Appendices (Available Electronically)

- A. Methods and Assumptions Document
- B. Traffic Forecast Memo
- C. Existing Condition Memo
- D. Future Conditions Memo
- E. Build Concept
- F. HCS Analysis Reports
- G. Concept Evaluation Memorandum
- H. Safety Memo / IHSDM Output

Appendix A - Methods and Assumptions Document

AMENDMENT #1

Methods & Assumptions Document



I-229 Exit 6 (10th Street) Interchange Study HP5596(20) P (Interchange Study)

1. Methods and Assumptions Document

This Methods and Assumptions document was developed in preparation for the Methods and Assumptions Meeting held as part of the project start-up with representatives from the South Dakota Department of Transportation (SDDOT), Federal Highway Administration (FHWA), City of Sioux Falls, and Sioux Falls MPO. This document is intended to serve as a historical record of the process, dates, and decisions made by the study team representatives for the *I-229 Exit 6 (10th Street) Interchange Study* portion of the project.

2. Stakeholder Acceptance Page

The undersigned parties concur with the Methods and Assumptions for the *I-229 Exit* 6 (10th Street) Interchange Study as presented in this document.

SDDOT: Signature

Plannia

FHWA:	Digitally signed by MARK
MARK D	D HOINES Date: 2020.09.30.06/24.00
HOINES	-0530
Signature	
Planning/Civ	il Rights Specialis
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The undersigned parties concur with AMMENDMENT #1 to the Methods and Assumptions for the *I-229 Exit 6 (10th Street) Interchange Study* as presented in this document in red.

 SDDOT:
 FHWA:

 Signature
 Signature

 Title
 Title

Notes:

Date

(1) Participation on the Study Advisory Team and/or signing of this document does not constitute approval of the *I-229 Exit 6 (10th Street) Interchange Study* Final Report or conclusions.

Date

(2) All members of the Study Advisory Team will accept this document as a guide and reference as the study progresses through the various stages of development. If there are any agreed-upon changes to the assumptions in this document a revision will be created, endorsed, and signed by all the signatories.

3. Introduction and Project Description

Project Background, Understanding, and Need for Study

The recently completed I-229 Major Investment Study determined that the I-229 Exit 6 (10th Street) interchange will need modification to better handle current and future traffic. That study also recommended that the I-229 mainline be expanded to 3 lanes in each direction between Exit 5 (26th Street) and Exit 6 (10th Street).

SDDOT currently intends to reconstruct the I229 mainline and Exit 6 in conjunction with City of Sioux Falls construction of 10th Street east and west of the interchange. The exact limits of the construction will be determined by this study and are currently planned to begin in for Federal fiscal year 2027.

Five future alternatives for the Exit 6 interchange were forwarded from the I-229 Major Investment Study. The technical feasibility of each alternative will be evaluated for consideration in the forthcoming environmental documentation. The alternatives include:

- No-Build
- Widen existing single point interchange, 4-lane divided corridor
- Widen existing single point interchange, 5-lane undivided corridor
- Convert to DDI interchange, 4-lane divided corridor
- Convert to DDI interchange, 5-lane undivided corridor

One additional interchange alternative will be evaluated, including:

• Modification of single point interchange through the addition of a second northbound to westbound left turn lane, a second northbound to eastbound right turn lane, and a second southbound to eastbound left turn lane

Three future alternatives for the I-229 mainline were forwarded from the I-229 Major Investment Study. The technical feasibility of each alternative will be evaluated for consideration in the forthcoming environmental documentation. The alternatives include:

- No Build
- Convert to a six-lane cross-section with no curve improvement
- Convert to a six-lane cross-section with curve improvement

Two additional alternatives for the I-229 mainline will be evaluated, including:

- Widen inside shoulder north of 18th Street to 10th Street
- No inside shoulder widening

Study expectations and objectives, identified in the study Request for Proposal (RFP), include:

- 1. Interchange Modification Study: The development of the Interchange Modification Justification Report (IMJR) for the interchange.
- 2. Environmental Study: The development of all environmental documentation

necessary for the construction project to modify the interchange and related crossroad improvements.

- 3. Topographic Survey: Conducting the survey data necessary for design.
- 4. Subsurface Utility Engineering and Evaluation (SUE): Collecting the subsurface utility locations.
- 5. Design: Complete design necessary to prepare construction plan set(s) for the project(s).

Study Schedule

Date	Task/Event
July 2020	Project Kickoff and M&A Document
August – September 2020	Data Collection
September – October 2020	Traffic Forecasts, Analysis, and Crash History Reviews
October 2020	Concept Development, Analysis, and Screening
October – November 2022 2020	Build Options Refinement, Analysis, and Screening
December 2022 2020	Draft IMJR
January 2023 2021 – March 2023 2021	IMJR Document Reviews and Revisions
April 2023 2021	Final IMJR and Draft Environmental Scan Documents (as field conditions allow, certain studies may be delayed if dependent upon weather conditions)

Location

The I-229 Exit 6 interchange is located within east-central Sioux Falls. Details of the study area, including the I-229 mainline and adjacent intersecting arterial streets are provided in Section 4 of this document.

Facilities Affected by the Study

The study will evaluate traffic conditions on public facilities within the study area, including the I-229 and 10th Street corridors and connecting streets. Private access/driveway locations within the study area are also likely to be affected. See the Study Area discussion for a list of these facilities.

Widening on the I-229 mainline could impact the interstate overpasses at 12th Street and 18th Street, requiring reconstruction of the structures. If reconstructed, the structures need to provide pedestrian and bicycle access for both eastbound and westbound non-motorized traffic.

Modifications within the study area may also affect parallel and cross-routes around the study area through detour routes during construction and potential shifts in traffic patterns following construction.

Previous Studies

The following previous studies will be reviewed during this study:

- Go Sioux Falls MPO 2040 Long-Range Transportation Plan
 - http://siouxfallsmpo.org/files/3815/1119/5024/SiouxFalls2040LRTP-FinalNov2015wApp.pdf
- Shape Sioux Falls 2045 Comprehensive Plan (currently being finalized)
- Coordinated Public Transit Human Services Plan
 - <u>http://siouxfallsmpo.org/files/3715/7410/4775/2018_Coordinated_Plan_with_Addendu</u> <u>ms.pdf</u>
- MPO Bicycle Plan
 - o http://siouxfallsmpo.org/files/1313/7766/4918/MPO_Bicycle_Plan.pdf
- I-229 Major Investment Corridor Study
 - o http://www.i229study.com/
- I-229 Exit 5 (26th Street) Interchange Justification Study
 - o <u>https://dot.sd.gov/media/documents/Exit5_26thStreet_IMJR102714.pdf</u>
- I-229 Exit 6 (10th Street) Final Report
 - <u>https://dot.sd.gov/media/documents/I229_SS3_FINALReportAppendices_June2017.pdf</u>
- I-229 Exit 7 (Rice Street) Final Report
 - o https://dot.sd.gov/media/documents/I229_SS5_FINALReportAppendices_June2017.pdf

Study Advisory Team Members

A Study Advisory Team has been formed to guide the study through completion. The Study Advisory Team is comprised of representative parties of the SDDOT, FHWA, the City of Sioux Falls, and the Sioux Falls MPO. Members of the Study Advisory Team are:

Participant	Agency
Greg Aalberg	SDDOT – Sioux Falls Area
Shannon Ausen	City of Sioux Falls – Public Works
Jeff Brosz	SDDOT – Trans. Inv. Management
Travis Dressen	SDDOT – Mitchell Region
Stacy DuChene	SDDOT – Road Design
Jim Feeney	Sioux Falls MPO
Joel Gengler	SDDOT - ROW
Sarah Gilkerson	SDDOT – Project Development
Steve Gramm	SDDOT – Project Development

Heath Hoftiezer	City of Sioux Falls – Public Works
Joanne Hight	SDDOT – Administration
Mark Hoines	FHWA
Andrea Kramer	SDDOT – Administration
Tom Lehmkuhl	FHWA
Steve Kerr	SDDOT – Bridge Design
Scott Rabern	SDDOT – Road Design
Brian Rogness	SDDOT – Project Development
Brooke White Joseph Sestak	SDDOT – Mitchell Region
Kelly VanDeWiele	FHWA

* Additional team members may be added as the study progresses.

4. Study Area

The I-229 Exit 6 (10th Street) Interchange Study area includes (corridors highlighted in red in Figure 1):

- 10th Street from the intersection with Jessica Avenue to the signalized Hy-Vee/Campbells entrance, approximately 0.75 miles
- 26th Street from Van Eps Avenue to Southeastern Avenue, approximately 0.75 miles
- Rice Street from Lowell Avenue to Bahnson Avenue, approximately 1.2 miles
- 6th Street from Lowell Avenue to Cleveland Avenue, approximately 0.3 miles
- 12th Street from Lowell Avenue to Cleveland Avenue, approximately 0.3 miles
- 18th Street from Southeastern Avenue to Cleveland Avenue, approximately 0.4 miles
- Southeastern Avenue from 26th Street to 18th Street, approximately 0.6 miles
- Mainline I-229 from north of I-229 Exit 4 interchange to north of the I-229 Exit 7 interchange, approximately 3.5 miles
- The ramps for the I-229 Exit 5 (26th Street) interchange
- The ramps for the I-229 Exit 6 (10th Street) interchange
- The ramps for the I-229 Exit 7 (Rice Street) interchange

The limits of the environmental study will be determined as part of the planning study but are anticipated to encompass a smaller area than the study corridors.

Refinements of the mainline, interchange and arterial alternatives will be made to address the findings of the technical analysis and will be reflected in the final study results and reported measures of effectiveness.

I-229 Exit 6 (10th Street) Interchange Study M&A Document

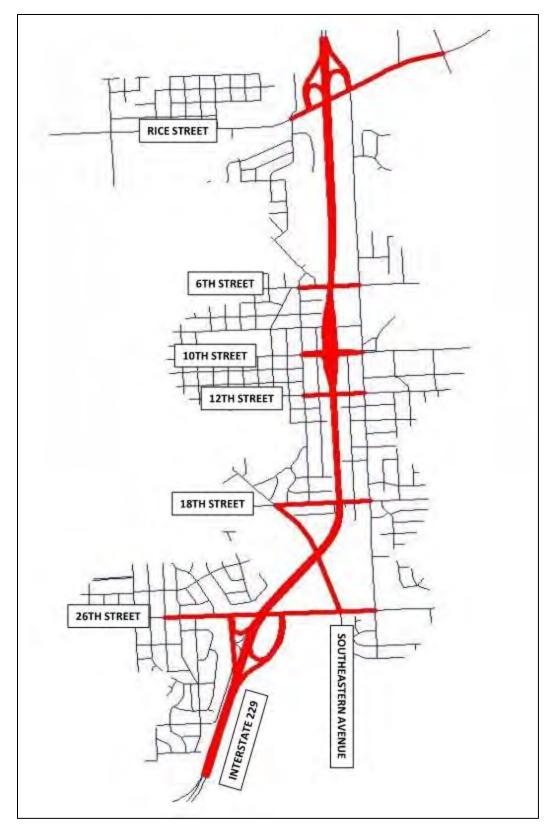


Figure 1 – Study Area Overview Map

Study intersections that will be analyzed as multi-modal intersections, either signal or stop sign controlled, include:

Ref #	Street #1	Street #2
1	10 th Street	Jessica Avenue
2	10 th Street	Lowell Avenue
3	10 th Street	Conklin Avenue
6	10 th Street	Blaine Avenue
7	10 th Street	Cleveland Avenue
8	10 th Street	Hy-Vee/Campbell's Entrance
9	26 th Street	Van Eps Avenue
10	26 th Street	Yeager Road/Frederick Drive
13	26 th Street	Southeastern Avenue
14	26 th Street	Cleveland Avenue
15	Rice Street	Lowell Avenue
18	Rice Street	Bahnson Avenue
19	18 th Street	Southeastern Avenue
20	18 th Street	Cleveland Avenue
21	12 th Street	Lowell Avenue
22	12 th Street	Cleveland Avenue
23	6 th Street	Lowell Avenue
24	6 th Street	Cleveland Avenue

Study intersections that will be analyzed as interchange ramp terminals include:

Ref #	Street #1	Street #2
4	10 th Street	Single Point Ramp Terminal
11	26 th Street	SB Ramp Terminal
12	26 th Street	NB Ramp Terminal
16	Rice Street	SB Ramp Terminal
17	Rice Street	NB Ramp Terminal

5. Analysis Years/Periods

This study will evaluate traffic operations during the following time periods:

- Existing Conditions (Year 2021)
- Year of Project Completion (Year 2027)
- Planning Horizon Year (Year 2050)

Existing Conditions (Year 2021)

Existing conditions analyses will be conducted for year 2020 volume conditions. The raw counts will be factored to a design season and balanced between intersections. Peak hour volumes will be determined on a per intersection basis and representative of:

- AM Peak Hour
- PM Peak Hour

Future Conditions (Years 2027 and 2050)

Future/Design conditions analyses will be conducted for years 2027 Year of Project Completion and 2050 Planning Horizon Year. Traffic forecasts for these Future Conditions will be developed using methodology outlined in the 'Existing Volumes and Traffic Forecasts' section. Future Conditions peak hour timeframes will coincide with those identified in the Existing Conditions.

For 2027 Year of Project Completion and 2050 Planning Horizon Year, the following peak hours will be evaluated:

- AM Peak Hour
- PM Peak Hour

6. Data Collection

Intersection Turning Movement Count Data

Turning movement counts define actual traffic at the study intersections during a typical weekday. Turning movement counts are available for some of the study area intersections while new counts will have to be conducted at other locations. The City will provide historical turning movement counts from 2017 – 2019 and new counts will be conducted at any locations that have not been counted during this period. All counts will be factored for annual growth and seasonality to produce a balanced 2021 data set for analysis. Factoring of historical counts will be used to eliminate the effects of the COVID-19 pandemic on traffic volumes and to account for construction within the study area.

Counts at Rice Street/Bahnson Avenue and 12th Street/Lowell Avenue will be collected by the consultant team in September 2020. The new intersections at 26th Street/ Frederick Drive/Yeager Road and 26th Street/ I-229 SB ramp will be counted after 26th Street construction is completed to establish a volume baseline and validate the balanced 2021 data set. The new turning movement counts will be 12-hour duration (6:00 AM to 6:00 PM), collected to cover the AM and PM peak periods in 15-minute

intervals. Vehicle classification and pedestrian/bicycle data will also be included in these counts. Study area intersections and count status include:

Ref #	Street #1	Street #2	Year Last Collected
1	10 th Street	Jessica Avenue	2017
2	10 th Street	Lowell Avenue	2017
3	10 th Street	Conklin Avenue	2013
4	10 th Street	Single Point Ramp Terminal	2019
5	10 th Street	NB Ramp Terminal	***
6	10 th Street	Blaine Avenue	2013
7	10 th Street	Cleveland Avenue	2019
8	10 th Street	Hy-Vee/Campbell's Entrance	2019
9	26 th Street	Van Eps Avenue	2018
10	26 th Street	Yeager Road/Frederick Drive	2018**
11	26 th Street	SB Ramp Terminal	**
12	26 th Street	NB Ramp Terminal	2018**
13	26 th Street	Southeastern Avenue	2018**
14	26 th Street	Cleveland Avenue	2018
15	Rice Street	Lowell Avenue	2015
16	Rice Street	SB Ramp Terminal	2018
17	Rice Street	NB Ramp Terminal/Cleveland	2018
18	Rice Street	Bahnson Avenue	1998*
19	18 th Street	Southeastern Avenue	2018
20	18 th Street	Cleveland Avenue	2018
21	12 th Street	Lowell Avenue	*
22	12 th Street	Cleveland Avenue	2019
23	6 th Street	Lowell Avenue	2015
24	6 th Street	Cleveland Avenue	2018

*Counted by Consultant in 2020

**Currently under construction – previous count data will be factored and balanced for initial analysis and intersections 10 and 11 will be counted after construction is complete.

***Intersection does not currently exist - volumes to be forecast depending on scenario

Interchange/Interstate Count Data

The SDDOT will provide 24-hour traffic volume ramp and crossroad counts for I-229 Exits 5, 6, and 7, and I-229 mainline.

Collected data will include mainline per vehicle record, which will provide time, class, and speed for each vehicle.

Heavy Vehicle Data

Intersection heavy vehicle percentages will be determined by intersection turning movement counts. Interstate mainline heavy vehicle percentages will be determined by 24-hour mainline counts.

Traffic Data Collection Techniques

All traffic data was/will be collected using standard field practices, which may consist of video cameras at intersections and tube counters on roadway segments.

Counts will be collected on a Tuesday, Wednesday, or Thursday when school is in session during good driving/weather conditions. The City has maintained an index of traffic volumes at selected arterial street intersections throughout the COVID-19 pandemic. That index shows that recent volumes have returned to near pre-pandemic levels. Recent SDDOT count also show traffic volume trends returning to normal. The Sioux Falls index will be used to develop factors for application to new traffic counts to create consistent data sets independent of the effects of the pandemic. New counts will represent a small portion of the total traffic data set and all volumes will be balanced to reflect pre-pandemic conditions.

The percentages of Interstate traffic that enter from an interchange on ramp, remain in the auxiliary lane, and exit at the following off-ramp are available from previous studies and will be augmented with samples within the study area. The previous study data were obtained from smartphone tracking analysis provided by StreetLight Data, Inc. and represent the 2017 - 2018 period.

Additional Data Supplied by SDDOT, City of Sioux Falls, or Sioux Falls MPO

- Existing vehicular traffic data, including crash data and turning movement counts as mentioned above
- Existing structure condition data
- SDDOT Road Design Manual
- Available construction plans
- Available land survey data (topography and original DTM file)
- Available GIS data, including aerial photography, parcel information, existing land use (rooftops and commercial square footage) and crash locations
- Available data and reports from previously completed and on-going studies

Free-Flow Speeds

I-229 free-flow speeds will be based on measured speeds collected as part of the 24hour counts, supplemented by data collected for the I-229 Major Investment Study. Additional verification will be provided through the MPM-RDS database.

Crossroad free-flow speeds will be estimated using estimation procedures documented in HCM6. Required data, such as lane widths, speed limits, and lateral clearance, will be obtained from field visits, available construction plans, and future concept geometrics.

7. Existing Volumes and Traffic Forecasts

Existing Volumes

The following process will be used to develop the study area Existing Conditions (2020) AM and PM peak period traffic volumes:

- 1. Identify AM and PM peak hours at each study intersection.
- 2. Factor counts to a design season (factor provided by SDDOT).
- 3. Factor counts to account for annual and COVID index variances.
- Balance counts across study area intersections/roadway segments to five (5) vehicle increments. For low-volume movements, presented movement volume may be less than 5 vehicles.

Heavy vehicle percentages based on collected 2020 vehicle classification counts.

Traffic Forecasts

The Sioux Falls MPO Travel Demand Model will be utilized for the purposes of this study.

FHWA requirements for use of the travel demand model include documentation of the following:

- 1. Assemble continuous daily, directional traffic count information for comparison with Year of Project Completion model information.
- 2. Compare Year of Project Completion model estimated volumes to observed counts within the project study area.
- 3. Discuss impacted travel markets where path diversion is most likely to occur.
- 4. Compare model estimated and observed travel speeds on the project main line and directly impacted facilities (e.g. arterials at a new interchange).

The following methodology will be used to develop 2027 Year of Project Completion and 2050 Planning Horizon Year traffic forecasts:

- 1. Obtain existing traffic data for the study area freeway segments and intersections.
- 2. Identify AM and PM peak hour volumes for the area freeway segments and intersections.
- 3. Develop "K" factors for the AM and PM peak periods.
- 4. Obtain calibrated Year of Project Completion and future year GIS-based model output from City of Sioux Falls Staff.
- 5. Generate 24-hour, AM peak hour, and PM peak hour link volumes
- 6. Develop a growth rate based on the base year and 2050 models
 - a. Project 2050 Planning Horizon Year volumes based on growth rate.
 - b. Interpolate growth between base year and 2050 models to determine 2027 Year of Project Completion volumes.
 - c. Make necessary post-processing adjustments.
- 7. Using existing turning movement percentages from collected traffic count data and model distribution, develop design turning movement volumes for the purposes of intersection evaluation.
 - a. Smooth and balance forecasts to five (5) vehicle increments within the study area.
 - b. For low-volume movements, presented movement volume may be less than 5 vehicles.
 - c. If a location shows a decline in traffic volumes between the Existing Conditions (2020) and years 2027 and 2050 and no readily-apparent reason for this decline is identified after reviewing model input, the reported volumes will be held at 0% growth in developing the future-year volume and noted to the SAT.
- 8. Complete needed evaluation on design volumes calculated.

Heavy vehicle percentages based on collected 2020 vehicle classification counts.

8. Traffic Operations Analysis

Traffic Operations Analysis

- 1. Software
 - a. Signalized Intersections
 - Highway Capacity Software (HCS7) Release 7.9 (HCM 6th Edition (HCM6) methodology) Streets module
 - Ramp terminal intersections meeting the interchange types defined in HCM6 Chapter 23 (Interchange Ramp Terminals) will be analyzed with the Interchanges section of the HCS7 Streets module.

- b. Non-signalized intersections may include:
 - i. Highway Capacity Software (HCS7) Release 7.9 (HCM6 methodology) Two-Way Stop-Control (TWSC) module
 - 1. Ramp terminal intersections with stop control will be included.
 - ii. Highway Capacity Software (HCS7) Release 7.9 (HCM6 methodology) All-Way Stop-Control (AWSC) module
 - iii. Highway Capacity Software (HCS7) Release 7.9 (HCM6 methodology) Roundabouts module
- c. Basic Freeway, Ramp Junctions and Weave Areas
 - i. Highway Capacity Software (HCS7) Release 7.9 (HCM6 methodology) Freeways Facility module
- d. Pedestrians and Bikes may include:
 - i. Highway Capacity Software (HCS7) Release 7.9 (HCM6 methodology) Street module
 - 1. For segment pedestrian and bicycle LOS scores, applies only to corridors with signalized boundary intersections.
 - 2. For signalized intersection pedestrian and bicycle LOS scores
 - ii. Highway Capacity Software (HCS7) Release 7.9 (HCM6 methodology) TWSC module
 - 1. For TWSC intersection pedestrian LOS scores (crossing major road)
 - iii. Highway Capacity Software (HCS7) Release 7.9 (HCM6 methodology) Two-Lane Highways module
 - 1. For segment bicycle LOS scores on two-lane highway segment

Synchro/SimTraffic software may be utilized, if necessary, for the development of signal timings and/or queue length projections.

- 2. Operational Analysis Results (Existing Conditions and Future No-Build Conditions)
 - a. Level of Service (LOS)
 - i. Ramp Terminal Intersections
 - 1. LOS based on HCM6 Chapter 20 (TWSC Intersection) methodology.
 - ii. Crossroad Corridor Intersections
 - 1. LOS based on
 - a. HCM6 Chapter 20 (TWSC Intersection) methodology, and

- b. Weighted average intersection delay
 - i. Based on total 'Intersection Delay' as reported in HCS7 TWSC module compared with AWSC LOS thresholds.
- iii. Basic Freeway, Ramp Junctions and Weave Areas
 - LOS based on HCM6 Chapter 10 Freeway Facilities Core Methodology
- 3. Operational Analysis Results (Future Build Conditions)
 - a. Signal Warrants
 - Signal warrant analysis will be completed for study area intersections along the corridor as determined by the SAT. Some potential interchange configurations require signals regardless of warrant.
 - ii. If results of a signal warrant analysis indicates a signal may be warranted in one of the study analysis years, an approximate year in which the warrant(s) is/are met will be determined based on a straight-line interpolation of traffic volumes between the Existing Conditions (2020) and 2050 Planning Horizon Year.
 - b. Level of Service (LOS)
 - i. Freeway Segments
 - Urban area minimum allowable LOS LOS 'C'; LOS 'B' desirable.
 - ii. Ramp Terminal Intersections
 - Urban area minimum allowable LOS LOS 'C' LOS 'F'; LOS will not be used. Instead:
 - a. Individual movements will be allowed to operate at LOS 'D' but the overall intersection LOS shall be 'C' or better. 95th percentile queuing at ramp terminal intersections must be contained to the ramps, and not extend onto mainline I-229.
 - iii. Signalized Non-Ramp Terminal Intersections modified by project improvements.
 - 1. Urban area minimum allowable LOS LOS 'D'
 - a. Individual movements cannot operate with a v/c ratio greater than 1.0.
 - Individual movements will be allowed to operate at LOS 'E', but the overall intersection LOS shall be 'D' or better.
 - iv. Other intersections modified by project improvements

- 1. Urban area minimum allowable LOS LOS 'D'
 - a. Individual movements will be allowed to operate at LOS 'E' or 'F', but the overall intersection LOS shall be 'D' or better.
- v. Intersections not modified by project improvements
 - 1. Minimum allowable LOS LOS 'D'
 - a. Individual movements will be allowed to operate at LOS 'E' or 'F', but the overall intersection LOS shall be 'D' or better.
- vi. TWSC Intersection LOS Reporting
 - 1. HCM6 Chapter 20 (TWSC Intersection) methodology, and
 - 2. Weighted average intersection delay
 - Based on total 'Intersection Delay' as reported in HCS7 TWSC module compared with HCM6 AWSC LOS Thresholds.
- vii. Queue Storage Ratio
 - 1. Queue storage ratio greater than 1.0 for any movement will result in the overall intersection being reported as LOS F.
- viii. Basic Freeway, Ramp Junctions and Weave Areas
 - 1. Urban area minimum allowable LOS LOS 'C'
- 4. Variables
 - a. Peak Hour Factor (PHF)
 - i. Existing Conditions (2020) analysis will use calculated PHFs from existing counts with a maximum value of 0.90.
 - Planning Horizon Year (2050) conditions and Year of Project Completion (2027) analysis will use 'Suggested Default Values' for PHFs as indicated in HCM6:
 - 1. TWSC Analysis: 0.92
 - 2. AWSC Analysis: 0.92
 - 3. Roundabout Analysis: 0.92
 - 4. Two-Lane Highway Analysis: 0.88
 - 5. Signalized Arterial and Ramp Terminal Intersections Analysis:
 - a. 0.92 for \geq 1,000 veh/h entering volume
 - b. 0.90 for < 1,000 veh/h entering volume
 - b. Saturation Flow Rate
 - i. SDDOT Design Manual indicates the use of up to 1,900 vph ideal saturation flow rate in urban and suburban areas and up to 1,700 vph in rural areas. An ideal saturation flow rate of 1,800 vph will be used for this study to account for a mix of urban and visiting driver

behavior. This value will be used for the signalized intersections, uncontrolled movements along major route through a TWSC intersection, and freeway locations within the study area.

- c. Traffic Signal Controllers
 - i. Operational analysis will allow for both actuated and coordinated controllers.
- d. Left-Turn Phasing
 - i. Protected, Permitted/Protected or Split Phasing will be allowed at intersections.
- e. Heaviest Lane Volume (HLV)
 - i. Default HCS Streets values used for ramp terminal/arterial intersections.
- f. Heavy Vehicle Percentage
 - i. Based on sampling of existing traffic.
- g. Phase Change Intervals
 - i. Future No-Build (Year 2027 and 2050) Conditions
 - Phase change intervals will be calculated for new signalized intersections using methodologies outlined in the SDDOT Road Design Manual.
- h. Right Turn on Red
 - i. All intersections will be evaluated with the HCM6 default of 0 unless otherwise determined by the SAT.
- i. Design Input Data for HCS Analysis
 - i. Existing Conditions and No-Build Conditions will use design features based on construction plans and/or available GIS roadway characteristic data.
 - ii. Build Conditions will correspond to respective Build Alternative design.
 - iii. Terrain: Flat
 - iv. Highway Class (arterial crossroads): as recommended in HCM6.
 - v. Free-Flow Speed:
 - 1. Arterial crossroads Existing and Build Conditions: measured speed, as available, or current posted speed limit + 5 mph
 - 2. I-229 Existing and Build Conditions: measured speed

9. Safety Issues

Crash data will be reviewed for the study area based on South Dakota Department of Public Safety (SDDPS) crash records for the most recent five years of available data. SDDPS's database will be the only database used in the calculation of crash rates and critical crash rates. The following information will be provided from the crash analysis:

- Segment and Intersection Crash Rates
- Segment and Intersection Critical Crash Rates (per Highway Safety Manual)
- Crash Trends
- Potential Mitigation Measures to Improve Locations Above Critical Crash Rates

A safety analysis of Build Options for 2027 Year of Project Completion and 2050 Planning Horizon Year time periods be completed utilizing FHWA's Interactive Highway Safety Design Model's (IHSDM) Crash Prediction Module in accordance with the Highway Safety Manual. SDDOT-provided calibration data, if available, will be incorporated into the model.

10. Selection of Measures of Effectiveness (MOE)

The main goals of this study are as follows:

- 1. Complete a traffic level of service analysis for both existing and future (2027 and 2050) conditions on the I-229 mainline, select interchanges and crossroads.
- 2. Complete a safety analysis of I-229 mainline, interchanges, and crossroads.
- Identify locations on I-229 not in compliance with current level of service standards under both the current and forecasted future traffic conditions, level of service requirements of LOS 'C'.
- 4. Conduct interchange options feasibility study on the Exit 6 interchange as required by the scope of work.
- 5. Create final products for use by the SDDOT which will guide the Department in the implementation of recommended improvements that will maximize the efficiency of the system.

To satisfy the study objective, the following MOEs will be used to evaluate and compare the alternatives:

- Signalized Intersections: LEVEL OF SERVICE and INDIVIDUAL MOVEMENT DELAY
- Freeway Segments, Ramp Junctions, and Weave Areas: LEVEL OF SERVICE
- Arterial Corridor Segments: LEVEL OF SERVICE, SPEED, and DELAY
- Ramp Terminal Intersections: LEVEL OF SERVICE and INDIVIDUAL MOVEMENT DELAY plus ORIGIN-DESTINATION (OD) LOS

11. FHWA Interstate Access Modification Policy Points

An Interchange Modification Justification Report (IMJR) will be developed for the I-229 Exit 6 interchange in accordance with section 3.5.3 of FHWA's Interstate System

Access Informational Guide and the May 22, 2017, FHWA Policy on Access to the Interstate System.

12. Environmental Scan

Preliminary environmental investigation will be conducted to provide a bridge between the Interchange Justification Report and the NEPA decision document. The purpose of the scan document is to identify potential resources and alternatives early in the planning process to avoid fatal flaws and to consider sensitive environmental, community and economic resources.

In order to be efficient with environmental studies and avoid situations where re-work is necessary due to changing study findings from the traffic or concept design portions of work, the majority of environmental scan field work will be conducted after preliminary findings from the IMJR process are developed and vetted by the SAT. This should not prevent coordination with partner agencies and similar foundational components of the scan process.

The scan tasks will include:

- Determine environmental study area
- Provide public and agency coordination
- Prepare and distribute tribal consultation letters
- Coordinate landowner permission for site surveys
- Evaluation of project independent utility and termini
- Develop project purpose and need
- Document and screen alternatives
- Identify resources and the alternatives' influence on each
- Evaluate environmental justice impacts
- Evaluate wetland and waterway impacts
- Evaluate cultural resources impacts
- Evaluate bicyclist, pedestrian, and recreational impacts
- Evaluate Section 4(f) and 6(f) impacts
- Evaluate economic resources impacts
- Evaluate noise impacts
- Evaluate floodplain impacts
- Evaluate vegetation, fish, and wildlife impacts
- Evaluate threatened and endangered species impacts
- Evaluate regulated materials impacts
- Evaluate air and water quality impacts

- Evaluate impacts to social environment, visual quality and aesthetics, farmland, public facilities, invasive species, and construction.
- Evaluate indirect and cumulative impacts
- Develop potential mitigation strategies
- Coordinate with the NEPA action determination
- Prepare an environmental scan document

13. Deviations/Justifications

No deviations from standards are currently known. Deviations required will be documented through amendments to this document prior to proceeding.

14. Traffic Variables for Design

The following traffic variables for design will be determined for use in future design as part of this study:

- Average Annual Daily Traffic for the year of construction (AADT2027)
- Average Annual Daily Traffic for the future year (AADT2050)
- Design Hour Volume, 30th highest hour of the year (DHV)
- Direction Distribution in the predominate direction of travel (D)
- Truck Percentage of DHV (T DHV)
- Truck Percentage of AADT (T ADT)
- Design speed(s) (V)

These variables will be determined for the following:

- I-229 Mainline
- Exit 6 off-ramps
- Exit 6 on-ramps
- 10th Street
- Any other I-229 cross-street impacted by construction

15. Conclusion

All sections contained in this document will guide the traffic data collection and traffic assessment for this study.

Appendix B - Traffic Forecast Memo



DRAFT MEMORANDUM

TO:	Steve Gramm South Dakota Department of Transportation
FROM:	Chase Cutler, HR Green, PE, PTOE
DATE:	January 19, 2021
RE:	I-229 Exit 6 (10th Street) Interchange Study – Traffic Forecast Memo SD DOT Project Number: PL0194(98) P, PCN 07P7

This technical memorandum provides the future year traffic forecast methodology developed for the I-229 Exit 6 Interchange Study. The project area includes mainline I-229 between Exit 5 and Exit 7, as well as adjacent intersections along the corridors of Rice Street, 6th Street, 10th Street, 12th Street, 18th Street, Southeastern Avenue, and 26th Street in Sioux Falls, South Dakota.

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I-229 Exit 6 (10th Street) Interchange Study – Traffic Forecast Memo January 19, 2021 Page 2

INTRODUCTION

As part of the I-229 Exit 6 (10th Street) Interchange Modification Study in the City of Sioux Falls, South Dakota, traffic forecasts were completed. The study area limits extend north/south along I-229 from Exit 5 (26th Street) to Exit 7 (Rice Street), and east/west along 10th Street from Jessica Avenue to the signalized Hy-Vee entrance. Additional corridors within the study limits include:

- 26th Street form Van Eps Avenue to Southeastern Avenue,
- 18th Street from Southeastern Avenue to Cleveland Avenue,
- 12th Street from Lowell Avenue to Cleveland Avenue,
- 6th Street from Lowell Avenue to Cleveland Avenue, and
- Rice Street from Lowell Avenue to Bahnson Avenue.

As part of the study, the Average Daily Traffic (ADT) and peak hour traffic volume projections have been prepared for the 2027 Year of Project Completion and 2050 Planning Horizon Year. Existing turning movement volumes and output from the Sioux Falls MPO Travel Demand Model (TDM) were used to estimate the peak hour traffic volumes. The existing traffic volumes, established from the most recent available data which included mainline, ramp, and intersection counts, are documented in the previously submitted Existing Conditions technical memorandum. Using straight-line growth, interim year traffic forecasts were developed for the 2027 Year of Project Completion and 2050 Planning Horizon Year traffic volume conditions. The purpose of this memorandum is to document the process used to develop the projected volumes and to present the resulting values used for the analysis and assessment of traffic conditions.

TRAVEL DEMAND MODEL

The Sioux Falls Metropolitan Planning Organization (SFMPO) maintains a computerized travel demand model (TDM), using Cube Voyager software, for estimating future year traffic. In the model, the Sioux Falls metropolitan area is divided into smaller transportation analysis zones (TAZs), each of which includes information such as existing and future population, household size, number of vehicles, employment, and other socioeconomic data. The future land use for each TAZ (which will determine the future population and employment) is based on the plans in the area. The primary model outputs used for this study were the 2018 base model and 2045 projection year model average daily traffic (ADT) for each link in the network.

Data was retrieved from the SFMPO TDM for each interstate mainline, ramp, interchange crossroads and corridors within the study area. **Figure 1** shows the project study area.

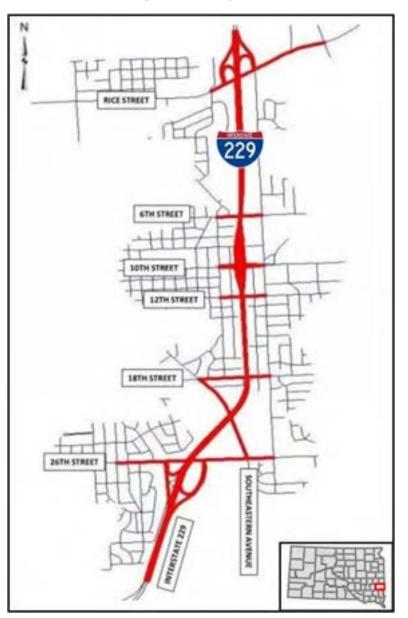


Figure 1: Study Area

FUTURE YEAR ADT FORECASTS

In order to evaluate the existing infrastructure under future traffic conditions, the estimated 2045 ADT volumes were provided by the Sioux Falls MPO Travel Demand Model. These forecasted volumes accounted for localized traffic growth, changes in traffic patterns, and any planned interchange improvements. The estimated ADT was provided for the Interstate mainline and crossroad corridors, as described earlier in this document. In order to determine the traffic growth within the study area to estimate 2050 traffic volumes, the 2018 base year ADT was also provided in the travel demand model. Growth factors were developed from the TDM data and applied to the existing traffic volume data to develop the 2050 ADT forecast.

FUTURE YEAR PEAK HOUR VOLUMES

The estimated ADT volumes for the 2050 Planning Horizon Year were used in the development of the morning (AM) and afternoon (PM) peak hour volumes. The peak hour volumes were later used for the traffic analysis to assess the level of operations for freeway sections and intersections within the study corridor.

Utilizing existing peak hour traffic data along with projected future year and base year ADT volumes, a multi-step process was used to obtain peak hour traffic counts for the planning horizon year condition. Growth factors developed from the TDM data were applied to the existing traffic volume data to develop the 2050 Planning Horizon Year peak hour traffic movement volumes. This output was compared against K factors developed for the AM and PM period at each location to verify the accuracy of growth and adjustments were made where necessary. The peak hour volumes between intersections were then smoothed and balanced to within five vehicles. The peak hour volumes between interchange ramps were smoothed and balanced to remove any vehicle flow variability. The resulting output was the 2050 Planning Horizon Year's peak hour turning volumes for the no build condition.

Table 1 and Table 2 show the 2050 peak hour traffic forecast volumes.

INTERIM YEAR ADT FORECASTS

In order to evaluate the existing infrastructure under interim year traffic conditions, straight-line growth rates between the existing year ADT volumes and the estimated 2050 ADT volumes were calculated and the interim year traffic volumes were interpolated. The 2027 Year of Project Completion daily traffic forecast was developed and carried forward to approximate the peak hour volumes.

INTERIM YEAR PEAK HOUR VOLUMES

The estimated 2027 Year of Project Completion morning (AM) and afternoon (PM) peak hour volumes were developed by process of interpolation using straight-line growth assumptions based on the existing year and future year 2050 traffic volumes. The peak hour volumes were later used for the traffic analysis to assess the level of operations for freeway sections and intersections within the study corridor.

Table 3 and Table 4 show the 2027 peak hour traffic forecast volumes.

SUMMARY

The traffic forecast methodology used for the I-229 Exit 6 (10th Street) Interchange Modification Study provided acceptable results for the 2050 Planning Horizon Year traffic demand. The minor adjustments were based on general knowledge of the area and the expected population and employment growth along with observed existing conditions.

The resulting 2050 No Build traffic forecast produced from the procedures described within this memorandum are depicted in **Figure 2** and **Figure 3**. The resulting 2027 No Build traffic forecast produced from straight-line growth interpolation is depicted in **Figure 4** and **Figure 5**.

