveyed to the seller and which can be passed on to the buyer.

Additional terms and conditions apply - See MoboTrex, Inc. Terms & Conditions document at our website: www.mobotrex.com.

Thank you for the opportunity to provide this quote.

Mobotrex, Inc Monday, August 12, 2024 10:27 AM Page 1 of 1

D. TIME SCHEDULE

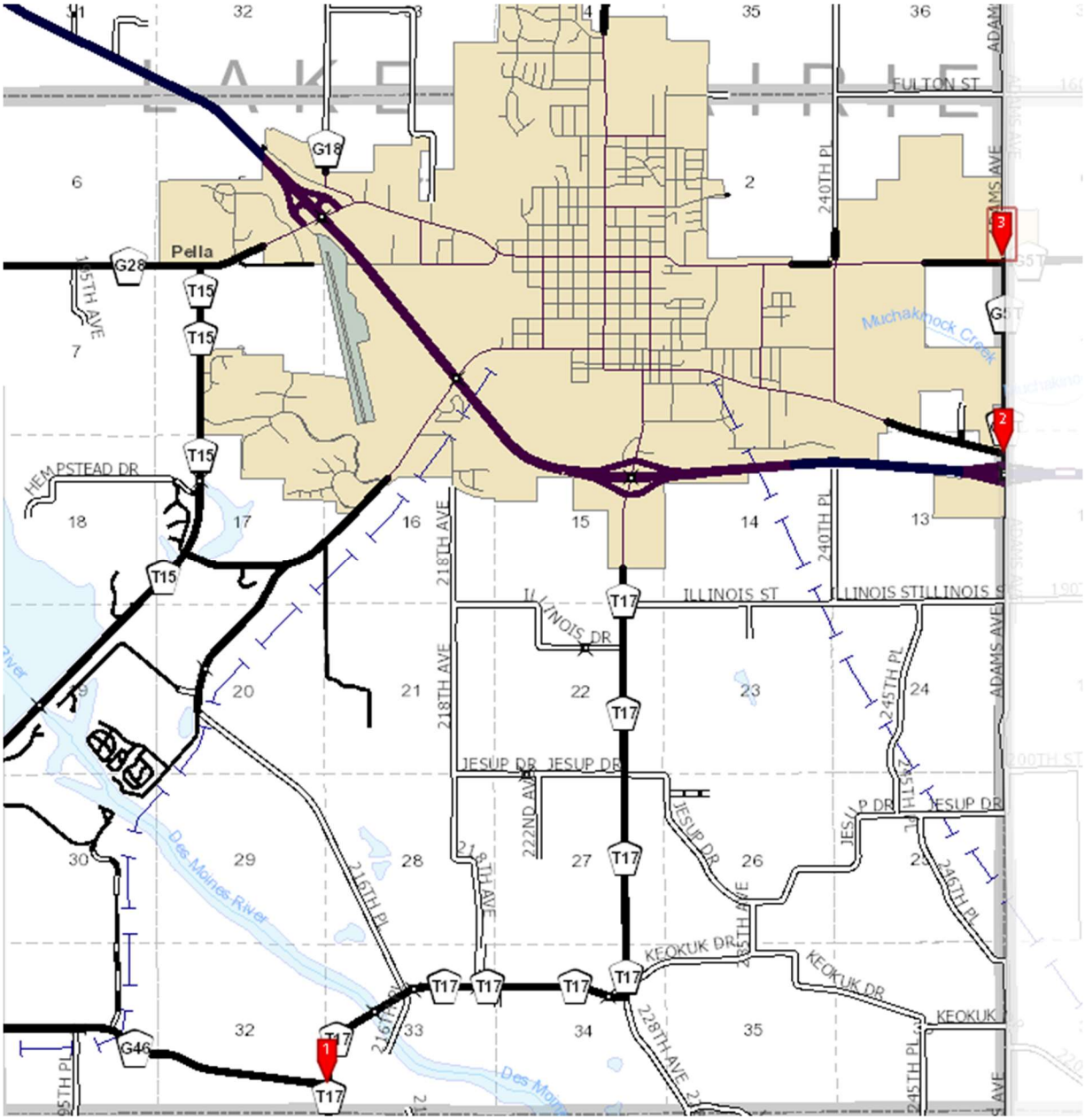
D. Time Schedule

TSIP Application Due	August 15, 2024
TSIP Award Notification	January, 2025
TSIP Funding Available	July 1, 2025
Final Quote Comparison	July 2025 (est.)
Purchase of Flashing Beacons	August 2025 (est.)
Installation of Beacons	Fall 2025 (est.)

E. MAP

E. Map

Marion County Locations:



F. PICTURES

F. Pictures

Product Photos:

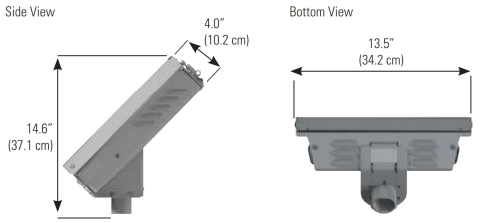
F. PICTURES

R247-E
SOLAR 24-HOUR FLASHING BEACON

1.844.412.8395 | traffic@carmanah.com | carmanahtraffic.com

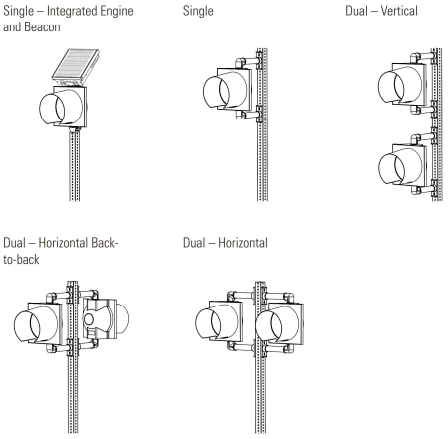
carmanah® Traffic

DIMENSIONS



SOLAR ENGINE MOUNTING

BEACON MOUNTING



*** Other solar engine and beacon mounting configurations are available.**

Specifications subject to local environmental conditions, and may be subject to change.
All Carmanah products are manufactured in facilities that are certified to ISO quality standards.
US Patent No 6,573,659, Other patents pending.
"Carmanah" and Carmanah logo are trademarks of Carmanah Technologies Corp.