		Northbound I-229												
	1-229	-	Exit 5		1-229		Exit 6				Exit 7	0	1-229	
Time	NB4	5R1	NB55	5R2	NB5	6R1	NB66	6R2	NB6	7R1	NB77	7R2	NB7	
7:15	840	135	650	110	835	245	645	210	770	130	675	130	760	
7:30	1,060	195	795	130	1,015	355	740	290	935	145	830	205	970	
7:45	1,180	205	895	105	1.080	350	800	240	940	135	845	190	975	
8:00	880	170	645	85	785	250	590	175	690	175	565	90	610	
AM Hr	3,960	705	2,985	430	3,715	1,200	2,775	915	3,335	585	2,915	615	3,315	
PHF	0.84	0.86	0.83	0.83	0.86	0.85	0.87	0.79	0.89	0.84	0.86	0.75	0.85	
ADJ	4,250	705	3,545	430	3,975	1,200	2,775	915	3,690	585	3,105	615	3,720	
16:30	1,120	300	705	35	765	390	460	195	595	185	460	100	525	
16:45	960	225	650	50	730	350	455	165	565	215	410	85	465	
17:00	1,080	305	660	75	785	395	475	180	595	230	425	105	500	
17:15	1,120	255	765	45	840	405	525	205	660	255	480	115	560	
PM Hr	4,280	1,085	2,780	205	3,120	1,540	1,915	745	2,415	885	1,775	405	2,050	
PHF	0.96	0.89	0.91	0.68	0.93	0.95	0.91	0.91	0.91	0.87	0.92	0.88	0.92	
ADJ	4,335	1,085	3,250	205	3,455	1,540	1,915	745	2,660	885	1,775	405	2,180	

Table 1: 2050 Interstate and Ramp Traffic Volume Projections

Daily	47,672	11,259	32,150	3,297	37,692	16,525	24,691	9,786	31,269	9,155	24,661	5,260	28,112
MPO Raw	41,813	7,482	34,331	6,340	40,671	11,201	29,470	8,058	37,528	10,739	26,789	5,258	32,047
ADJ	49,180	11,260	37,920	3,295	41,215	16,525	24,690	9,785	34,475	9,155	25,320	5,260	30,580

	Southbound I-229												
3	1-229	Exit 7			1-229	1-229	Exit 6		1-229		Exit 5		1-229
Time	SB7	7R3	SB77	7R4	SB6	6R3	SB66	6R4	SB5	5R3	SB55	5R4	SB4
7:15	495	85	395	190	605	130	450	280	730	95	560	250	1,025
7:30	515	45	460	190	675	165	480	345	825	100	640	275	1,150
7:45	570	75	475	185	690	155	500	345	845	95	675	265	1,165
8:00	400	45	345	150	510	110	380	260	640	75	500	195	865
AM Hr	1,980	250	1,675	715	2,480	560	1,810	1,230	3,040	365	2,375	985	4,20
PHF	0.87	0.74	0.88	0.94	0.90	0.85	0.91	0.89	0.90	0.91	0.88	0.90	0.90
ADJ	1,905	250	1.655	715	2,370	560	1,810	1,230	3,040	365	2,675	985	3.66
16:30	935	110	800	160	1,015	210	765	335	1,130	120	915	195	1,275
16:45	925	140	755	130	940	215	680	340	1,040	195	685	165	990
17:00	1,045	150	865	175	1,100	225	830	460	1,310	180	985	205	1,370
17:15	950	140	775	120	955	225	685	460	1,140	235	715	170	1,030
PM Hr	3,855	540	3,195	585	4,010	875	2,960	1,595	4,620	730	3,300	735	4,66
PHF	0.92	0.90	0.92	0.84	0.91	0.97	0.89	0,87	0.88	0.78	0.84	0.90	0.85
ADI	3,790	540	3,250	585	3,835	875	2,960	1,595	4,555	730	3,825	735	4,56
Dally	20 760	4.950	04 000	7.002	22.444	7 570	24 404		40.547	4 004	24.004	10 544	EA 47

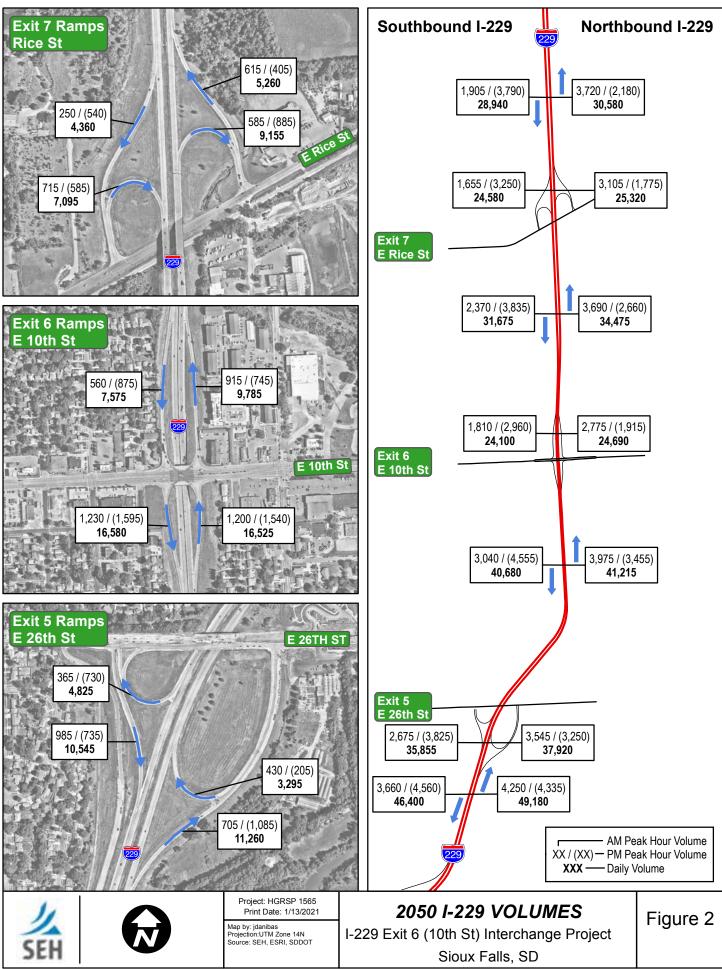
Daily	29,750	4,359	24,396	7,093	33,114	7,576	24,101	16,579	40,547	4,824	31,864	10,544	51,471
MPO Raw	34,087	5,763	28,324	8,283	36,607	10,756	25,851	13,095	38,946	2,852	36,094	6,084	42,178
ADJ	28,940	4,360	24,580	7,095	31,675	7,575	24,100	16,580	40,680	4,825	35,855	10,545	46,400

Table 2: 2050 Arterial Traffic Volume Projections

2050 AM Turning Movements	_		_							_	_				
Intersection	Int. #	Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
10th St at Jessica Ave	1	7:15	155	0	50	0	0	0	0	985	60	30	1905	0	3185
10th St at Lowell Ave	2	7:15	15	15	55	90	20	35	15	1045	10	55	1880	50	3285
10th St at Conklin Ave	3	7:15	0	0	170	0	0	10	0	1180	10	0	1975	10	3355
10th St at I-229 SPUI	4	7:15	620	0	580	225	Ó	335	155	660	535	695	1030	760	5595
10th St at XX	5	7:15	0	0	0	0	0	0	0	0	0	D	0	0	0
10th St at Blaine Ave	6	7:15	0	0	10	0	0	Ø	0	1415	50	0	2485	0	3960
10th St at Cleveland Ave	7	7:15	295	315	30	90	180	340	235	1050	140	35	1850	115	4675
10th St at Hyvee	8	7:15	10	5	5	30	5	65	100	1045	25	20	1925	90	3325
26th St at Van Eps Ave	9	7:15	5		10	25	5	15	5	450	10	20	885	10	1440
26th St at Yeager Rd	10	7:15	25	5	55	10	5	10	5	435	10	125	890	10	1585
26th St at I-229 SB Ramp	11	7:15	155	0	210	0	0	0	0	415	85	900	870	0	2635
26th St at I-229 NB Ramp	12	7:15	190	0	515	0	0	0	0	510	115	315	1580	0	3225
26th St at Southeastern Ave	13	7:15	525	1200	90	110	205	75	80	820	125	40	1295	325	4890
26th St at Cleveland Ave	14	7:15	45	65	30	60	10	105	55	940	25	15	1510	85	2945
Rice St at Lowell Ave	15	7:15	60	0	-90	0	O	0	0	425	25	30	1150	Ø	1780
Rice St at I-229 SB Ramp	16	7:15	0	0	0	155	0	-95	170	345	0	0	1085	545	2395
Rice St at I-229 NB Ramp	17	7:15	300	355	155	170	40	375	40	210	250	60	955	220	3130
Rice St at Bahnson Ave	18	7:15	10	0	30	5	0	35	45	485	10	20	1185	15	1840
18th St at Southeastern Ave	19	7:15	1375	190	40	5	85	25	15	175	210	25	395	15	2555
18th St at Cleveland Ave	20	7:15	55	160	5	25	115	100	40	100	25	20	310	65	1020
12th St at Lowell Ave	21	7:15	5	45	20	35	15	10	10	175	5	5	495	40	860
12th St at Cleveland Ave	22	7:15	160	415	10	35	200	35	25	120	20	25	340	75	1460
6th St at Lowell Ave	23	7:15	15	10	15	5	20	35	10	530	20	45	1075	5	1785
6th St at Cleveland Ave	24	7:15	140	195	300	160	195	110	55	435	80	380	900	270	3220

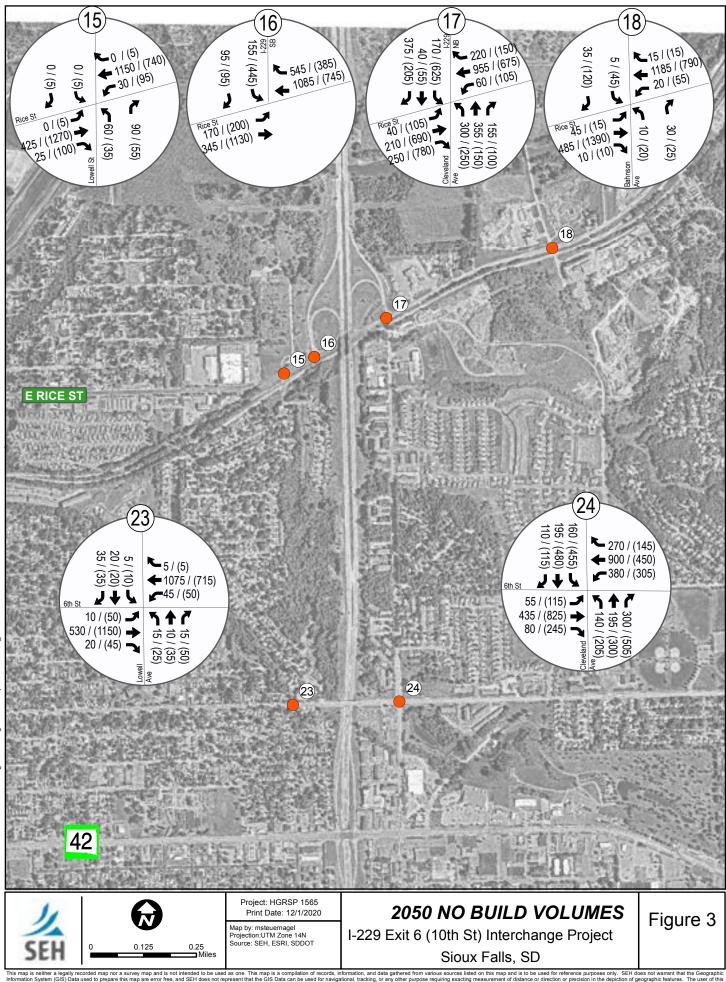
2050 PM Turning Movements

Intersection	Int. #	Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
10th St at Jessica Ave	1	16:30	65	D	60	0	0	0	0	2060	105	65	1460	0	3815
10th St at Lowell Ave	2	16:30	10	30	70	180	55	20	30	2115	20	180	1525	100	4335
10th St at Conklin Ave	3	16:30	Q	0	90	0	0	25	0	2340	25	0	1780	20	4280
10th St at 1-229 SPUI	4	16:30	535	0	1005	595	0	280	320	1245	865	730	985	425	6985
10th St at XX	5	16:30	0	0	0	D	0	0	0	0	0	0	0	D	0
10th St at Blaine Ave	6	16:30	0	0	15	0	0	0	0	2760	85	0	2140	0	5000
10th St at Cleveland Ave	7	16:30	230	300	70	235	345	220	340	2045	390	40	1690	185	6090
10th St at Hyvee	8	16:30	30	10	20	100	5	90	185	2080	85	25	1795	80	4505
26th St at Van Eps Ave	9	15:30	5	5	5	10		15	10	575	5	5	605	15	1255
26th St at Yeager Rd	10	16:30	15	5	160	10	5	10	10	540	15	150	610	10	1540
26th St at I-229 SB Ramp	11	16:30	150	0	580	0	0	0	0	615	95	640	620	0	2700
26th St at I-229 NB Ramp	12	16:30	85	0	1000	0	0	0	0	1090	105	100	1175	0	3555
26th St at Southeastern Ave	13	16:30	225	490	140	375	1050	85	120	1355	615	95	965	170	5685
26th St at Cleveland Ave	14	16:30	35	30	25	140	100	150	170	1650	50	45	1045	105	3545
Rice St at Lowell Ave	15	16:30	35	0	55	5	0	5	5	1270	100	95	740	5	2315
Rice St at I-229 SB Ramp	16	16:30	0	0	0	445	0	95	200	1130	0	0	745	385	3000
Rice St at I-229 NB Ramp	17	16:30	250	150	100	625	55	205	105	690	780	105	675	150	3890
Rice St at Bahnson Ave	18	16:30	20	0	25	45	0	120	15	1390	10	55	790	15	2485
18th St at Southeastern Ave	19	16:30	485	155	150	20	105	15	65	610	1315	105	170	20	3215
18th St at Cleveland Ave	20	16:30	55	225	30	170	270	80	125	465	140	15	125	40	1740
12th St at Lowell Ave	21	16:30	5	25	30	95	65	15	10	700	10	15	290	20	1280
12th St at Cleveland Ave	22	16:30	90	315	40	110	465	65	95	495	210	25	190	55	2155
6th St at Lowell Ave	23	16:30	25	35	50	10	20	35	50	1150	45	50	715	5	2190
6th St at Cleveland Ave	24	16:30	205	300	505	455	480	115	115	825	245	305	450	145	4145



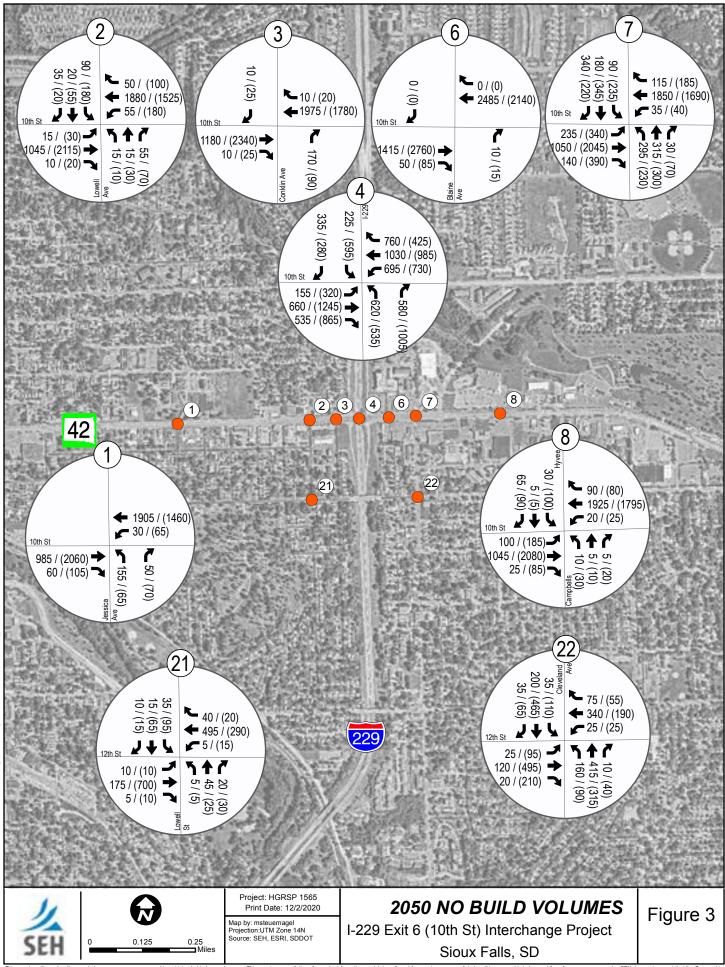
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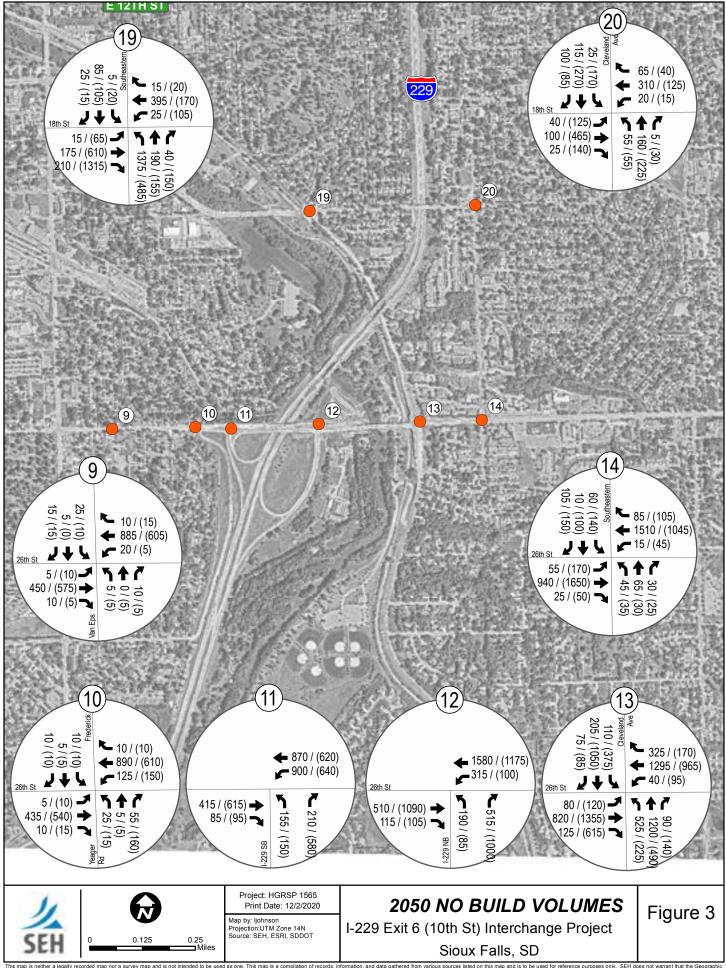
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						Nort	hbound I	-229					
	1-229	5	Exit 5	v - 3	1-229	2	Exit 6	1	1-229		· 3	1-229	
Time	NB4	5R1	NB55	5R2	NB5	6R1	NB66	6R2	NB6	7R1	NB77	7R2	NB7
7:15	520	110	405	110	525	125	405	140	530	70	465	95	555
7:30	660	155	495	130	640	185	465	195	645	75	570	150	710
7:45	735	165	555	105	675	185	500	160	650	70	585	140	715
8:00	545	135	400	85	495	130	370	115	475	95	390	65	450
AM Hr	2,460	565	1,855	430	2,335	625	1,740	610	2,300	310	2,010	450	2,430
PHF	0.84	0.86	0.84	0.83	0.86	0.84	0.87	0.78	0.88	0.82	0.86	0.75	0.85
ADJ	2,470	565	1,905	430	2,335	625	1,710	610	2,320	310	2,010	450	2,460
16:30	695	240	440	35	480	200	290	130	410	100	315	75	385
16:45	600	180	405	50	460	180	285	110	390	115	280	65	340
17:00	670	245	410	75	490	205	295	120	410	125	295	75	365
17:15	695	205	475	45	530	210	330	135	455	135	330	85	410
PM Hr	2,660	870	1,730	205	1,960	795	1,200	495	1,665	475	1,220	300	1,500
PHF	0.96	0.89	0.91	0.68	0.92	0.95	0.91	0.92	0.91	0.88	0.92	0.88	0.91
AD)	2,625	870	1,755	205	1,960	795	1,165	495	1,660	475	1,185	300	1,485
Daily	29,620	9,025	19,975	3,295	23,650	8,570	15,490	6,485	21,540	4.870	16,985	3,900	20,625
MPO Raw	-	1	1	1000		-	(L.)		1.000		1000	-	
ADJ	29,380	9,025	20,395	3,295	23,650	8,570	15,080	6,485	21,565	4,870	16,695	1,900	20,595
						Sout	thbound I	-229					
()	1-229	e	Exit 7		1-229	8	Exit 6		1-229	Exit 5			1-229
Time	SB7	7R3	SB77	7R4	SB6	6R3	SB66	6R4	SB5	5R3	SB55	5R4	SB4
7:15	365	70	290	125	420	105	310	150	460	95	350	250	635
7:30	380	40	335	125	465	130	330	185	515	100	400	275	715
7:45	420	65	350	120	475	125	345	185	530	95	425	265	725
8:00	290	40	250	100	350	90	260	140	400	75	315	195	535
AM Hr	1,455	215	1,225	470	1,710	450	1,245	660	1,905	365	1,490	985	2,610
PHF	0.87	0.77	0.88	0.94	0.90	0.87	0.90	0.89	0.90	0.91	0.88	0.90	0.90
ADJ	1,440	215	1,225	470	1,695	450	1,245	660	1,905	365	1,540	985	2,525
16:30	685	95	585	105	700	165	525	180	710	120	575	195	795
16:45	680	120	555	85	645	170	470	180	655	195	430	165	615
17:00	765	130	635	115	755	180	570	245	820	180	615	205	850
	695	120	570	80	655	180	470	245	715	235	450	170	640
17:15	030							_				_	
PM Hr	2,825	465	2,345	385	2,755	695	2,035	850	2,900	730	2,070	735	2,900
			2,345 0.92	385 0.84	2,755	695 0.97	2,035	850 0.87	2,900 0.88	730 0.78	0.84	735 0.90	2,900

Table 3: 2027 Interstate and Ramp Traffic Volume Projections

Daily	21,825	3,765	17,895	4,670	22,810	5,990	16,600	8,805	25,440	4,825	19,990	10,545	31,980
MPO Raw													
ADI	21,720	3,765	17,955	4,670	22,675	5,990	16,635	8,805	25,440	4,825	20,615	10,545	31,160

Table 4: 2027 Arterial Traffic Volume Projections

2027 AM Turning Movements

26th St at Cleveland Ave

Rice St at I-229 SB Ramp

Rice St at I-229 NB Ramp

18th St at Southeastern Ave

Rice St at Bahnson Ave

18th St at Cleveland Ave

12th St at Cleveland Ave

6th St at Cleveland Ave

12th St at Lowell Ave

6th St at Lowell Ave

Rice St at Lowell Ave

14 16:30

15 16:30

16 16:30

17 16:30

18 16:30

16:30

16:30

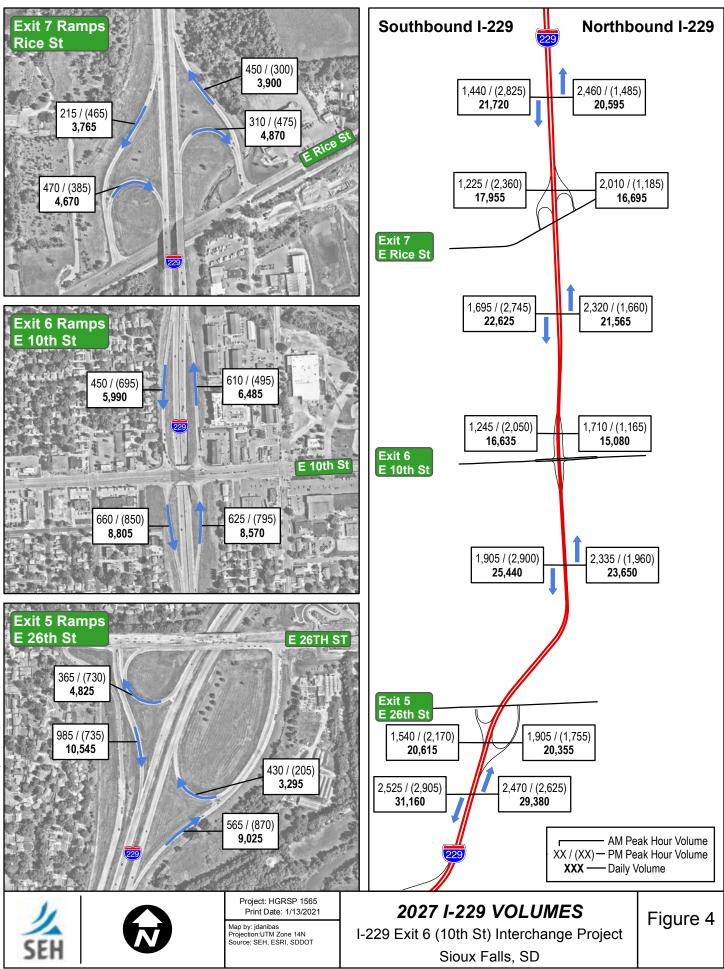
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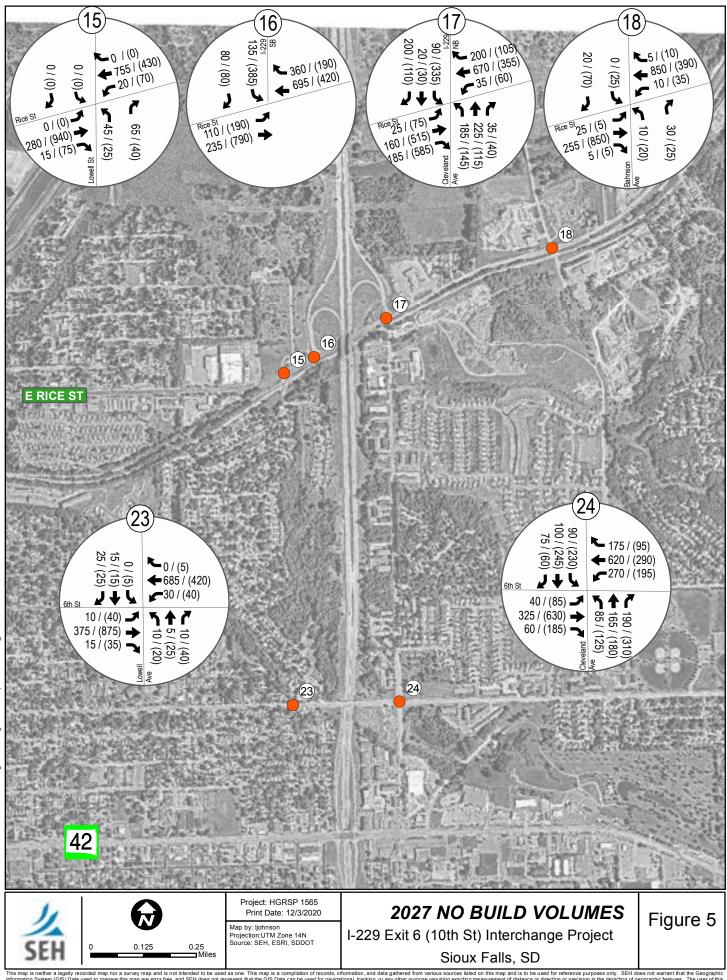
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2027 AM Turning Movements	-						10000		1000	-					
Intersection	1.53.07.00	Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
10th St at Jessica Ave	1	7:15	115	0	40	0	0	0	0	600	45	20	1415	0	2235
10th St at Lowell Ave	2	7:15	10	10	40	65	15	25	10	675	10	35	1275	30	2200
10th St at Conklin Ave	3	7:15	0	0	125	0	0	10	0	775	10	0	1340	5	2265
10th St at I-229 SPUI	4	7:15	320	0	300	180	0	270	110	490	300	350	750	495	3565
10th St at XX	5	7:15	0	0	0	0	0	0	0	0	0	0	0	0	0
10th St at Blaine Ave	6	7:15	0	0	5	0	0	0	0	935	35	0	1600	0	2575
10th St at Cleveland Ave	7	7:15	205	220	20	55	110	210	160	690	95	20	1185	60	3030
10th St at Hyvee	8	7:15	10	5	5	30	5	65	90	655	15	10	1210	70	2170
26th St at Van Eps Ave	9	7:15	5	0	5	25	5	15	5	365	10	20	805	5	1265
26th St at Yeager Rd	10	7:15	25	5	55	10	5	10	5	400	5	120	730	5	1375
26th St at I-229 SB Ramp	11	7:15	155	0	210	0	0	0	0	380	85	900	700	0	2430
26th St at I-229 NB Ramp	12	7:15	150	0	415	0	0	0	0	475	115	315	1455	0	2925
26th St at Southeastern Ave	13	7:15	480	685	55	55	115	40	65	700	120	40	1250	250	3855
26th St at Cleveland Ave	14	7:15	45	35	30	55	10	100	50	740	20	10	1395	70	2560
Rice St at Lowell Ave	15	7:15	45	0	65	0	D	0	0	280	15	20	755	0	1180
Rice St at I-229 SB Ramp	16	7:15	0	0	0	135	0	80	110	235	0	0	695	360	1615
Rice St at I-229 NB Ramp	17	7:15	185	225	35	90	20	200	25	155	185	35	665	200	2020
Rice St at Bahnson Ave	18	7:15	10	0	30	0	0	20	25	255	5	10	850	5	1210
18th St at Southeastern Ave	19	7:15	970	85	15	5	20	25	10	100	120	25	390	15	1780
18th St at Cleveland Ave	20	7:15	55	155	5	20	95	85	35	65	20	20	305	65	925
12th St at Lowell Ave	21	7:15	5	35	15	30	10	10	10	140	0	5	390	35	685
12th St at Cleveland Ave	22	7:15	135	345	5	25	140	20	15	65	15	20	315	70	1170
6th St at Lowell Ave	23	7:15	10	5	10	0	15	25	10	375	15	30	685	0	1180
6th St at Cleveland Ave	24	7:15	85	120	190	90	100	75	40	325	60	270	620	175	2150
2027 PM Turning Movements															
Intersection	Int.#	Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
10th St at Jessica Ave	1	16:30	45	0	45	0	Ö	0	0	1620	80	50	870	0	2710
10th St at Lowell Ave	Z	16:30	5	25	50	135	40	15	25	1400	15	135	955	70	2870
10th St at Conklin Ave	3	16:30	0	0	65	0	0	20	0	1565	20	0	1140	15	2825
10th St at I-229 SPUI	4	16:30	275	0	520	470	0	220	225	920	480	365	655	270	4400
10th St at XX	5	16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
10th St at Blaine Ave	6	16:30	0	0	10	0	0	0	0	1865	55	0	1290	0	3220
10th St at Cleveland Ave	7	16:30	175	210	50	145	210	160	235	1345	300	20	950	90	3890
10th St at Hyvee	8	16:30	30	10	20	100	5	90	160	1365	45	15	950	65	2855
26th St at Van Eps Ave	9	16:30	5	0	0	10	0	15	5	680	5	0	500	10	1230
26th St at Yeager Rd	10	16:30	15	5	150	10	5	10	10	520	10	140	480	10	1365
26th St at I-229 SB Ramp	11	16:30	150	0	585	0	0	0	0	590	90	640	480	0	2535
26th St at I-229 NB Ramp	12	16:30	65	0	805	0	0	0	0	1070	105	100	1055	0	3200
26th St at Southeastern Ave	13	16:30	195	240	100	270	600	50	60	1285	525	90	910	140	4465
and a source of the	Aug.	10.50	100	640	100	210	000	50	00	1203	525	10	210	140	1105

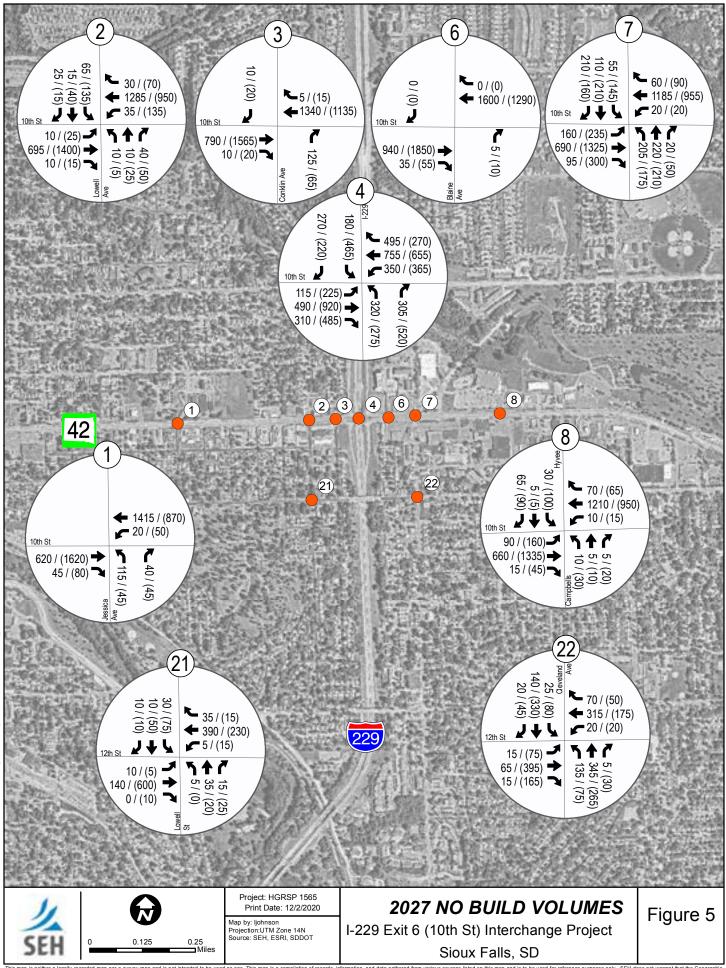


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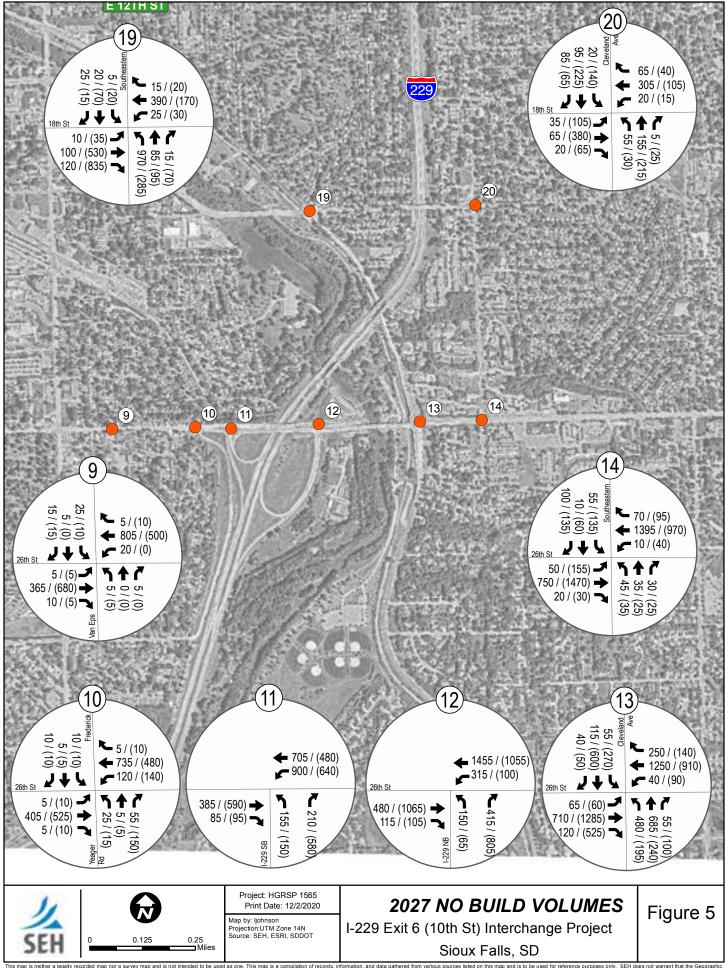


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Appendix C – Existing Conditions Memo



Building a Better World for All of Us[®]

DRAFT MEMORANDUM

TO:	Steve Gramm South Dakota Department of Transportation
FROM:	Graham Johnson, PE (SD, MN, IA), PTOE Justin Anibas, EIT Chase Cutler, HR Green, PE, PTOE
DATE:	October 28, 2020
RE:	I-229 Exit 6 (10th Street) Interchange Project - Existing Conditions Memo SEH No. HRGSP 156524

This technical memorandum provides the findings related to the existing conditions of the I-299 Exit 6 interchange at 10th Street. The project area includes mainline I-229 between Exit 5 and Exit 7, as well as Rice Street, 6th Street, 10th Street, 12th Street, 18th Street, Southeastern Avenue, and 26th Street in Sioux Falls, South Dakota.

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INTRODUCTION

The South Dakota Department of Transportation (SDDOT) initiated an assessment of the existing interchange on Interstate 229 (I-229) at 10th Street (Exit 6) to improve the safety, operations and geometric design of the interchange area.

The subject interchange is at mileage reference marker 6 on I-229, in eastern Sioux Falls, SD. The interchange is approximately six miles east/northeast of the I-29/I-229 system interchange and four miles south of the I-229/I-90 system interchange. The adjacent interchanges along I-229 are 26th Street (Exit 5) and Rice Street (Exit 7); the interchange spacing is approximately 1-1/4 mile to either side of the subject interchange.

Engineers | Architects | Planners | Scientists

This location is within the Sioux Falls MPO and within the developed urban area of the city. The 10th Street corridor is a primary commuter route between downtown and the urban/suburban residential areas throughout the Sioux Falls eastern metropolitan area.

Figure 1 shows the project area and the 24 study intersection, which includes Mainline I-229, 10th Street (Exit 6 Interchange), and several other roadways that cross I-229.



Figure 1 Project Location

EXISTING ROADWAY NETWORK

The existing roadway network, represented by their Federal functional classification, surrounding the project area is shown in **Figure 2**.

The existing major roadways within the study area include:

- **I-229** urban interstate facility, currently two continuous lanes in each direction with auxiliary lanes provided between the Exit 6 and Exit 7 interchanges.
 - 2018 Average Annual Daily Traffic (AADT) ranges between 29,800 to 37,700 vehicles in the project area.
- **Rice Street** urban minor arterial transitioning between a 3-lane and 4-lane roadway; west of the interstate the roadway is a 4-lane undivided facility and east of the interstate the roadway is a 3-lane facility.
 - o 2018 AADT ranges between 12,500 and 13,700 vehicles in the project area.
- E. 6th Street urban major collector transitioning between a 3-lane and 4-lane roadway; west of the interstate the roadway is a 3-lane facility and east of the interstate the roadway is a 4-lane undivided facility.
 - o 2018 AADT ranges between 10,200 and 15,100 vehicles in the project area.
- E. 10th Street urban principal arterial with a 4-lane divided roadway within the interchange area; east and west of the interchange area the roadway is a 4-lane undivided with a two-way left turn lane (TWLTL, 5-lane).
 - o 2018 AADT ranges between 21,200 and 31,400 vehicles in the project area.
- E. 12th Street 2-lane major urban collector roadway.
 - 2018 AADT ranges between 3,400 and 4,600 vehicles in the project area.
- E. 18th Street 2-lane major urban collector roadway.
 - o 2018 AADT ranges between 3,800 and 5,500 vehicles in the project area.
- **E. 26th Street** urban minor arterial varying between 3-lane and 5-lane sections. 26th Street is being reconstructed to a 4-lane divided roadway through the I-229 interchange as part of an on-going interchange project (complete in 2020).
 - o 2018 AADT ranges between 12,400 and 28,500 vehicles in the project area.
- N. Cleveland Avenue urban major collector roadway transitioning between a 2-lane and 3-lane facility.
 - 2018 AADT ranges between 6,400 and 7,100 vehicles in the project area.
- S. Cleveland Avenue 2-lane urban major collector roadway.
 - 2018 AADT ranges between 5,400 and 6,400 vehicles in the project area.
- **S. Southeastern Avenue** urban minor arterial transitioning between a 3-lane and 4-lane roadway.
 - o 2018 AADT ranges between 8,500 and 12,700 vehicles in the project area.
 - As part of the 2020 reconstruction on 26th Street, the Southeastern Avenue approaches to 26th Street are being expanded to include dual left turn lanes, two through lanes, and a right turn lane.
- N. Lowell Avenue 2-lane urban local roadway.
- S. Lowell Avenue 2-lane urban local roadway.



Figure 2 Existing Federal Functional Classification

EXISTING INTERCHANGES

The following is a description and aerial photograph of the four existing interchanges within the entire project study area.

I-229 at 26th Street (Exit 5)

The interchange is wrapping up a major reconstruction project in 2020. The interchange was reconstructed to a standard folded diamond configuration as shown in **Figure 3**. The northbound I-229 ramp connections were widened near the ramp terminal intersection, but are unchanged near the ramp gores. The southbound ramp configuration was entirely reconfigured.

Yeager Road was realigned to connect to 26th Street west of its current location and will no longer be related to the interchange. A new southbound exit loop ramp will directly tie into 26th Street; this new ramp terminal intersection is essentially in the same location as the existing 26th Street/Yeager Road intersection. The first intersection to the west will be approximately 400 feet away at the new Yeager Road intersection. 26th Street was widened and additional turn lanes were provided at the ramp terminal intersections; both are controlled by traffic signals.

The 26th Street at Yeager Road intersection will be under minor street stop control. The expansion of 26th Street will extend to the east and include significant reconfiguration of the intersection with Southeastern Avenue. The first intersection to the east will be approximately 300 feet away at a business driveway, with the first major intersection approximately 1,250 feet away at Southeastern Avenue.



Figure 3 Existing I-229 at 26th Street Interchange (2020)

I-229 at 10th Street (Exit 6)

This service interchange along I-229 is a Single Point Urban Interchange (SPUI) as shown in **Figure 4**. All ramp connections are currently single lane ramps at the merge and diverge locations with I-229, with full auxiliary lanes provided between the adjacent interchange to the north. At this interchange, 10th Street travels over I-229 on a single bridge structure.

The ramp connections are a SPUI design that is currently controlled by a single traffic signal. The nearest intersection west of the interchange is approximately 275 feet at Conklin Avenue which is a Right-In/Right Out (RI/RO) access, the nearest full access intersection is approximately 600 feet away at Lowell Avenue (traffic signal control). The nearest intersection east of the interchange is approximately 375 feet at Blaine Avenue which is a Right-In/Right Out (RI/RO) access, the nearest full access, the nearest full access intersection is approximately 375 feet at Blaine Avenue which is a Right-In/Right Out (RI/RO) access, the nearest full access intersection is approximately 375 feet at Blaine Avenue which is a Right-In/Right Out (RI/RO) access, the nearest full access intersection is approximately 700 feet away at Cleveland Avenue (traffic signal control).



Figure 4 Existing I-229 at 10th Street Interchange

I-229 at Rice Street (Exit 7)

This service interchange along I-229 is a folded diamond configuration to the north as shown in **Figure 5**. All ramp connections are currently single lane ramps at the merge and diverge locations with I-229, with full auxiliary lanes provided between the adjacent interchange to the south and north. At this interchange, I-229 travels over Rice Street on two separate bridge structures.

Both ramp terminal intersections are currently controlled by traffic signals with approximately 1,000 feet between the intersections. The south leg of the eastern ramp terminal (northbound I-229) is Cleveland Avenue. The nearest intersection west of the interchange is approximately 450 feet away at Lowell Avenue (minor street stop control), the nearest intersection to the east is approximately 2,250 feet away at Bahnson Avenue (minor stop control).

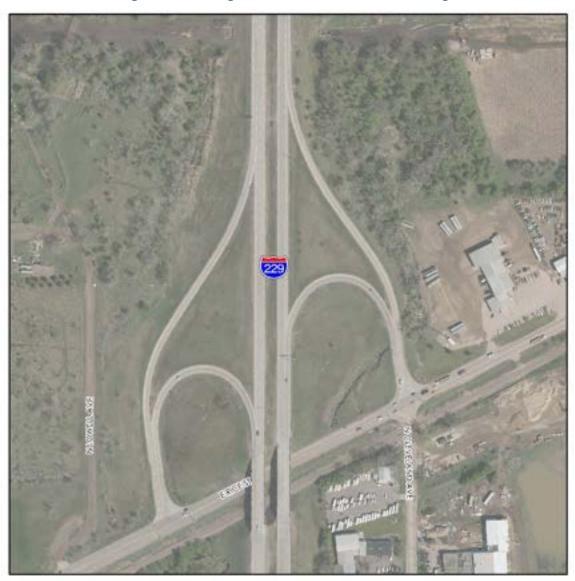


Figure 5 Existing I-229 at Rice Street Interchange

TRAFFIC DATA AND INFORMATION

The data used to create this document came from the participating agencies including the SDDOT and the City of Sioux Falls. The most recent data available was used in the analysis including traffic counts, crash data, and signal timing data.

Traffic Volumes

Due to multiple conditions in the project area, traffic volumes and turning movement volumes were not able to be collected as part of this study. The following two reasons limited the data collection at the time of this study:

- The current health pandemic (Covid 19) and associated travel reductions throughout the state.
- Construction detours corresponding to the 26th Street interchange reconstruction.

However, there have been several recent studies as well as other miscellaneous turning movement counts that were provided and utilized for this project. **Table 1** lists all the study intersections and the most recent count year provided; the SDDOT provided 2018 I-229 mainline and ramp data for the project area.

Int #	Main Street	Cross Street	Count Year(s)
1	10 ^{⊤⊢} Street	Jesiica Avenuve	2017
2	10 [™] Street	Lowell Avenue	2017/2015
3	10 [™] Street	Conklin Avenue	2013
4	10 [™] Street	I-229 SPUI	2019/2016
6	10 ^{⊤∺} Street	Blaine Avenue	2013
7	10 [™] Street	Cleveland Avenue	2019/2018
8	10 ^{⊤н} Street	HyVee Entrance	2019
9	26 TH Street	Van Eps Avenue	2018
10	26 [™] Street	Yeager/Frederick Avenue	2018
11	26 TH Street	I-229 SB Ramp Terminal	2016
12	26 ^{⊤H} Street	I-229 NB Ramp Terminal	2018
13	26 ^{⊤∺} Street	Southeastern Avenue	2018
14	26 [™] Street	Cleveland Avenue	2018
15	Rice Street	Lowell Avenue	2015
16	Rice Street	I-229 SB Ramp Terminal	2018
17	Rice Street	I-229 NB Ramp Terminal	2018
18	Rice Street	Bahnson Avenue	2020
19	18 ^{⊤н} Street	Southeastern Avenue	2018
20	18 ^{⊤н} Street	Cleveland Avenue	2018
21	12 TH Street	Lowell Avenue	2020
22	12 TH Street	Cleveland Avenue	2019/2016
23	6 ^{⊤н} Street	Lowell Avenue	2015
24	6 ^{⊤∺} Street	Cleveland Avenue	2018/2015

Table 1 Intersection Count Information

Notes: 2019 Data along 10th Street includes detour traffic from 26th Street construction; previous counts were reviewed to blend data.

26th St at Yeager/SB Ramp 2018 data was modified to match new conditions.

All historical traffic count data was factored up to an existing 2021 estimate based on the existing count year, historical average annual daily traffic (AADT), and balancing between study intersections.

Figure 6 represents the study intersection count locations. The existing 2021 freeway traffic counts and intersection turning movements at all study intersections can be found in the attached **Figures A1-A3**.

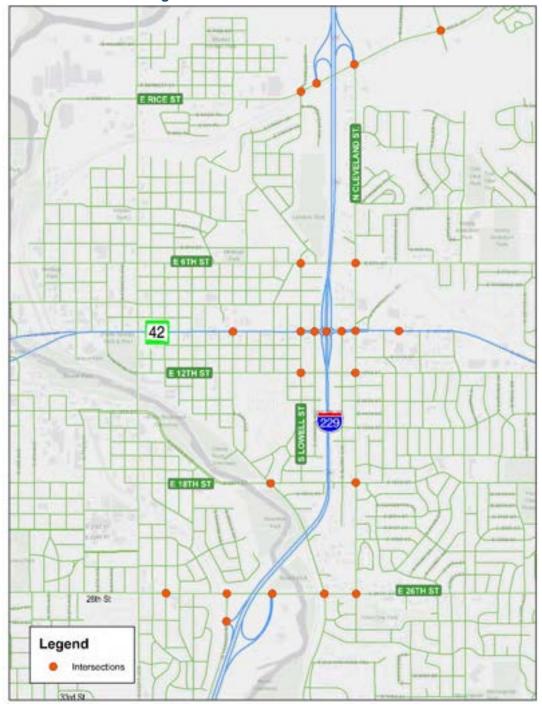


Figure 6 Intersection Count Locations

Origin Destination Study

An origin-destination (OD) study was previously developed for I-229 during the interchange study for Exit 3 and Exit 4. As the current Exit 5 construction is presently creating unrealistic patterns due to detouring traffic, updating the OD study was not considered feasible and therefore the previous results will be utilized and described below.

During the Exit 3 and Exit 4 study, data from a 3rd party vendor platform, StreetLight Data Incorporated was used. The platform uses global positioning system (GPS) information and location based service (LBS) information from both connected vehicles (cars and trucks) and cell phones.

A full OD study was conducted along I-229 between I-29 and I-90, including all nine service interchanges between the two system interchanges. The full results can be found in the I-229 Exits 3 & 4 Interchange Study: Origin-Destination Study memorandum, as part of the Exit 3 and Exit 4 Interstate Modification Justification Reports (IMJR).

The platform allowed for 1-year worth of data to be pulled for the entire I-229 corridor; a total of 375,000 personal LBS trips and 265,000 commercial GPS trips were captured along the corridor. The data is sorted out by day of the week and grouped by hours throughout the day. For the OD analysis, the weekday trips during the AM and PM peak periods, 6am to 9am and 3pm to 6pm, were tabulated for use in this study evaluation.

For this analysis, the information regarding the weaving percentages between the study interchanges was utilized in the operational weaving analysis. **Table 2** shows the results of the four weaving segments within this interchange project area; the percentages are of the entrance ramp volumes entering I-229.

Ramp Weaving Segment		Avg Weekday 24-hr Data	Avg Weekday AM Peak	Avg Weekday PM Peak
NB I-229	Exit 5 to Exit 6	22%	12%	31%
NB I-229	Exit 6 to Exit 7	17%	13%	22%
SB I-229	Exit 7 to Exit 6	23%	14%	24%
SB I-229	Exit 6 to Exit 5	11%	9%	11%

Table 2 Origin Destination Information

TRAFFIC OPERATIONS

A traffic operations study was conducted for the project area using the estimated 2021 traffic volumes. A total of twenty-three existing intersections and twelve ramp junctions were analyzed within the interchange study area.

Analysis techniques included evaluation of operational capacity using the Highway Capacity Manual (HCM), 6th Edition, techniques via the Highway Capacity Software (HCS) Version 7.

It should be noted that the HCM does not recommend using the merge and diverge analysis procedures when a full length auxiliary lane is provided; the methodologies were derived from acceleration and deceleration lengths of 1,500 feet or less. Page 14-30 of the HCM 6th Edition says:

- The freeway segment downstream of the on-ramp or upstream of the off-ramp is simply considered to be a basic freeway segment with an additional lane.
- The case of an on-ramp followed by an off-ramp lane drop may be a weaving segment and should be evaluated with the procedures of Chapter 13, Freeway Weaving Segments.

Therefore, for this analysis both the basic lane and weaving segment analysis were conducted on all freeway mainline segments that include full auxiliary lanes between ramp connections.

Level of Service Criteria

The freeway and arterial Level of Service (LOS) criteria presented in the following tables were used to evaluate the traffic operations in the study area; the information is from the SDDOT Road Design Manual (Chapter 15) and based on the Highway Capacity Manual (HCM).

Level of Service (LOS)	Description	Density (pc/mi/ln)
А	Free-flow operation	<u><</u> 11.0
В	Reasonably free-flow operation; minimal restriction on lane changes & maneuvers	> 11.0 to 18.0
С	Near free-flow operation; noticeable restriction on lane changes & other maneuvers	> 18.0 to 26.0
D	Speed decline with increasing flows; significant restriction on lane changes & other maneuvers	> 26.0 to 35.0
E	Facility operates at capacity; very few gaps for lane changes & other maneuvers; frequent disruptions & queues	> 35.0 to 45.0
F	Unstable flow; operational breakdown	> 45.0

Table 3 Freeway - LOS Criteria

Source: SDDOT Road Design Manual (Table 15-1)

Level of Service (LOS)	Description	Signalized Delay (sec/veh)
А	Very minimal queueing; excellent corridor progression	<u><</u> 10.00
В	Some queuing; good corridor progression	> 10.0 to 20.0
С	Regular queueing; not all demand may be serviced on some cycles (cycle failure)	> 20.0 to 35.0
D	Queue lengths increased; routine cycle failures	> 35.0 to 55.0
E	Majority of cycles fail	> 55.0 to 80.0
F	Volume to capacity ratio approaches 1.0; very long queues, almost all cycles fail	> 80.0

Table 4 Signalized Intersection Control - LOS Criteria

Source: SDDOT Road Design Manual (Table 15-5)

Table 5 All-Way Stop & Two Way Stop Intersection Control - LOS Criteria

Level of Service (LOS)	Description	Un-signalized Delay (sec/veh)
А	Queuing is rare	<u><</u> 10.00
В	Occasional queueing	> 10.0 to 15.0
С	Regular queueing	> 15.0 to 25.0
D	Queue lengths increase	> 25.0 to 35.0
Е	Significant queueing	> 35.0 to 50.0
F	Volume to capacity ratio approaches 1.0; very long queues	> 50.0

Source: SDDOT Road Design Manual (Table 15-6 and 15-7)

The SDDOT has established a minimum of LOS C on urban interstate highway corridors. At ramp terminal intersections the overall intersection must be at a LOS C or better; however, individual movements may operate at a LOS D.

The City of Sioux Falls has established a minimum of LOS D on arterial signalized intersections and any intersection movement at LOS E or better. Two way stop control intersections should have the minor approaches operate at a LOS D or better.

Available storage for turning vehicles plays an important role in the operations of an intersection. The HCM software does not properly handle lane blockage conditions, providing LOS results that are not reflective of actual operations. The HCM methodologies provide a "Queue Storage Ratio" (QSR) which is the maximum stacking of queued vehicles (SDDOT recommends the 95th percentile queue) divided by the available storage length provided for the movement. If the QSR is above 1.0, it represents a queue that is spilling outside of the available storage and blocking other movements at the intersection. At any intersection where the QSR is above 1.0 for a movement, it is SDDOT preference to state the intersection has failing operations, regardless of the overall delay at the intersection. The volume to capacity (v/c) ration should also be less than 1.0 for all movements.

Existing Operations

The project area includes 3 service interchanges with 12 ramp junctions and 7 mainline segments; however some of the ramps have auxiliary lanes between adjacent interchanges and therefore limit the number of merge and diverge analysis locations.

The summation of the existing traffic operations analysis show that mainline I-229 operates acceptably. All existing ramp junctions and weaving segments operate at a LOS C or better during the AM and PM peak hours. Results for the individual segments and ramp junctions of I-229 in the project area are shown in **Table 6** as well as **Figure 7**.

Road	Description	Analysis Type	AM Peak LOS	PM Peak LOS
VB I-229	NB I-229: southwest of Exit 5	Basic	В	В
	NB I-229: between Exit 5 Exit and Entrance Ramps	Basic	В	В
	NB I-229: Exit 5 Entrance Ramp	Merge	С	В
	NB I-229: between Exit 5 and Exit 6	Basic	С	В
	NB I-229: Exit 6 Exit Ramp	Diverge	В	А
B	NB I-229: between Exit 6 Exit and Entrance Ramps	Basic	В	А
2	NB I-229: between Exit 6 and Exit 7	Basic	В	А
	IND 1-229. Detween Exit 6 and Exit 7		В	А
	NB I-229: between Exit 7 Exit and Entrance Ramps	Basic	В	А
	NB I-229: north of Exit 7	Basic	В	А
	SB I-229: north of Exit 7	Basic	А	В
	SB I-229: between Exit 7 Exit and Entrance Ramps	Basic	А	С
	SB I-229: between Exit 7 and Exit 6		А	В
0			В	В
-22	SB I-229: between Exit 6 Exit and Entrance Ramps	Basic	А	В
SB I-229	SB I-229: Exit 6 Entrance Ramp	Merge	В	В
	SB I-229: between Exit 6 and Exit 5	Basic	В	С
	SB I-229: Exit 5 Exit Ramp	Diverge	В	С
	SB I-229: between Exit 5 Exit and Entrance Ramps	Basic	В	В
	SB I-229: southwest of Exit 5	Basic	В	В

Table 6 Existing (2021) Freeway Operations Summary

Of the five total LOS C segments or junctions, the 4-lane section of I-229 between Exit 5 and Exit 6 includes 4 of the LOS C results. Currently the basic lanes have LOS C directionally with northbound in the AM peak hour and southbound in the PM peak hour. With the basic lane approaching capacity, the northbound merge from Exit 5 and the southbound diverge to Exit 5 both currently operate at a LOS C. The ramps merge and diverge from Exit 6 are not an issue on this segment as they both have long acceleration and deceleration lanes provided.

The southbound direction between Exit 6 and Exit 5 in the PM peak hour is currently approaching the LOS C/D threshold; it is within approximately 300 vehicles or approximately 10% of the volume threshold to be LOS D.

The final LOS C is located along southbound I-229 between the Exit 7 ramps, this location is just over the density criteria for LOS B/C and should continue to operate well in the short term.

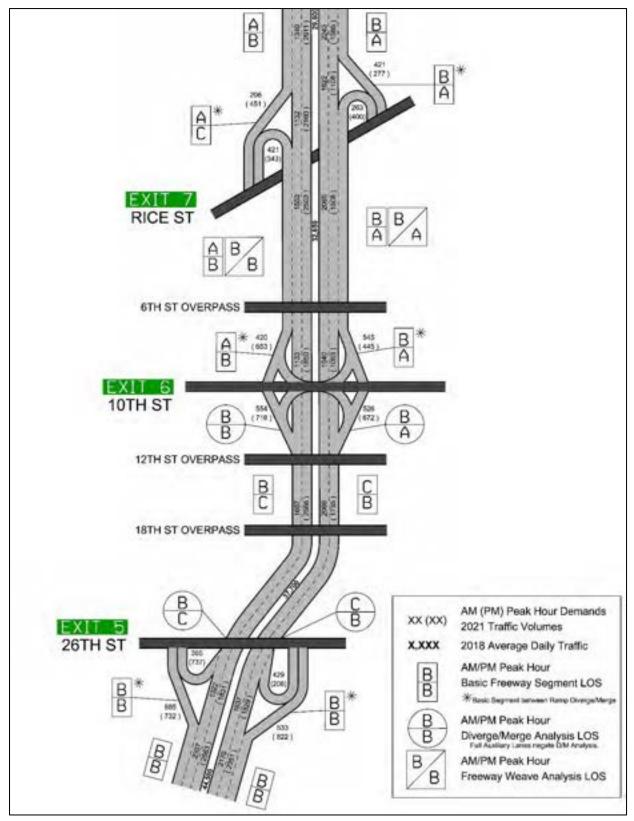


Figure 7 Existing (2021) Freeway Summary

For the arterial intersection analysis, a total of 23 study intersections were included in the analysis, this includes 16 traffic signals, 5 minor stop control intersections, and 2 right-in/right-out (RI/RO) intersections. Results for the intersection analysis in the project area are shown in **Table 7** as well as **Figure 8**.

			AM Peak Hour				PM Peak Hour					
Major Roadway	Intersecting Roadway	Control Type	Approach				Approach			INT		
licularity		Type	EB	WB	NB	SB	INT.	EB	WB	NB	SB	INT.
Rice Street	Lowell Avenue	Minor Stop	А	А	С	А	С	А	А	D	С	D
Rice Street	I-229 SB Ramp Terminal	Signal	А	А	NA	D -	В-	В	В	NA	D -	C -
Rice Street	I-229 NB Ramp Terminal	Signal	В	В	D	С	С	В	В	С	E -*	C -*
Rice Street	Bahnson Avenue	Minor Stop	А	А	С	С	С	А	А	Е	D	E
6 ^{⊤н} Street	Lowell Avenue	Minor Stop	А	А	С	С	С	А	В	F	Е	F
6 ^{⊤н} Street	Cleveland Avenue	Signal	В	В	С	С	В	D	С	С	С	С
10 [™] Street	Jessica Avenue	Signal	А	А	E*	NA	A *	Α	А	E-	NA	A-
10 [™] Street	Lowell Avenue	Signal	А	Α	D	D	А	В	A *	D	D	B*
10 [™] Street	Conklin Avenue	RI/RO			С	С	С			С	В	С
10 [™] Street	I-229 SPUI	Signal	D -	С	D	D	D -	F	F	С	D	F
10 ^{⊤н} Street	Blaine Avenue	RI/RO			В	NA	В			С	NA	С
10 [™] Street	Cleveland Avenue	Signal	В	С	D*	Е	C*	В	С	D*	E*	C*
10 [™] Street	HyVee Entrance	Signal	А	А	D	D	А	Α	А	D	D*	B*
12 [™] Street	Lowell Avenue	Minor Stop	А	А	С	С	С	Α	А	С	F	F
12 [™] Street	Cleveland Avenue	Signal	В	В	В	В	В	С	В	В	В	В
18 [™] Street	Southeastern Avenue	Signal	D	D	F	Е	F	С	В	D	Е	D
18 ^{⊤н} Street	Cleveland Avenue	Signal	В	В	В	В	В	В	В	В	С	В
26 TH Street	Van Eps Avenue	Signal	А	Α	D	D	А	Α	А	Е	Е	А
26 [™] Street	Yeager/Frederick Avenue	Minor Stop	А	А	С	Е	E	Α	А	D	F	F
26 [™] Street	I-229 SB Ramp Terminal	Signal	С	A *	С	NA	A *	D*	А	В	NA	C*
26 [™] Street	I-229 NB Ramp Terminal	Signal	А	С	С	NA	С	С	Α	С	NA	С
26 [™] Street	Southeastern Avenue	Signal	В	В	D*	Е	C*	D	D	D	Е	D
26 ^{⊤н} Street	Cleveland Avenue	Signal	A	С	D	D	С	Α	С	Е	D*	C*

Table 7 Existing (2021) Arterial Intersection Operations Summary

Notes:

- "n/a" denotes an approach that does not exist at the intersection. "-" denotes an approach with no delay due to control type.

- Bold/Highlighted indicates a poor LOS due to LOS E/F, volume to capacity (v/c) ration > 1.0, or queue storage issue.

- " * " Queue storage ratio (QSR) greater than 1.0 for at least one movement resulting in entire intersection considered failing.

- " - " At least one movement is deemed failing resulting in entire intersection considered failing (not noted if intersection is LOS F).

Under the existing conditions, there are fifteen intersections that currently have failing traffic operations in at least one of the peak periods; these conditions are due to volume to capacity issues, queue storage issues, or delay issues. There is an additional single intersection with an approach that is failing yet the overall intersection is acceptable. Therefore, seven intersections currently have acceptable operations in both peak periods.

Along Rice Street, both ramp terminal intersections operate at a LOS C or better; however, both intersections have at least one movement that fails. The southbound left turns at the southbound ramp operates at a LOS E, the southbound left at the northbound ramp operates at a LOS F with both QSR and V/C issues.

Along 6th Street, the Lowell Avenue minor stop controlled approach have poor LOS on both the approaches to 6th Street. 6th Street carries a high volumes of traffic during the PM peak hour that limits gaps for Lowell Avenue traffic to enter or cross 6th Street.

Along 10th Street, only the I-229 SPUI intersection operates under failing conditions. At Cleveland Avenue, the southbound approach is at a LOS E in both peak hours with QSR issues, this is created by capacity issues on this approach leg. At Jessica Avenue, the northbound approach is at a LOS E in both peak hours with the overall intersection at a LOS A, this minor approach delay is created by the signal timing which provides more time for 10th Street.

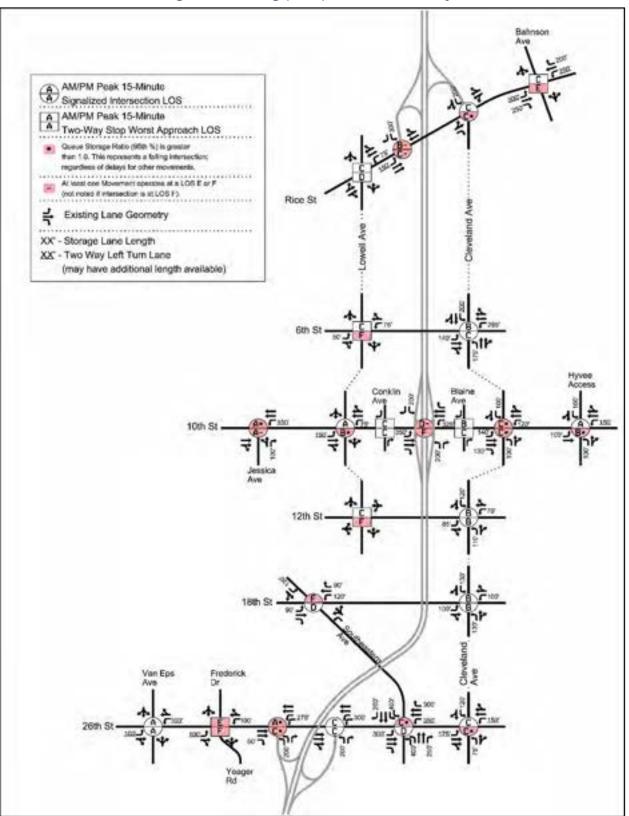
The 10th Street at I-229 SPUI intersection currently operates under significant delays in the PM peak hour; however, the AM peak is operating at a LOS D with a movement at LOS E. The single left turn lane on all four approaches of the SPUI design create significant delays and vehicles are not served within a cycle length at the intersection.

Along 12th Street, the Lowell Avenue southbound minor stop controlled approach has a poor LOS. 12th Street carries a higher volumes of traffic during the PM peak hour that limits gaps for Lowell Avenue traffic to enter or cross 12th Street.

Along 18th Street, the Southeastern Avenue intersection currently has failing operations in the AM peak hour. The northbound left turn volume is a significant constraint that requires the intersection to operate under a split phase timing; split phase signal timings typically create longer delays for all approaches. The eastbound approach carries a high volume in the PM peak hour that requires a long green phase to serve the demands, which adds delay for all approaches.

While 26th Street is currently under construction, the resulting design will still incur operational issues during both peak periods outside of the immediate interchange area. Three of the study intersections will have a poor approach LOS, but the overall intersection is acceptable; this includes Van Eps Avenue, Southeastern Avenue, and Cleveland Avenue. The new Yeager Avenue/Frederick Avenue intersection will operate under minor stop control; the high directional volumes along 26th Street will limit gaps for vehicles to cross or enter the roadway and the approach will operate at a LOS F. The southbound I-229 ramp does have queue storage issues for the eastbound right turn as the storage lane is very short.

Attached to this memorandum is an HCS analysis summary table that also includes a multi-modal analysis. Most of the intersections (analysis only includes signalized intersections) have a LOS of C or better for both the pedestrian and bicycle LOS. There are 3 locations that have a poor LOS, all of which are on the ramp connection legs of the intersections.





Crash History

A comprehensive safety analysis was conducted for the entire project area for this study. The analysis included the most recent 5-years of crash history available from the SDDOT. This included the five calendar years of 2015 through 2019.

A detailed crash analysis was completed and documented in a separate memorandum; *I-229 Exit 6 (10th Street) Interchange Project – Safety Memo*. The crash memorandum is attached to this document, however a brief summary is provided below.

The crash records were segregated into crashes for each of the study intersections and the arterial and freeway segments. The type and severity of the crashes were reviewed and crash rates and critical rates were calculated for each.

Crash severity is comprised of 5 separate types including fatal, an incapacitating injury (Severity A), a nonincapacitating injury (Severity B), a possible injury (Severity C), or a property damage only (PD) crash; wild animal hits are coded in a separate category.

Crash rates are expressed as the number of crashes per million entering vehicles (MEV) at an intersection or along a segment. The critical crash rate is a statistical value that is unique to each intersection or segment. It is based on vehicular exposure and the average crash rate for similar intersection or segment; a crash rate higher than the critical rates indicates a sustained crash problem. A critical crash rate index is calculated by dividing the crash rate by the critical rate. Any index value above 1.0 indicates a crash rate at or exceeding the critical rate.

The average crash rate for an urban freeway system, provided by SDDOT, was 1.03 crashes per MEV. The City of Sioux Falls provided the most recent average crash data, from 2015, for the varying arterial roadway and intersection control types.

A total of 1,632 crashes occurred within the entire project area during the 5-year analysis period. A total of 400 crashes occurred along the freeway mainline or ramp connections and a total of 1,232 occurred at a study intersection or segment.

A total of 353 crashes occurred along mainline I-229, 6 segment areas that have had crash rates above the critical, these include:

- Northbound I-229 Locations:
 - Mainline segment between Exit 5 and Exit 6.
 - Exit 6 Diverge Area.
 - Exit 7 Merge Area.
- Southbound I-229 Locations:
 - Exit 7 Merge Area.
 - Exit 6 Diverge Area.
 - o Exit 6 Merge Area.

A total of 47 crashes occurred on the I-229 ramp connections, there were 3 ramp connections from I-229 that had crash rates above the critical rate, these include:

- Northbound I-229 Entrance Ramp from 26th Street (Exit 5).
- Northbound I-229 Exit Ramp to Rice Street (Exit 7).
- Southbound I-229 Entrance Ramp from 10th Street (Exit 6).

A total of 1,104 crashes occurred at study intersections within the project area. The study intersections included 23 recommended study intersections; 4 additional intersections were included as they had approximately 10 crashes during the 5-year period. A total of 15 intersections have crash rates that exceed the critical rates, these include:

- Rice Street at the I-229 Northbound Ramp Terminal
- 6th Street at Cleveland Avenue
- 10th Street at Lowell Avenue
- 10th Street at I-229 SPUI
- 10th Street at Cleveland Avenue
- 12th Street at Lowell Avenue
- 12th Street at Cleveland Avenue
- 18th Street at Southeastern Avenue
- 18th Street at Blaine Avenue (non-study intersection)
- 18th Street at Cleveland Avenue
- 26th Street at Yeager Road**
- 26th Street at I-229 Northbound Ramp Terminal**
- 26th Street at Southeastern Avenue**
- 26th Street at Cleveland Avenue**
- Yeager Road at I-229 Southbound Ramp Terminal**
 - **26th Street/Exit 5 is currently under construction and the new design should improve safety on the corridor.

A total of 128 crashes occurred along arterial segments between intersections, a total of 22 segments were evaluated along the 7 study corridors. Only 1 segment had a crash rate higher than the critical rate.

• 12th Street: between Lowell Avenue and Cleveland Avenue

More detailed information can be found in the attached traffic safety memorandum.

FREEWAY DESIGN CRITERIA

This section will discuss the I-229 freeway facility within the project area. The primary design principles and criteria that impact freeway operations include:

- Basic Lane Capacity
- Route Continuity
- Lane Balance
- Interchange Spacing
- Ramp Spacing

These criteria are described in the American Association of State Highway and Transportation Official's (AASHTO) Policy on Geometric Design of Highways and Streets 2011 edition. The existing design speed for I-229 is 70 mph, with a posted speed limit of 65 mph.

Basic Lane Capacity

The basic number of lanes is defined as a minimum number of lanes designated and maintained over a significant length of a corridor, regardless of changes in traffic volumes and lane-balance. An assessment of basic lane needs is an indicator of minimum capacity requirements; it is not an indicator of the actual capacity. **Table 8**, below, summarizes the basic lane volumes for LOS C, LOS D and LOS E from the Highway Capacity Manual (HCM).

Table 8 Basic Lane Capacity

Free Flow Speed (mph)	Per-Lane Volume Threshold (pcphpl) / (Vehicle Density (pc/mi/ln))					
	LOS C	LOS D	LOS E			
75 mph	1,750 / (26.0)	2,110 / (35.0)	2,400 / (45.0)			
70 mph	1,690 / (26.0)	2,080 / (35.0)	2,400 / (45.0)			
65 mph	1,630 / (26.0)	2,030 / (35.0)	2,350 / (45.0)			
60 mph	1,560 / (26.0)	2,010 / (35.0)	2,300 / (45.0)			
55 mph	1,430 / (26.0)	1,900 / (35.0)	2,250 / (45.0)			

Source: Highway Capacity Manual 6th Edition, Exhibit 12-4; HCM 2010, Exhibit 11-17

While the previous **Table 6** shows the results of the operational analysis, this Basic Lane Capacity assessment still evaluated each mainline segment based on the higher of the AM or PM peak hour data. The following **Table 9** shows the results of the analysis, all segments have enough basic lane capacity to reach a LOS C or better

	Descrip	Existing	Max Hourly	Basic	# of Lanes	
	From	То	Lane	Volume (AM or PM)	Lane LOS	for LOS C Conditions
	NB I-229	26th Street Exit	3	2351	В	1.6
	26th Street Exit	26th Street Entrance	2	1637	В	1.1
29	26th Street Entrance	10th Street Exit	2	2066	В	1.4
1-229	10th Street Exit	10th Street Entrance	2	1540	В	1.1
RB	10th Street Entrance	Rice Street Exit	3	2085	В	1.4
	Rice Street Exit	Rice Street Entrance	2	1822	В	1.2
	Rice Street Entrance	NB I-229	3	2243	В	1.5
	SB I-229	Rice Street Exit	3	2611	В	1.8
	Rice Street Exit	Rice Street Entrance	2	2160	С	1.5
29	Rice Street Entrance	10th Street Exit	3	2503	В	1.7
-2	10th Street Exit	10th Street Entrance	2	1850	В	1.3
SB	10th Street Entrance	26th Street Exit	2	2568	С	1.8
	26th Street Exit	26th Street Entrance	2	1831	В	1.2
	26th Street Entrance	SB I-229	3	2563	В	1.7

Table 9 I-229 Basic Lane Assessment

Route Continuity

A route continuity evaluation is used to determine if any forced lane changes are required to continue along a specific highway. A forced lane change occurs when either an established through lane is dropped at a major fork diverge or when an auxiliary lane is added to the left side of the roadway to accommodate the design of a major fork diverge and the through traffic must change lanes in order to continue.

Route continuity is currently satisfied for I-229 in the project area; I-229 has two continuous travel lanes in both directions which connect to both the I-29 and I-90 system interchanges.

Lane Balance

The concept of lane balance is intended to smooth traffic flow through and beyond an interchange. The AASHTO definition of lane balance is as follows:

- 1. At entrances, the number of lanes beyond the merging of two traffic streams should not be less than the sum of all traffic lanes on the merging roadways minus one.
- 2. At exits, the number of approach lanes on the highway must be equal to the number of lanes on the highway beyond the exit, plus the number of lanes on the exit, minus one. Exceptions to this principle occur at cloverleaf loop-ramp exits that follow a loop-ramp entrance and at exits between closely spaced interchanges (i.e. interchanges where the distance between the end of the taper of the entrance terminal and the beginning of the taper of the exit terminal is less than 1,500 ft). In these cases, the auxiliary lane may be dropped in a single-lane exit with the number of lanes on the approach roadway being equal to the number of through lanes beyond the exit plus the lane on the exit.
- 3. The traveled way of the highway should be reduced by not more than one traffic lane at a time.

Lane balance is satisfied at all entrances in the project area. Lane balance is not satisfied at the exit ramp locations that are fed by a full auxiliary; to fully satisfy the criteria, escape lanes would need to be provided after the exit ramp to ensure vehicles would not become trapped in the auxiliary lane.

Interchange Spacing

In urban or urbanizing areas, the minimum recommended interchange spacing is 1-mile. The three existing I-229 interchanges all currently exceed the 1-mile spacing.

Ramp Spacing

The distance between freeway ramps can be one of the most important features to impact freeway operations. SDDOT has established guidelines for desired interchange ramp spacing based on AASHTO criteria and these guidelines are documented in the SDDOT Road Design Manual, Chapter 13, and are shown in **Figure 9**.

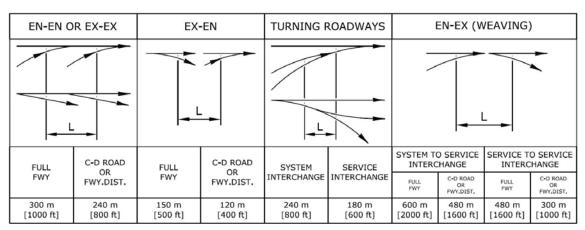


Figure 9 AASHTO / SDDOT Ramp Spacing Criteria

The primary goal for ramp spacing is "desirable" spacing; the shortest acceptable spacing is "minimum" spacing. **Table 10** summarizes the existing ramp spacing for I 229; all ramp spacing is greater than the "desirable".

	Descrip	otion	Ramp	Desirable	Minimum	Existing
	From	То	Туре	Space (ft)	Space (ft)	(ft)
	NB I-229	26th Street Exit	EN-EX	2,000	1,500	2,750
	26th Street Exit	26th Street Entrance	EX-EN	750	500	1,550
29	26th Street Entrance	10th Street Exit	EN-EX	2,000	1,500	6,700
-7	10th Street Exit	10th Street Entrance	EX-EN	750	500	2,280
RB	10th Street Entrance	Rice Street Exit	EN-EX	2,000	1,500	5,110
	Rice Street Exit	Rice Street Entrance	EX-EN	750	500	1,350
	Rice Street Entrance	NB I-229	EN-EX	2,000	1,500	5,280
	SB I-229	Rice Street Exit	EN-EX	2,000	1,500	5,670
	Rice Street Exit	Rice Street Entrance	EX-EN	750	500	1,340
29	Rice Street Entrance	10th Street Exit	EN-EX	2,000	1,500	4,830
-2	10th Street Exit	10th Street Entrance	EX-EN	750	500	2,270
SB	10th Street Entrance	26th Street Exit	EN-EX	2,000	1,500	6,400
	26th Street Exit	26th Street Entrance	EX-EN	750	500	1,200
	26th Street Entrance	SB I-229	EN-EX	2,000	1,500	2,520

Table 10 I-229 Ramp Spacing - Existing

CONCLUSIONS

The existing interchange of I-229 at 10th Street (Exit 6) currently has both safety and operational issues.

Mainline I-229

Operationally, the I-229 mainline currently performs under acceptable conditions along the study area. The 4-lane segment between Exit 5 and Exit 6 currently operate at LOS C, the southbound basic lane is currently within 10% of the LOS D criteria during the PM peak hour.

Crashes on I-229 are concentrated mainly at entrance and exit ramp locations. Three of the four Exit 6 ramp connections are currently over the critical crash rate; only the northbound entrance ramp is not over. Both of the entrance ramps from Exit 7 are also above the critical rates. The only mainline segment over the critical rate is northbound I-229 between Exit 5 and Exit 6; the two curves and the river bridge have had a high number of crashes with a high percentage of poor roadway conditions (rain, snow, ice, etc.).

I-229 Ramp Connections

All ramp connections are currently single lane connections to I-229; the ramp volumes are all significantly below the capacity of each ramp and there are no capacity issues. However, three ramp connections have had a crash history that results in a crash rate above the critical rate. In the northbound direction, the Exit 5 entrance ramp and the Exit 7 off ramp have had a crash problem; poor roadway conditions on the loop ramp areas. In the southbound direction, the Exit 6 entrance has had a crash problem.

Study Intersections

The project area includes 23 study intersections that were evaluated. Operationally, many of the study intersections currently have operational issues that would require additional capacity or traffic signal upgrades to improve.

Under the existing conditions, there are fifteen intersections that currently have failing traffic operations in at least one of the peak periods; these conditions are due to volume to capacity issues, queue storage issues, or delay issues. There is an additional single intersection with an approach that is failing yet the overall intersection is acceptable. Therefore, seven intersections currently have acceptable operations in both peak periods.

The fifteen intersections with failing operations include:

- Rice Street at I-229 Southbound Ramp Terminal
- Rice Street at I-229 Northbound Ramp Terminal
- Rice Street at Bahnson Avenue
- 6th Street at Lowell Avenue
- 10th Street at Jessica Avenue
- 10th Street at Lowell Avenue
- 10th Street at I-229 SPUI
- 10th Street at Cleveland Avenue
- 10th Street at Hyvee Entrance
- 12th Street at Lowell Avenue
- 18th Street at Southeastern Avenue
- 26th Street at Yeager/Frederick Avenue
- 26th Street at I-229 Southbound Ramp Terminal
- 26th Street at Southeastern Avenue
- 26th Street at Cleveland Avenue

Of the 23 study intersection, currently 15 intersections have crash rates that exceed the critical rates; this includes at least one intersection on each corridor. There are 4 intersections that have crash rates that are more than two times the critical rate which indicates a major safety concern:

- 10th Street at I-229 SPUI
- 10th Street at Cleveland Avenue
- 26th Street at I-229 Northbound
- 26th Street at Cleveland Avenue

The 26th Street corridor has safety issues at 5 of the 6 study intersections. The current Exit 5 construction project should improve both safety and operations at 4 of the intersections directly as they are being improved with the project. 26th Street at Cleveland Avenue is not directly part of the current project, but improvements at the Exit 5 intersections should improve the safety and operations at this intersection as traffic will flow through the interchange area more efficiently.

Design Considerations

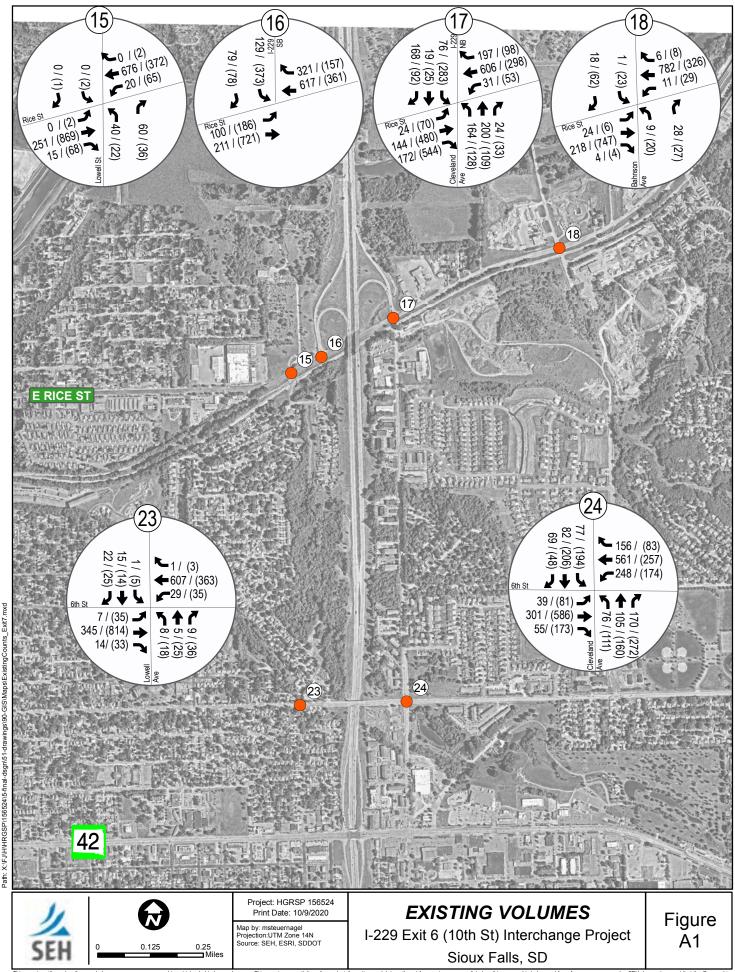
Based on the AASHTO design guidance, the current I-229 meets many of the basic freeway criteria including the number of basic lanes, route continuity, interchange spacing and ramp spacing. Lane balance is met at all entrance ramp locations, but is not currently met at all exit ramp locations. At an exit ramp, a full auxiliary lane typically requires an escape lane along mainline to meet the criteria for lane balance.

Recommendations

Based on the existing conditions evaluation, proposed project improvements to the corridor should address the safety and operational issues described in this memorandum.

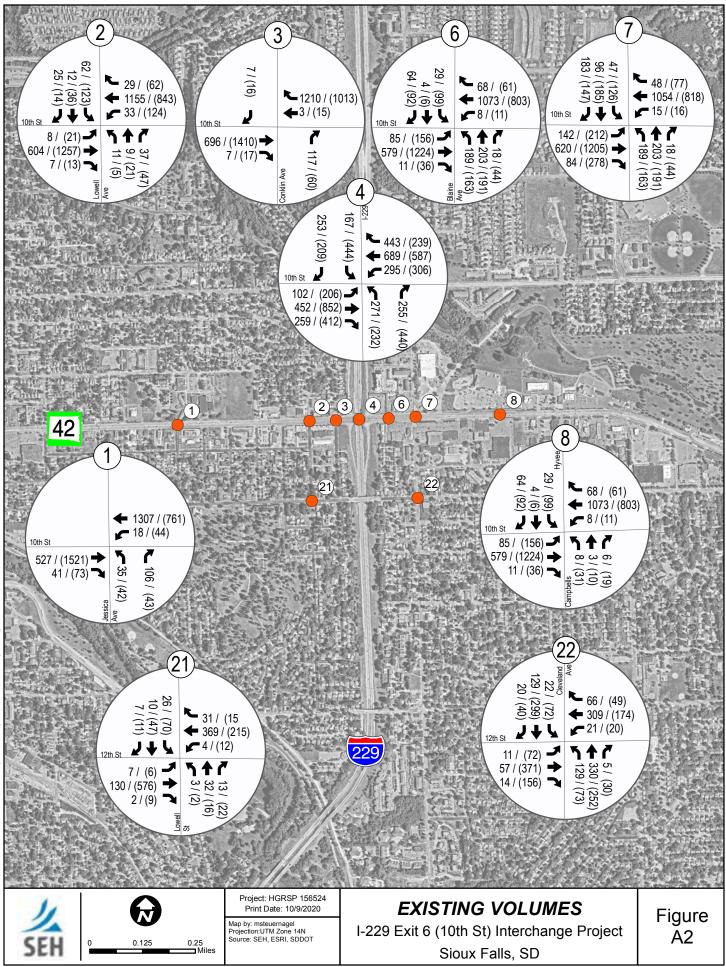
gtj Figures A1-A3 – Existing Traffic Volumes HCS Analysis Summary (includes Multi-Modal)

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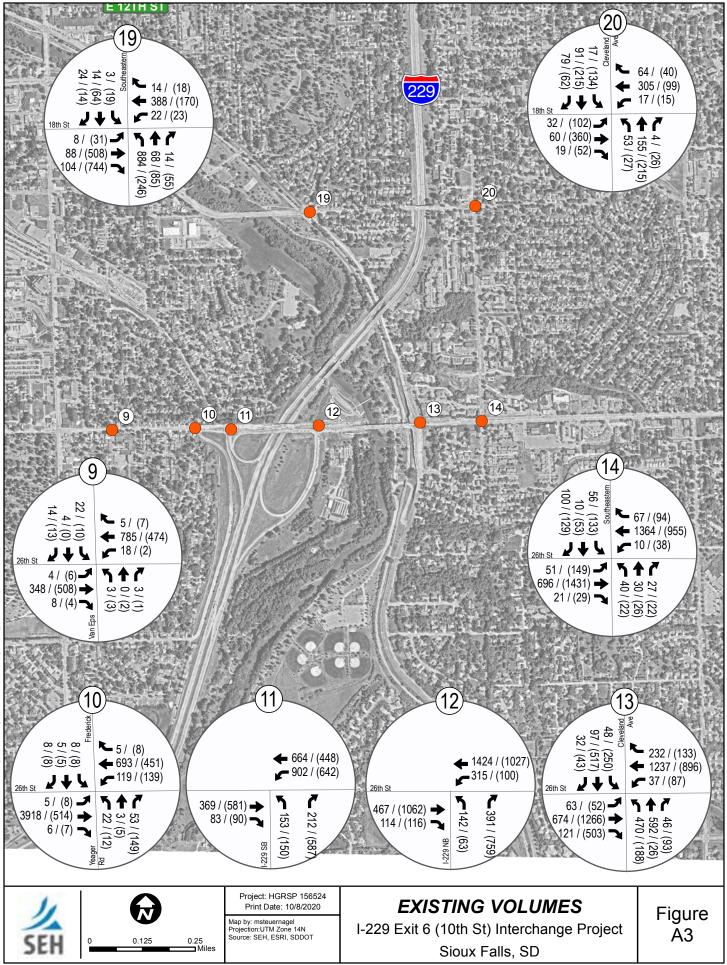
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us sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic uiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data mation System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or a achrowledges that SEH shall not be lable for any damages which arise out of the user's access or use of data provided.