Document: SPEC_TRA_R247-E_RevJ

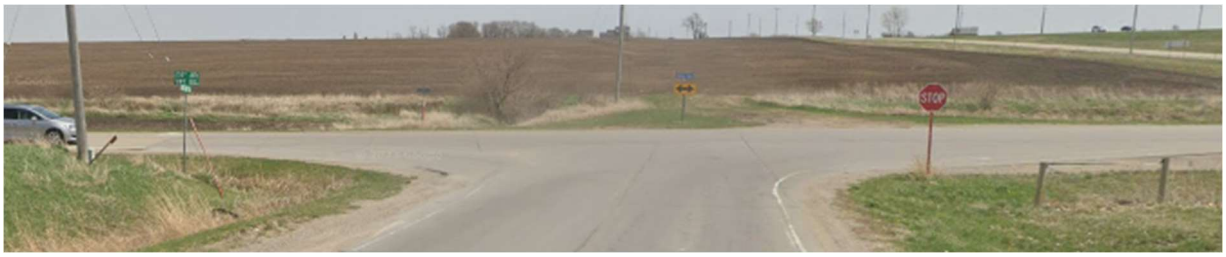
On-Board User Interface (OBUI)	Adjustable system settings with auto-scrolling LED display on our latest EMS
	System test, status, and fault detection: battery, solar, button, beacon, radio, day/night
	Flash patterns: RFB1 (WW+S), RFB2 (WSDOT), 0.5 sec. alternating (MUTCD), 0.5 sec. unison (MUTCD), 0.1 sec. unison, 0.25 sec. unison, 0.1 sec. x3 quick flashes unison, 0.1 sec. x3 quick flashes alternating
	Input: momentary for push button activation, normally open switch, normally closed switch
	Flash duration: 5 sec. to 1 hr.
	Intensity setting: 20 to 1400 mA for multiple circular beacons, RRFBs, or LED enhanced signs
	Nighttime dimming: 10 to 100% of daytime intensity
	Ambient Auto Adjust: increases intensity during bright daytime
	Automatic Light Control: reduces intensity if the battery is extremely low
	Temperature correction: yellow or red beacons
	Calendar: internal time clock function
	Radio settings: enable/disable, selectable channel from 1 to 14
	Output: enabled when beacons flashing daytime and nighttime, or nighttime only
	Activation counts and data reporting via OBUI or optional USB connection
Optical	**MUTCD compliant:** 2009 MUTCD, Chapter 4L, Flashing Beacons, Manual on Uniform Traffic Control Devices (MUTCD)
	ITE VTCSH-LED Circular Signal Supplement compliant: meets ITE or 1.7x ITE intensity when used as recommended
	12 in (305 mm) or 8 in (203 mm) diameter LED modules, yellow or red
	High-power LEDs: +90% lumen maintenance (L90) based on IES LM-80
	Yellow, black, or green signal heads in UV-resistant polycarbonate or aluminum
Connectivity	Optional encrypted, wireless radio with 2.4 GHz mesh technology
	Optional radio allows calendar program, manual override switch, or input device from one system to remotely control other systems
	User-selectable multiple channels to group different beacons and ensure a robust wireless signal
	Instantaneous wireless activation: <150 ms
	Wireless range: 1000 ft (305 m)
	Integrated, vandal-proof antenna
Energy Collection	13 W high-efficiency photovoltaic solar panel
	45 deg tilt for optimal energy collection
	Maximum Power Point Tracking with Temperature Compensation (MPPT-TC) battery charger for optimal energy collection in all solar and battery conditions
Energy Storage	12 V 14 Ahr. battery system
	Replaceable, recyclable, sealed, maintenance-free, best-in-class AGM batteries offer the widest temperature range and longest life
	Battery design life: +5 yrs.
	Tool-less battery change with quick connect terminals and strapping for easy installation
Solar Engine Construction	Weatherproof, gasketed enclosure with vents for ambient air transfer (NEMA 3R)
	Lockable, hinged lid for access to on-board user interface and batteries
	Corrosion-resistant aluminum with stainless steel hardware
	Raw aluminum finish or yellow, black, or green powder coated
	Prewired to minimize installation time
	High-efficiency optics and EMS = the most compact, lightweight system
	19 lb (8.6 kg) including batteries, excluding beacons and push button
Environmental	-40 to 165° F (-40 to 74° C) system operating temperature
	-40 to 140° F (-40 to 60° C) battery operating temperature
	150 mph (241 kph) wind speed as per AASHTO LTS-6
Activation	Standard operation is flashing 24 hrs./day
	Optional internal time clock for calendar programming
	Optional manual override switch allows local control of beacons
	Optional junction box: lockable, hinged door, corrosion-resistant aluminum enclosure allows easy calendar programming and access to manual override switch
Warranty	**5-year limited warranty**

F. PICTURES

Location Photos:

Location 1:

Location 2:



Location 3:

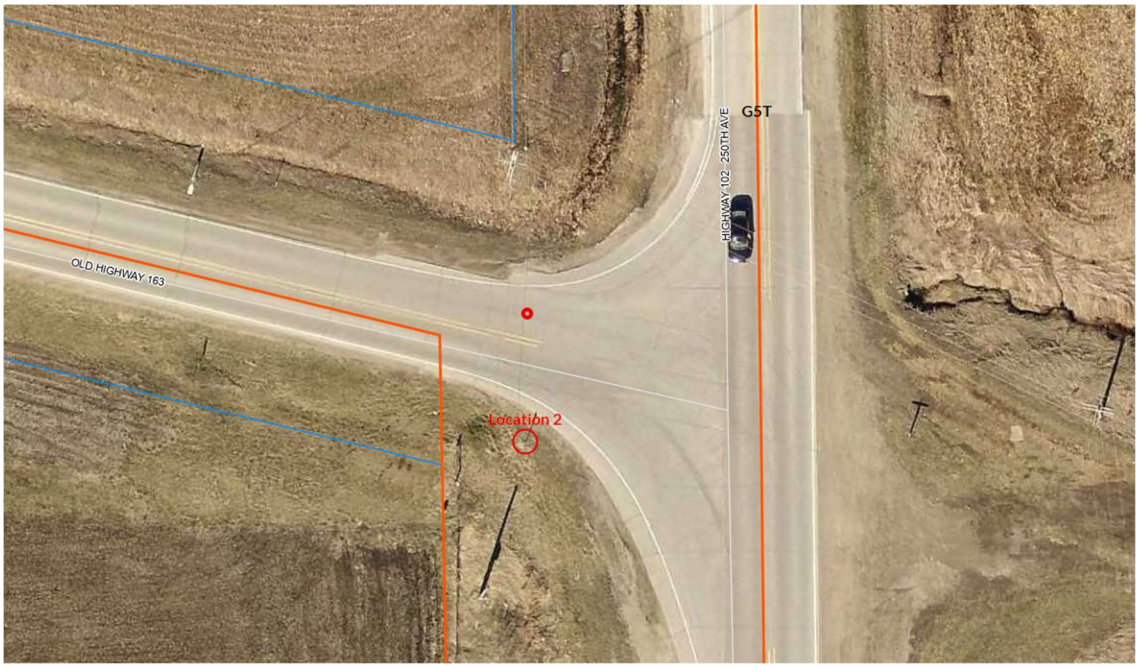
F. PICTURES

G. Plan View

Location 1

F. PICTURES

Location 2



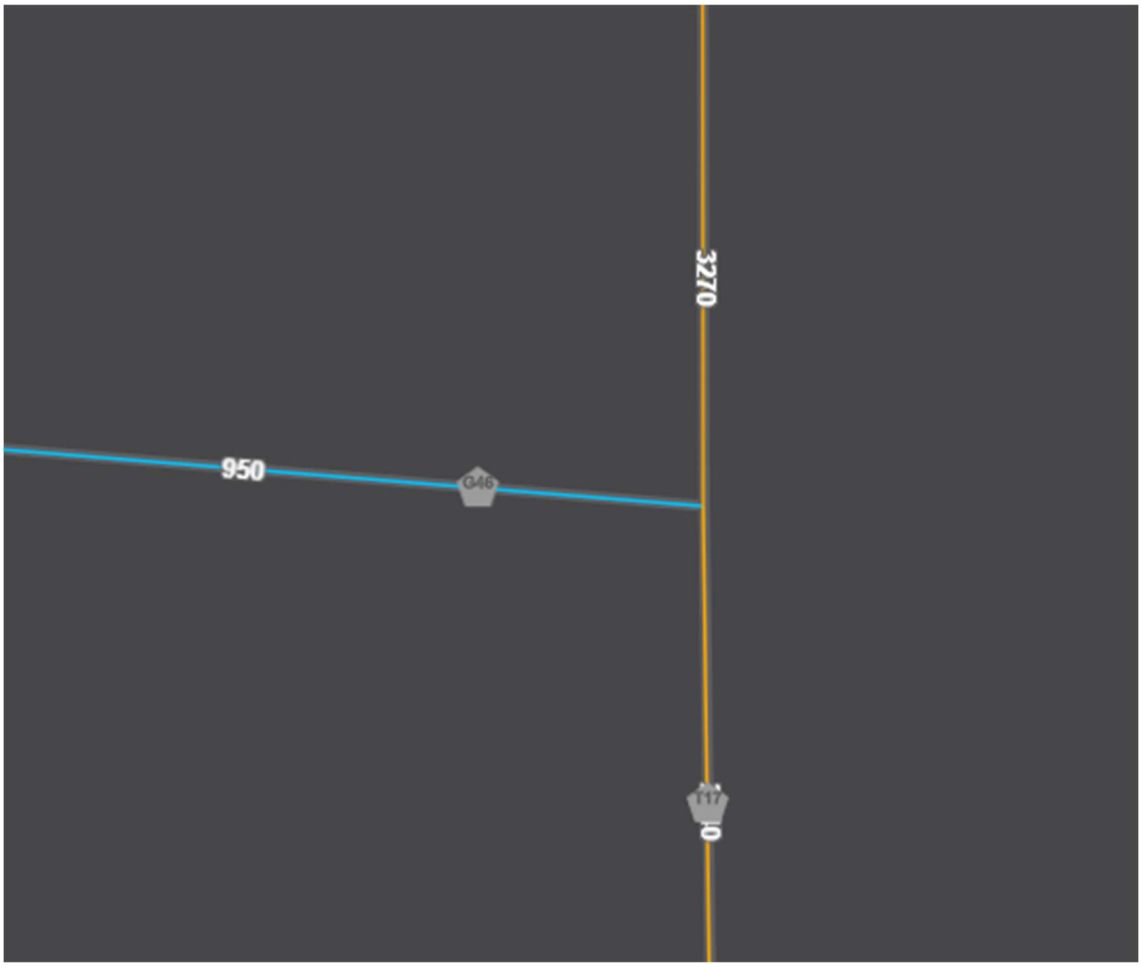
Location 3

H. TRAFFIC VOLUMES

H. Traffic Volumes

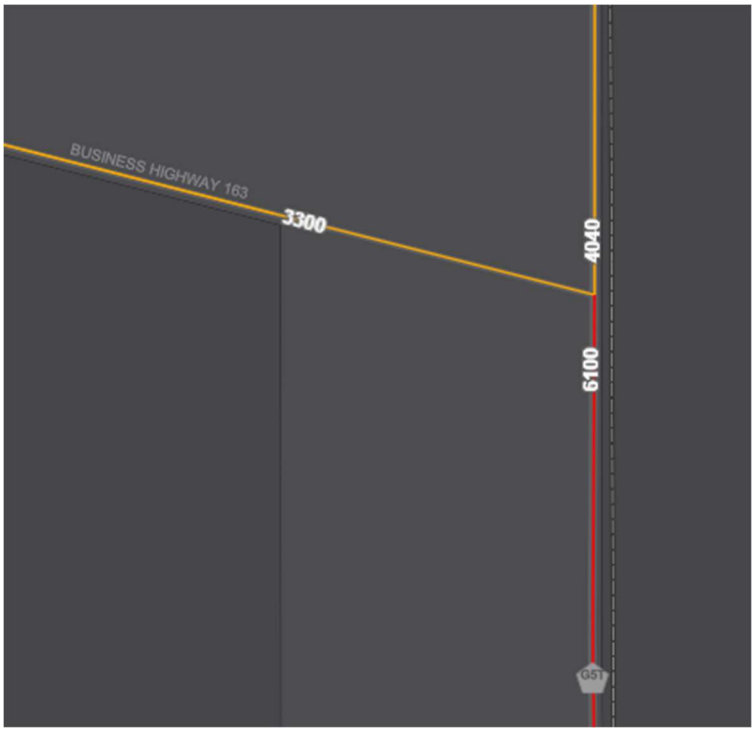
Traffic volumes represented at the various intersection locations are from the Iowa DOT 2022 counts interactive map. No turning movement counts or diagrams avialable from within the last 22 years, so this information was excluded.

Location 1:

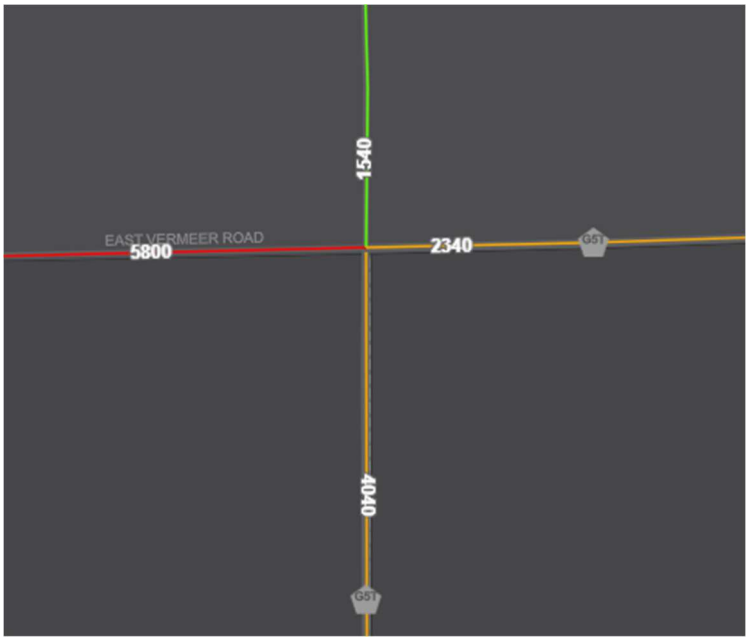


H. TRAFFIC VOLUMES

Location 2:



Location 3:



I. TRAFFIC SIGNAL LAYOUT

I. Traffic Signal Layout

Please refer to Section G (Plan View) for Solar Flashing Beacon layout information.

J. COST / BENEFIT WORKSHEET

J. Cost / Benefit Worksheet

Per Traffic Control Device application instructions, a Benefit/Cost worksheet is not required for consideration in the Traffic Control Device category. Our research of the Planning-Level Crash Reduction Factor (CRF) List indicates a CRF of 5 for installation of Flashing Beacons on Existing Stop Signs. Furthermore, we reviewed cmfclearinghouse.org for crash medication factor (CMF) information which indicated a possible CMF of 0.95 for all crashes and severities, which would coincide with the Iowa DOT Planning-Level CRF.

PRINCIPAL CONTACT/ COMPANY INFORMATION

Principal Contact/ Company Information

Tyler Christian, P.E.
Marion County Engineer
tchristian@marioncountyiowa.gov

Marion County Road Department
402 Willets Drive, Knoxville, IA 50138
Tel (641) 828-2225
Fax (641) 828-7349

REFERENCES

References

1. *Srinivasan, Raghavan; Daniel Carter; Kimberly Eccles; Bhagwant Persaud; Nancy Lefler; Craig Lyon; and Roya Amjadi, "Safety Evaluation of Flashing Beacons at STOP-Controlled Intersections", Federal Highway Administration, FHWA-HRT-08-044, Washington, D.C., December 2007.*

2. *Manual on Uniform Traffic Control Devices.* United States Department of Transportation, Federal Highway Administration, 11th Edition, Dec. 2023. MUTCD Chapter 4L Flashing Beacons

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE
TSIP FUNDS

GENERAL INFORMATION **DATE:** 8-7-2024

Location / Title of Project Story County Temporary Traffic Signals

Applicant Story County Secondary Roads

Contact Person Darren Moon Title County Engineer

Complete Mailing Address 837 N Ave.