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Troffic		Troffic		Existing Year 2021										
nters	tersection Location Control		Motric		A	M Peak Ho	our	PM Peak Hour						
		Control		EB	WB	NB	SB	Overall	EB	WB	NB	SB	Overall	
		T	Delay (Sec.)	0.0	0.2	15.3	0.0	15.3	0.0	1.7	32.3	22.5	32.3	
	Rice Street & Lowell Avenue	Two-way	LOS	Α	A	С	A	С	Α	А	D	С	D	
		Stop	Ped LOS	-	-	-	-		-	-	-	-		
		Control	Bicycle LOS	-	-	-	-		-	-	-	-		
			Delay (Sec.)	4.9	8.8	-	53.4	14.3	10.7	12.9	-	54.9	21.9	
	Rice Street & SB I-229	Traffic	LOS	Α	А	NA	D	В	В	В	NA	D	С	
treet		Signal	Ped LOS	Α	В	В	В		А	В	В	В		
Ľ		•	Bicycle LOS	Α	А	-	F	-	А	А	-	F		
5			Delay (Sec.)	19.9	19.4	40.3	27.4	25.1	12.1	10.6	33.9	73.5	25.5	
KICe	Rice Street &	Traffic	LOS	B	B	D	C	C	B	B	C	E	C	
r	NB I-229	Signal	Ped LOS	В	В	В	В		В	В	В	В	-	
		Ū	Bicycle LOS	Α	Α	Α	Α	-	В	Α	Α	Α		
			Delay (Sec.)	1.0	0.1	16.7	17.8	17.8	0.1	0.8	43.2	30.0	43.2	
	Rice Street &	Two-way	LOS	A	A	C	C	C	A	A	= 45.2 E	D	E	
	Bahnson Avenue	Stop	Ped LOS	-	-	-	-	U	-	-	-	-	_	
		Control	Bicycle LOS		-	-	-	-	-	-	-	-		
			Delay (Sec.)	9.0	0.4	23.1	20.5	23.1	8.3	10.4	85.0	37.0	85.0	
	6th Street &	Two-way	LOS	9.0 A	0.4 A	23.1 C	20.5 C	23.1 C	6.5 A	10.4 B	85.0 F	57.0 E	- 85.U F	
ц С	6th Street & Lowell Avenue	Stop			- A		- L	L.	A		- Г -		F	
Lee l		Control	Ped LOS	-		-		-		-		-		
St -			Bicycle LOS	-	-	-	-		-	-	-	-		
eth.	6th Street &	T	Delay (Sec.)	18.3	15.2	30.5	26.9	20.0	39.6	21.0	29.7	21.6	29.8	
t e		Traffic	LOS	В	В	С	С	В	D	С	С	С	С	
C	leveland Avenue	Signal	Ped LOS	B	В	B	B	-	В	В	В	B	-	
			Bicycle LOS	A	A	A	A		A	A	A	A		
			Delay (Sec.)	3.1	2.5	58.3	-	6.8	4.6	3.0	59.4	-	6.0	
		Traffic Signal	LOS	A	A	E	NA	Α	A	A	E	NA	Α	
			Ped LOS	В	A	В	В	_	В	A	В	В		
			Bicycle LOS	A	В	F	-		В	A	F	-		
			Delay (Sec.)	6.0	1.5	49.9	54.5	7.0	10.9	7.2	43.5	53.5	13.3	
		Traffic	LOS	Α	A	D	D	A	В	А	D	D	В	
		Signal	Ped LOS	В	В	В	В		В	В	В	В	D B	
			Bicycle LOS	Α	В	A	A		В	Α	A	A		
	10th Street & Conklin Avenue	T	Delay (Sec.)	-	-	15.6	17.4	17.4	-	-	22.6	14.8	22.6	
		Two-way Stop Control	LOS			С	С	С			С	В	С	
			Ped LOS	-	-	-	-		-	-	-	-		
ų			Bicycle LOS	-	-	-	-		-	-	-	-		
Stree		Traffic Signal	Delay (Sec.)	39.0	34.9	48.5	41.3	37.9	440.3	85.4	31.9	45.2	248.2	
E I	10th Street &		LOS	D	С	D	D	D	F	F	С	D	F	
ה ב	I-229 SPUI		Ped LOS	В	В	В	В		В	В	В	В		
Ĕ			Bicycle LOS	Α	А	А	А		Α	А	Α	А		
		_	Delay (Sec.)	-	-	12.4	-	12.4	-	-	19.7	-	19.7	
	10th Street &	Two-way	LOS			В	NA	B			C	NA	C	
	Blaine Avenue	Stop	Ped LOS	-	-	-	-	_	-	-	-	-	_	
		Control	Bicycle LOS	-	-	-	-		-	-	-	-		
			Delay (Sec.)	13.4	27.9	38.0	69.5	31.1	11.8	23.5	40.7	61.1	27.4	
	10th Street &	Traffic	LOS	B	C 27.9	D	E	C	B	23.3 C	40.7 D	E	27.4 C	
C C	Cleveland Avenue	Signal	Ped LOS	B	B	B	B		B	B	B	B		
		5151101	Bicycle LOS	A	B	A	A		B	A	A	A		
				-			-	70			50.4		10.7	
	10th Streat P	Traffia	Delay (Sec.)	2.5	6.1	51.6 D	54.5	7.8	3.1	6.8		52.5 D	10.7	
	10th Street &	Traffic	LOS	A	A		D	Α	A	A	D		В	
	Hy-Vee Access	Signal	Ped LOS	B	B	B	B	-	B	B	B	B		
			Bicycle LOS	A	B	A	A		В	A	A	A		
		Two-way	Delay (Sec.)	0.5	0.1	15.5	18.3	18.3	0.2	0.7	21.3	93.7	93.7	
e e	12th Street &	Stop	LOS	A	A	С	С	С	A	A	С	F	F	
treet	Lowell Avenue	Control	Ped LOS	-	-	-	-		-	-	-	-		
5			Bicycle LOS	-	-	-	-		-	-	-	-		
יא ב			Delay (Sec.)	12.2	17.5	16.0	12.9	15.8	25.6	14.3	15.4	16.0	19.2	
12th	12th Street &	Traffic	LOS	В	В	В	В	В	С	В	В	В	В	
C	leveland Avenue	Signal	Ped LOS	В	В	В	В		В	В	В	В		
			Bicycle LOS	Α	A	A	A		В	А	A	A		

HCS SUMMARY - Multi-Modal (LOS)

			Existing Year 2021										
Intersection Location	Traffic Control	Metric		PM Peak Hour									
	Control		EB	WB	NB	SB	Overall	EB	WB	NB	SB	Overall	
18th Street &		Delay (Sec.)	35.9	40.6	191.8	70.0	130.5	33.4	15.5	46.9	58.3	35.9	
	Traffic	LOS	D	D	F	E	F	С	В	D	E	D	
Southeastern Avenue	Signal	Ped LOS	В	В	В	В		В	В	В	С		
Avenue		Bicycle LOS	A	A	С	A		С	A	A	A		
2		Delay (Sec.)	11.9	14.4	18.6	18.6	16.0	14.6	11.0	19.6	22.6	17.4	
5 18th Street &	Traffic	LOS	В	В	В	В	В	В	В	В	С	В	
Cleveland Avenue	Signal	Ped LOS	В	В	В	В		В	В	В	В		
		Bicycle LOS	Α	A	A	A		А	A	A	A		
		Delay (Sec.)	3.5	4.4	50.7	52.0	5.9	4.4	2.4	58.3	59.2	4.7	
26th Street & Van	Traffic Signal	LOS	A	A	D	D	Α	А	A	E	E	Α	
Eps Avenue		Ped LOS	В	В	В	В		В	В	В	В		
		Bicycle LOS	A	В	A	A		В	A	A	A		
	Two-way	Delay (Sec.)	0.1	1.3	23.1	45.5	45.5	0.1	2.2	25.3	66.1	66.1	
26th Street &	Stop	LOS	Α	A	C	E	E	Α	A	D	F	F	
Frederick Drive		Ped LOS	-	-	-	-		-	-	-	-		
	control	Bicycle LOS	-	-	-	-		-	-	-	-		
		Delay (Sec.)	31.4	9.6	21.4	-	9.3	54.1	7.0	12.7	-	22.0	
26th Street &	Traffic Signal	LOS	С	A	С	NA	Α	D	A	В	NA	С	
26th Street & SB I-229		Ped LOS	В	A	В	В		В	A	В	В		
Str		Bicycle LOS	A	В	F	-		А	В	F	-		
		Delay (Sec.)	7.8	24.9	29.8	-	22.6	25.4	9.9	32.4	-	20.4	
26th Street &	Traffic Signal	LOS	Α	С	С	NA	С	С	A	С	NA	С	
NB I-229		Ped LOS	В	A	С	В		В	A	С	В		
		Bicycle LOS	A	В	A	-		А	В	В	-		
26th Street &		Delay (Sec.)	10.1	18.1	47.4	57.3	27.4	35.7	35.4	53.6	59.9	42.9	
Southeastern	Traffic	LOS	В	В	D	E	С	D	D	D	E	D	
Avenue	Signal	Ped LOS	С	С	В	В		С	С	В	В		
Avenue		Bicycle LOS	А	В	В	A		В	В	A	A		
		Delay (Sec.)	8.0	21.3	53.6	45.5	20.4	8.0	26.6	59.2	47.5	21.0	
26th Street &	Traffic	LOS	Α	С	D	D	С	Α	С	E	D	С	
Cleveland Avenue	Signal	Ped LOS	В	В	В	В		В	В	В	В		
		Bicycle LOS	A	В	A	A		В	A	A	A		

HCS SUMMARY - Multi-Modal (LOS)

, , , Traffic									xisting Year 2021						
rsection Loca	tion Control	Metric	AM Peak Hour			ur	PM Peak Hour								
	Control		EB	WB	NB	SB	Overall	EB	WB	NB	SB	Over			
	Two-way	Delay (Sec.)	0.0	0.2	15.3	0.0	15.3	0.0	1.7	32.3	22.5	32.3			
Rice Street	× ·	LOS	А	A	С	A	С	А	A	D	С	D			
Lowell Aver	Stop	Queues (veh)	-	-	-	-		-	-	-	-				
	Control	v/c > 1.0	-	-	-	-		-	-	-	-				
		Delay (Sec.)	4.9	8.8	-	53.4	14.3	10.7	12.9	-	54.9	21.9			
Rice Street	& Traffic	LOS	A	A	NA	D	B	B	B	NA	D	C			
SB 1-229	Signal	QSR	-	-	-	0.64	_		-	-	1.34	32 32 32 3 3 3 3 3 3 3 4 3 3 4 3 4 3 4 3			
	0.8.00	v/c > 1.0	-	-	-	0.817	-		-	-	0.96	-			
		Delay (Sec.)	19.9	19.4	40.3	27.4	25.1	12.1	10.6	33.9	73.5	25			
Rice Street	& Traffic	LOS	B	15.4 B	40.3	C	23.1 C	B	B	C	73.5 E	- <u>2</u> .5.			
NB I-229	Signal	QSR	-	-	0.95	-	L.	-	-	-	1.73				
ND 1-229	Signai	v/c > 1.0		-	0.622	-	-		-	-	-	-			
							47.0								
	Two-way	Delay (Sec.)	1.0	0.1	16.7	17.8	17.8	0.1	0.8	43.2					
Rice Street	Stop	LOS	A	A	С	С	С	A	A	E		E			
Bahnson Ave	Control	Queues (veh)	-	-	-	-	-	-	-	1.7		-			
		v/c > 1.0	-	-	-	-		-	-	-					
	Two-way	Delay (Sec.)	9.0	0.4	23.1	20.5	23.1	8.3	10.4	85.0	37.0	85.			
6th Street	& Ston	LOS	A	A	С	С	С	A	В	F	E	F			
Lowell Aver	ue Control	Queues (veh)	-	-	-	-		-	-	4.1					
	control	v/c > 1.0	-	-	-	-		-	-	0.72	-				
		Delay (Sec.)	18.3	15.2	30.5	26.9	20.0	39.6	21.0	29.7	21.6	29.			
6th Street	& Traffic	LOS	В	В	С	С	В	D	С	С	С	с			
Cleveland Av	enue Signal	QSR	-	-	-	-		-	C -	-		_			
	Ū	v/c > 1.0	-	-	-	-	-		-	-	-				
		Delay (Sec.)	3.1	2.5	58.3	-	6.8	4.6	3.0	59.4		6.0			
10th Street	& Traffic	LOS	A	A	E	NA	A	4.0 A	A	E	ΝA				
Jessica Aver		QSR	-	-	1.52	-	~	-	-		114				
Jessica Avei	iue Signai		-	-	0.762	-	-	-	-	-		-			
		v/c > 1.0													
1011 0111	& Traffic	Delay (Sec.)	6.0	1.5	49.9	54.5	7.0	10.9	7.2	43.5		_			
10th Street		LOS	A	A	D	D	Α	В	A	D	D	В			
Lowell Aver	ue Signal	QSR	-	-	-	-	-	-	1.12		1.048 3.2 30.0 4 D D .7 2.0 .7 2.0 .7 2.0 .7 2.0 .7 2.0 .7 2.0 .7 2.0 .7 2.0 .7 2.0 .7 2.0 .7 2.0 .7 2.0 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1	-			
		v/c > 1.0	-	-	-	-		-	0.511	-					
	Two-way	Delay (Sec.)	-	-	15.6	17.4	17.4	-	-	22.6					
10th Street	& Ston	LOS			C	С	С			С	В	c			
Conklin Ave	Control	Queues (veh)		-	-	-	_		-			_			
		v/c > 1.0	-	-	-	-		-	-	-	-				
		Delay (Sec.)	39.0	34.9	48.5	41.3	37.9	440.3	85.4	31.9	45.2	248			
10th Street	& Traffic	LOS	D	С	D	D	D	F	F	С	D	F			
I-229 SPU	I Signal	QSR	-	-	-	-		-	-	-	-				
		v/c > 1.0	-	0.512	-	-		2.078	1.043	0.421	0.817				
	-	Delay (Sec.)	-	-	12.4	-	12.4	-	-	19.7	-	19.			
10th Street	& Two-way	LOS			В	NA	В			С	NA	C			
Blaine Aven	Stop	Queues (veh)	-	-	-	-		-	-						
· · · ·	Control	v/c > 1.0	-	-	-	-		-	-	-	-				
		Delay (Sec.)	13.4	27.9	38.0	69.5	31.1	11.8	23.5	40.7		27			
10th Street	& Traffic	LOS	B	27.5 C	D	E	F	B	23.5 C	40.7		- 2/. F			
Cleveland Ave		QSR	-	-	2.44	-		-	-	1.99					
	Signal	v/c > 1.0		0.815	0.815	0.938			-	0.741					
					1		70					10			
10+h C++++	9. Traff:	Delay (Sec.)	2.5	6.1	51.6	54.5	7.8	3.1	6.8	50.4	52.5	_			
10th Street		LOS	A	A	D	D	Α	Α	A	D	D	В			
Hy-Vee Acc	ess Signal	QSR	-	-	-	-			-		1.74	-			
		v/c > 1.0	-	-	-	-		-	-	-	0.587				
	Two-way	Delay (Sec.)	0.5	0.1	15.5	18.3	18.3	0.2	0.7	21.3	93.7	93.			
12th Street	& Stop	LOS	A	A	С	С	С	A	A	С	F	F			
Lowell Aver	Control	Queues (veh)	-	-	-	-		-	-		6.8				
	control	v/c > 1.0	-	-	-	-		-	-	-	0.90				
		Delay (Sec.)	12.2	17.5	16.0	12.9	15.8	25.6	14.3	15.4	16.0	19.			
	& Traffic	LOS	В	B	B	B	B	C	B	B	B	B			
12th Street				-		-	_			-	-				
12th Street Cleveland Ave		QSR	-	-	0.86	-			-						

HCS SUMMARY - Intersection (LOS, QSR, V/C)

	18th Street & Southeastern Avenue		Delay (Sec.)	35.9	40.6	191.8	70.0	130.5	33.4	15.5	46.9	58.3	35.9
		Traffic	LOS	D	D	F	E	F	С	В	D	E	D
e e		Signal	QSR	-	-	0.0	0.0		0.22	-	0.0	0.190	
Street			v/c > 1.0	-	-	1.381	0.126		0.907	-	0.859	0.753	
	18th Street & Cleveland Avenue		Delay (Sec.)	11.9	14.4	18.6	18.6	16.0	14.6	11.0	19.6	22.6	17.4
8th		Traffic	LOS	В	В	В	В	В	В	В	В	С	В
-		Signal	QSR	-	-	-	-		-	-		0.78	
			v/c > 1.0	-	-	-	-		-	-	-	0.506	
			Delay (Sec.)	3.5	4.4	50.7	52.0	5.9	4.4	2.4	58.3	59.2	4.7
	26th Street & Van	Traffic	LOS	А	Α	D	D	Α	А	А	E	E	Α
	Eps Avenue	Signal	QSR	-	-	-	-		-	-			
			v/c > 1.0	-	-	-	-		-	-	-	-	
		T	Delay (Sec.)	0.1	1.3	23.1	45.5	45.5	0.1	2.2	25.3	66.1	66.1
	26th Street &	Two-way Stop	LOS	А	Α	С	E	E	А	А	D	F	F
	Frederick Drive	Control	Queues (veh)	-	-	-	0.7		-	-		1.1	
		Control	v/c > 1.0	-	-	-	0.21		-	-	-	0.30	
	26th Street & SB I-229		Delay (Sec.)	31.4	9.6	21.4	-	9.3	54.1	7.0	12.7	-	22.0
÷		Traffic	LOS	С	Α	С	NA	Α	D	А	В	NA	С
e		Signal	QSR	-	1.23	-	-		1.67	-	0.93		
Street			v/c > 1.0	-	0.505	-	-		0.72	-	0.567	-	
			Delay (Sec.)	7.8	24.9	29.8	-	22.6	25.4	9.9	32.4	-	20.4
26th	26th Street &	Traffic Signal	LOS	А	С	С	NA	С	С	А	С	NA	С
2	NB I-229		QSR	-	-	-	-		-	-	0.0		
			v/c > 1.0	-	0.706	0.533	-		0.739	-	0.817	-	
	26th Street &		Delay (Sec.)	10.1	18.1	47.4	57.3	27.4	35.7	35.4	53.6	59.9	42.9
	Southeastern	Traffic	LOS	В	В	D	E	С	D	D	D	E	D
	Avenue	Signal	QSR	-	-	1.31	-		-	-			
	Avenue		v/c > 1.0	-	0.842	0.743	-		-	-	-	-	
			Delay (Sec.)	8.0	21.3	53.6	45.5	20.4	8.0	26.6	59.2	47.5	21.0
	26th Street &	Traffic	LOS	А	С	D	D	С	А	С	E	D	С
	Cleveland Avenue	Signal	QSR	-	-	-	-		-	-		1.69	
			v/c > 1.0	-	-	-	-		-	-	-	0.543	

Appendix D – Future Conditions Memo



DRAFT MEMORANDUM

- TO: Steve Gramm South Dakota Department of Transportation
- FROM: Chase Cutler, HR Green, PE, PTOE

DATE: February 2, 2021

RE: I-229 Exit 6 (10th Street) Interchange Study – Future No Build Traffic Operations Memo SD DOT Project Number: PL0194(98) P, PCN 07P7

This technical memorandum provides the future year traffic operations results for the I-229 Exit 6 Interchange Study. The project area includes mainline I-229 between Exit 5 and Exit 7, as well as adjacent intersections along the corridors of Rice Street, 6th Street, 10th Street, 12th Street, 18th Street, Southeastern Avenue, and 26th Street in Sioux Falls, South Dakota.

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INTRODUCTION

As part of the I-229 Exit 6 (10th Street) Interchange Modification Study in the City of Sioux Falls, South Dakota, an operational analysis of the system was conducted.

The study area limits extend north/south along I-229 from Exit 5 (26th Street) to Exit 7 (Rice Street), and east/west along 10th Street from Jessica Avenue to the signalized Hy-Vee/Campbells entrance. Additional corridors within the study limits include:

- 26th Street from Van Eps Avenue to Southeastern Avenue,
- 18th Street from Southeastern Avenue to Cleveland Avenue,
- 12th Street from Lowell Avenue to Cleveland Avenue,
- 6th Street from Lowell Avenue to Cleveland Avenue, and
- Rice Street from Lowell Avenue to Bahnson Avenue.

The purpose of this memorandum is to present the resulting values for the future No Build traffic operation analysis and assessment of traffic conditions. This information will serve as the baseline analysis for the evaluation and refinement of Build concepts at the I-229 Exit 6 interchange.

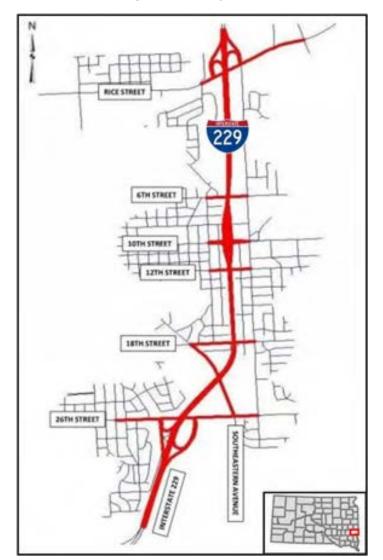


Figure 1: Study Area

TRAFFIC OPERATIONS ANALYSIS METHODOLOGY

System traffic operations for the 2027 Year of Project Completion and 2050 Planning Horizon Year forecasted traffic were evaluated by conducting a capacity analysis of freeway segments and arterial intersections to assess the quality of service within the study area. The capacity analysis methodology considers traffic volumes, geometry, signal control type, and other characteristics to determine how the system is operating.

Analysis measures and methodologies are based on those outlined in the 6th edition of the Highway Capacity Manual (HCM 6). This provides a systematic, and widely understood, method to compare operations of similar roadway segment type or intersection across various alternatives in terms of Level of Service (LOS). Along freeway segments, the primary Measure of Effectiveness (MOE) is vehicle density measured in terms of passenger cars per mile (pc/mi/ln), shown in **Table 1**. This applies to basic freeway (mainline), segments, merge/diverge segments, and weave segments. At unsignalized and signalized intersections, the primary MOE is average control delay, measured in seconds per vehicle (sec/veh), shown in **Table 2**. A weighted average approach was also used to present an alternative average delay measure at minor cross-street two-way stop-controlled intersections.

Level of	Se	Segment Density (pc/mi/ln)											
Service (LOS)	Merging and Diverging Segment	Freeway Weaving Segment	Basic Freeway Segment										
А	0-10	0-10	0-11										
В	> 10 - 20	> 10 - 20	> 11 - 18										
С	> 20 – 28	> 20 – 28	> 18 – 26										
D	> 28 – 35	> 28 – 35	> 26 – 35										
E	> 35	> 35	> 35 – 45										
F	Demand exceeds capacity	Demand exceeds capacity	Demand exceeds capacity; > 45										

Table 1: Freeway Level of Service Thresholds

Source: Transportation Research Board, Highway Capacity Manual, 6th edition.

Level of	Intersection Delay p	er Vehicle (sec/veh)
Service (LOS)	Signalized Intersections	Two-Way Stop-Control*, All-Way Stop-Control, and Roundabouts
А	0-10	0-10
В	> 10 - 20	> 10 - 15
С	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	Demand exceeds capacity; > 80	Demand exceeds capacity; > 50

Table 2: Intersection Level of Service Thresholds

Source: Transportation Research Board, Highway Capacity Manual, 6th edition

* Two-way stop-control LOS reflects worst-case stop-controlled approach.

Level of Service measures are graded in accordance with six levels of traffic service, between A and F, established by the HCM 6. Levels of service (LOS) are measures of traffic operations which consider speed, delay, traffic interruptions, safety, driver comfort, and convenience ranging from Level A "Free Flow" to Level F "Fully Saturated". LOS C, which is normally used for design, represents a roadway with volumes ranging from 70% to 80% of its capacity. LOS D is generally considered acceptable for peak periods in urban and suburban areas. LOS C is typically acceptable for newly constructed roadways in urban areas and LOS E represents full capacity. Other MOEs not directly translated to LOS thresholds, but still an important part in the assessment of quality of service and often related to LOS threshold measures include queue length and average vehicle travel speed. In addition, volume to capacity (V/C), often expressed as a ratio, is used to quantify available capacity of a roadway segment based on a given demand.

The SDDOT has established a minimum LOS C on urban interstate highway corridors. At ramp terminal intersections, the overall intersection must be at a LOS C or better; however, individual movements may operate at a LOS D. At other arterial intersections, the overall intersection must be a LOS D or better; however, individual movements may operate at a LOS E if signalized or LOS F if unsignalized. Signalized intersections that are modified by the project cannot operate with a volume to capacity ratio greater than 1 for any movement. If arterial intersections are shown to have any movements with a queue storage ratio greater than 1 than that intersection will be reported as LOS F.

The traffic operations analysis utilized Highway Capacity Software 7 (HCS 7), Version 7.9. I-229 freeway operations on basic freeway, merge/diverge, and weaving segments were analyzed using the Freeways Facility module. The crossroad corridor intersections were analyzed using the Streets module for signalized intersections and the Stop Control module for any unsignalized intersections. Synchro/SimTraffic, Version 10 was used to develop signal timings at local arterial intersections.

FUTURE YEAR 2027 AND 2050 PEAK HOUR VOLUMES

Future year AM and PM peak hour traffic volumes were developed for 2027 and 2050 No-Build Conditions using the Existing Conditions peak hour traffic volumes and the Sioux Falls Metropolitan Planning Organization 2045 travel demand model. Future year 2027 represents the Year of Project Completion and 2050 represents the Planning Year horizon for the interchange and corridor improvements. The Traffic Forecast memorandum presents more details regarding the future-year peak hour traffic model development.

2027 NO BUILD TRAFFIC OPERATIONS

The traffic operations representing the 2027 Year of Project Completion No Build condition are provided in the following section. The project area includes 3 service interchanges with 12 ramp junctions. Results for the individual segments and ramp junctions of I-229 within the study area are shown in **Table 3** as well as **Figure 2**.

Road	Description	Analysis Type	AM Peak LOS	PM Peak LOS
	NB I-229: southwest of Exit 5	Basic	В	В
	NB I-229: between Exit 5 Exit and Entrance Ramps	Basic	В	В
	NB I-229: Exit 5 Entrance Ramp	Merge	С	В
0	NB I-229: between Exit 5 and Exit 6	Basic	С	В
NB I-229	NB I-229: Exit 6 Exit Ramp	Diverge	В	В
B	NB I-229: between Exit 6 Exit and Entrance Ramps	Basic	В	А
2	NB I-229: between Exit 6 and Exit 7	Basic	В	А
	IND 1-229. Detween Exit 6 and Exit 7	Weave	В	В
	NB I-229: between Exit 7 Exit and Entrance Ramps	Basic	С	А
	NB I-229: north of Exit 7	Basic	В	А
	SB I-229: north of Exit 7	Basic	А	В
	SB I-229: between Exit 7 Exit and Entrance Ramps	Basic	А	С
	SB I-229: between Exit 7 and Exit 6	Basic	А	В
0	SB 1-229. between Exit 7 and Exit 6	Weave	В	В
-22	SB I-229: between Exit 6 Exit and Entrance Ramps	Basic	В	С
SB I-229	SB I-229: Exit 6 Entrance Ramp	Merge	В	С
0	SB I-229: between Exit 6 and Exit 5	Basic	В	D
	SB I-229: Exit 5 Exit Ramp	Diverge	В	D
	SB I-229: between Exit 5 Exit and Entrance Ramps	Basic	В	С
	SB I-229: southwest of Exit 5	Basic	В	В

Table 3: 2027 No Build Freeway Operations Summary

The analysis of the 2027 No Build condition demonstrated that the majority of mainline I-229 operated acceptably. However, the mainline segment of southbound I-229 between Exit 6 and Exit 5 and the ramp diverge to Exit 5 were shown to operate at LOS D during the PM peak hour. All other mainline segments operated at a LOS C or better during the AM and PM peak hours.

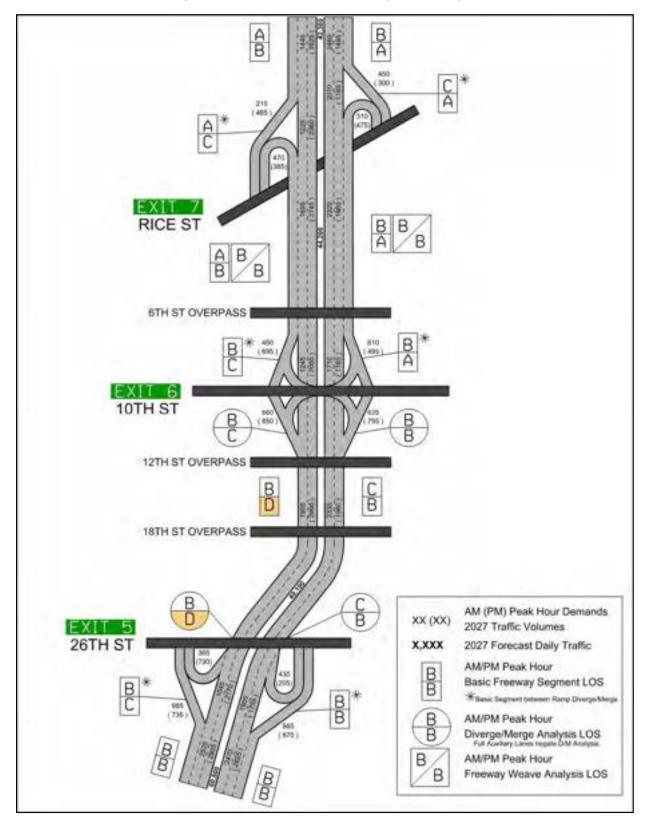


Figure 2: 2027 No Build Freeway Summary

A total of 23 study intersections were included in the analysis, including 16 traffic signals, 5 minor stop control intersections, and 2 right-in/right-out (RI/RO) intersections. Results for the intersection analysis in the project area are shown in **Table 4** as well as **Figure 3**.

				A	M Peak	Hour		PM Peak Hour				
Major Roadway	Intersecting Roadway	Control Type		Appr	oach		INT		Appr	oach		INIT
iteautray		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	EB	WB	NB	SB	INT.	EB	WB	NB	SB	INT.
Rice Street	Lowell Avenue	Minor Stop	А	А	С	А	С	А	А	Е	А	Е
Rice Street	I-229 SB Ramp Terminal	Signal	А	А	NA	С	В	В	С	NA	D*	C*
Rice Street	I-229 NB Ramp Terminal	Signal	А	С	С	В	В	С	В	D	E-*	C-*
Rice Street	Bahnson Avenue	Minor Stop	А	А	С	С	С	А	А	Е	D	Е
6 TH Street	Lowell Avenue	Minor Stop	А	А	D	С	D	А	А	F	Е	F
6 TH Street	Cleveland Avenue	Signal	В	В	С	С	В	D	В	F	C*	D-*
10 TH Street	Jessica Avenue	Signal	А	А	D*	NA	A *	А	А	D	NA	А
10 TH Street	Lowell Avenue	Signal	А	А	С	D	А	В	A *	D	D	В*
10 TH Street	Conklin Avenue	RI/RO			С	С	С			С	С	С
10 TH Street	I-229 SPUI	Signal	В	В	В	В	В	D	С	В	D	D
10 ^{⊤H} Street	Blaine Avenue	RI/RO			В	NA	В			С	NA	С
10 TH Street	Cleveland Avenue	Signal	А	В	D*	F	C-*	B *	С	D*	Е	C*
10 TH Street	Hy-Vee Entrance	Signal	А	А	С	С	А	А	А	D	D*	A *
12 TH Street	Lowell Avenue	Minor Stop	А	А	В	С	С	А	А	С	Е	Е
12 TH Street	Cleveland Avenue	Signal	А	В	В	В	В	В	В	В	С	В
18 TH Street	Southeastern Avenue	Signal	С	С	F	D	F	Е	В	D	F	E-
18 TH Street	Cleveland Avenue	Signal	В	В	А	А	В	В	В	В	В	В
26 TH Street	Van Eps Avenue	Signal	А	А	D	D	А	А	А	В	В	А
26 TH Street	Yeager/Frederick Avenue	Minor Stop	А	А	D	Е	E	А	А	С	F	F
26 TH Street	I-229 SB Ramp Terminal	Signal	В	А	А	NA	А	С	А	А	NA	В
26 TH Street	I-229 NB Ramp Terminal	Signal	В	В	В	NA	В	В	А	F	NA	D-
26 TH Street	Southeastern Avenue	Signal	В	С	D*	D	C*	С	С	D	Е	С
26 TH Street	Cleveland Avenue	Signal	В	В	D	С	В	В	С	D	C*	C*

Table 4: 2027 No Build Arterial Intersection Operations Summary

Notes:

- "n/a" denotes an approach that does not exist at the intersection. "-" denotes an approach with no delay due to control type.

- Bold/Highlighted indicates a poor LOS due to LOS E/F, volume to capacity (v/c) ration > 1.0, or queue storage issue.

- " * " Queue storage ratio (QSR) greater than 1.0 for at least one movement resulting in entire intersection considered failing.

- " - " At least one movement is deemed failing resulting in entire intersection considered failing (not noted if intersection is LOS F).

The analysis of the 2027 No Build condition determined that there were sixteen intersections that demonstrated inadequate traffic operations in at least one of the peak periods. The intersections exhibited issues with high delays, inadequate queue storage, or capacity constraints.

Along Rice Street, both ramp terminal intersections operated at a LOS C or better; however, both intersections had at least one movement that failed. The southbound ramp had a southbound left turn that operated at a LOS D with a QSR greater than 1, the northbound ramp had a southbound left turn that operated at a LOS F with both QSR and V/C issues. The other two arterial intersections along Rice Street also demonstrated poor operations with a LOS E during the PM peak hour.

Along 6th Street, the Lowell Avenue intersection operated at a LOS F with high delays on the northbound and southbound approaches. The intersection with Cleveland Avenue operated at LOS D but had a failing northbound right turn movement and a southbound left turn that demonstrated QSR issues.

Along 10th Street, the ramp terminal intersection operated at a LOS B and LOS D during the AM and PM peak hours, respectively. This intersection demonstrated V/C issues on both the eastbound and westbound approaches with significant delays attributed to the left turn movements. The other arterial intersections along 10th Street all demonstrated poor operations with the exception of the two right-in, right-out intersections with Conklin Avenue and Blaine Avenue. At Jessica Avenue, the northbound approach demonstrated QSR issues. At Lowell Avenue, the westbound approach demonstrated QSR issues. At Cleveland Avenue, the northbound and eastbound approaches demonstrated QSR issues and the southbound approach demonstrated V/C issues. At the Hy-Vee access, the southbound approach demonstrated QSR issues.

Along 12th Street, the intersection with Lowell Avenue was shown to operate at a LOS E with high delays on the southbound approach. The intersection with Cleveland was shown to operate with a LOS B.

Along 18th Street, the intersection with Southeastern Avenue was shown to operate at a LOS F and E during the AM and PM peak hour, respectively. The heavy northbound left turn volume contributed to a high delay and significant V/C issue during the AM peak hour. Similarly, the PM peak hour eastbound approach carries a high right-turning volume that contributes to V/C issues along with high delays on the southbound approach.

Along 26th Street, the southbound ramp terminal intersection operated at LOS B or better, but the northbound ramp terminal intersection was shown to operate at LOS D with the heavy northbound right turn volume contributing to high delays and V/C issues. The other arterial intersections along 26th Street demonstrated poor operations with the exception of the intersection with Van Eps Avenue. At Fredrick Avenue, the southbound approach demonstrated high delays and LOS F. At Southeastern Avenue, the overall intersection operated at a LOS C, but the northbound left turn had a QSR greater than 1. At Cleveland Avenue, the overall intersection operated at a LOS C or better, but the southbound left turn had a QSR greater than 1.

The Streets module within HCS analysis was used to analyze pedestrian and bicycle facilities using the HCM multimodal methodology. Multi-modal methodology limitations only allow for the analysis of signalized intersections. Most of the intersections have a LOS of C or better for both the pedestrian and bicycle operations. There were 3 locations that demonstrated a poor LOS, including Rice Street & SB I-229, 10th Street 7 Jessica Avenue, and 26th Street & SB I-229. The multi-modal scores can be seen in **Appendix A**.

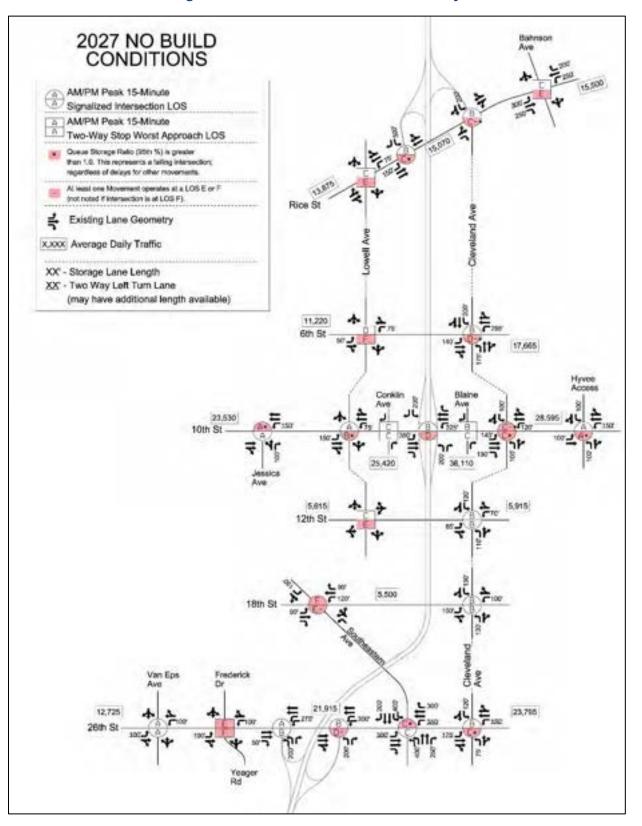


Figure 3: 2027 No Build Arterial Summary

2050 NO BUILD TRAFFIC OPERATIONS

The traffic operations representing the 2050 Year of Planning No Build condition are provided in the following section. The project area includes 3 service interchanges with 12 ramp junctions. Results for the individual segments and ramp junctions of I-229 within the study area are shown in **Table 5** as well as **Figure 4**.

Road	Description	Analysis Type	AM Peak LOS	PM Peak LOS
	NB I-229: southwest of Exit 5	Basic	D	D
	NB I-229: between Exit 5 Exit and Entrance Ramps	Basic	Е	D
	NB I-229: Exit 5 Entrance Ramp	Merge	F	D
ი	NB I-229: between Exit 5 and Exit 6	Basic	F	D
NB I-229	NB I-229: Exit 6 Exit Ramp	Diverge	F	С
B I	NB I-229: between Exit 6 Exit and Entrance Ramps	Basic	С	В
2	NB I-229: between Exit 6 and Exit 7	Basic	С	В
	IND 1-229. Detween Exit 6 and Exit 7	Weave	D	В
	NB I-229: between Exit 7 Exit and Entrance Ramps	Basic	D	В
	NB I-229: north of Exit 7	Basic	С	В
	SB I-229: north of Exit 7	Basic	В	С
	SB I-229: between Exit 7 Exit and Entrance Ramps	Basic	В	D
	CD 200, between Evit 7 and Evit C	Basic	В	С
0	SB I-229: between Exit 7 and Exit 6	Weave	В	D
-220	SB I-229: between Exit 6 Exit and Entrance Ramps	Basic	В	D
SB I-229	SB I-229: Exit 6 Entrance Ramp	Merge	С	F
S	SB I-229: between Exit 6 and Exit 5	Basic	D	F
	SB I-229: Exit 5 Exit Ramp	Diverge	D	F
	SB I-229: between Exit 5 Exit and Entrance Ramps	Basic	С	E
	SB I-229: southwest of Exit 5	Basic	С	D

Table 5: 2050 No Build Freeway Operations Summary

The analysis of the 2050 No Build condition revealed capacity constraints leading to poor operating LOS throughout mainline I-229. Out of the 18 total mainline segments, 15 were shown to operate at a LOS D or worse during either the AM or PM peak hour. There were three mainline segments that operated at a LOS C or better during the AM and PM peak hours.