Nevada, Iowa 50201

Phone 515-382-7355 (Area Code) E-Mail engineerweb@storycountyiowa.gov

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) Boone County Secondary Roads

Contact Person Jonathan Bullock Title Boone County Engineer

Complete Mailing Address 201 State Street

Boone, Iowa 50036

Phone 515-433-0532 (Area Code) E-Mail jbullock@boonecounty.iowa.gov

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	60,000.00
Total Project Cost	$	60,000.00
Safety Funds Requested	**$**	**60,000.00**

Additional Project Safety Documentation (when available):

- ☐ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan
- ☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan
- ☐ Iowa DOT TEAP Study or similar analysis and concept
- ☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the County of Story

Signed: Darren Moon 8-8-24

Signature Date Signed

Darren Moon

Printed Name

Attest: Tyler Sparks 8-8-24

Signature Date Signed

Tyler Sparks

Printed Name

Prepared by and return to: The Story County Engineer's Office, 837 N Ave, Nevada Iowa 50201 Phone 515-382-7355

RESOLUTION #25-09

Story County Board of Supervisors

RESOLUTION TO AUTHORIZE THE SUBMITTAL OF A TRAFFIC SAFETY FUND APPLICATION TO THE IOWA DEPARTMENT OF TRANSPORTATION

WHEREAS, the Iowa Department of Transportation is accepting applications for Traffic Safety Improvement Program (TSIP) funds to be used for the purchase of temporary traffic signals; and

WHEREAS, Story County Secondary Roads has determined that portable traffic signals at work zones will be more visible, improving safety to flaggers, work crews, and the traveling public; and

WHEREAS, portable temporary traffic signals are recognized traffic control devices in the Manual on Uniform Traffic Control Devices (MUTCD).

BE IT RESOLVED by the Board of Supervisors for Story County, Iowa, that Darren Moon, the County Engineer of Story County, Iowa be and is hereby designated, authorized, and empowered on behalf of the Board of Supervisors of said County to submit a Traffic Safety Improvement Program application to the Iowa Department of Transportation for a pair of portable traffic signal trailers.

BE IT FURTHER RESOLVED that the Story County Secondary Roads Department shall be responsible for maintaining said traffic control signals.

Adopted this 30th Day of July, 2024

Recommended Approval by:

Darren Moon 1-25-24

Darren R. Moon, P.E. Date
County Engineer

Lisa K Heddens

Chairperson, Board of Supervisors

Attest:

County Auditor

ROLL CALL FOR ALLOWANCE
Latifah Faisal Yea ✓ Nay ___ Absent ___
Lisa Heddens Yea ✓ Nay ___ Absent ___
Linda Murken Yea ✓ Nay ___ Absent ___

ALLOWED BY VOTE OF BOARD
Yea 3 Nay 0 Absent 0

Lisa K Heddens
CHAIRPERSON

Above tabulation made by LB

B. Narrative

The Story County Secondary Roads Department is applying for Traffic Safety Improvement Program (TSIP) funds to be used for the purchase of a pair of portable temporary traffic control signals. The signals would be used to replace flaggers for Secondary Roads work zone lane closures, and to be essential in situations where overnight lane closures are necessary. Story county would also be able to loan out these signals to cities in the county or surrounding counties and cities.

The Story County Secondary Roads Department is responsible for the maintenance, construction and engineering of the county's secondary road system. The secondary road system consists of 932 miles, (202 miles of paved roads, 706 miles of granular surfacing, and 24 miles of dirt roads) and 284 bridges. Typical paved route daily traffic counts range from 100 to 5,500 vehicles per day.

Part 6F.84 of the MUTCD provides standards, guidance, and support for the use of traffic signals in work zones. There is also additional information regarding signal use located in Part 4. The primary use of the temporary traffic signals would be in single lane closures on a two-way roadway and would be especially beneficial for nighttime closures which is currently not an option.

Traffic control is of paramount importance, currently requiring the use of trained and certified flaggers to safely direct traffic through work zones. Flagging can be stressful and dangerous on busy routes, and boring and monotonous on roads with very little traffic. Roads crews often close lanes for a variety of maintenance work such as: HMA patching, PCC patching, culvert repair and replacement, bridge repair and replacement, guardrail repair and replacement, bridge rail repair, tile repair and installation, and slope repairs.

The use of temporary traffic signals with traffic control plan 6H-12 in work zones would reduce the number of employees exposed to the traveling public, which reduces risk of injury, heat stress, extreme cold, fatigue and conflicts with drivers. As well as provide a safer and more familiar and more visible method of traffic control to the motorists driving through projects.

The purchase of temporary traffic signals would remove the burden of flagging and make safer conditions for everyone involved. They are easily moved and set up, very little training and instruction is necessary, could be used on long-term closures or overnight, and could be rapidly deployed in emergency situations. Overall, they provide safe and effective traffic control while removing employees from high-risk situations with an ever-growing inattentive driving population.

C. Itemized Breakdown of Cost

Quotes listed here are for a set of two signals, with vehicle detection and pilot car remote for Temporary Traffic Control. These preliminary quotes are attached in appendix A.

DATE	VENDOR	PRICE
8-7-23	OMJC Signal	$60,000.00
7-22-24	Iowa Plains Signing, Inc.	$71,420.00
7-26-24	Astro Optics, LLC	$87,548.00

D. Time Schedule

TSIP Application Due	August 15, 2024
TSIP Award Notification	Mid – January 2025
Final Quote Comparison	June - July 2025 (estimated)
TSIP Funding Available	July 1, 2025
Purchase of Traffic Signals	July – August 2025 (estimated)
Use of Portable Traffic Signals	August 2025 (after purchase)