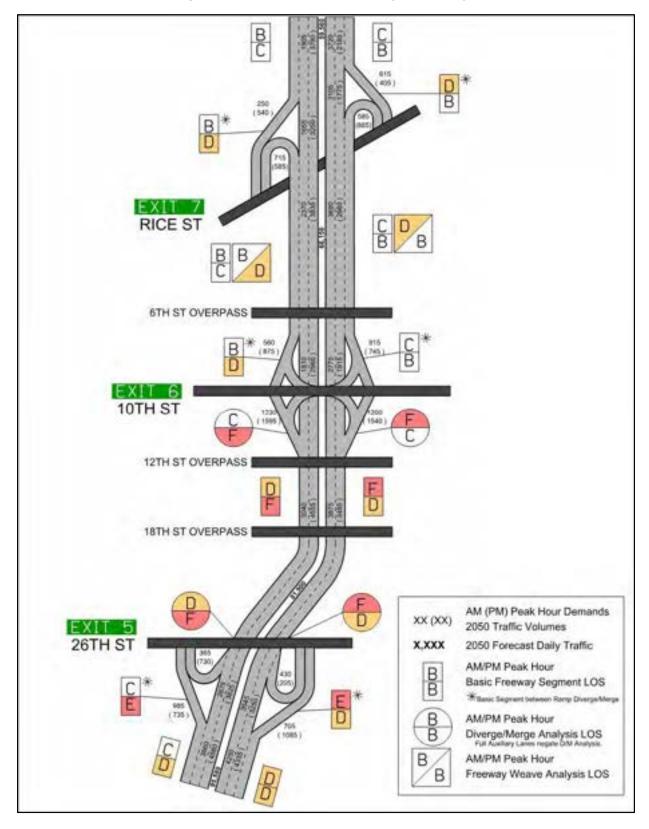


Figure 4: 2050 No Build Freeway Summary

A total of 23 study intersections were included in the analysis, including 16 traffic signals, 5 minor stop control intersections, and 2 right-in/right-out (RI/RO) intersections. Results for the intersection analysis in the project area are shown in **Table 6** as well as **Figure 5**.

				A	M Peak	Hour		PM Peak Hour					
Major Roadway	Intersecting Roadway	Control Type		Appr	oach		INT		Appr	oach			
nouunuj		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	EB	WB	NB	SB	INT.	EB	WB	NB	SB	INT.	
Rice Street	Lowell Avenue	Minor Stop	А	А	D	А	D	А	С	F	F	F	
Rice Street	I-229 SB Ramp Terminal	Signal	B *	В	NA	Е	C-*	C*	С	NA	D*	C*	
Rice Street	I-229 NB Ramp Terminal	Signal	F	F	F*	E*	F	F	D	F*	F*	F	
Rice Street	Bahnson Avenue	Minor Stop	А	А	F	E	F	А	А	F	F	F	
6 TH Street	Lowell Avenue	Minor Stop	А	А	F	F	F	А	А	F	Е	F	
6 TH Street	Cleveland Avenue	Signal	С	С	Е	С	D	Е	E*	F*	F*	F	
10 TH Street	Jessica Avenue	Signal	А	А	С	NA	А	В	А	D	NA	В	
10 TH Street	Lowell Avenue	Signal	А	В	Е	Е	В	D	C*	D	F	D-*	
10 ^{⊤H} Street	Conklin Avenue	RI/RO			D	D	D			F	С	F	
10 TH Street	I-229 SPUI	Signal	F	D	F	D	F	Е	D	D	F	E-	
10 TH Street	Blaine Avenue	RI/RO			С	NA	С			Е	NA	Е	
10 TH Street	Cleveland Avenue	Signal	D*	F	F*	F	F	B *	F	F*	F*	F	
10 TH Street	Hy-Vee Entrance	Signal	A *	В	Е	F	B-*	A *	В	E*	E*	B*	
12 TH Street	Lowell Avenue	Minor Stop	А	А	С	С	С	А	А	D	F	F	
12 TH Street	Cleveland Avenue	Signal	В	В	В	В	В	D	В	С	С	С	
18 TH Street	Southeastern Avenue	Signal	Е	Е	F	F	F	F	C*	Е	F	F	
18 TH Street	Cleveland Avenue	Signal	В	С	А	А	В	В	В	В	С	В	
26 TH Street	Van Eps Avenue	Signal	А	А	С	С	А	А	А	С	С	А	
26 TH Street	Yeager/Frederick Avenue	Minor Stop	А	А	D	F	F	А	А	D	F	F	
26 TH Street	I-229 SB Ramp Terminal	Signal	В	А	В	NA	В	С	А	В	NA	В	
26 TH Street	I-229 NB Ramp Terminal	Signal	С	В	В	NA	В	В	А	F	NA	E-	
26 TH Street	Southeastern Avenue	Signal	С	D*	F*	Е	E-*	С	D	Е	F*	E-*	
26 TH Street	Cleveland Avenue	Signal	В	С	Е	D	С	В	С	D	D*	C*	

Table 6: 2050 No Build Arterial Intersection Operations Summary

Notes:

- "n/a" denotes an approach that does not exist at the intersection. "-" denotes an approach with no delay due to control type.

- Bold/Highlighted indicates a poor LOS due to LOS E/F, volume to capacity (v/c) ration > 1.0, or queue storage issue.

- " * " Queue storage ratio (QSR) greater than 1.0 for at least one movement resulting in entire intersection considered failing.

- " - " At least one movement is deemed failing resulting in entire intersection considered failing (not noted if intersection is LOS F).

The analysis of the 2050 No Build condition determined that there were eighteen intersections that demonstrated inadequate traffic operations in at least one of the peak periods. The intersections exhibited issues with high delays, inadequate queue storage, or capacity constraints.

Along Rice Street, all intersections operated with LOS F or QSR and V/C issues that designate them failing. The southbound ramp terminal intersection operated at a LOS C with a QSR greater than 1, the northbound ramp terminal intersection operated at a LOS F with a QSR greater than 1 and V/C issues. The other two arterial intersections along Rice Street also demonstrated poor operations with a LOS F and V/C issues.

Along 6th Street, all intersections operated with LOS F or QSR and V/C issues that designate them failing.

Along 10th Street, the ramp terminal intersection operated at a LOS F and LOS E during the AM and PM peak hours, respectively with V/C issues. The other arterial intersections along 10th Street all demonstrated poor operations with the exception of Jessica Avenue. At Lowell Avenue, the westbound approach demonstrated QSR issues. The right-in, right-out intersections with Conklin Avenue and Blaine Avenue, were shown to operate at LOS F and LOS E, respectively. At Cleveland Avenue, the intersection experienced high delays, QSR and V/C issues. At the Hy-Vee access, the northbound and southbound approaches demonstrated QSR issues.

Along 12th Street, the intersection with Lowell Avenue was shown to operate at a LOS F with high delays and V/C issues on the southbound approach. The intersection with Cleveland was shown to operate with a LOS B and LOS C during the AM and PM peak hours, respectively.

Along 18th Street, the intersection with Southeastern Avenue was shown to operate at a LOS F. The heavy northbound left turn volume contributed to a high delay and significant V/C issue during the AM peak hour. Similarly, the PM peak hour carries a high eastbound right-turning volume that contributes to V/C issues along with high delays on the southbound approach and QSR issues on the westbound approach.

Along 26th Street, the southbound ramp terminal intersection operated at LOS B or better, but the northbound ramp terminal intersection was shown to operate at LOS E with the heavy northbound right turn volume contributing to high delays and V/C issues. The other arterial intersections along 26th Street demonstrated poor operations with the exception of the intersection with Van Eps Avenue. At Fredrick Avenue, the southbound approach demonstrated high delays and LOS F. At Southeastern Avenue, the intersection operated at a LOS E, with QSR and V/C issues. At Cleveland Avenue, the overall intersection operated at a LOS C or better, but the southbound left turn had a QSR greater than 1.

The Streets module within HCS analysis was used to analyze pedestrian and bicycle facilities using the HCM multimodal methodology. Multi-modal methodology limitations only allow for the analysis of signalized intersections. Most of the intersections have a LOS of C or better for both the pedestrian and bicycle operations. There were 4 locations that demonstrated a poor LOS, including Rice Street & SB I-229, 10th Street & Jessica Avenue, 18th Street & Southeastern Avenue, and 26th Street & SB I-229. The multi-modal scores can be seen in **Appendix A**.

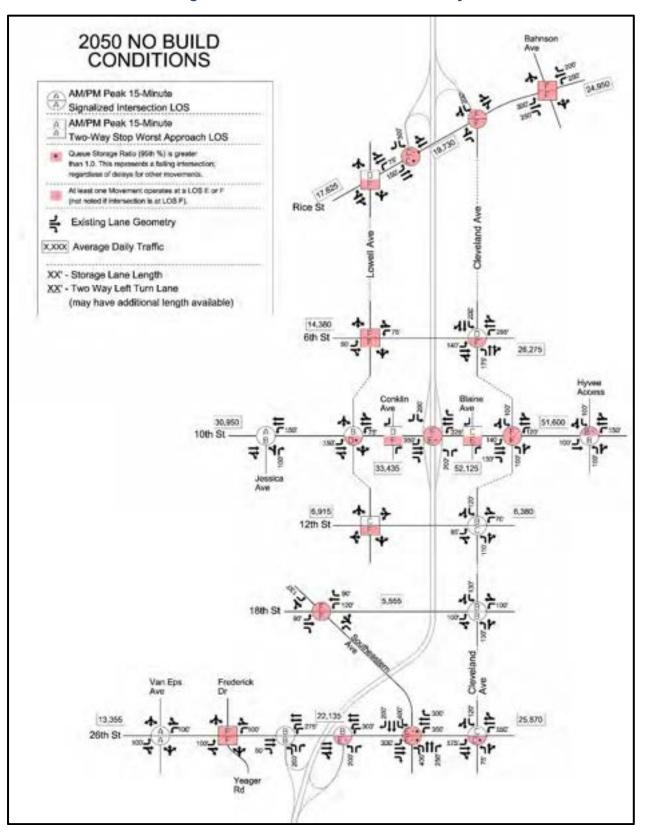


Figure 5: 2050 No Build Arterial Summary

SUMMARY

The No Build traffic operations analysis of the 2027 Year of Project Construction and the 2050 Planning Horizon Year provide documentation of the operational deficiencies that manifest within the study area due to traffic demand increases across this time period and capacity constraints imposed by the existing roadway infrastructure.

The 2027 No Build operations analysis demonstrated that the majority of mainline I-229 operated acceptably. However, southbound I-229 between Exit 6 and Exit 5 and the ramp diverge to Exit 5 were shown to operate at LOS D during the PM peak hour. All other mainline segments operated at a LOS C or better during the AM and PM peak hours. Under the 2027 No Build traffic volumes, there were few capacity constraints present along mainline I-229 or at the ramp junctions.

The 2027 No Build operations analysis of arterial intersections demonstrated that 16 out of the 23 intersections resulted in operations that were considered failing. The I-229 Exit 6 interchange ramp terminal intersection was determined to operate with a LOS B and LOS D during the AM and PM peak hours, respectively. The other ramp terminal intersections also demonstrated failing operations in at least one peak hour, with the exception of the southbound Exit 5 ramp terminal intersection. The arterial intersections were determined to operate poorly due to either high delays or QSR greater than 1, but there were also capacity issues documented with V/C greater than 1 at approach movements.

Along 10th Street, the arterial intersections demonstrated poor operations with the exception of the two right-in, right-out intersections with Conklin Avenue and Blaine Avenue. At Jessica Avenue, the northbound approach demonstrated QSR issues. At Lowell Avenue, the westbound approach demonstrated QSR issues. At Cleveland Avenue, the northbound and eastbound approaches demonstrated QSR issues and the southbound approach demonstrated V/C issues. At the Hy-Vee access, the southbound approach demonstrated QSR issues.

The 2050 No Build operations analysis revealed capacity constraints leading to poor operating LOS throughout mainline I-229. The majority of mainline segments were determined to have failing operations. Out of the 18 total mainline segments, 15 were shown to operate at a LOS D or worse during either the AM or PM peak hour. Under the 2050 No Build traffic volumes, the existing road network demonstrated the capacity limitations present along mainline I-229 and at the ramp junctions that should be addressed.

The 2050 No Build operations analysis of arterial intersections demonstrated that 18 out of the 23 intersections resulted in operations that were considered failing. The I-229 Exit 6 interchange ramp terminal intersection was determined to operate with a LOS F and LOS E during the AM and PM peak hours, respectively. The other ramp terminal intersections also demonstrated failing operations in at least one peak hour, with the exception of the southbound Exit 5 ramp terminal intersection. The arterial intersections were determined to operate poorly due to either high delays or QSR greater than 1, but there were also capacity issues documented with V/C greater than 1 at approach movements.

Along 10th Street, the arterial intersections demonstrated poor operations with the exception of Jessica Avenue. At Lowell Avenue, the westbound approach demonstrated QSR issues. The right-in, right-out intersections with Conklin Avenue and Blaine Avenue, were shown to operate at LOS F and LOS E, respectively. At Cleveland Avenue, the intersection experienced high delays, QSR and V/C issues. At the Hy-Vee access, the northbound and southbound approaches demonstrated QSR issues.

Throughout the I-229 corridor, the operations of the mainline segments are shown to degrade as traffic volumes increase with the majority experiencing failing operations by year 2050. Similarly, the arterial intersections showed degrading traffic operations with high delays, queue storage issues and capacity constraints at intersections increasing over time with many intersections failing by year 2050.

APPENDIX A – HCS SUMMARY

		T						Interim Y	'ear 2027				
Inte	rsection Location	Traffic Control	Metric		A	M Peak Ho	ur			P	M Peak Ho	ur	
		Control		EB	WB	NB	SB	Overall	EB	WB	NB	SB	Overall
			Volume	295	775	110	0	1180	1015	500	65	0	1580
		Two-wav	Delay (Sec.)	0.0	0.2	15.1	0.0	15.1	0.0	1.6	40.7	0	40.7
	Rice Street &	Stop	LOS Weighted Intersection	Α	A	С	A	С	Α	A	E	A	E
	Lowell Avenue	Control	Delay (Sec.)	-	-	-	-	1.54	-	-	-	-	2.18
			Ped LOS	-	-	-	-		-	-	-	-	
			Bicycle LOS	-	-	-	-		-	-	-	-	
			Volume	345	1055	0	215	1615	980	610	0	475	2065
	Rice Street &	Traffic	Delay (Sec.)	5.4	10	-	32.7	12.1	13.1	20.1	-	35.9	20.3
et	SB I-229	Signal	LOS	A	A	NA	С	В	В	C	NA	D	С
ē			Ped LOS	A	B	- B	B		A	B	B -	B	
S			Bicycle LOS Volume	370	905	445	310	2030	1175	520	300	475	2470
Rice Street			Delay (Sec.)	8.5	21	29.3	17.4	2030	22.6	13.6	40.4	60.4	30.1
2	Rice Street &	Traffic	LOS	A	C 21	C	ц7.4 В	B	C	13.0 B		E	C
	NB I-229	Signal	Ped LOS	В	B	B	B	_	B	В	B	B	
			Bicycle LOS	А	A	A	А		С	A	Α	A	
			Volume	285	865	40	20	1210	860	435	45	95	1435
			Delay (Sec.)	0.9	0.1	17.3	16.8	17.3	0.0	0.8	41.2	28.6	41.2
	Rice Street &	Two-way	LOS	А	A	С	С	С	А	A	E	D	E
	Bahnson Avenue	Stop	Weighted Intersection	- ⁻	-	-	-	1.13	- ⁻	-	-	-	3.43
		Control	Delay (Sec.) Ped LOS	-	-	-	-		-	-	-	-	
			Bicycle LOS	-	-	-	-		-	-	-	-	
			Volume	400	715	25	40	1180	950	465	85	45	1545
			Delay (Sec.)	0.2	0.3	26.4	21.3	26.4	0.4	0.9	99.0	40.9	99.0
	6th Street &	Two-way	LOS	Α	A	D	С	D	Α	A	F	E	F
4	Lowell Avenue	Stop	Weighted Intersection	-	_	-	-	1.53	-	-	-	_	7.15
e e	Lowell Avenue	Control	Delay (Sec.)					1.55					7.15
Ę			Ped LOS	-	-	-	-		-	-	-	-	-
6th Street			Bicycle LOS	-	-	-	-	2105	-	-	-	-	2620
6t			Volume Delay (Sec.)	425 17.5	1065 15.4	440 30.4	265 21.9	2195 19.6	900 36.0	580 17.8	615 89.1	535 26.9	2630 42.5
	6th Street &	Traffic	LOS	B	15.4 B	30.4 C	21.9 C	19.6 B	D	17.8 B	89.1 F	26.9 C	42.5 D
	Cleveland Avenue	Signal	Ped LOS	B	B	B	В		B	B	B	B	
			Bicycle LOS	A	A	A	A		A	A	A	A	
			Volume	665	1435	155	0	2255	1700	920	90	0	2710
	10th Street &	Traffic	Delay (Sec.)	3.4	1.6	41.5	-	5.1	5.6	3.0	49.8	-	6.1
	Jessica Avenue	Signal	LOS	А	A	D		Α	А	A	D		Α
	Jessica Avenue	Jightai	Ped LOS	В	A	В	В		В	A	В	В	
			Bicycle LOS	Α	В	F	-		В	A	F	-	
			Volume	715	1350	60	105	2230	1435	1155	80	190	2860
	10th Street &	Traffic	Delay (Sec.)	6.0	2.7	34.5	37.2	6.3	15.7	8.7	37.3	46.1	15.5
	Lowell Avenue	Signal	LOS Ped LOS	A B	AB	C B	DB	A	B	AB	DB	DB	В
			Bicycle LOS	A	B	A	A		B	B	A	A	
			Volume	800	1345	125	10	2280	1585	в 1150	65	20	2820
			Delay (Sec.)		-	123	16.9	16.9	-	- 1150	24.3	15.4	2820
	10th Street &	Two-way	LOS			C	C	C			C	C	C
	Conklin Avenue	Stop	Weighted Intersection	-	_	-	-	0.91	_	-	_	_	0.67
	contain Avenue	Control	Delay (Sec.)					0.51					0.07
			Ped LOS Bievela LOS	-	-	-	-		-	-	-	-	
يد			Bicycle LOS			-		2210	-				2005
e e			Volume Delay (Sec.)	605 18.5	1105 14.4	320 15.6	180 10.1	2210 15.0	1145 47.3	1020 32.2	275 11.1	465 38.4	2905 35.4
St	10th Street &	Traffic	LOS	B	B	B	B	15.0 B	47.3 D	52.2 C	B	D	D
£	I-229 SPUI	Signal	Ped LOS	B	B	B	B	_	B	B	B	B	_
10th Street			Bicycle LOS	A	A	A	A		B	A	A	A	
			Volume	975	1600	5	0	2580	1905	1290	10	0	3205
			Delay (Sec.)	-	-	12.4	-	12.4	-	-	21.5	-	21.5
	10th Street &	Two-way	LOS			В		В			С		С
	Blaine Avenue	Stop	Weighted Intersection	-	-	-	-	0.02	-	-	-	-	0.07
		Control	Delay (Sec.) Ped LOS	-	-	-	-		-	-	-	-	
			Bicycle LOS	-	-	-	-		-	-	-	-	
			Volume	945	1265	445	375	3030	1860	1065	435	515	3875
			Delay (Sec.)	7.3	19.4	49.3	136.1	34.9	14.9	25.7	49.1	77.8	30.3
	10th Street &	Traffic	LOS	A	B	D	F	C	B	C	D	E	C
	Cleveland Avenue	Signal	Ped LOS	В	В	В	В		В	В	В	В	
			Bicycle LOS	Α	В	A	A		В	A	A	A	

	Traffic						Interim Y	n Year 2027					
Intersection Location	Control	Metric			M Peak Ho	ur				M Peak Ho			
	0011101		EB	WB	NB	SB	Overall	EB	WB	NB	SB	Overall	
		Volume	765	1290	20	100	2175	1540	1030	60	195	2825	
10th Street &	Traffic	Delay (Sec.)	5.2	9.2	33.2	34.0	9.3	4.2	7.6	43.0	45.2	9.2	
		LOS	Α	A	С	С	Α	Α	Α	D	D	Α	
Hy-Vee Access	Signal	Ped LOS	В	В	В	В		В	В	В	В		
		Bicycle LOS	Α	В	A	A		В	А	A	A		
		Volume	150	430	55	50	685	615	260	45	135	1055	
		Delay (Sec.)	0.6	0.1	14.2	15.9	15.9	0.1	0.7	17.6	46.3	46.3	
12th Street &	Two-way	LOS	А	A	В	С	С	A	A	С	E	E	
Lowell Avenue	Stop Control	Weighted Intersection Delay (Sec.)	-	-	-	-	2.49	-	-	-	-	6.91	
tre		Ped LOS	-	-	-	-		-	-	-	-		
N I		Bicycle LOS	-	-	-	-		-	-	-	-		
tt		Volume	95	405	485	185	1170	635	245	370	455	1705	
12th		Delay (Sec.)	9.5	15.1	13.2	10.2	13.1	18.4	10.3	18.1	20.6	17.7	
12th Street &	Traffic	LOS	A	B	B	B	B	B	B	B	C	B	
Cleveland Avenue	Signal	Ped LOS	В	В	В	В		В	В	В	В		
		Bicycle LOS	A	A	A	A		В	A	A	A		
		Volume	230	430	1070	50	1780	1400	220	450	105	2175	
18th Street &		Delay (Sec.)	30.1	33.6	208.6	48.0	139.2	65.3	15.6	430	103	57.7	
	Traffic	LOS	C	C	F		F	E	B		F	E	
Avenue	Signal	Ped LOS	B	B	B	B		B	B	B	C	_	
		Bicycle LOS	A	A	B	A	-	C	A	A	A	-	
Avenue Avenue 18th Street &		Volume	120	390	215	200	925	550	160	270	430	1410	
tr tr		Delay (Sec.)	120	19.7	8.7	8.8	14.0	18.0	11.6	12.4	14.2	1410	
18th Street &	Traffic	LOS	B	19.7 B	A	0.0 A	14.0 B	B	B	B	14.2 B	B	
Cleveland Avenue	Signal	Ped LOS	B	B	B	B	D	B	B	B	B	D	
		Bicycle LOS	A	A	A	A	-	A	A	A	A	-	
							4265			5		1220	
		Volume	380 2.7	830 4.9	10 40.0	45 41.1	1265 5.8	690 4.5	510 4.0	19.5	25 19.8	1230 4.6	
26th Street & Van	Traffic	Delay (Sec.)											
Eps Avenue	Signal	LOS Ped LOS	A	A	D	D	Α	A	A	B	B	Α	
			B	B	B	В	-	B	B	B	B	-	
		Bicycle LOS	A	B	A	A	4005	B	A	A	A	4070	
		Volume	415	860	85	25	1385	545	630	170	25	1370	
	Two-way	Delay (Sec.)	0.1	1.2	25.5	48.7	48.7	0.2	2.1	23.9	59.2	59.2	
26th Street &	Stop	LOS Weighted Interpretion	A	A	D	E	E	A	A	С	F	F	
Frederick Drive	Control	Weighted Intersection Delay (Sec.)	-	-	-	-	3.22	-	-	-	-	5.09	
	Control	Ped LOS	-	-	-	-		-	-	-	-		
		Bicycle LOS	-	-	-	-	-	-	-	-	-	-	
		Volume	470	1605	365	0	2440	685	1120	730	0	2535	
		Delay (Sec.)	16.5	4.4	9.3	-	7.2	33.1	5.1	8.8	-	13.8	
26th Street &	Traffic	LOS	B	4.4 A	9.3 A	-	7.2 A	233.1 C	5.1 A	6.6 A	-	13.8 B	
26th Street & SB I-229	Signal	Ped LOS	B	A	B	В	A	В	A	B	В	D	
		Bicycle LOS	A	B	F	-		A	A	F	- D		
6th		Volume	595	1770		0	2930		1155			3195	
26				-	565	-		1170		870	0		
26th Street &	Traffic	Delay (Sec.)	19.6	11.2 P	12.1 P	-	12.8 P	12.9 P	6.0	135.4	-	41.8 D	
NB I-229	Signal	LOS	B	B	B		В	B	A	F		U	
		Ped LOS	B	A	C	B -	-	B	A	C	B -	-	
		Bicycle LOS	A	B	A		2007	A	B	B		4465	
acut ci i c		Volume	895	1540	1220	210	3865	1870	1140	535	920	4465	
26th Street &	Traffic	Delay (Sec.)	17.6	27.0	45.0	43.7	31.8	20.1	24.8	42.1	55.5	32.7	
Southeastern	Signal	LOS	В	C	D	D	С	C	C	D	E	С	
Avenue	5	Ped LOS	C	C	В	В		С	C	В	B		
		Bicycle LOS	Α	В	В	A		В	В	A	A		
		Volume	820	1475	110	165	2570	1655	1105	85	350	3195	
26th Street &	Traffic	Delay (Sec.)	10.5	18.3	41.3	34.4	18.1	13.8	24.2	41.7	35.0	21.2	
Cleveland Avenue	Signal	LOS	В	В	D	С	В	В	С	D	С	С	
Cievelallu Aveilue	Jigilai	Ped LOS	В	В	В	В		В	В	В	В		
		Bicycle LOS	A	В	A	A		В	A	A	A		

								Planning	Year 2050	1			
Inte	rsection Location	Traffic Control	Metric		А	M Peak Ho	ur			P	M Peak Ho	ur	
		Control		EB	WB	NB	SB	Overall	EB	WB	NB	SB	Overall
			Volume	450	1180	150	0	1780	1370	840	90	5	2305
		Two-wav	Delay (Sec.)	0.0	0.2	33.8	0.0	33.8	0.2	15.9	483.1	63.7	483.1
	Rice Street &	Stop	LOS Weighted Intersection	A	A	D	A	D	A	С	F	F	F
	Lowell Avenue	Control	Delay (Sec.)	-	-	-	-	2.98	-	-	-	-	24.91
			Ped LOS	-	-	-	-		-	-	-	-	
			Bicycle LOS	-	-	-	-		-	-	-	-	
			Volume	495	1630	0	250	2375	1330	1130	0	540	3000
	Rice Street &	Traffic	Delay (Sec.)	15.9	13.2	-	69.7	20.1	20.7	25	-	52.2	28.2
t	SB 1-229	Signal	LOS	В	В	NA	E	С	C	С	NA	D	С
ě		•	Ped LOS	A	B	В	B		A	B	В	B	
S			Bicycle LOS	A	B	-	F	2120	B	B	-	F	2000
Rice Street			Volume Delay (Sec.)	500 155.2	1235 89.8	810 114.1	585 57.3	3130 100.5	1575 630.9	930 35.4	500 130.3	885 374.6	3890 365.9
R.	Rice Street &	Traffic	LOS	F	69.8 F	F	57.5 E	F	F	D	F	574.0 F	505.9 F
	NB I-229	Signal	Ped LOS	B	В	В	В	•	B	B	В	B	•
			Bicycle LOS	A	B	B	B	-	C	A	A	B	-
			Volume	540	1225	40	40	1845	1415	860	45	165	2485
			Delay (Sec.)	1.1	0.1	55.2	44.8	55.2	0.1	1.0	1120.2	1601.5	1601.5
	Rice Street &	Two-way	LOS	Α	A	F	E	F	A	A	F	F	F
	Bahnson Avenue	Stop	Weighted Intersection	-	-	-	-	2.56	-	-	-	-	127.03
		Control	Delay (Sec.) Ped LOS			-	-			-	-	-	
			Bicycle LOS	-	-	-	-		-	-	-	-	
			Volume	560	- 1125	40	60	1785	- 1245	770	105	65	2185
			Delay (Sec.)	0.2	0.4	156.7	83.7	1785	0.4	0.8	1654.6	37.0	1654.6
	Call Church D	Two-way	LOS	A	A	F	F	F	A	A	F	E	F
	6th Street &	Stop	Weighted Intersection				-	6.64					81.12
eet	Lowell Avenue	Control	Delay (Sec.)	-	-	-	-	0.04	-	-	-	-	81.12
Ľ.			Ped LOS	-	-	-	-		-	-	-	-	
6th Street			Bicycle LOS	-	-	-	-		-	-	-	-	
6t			Volume	570	1550	635	465	3220	1185	900	1010	750	3845
	6th Street &	Traffic	Delay (Sec.) LOS	22.9 C	32.6 C	79.1 E	29.1 C	39.5 D	69.9 E	70.3 E	297.7 F	109.0 F	135.4 F
	Cleveland Avenue	Signal	Ped LOS	В	В	B	B	U	B	B	В	В	F
			Bicycle LOS	A	B	A	A	-	B	A	A	A	-
			Volume	1045	1935	205	0	3185	2165	1525	135	0	3825
		- "	Delay (Sec.)	5.1	7.2	24.9	-	7.7	12.4	5.0	40.3	-	10.8
	10th Street & Jessica Avenue	Traffic Signal	LOS	Α	A	С		Α	В	A	D		В
	Jessica Avenue	Sigilai	Ped LOS	В	A	В	В		В	A	В	В	
			Bicycle LOS	Α	В	F	-		В	В	F	-	
			Volume	1070	1985	85	145	3285	2165	1805	110	255	4335
	10th Street &	Traffic	Delay (Sec.)	8.2	15.1	60.6	70.2	16.7	54.0	24.0	51.4	97.0	45.5
	Lowell Avenue	Signal	LOS Ped LOS	A B	B	E	E	В	D B	C B	DB	F	D
								-	B	B			-
			Bicycle LOS Volume	A 1190	B 1985	A 170	A 10	3355	2365	1800	A 90	A 25	4280
			Delay (Sec.)	- 1190	- 1965	25.7	25.8	25.8	- 2305	- 1800	83.9	23	83.9
	10th Street &	Two-way	LOS			D	D	D			F	C	F
	Conklin Avenue	Stop	Weighted Intersection	_	_		-	1.38	_	-	-	-	1.91
	Sound Avenue	Control	Delay (Sec.)					1.30					1.91
			Ped LOS Biovolo LOS	-	-	-	-		-	-	-	-	
يد			Bicycle LOS Volume					2205					4350
e			Delay (Sec.)	815 149.2	1725 51.4	620 154.2	225 48.9	3385 100.6	1565 73.8	1655 49.2	535 45.7	595 127.9	4350 68.2
Sti	10th Street &	Traffic	LOS	F	D	134.2 F	48.9 D	F	73.8 E	49.2 D	43.7 D	F	E
£	I-229 SPUI	Signal	Ped LOS	B	B	B	B		В	B	B	В	_
10th Street			Bicycle LOS	A	B	B	A		B	B	A	B	
			Volume	1465	2485	10	0	3960	2840	2140	15	0	4995
			Delay (Sec.)	-	-	16.3	-	16.3	-	-	46.3	-	46.3
	10th Street &	Two-way	LOS			С		С			E		E
	Blaine Avenue	Stop	Weighted Intersection	-	-	-	-	0.04	-	-	-	-	0.14
		Control	Delay (Sec.) Ped LOS	-	-	-	-		-	-	-	-	
			Bicycle LOS	-	-	-	-		-	-	-	-	
			Volume	1425	2000	640	610	4675	2775	1915	600	800	6090
			Delay (Sec.)	37.3	164.0	145.0	313.6	146.1	17.0	181.3	174.9	300.0	140.0
	10th Street &	Traffic	LOS	D	F	F	F	F	В	F	F	F	F
	Cleveland Avenue	Signal	Ped LOS	В	В	В	В		В	В	В	В	
				В	В	В	В		С	В	В	В	

	Traffic		Planning Year 2050										
ntersection Location	Control	Metric			M Peak Ho	ur				M Peak Ho			
			EB	WB	NB	SB	Overall	EB	WB	NB	SB	Overall	
		Volume	1170	2035	20	100	3325	2350	1900	60	195	4505	
10th Street &	Traffic	Delay (Sec.)	4.7	10.1	69.6	83.4	11.0	6.6	12.5	66.4	71.9	13.9	
		LOS	А	В	E	F	В	А	В	E	E	В	
Hy-Vee Access	Signal	Ped LOS	В	В	В	В		В	В	В	В		
		Bicycle LOS	В	В	A	A		С	В	A	A		
		Volume	190	540	70	60	860	720	325	60	160	1265	
		Delay (Sec.)	0.6	0.1	17.0	21.0	21.0	0.2	0.6	25.8	179.6	179.6	
12th Street &	Two-way	LOS	A	A	С	С	С	Α	A	D	F	F	
	Stop	Weighted Intersection		_	_	_	3.04	_	_	_	_	24.21	
Lowell Avenue	Control	Delay (Sec.)					3.04					24.21	
		Ped LOS	· ·	-	-	-	-	-	-	-	-	-	
Ś.		Bicycle LOS	-	-	-	-		-	-	-	-		
171		Volume	165	440	585	270	1460	1000	270	445	640	2355	
12th Street &	Traffic	Delay (Sec.)	11.4	17.5	15.5	11.7	14.9	39.6	15.1	25.8	32.6	31.6	
Cleveland Avenue	Signal	LOS	В	В	В	В	В	D	В	С	С	С	
	8	Ped LOS	В	В	В	В	_	В	В	В	В		
		Bicycle LOS	A	A	В	A		В	A	A	В		
		Volume	400	435	1785	115	2735	1990	295	790	140	3215	
18th Street &	Traffic	Delay (Sec.)	64.2	60.3	273.8	146.9	198.4	377.1	32.2	55.8	212.3	256.2	
Southeastern	Signal	LOS	E	E	F	F	F	F	С	E	F	F	
Avenue 18th Street &	SiBilai	Ped LOS	В	В	В	В		В	В	В	C		
		Bicycle LOS	Α	A	С	A		D	A	В	A		
c		Volume	165	395	220	240	1020	730	180	310	520	1740	
18th Street &	Traffic	Delay (Sec.)	14.1	20.1	8.9	9.2	14.1	19.3	11.5	17.6	21.4	18.8	
Cleveland Avenue		LOS	В	C	A	A	В	В	В	В	С	В	
Cleveland Avenue	Signal	Ped LOS	В	В	В	В		В	В	В	В		
		Bicycle LOS	А	A	A	A		В	A	A	A		
		Volume	465	915	15	45	1440	590	625	15	25	1255	
acht Church 8 Mar	T	Delay (Sec.)	3.2	7.0	29.2	29.9	6.8	3.1	4.3	24.6	24.9	4.4	
26th Street & Van	Traffic Signal	LOS	A	A	С	С	Α	A	A	С	С	Α	
Eps Avenue		Ped LOS	В	В	В	В		В	В	В	В		
		Bicycle LOS	A	В	A	A		В	В	A	A	-	
		Volume	450	1025	85	25	1585	565	770	180	25	1540	
		Delay (Sec.)	0.1	1.1	33.4	77.9	77.9	0.2	1.8	28.9	96.5	96.5	
26th Street &	Two-way	LOS	А	Α	D	F	F	Α	Α	D	F	F	
Frederick Drive	Stop	Weighted Intersection		_		-	2.76		_	_	_	F 02	
Frederick Drive	Control	Delay (Sec.)	-	-	-	-	3.76	-	-	-	-	5.92	
		Ped LOS	-	-	-	-		-	-	-	-		
		Bicycle LOS	-	-	-	-		-	-	-	-		
		Volume	500	1770	365	0	2635	710	1260	730	0	2700	
26th Street &	Traffic	Delay (Sec.)	18.5	7.5	12.0	-	10.1	34.2	4.2	10.9	-	13.0	
U 20th Street &	Signal	LOS	В	A	В		В	С	A	В		В	
26th Street & SB I-229	Jigliai	Ped LOS	В	A	В	В		В	A	В	В		
		Bicycle LOS	А	В	F	-		А	В	F	-		
010		Volume	625	1895	705	0	3225	1195	1275	1085	0	3555	
Z	T	Delay (Sec.)	20.7	12.3	17.3	-	14.9	15.4	8.3	193.6	-	68.5	
26th Street &	Traffic	LOS	С	В	В		В	В	A	F		E	
NB I-229	Signal	Ped LOS	В	А	С	В		В	А	С	В		
		Bicycle LOS	A	В	В	-		A	В	В	-		
		Volume	1025	1660	1815	390	4890	2090	1230	855	1510	5685	
26th Street &		Delay (Sec.)	32.2	52.5	80.3	66.2	59.9	26.6	41.8	61.1	90.6	56.2	
Southeastern	Traffic	LOS	C	D	F	E	E	C	D	E	F	E	
Avenue	Signal	Ped LOS	C	C	B	B		C	C	B	B		
		Bicycle LOS	A	B	B	A		В	B	A	B		
		Volume	1020	1610	140	175	2945	1870	1195	90	390	3545	
		Delay (Sec.)	1020	21.9	57.6	48.6	2943	1870	25.5	54.1	52.3	23.5	
26th Street &	Traffic	LOS	B	21.9 C	E 57.0	48.0 D	C 21.0	B	23.5 C	D	D	23.5 C	
	Signal				-		L			-		L L	
Cleveland Avenue	Jigilai	Ped LOS	В	B	B	B		В	B	B	B		

Appendix E – Build Concept

LEGEND



2024 - Municipal Street Construction
2028 - Bridge Construction
2029 And 2030 - I-229 Construction
2029 And 2030 - Bridge Construction
2031 - Interchange/Ramp Construction Project
2031 - Raised Median Construction
2031 - Sidewalk, C&G Construction
Existing Bridge
Total Acquisitions

State Owned Property

Anticipated ROW Impact

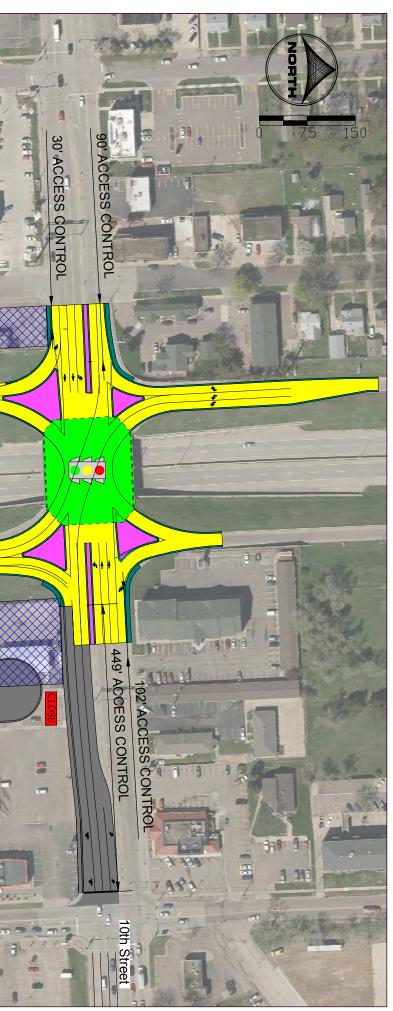




S BLAINE AVE

S CLEVELAND AVE

111

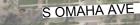


LEGEND

2024 - Municipal Street Construction
2028 - Bridge Construction
2029 And 2030 - I-229 Construction
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2031 - Interchange/Ramp Construction Project
2031 - Raised Median Construction
2031 - Sidewalk, C&G Construction
Existing Bridge
Total Acquisitions
State Owned Property

Anticipated ROW Impact

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S LOWELL AVE

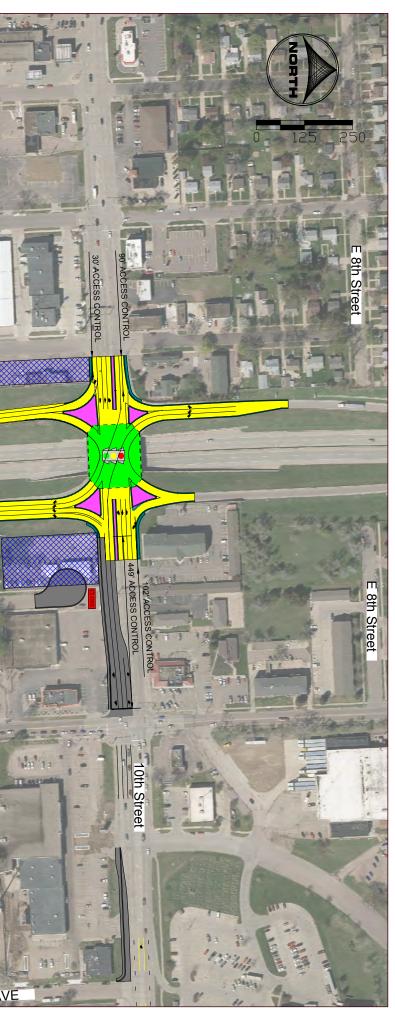
S CONKLIN AVE

S BLAINE AVE

an 9'.

S CLEVELAND AVE

S THOMSON AVE



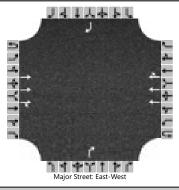
Appendix F – HCS Reports

		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts Su	mmar	у	-	-	_	
General Inform	nation								Interse	ction Inf	ormatio	on		4.2.41	1 2 4
Agency	lation	HRG							Duratio		0.250				
Analyst		RL		Analys	is Date	e Jul 29	2020		Area Ty		Other				5 Ai
Jurisdiction		SIOUX FALLS		Time F			, 2020		PHF	<u>po</u>	0.85			414	
Urban Street		10TH STREET				r 2020				s Period	1> 7:0	00	-2		
Intersection		JESSICA AVENUE		File Name AMpeak.xus											
Project Descrip	tion	I-229/10TH ST IMJ													1911
													ļ		
Demand Inform	nation				EB		Τ	W	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h				527	41	18	130)7	106		35			
							_	_							
Signal Informa	_					_									
Cycle, s	116.0	Reference Phase	6		R .	5	2					1		3	4
Offset, s	46	Reference Point	Begin	Green	93.5	11.3	0.0	0.0	0.0	0.0			-		
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	0.0	0.0					Y		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	
Timer Results			_	EBL	_	EBT	WB	1	WBT	NBI		NBT	SBL		SBT
Assigned Phase						2			6		-	8			
Case Number					+	8.0			6.0	-		9.0		\rightarrow	
						99.1			99.1	-		9.0 16.9		+	
	Phase Duration, s Change Period, (<i>Y+R c</i>), s					5.6	<u> </u>		5.6			5.6		\rightarrow	
Max Allow Hea						0.0		-	0.0	-		5.3		+	
Queue Clearan	2 (,				0.0	-		0.0	-		10.4		\rightarrow	
Green Extensio		, _ ,				0.0	-		0.0			1.0			
Phase Call Pro		(9,0), 3				0.0			0.0	-		1.00			
Max Out Proba										-		0.00			
	2											0100		ania (
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment				2	12	1	6		3		18			
Adjusted Flow	Rate(<i>v</i>), veh/h			338	330	19	1376	5	125		41			
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In		1758	1713	762	1674	-	1688		1502			
Queue Service	Time (g	g s), S			13.2	5.4	0.7	13.3		8.4		3.0			
Cycle Queue C	learanc	e Time (<i>g c</i>), s			13.2	5.4	14.1	13.3		8.4		3.0			
Green Ratio (g	,				0.81	0.81	0.81	0.81		0.10		0.10			
Capacity (c), v					1418	1381	590	2699	-	164		146			
Volume-to-Cap	-	· · /			0.238		0.032	0.510		0.762		0.283		<u> </u>	
	. ,	In (95 th percentile			71.7	68.6	6	142.1		182		53.5			
	· /	eh/In (95 th percent	,		2.8	2.7	0.2	5.6		7.2		2.1		<u> </u>	
-		RQ) (95 th percen	tile)		0.00	0.00	0.06	0.00		1.52		0.00			
Uniform Delay	, ,,				2.7	2.7	4.8	2.8		51.1		48.6			_ _
Incremental De					0.4	0.4	0.1	0.6	-	9.9		1.5			
Initial Queue D					0.0	0.0	0.0	0.0		0.0		0.0			_
Control Delay (3.1	3.1	4.9	3.4		61.0		50.1			
	evel of Service (LOS) opproach Delay, s/veh / LOS				A	A	A 35	A	^	E		D E	0.0	L	
Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS				3.1		A 7	3.5 .4		A	58.3			0.0 A		
				/	.4		······								
Multimodal Re	Multimodal Results				EB			WB			NB			SB	
Pedestrian LOS		/LOS		1.83		В	0.63		A	2.32		В	2.15		В
Bicycle LOS So				1.04		A	1.7		B		2.32 B			-+	-
,															

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	_	HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts Sur	nmar	у	_	_	_	
Concret Inform	notion								Interee	tion Inf	o rmotic		T u	4.2.4.1	De LU
General Inform	nation								Intersec		1		- 11	*	
Agency		HRG			·				Duration,		0.250				
Analyst		RL				e Jul 29	, 2020		Area Typ	e	Other	-	-		*
Jurisdiction		SIOUX FALLS		Time F		0000			PHF	<u> </u>	0.80				
Urban Street		10TH STREET				2020			Analysis	Period	1> 7:(00	÷		
Intersection		LOWELL AVENUE		File Na	ame	AMpe	ak.xus							+	
Project Descrip	otion	I-229/10TH ST IMJ	R						_						(M) (2)
Demand Infor	mation		_		EB	_		W	В		NB	_		SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			8	604	7	33	115	5 29	11	9	37	62	12	25
							121	_	_	_					
Signal Informa	1			-	57		212				1	-			x
Cycle, s	116.0	Reference Phase	6		8		- 51	21				1		3	4
Offset, s	102	Reference Point	Begin	Green		86.6	12.3	0.0		0.0			<u> </u>		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	-	3.6	3.6	0.0		0.0	_				· Ψ
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0	0.0	0.0	_	5	6	7	
Timer Results			_	EBL		EBT	WB	1	WBT	NB		NBT	SBI		SBT
Assigned Phas						2	1	-	6			8		-	4
Case Number						6.3	1.0		4.0			8.0			8.0
Phase Duration	1. S					92.2	5.8		98.1			17.9			17.9
	Period, (Y+R c), s					5.6	3.0		5.6			5.6			5.6
	Period, (Y+R c), s ow Headway (MAH), s					0.0	4.2	_	0.0			5.3			5.3
Queue Clearar	2 (,					2.6					6.9		+	11.5
Green Extensio		1 = 7				0.0	0.1		0.0			0.9			0.8
Phase Call Pro	bability	· - ·					0.71	1				1.00			1.00
Max Out Proba	bility						0.00)				0.00			0.02
Movement Cr	un Dee				EB			WB			ND			SB	
Movement Gro	-	Suits		L	Т	R	L	T	R	L	NB T	R	L	T	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow) veh/h		9	327	326	39	694		5	71	10	<u> </u>	124	14
-		ow Rate (<i>s</i>), veh/h/	In	388	1758	1751	1688	1772			1598			1458	
Queue Service				0.9	7.8	7.8	0.6	8.4			0.0			4.7	
		e Time (<i>g c</i>), s		3.5	7.8	7.8	0.6	8.4			4.9			9.5	
Green Ratio (g		e fille (g t), s		0.75	0.75	0.75	0.79	0.80			0.11			0.11	
Capacity (c),	,			343	1313	1307	633	1413			207			205	
Volume-to-Cap		itio (X)		0.025	0.249		0.061	0.492			0.345			0.603	
· · ·		/In (95 th percentile)	3.6	126.8	123.6	7.4	91.6			92			170.4	
		eh/In (95 th percent	,	0.1	5.0	4.9	0.3	3.6	3.5		3.6			6.7	1
	· /	RQ) (95 th percen	,	0.03	0.00	0.00	0.12	0.00			0.00			0.00	
Uniform Delay	(d1), s	/veh		5.5	5.5	5.5	3.2	1.7	1.6		48.5			50.5	
Incremental De	elay (d 2), s/veh		0.1	0.4	0.4	0.0	0.9	1.0		1.4			4.0	
Initial Queue D	elay(d	з), s/veh		0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Control Delay (5.7	6.0	6.0	3.2	2.6	2.6		49.9			54.5	
Level of Servic	<u>, </u>			Α	A	A	Α	A	Α		D			D	
Approach Dela				6.0		А	2.6		А	49.9	9	D	54.5	5	D
Intersection De	lay, s/ve	eh / LOS				7	.9						A		
					55									0.5	
Multimodal Re		// 02		4.00	EB	B	4.0	WB		0.01	NB	P	0.04	SB	B
Pedestrian LOS Bicycle LOS So				1.62		B	1.6		B	2.3		B	2.31	_	B
Dicycle LUS S	JOIE / LC	10		1.13	,	А	1.74	+	В	0.6		A	0.69	,	A

	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	HR Green	Intersection	10th St & Conklin Ave
Agency/Co.		Jurisdiction	
Date Performed	10/2/2020	East/West Street	10th Street
Analysis Year	2021	North/South Street	Conklin Avenue
Time Analyzed	AM Peak Hour - Existing	Peak Hour Factor	0.80
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	I-229/10th Street IMJR		
Lanes			

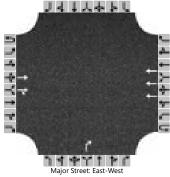


Vehicle Volumes and Adjustments

venicle volumes and Adj	ustine																		
Approach		Eastb	bound			West	bound			North	bound			South	bound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R			
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12			
Number of Lanes	0	0	3	0	0	0	3	0		0	0	1		0	0	1			
Configuration			Т	TR			Т	TR				R				R			
Volume (veh/h)			696	7			1210	3				117				7			
Percent Heavy Vehicles (%)												2				2			
Proportion Time Blocked																			
Percent Grade (%)	0 0 0																		
Right Turn Channelized	No No																		
Median Type Storage				Undi	vided														
Critical and Follow-up H	eadwa	ys																	
Base Critical Headway (sec)												7.1				7.1			
Critical Headway (sec)												7.14				7.14			
Base Follow-Up Headway (sec)												3.9				3.9			
Follow-Up Headway (sec)												3.92				3.92			
Delay, Queue Length, an	d Leve	l of Se	ervice																
Flow Rate, v (veh/h)	Τ											146				9			
Capacity, c (veh/h)												483				300			
v/c Ratio												0.30				0.03			
95% Queue Length, Q ₉₅ (veh)												1.3				0.1			
Control Delay (s/veh)												15.6				17.4			
Level of Service (LOS)												С				С			
Approach Delay (s/veh)										15	5.6			17	7.4				
Approach LOS										(C				С				

		HCS	7 Sig	nalize	ed Int	ersec	tion F	Resu	Its Su	mmar	у				
									_						
General Inform	nation								Intersec				- 20	JIL	2.5
Agency		HRG							Duration		0.250		-	and loss	
Analyst		RL				e Jul 29	9, 2020		Area Typ	be	Other				2
Jurisdiction		SIOUX FALLS		Time F					PHF		0.84			1	*
Urban Street		10TH STREET				r 2020			Analysis	Period	1> 7:(00	7		
Intersection		1-229		File Na	ame	AMpe	ak.xus							510	
Project Descrip	otion	I-229/10TH ST IMJ	R	_	_	_	_	_	_	_	_	_		4.1.444	
Demand Inform	mation				EB			W	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v				102	452	259	295	68	9 443	271	0	255	167	0	253
Signal Informa	1				1.9		4	12				-	-		A
Cycle, s	116.0	Reference Phase	6		- 1		73.	6	10			-	€ ₂	3	4
Offset, s	104	Reference Point	Begin	Green	5.8	1.7	47.7	29.	2 0.0	0.0	_	1	<u>.</u>		
Uncoordinated		Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	3.6	0.0	0.0		>	7		- V 2
Force Mode	Fixed	Simult. Gap N/S	On	Red	4.5	4.5	4.5	3.7	0.0	0.0		5	6	7	1
Timer Results				EBI		EBT	WB	L	WBT	NBI	_	NBT	SBI	_	SBT
Assigned Phas				5		2	1	-	6			8			4
Case Number				1.1		3.0	1.1	+	3.0			5.0			5.0
Phase Duration	ו. s			13.9)	55.8	23.7		65.6			36.5			36.5
	e Period,(Y+R c), s					8.1	8.1		8.1			7.3			7.3
-	ge Period, (Y+R c), s Allow Headway (<i>MAH</i>), s					0.0	4.2		0.0			5.3			5.3
Queue Clearan		,		4.2 5.8		0.0	14.3		0.0			24.4	-		24.6
Green Extensio		, _ ,		0.3		0.0	1.3		0.0			4.6			4.5
Phase Call Pro		(3,),		0.96			1.00					1.00			1.00
Max Out Proba				0.00			0.00)				0.68			0.70
Movement Gro	-	sults			EB		<u> </u>	WB	-	<u> </u>	NB			SB	
Approach Move				L	Т	R		Т	R	L	Т	R		Т	R
Assigned Move) l. /l.		5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow				96	427	245	342	799		323	0	304	199	0	301
		w Rate (<i>s</i>), veh/h/	In	1688	1627		1674	1661		1701	1669		1674	1643	
Queue Service		- ,		3.8	8.5		12.3	18.3		20.3	0.0		11.7	0.0	
-		e Time (<i>g c</i>), s		3.8	8.5		12.3	18.3		20.3	0.0		11.7	0.0	
Green Ratio (g				0.46	0.41		0.56	0.50 1648	_	0.25	0.25 420		0.25	0.25 413	
Capacity (c), v		tic (X)		364	1339		610		_	490			483		+
Volume-to-Cap		Itio (X) /In (95 th percentile)	0.265 69.4	0.319	-	0.561 200.8	0.48 253		0.659 346.2	0.000		0.412	0.000	+
	. ,	eh/In (95 th percentile	,	2.7	5.6	-	7.8	9.9	-	13.7	0.0		8.5	0.0	
	, ,	RQ) (95 th percent	,	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	1
Uniform Delay		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		18.5	17.6		15.9	19.1	-	40.1	0.00		36.9	0.00	
Incremental De	· ,			0.4	0.6		0.4	0.4		2.9	0.0		0.8	0.0	1
Initial Queue D				0.0	0.0		0.0	0.0	-	0.0	0.0		0.0	0.0	1
Control Delay (,		18.8	18.2	0.0	16.3	19.6	0.0	43.0	0.0	0.0	37.7	0.0	0.0
Level of Service				B	B	A	В	В	A	D		A	D		A
	Approach Delay, s/veh / LOS					B	12.8	<u> </u>	B	22.2	2	С	15.0)	B
Intersection De				12.5			4.7						В		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS				2.11		В	2.10		В	2.45		В	2.45		В
Bicycle LOS So	core / LC	DS		1.29)	Α	1.89	9	В	1.52	2	В	1.31		A

	HCS7 Two-Way Sto	p-Control Report	
General Information		Site Information	
Analyst	HR Green	Intersection	10th St & Blaine Ave
Agency/Co.		Jurisdiction	
Date Performed	10/2/2020	East/West Street	10th Street
Analysis Year	2021	North/South Street	Blaine Avenue
Time Analyzed	AM Peak Hour - Existing	Peak Hour Factor	0.83
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	I-229/10th Street IMJR	-	
Lanes			
	1711	10 TO TO	



Vehicle Volumes and Adjustments

venicle volumes and Adj	ustine	ints																		
Approach		Eastb	ound			West	bound			North	bound			South	bound					
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R				
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12				
Number of Lanes	0	0	2	0	0	0	3	0		0	0	1		0	0	0				
Configuration			Т	TR			Т					R								
Volume (veh/h)			840	34			1426					6								
Percent Heavy Vehicles (%)												2								
Proportion Time Blocked																				
Percent Grade (%)							-			(0									
Right Turn Channelized										Ν	lo									
Median Type Storage				Undi	vided															
Critical and Follow-up H	eadwa	ys																		
Base Critical Headway (sec)												6.9								
Critical Headway (sec)												6.94								
Base Follow-Up Headway (sec)												3.3								
Follow-Up Headway (sec)												3.32								
Delay, Queue Length, an	d Leve	l of Se	ervice																	
Flow Rate, v (veh/h)	Τ											7								
Capacity, c (veh/h)												496								
v/c Ratio												0.01								
95% Queue Length, Q ₉₅ (veh)												0.0								
Control Delay (s/veh)												12.4								
Level of Service (LOS)												В								
Approach Delay (s/veh)								•		- 12	2.4									
Approach LOS										ļ	В									

		HCS	57 Sig	nalize	ed Int	ersec	tion F	kesu	lts Sui	mmar	у		_	_	_
General Inform	nation								Intersec	tion Inf	ormatic		T t	4.2441	be lu
	nation											-	- 1	11	
Agency		HRG			·				Duration		0.250		-		
Analyst		RL				e Jul 29	, 2020		Area Typ	be	Other				*
Jurisdiction		SIOUX FALLS		Time F					PHF		0.82		1	- T	
Urban Street		10TH STREET		-		r 2020			Analysis	Period	1> 7:(00			10
Intersection		CLEVELAND AVEN		File Na	ame	AMpe	ak.xus							11	
Project Descrip	tion	I-229/10TH ST IMJ	R	_	_	_	_	_	_	_	_	_	1	1144	
Demand Inform	nation				EB			WE	3		NB			SB	
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v				142	620	84	15	105	4 48	189	203	_	47	96	183
Signal Informa	ation				7	1.4		1	11	2.9			- 1	-	L.
Cycle, s	116.0	Reference Phase	6		×.	1 H	20	NR	12 5	12			€	1	sta
Offset, s	103	Reference Point	Begin	Green	7.6	51.0	4.3	6.7	26.3	3 0.0	-			* • •	
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.0	3.0		0.0		7	7	$\mathbf{\nabla}$	5
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	0.0	0.0	2.0	0.0		5	6	7	T
Time D. If						EDT	14/25		MOT			NDT	0.5		OPT
Timer Results				EBL		EBT	WB		WBT	NB		NBT	SB	-	SBT
Assigned Phas	e			5		2			6	3		8	7		4
Case Number				1.0		3.0			6.3	1.1		4.0	1.1		4.0
Phase Duration		```		10.6 3.0		67.2	<u> </u>		56.6	16.9	_	41.6	7.3		31.9
	nge Period, (Y+R c), s Allow Headway (<i>MAH</i>), s					5.6		_	5.6	3.0	_	5.6	3.0	_	5.6
	x Allow Headway (<i>MAH</i>), s eue Clearance Time (<i>g</i> s), s				_	0.0	<u> </u>		0.0	4.2		4.2	4.2		4.2
		, <u> </u>		7.5		0.0	<u> </u>		0.0	13.		16.6	5.0		26.3
Green Extensio		(ge), s		0.1		0.0			0.0	0.2		2.3	0.1		0.1
Phase Call Pro				0.99						1.0		1.00	0.84		1.00
Max Out Proba	DIIILY		-	1.00)	-			_	1.00	J	0.01	0.00)	1.00
Movement Gro	oup Res	sults			EB	_		WB	_		NB	_		SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow	Rate (v), veh/h		156	681	92	17	632	623	230	270		57	340	
-		ow Rate (s), veh/h/	In	1674	1674	1490	747	1744		1688	1746		1701	1597	
Queue Service				5.5	17.5	2.0	1.2	33.4	33.4	11.7	14.6		3.0	24.3	
		e Time (g c), s		5.5	17.5	2.0	8.2	33.4		11.7	14.6		3.0	24.3	
Green Ratio (g				0.52	0.53	0.65	0.44	0.44	-	0.36	0.31		0.26	0.23	
Capacity (c), v	,			238	1776	969	346	766	754	283	542		311	363	
Volume-to-Cap		atio (X)		0.656	0.384	0.095	0.049	0.825	-	0.815			0.184	0.938	
•		/In (95 th percentile)	118.5	298	29.2	10.4	483.4	-	244.1	263.7		57.1	467.2	
	. ,	eh/In (95 th percent	,	4.6	11.6	1.1	0.4	18.7		9.6	10.4		2.3	18.5	
	· /	RQ) (95 th percen		0.88	0.00	0.22	0.09	0.00	_	2.44	0.00		0.71	0.00	
Uniform Delay	(d1), s	/veh		24.8	22.9	5.6	15.6	19.9	19.8	30.5	32.6		32.8	44.0	
Incremental De	· ,			3.9	0.5	0.2	0.2	8.7	8.9	12.9	0.7		0.3	31.6	
Initial Queue D	2 1	,		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (•		28.7	23.5	5.7	15.9	28.6	28.6	43.5	33.3		33.0	75.6	
Level of Servic				С	С	Α	В	С	С	D	С		С	E	
Approach Dela	<u> </u>			22.6	3	С	28.4	1	С	38.0		D	69.5		E
Intersection De							3.5						С		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS				1.90		В	1.9′		В	2.2		В	2.45		В
Bicycle LOS So	core / LC	DS		1.34	1	Α	1.61	1	В	1.3	1	А	1.14	1	А

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	HUS	or Sig	nalize	aint	ersec	tion F	lesu	its Sui	mmar	у	_			
General Information								Intersec	tion Inf	ormatic	מר		4.241	ie la
	HRG									0.250		- 💷	46	
Agency			Analys	in Dat	- Iul 20	2020		Duration	·	O.250 Other		- 200		
Analyst	RL				e Jul 29	, 2020		Area Typ PHF	be		-	- 12		1
Jurisdiction	SIOUX FALLS		Time F		- 0000				Devie	0.90	20			
Urban Street	10TH STREET				r 2020			Analysis	Period	1> 7:(00	_ <u> </u>		
Intersection	HY-VEE DRIVEWA		File Na	ame	АМре	ak.xus							11	
Project Description	I-229/10TH ST IMJ	R						_					INT THEY	MIC.
Demand Information				EB			WE	3		NB		7	SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), veh/h			85	579	11	8	107	3 68	8	3	6	29	4	64
						111		-	_					
Signal Information	<u> </u>	_		1		215	1							x
Cycle, s 116.0		6			3 - 2 6.5	100	7				1	e 2	3	4
Offset, s 93	Reference Point	Begin	Green	4.8	87.2	9.8	0.0		0.0			~		
Uncoordinated No	Simult. Gap E/W	On	Yellow	3.0	3.6	3.6	0.0		0.0		>	Y		∇
Force Mode Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0	0.0	0.0		5	6	7	
Timer Results			EBL		EBT	WB		WBT	NB	1	NBT	SBI		SBT
Assigned Phase			5	•	2			6	IND	-	8			4
Case Number			1.0		4.0		-	5.3			6.0			6.0
Phase Duration, s			7.8		100.6	-		92.8			15.4	<u> </u>		15.4
			3.0		5.6			5.6			5.6			5.6
					0.0		+	0.0			4.8	<u> </u>		4.8
	x Allow Headway (<i>MAH</i>), s eue Clearance Time (<i>g</i> s), s				0.0			0.0			8.3			7.5
Green Extension Time	, <u> </u>		3.3 0.1		0.0			0.0			0.4			0.4
Phase Call Probability	(=)		0.95	;	0.0		-	0.0			0.98			0.98
Max Out Probability			0.00								0.00			0.00
Movement Group Re	sults			EB	1 -		WB			NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R		Т	R
Assigned Movement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (96	333	331	9	1192		9	10	<u> </u>	32	76	\square
Adjusted Saturation Fl		In	1661	1744	-	753	1647	_	1324	1582		1416	1527	\square
Queue Service Time (- ,		1.3	3.1	3.1	0.3	16.3	_	0.8	0.7		2.5	5.5	
Cycle Queue Clearand	ce Time (<i>g</i> c), s		1.3	3.1	3.1	0.4	16.3	-	6.3	0.7		3.2	5.5	
Green Ratio (g/C)			0.81	0.82	0.82	0.75	0.75		0.08	0.08		0.08	0.08	<u> </u>
Capacity (c), veh/h			413	1428	1418	628	2476		111	134		174	129	
Volume-to-Capacity R		\ \	0.232	0.234	_	0.014	0.482	_	0.080	0.075		0.185	0.584	
Back of Queue (Q), f	, .		16.3	38.5	36.9	2.5	225.9		11.9	12.6		41.4	103.9	
Back of Queue (Q), V	· ·		0.6	1.5	1.5	0.1	8.7	0.8	0.5	0.5		1.6	4.1	
Queue Storage Ratio	, ,, ,	tile)	0.16	0.00	0.00	0.03	0.00	_	0.24	0.00		0.49	0.00	
Uniform Delay (<i>d</i> 1), s			4.2	1.3	1.3	3.6	5.6	3.8	54.1	48.9		50.3	51.1	
Incremental Delay (d			0.1	0.4	0.4	0.0	0.7	0.1	0.3	0.2		0.6	5.0	
Initial Queue Delay (a	·		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/v			4.3 A	1.7	1.7	3.7	6.3	3.9	54.4	49.1		51.0	56.1	
	evel of Service (LOS)			A	A	A	A	A	D			D	E	
	Approach Delay, s/veh / LOS				A 7	6.1		A	51.6		D	54.5)	D
Intersection Delay, s/v				(.5						A			
			50			WB			NB			SB		
Multimodal Results				FR									00	
Multimodal Results Pedestrian LOS Score	e / LOS		1.82	EB	В	1.85	1	В	2.47	ī	В	2.31	1	В

	-	HCS	7 Sig	nalize	d Int	ersec	tion F	Resul	ts Su	nmary	у	-	_	_	
General Information	ation								Intersec	tion Inf	ormatio	on		4.24	1 10 10
Agency		HRG							Duration		0.250				
Analyst		RL		Analys	is Date	e Jul 29	2020		Area Typ		Other				
Jurisdiction		SIOUX FALLS		Time F			, 2020		PHF		0.90				=
Urban Street		10TH STREET		Analys		r 2020			Analysis	Period	1> 7:0	າດ			
Intersection		JESSICA AVENUE		File Na			ak.xus		rangoio	1 chou		50			
Project Descriptio		I-229/10TH ST IMJ					ak.xu3						-	ר ך 1990 איז איז	2 94 2
		1-223/1011101 1103	IX.												
Demand Informa	ation				EB			WE	3		NB			SB	
Approach Movem	nent			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), veh	h/h				1521	1 73	44	761	1	43	-	42		<u>†</u>	1
					1								ر میں اور		
Signal Information	ion						Τ								
Cycle, s 1	116.0	Reference Phase	2		H	5	2					1	.	2	
Offset, s	37	Reference Point	Begin	Green	98.1	6.7	0.0	0.0	0.0	0.0		1		3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	0.0	0.0	0.0	0.0			7		52
Force Mode F	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	<u> </u>
				_							Ĩ				
Timer Results				EBL	-	EBT	WB	L	WBT	NBL	-	NBT	SBL		SBT
Assigned Phase						2			6			8		\rightarrow	
Case Number						8.0			6.0			9.0			
Phase Duration, s						103.7			103.7			12.3		\rightarrow	
2 1	ge Period, (Y+R c), s Allow Headway (MAH) s					5.6			5.6			5.6			
	Allow Headway (MAH), s					0.0			0.0			5.3		\perp	
Queue Clearance		1 = 1										5.5			
Green Extension		(g e), s				0.0			0.0			0.4			
Phase Call Proba												0.95			
Max Out Probabil	lity											0.00			
Movement Grou	ın Resi	ults			EB			WB			NB			SB	
Approach Movem	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movem					2	12	1	6		3		18			
Adjusted Flow Ra) veh/h	_		888	883	53	909	-	48		47			+
-	. ,	w Rate (<i>s</i>), veh/h/l	In		1758	1729	267	1674		1688		1502			+
Queue Service Ti					38.8	18.6	11.9	5.7	-	3.2		3.5			+
Cycle Queue Clea		,			38.8	18.6	52.4	5.7		3.2		3.5			+
Green Ratio (g/C		, iiiio (g t), o			0.85	0.85	0.85	0.85	1	0.06		0.06			
Capacity (c), ver	,				1487	1463	199	2831	_	97		86			+
Volume-to-Capac		io(X)			0.597	0.604	0.265	0.321	_	0.493		0.541			1
		n (95 th percentile))		202.8	_	45	53.2		68.4		68.5			-
	,	h/ln (95 th percent			7.9	8.0	1.8	2.1		2.7		2.7			1
	· ·	RQ) (95 th percen			0.00	0.00	0.45	0.00		0.57		0.00			
Uniform Delay (d		,, .			2.8	2.8	16.2	1.6	1	53.0		53.2			1
Incremental Delay					1.8	1.9	3.0	0.3		5.4		7.3		_	1
Initial Queue Dela		,			0.0	0.0	0.0	0.0		0.0		0.0			-
Control Delay (d	• •	•			4.6	4.7	19.1	1.8		58.4		60.5			1
Level of Service (_		4.0 A	<u> .,</u> А	B	A	1	E		E			
Approach Delay,	<u>, </u>	(105		4.6		A	2.8		A	59.4		E	0.0		
Intersection Delay				4.0			.8			00.4			0.0 A		
	, <i>.,</i> , , , , , , , , , , , , , , , , , ,					5									
Multimodal Resu	ults				EB			WB			NB			SB	
Multimodal Resu Pedestrian LOS S		LOS		1.81		В	0.6		A	2.32	1	В	2.15		В

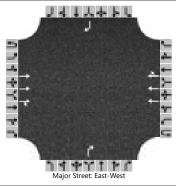
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	_	HCS	ar sig	nalize	ed Int	ersec	tion F	kesu	Its Sur	nmar	у	_	_	_	_
General Inform	nation								Intersect	tion Inf	ormatic		1	4.241	b l
													- 11	+	
Agency		HRG			·				Duration,		0.250				
Analyst		RL		L		e Jul 29	, 2020		Area Typ	e	Other		2		*
Jurisdiction		SIOUX FALLS		Time F		0000			PHF	<u> </u>	0.87				
Urban Street		10TH STREET				2020			Analysis	Period	1> 7:(00	<u> </u>		-
Intersection		LOWELL AVENUE	_	File Na	ame	РМре	ak.xus							+	
Project Descrip	otion	I-229/10TH ST IMJ	R						_					1997 1997	916
Demand Inform	mation		_		EB	_		W	3		NB	_		SB	_
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			21	1257	13	124	84	3 62	5	21	47	123	36	14
Oinnel Informa	4			1	T		101	-		_	-				
Signal Informa	1	Defense Dhara	0		040	= . • · •	- etta				4	-			A
Cycle, s	116.0	Reference Phase	2	-		1	12	21			1.5	1		3	4
Offset, s	72	Reference Point	Begin	Green		77.8	19.0	0.0		0.0			<u>~</u>		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	-	3.6	3.6	0.0		0.0					∇
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0	0.0	0.0		5	6	7	
Timer Results				EBI		EBT	WB		WBT	NB		NBT	SBI		SBT
Assigned Phas					-	2	1	-	6			8			4
Case Number	-					6.3	1.0	+	4.0			8.0			8.0
Phase Duration	1.5					83.4	8.0	_	91.4			24.6			24.6
	Period, (Y+R c), s					5.6	3.0		5.6			5.6			5.6
-	<u> </u>	,				0.0	4.2		0.0			5.3			5.3
	Allow Headway (<i>MAH</i>), s ue Clearance Time (<i>g</i> _s), s						4.7					7.4			18.3
Green Extensio		1 - 7				0.0	0.3		0.0			1.4			0.8
Phase Call Pro							0.99)				1.00			1.00
Max Out Proba	bility						0.00)				0.01			0.71
Movement Cr	un Dee				ГР			WB			ND			CD	
Movement Gro	-	Suits		L	EB T	R	L	T	R	L	NB T	R	L	SB T	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow) yoh/h		28	2 855	854	138	511	498	5	84	10	<u> </u>	199	14
		,	In			+		<u> </u>					<u> </u>		
Queue Service		w Rate (<i>s</i>), veh/h/l	IN	554	1758	1751	1688 2.7	1772			1615			1388	
Cycle Queue C				1.8	30.6 30.6	30.7 30.7	2.7	17.0 17.0			0.0 5.4		<u> </u>	10.9 16.3	
-		e nine (<i>g c</i>), s		11.1	0.67	0.67	0.73	0.74						0.16	
Green Ratio (g Capacity (c), v				0.67 390	1179	1174	251	1310			0.16 298			281	
Volume-to-Cap		itio (X)		0.072	0.725		0.552	0.39			0.281			0.708	
· · ·		/In (95 th percentile))	11	367.3	358.1	86	279.2			100.1			256.3	
	· /	eh/In (95 th percent		0.4	14.3	14.3	3.4	11.0			3.9			10.1	
	(.).	RQ) (95 th percen	,	0.08	0.00	0.00	1.43	0.00			0.00			0.00	
Uniform Delay		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	7.2	8.4	8.4	14.2	9.2	8.3		42.8			47.4	
Incremental De	· ,			0.3	3.1	3.1	1.5	0.7	0.7		0.7			6.1	
Initial Queue D	• •			0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Control Delay (•		7.5	11.5	11.5	15.8	9.9	9.1		43.5			53.5	
Level of Servic				Α	В	В	В	Α	A		D			D	
Approach Dela	y, s/veh	/ LOS		11.5	5	В	10.2	2	В	43.5	5	D	53.5	5	D
Intersection De	lay, s/ve	eh / LOS				14	1.5						В		
Multimodal Re					EB			WB			NB			SB	
Pedestrian LOS				1.65		В	1.63		В	2.3		В	2.31	_	В
Bicycle LOS So	core / LC	05		1.71		В	1.46	j	Α	0.63	5	A	0.82	2	A

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HCS[™] Streets Version 7.9

	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	HR Green	Intersection	10th St & Conklin Ave
Agency/Co.		Jurisdiction	
Date Performed	10/2/2020	East/West Street	10th Street
Analysis Year	2021	North/South Street	Conklin Avenue
Time Analyzed	PM Peak Hour - Existing	Peak Hour Factor	0.87
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	I-229/10th Street IMJR		
Lanes			



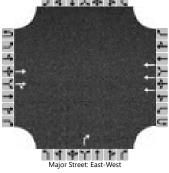
Vehicle Volumes and Adjustments

venicle volumes and Adj	ustine																	
Approach		Eastb	ound			West	oound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	0	3	0	0	0	3	0		0	0	1		0	0	1		
Configuration			Т	TR			Т	TR				R				R		
Volume (veh/h)			1410	17			1013	15				60				16		
Percent Heavy Vehicles (%)												2				2		
Proportion Time Blocked																		
Percent Grade (%)	0 0 No																	
Right Turn Channelized	No No																	
Median Type Storage				Undi	vided													
Critical and Follow-up H	eadwa	ys																
Base Critical Headway (sec)												7.1				7.1		
Critical Headway (sec)												7.14				7.14		
Base Follow-Up Headway (sec)												3.9				3.9		
Follow-Up Headway (sec)												3.92				3.92		
Delay, Queue Length, an	d Leve	l of Se	ervice															
Flow Rate, v (veh/h)												69				18		
Capacity, c (veh/h)												273				386		
v/c Ratio												0.25				0.05		
95% Queue Length, Q ₉₅ (veh)												1.0				0.1		
Control Delay (s/veh)												22.6				14.8		
Level of Service (LOS)												С				В		
Approach Delay (s/veh)										22	2.6			14	4.8			
Approach LOS										(C				В			

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		HCS	7 Sig	nalize	d In	tersec	tion F	Resu	lts Su	mmar	у					
-									_							
General Inform						Intersection Information					1 4 4 4 1 1 1 L	21.5				
Agency HRG								Duration,						19110	100 M	
Analyst RL			<u> </u>		e Jul 29	9, 2020		Area Type		Other						
Jurisdiction SIOUX FALLS			Time Period					PHF		0.90			1	-		
Urban Street 10TH STREET			Analysis Year					Analysis Period		1> 7:00		7		-		
Intersection I-229				File Name PMpeak.xus										110		
Project Descrip	otion	I-229/10TH ST IMJ	R	_	_	_	_	_	_	_	_	_	1	1144	20	
Demand Information					EB		V		/B		NB		SB			
Approach Movement				LT		R	_		R	L	LT		L	TR		
Demand (v), veh/h			206	852	2 412	306	58	7 239	232	0	R 440	444	0	209		
Signal Information					1			-21	Sair			-	_		×	
Cycle, s 116.0 F		Reference Phase			-	<u> </u>	1 KAN				·		3	a ta		
Offset, s	100	Reference Point	Begin	Green	15.7	6.3	29.4	41.	1 0.0	0.0	_					
Uncoordinated	No	Simult. Gap E/W	On	Yellow		0.0	3.6	3.6	0.0	0.0		X	7		×17	
Force Mode	Fixed	Simult. Gap N/S	On	Red	4.5	0.0	4.5	3.7	0.0	0.0		5	6	7	T	
Timer Results				EBL		EBT	WBL		WBT	NBI	L NBT		SBL SB		SBT	
Assigned Phase			5		2	1				8			<u>36L</u> 361			
			1.1		3.0	1.1	· ·			5.0			5.0			
Case Number Phase Duration, s			23.8		37.5	30.			-	48.4			48.4			
			8.1		8.1	8.1		8.1		_	_					
Change Period, (Y+R c), s			4.2		0.0						7.3 5.3		7.3 5.3			
Max Allow Headway (<i>MAH</i>), s						0.0	-	4.2 0.0		<u> </u>				33.3		
Queue Clearance Time (g_s), s Green Extension Time (g_e), s				15.0 0.7		0.0		21.3 0.7 (37.4		5.9		
Phase Call Probability				1.00		0.0	1.00			<u> </u>		3.7		1.00		
Max Out Probability				0.03			0.37			-	1.00			0.79		
Max Out 1100a	ionity			0.00			0.57	,				1.00			0.75	
Movement Group Results					EB			WB			NB			SB		
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R		
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14	
Adjusted Flow Rate (v), veh/h		264	1093	529	343	658	268	258	0	489	493	0	232			
Adjusted Saturation Flow Rate (s), veh/h/ln			1688	1714		1674	1643	3	1701	1669		1674	1643			
Queue Service Time (g s), s			13.0	29.4		19.3	21.9)	13.4	0.0		31.3	0.0			
Cycle Queue Clearance Time (g c), s			13.0	29.4		19.3	21.9)	13.4	0.0		31.3	0.0			
Green Ratio (g/C)			0.39	0.25		0.44	0.31		0.35	0.35		0.35	0.35			
Capacity(<i>c</i>), veh/h			369	869		379	1012	2	665	592		655	582			
Volume-to-Capacity Ratio (X)			0.716	1.257	7	0.905	0.65	D	0.388	0.000		0.753	0.000			
Back of Queue (Q), ft/In (95 th percentile)			229.2	943.4	1	418.7	352.2	2	236.9	0		497.7	0			
Back of Queue (Q), veh/In (95 th percentile)			9.0	37.1		16.4	13.8	;	9.4	0.0		19.4	0.0			
Queue Storage Ratio (RQ) (95 th percentile)			0.00	0.00		0.00	0.00)	0.00	0.00		0.00	0.00			
Uniform Delay	(d1), s	/veh		29.9	37.2		39.5	43.5	;	28.5	0.0		34.3	0.0		
Incremental Delay (<i>d</i> ₂), s/veh				1.9	122.0)	12.8	2.0		0.5	0.0		5.0	0.0		
Initial Queue D	elay (<i>d</i>	з), s/veh		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Control Delay (d), s/ve	eh		31.8	159.2	2 0.0	52.3	45.5	0.0	29.0	0.0	0.0	39.3	0.0	0.0	
Level of Service	e (LOS)			С	F	Α	D	D	А	С		Α	D		A	
Approach Delay, s/veh / LOS				96.7 F 37.7				37.7 D		10.0 B			26.7 C			
Intersection Delay, s/veh / LOS				55.6						E						
Multimodal Results				EB			WB			NB				SB		
Pedestrian LOS Score / LOS			2.13		B	2.12		B	2.44		В	2.44	_	B		
Bicycle LOS Score / LOS				1.84		В	1.53	3	В	1.72	2	В	1.68	3	В	

	HCS7 Two-Way	Stop-Control Report	
General Information		Site Information	
Analyst	HR Green	Intersection	10th St & Blaine Ave
Agency/Co.		Jurisdiction	
Date Performed	10/2/2020	East/West Street	10th Street
Analysis Year	2021	North/South Street	Blaine Avenue
Time Analyzed	PM Peak Hour - Existing	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	I-229/10th Street IMJR		
Lanes			
	U R	1.4.4.5.6	



Vehicle Volumes and Adjustments

Annuar	1	C a atl					h a cua d		1	N a utila	la a cua al			Cauth	la a cua al	
Approach			ound				bound				bound				bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	3	0		0	0	1		0	0	0
Configuration			Т	TR			Т					R				
Volume (veh/h)			1686	50			1128					9				
Percent Heavy Vehicles (%)												2				
Proportion Time Blocked																
Percent Grade (%)			·							(0			-	-	
Right Turn Channelized										Ν	lo					
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)												6.9				
Critical Headway (sec)												6.94				
Base Follow-Up Headway (sec)												3.3				
Follow-Up Headway (sec)												3.32				
Delay, Queue Length, and	d Leve	l of Se	ervice						<u> </u>							
Flow Rate, v (veh/h)	Τ											10				
Capacity, c (veh/h)												255				
v/c Ratio												0.04				
95% Queue Length, Q ₉₅ (veh)												0.1				
Control Delay (s/veh)												19.7				
Level of Service (LOS)												С				
Approach Delay (s/veh)	1									19	9.7					
Approach LOS										(2					

	HCS7 Si			nalize	ed Int	ersec	tion F	Resu	ilts Sui	nmar	у	_	_	_	_
														4.241	1.11
General Inform	nation								Intersec		ii.		- 20	41	per l'a
Agency		HRG							Duration		0.250		-		1
Analyst		RL		<u> </u>		e Jul 29	9, 2020		Area Typ	e	Other				~
Jurisdiction		SIOUX FALLS		Time F		_			PHF		0.90				- F
Urban Street		10TH STREET				r 2020			Analysis	Period	1> 7:(00	1		V-2
Intersection		CLEVELAND AVEN		File Na	ame	PMpe	ak.xus							11	
Project Descrip	otion	I-229/10TH ST IMJ	R											14.1444	20
Demand Inform	mation				EB			W	B		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			212	1205	5 278	16	81	8 77	163	191	44	126	185	147
Signal Informa	ation				1.20	0000			1	4-9				12	1
Cycle, s	116.0	Reference Phase	2	55 	E .		30	NO	ST2 5			-	4 -	1	T
Offset, s	95	Reference Point	Begin	Green	10.6	49.4	9.1	2.1		1.1.1		1	2	+ 1 *	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.0	0.0		0.0	_	7	\rightarrow		ĸŤz
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	0.0	0.0		0.0		5	6	7	Y
									14/25				67		057
Timer Results				EBI	-	EBT	WB	L	WBT	NB	L	NBT	SBI	-	SBT
Assigned Phas	е			5		2			6	3		8	7		4
Case Number				1.0		3.0			6.3	1.1		4.0	1.1		4.0
Phase Duration	· · · · · · · · · · · · · · · · · · ·			13.6		68.6		_	55.0	14.2		35.3	12.1		33.2
Change Period	<u> </u>	,		3.0	_	5.6			5.6	3.0		5.6	3.0		5.6
Max Allow Hea				4.2		0.0		\rightarrow	0.0	4.2		4.2	4.2		4.2
Queue Clearan				10.2				\rightarrow		11.2		17.5	9.1		27.4
Green Extensio		(ge), s		0.4		0.0		\rightarrow	0.0	0.0		2.1	0.1		0.3
Phase Call Pro				1.00				_		1.00		1.00	0.99		1.00
Max Out Proba	bility			0.47	7	_				1.00)	0.07	1.00)	1.00
Movement Gro	oup Res	sults			EB	_		WE	3		NB	_		SB	_
Approach Move	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow), veh/h		232	1316	304	18	513	498	181	261		140	369	
-		ow Rate (s), veh/h/	In	1674	1674	1490	411	174		1688	1714		1701	1654	
Queue Service		. ,		8.2	35.2	6.5	2.9	25.1		9.2	15.5		7.1	25.4	
Cycle Queue C		- ,		8.2	35.2	6.5	25.2	25.1	_	9.2	15.5		7.1	25.4	
Green Ratio (g				0.53	0.54	0.64	0.43	0.43		0.34	0.26		0.32	0.24	
Capacity (c), v	. ,			331	1818	952	161	743	_	244	439		314	394	
Volume-to-Cap		itio (X)		0.700	0.724	0.319	0.113	0.69		0.741	0.595		0.446	0.936	
· ·		/In (95 th percentile)	118	392.1	52.8	18.3	390.		199.3			135.9	490.5	
	. ,	eh/In (95 th percent		4.6	15.3	2.1	0.7	15.1		7.8	11.0		5.4	19.5	
	, ,	RQ) (95 th percen		0.87	0.00	0.39	0.17	0.00	_	1.99	0.00		1.70	0.00	
Uniform Delay		,, .	,	22.4	21.2	4.8	26.3	21.1	_	31.4	37.9		30.7	43.3	
Incremental De	· ,			0.4	0.2	0.1	1.3	4.8	_	10.4	2.1		1.0	29.0	
Initial Queue D	• •	,		0.0	0.0	0.0	0.0	0.0	_	0.0	0.0		0.0	0.0	
Control Delay (•		22.8	21.4	4.8	27.6	25.9	_	41.8	39.9		31.7	72.3	
Level of Service				C	C	A	C	C	C	D	D		C	E	
Approach Dela	· /			18.9	<u> </u>	B	25.7		C	40.7		D	61.1		E
Intersection De				10.0			8.8		-				C		_
Multimodal Re	sults				EB			WE	3		NB			SB	
Pedestrian LOS	S Score	/LOS		1.90)	В	1.92	2	В	2.30)	В	2.45	5	В
Bicycle LOS So	core / LC	DS		2.04	1	В	1.32	2	А	1.22	2	А	1.33	3	А