E. Map

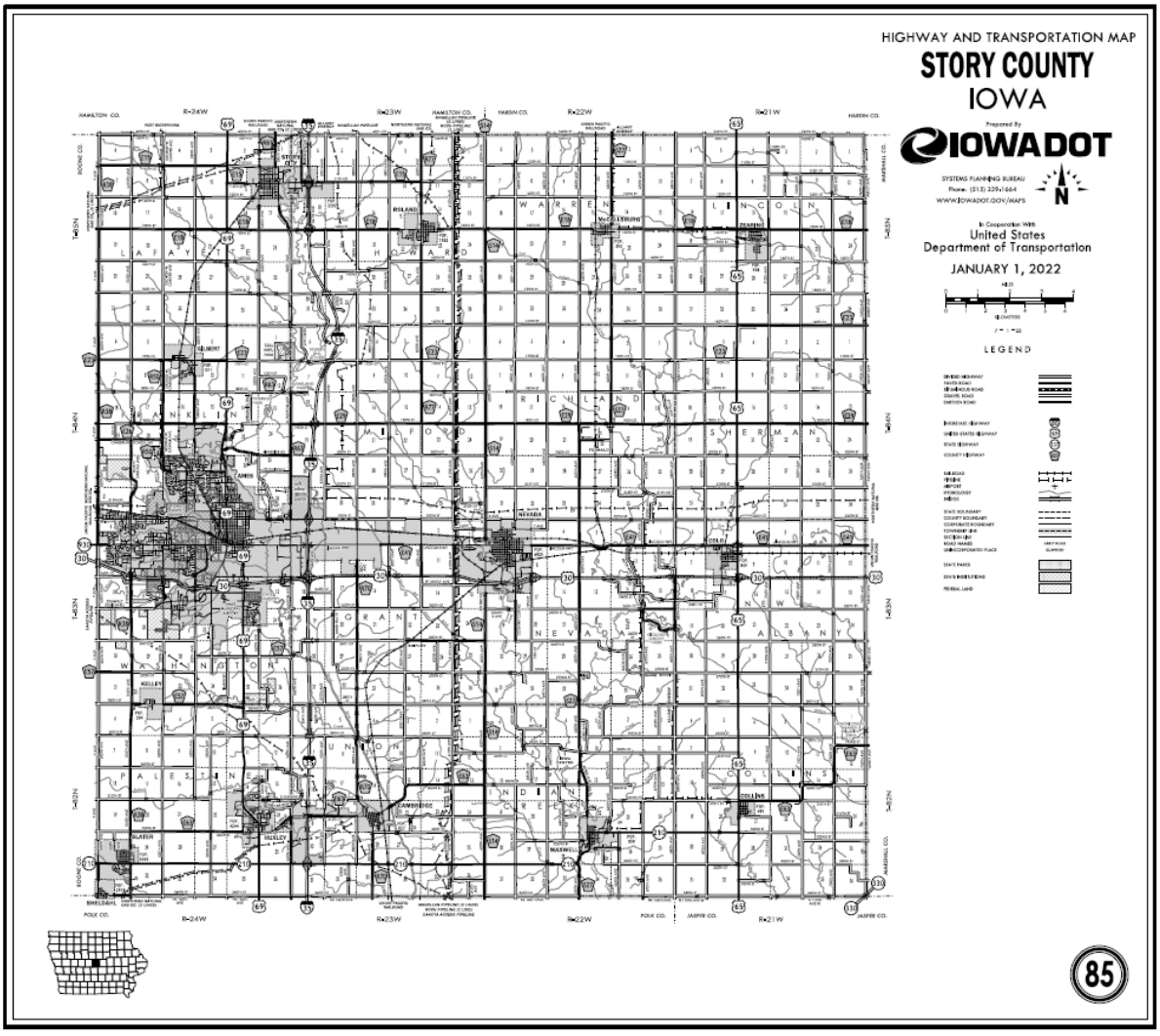


Image Source: https://iowadot.gov/maps/Digital-maps/pdfview/story#25672717-city-and-county-maps (view the link for higher quality map)

F. Color Pictures

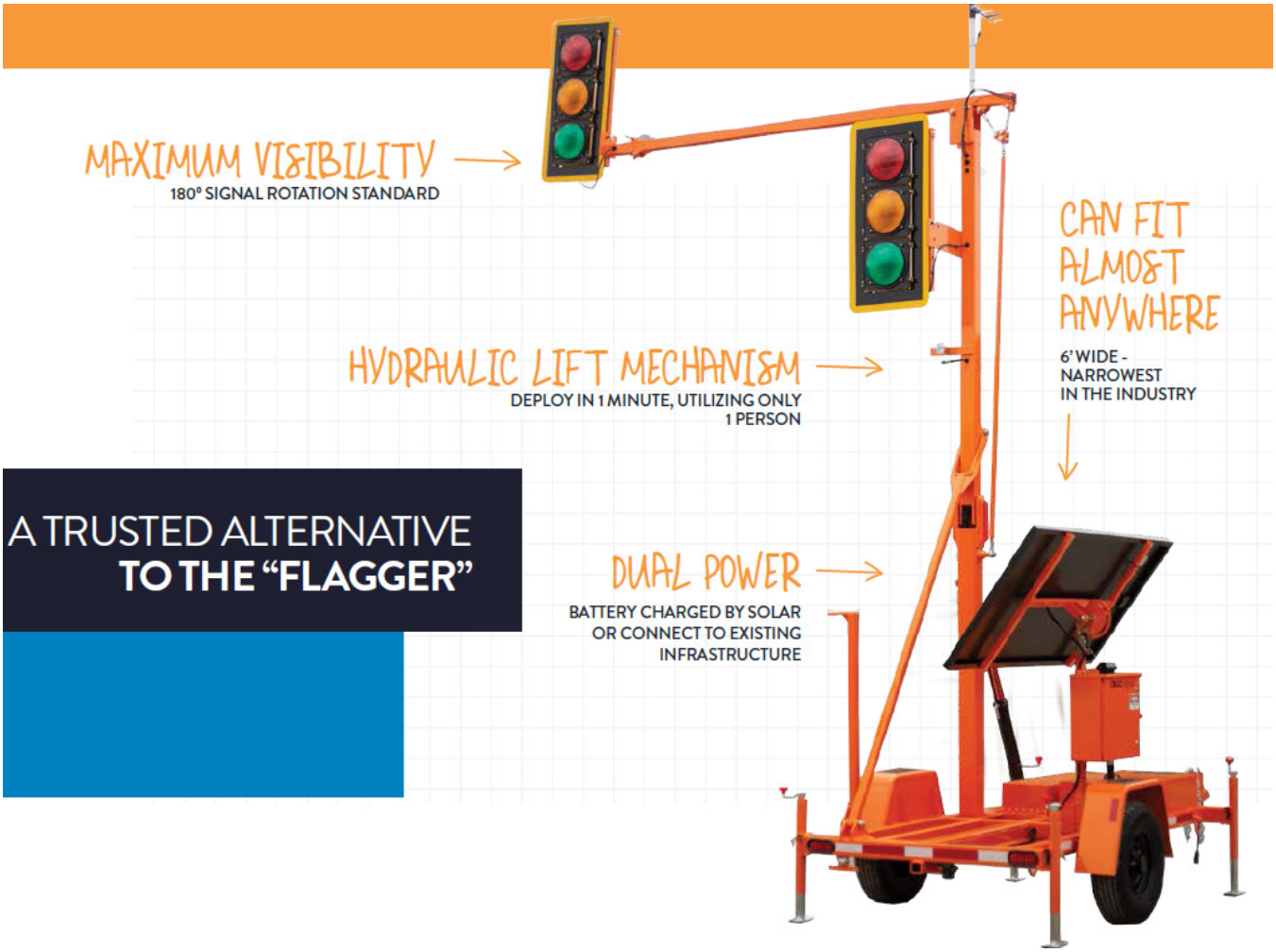
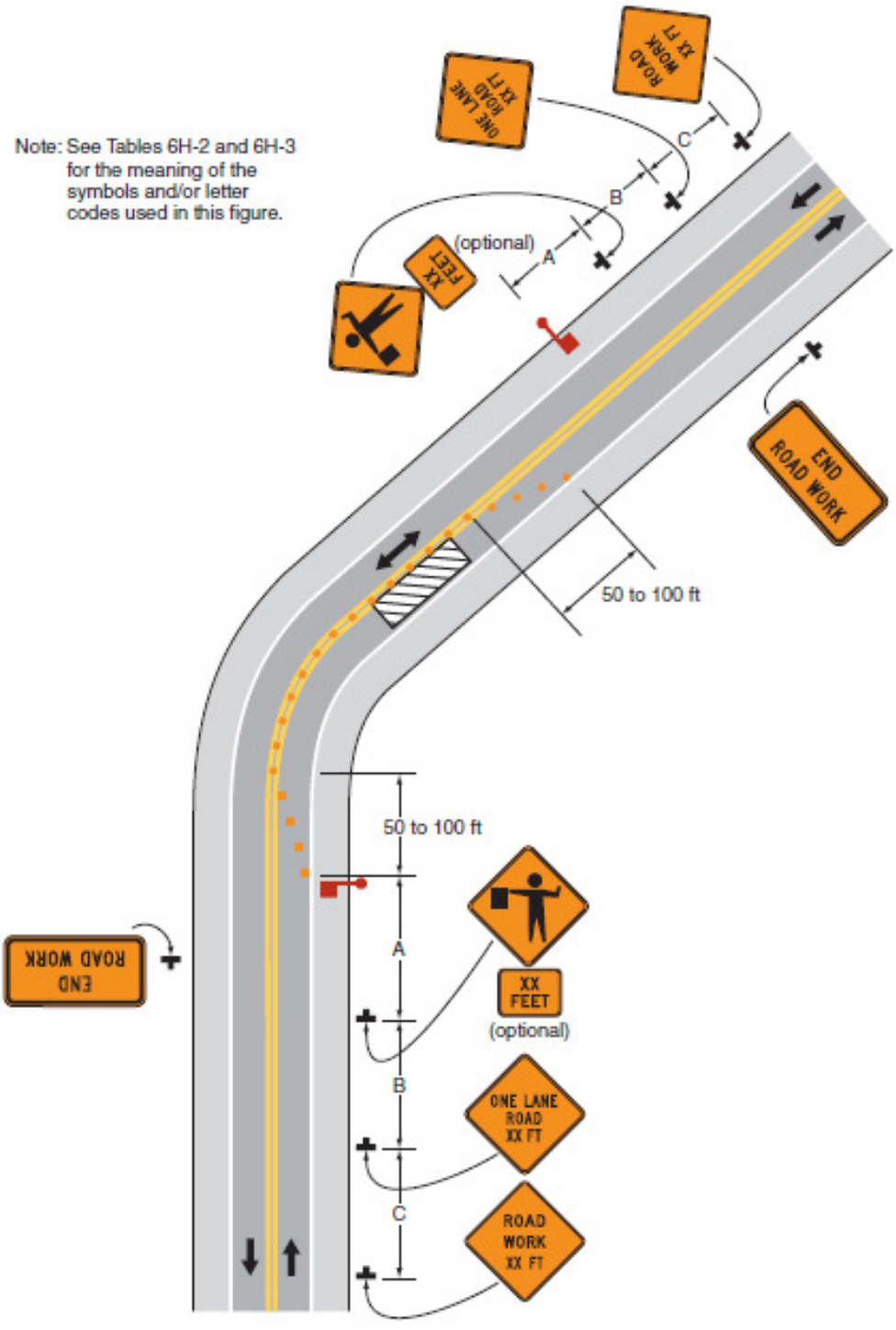