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	-	псэ	r Siy	nanze	a m	ersec		kesu	lts Sur	IIIIai	у	-	-	-	-
General Inform	nation								Intersec	tion Inf	ormatic	on in		4.5.41	je la
	nation	HRG							Duration		0.250	-	- 11	46	
Agency		RL		Analyz	ie Det		2020						-		
Analyst						e Jul 29	, 2020		Area Typ PHF	be	Other			aller -	
Jurisdiction		SIOUX FALLS		Time F		. 0000			-	Devied	0.90	00			
Urban Street		10TH STREET				r 2020			Analysis	Period	1> 7:0	00	-		-
Intersection		HY-VEE DRIVEWA		File Na	ame	Рмре	ak.xus						- 4	11	-
Project Descrip	otion	I-229/10TH ST IMJ	R	_	_	_	_	-	_	_	_	_		14 1400	96
Demand Infor	mation		_		EB	_		W	B		NB	_		SB	_
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			156	1224	4 36	11	80	3 61	31	10	19	99	6	92
				-	1			1-		<u> </u>					_
Signal Informa	1						215	1					-		A
Cycle, s	116.0	Reference Phase	2		R		1.0	7				1	€₂	3	4
Offset, s	98	Reference Point	Begin	Green	5.0	82.8	14.1	0.0	0.0	0.0			~		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.0	3.6	3.6	0.0	0.0	0.0		>	Y		₩
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0	0.0	0.0		5	6	7	1
Timer Results					_	грт						NDT	C D		CDT
Assigned Phas				EBL 5		EBT 2	WB		WBT 6	NB		NBT 8	SB	-	SBT 4
Case Number				1.0		4.0	<u> </u>	\rightarrow	5.3	<u> </u>		6.0			6.0
Phase Duration				8.0		96.3			88.4			19.7			19.7
Change Period		a) e		3.0		5.6	<u> </u>		5.6	<u> </u>		5.6			5.6
Max Allow Hea	· ·	,		2.2		0.0		-	0.0			4.7			4.7
Queue Clearar	2 1	·		4.8		0.0			0.0			12.8			13.0
Green Extensio		1 - 7		0.1		0.0			0.0			1.0			1.0
Phase Call Pro		(9 °), °		1.00)	0.0			0.0			1.00			1.00
Max Out Proba				0.00								0.02			0.03
Movement Gro	-	sults			EB	1		WB			NB	1 -		SB	1
Approach Move				L	Т	R	L	Т	R	L	Т	R		Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow				166	673	667	12	892	_	34	32		110	109	
		ow Rate (<i>s</i>), veh/h/l	n	1661	1744	1726	398	1647	_	1285	1585		1388	1528	
Queue Service				2.8	8.5	8.3	1.1	12.4		3.0	2.1		9.0	7.8	<u> </u>
Cycle Queue C		e Time (g ₀), s		2.8	8.5	8.3	1.6	12.4	_	10.8	2.1		11.0	7.8	
Green Ratio (g				0.77	0.78	0.78	0.71	0.71	_	0.12	0.12		0.12	0.12	
Capacity (c),				505	1364	1350	344	2349	_	132	192		206	186	
Volume-to-Cap	<u> </u>	()	<u></u>	0.328	0.493		0.035	0.38		0.261	0.167		0.535	0.587	<u> </u>
	. ,	In (95 th percentile)		39.8	92.1	86.3	4.7	189.3	_	46.4	39.3		147.5	143.5	<u> </u>
		eh/In (95 th percent	,	1.5	3.6	3.5	0.2	7.3	0.9	1.8	1.5		5.9	5.7	
		RQ) (95 th percent	tile)	0.40	0.00	0.00	0.05	0.00	-	0.93	0.00		1.74	0.00	
Uniform Delay	<u> </u>			4.7	1.8	1.7	5.1	6.5	5.0	53.3	45.7		50.6	48.2	
Incremental De Initial Queue D				0.1	0.8	0.9	0.2	0.5	0.1	1.0 0.0	0.4		2.6 0.0	3.5 0.0	
Control Delay (•		4.8	2.6	2.6	5.3	7.0	5.1	54.3	46.1		53.2	51.7	
Level of Servic				4.0 A	2.0 A	2.0 A	5.3 A	7.0 A	5.1 A	54.3 D	40.1 D		55.2 D	D	
Approach Dela	· /			2.9		A	6.9	<u> </u>	A	50.4		D	52.5		D
Intersection De				2.9			.3		~	30.4			A 32.		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS		/LOS		1.84	1	В	1.86		В	2.4	1	В	2.3	ii ii	В
Bicycle LOS So	core / LC	DS		1.79)	В	1.29	9	А	0.6	C	А	0.85	5	А

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HCS™ Streets Version 7.9

_	_	HCS	57 Sig	nalize	d Int	ersec	tion R	lesu	lts	Sun	nmar	У	-	_	_	
General Inform	nation								Inte	rsect	ion Inf	ormatic	on	J. J	4.5.41	
Agency	lation	HRG							-	ation,		0.250				
Analyst		RL		Analys	is Date	Jul 29	2020			a Type		Other		-2		1.
Jurisdiction		SIOUX FALLS		Time F		, Jul 23	, 2020		PHF	• •		0.90				
Urban Street		26TH STREET				2020					Period	1> 7:0	0	1		
Intersection		I-229 NB		File Na			ak.xus		Alla	19515 1	enou	1-1.				
Project Descrip	tion	I-229 NB I-229/10TH ST IMJ	D	File IN		Aivipe	ak.xus							- 4	14	
Project Descrip	ouon	1-229/101H ST 110J	ĸ					-	-	-	-					
Demand Inform	mation				EB			W	В		<u> </u>	NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Demand (v), v	/eh/h				467	114	315	142	24		142	0	391			
								_		_						
Signal Informa	1			-	- ÷	- •	_						_			
Cycle, s	130.0	Reference Phase	6		2	- × *	12	2				*		↔ ,	3	4
Offset, s	80	Reference Point	Begin	Green	17.4	58.5	39.1	0.0		0.0	0.0	_				
Uncoordinated		Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0		0.0	0.0			7		512
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.9	1.3	0.0		0.0	0.0		5	6	7	T
					1	EDT				T	NDI	_		CDI		ODT
Timer Results				EBL	-	EBT 2	WB		WE 6	_	NBL	-	NBT 8	SBL		SBT
Assigned Phas Case Number	e				_	8.3	1.0		4.0	_			o 11.0	<u> </u>	\rightarrow	
					_					_					\rightarrow	
Phase Duration		\ -			_	64.0	22.0		86.	_			44.0	<u> </u>	\rightarrow	
Change Period	· ·				_	5.5	4.6		5.5	_		_	4.9		\rightarrow	
Max Allow Hea	2 (,			_	0.0	2.2		0.0	5			2.4		\rightarrow	
Queue Clearan		1 = 7				0.0	8.3		0.0	2			24.0		+	
Green Extensio		(ge), s			_	0.0	0.3		0.0	5			0.4	<u> </u>	\rightarrow	
Phase Call Pro					_		1.00			_			1.00	<u> </u>	\rightarrow	
Max Out Proba	bility	_	_			-	0.00)			-		0.00			_
Movement Gro	oup Res	ults			EB	_		WB	;		_	NB			SB	
Approach Move	-			L	Т	R	L	Т	Т	R	L	Т	R	L	Т	R
Assigned Move					2	12	1	6			3	8	18			
Adjusted Flow). veh/h			372	174	354	1600)			158	348			<u> </u>
-		ow Rate (<i>s</i>), veh/h/	In		1708	1535	1652	1829	_			1714	1512			+
Queue Service		. ,			10.1	2.8	6.3	45.7				9.2	22.0			
		e Time (<i>g c</i>), s			10.1	2.8	6.3	45.7	_			9.2	22.0			+
Green Ratio (g		- · · · · · (3 ·), -			0.34	0.34	0.60	0.62	_			0.30	0.43			+
Capacity (c), v					1156	691	1006	2265	_			516	653			
Volume-to-Cap		tio (X)			0.321	0.252	0.352	0.70	_			0.306	0.533			1
· · ·		/In (95 th percentile)		61.7	39.7	102.7	664.	_			175.5	315.7			
	·	eh/In (95 th percent	,		2.4	1.6	4.1	26.4	_			7.0	12.6			1
	(.).	RQ) (95 th percen	,		0.00	0.00	0.26	0.00	_			0.00	0.00			
Uniform Delay		, , .	,		7.8	6.0	15.2	26.0	_			35.0	27.0			1
Incremental De					0.5	0.6	0.0	1.0	_			0.1	0.4			1
Initial Queue D					0.0	0.0	0.0	0.0	_			0.0	0.4			1
Control Delay (•			8.3	6.6	15.2	27.0	_			35.1	27.4			+
Level of Service	-				0.5 A	0.0 A	B	27.0 C	-			D	C			
Approach Dela	<u>, ,</u>			7.8		A	24.9		C		29.8		C	0.0		
Intersection De				7.0			2.6				20.0			0.0 C		
	y, 3/vC													_		
Multimodal Re	sults				EB			WB				NB			SB	
						-		1				1	-	0.00		
Pedestrian LOS	S Score	/ LOS		2.22		В	1.37	/ I	A		2.62	2	C	2.33	\$	В

		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts S	umma	ry				
General Inforn									-	ection In			- 11	4,4,4	124
Agency		HRG				-14			Durati	on, h	0.25		-		
Analyst		RL		Analys	is Date	e Jul 29	, 2020		Area 7	уре	Othe	er			
Jurisdiction		SIOUX FALLS		Time F					PHF		0.90				
Urban Street		26TH STREET		Analys	is Yea	r 2020			Analys	sis Perioc	1>7	:00	14		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Intersection		I-229 SB		File Na	ame	AMpe	ak.xus							ា	C [
Project Descrip	tion	I-229/10TH ST IMJ	R											1.1.4	10.00
Demand Inform	nation				EB			W	B		NE	3		SE	3
Approach Move				L	Т	R	1 1	Т	II.	λ L	T	R	L	T	
Demand (v), v					369	83	902	66		15		212	<u> </u>	<u>+</u>	
	CII/II				005	00	302	00	-	10	5	212		ė.	
Signal Informa	ation													_	
Cycle, s	130.0	Reference Phase	6		2		20	2			-	-	→ -	1.	
Offset, s	16	Reference Point	Begin	Green	56 5	39.5	18.1	0.0	0	0 0.0		1	2	+	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		39.5	3.6	0.0					7		
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.9	1.9	1.3	0.0				5	6		7 Y
Timer Desults				EDI		EDT				NI		NDT			ODT
Timer Results				EBL		EBT	WB		WBT	NE	SL	NBT	SBI		SBT
Assigned Phas	e					2	1		6	—		8	<u> </u>	\rightarrow	
Case Number					_	7.3	1.0		4.0	-		9.0	<u> </u>	\rightarrow	
Phase Duration						45.0	62.0		107.0	_		23.0		\rightarrow	
Change Period		•			-	5.5	5.5		5.5	—		4.9		\rightarrow	
Max Allow Hea		,				0.0	2.2		0.0	—		2.3		\rightarrow	
Queue Clearan		, <u> </u>					18.0			_		20.1		\rightarrow	
Green Extensio		(ge), s				0.0	1.3		0.0	—		0.0		\rightarrow	
Phase Call Pro							1.00	_		_		1.00		\rightarrow	
Max Out Proba	bility						0.00)				1.00			_
Movement Gro	oup Res	sults			EB			WB		_	NB			SE	}
Approach Move	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move					2	12	1	6	1	3		18			
Adjusted Flow), veh/h			338	76	1012	745	-	170		236			<u> </u>
		ow Rate (s), veh/h/	In		1622	1421	1639	1679		1626					
Queue Service		. ,			10.1	3.9	16.0	14.1		6.2					1
Cycle Queue C	learance	e Time (g c), s			10.1	3.9	16.0	14.1	1	6.2					
Green Ratio (g					0.30	0.44	0.75	0.78		0.14					<u> </u>
Capacity (c), v					985	630	2007	2622		453					
Volume-to-Cap		atio (X)			0.343		0.505	0.28	-	0.376	3				
· ·		/In (95 th percentile)		185.5		246.1	225.	_	117.1	_				
	. ,	eh/In (95 th percent			7.3	2.4	9.7	8.9	_	4.6					
	· ,	RQ) (95 th percen			0.00	0.62	1.23	0.00	_	0.78	<u>†</u>				
Uniform Delay			,		33.0	19.9	10.1	8.6	_	50.8	_				
Incremental De					0.9	0.4	0.1	0.2		0.2	1				
Initial Queue D	•	,			0.0	0.0	0.0	0.0		0.0					
Control Delay (• •	,			33.9	20.3	10.2	8.8		51.0	<u>†</u>	0.0			
Level of Service					C	C	В	A		D		A			
Approach Dela	· · ·			31.4		C	9.6	<u> </u>	A	21	.4	C	0.0	<u> </u>	Į
Intersection De							5.0						B		
Multimodal Re					EB			WB			NB			SE	5
Pedestrian LOS				2.30		В	0.65		А	2.4	8	В	2.33	3	В
Bicycle LOS So	core / LC	DS		0.90		А	1.92	2	В			F			

	_	HCS	7 Sig	nalize	d In	tersec	tion R	lesi	ults Su	mmar	у	_	_		
	C.									··			1 1	4.241	-
General Inform	nation								Intersec				- 11	11	
Agency		HRG							Duration		0.250		-		1
Analyst		RL		Analys		e Jul 29	, 2020		Area Typ	be	Other				2
Jurisdiction		SIOUX FALLS		Time F		_			PHF		0.84		1		*
Urban Street		RICE STREET				ar 2020			Analysis	Period	1> 7:(00	1		100 N
Intersection		I-229 NB		File Na	ame	AMpe	ak.xus							11	
Project Descrip	otion	AM Peak Hour	_	_	_		_			_	_	_	1	11.000	<u>MIN</u>
Demand Inform	mation	_			EB			V	VB		NB			SB	
Approach Move				L	Т	R	L L	_	T R	L	Т	R	L	Т	R
Demand (v), v				24	144	_	31	6	06 197	164	200	24	76	19	168
Signal Informa	ation				-		11								1
Cycle, s	102.0	Reference Phase	6		12	3	51	2				-	4		to
Offset, s	0	Reference Point	Begin	Green	55.2	5.7	25.1	0.	0 0.0	0.0		1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0	-		\rightarrow	LΙ	512
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	0.		0.0		5	6	7	T I
								. 1			Ĩ				
Timer Results				EBI		EBT	WB		WBT	NBI	-	NBT	SBI		SBT
Assigned Phas	e				\rightarrow	2		\rightarrow	6	<u> </u>	_	8	7	\rightarrow	4
Case Number						7.0			8.0	<u> </u>		6.3	1.0		4.0
Phase Duration	· · · · · · · · · · · · · · · · · · ·	`				61.2	<u> </u>	\rightarrow	61.2	<u> </u>		31.1	9.7		40.8
Change Period					_	6.0		_	6.0			6.0	4.0	_	6.0
Max Allow Hear	2 (,				0.0	<u> </u>	\rightarrow	0.0	<u> </u>		5.7 21.9	6.0 6.2		5.7 14.9
Green Extensio		1 = 7				0.0		\rightarrow	0.0		-	3.2	0.2		5.2
Phase Call Pro		(<i>ge</i>), s				0.0		\rightarrow	0.0			1.00	0.02		1.00
Max Out Proba					-			-				0.55	1.00		0.04
Movement Gro	oup Res	sults			EB			W	В		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow	Rate(<i>v</i>), veh/h			198	202	538		455	195	267		90	223	
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In		1091	1384	1616		1337	1131	1642		1594	1386	
Queue Service	Time (g	g s), S			1.1	10.3	0.0		24.1	16.7	14.9		4.2	12.9	
Cycle Queue C	learanc	e Time (<i>g c</i>), s			25.3	10.3	23.3		24.1	19.9	14.9		4.2	12.9	
Green Ratio (g	g/C)				0.54	0.54	0.54		0.54	0.25	0.25		0.32	0.34	
Capacity(c), v	/eh/h				631	749	912		724	314	404		265	473	
Volume-to-Cap		· · /			0.313	3 0.270	0.589		0.629	0.622	0.660		0.342	0.471	
Back of Queue	(Q), ft/	In (95 th percentile)		184.4	168.5	333.1		304.4	223.4	272.7		78.1	198.2	
Back of Queue	(Q), ve	eh/In (95 th percent	ile)		7.0	6.4	13.3		12.2	8.6	10.5		2.9	7.4	
Queue Storage	Ratio (RQ) (95 th percen	tile)		0.00	0.00	0.00		0.00	0.95	0.00		0.39	0.00	
Uniform Delay	(d 1), s	/veh			20.1	17.7	15.8		16.2	38.0	34.6		26.4	26.4	
Incremental De	elay (d 2), s/veh			1.2	0.8	2.8		4.1	4.4	4.2		1.6	0.7	
Initial Queue D	elay(d	з), s/veh			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/ve	eh			21.3	18.6	18.6		20.3	42.3	38.8		28.1	27.1	
Level of Service	<u>, ,</u>				С	В	В		С	D	D		С	С	
Approach Dela	y, s/veh	/ LOS		19.9)	В	19.4	1	В	40.3	3	D	27.4	ł	С
Intersection De	lay, s/ve	eh / LOS				25	5.1						С		
Multimodal Re	sulte				EB			W	B		NB			SB	
Pedestrian LOS		/105		1.89	1	В	1.89	1	B	1.93	-	В	2.11	ī	В
Bicycle LOS So				1.16		A	1.31		A	1.25		A	1.00		A
210,010 200 00				1.10			1.0			1.20			1.00		

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		HCS	57 Sig	nalize	d Int	ersec	tion F	Resul	ts Sun	nmary	/				
								, en el					F		
General Inform	nation								Intersect	ion Info	ormatio	on		4.200	1 2 4
Agency		HRG							Duration,	h	0.250		-		1. Ch.
Analyst		RL		Analys	sis Dat	e Jul 29	9, 2020		Area Typ	е	Other		-A-		
Jurisdiction		SIOUX FALLS		Time F	Period				PHF		0.85				- ÷
Urban Street		RICE STREET		Analys	sis Yea	r 2020			Analysis	Period	1> 7:0	00			
Intersection		I-229 SB		File Na	ame	AMpe	ak.xus								
Project Descrip	SIOUX FALLSRICE STREETI-229 SBI-229 SBormationAM Peak Hourorwationovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovementovement </td <td></td> <td>1</td> <td>4140</td> <td>997</td>											1	4140	997	
Demand Inform	mation	_			EB			WE	3	,	NB			SB	
Approach Move					Т	R	1 1	T	, R		T	R	L	T	R
Demand (v), v				100	211		-	617	_	-	· ·		129	<u> </u>	79
				100	2.11			011	021				120	in a s	10
Signal Informa	ation				1.2.1						-				1
Cycle, s	102.0	Reference Phase	6		l,≦	-						1	4		22
Offset, s	75	Reference Point	Begin	Green	12	68.2	11.6	0.0	0.0	0.0		1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		5.0	4.0	0.0	0.0	0.0		7	4		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	0.0	0.0		5	6	7	8
Timer Desults				EDI	I	EDT				NDI		NDT			ODT
Timer Results				EBL	-	EBT	WB		WBT	NBL		NBT	SBL	·	SBT
Assigned Phas	e			5	-	2	<u> </u>	\rightarrow	6		_			\rightarrow	4
Case Number				1.0		4.0			8.3		_			+	9.0
Phase Duration		```		9.2		84.4	<u> </u>	\rightarrow	75.2		_			\rightarrow	17.6
				5.0	_	7.0	<u> </u>	_	7.0		_			\rightarrow	6.0
		,		4.1	-	0.0	<u> </u>	\rightarrow	0.0		_		<u> </u>	\rightarrow	4.2
		1 = 7		4.1		0.0			0.0					+	11.3
		(ge), s		0.2		0.0		\rightarrow	0.0		_		<u> </u>	\rightarrow	0.4
				0.96			<u> </u>						<u> </u>	+	1.00
Max Out Proba	DIIITY			0.00)										0.73
Movement Gro	oup Res	sults			EB	_		WB			NB	_		SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2			6	16				7		14
Adjusted Flow	Rate (v), veh/h		118	248			592	525		_		152		93
Adjusted Satur	ation Flo	w Rate (<i>s</i>), veh/h/	În	1647	1564			1722	1508				1634		1375
Queue Service		. ,		2.1	2.1			22.0	18.3				9.3		6.6
		e Time (<i>g</i> c), s		2.1	2.1			22.0	18.3		_		9.3		6.6
Green Ratio (g				0.73	0.76			0.67	0.67				0.11		0.11
Capacity (c), v	/eh/h			362	2374			1151	1008		_		186		156
Volume-to-Cap		itio (X)		0.325	0.105			0.514	0.520				0.817		0.594
		In (95 th percentile)	29.2	24.9			193.4					204.3		110.7
	. ,	eh/In (95 th percent		1.1	1.0			7.3	9.1				7.8		4.2
	· /	RQ) (95 th percen		0.29	0.00			0.00	0.00				0.64		0.00
Uniform Delay				7.7	3.2			6.2	8.8				44.2		43.0
Incremental De				0.5	0.1			1.3	1.5				13.4		3.6
Initial Queue D	• •			0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (• •	,		8.2	3.3			7.5	10.3				57.5		46.5
Level of Service				A	A			A	В		_		E		D
Approach Dela	<u> </u>			4.9		A	8.8		A	0.0			53.4		 D
Intersection De							4.3						B		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS	S Score	/LOS		0.64	-	А	1.87	7	В	2.15		В	2.32		В
Bicycle LOS So	core / LC	DS		0.79)	А	1.40)	А						F

		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts S	um	mary	y				
General Inforn									Inters	sectio	on Info	ormatio			4.2.4.1	24
Agency		HRG							Durat	ion, h	1	0.250		-		
Analyst		RL		Analys	sis Date	e Jul 29	, 2020		Area	Туре		Other		-A-		1
Jurisdiction		SIOUX FALLS		Time F	Period				PHF			0.90				
Urban Street		26TH STREET		Analys	sis Yea	r 2020			Analy	sis Pe	eriod	1> 7:0	00			
Intersection		I-229 NB		File Na	ame	PMpe	ak.xus								**	
Project Descrip	tion	I-229/10TH ST IMJ	R											1	1100	100
Demond Inform	notion.			r					ר ר		_				00	
Demand Inform				L	EB T	R	<u> </u>		1	R		NB T	R	L	SB T	R
Demand (v), v					1062		100				63	0	759			
Demand (V), V	en/n	_	-		1002	100	100	102	./		03	0	759			
Signal Informa	tion			[<u> </u>		Т									
Cycle, s	140.0	Reference Phase	2	1	ž.		54	2						-+		
Offset, s	13	Reference Point	Begin		20.4	505					0.0	_		2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		50.5 3.6	45.1 3.6	0.0).0).0	0.0					x †=
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.9	1.3	0.0).0).0	0.0		5	6	7	Ŷ
Timer Results				EBL	-	EBT	WB	L	WBT	-	NBL		NBT	SBL	-	SBT
Assigned Phase	e					2	1		6	_			8			
Case Number						8.3	1.0		4.0	_			11.0			
Phase Duration						56.0	34.0		90.0	_			50.0			
Change Period	-					5.5	4.6		5.5				4.9			
Max Allow Head	2 1	· ·				0.0	2.2		0.0				2.4			
Queue Clearan		, _ ,					4.0					-	47.1			
Green Extensio		(ge),s				0.0	0.1		0.0	_			0.0			
Phase Call Pro							1.00						1.00			
Max Out Proba	bility					_	0.00)	_		_		1.00			
Movement Gro	oup Res	sults			EB	_		WB	_	Т	_	NB			SB	_
Approach Move	· ·			L	T	R	L	T	R	2	L	T	R	L	T	R
Assigned Move					2	12	1	6	-		3	8	18			+
Adjusted Flow I), veh/h			567	272	111	1141			-	70	674			<u> </u>
-		w Rate (<i>s</i>), veh/h/	In		1743	1656	1652	1767	_			1714	1618			+
Queue Service		. ,			29.4	17.7	2.0	17.1	-			4.0	45.1			<u> </u>
Cycle Queue C		- ,			29.4	17.7	2.0	17.1	_			4.0	45.1			+
Green Ratio (g		o milo (g o), o			0.22	0.22	0.59	0.60	-	-1-	_	0.32	0.53			-
Capacity (c), v					768	597	810	2133	_	-		552	826			+
Volume-to-Cap		tio (X)			0.739		0.137	0.535	-			0.127	0.817			1
•		In (95 th percentile)		154	150.6	33.9	210.7	_			77.3	655.5			1
	. ,	eh/In (95 th percent			6.1	6.0	1.3	8.4				3.1	26.2			
		RQ) (95 th percen	,		0.00	0.00	0.08	0.00		+		0.00	0.00			1
Uniform Delay			,		22.9	29.1	21.8	8.0				33.5	26.3			1
Incremental De					0.6	0.2	0.0	0.8		+		0.0	6.0		_	1
Initial Queue De		,			0.0	0.0	0.0	0.0				0.0	0.0			1
Control Delay (23.5	29.3	21.8	8.8				33.6	32.3			1
Level of Service					С	C	С	A				С	С			
Approach Dela	· /			25.4		С	9.9		A		32.4		С	0.0		
Intersection De).4							С		
Multimodal Re					EB			WB				NB			SB	
Pedestrian LOS				2.34		В	1.38		Α		2.62		С	2.33	5	В
Bicycle LOS Sc	ore / LC	DS		1.20)	А	1.52	2	В		1.72	2	В			

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		HCS	7 Sig	nalize	ed Int	ersec	tion F	Resu	lts Su	mmar	У	-	_	-	
General Inform	nation								Intersed	tion Infe	ormatio	on		4.24	1.10
Agency	lation	HRG							Duratior		0.250				
Analyst		RL		Analys	sis Date	Jul 29	2020		Area Ty		Other				
Jurisdiction		SIOUX FALLS		Time F			, 2020		PHF		0.87		4	4	t t
Urban Street		26TH STREET			sis Year	2020			Analysis	Period	1> 7:0	00	1		
Intersection		I-229 SB		File Na			ak.xus		/ thatyoic				-		
Project Descrip	tion	I-229/10TH ST IMJ	R				ak.xu3						-	רך וויי	1 1 1 1
T Toject Descrip	lion	1-223/1011101 1103											_		
Demand Inform	nation				EB			WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v					581	90	642	44	8	150		587		<u> </u>	
Signal Informa	tion				-							_		_	
Cycle, s	140.0	Reference Phase	2		Ù	- -	20	2				-	↔ -	n.	
Offset, s	107	Reference Point	Begin	Green	70.5	40.5	13.1	0.0	0.0	0.0		1		* *	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.6	0.0		0.0					5.2
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.9	1.9	1.3	0.0		0.0		5	6	7	<u> </u>
								1							
Timer Results				EBI	-	EBT	WB	L	WBT	NBL	-	NBT	SBI	_	SBT
Assigned Phase	e					2	1		6			8			
Case Number						7.3	1.0		4.0			9.0			
Phase Duration	i, S					46.0	76.0)	122.0			18.0			
Change Period	, (Y+R)	c), S				5.5	5.5		5.5			4.9			
Max Allow Head	dway(A	<i>MAH</i>), s				0.0	2.2		0.0			2.4			
Queue Clearan	ce Time	e (g s), s					9.6					15.1			
Green Extensio	n Time	(ge), s				0.0	0.8		0.0			0.0			
Phase Call Pro	bability						1.00)				1.00			
Max Out Proba	bility						0.00)				1.00			
	107Reference PointBnatedNoSimult. Gap E/WIdeFixedSimult. Gap N/SIsultsPhasenberuration, sPeriod, (Y+R c), s/ Headway (MAH), searance Time ($g s$), stension Time ($g e$), sall ProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbabilityProbability														
	-	sults			EB			WB			NB		<u> </u>	SB	
				L	Т	R	L	Т	R	L	Т	R	L	Т	R
		<u> </u>			2	12	1	6		3		18	<u> </u>		
-					700	109	713	498		172		675		<u> </u>	
-		. ,	In		1680	1431	1639	1649	<u> </u>	1626			<u> </u>		
		- ,			27.7	8.1	7.6	7.1		7.1					_
-		e lime (<i>g c</i>), s			27.7	8.1	7.6	7.1		7.1				<u> </u>	
Green Ratio (g	,				0.29	0.38	0.81	0.83		0.09					
Capacity (c), v					972	548	1890	2744		304					
		· · /	\		0.720	0.198	0.377	0.181		0.567					+
	. ,				460.6	167.1	147.2	99.6	-	138.8					+
	(.),	eh/In (95 th percent	,		18.1	6.6	5.8	3.9		5.4					+
		RQ) (95 th percen	tile)		0.00	1.67	0.74	0.00		0.93					
Uniform Delay (53.1	34.3	8.6	4.5		60.7				<u> </u>	
Incremental De					3.9	0.7	0.0	0.1		1.6					
Initial Queue De		•			0.0	0.0	0.0	0.0		0.0					
Control Delay (57.0	35.0	8.7	4.6		62.3		0.0			
Level of Service	· /				E	C	A	A		E		A		L_	
Approach Delay				54.1		D	7.0		Α	12.7	7	В	0.0		
Intersection De	lay, s/ve	eh / LOS				22	2.0						С		
Multimodal Re		/1.00		0.01	EB		0.01	WB		0.45	NB		0.00	SB	
Pedestrian LOS				2.30		B	0.63		A	2.48	5	В	2.33	5	В
Bicycle LOS So	ore / LC	5		1.12	2	А	1.52	2	В			F			

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	_	HCS	57 Sig	nalize	d Int	ersec	tion R	lesi	ults Su	mmar	у	_	_	_	
	C.									··	1		1 1		
General Inform									Intersec			-	- 11	4.444	
Agency		HRG							Duration		0.250		-	24.72	
Analyst		RL		Analys		e Jul 29	, 2020		Area Ty	be	Other	•	-		
Jurisdiction		SIOUX FALLS		Time F		_			PHF		0.90		1		*
Urban Street		RICE STREET		Analys	sis Yea	r 2020			Analysis	Period	1> 7:(00	1		
Intersection		I-229 NB		File Na	ame	PMpe	ak.xus							11	
Project Descrip	otion	PM Peak Hour						_					1	4144	10
Demand Infor	mation				EB			1/1	VB		NB			SB	
Approach Move				L	Т	R	L	_	T R		T	R	1.1	T	R
Demand (v), v				70	480	544	53	-	98 98	128	109	33	283	25	92
Demand (V), V				10	+00	044	00	2	30 30	120	103	00	200	23	52
Signal Informa	ation						迅度				1				1
Cycle, s	76.0	Reference Phase	2		41		2.4	2				1	4		P
Offset, s	0	Reference Point	Begin	Green	44.7	6.0	12.3		0 0.0	0.0	_	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0	-	l l	\rightarrow	LΙ	st2
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	0.		0.0		5	6	7	Y
		Р 		1				Ĩ							
Timer Results				EBL	· -	EBT	WB	L	WBT	NBI		NBT	SBL		SBT
Assigned Phas	e					2		\rightarrow	6			8	7		4
Case Number						7.0		\rightarrow	8.0			6.3	1.0		4.0
Phase Duration						47.7		\rightarrow	47.7			18.3	10.0		28.3
Change Period						6.0		\rightarrow	6.0			6.0	4.0		6.0
Max Allow Hea	- ,	,		<u> </u>		0.0		\rightarrow	0.0		_	5.7	6.0		5.7
Queue Clearan		1 = 7						\rightarrow				10.3	8.0		7.6
Green Extensio		(ge), S			_	0.0		\rightarrow	0.0		_	2.0	0.0		2.9
Phase Call Pro	-											1.00	1.00		1.00
Max Out Proba	bility	_				_			_			0.36	1.00)	0.01
Movement Gro	oup Res	sults			EB			W	В		NB			SB	
Approach Move	-			L	Т	R	L	Т	Ĩ	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6		3	8	18	7	4	14
Adjusted Flow), veh/h			611	604	251	-	248	142	158		314	130	
-		ow Rate (<i>s</i>), veh/h/	In		1588	1431	1295	<u> </u>	1306	1230	1576	<u> </u>	1594	1388	
Queue Service		. ,			6.5	20.7	0.0		8.0	8.3	7.1		6.0	5.6	
Cycle Queue C					16.9	20.7	6.3		8.0	8.3	7.1		6.0	5.6	
Green Ratio (g					0.55	0.55	0.55	-	0.55	0.16	0.16		0.27	0.29	
Capacity (c),	· /				925	785	769		717	294	255		300	407	
Volume-to-Cap		itio (X)			0.661	0.770	0.326	-	0.347	0.484	0.619		1.048	0.319	
•		/In (95 th percentile)		193.8		96.9		100.4	121.5	138.7		345.5	81.2	
	. ,	eh/In (95 th percent			7.3	7.7	3.9	-	4.0	4.7	5.3		12.9	3.0	
		RQ) (95 th percen	,		0.00	0.00	0.00		0.00	0.52	0.00		1.73	0.00	
Uniform Delay		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,		7.9	8.1	9.2	-	9.5	30.2	29.7		30.1	20.9	
Incremental De	· ,				2.8	5.4	1.1	-	1.3	2.6	5.2		65.0	0.4	
Initial Queue D	2 1	•			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	
Control Delay (•			10.7	13.5	10.3		10.8	32.8	34.8		95.1	21.4	
Level of Servic					B	B	B	-	B	C	C		F	C	
Approach Dela	· /			12.1		B	10.6	3	B	33.9		С	73.5		E
Intersection De							5.5						C		
Multimodal Re	sults				EB			W	В		NB			SB	
Pedestrian LOS	S Score	/LOS		1.88	3	В	1.88	3	В	1.93	3	В	2.11		В
Bicycle LOS So	core / LC	DS		2.49)	В	0.90)	А	0.98	3	А	1.22	2	А

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HCS[™] Streets Version 7.9

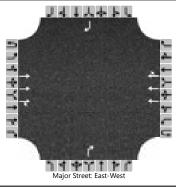
	HCS	S7 Sig	nalize	d Int	ersec	tion R	Resul	ts Sun	nmary	/		_		_
General Information								Intersect	ion Info	ormatio	n	R.	4.2.4-1	
	HRG							Duration,		0.250			11	
<u> </u>			Analys	is Date	Jul 29	2020		Area Typ		Other				1. A
Jurisdiction			Time F			, 2020		PHF	<u> </u>	0.90		*	-Te	
Urban Street			Analys		2020			Analysis	Period	1> 7:0	20			r V
Intersection	<u></u>		File Na			ak.xus	′	anaryoio		1. 1.				- 34 <u>-</u> -
	HRG RL SIOUX FALLS I-229 SB cription PM Peak Hour formation lovement), veh/h 76.0 Reference Phase 65 Reference Point red No Simult. Gap E/W Fixed Simult. Gap N/S Its nase er tion, s iod, (Y+R c), s leadway (MAH), s rance Time (g s), s Probability obability Group Results lovement ovement o													1912
	HRGRLSIOUX FALLSetRICE STREETI-229 SBcriptionPM Peak HourformationIdvement), veh/hrmation76.0Reference Phase65Reference Point65Reference PointEtedNoSimult. Gap N/SFixedSimult. Gap N/SFixedSimult. Gap N/SerItsiod, (Y+R c), sieadway (MAH), srance Time (g s), snsion Time (g e), sProbabilityobabilityGroup Resultslovementovementovementovementovementovementovementfor Rate (v), veh/hituration Flow Rate (s), veh/h/In													
Demand Information	mationImage: Image: Image			EB			WE	3		NB			SB	
Approach Movement	ationHRGRLSIOUX FALLSRICE STREETI-229 SBonPM Peak Hourationmentch/h76.0Reference Phase65Reference Point65Reference Point76.0Simult. Gap E/WFixedSimult. Gap N/Ss(Y+R c), sway (MAH), serime (g s), sn Time (g s), sn Time (g s), sabilityilityitinate (v), veh/htion Flow Rate (s), veh/h/lnTime (g s), scarance Time (g c), sc)eh/hitin Flow Rate (s), s		L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), veh/h	HRG RL SIOUX FALLS RICE STREET I-229 SB PM Peak Hour n t Simult. Gap E/W d Simult. Gap N/S Reference Point Simult. Gap N/S (MAH), s me ($g \circ$), s ty Results t (v), veh/h Flow Rate (s), veh/h/ln ($g \circ$), s nce Time ($g \circ$), s Ratio (X) ft/ln (95 th percentile)		186	721			361	I 157		<u> </u>		373		78
			1100											
Signal Information				4	1.5	21				1				
Cycle, s 76.0	Reference Phase	2		B.	- 						-	4	2	
Offset, s 65	Reference Point	Begin	Green	7.5	30.5	20.0	0.0	0.0	0.0	_			3	4
Uncoordinated No	Simult. Gap E/W	On	Yellow		5.0	4.0	0.0	0.0	0.0		×			
Force Mode Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	0.0	0.0		5	6	7	8
		_					1	_		_			-	_
Timer Results			EBL		EBT	WB		WBT	NBL	-	NBT	SBL	· -	SBT
Assigned Phase			5		2			6						4
Case Number			1.0		4.0			8.3						9.0
Phase Duration, s			12.5	5	50.0			37.5						26.0
Change Period, (Y+R	•		5.0		7.0			7.0					_	6.0
· · ·	,		4.1		0.0			0.0						4.2
	(<u> </u>)		7.2											21.0
	(ge), s		0.4		0.0			0.0					_	0.0
Phase Call Probability			0.99				_							1.00
Max Out Probability			0.08	3	_			_			_			1.00
Movement Group Res	sults	_		EB	_		WB			NB	_		SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	T	R
Assigned Movement			5	2	<u> </u>		6	16				7		14
), veh/h		207	801	<u> </u>		301	275				414	-	87
		/In	1647	1601	<u> </u>		1638					1634		1370
Queue Service Time (g			5.2	11.0	<u> </u>		11.2	7.2				19.0		3.8
	- ,		5.2	11.0	1		11.2	7.2				19.0		3.8
Green Ratio (g/C)	- · · · · · (3 -), -		0.53	0.57	<u> </u>		0.40	0.40				0.26		0.26
Capacity (c), veh/h			465	1811	<u> </u>		658	589				430	_	361
Volume-to-Capacity Ra	itio (X)		0.444	0.442	<u> </u>		0.457			_		0.964		0.240
	. ,	:)	79.8	160.3	-		132.7			_		429.8	_	55.9
(· · //	<u>, i</u>	,	3.1	6.2			5.0	3.9				16.4		2.1
Queue Storage Ratio (<u>, ,</u>	,	0.80	0.00			0.00	0.00				1.34		0.00
Uniform Delay (d_1), s/	,, ,	,	11.3	9.6			11.7	9.4				27.6		22.0
Incremental Delay (d 2			0.7	0.8			2.1	2.5				34.0		0.3
Initial Queue Delay (d)			0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (d), s/ve			11.9	10.3			13.8	11.8		_		61.7	_	22.4
Level of Service (LOS)			В	В			В	В				E		C
Approach Delay, s/veh			10.7		В	12.9		B	0.0			54.9		D
Intersection Delay, s/ve						1.9						С		
Multimodal Results														
Multimoual Results				EB			WB			NB			SB	
Pedestrian LOS Score	/ LOS		0.68	1	A	1.90	ī	В	2.14	1	В	2.31		В

		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts Su	mmar	у				
_															
General Inform	nation								-	ction Inf	ormatio	on		4.00	
Agency		HRG							Duratio	n, h	0.250		-		and the second
Analyst		RL		Analys	is Date	Jul 29			Area Ty	ре	Other	-	-6		
Jurisdiction		SIOUX FALLS		Time F	Period	AM P	eak Hou	ır	PHF		0.92			1	
Urban Street		10TH STREET		Analys	is Year	2050			Analysi	s Period	1> 7:(00			
Intersection		JESSICA AVENUE		File Na	ame	2050	AMpeak	.xus						11	
Project Descrip	tion	I-229/10TH ST IMJ	R										n n	1.140	2.91
Demand Inform	nation	_			EB			W	B		NB			SB	
Approach Move				L	Т	R	L	Т		L	Т	R	L L	Т	R
Demand (v), v					985	60	30	190		155	+	50		<u> </u>	
					000	00	00	100		100		00			
Signal Informa	ition														
Cycle, s	52.0	Reference Phase	6	1	¥ ک		7						→ []		ſ
Offset, s	23	Reference Point	Begin	Green	32 /	7.5	0.0	0.0	0.0	0.0		1	2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		3.6	0.0	0.0					7		K 3
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0				5	6	7	ΓY.
Timer Results				EBL	_	EBT	WB		WBT	NBI		NBT	SBL		SBT
Assigned Phase	0			EDL	·	2			6	IND	-	8	301	·	301
<u> </u>	Number					8.0		\rightarrow	6.0		-	o 9.0	<u> </u>	+	
	e Number se Duration, s					39.0			39.0			9.0 13.1	<u> </u>	-	
	se Duration, s nge Period, (Y+ <i>R</i> c), s					5.6	<u> </u>		5.6			5.6	<u> </u>		
-	· ·	,									_		<u> </u>		
Max Allow Head	- ,	,		<u> </u>		3.1		\rightarrow	3.1			5.3	<u> </u>		
Queue Clearan		(=)			_	15.7			21.8			6.9		-	
Green Extensio		(ge), s				11.9		\rightarrow	11.5		_	0.8			
Phase Call Prol						1.00	<u> </u>		1.00			0.96		-	
Max Out Proba	DIIILY					0.08			0.12			0.11			
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment				2	12	1	6		3		18			1
Adjusted Flow F	Rate (v), veh/h			574	562	27	1724	L I	168		54			
Adjusted Satura	ation Flo	ow Rate (s), veh/h/	In		1758	1722	492	1674	L I	1688		1502			1
Queue Service	Time (g	g s), s			13.7	9.1	1.9	19.8		4.9		1.7			
Cycle Queue C		- ,			13.7	9.1	15.4	19.8		4.9	_	1.7			
Green Ratio (g					0.64	0.64	0.64	0.64		0.14		0.14			
Capacity (c), v	/eh/h				1128	1105	326	2148	3	242		215			
Volume-to-Capa	acity Ra	atio (X)			0.509	0.509	0.083	0.80	3	0.696		0.252			
· ·		/In (95 th percentile)		92.2	88.3	8.2	179.8		97.1		26.9			
	. ,	eh/In (95 th percent			3.6	3.5	0.3	7.0		3.8		1.1			
	· ,	RQ) (95 th percen			0.00	0.00	0.08	0.00		0.81	-	0.00			
Uniform Delay ((d1), s	/veh			5.0	5.0	10.6	6.9		21.2		19.8			
-	cremental Delay ($d = j$, siven					0.1	0.0	0.2		5.1	-	0.9			
	tial Queue Delay (<i>d</i> ₃), s/veh					0.0	0.0	0.0		0.0		0.0			
	ontrol Delay (<i>d</i>), s/veh					5.1	10.6	7.1		26.3		20.7			
2 (vel of Service (LOS)					Α	В	Α		С		С			
	pproach Delay, s/veh / LOS					A	7.2		A	24.9)	С	0.0		
	tersection Delay, s/veh / LOS					7	.7						A		
M								14/5			NIC			~~	
Multimodal Re		11.00		4.05	EB		0.07	WB		0.01	NB		0.40	SB	
Pedestrian LOS				1.85		B	0.65		A	2.30	,	В	2.13		В
Bicycle LOS Sc	ore / LC	72		1.42		А	2.22	2	В			F			