Image Source: OMJC Signal Quote

Image Source: OMJC Signal Quote

G. Plan View

Figure 6H-10. Lane Closure on a Two-Lane Road Using Flaggers (TA-10)



Typical Application 10

Image source: MUTCD 2009, page 655

H. Traffic Volumes

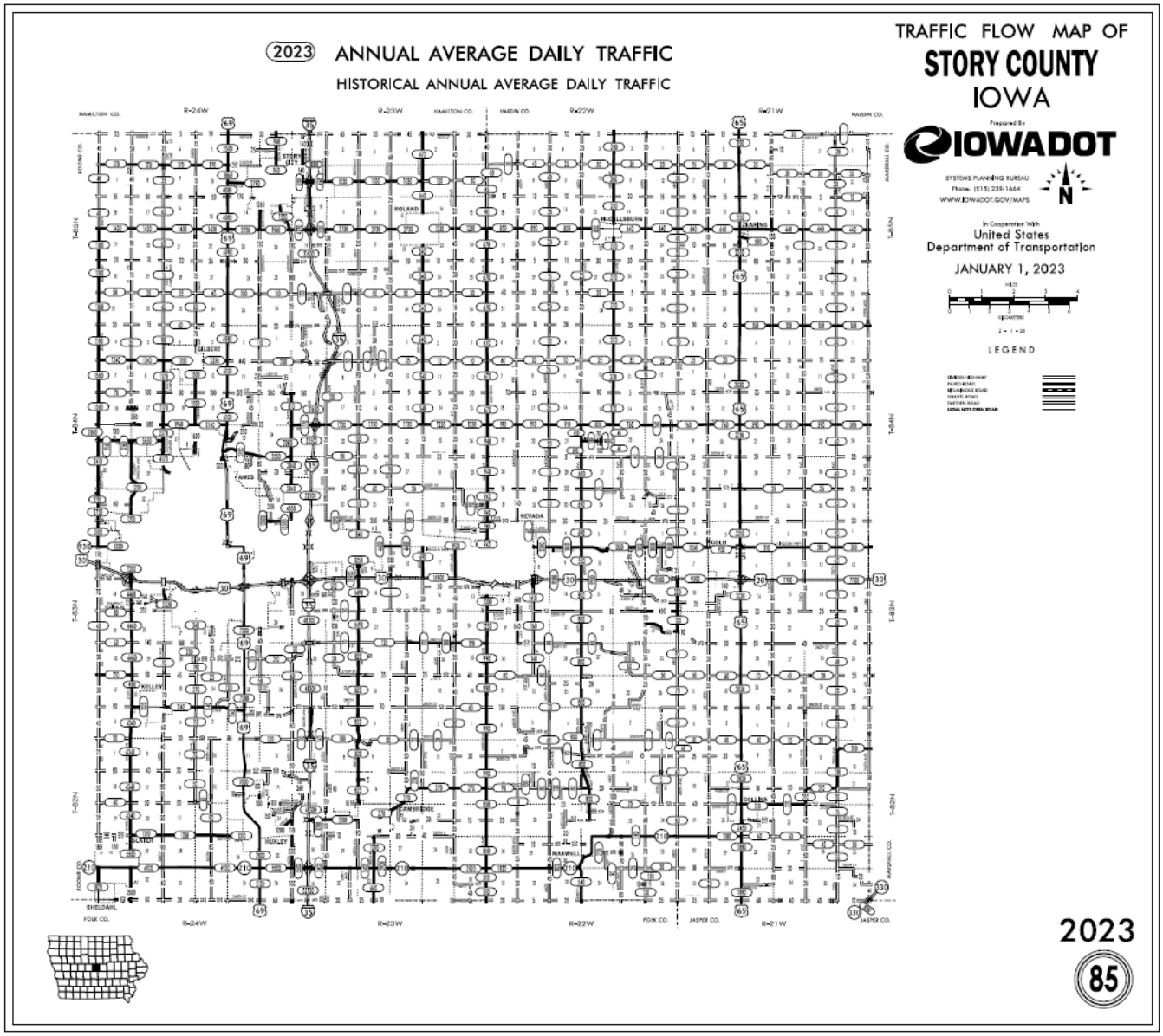


Image Source: https://iowadot.gov/maps/msp/traffic/2023/counties/STORY.pdf (view the link for higher quality map)

I. Traffic Signal Layout

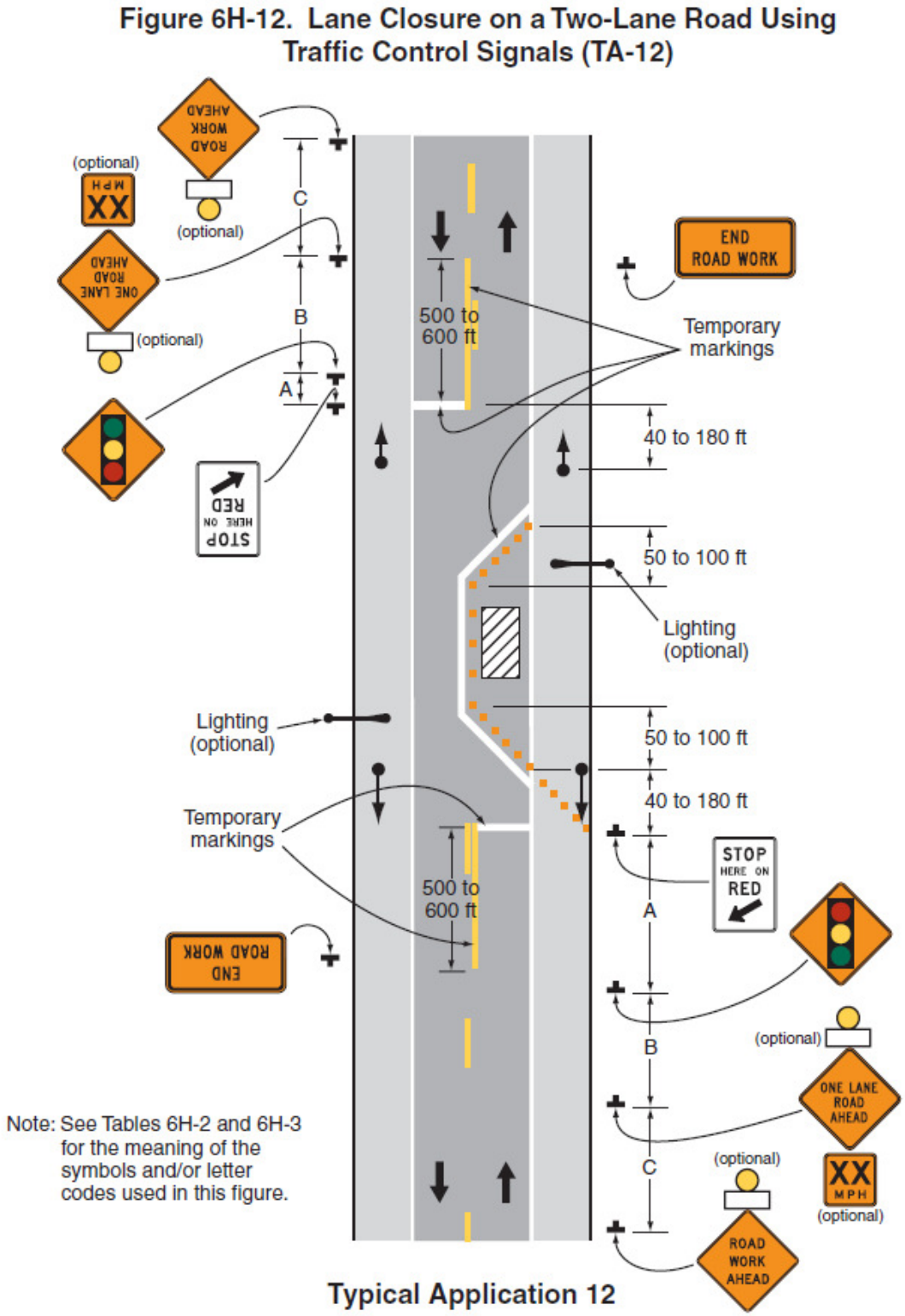


Image source: MUTCD 2009, page 659

J. Cost/ Benefit Worksheet

Not Applicable

Appendix A

QUOTES

OMJCSignal
PO Box 1594
Waterloo, IA 50704
403 Chestnut St.
Waterloo, IA 50703
800.776.5999
Fax: 319.236.1554
Email: sales@omjcsignal.com
omjcsignal.com

Quotation

Quote Number
8846REV

Quote Date
August 7, 2024

Page:
1

Quoted to:
ATTN: TYLER SPARKS
STORYCOUNTYIOWA

SHIP TO:
STORYCOUNTYIOWA

PH: 515.382.7355
FAX:

Customer ID	Good Thru	Payment Terms	Sales Rep Name
STORYCOUNTYIA	9/6/24	Net 30 Days	Kane Shimp

Quantity	Item	Description	Unit Price	Extension
1.00	LDPTS	ONE PAIR OF POP-UP LIGHT DUTY TRAILERS (ONE MASTER, ONE SECONDARY) W/ WIRELESS TRAFFIC CONTROL AND SOLAR POWER	54,900.00	54,900.00
2.00	MISC	VPR-26-OMJC: VEHICLE DETECTOR	1,100.00	2,200.00
1.00	MISC	FALCONMAX_OMJC03HF: 3 BUTTON REMOTE SYSTEM 900MHZ, 12VDC, ANTENNA BULKHEAD PATCH CABLE, CUSTOM OMJC LABELING free delivery and training	2,900.00	2,900.00

Freight & handling are in addition to the prices quoted above unless otherwise specified. All parts, materials and components are new unless otherwise specifi
OMJC has been in business since July of 1985 to serve you.

Subtota	60,000.00
Sales Ta	
Freight	
Tota	60,000.00

IOWA PLAINS SIGNING, INC.

SAFER ROADS SAVE LIVES

Associated General Contractors of Iowa

AGC NEBRASKA
THE CONSTRUCTION ASSOCIATION

1110 W. 6TH AVENUE (HWY. 210 W) | P.O. BOX 654 | SLATER, IOWA 50244-0654
TELEPHONE:(515) 685-3536 FAX: (515) 685-3530

Quote For: Story County - Iowa
Type of Sale: Signal Sale
Quote Date: July 22, 2024

Att. Tyler Sparks
Phone
Fax #

Bid Item #	Description	Quantity	Units	Per Unit	Total
1	SQ3TS System	1	5	$ 65,000.00	$ 65,000.00
2	Motion Sensors Price includes (2) Sensors	1	EA	$ 2,270.00	$ 2,270.00
3	Back Plate	4	EA	$ 175.00	$ 700.00
4	Pilot Car/ Flagger Module	1	EA	$ 3,450.00	$ 3,450.00
				Total	$ 71,420.00

Conditions or Notes:
This price does not include any shipping incured. This price does not include sales tax. This is Signals only and does not include any signing or extra materials.

7-22-24 **Date** _____ **Date**

Signature _____ **Acceptance Signature**

Mac Campbell
Cell 515-494-8591

Quote

Astro Optics, LLC
www.astrooptics.com
… a TAPCO (Traffic & Parking Control) company
5100 W. Brown Deer Road, Brown Deer, WI 53223
P (847) 488-9151 | sales@astrooptics.com | F (847) 488-9154

DATE: July 26, 2024

Tyler Sparks

Comments or Special Instructions:

SALESPERSON	P.O. NUMBER	SHIP DATE	SHIP VIA	FREIGHT	TERMS
Heather Lopez	Quote		PPA	PPA	

QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
1	Portable Traffic Signal System, SQ3TS, Solar Assisted Model w/2 signal trailers, wireless radios	$ 78,450.00	$ 78,450.00
1	Motion Detector, 1 sensor, for Signal Activation	$ 2,724.00	$ 2,724.00
4	SQ3TS Back Plate (Black)	$ 192.00	$ 192.00
1	Pilot Car/Flagger Module	$ 4,182.00	$ 4,182.00
		SUBTOTAL	$ 85,548.00
		TAX RATE	
		SALES TAX	
		SHIPPING & HANDLING	2,000.00
		TOTAL	$ 87,548.00

THANK YOU FOR YOUR BUSINESS!

Rev. 07/23

Application for TRAFFIC CONTROL DEVICE
TSIP FUNDS

GENERAL INFORMATION **DATE:** 07/17/24

Location / Title of Project: Statewide/Small City Work Zone Sign Package Program (2025-2026)

Applicant: Iowa Local Technical Assistance Program (LTAP)

Contact Person: Keith Knapp Title: Director

Complete Mailing Address: 2711 S. Loop Drive, Suite 4700

Ames, IA 50010

Phone: 515-294-8817 (Area Code) E-Mail: kknapp@iastate.edu

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: _____ (Area Code) E-Mail: _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Funding Amount

Total Safety Cost	$	$70,000
Total Project Cost	$	
Safety Funds Requested	**$**	**$70,000**

Additional Project Safety Documentation (when available):

☒ Project information sheet(s) or "Risk Score">50% from County/City's Local Road Safety Plan

☐ FHWA SS4A Safety Action Plan or similar comprehensive transportation safety plan

☐ Iowa DOT TEAP Study or similar analysis and concept

☐ Project intersection or segment with High or Medium PCR Level (PCR-All or PCR-Severe) from the Iowa DOT Potential for Crash Reduction (PCR) web-based map tool https://pcr.iowadot.gov/

Potential for Crash Reduction (PCR) Information					
Intersection ID (1234567890) or Segment ID (1234)	Intersection or Segment	PCR Level High	PCR Level Medium	PCR-All value	PCR-Severe value
		☐	☐		
		☐	☐		

Rev. 07/23

APPLICATION CERTIFICATION FOR PUBLIC AGENCY

To the best of my knowledge and belief, all information included in this application is true and accurate, including the commitment of all physical and financial resources. This application has been duly authorized by the participating public agency(ies). I understand the attached resolution(s), where applicable, binds the participating public agency(ies) to assume responsibility for any additional funds, if required, to complete the project. In addition, the participating public agency(ies) agrees to maintain any new or improved public streets or roadways for a minimum of five years.

I understand that, although this information is sufficient to secure a commitment of funds, a firm contract between the applicant and the Department of Transportation is required prior to the authorization of funds.

Representing the Iowa LTAP

Signed: 

Signature — Date Signed: 7/17/24

Keith K. Knapp
Printed Name

Attest:

Signature — Date Signed

Printed Name

TCD Program Application
2025 - 2026
Statewide Small City Work Zone Sign Package Program

Introduction

The Iowa Work Zone Safety Workshops have provided an opportunity for operations personnel from various cities in Iowa to improve their work zone safety and setups when conducting routine street maintenance. Many participants come from cities with a population of less than 10,000 residents and small city budgets for this type of work can sometimes lead to a lack of funding for temporary traffic control devices and the use of signs, barricades, cones, and vests that are deteriorated and may be out of compliance with the Manual on Uniform Traffic Control Devices (MUTCD). The project proposed here was developed to assist smaller cities with the introduction or upgrade of their temporary traffic control devices and vests to meet current standards for compliance and to make their work zones safer for workers and motorist.

This statewide program is competitive and grown from 10 applications in 2017, its initial year, to over 100 in 2022-2023 and approaching 200 applications more recently. The number of packages provided to cities has ranged from 12-14 per year.

Program Objectives

The goal of this project is to provide an avenue for smaller cities to be able to obtain a basic work zone sign package in compliance with the current MUTCD and to make their work zones safer for operations personnel and motorist. It is currently proposed that the materials to be included in the package will be the following:

- One Lane Road Ahead Signs
- Road Work Ahead Signs with “CLOSED” snap on.
- Be Prepared to Stop Signs
- Type III Barricades
- 28” Traffic Cones
- Class 2 Safety Vests
- Sign Stands
- 42 inch Channelizers

Each of these items will be of the correct type and size of signs for lower speed city street work. All of the devices will include high intensity retro-reflective sheeting suitable for nighttime use. The process being used to determine which small cities will be awarded the work zone signing package includes the consideration of a city completed application by the project team. Eligibility requirements and award criteria for the consideration and ranking of these applications will also developed. It is expected that approximately 10-14 cities will be chosen to

receive one work zone sign package. However, the total number distributed will dependent upon the actual cost to purchase them.

Project Approach

To meet the goals of the project, several tasks will need to be completed. First, a technical advisory committee (TAC) will be established. They will review and respond to the results of all the tasks described below. Second, the application and ranking process, eligibility requirements, and award criteria will be developed and reviewed. Third, the temporary traffic control devices for the package will be identified and proposed. Fourth, the program will be appropriately advertised and an application distributed as needed to targeted cities. Fifth, the entries will be evaluated through a matrix based on the predetermined criteria and cities notified. Sixth, the signs will be ordered and distributed. Seventh, LTAP staff will prepare a draft and final technical brief.

Proposed Project Tasks

1. Identify a technical advisory committee (TAC). The TAC will be used to review and comment on the results of the tasks described below. It will consist of public works directors and/or supervisors, work zone safety training instructors, and Iowa DOT representative(s). The TAC will meet for an initial meeting, at milepost periods in the project (e.g., to evaluate applications and select winning cities) and to discuss the draft final report.
2. Update application and ranking process, eligibility requirements, and award criteria. The application and ranking process, eligibility requirements, and award criteria will be updated in this task using the recommendations and lessons learned following the previous round of this program and suggested by the TAC. Some possible factors included in the processes, requirements, and criteria developed could include population, staff size (including seasonal and part-time employees), demonstrated need, signing condition, and commitment to work zone safety. The TAC may also use attendance at work zone safety workshops, but the program may also not be limited to just those attending, but those willing to attend or host work zone safety workshops in the near future. This is also the task in which deadlines for applications will be determined.
3. Determine sign package content. The signing and materials included in the sign package will be identified and/or confirmed during this task (see project objectives). The TAC will be asked to provide input on the project team proposal for the type of work zone signing and operation materials to include for smaller cities.
4. Advertisement of program availability and application. This task will include advertising the program availability and the application. This information may be distributed throughout the state of Iowa or targeted to those cities that meet the entry eligibility requirements that are developed in Task 2. The advertisement of the program and application may also be posted on the Public Works Service Bureau (PWSB) listserv,

Iowa County Engineers Association (ICEA) website, and through LTAP email list and social media sites. Iowa LTAP staff will serve as the point of contact for the applications.

5. Application evaluation. In this task the project team will develop an evaluation matrix for application comparison purposes. The content of the matrix will be based on the results of Task 2. The TAC will be asked to evaluate the results and provide their input on the applications received from qualified cities and the potential number of packages awarded. The cities selected will based on the criteria established in Task 2.
6. Notification and delivery. LTAP staff will notify the cities selected and place an order for the signing package with a selected vendor. LTAP will store and then distribute the materials to the selected cities.
7. Draft and final technical brief development. LTAP staff will prepare an update technical brief draft and, based on the input of the TAC, a final technical brief of the task completion and results of the project.

Proposed Time Schedule

	Month											
Task	1	2	3	4	5	6	7	8	9	10	11	12
1	X	X										
2			X									
3			X									
4				X								
5					X	X						
6							X	X	X			
7										X	X	X

The proposed project start date will be August 1, 2025 and its end date will be July 31, 2026.

Proposed Project Team

This project would be conducted by the following staff from the Institute for Transportation at Iowa State University.

Keith Knapp, Director, Iowa LTAP – Principal Investigator

Paul Albritton, Technical Training Coordinator, Iowa LTAP

Proposed Budget

The total amount of funding requested for this project is $70,000. In the past, approximately 60 percent of this budget focused on direct costs. If selected, a detailed budget will be submitted as part of the contract negotiations.