		HCS	or Sig	nalize	a int	ersec	tion F	lesu	lts Sur	nmar	у				
General Inform	nation								Intersect	tion Inf	ormatic	on	I. J	a de la composition de la comp	6 Q
Agency		HRG							Duration,		0.250			+	
Analyst		RL		Analys	sis Date	e Jul 29	, 2020	Ť	Area Typ	e	Other		.2.		
Jurisdiction		SIOUX FALLS		Time F			eak Hou		PHF		0.92		*		÷
Urban Street		10TH STREET		Analys		_			Analysis	Period	1> 7:0	00	1 H		-
Intersection		LOWELL AVENUE		File Na		_	AMpeak	1						*	
Project Descrip	otion	I-229/10TH ST IMJ		I										151815555	10.15
Demand Infor	mation				EB			WE	2	_	NB		,	SB	
Approach Move				L		R	1 1	T	1		T	R	L	<u></u> Т	R
Demand (v), v				15	1045	_	55	188	_	15	15	55	90	20	35
Demand (V), V				15	1040		55	100	0 30	15	15	- 55	90	20	- 33
Signal Informa	ation				- 5							_			1
Cycle, s	150.0	Reference Phase	6		4		The second	2					4		str.
Offset, s	148	Reference Point	Begin	Green	3.5	111.7	20.6	0.0	0.0	0.0				3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.6	0.0		0.0					512
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0		0.0		5	6	7	T
Timer Results				EBI		EBT	WB		WBT	NBI		NBT	SB		SBT
Assigned Phas						2	1		6			8			4
Case Number						6.3	1.0		4.0			8.0			8.0
Phase Duration	ו. s					117.3	6.5		123.8			26.2			26.2
		c). S				5.6	3.0		5.6			5.6			5.6
	ange Period, (<i>Y+R c</i>), s x Allow Headway (<i>MAH</i>), s					0.0	4.2		0.0			5.3			5.3
Queue Clearar	2 (· ·				010	3.0		0.0			10.0			19.7
Green Extensio		, <u> </u>				0.0	0.1		0.0			1.3			0.9
Phase Call Pro		(90),0				010	0.87		0.0			1.00			1.00
Max Out Proba							0.00					0.00			0.15
Movement Gro		ulto.			EB			WB			NB			SB	
Approach Move	· ·	Suits			Т	R	L	Т	R	L		R	<u> </u>	T	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow) veh/h		16	2 556	554	50	873			92	10		158	- 14
,	· ·	ow Rate (<i>s</i>), veh/h/	In	275	1758		1688	1772			1597			1326	<u> </u>
Queue Service				4.7	17.7	17.7	1.0	45.6			0.0			9.7	<u> </u>
		e Time (<i>g c</i>), s		43.8	17.7	17.7	1.0	45.6			8.0			17.7	+
Green Ratio (g		5 mile (g t), 5		0.74	0.74	0.74	0.78	0.79			0.14			0.14	
Capacity (c), v	. ,			181	1309	1305	406	1396			248			221	
Volume-to-Cap		tio(X)		0.087	0.424		0.122	0.625			0.373			0.713	
		/In (95 th percentile)	16.2	269.1		14.9	625.6			152.5			265.2	
	. ,	eh/In (95 th percent		0.6	10.5	10.5	0.6	24.6	_		6.0			10.4	1
	· /	RQ) (95 th percen	,	0.12	0.00	0.00	0.25	0.00			0.00			0.00	<u> </u>
		,, ,		21.2	7.1	7.1	5.2	14.6	_		59.3			63.8	<u> </u>
	iform Delay (d 1), s/veh remental Delay (d 2), s/veh					0.9	0.1	1.0	1.1		1.3			6.4	<u> </u>
	tial Queue Delay (d_3), s/veh					0.0	0.0	0.0	0.0		0.0			0.0	<u> </u>
	ntrol Delay (<i>d</i>), s/veh					8.0	5.3	15.6			60.6			70.2	<u> </u>
Level of Servic				22.0 C	8.0 A	A	A	B	B		E			E	<u> </u>
	pproach Delay, s/veh / LOS					A	15.1		В	60.6		E	70.2	<u> </u>	E
	tersection Delay, s/veh / LOS						6.7						B		
Multimodal Re	ultimodal Results				EB			WB			NB			SB	
	lestrian LOS Score / LOS				1	В	1.62		В	2.32		В	2.32		В
Pedestrian LOS	Score	/ LUS		1.64			1.02			2.02	- I	U 1	2.02	- I	D

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	HCS7 Two-Way Stop	o-Control Report											
General Information		Site Information											
Analyst HR Green Intersection 10th St & Conklin Ave													
Agency/Co. Jurisdiction													
Date Performed	Date Performed 10/2/2020 East/West Street 10th Street												
Analysis Year	2050	North/South Street	Conklin Avenue										
Time Analyzed	AM Peak Hour - No Build	Peak Hour Factor	0.92										
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25										
Project Description	I-229/10th Street IMJR												
Lanes													



Vehicle Volumes and Adjustments

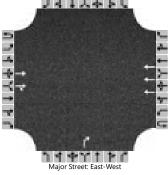
venicle volumes and Auj	ustine	ints														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	3	0	0	0	3	0		0	0	1		0	0	1
Configuration			Т	TR			Т	TR				R				R
Volume (veh/h)			1180	10			1975	10				170				10
Percent Heavy Vehicles (%)												2				2
Proportion Time Blocked																
Percent Grade (%)										(0				0	
Right Turn Channelized										Ν	lo			Ν	lo	
Median Type Storage				Undi	vided											
Critical and Follow-up He	eadwa	ys														
Base Critical Headway (sec)												7.1				7.1
Critical Headway (sec)												7.14				7.14
Base Follow-Up Headway (sec)												3.9				3.9
Follow-Up Headway (sec)												3.92				3.92
Delay, Queue Length, and	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)												185				11
Capacity, c (veh/h)												355				184
v/c Ratio												0.52				0.06
95% Queue Length, Q ₉₅ (veh)												2.9				0.2
Control Delay (s/veh)												25.7				25.8
Level of Service (LOS)												D				D
Approach Delay (s/veh)								•		25	5.7			. 2!	5.8	
Approach LOS										[C			l	C	

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		HCS	7 Sig	nalize	d In	tersec	tion F	Resu	Its Sur	nmar	у				
									-						
General Inform									Intersec				1 11	111	
Agency		HRG		1					Duration		0.250		-		
Analyst		RL				e Jul 29			Area Typ	e	Other		÷		
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF		0.92				÷.
Urban Street		10TH STREET		Analys	sis Yea	ar 2050			Analysis	Period	1> 7:(00	7		¥.
Intersection		1-229		File Na	ame	2050	AMpeak	.xus						- 11C	
Project Descrip	otion	I-229/10TH ST IMJ	R										1	141444	10.10
Domond Inform									D	-				00	
Demand Inform				L	EB T	R	<u> </u>	W T		<u> </u>	NB T	R	L	SB T	R
Demand (v), v				155	660	_	695			620	0	580	225	0	335
Demand (V), V	/en/n	_	-	155	000	0 000	095	10.	30 700	020	0	560	220	0	335
Signal Informa	ation			[[- 8		C ()	ŝ		- E5				1
Cycle, s	150.0	Reference Phase	6		2	0 2		-	Cop. Or				4		4
Offset, s	9	Reference Point	Begin		44.7	00.0		47		- 0.0		1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		26.0 3.6	33.0 3.6	47		0.0		7	\rightarrow		KŤ2
Force Mode	Fixed	Simult. Gap N/S	On	Red	4.5	4.5	4.5	3.7		0.0		5	6	7	
Timer Results				EBI	-	EBT	WB	L	WBT	NB	L	NBT	SB	L	SBT
Assigned Phas	e Number					2	1		6			8			4
Case Number						3.0	1.1		3.0			5.0			5.0
Phase Duration					3	41.1	53.9	9	75.2			55.0			55.0
Change Period	ange Period,(Y+R c), s					8.1	8.1		8.1			7.3			7.3
Max Allow Hea	Allow Headway (<i>MAH</i>), s					0.0	4.2		0.0			5.3			5.3
Queue Clearar	ice Time	e (g s), s		11.8	3		44.9	9				49.7			34.9
Green Extensio	on Time	(ge),s		0.0		0.0	1.0		0.0			0.0			9.3
Phase Call Pro	bability			1.00)		1.00)				1.00			1.00
Max Out Proba	bility			1.00)		1.00)				1.00			0.80
Movement Gro	oun Res	ults			EB	_		WE	3		NB			SB	
Approach Move	-			1	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow), veh/h		144	614	498	566	839	_	674	0	630	245	0	364
		w Rate (<i>s</i>), veh/h/l	In	1688	1674		1674	169	_	1701	1669	1606	1674	1643	1495
Queue Service				9.8	26.4	_	42.9	31.5		47.7	0.0	47.7	17.5	0.0	32.9
Cycle Queue C		- ,		9.8	26.4	_	42.9	31.5		47.7	0.0	47.7	17.5	0.0	32.9
Green Ratio (g				0.30	0.22		0.54	0.45		0.32	0.32	0.32	0.32	0.32	0.32
Capacity (c),				324	736	341	595	1519	_	589	531	511	580	522	476
Volume-to-Cap		tio(X)		0.445	0.834		0.952	0.55	_	1.144	0.000	1.234	0.421	0.000	0.766
·	,	In (95 th percentile))	200	451.9		658.3	405		1277. 5	0	1324	304.6	0	493.8
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	7.9	17.8		25.7	15.8	3 0.6	50.7	0.0	52.5	11.9	0.0	19.3
	. ,	RQ) (95 th percent	,	0.00	0.00	_	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay	(d1), s	/veh		43.3	57.5	58.9	51.6	41.1	1 59.8	53.1	0.0	51.2	40.9	0.0	46.1
Incremental De	· /			0.9	9.8	221.7	3.8	0.1	_	83.8	0.0	121.6	0.7	0.0	7.8
	itial Queue Delay ($d z$), s/veh					0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
	ontrol Delay (<i>d</i>), s/veh					280.6	55.4	41.2		136.9	0.0	172.7	41.5	0.0	53.9
Level of Servic	vel of Service (LOS)					F	E	D	E	F		F	D		D
	pproach Delay, s/veh / LOS					F	51.4	1	D	154.	2	F	48.9	9	D
	tersection Delay, s/veh / LOS					10	0.6						F		
	, ,														
Multimodal Re	Iltimodal Results							WE	3		NB			SB	
Pedestrian LOS				2.14	ŀ	В	2.11	1	В	2.45	5	В	2.45	5	В
Bicycle LOS So	core / LC	DS		1.70)	В	2.72	2	С	2.64	1	С	1.49	9	А

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HCS7 Two-Way Stop-Control Report													
General Information Site Information													
Analyst	HR Green	Intersection	10th St & Blaine Ave										
Agency/Co. Jurisdiction													
Date Performed 10/2/2020 East/West Street 10th Street													
Analysis Year	2050	North/South Street	Blaine Avenue										
Time Analyzed	AM Peak Hour - No Build	Peak Hour Factor	0.92										
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25										
Project Description	I-229/10th Street IMJR												
Lanes													
	U R I	አ ቆኑር											



Vehicle Volumes and Adjustments

venicle volumes and Adj	ustine								1							
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	3	0		0	0	1		0	0	0
Configuration			Т	TR			Т					R				
Volume (veh/h)			1415	50			2485					10				
Percent Heavy Vehicles (%)												2				
Proportion Time Blocked																
Percent Grade (%)											C					
Right Turn Channelized										Ν	lo					
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)												6.9				
Critical Headway (sec)												6.94				
Base Follow-Up Headway (sec)												3.3				
Follow-Up Headway (sec)												3.32				
Delay, Queue Length, and	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)	Τ											11				
Capacity, c (veh/h)												330				
v/c Ratio												0.03				
95% Queue Length, Q ₉₅ (veh)												0.1				
Control Delay (s/veh)												16.3				
Level of Service (LOS)												С				
Approach Delay (s/veh)				•		•		•		- 16	5.3			-		
Approach LOS										(2					

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		HCS	7 Sig	nalize	ed In	tersec	tion F	Resu	Its Sur	nmar	у				
-									_						
General Inforn	nation								Intersec	tion Inf	ormatio	on		1.1.4.1	24
Agency		HRG							Duration	, h	0.250		-	**	
Analyst		RL		Analys	sis Da	te Jul 29	9, 2020		Area Typ	e	Other		A		
Jurisdiction		SIOUX FALLS		Time F	Period	AM P	eak Hou	ır	PHF		0.92			- ÷	
Urban Street		10TH STREET		Analys	sis Yea	ar 2050			Analysis	Period	1> 7:(00			100 A
Intersection		CLEVELAND AVEN	IUE	File Na	ame	2050	AMpeak	.xus						18	
Project Descrip	tion	I-229/10TH ST IMJ	R											a new	
Demonstration						1		10/	D					00	
Demand Inform					EB T	R	.	W T	ii.		NB T	р	<u> </u>	SB T	R
Approach Move				L 235	105		L 35	18	_	L 295	315	R 30	L 90	180	340
Demand (v), v	en/n	_	_	235	105	0 140	35	18:	50 115	295	315	30	90	180	340
Signal Informa	ation				T				10		120				1
Cycle, s	150.0	Reference Phase	6		ES.		·		1.1.1			1	4 -	5	Φ
Offset, s	51	Reference Point	Begin		10.0	70.4	50				-	1	2	+1	4
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		72.4 3.6	5.0 3.0	8.0 3.0		0.0	-	7	\rightarrow		r†a
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	0.0	0.0		0.0		5	6	7	Y
		n.	4	ψ.											
Timer Results				EBI	-	EBT	WB	L	WBT	NB	_	NBT	SB	L	SBT
Assigned Phas	е			5		2			6	3		8	7		4
Case Number						3.0			6.3	1.1		4.0	1.1		4.0
Phase Duration						93.0			78.0	19.0) .	49.0	8.0		38.0
Change Period	nge Period,(Y+R c), s					5.6			5.6	3.0		5.6	3.0		5.6
Max Allow Hea	Allow Headway (<i>MAH</i>), s					0.0			0.0	4.2		4.2	4.2		4.2
Queue Clearan	ce Time	e (g s), s		14.0)					18.0)	31.2	7.0		34.4
Green Extensio		(g _e), s		0.0		0.0			0.0	0.0		3.4	0.0		0.0
Phase Call Pro	bability			1.00)					1.00)	1.00	0.98	3	1.00
Max Out Proba	bility			1.00)	_				1.00)	0.22	1.00)	1.00
Movement Gro	oup Res	sults			EB	_		WB			NB	_		SB	
Approach Move	-			L	T	R	L	Т	R	L	Т	R	L	T	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow), veh/h		226	1009	9 135	38	1068	3 1068	321	375		98	565	
-		w Rate (s), veh/h/l	n	1674	1674		550	1744		1688	1745		1701	1598	
Queue Service		():		12.0	19.2	. 1.2	5.3	72.4	72.4	16.0	29.2		5.0	32.4	
Cycle Queue C	learance	e Time (g c), s		12.0	19.2	. 1.2	9.6	72.4	72.4	16.0	29.2		5.0	32.4	
Green Ratio (g	ı/C)			0.58	0.58	0.69	0.48	0.48	0.48	0.34	0.29		0.25	0.22	
Capacity (c), v	/eh/h			182	1950) 1027	298	842	824	228	505		187	345	
Volume-to-Cap	acity Ra	itio(X)		1.241	0.51	7 0.131	0.128	1.26	9 1.296	1.406	0.743		0.522	1.638	
Back of Queue	(Q), ft/	/In (95 th percentile))	463.7	204.4	4 16.1	34.1	2084 5	. 2090. 9	772.6	498.8		61.3	1631.7	
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	18.1	8.0	0.6	1.3	80.8	8 83.6	30.4	19.6		2.4	64.8	
Queue Storage	Ratio (RQ) (95 th percent	tile)	3.43	0.00	0.12	0.31	0.00	0.00	7.73	0.00		0.77	0.00	
Uniform Delay	(d 1), s/	/veh		56.6	10.7	' 1.8	20.6	34.7	' 34.5	44.3	48.2		51.1	58.8	
Incremental De	remental Delay ($d z$), s/veh					0.1	0.5	126.	0 137.8	207.0	5.9		2.6	299.7	
	tial Queue Delay (d ȝ), s/veh					0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/ve	eh		176.3	11.0	1.9	21.1	160.	7 172.3	251.3	54.1		53.7	358.5	
	vel of Service (LOS)					A	С	F	F	F	D		D	F	
	pproach Delay, s/veh / LOS					D	164.	0	F	145.	0	F	313.	6	F
Intersection De	ersection Delay, s/veh / LOS					14	6.1						F		
														0.5	
Multimodal Re		/1.00		4.01	EB			WB		0.01	NB	D		SB	
Pedestrian LOS				1.90		B	1.92		B	2.30		B	2.46	_	B
Bicycle LOS So	core / LC	72		1.77		В	2.28	5	В	1.64	+	В	1.58	5	В

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		Analys	ia Data		2020									
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							Analysis	Period	1> 7:0	00	÷			
		File Na	ame	20507	AMpeak	.xus					- 1	11		
I-229/10TH ST IMJ	R					-	_						910	
			EB			W	3		NB			SB		
		L	Т	R	L	Т	R	L	Т	R	L	Т	R	
		100	1045	25	20	192	25 90	10	5	5	30	5	65	
					11	1							*	
Reference Phase	6		R.	12 *	154	7				1	e	3	* } *	
Reference Point	Begin	Green	4.9	120.5	10.4	0.0	0.0	0.0						
Simult. Gap E/W	On			3.6	3.6			0.0		×			K 17	
Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0	0.0	0.0		5	6	7		
		501		FDT			MOT			NET	0.00	_	0.D.T	
igned Phase					WB			NBI			SBI		SBT	
		-	_			\rightarrow			_	-		_	4	
e Number se Duration, s									_			_	6.0	
		_							_		<u> </u>		16.0 5.6	
ange Period, (Y+ <i>R</i> c), s k Allow Headway (<i>MAH</i>), s									_				4.7	
·				0.0	<u> </u>		0.0						9.3	
(_ ,				0.0		-	0.0						0.0	
, = ,				0.0		-	0.0				<u> </u>		1.00	
						-							1.00	
sults			EB			WB	1		NB			SB		
		L	Т		L	Т		L	Т	R	L	Т	R	
					1			3	8	18	7	4	14	
∠), veh/h		97	523	519	22	2092	2 98	11	11		33	76		
	ln	1661	1744	1729	529	1647	7 1466	1323	1626		1415	1530		
g s), s		1.4	10.4	10.4	1.4	51.4	2.1	1.2	0.9		3.3	7.3		
се Time (g с), s		1.4	10.4	10.4	3.9	51.4	2.1	8.5	0.9		4.3	7.3		
		0.85	0.86	0.86	0.80	L		0.07	0.07		0.07	0.07		
		191	1493		464			75			137	106		
` ` /					0.047								<u> </u>	
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cremental Delay (<i>d z</i>), s/veh							_							
tial Queue Delay (d_3), s/veh						L								
ntrol Delay (<i>d</i>), s/veh vel of Service (LOS)							_							
							_							
pproach Delay, s/veh / LOS							В	69.6				+	F	
tersection Delay, s/veh / LOS					.0	_			_	_	В		_	
			FR			W/R			NR			SB		
en/LOS		1.82	EB	B	1.84	WB	B	2.48	NB 3	B	2.32	SB	В	
	HRG RL SIOUX FALLS 10TH STREET HY-VEE DRIVEWA I-229/10TH ST IMJ I-229/10TH ST IMJ Simult. Gap E/W Simult. Gap E/W Simult. Gap N/S Simult. Gap N/S I Simult. Gap N/S Simult. S Simult. Gap N/S Simult. Gap N/	Image: second stateHRGRLSIOUX FALLS10TH STREETHY-VEE DRIVEWAYI-229/10TH ST IMJRI-229/10TH ST IMJRI-229/10TH ST IMJRSimult. Gap E/WSimult. Gap E/WOnSimult. Gap N/SOnSimult. Gap N/SOnSimult. Gap N/SOnSimult. Gap N/SOnSimult. Gap N/SOnSimult. Gap N/SOnSimult. Gap N/SOnSimult Gap N/SSimult Gap N/S	HRGRLAnalysSIOUX FALLSTime F10TH STREETAnalysIOTH STREETAnalysI-229/10TH ST IMJRFile National StressI-229/10TH ST IMJRII-229/10TH ST IMJRISimult. Gap E/WOnSimult. Gap N/SOnSimult. Gap N/SOnMAH), s2.2e (g s), s3.0MAH), s2.2e (g s), s0.0sultsIIIg s), s1.4Green1.9y, veh/h97low Rate (s), veh/h/ln1661g s), s1.4I0.509t/in (95 th percentile)1.10s/veh20.82), s/veh0.7f s), s/veh<	HRGRLAnalysis DateSIOUX FALLSTime Period10TH STREETAnalysis YearHY-VEE DRIVEWAYFile NameI-229/10TH ST IMJRII-229/10TH ST IMJRII-229/10T	HRG RL Analysis Date Jul 29 SIOUX FALLS Time Period AM Period 10TH STREET Analysis Year 2050 HY-VEE DRIVEWAY File Name 2050 I-229/10TH ST IMJR I T R I-229/10TH ST IMJR I I R 100 1045 25 Reference Phase 6 Reference Point Begin Green 4.9 120.5 Simult. Gap E/W On Simult. Gap N/S On Reference 3.6 R Simult. Gap N/S On Reference 5 2 0.0 0.0 2c., s 3.0 5.6 MAH), s 2.2 0.0 0.0 0.0 2c., s 3.3.4	HRG Analysis Date Jul 29, 2020 SUUX FALLS Time Period AM Peak Hou 10TH STREET Analysis Year 2050 Ampeak Hou HY-VEE DRIVEWAY File Name 2050 AMpeak I-229/10TH ST IMJR I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I <th< td=""><td>HRG RL Analysis Date Jul 29, 2020 SIOUX FALLS Time Period AM Peak Hour 10TH ST REET Analysis Year 2050 HY-VEE DRIVEWAY File Name 2050 AMpeak.xus I-229/10TH ST IMJR E WI L T Reference Phase 6 Reference Phase 6 Green 4.9 120.5 10.4 0.0 Simult. Gap R/W On Reference Phase 6 Simult. Gap R/W On Ref WBL C 2 0.0 Simult. Gap N/S On Ref Simult. Gap N/S On E V C 2 0.0 C <th co<="" td=""><td>Intersec Intersec Unitation RL Analysis Year 2050 Analysis SIOUX FALLS Time Period AM Peak Hour PHF 10TH ST REET Analysis Year 2050 Analysis HY-VEE DRIVEWAY File Name 2050 AMpeak.xus L T Reference Phase 6 Green 4.9 120.5 10.4 0.0 0.0 Simult. Gap E/W On Red Green 4.9 120.5 10.4 0.0 0.0 Simult. Gap E/W On Red Green 4.0 2 6 Simult. Gap N/S On Red 0.0 0.0 0.0 C EBL EBT<td>Intersection inf HRG Duration, h RL Analysis Date Jul 29, 2020 Analysis Period SIOUX FALLS Time Period AM Peak Hour PHF 10TH STREET Analysis Year 2050 Analysis Period HY-VEE DRIVEWAY File Name 2050 Amalysis Period I-229/10TH ST IMJR L T R L L T R L L L R L Simult Gap E/W On Reference Point Begin Simult Gap N/S On Z G G S Z G G S Z G G G G K MB</td><td>$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$</td><td>Intersection Information Intersection Information RL Analysis Date Jul 29, 2020 Area Type Other SIOUX FALLS Time Period AM Peak Hour PHF 0.92 10TH STREET Analysis Year 2050 Analysis Period 1 > 7.00 HV-VEE DRIVEWAY File Name 2050 AMpeak.xus I > 7.00 Analysis Period 1 > 7.00 H229/10TH ST IMJR L T R L T R L T R Simult. Gap EW On 100 1045 25 20 1925 90 10 5 5 Reference Phase 6 Green 4.9 2.05 10.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td><td>$\begin{array}{ c c c c c c c c c c c c c c c c c c c$</td><td>Intersection Information Duration, h 0.250 RL Analysis Date Jul 29, 2020 Area Type Other SIOUX FALLS Time Period AM Peak Hour PHF 0.92 Analysis Period 1>7.00 SIOUX FALLS Time Period AM Peak Hour PHF 0.92 Analysis Period 1>7.00 HY-VEE DRIVEWAY File Name 2050 AMpeak.xus Intersection Information 1>7.00 I-229/10TH ST IMJR I R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L</td></td></th></td></th<>	HRG RL Analysis Date Jul 29, 2020 SIOUX FALLS Time Period AM Peak Hour 10TH ST REET Analysis Year 2050 HY-VEE DRIVEWAY File Name 2050 AMpeak.xus I-229/10TH ST IMJR E WI L T Reference Phase 6 Reference Phase 6 Green 4.9 120.5 10.4 0.0 Simult. Gap R/W On Reference Phase 6 Simult. Gap R/W On Ref WBL C 2 0.0 Simult. Gap N/S On Ref Simult. Gap N/S On E V C 2 0.0 C <th co<="" td=""><td>Intersec Intersec Unitation RL Analysis Year 2050 Analysis SIOUX FALLS Time Period AM Peak Hour PHF 10TH ST REET Analysis Year 2050 Analysis HY-VEE DRIVEWAY File Name 2050 AMpeak.xus L T Reference Phase 6 Green 4.9 120.5 10.4 0.0 0.0 Simult. Gap E/W On Red Green 4.9 120.5 10.4 0.0 0.0 Simult. Gap E/W On Red Green 4.0 2 6 Simult. Gap N/S On Red 0.0 0.0 0.0 C EBL EBT<td>Intersection inf HRG Duration, h RL Analysis Date Jul 29, 2020 Analysis Period SIOUX FALLS Time Period AM Peak Hour PHF 10TH STREET Analysis Year 2050 Analysis Period HY-VEE DRIVEWAY File Name 2050 Amalysis Period I-229/10TH ST IMJR L T R L L T R L L L R L Simult Gap E/W On Reference Point Begin Simult Gap N/S On Z G G S Z G G S Z G G G G K MB</td><td>$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$</td><td>Intersection Information Intersection Information RL Analysis Date Jul 29, 2020 Area Type Other SIOUX FALLS Time Period AM Peak Hour PHF 0.92 10TH STREET Analysis Year 2050 Analysis Period 1 > 7.00 HV-VEE DRIVEWAY File Name 2050 AMpeak.xus I > 7.00 Analysis Period 1 > 7.00 H229/10TH ST IMJR L T R L T R L T R Simult. Gap EW On 100 1045 25 20 1925 90 10 5 5 Reference Phase 6 Green 4.9 2.05 10.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td><td>$\begin{array}{ c c c c c c c c c c c c c c c c c c c$</td><td>Intersection Information Duration, h 0.250 RL Analysis Date Jul 29, 2020 Area Type Other SIOUX FALLS Time Period AM Peak Hour PHF 0.92 Analysis Period 1>7.00 SIOUX FALLS Time Period AM Peak Hour PHF 0.92 Analysis Period 1>7.00 HY-VEE DRIVEWAY File Name 2050 AMpeak.xus Intersection Information 1>7.00 I-229/10TH ST IMJR I R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L</td></td></th>	<td>Intersec Intersec Unitation RL Analysis Year 2050 Analysis SIOUX FALLS Time Period AM Peak Hour PHF 10TH ST REET Analysis Year 2050 Analysis HY-VEE DRIVEWAY File Name 2050 AMpeak.xus L T Reference Phase 6 Green 4.9 120.5 10.4 0.0 0.0 Simult. Gap E/W On Red Green 4.9 120.5 10.4 0.0 0.0 Simult. Gap E/W On Red Green 4.0 2 6 Simult. Gap N/S On Red 0.0 0.0 0.0 C EBL EBT<td>Intersection inf HRG Duration, h RL Analysis Date Jul 29, 2020 Analysis Period SIOUX FALLS Time Period AM Peak Hour PHF 10TH STREET Analysis Year 2050 Analysis Period HY-VEE DRIVEWAY File Name 2050 Amalysis Period I-229/10TH ST IMJR L T R L L T R L L L R L Simult Gap E/W On Reference Point Begin Simult Gap N/S On Z G G S Z G G S Z G G G G K MB</td><td>$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$</td><td>Intersection Information Intersection Information RL Analysis Date Jul 29, 2020 Area Type Other SIOUX FALLS Time Period AM Peak Hour PHF 0.92 10TH STREET Analysis Year 2050 Analysis Period 1 > 7.00 HV-VEE DRIVEWAY File Name 2050 AMpeak.xus I > 7.00 Analysis Period 1 > 7.00 H229/10TH ST IMJR L T R L T R L T R Simult. 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Gap E/W On Red Green 4.9 120.5 10.4 0.0 0.0 Simult. Gap E/W On Red Green 4.0 2 6 Simult. Gap N/S On Red 0.0 0.0 0.0 C EBL EBT <td>Intersection inf HRG Duration, h RL Analysis Date Jul 29, 2020 Analysis Period SIOUX FALLS Time Period AM Peak Hour PHF 10TH STREET Analysis Year 2050 Analysis Period HY-VEE DRIVEWAY File Name 2050 Amalysis Period I-229/10TH ST IMJR L T R L L T R L L L R L Simult Gap E/W On Reference Point Begin Simult Gap N/S On Z G G S Z G G S Z G G G G K MB</td> <td>$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$</td> <td>Intersection Information Intersection Information RL Analysis Date Jul 29, 2020 Area Type Other SIOUX FALLS Time Period AM Peak Hour PHF 0.92 10TH STREET Analysis Year 2050 Analysis Period 1 > 7.00 HV-VEE DRIVEWAY File Name 2050 AMpeak.xus I > 7.00 Analysis Period 1 > 7.00 H229/10TH ST IMJR L T R L T R L T R Simult. Gap EW On 100 1045 25 20 1925 90 10 5 5 Reference Phase 6 Green 4.9 2.05 10.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>$\begin{array}{ c c c c c c c c c c c c c c c c c c c$</td> <td>Intersection Information Duration, h 0.250 RL Analysis Date Jul 29, 2020 Area Type Other SIOUX FALLS Time Period AM Peak Hour PHF 0.92 Analysis Period 1>7.00 SIOUX FALLS Time Period AM Peak Hour PHF 0.92 Analysis Period 1>7.00 HY-VEE DRIVEWAY File Name 2050 AMpeak.xus Intersection Information 1>7.00 I-229/10TH ST IMJR I R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L</td>	Intersection inf HRG Duration, h RL Analysis Date Jul 29, 2020 Analysis Period SIOUX FALLS Time Period AM Peak Hour PHF 10TH STREET Analysis Year 2050 Analysis Period HY-VEE DRIVEWAY File Name 2050 Amalysis Period I-229/10TH ST IMJR L T R L L T R L L L R L Simult Gap E/W On Reference Point Begin Simult Gap N/S On Z G G S Z G G S Z G G G G K MB	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Intersection Information Intersection Information RL Analysis Date Jul 29, 2020 Area Type Other SIOUX FALLS Time Period AM Peak Hour PHF 0.92 10TH STREET Analysis Year 2050 Analysis Period 1 > 7.00 HV-VEE DRIVEWAY File Name 2050 AMpeak.xus I > 7.00 Analysis Period 1 > 7.00 H229/10TH ST IMJR L T R L T R L T R Simult. 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HCS[™] Streets Version 7.9

UCS7 Signalized Interpretion Paculto Summary

		HCS	67 Sig	nalize	d Int	ersec	tion F	Resu	lts Sı	ımma	ry					
-								1						-		
General Inform	nation								Interse	ction I	nform	natio	n		4.200	1.44
Agency		HRG							Duratic	n, h	0.	.250		-		
Analyst		RL		Analys	is Date	Jul 29	, 2020		Area T	/pe	0	ther		-24		
Jurisdiction		SIOUX FALLS		Time F	Period	PM P	eak Hou	ır	PHF		0.	.92			4	
Urban Street		10TH STREET		Analys	is Year	2050			Analys	s Perio	1 1:	> 7:0	0			
Intersection		JESSICA AVENUE		File Na	ame	2050	PMpeal	k.xus							1	•••
Project Descrip	tion	I-229/10TH ST IMJ	R											1	414	Y 82
Demand Inform	nation			_	EB			W	<u>ح</u>			NB		Ţ	SE	2
Approach Move				L		R	<u> </u>		_	<u> </u>		T	R	L	T	
						_				6	-	-				
Demand (v), v	en/n	_	-		2060	105	65	146		0:		-	70			
Signal Informa	tion						T									
Cycle, s	79.9	Reference Phase	2	1	€ ک		2							→ []		
Offset, s	26	Reference Point	Begin	Croop	62.0	6.7	0.0	0.0	0.0) 0.	_		1	2		3
Uncoordinated	Yes	Simult. Gap E/W	On	Green Yellow		3.6	0.0	0.0					·	∽		K
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0					5	6		7 Y
					-		1								ī	
Timer Results				EBL	-	EBT	WB	L	WBT	N	BL		NBT	SBL	-	SBT
Assigned Phase	e Number					2			6	-			8		\rightarrow	
Case Number	e Number se Duration, s					8.0		_	6.0	-			9.0		_	
						67.6			67.6	_			12.3		\rightarrow	
Change Period,		•				5.6			5.6	-			5.6		\rightarrow	
Max Allow Head		,				3.4			3.4	-			5.3		\rightarrow	
Queue Clearan		, <u> </u>				52.2		\rightarrow	64.0				5.9		\rightarrow	
Green Extensio		(ge), s				8.3	<u> </u>	_	0.0	-			0.4	<u> </u>	\rightarrow	
Phase Call Prol				<u> </u>		1.00			1.00	-			0.96	<u> </u>	_	
Max Out Proba	bility	_				0.90			1.00			(0.36			
Movement Gro	oup Res	sults			EB	_		WB	_		١	١B			SE	3
Approach Move	ement			L	Т	R	L	Т	R	L	Т	Т	R	L	Т	R
Assigned Move	ment				2	12	1	6		3			18		_	
Adjusted Flow F	Rate (v), veh/h			1177	1177	59	1336	5	71			76			
Adjusted Satura	ation Flo	w Rate (<i>s</i>), veh/h/	In		1758	1728	151	1674		1688	3		1502			
Queue Service	Time (g	g s), S			50.2	38.3	11.8	11.9		3.2			3.9			
Cycle Queue C	learanc	e Time (<i>g c</i>), s			50.2	38.3	62.0	11.9	1	3.2			3.9			
Green Ratio (g	/C)				0.78	0.78	0.78	0.78		0.08	-		0.08		_	
Capacity (c), v	/eh/h				1364	1340	112	2596	3	142			126			
Volume-to-Capa	acity Ra	atio(X)			0.863	0.878	0.530	0.51	5	0.49	7		0.602			
Back of Queue	(Q), ft	/In (95 th percentile)		377.1	388	55.6	108.	3	65.7	·		74.2			
Back of Queue	(Q), ve	eh/In (95 th percent	ile)		14.7	15.5	2.2	4.2		2.6			2.9			
Queue Storage	Ratio (RQ) (95 th percen	tile)		0.00	0.00	0.56	0.00		0.55			0.00			
Uniform Delay ((d1), s	/veh			6.1	6.3	37.8	3.3		35.0			35.3			
Incremental De	remental Delay (d ₂), s/veh					6.7	1.9	0.1		3.8			6.4			
Initial Queue De	tial Queue Delay (d ȝ), s/veh					0.0	0.0	0.0		0.0			0.0			
Control Delay (d), s/ve	eh			11.8	13.0	39.7	3.4		38.8			41.7			
Level of Service	. ,				В	В	D	A		D			D			
	pproach Delay, s/veh / LOS					В	5.0		А	40	.3		D	0.0		
Intersection De	tersection Delay, s/veh / LOS					1(0.8							В		
Marile								14/5								
Multimodal Re		/1.02		4.00	EB		0.00	WB				NB		0.44	SE	
Pedestrian LOS				1.83		B	0.63		A	2.	51		В	2.14		В
Bicycle LOS Sc	ore / LC	15		2.43		В	1.86	0	В				F			

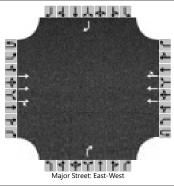
		HCS	67 Sig	nalize	d In	tersec	tion F	Resu	lts Sur	nmar	у				
															1411
General Inform	nation								Intersect			-	- 01	*	
Agency		HRG							Duration,		0.250		-		
Analyst		RL		Analys			9, 2020		Area Typ	e	Other	•			*
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF	<u> </u>	0.92		-	19	-
Urban Street		10TH STREET		Analys					Analysis	Period	1> 7:(00			1
Intersection		LOWELL AVENUE		File Na	ame	2050	PMpeak	(.xus						+	
Project Descrip	otion	I-229/10TH ST IMJ	R	-		-	-		_	-	-	-		14.1944	MIC .
Demand Infor	mation				EE	3		W	В		NB			SB	
Approach Move	ement			L	Т	R	L	T	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h		_	30	211	5 20	180	15	25 100	10	30	70	180	55	20
Signal Informa	ation		_	 	T	8			Γ	T	100				
Cycle, s	150.0	Reference Phase	2			741							4		4
Offset, s	100	Reference Point	Begin	·				Ê.			1.000	1	2	3	4
Uncoordinated		Simult. Gap E/W	On	Green Yellow) 94.4 3.6	31.4 3.6	0.0		0.0	_		-€		-+-
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0		0.0		5	6	7	Y
	1	<u>1</u> •	1	J								, i			
Timer Results				EBL	-	EBT	WB	L	WBT	NB	L	NBT	SB	L	SBT
Assigned Phas	e					2	1		6			8			4
Case Number						6.3	1.0		4.0			8.0			8.0
Phase Duration						100.0	13.0		113.0			37.0			37.0
Change Period						5.6	3.0		5.6			5.6			5.6
	(Allow Headway (<i>MAH</i>), s eue Clearance Time (<i>g</i> s), s				_	0.0	4.2		0.0	<u> </u>	_	5.3			5.3
		,			_		12.0				_	11.6			33.4
Green Extensio		(ge), S			_	0.0	0.0		0.0			2.3	<u> </u>		0.0
Phase Call Pro					_		1.00					1.00			1.00
Max Out Proba	ibility						1.00)				0.01			1.00
Movement Gro	oup Res	ults			EB			WE	;		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow	Rate(<i>v</i>), veh/h		32	1142	2 1142	161	733	721		120			277	
		ow Rate (<i>s</i>), veh/h/	ln	363	1758	8 1752	1688	1772			1650			1224	
Queue Service				7.6	94.4	1 94.4	10.0	35.4			0.0			21.8	
-		e Time (<i>g c</i>), s		30.0	94.4		10.0	35.4	_		9.6			31.4	<u> </u>
Green Ratio (g				0.63	0.63	_	0.71	0.72			0.21			0.21	<u> </u>
Capacity (c),				222	1106	_	161	1269	_		372			297	<u> </u>
Volume-to-Cap		. ,	,	0.144	1.03			0.57			0.322		<u> </u>	0.933	
Back of Queue	(Q), ft/	In (95 th percentile)	32	1389 4). 1366. 6	307.2	492.	3 459		181.1			500.8	
	. ,	eh/In (95 th percent	,	1.3	54.3	3 54.7	12.1	19.4			7.1			19.7	
-		RQ) (95 th percen	tile)	0.25	0.00		5.12	0.00	_		0.00			0.00	
Uniform Delay				22.3 0.6	27.8		56.3	14.0	_		50.7			61.8	
	remental Delay (d ₂), s/veh				26.1	_	52.4	1.0			0.7			35.2	<u> </u>
	ial Queue Delay (d ₃), s/veh					0.0	0.0	0.0			0.0			0.0	<u> </u>
	ntrol Delay (d), s/veh					55.1	108.7	15.0			51.4			97.0	
	vel of Service (LOS)					F	F 24.0	B	В	E 4			07/	F	
	oproach Delay, s/veh / LOS					D	24.0 5.5		С	51.4	+	D	97.0	J	F
milersection De	tersection Delay, s/veh / LOS					4	J.J						D		
Multimodal Re	sults				EB			WE			NB			SB	
Pedestrian LOS		/ LOS		1.67		В	1.64	H	В	2.3		В	2.3		В
Bicycle LOS So	core / LC	DS		2.43	3	В	2.1	1	В	0.68	3	А	0.94	4	А

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HCS7 Two-Way Stop-Control Report												
General Information Site Information												
Analyst HR Green Intersection 10th St & Conklin Ave												
Agency/Co. Jurisdiction												
Date Performed 10/2/2020 East/West Street 10th Street												
Analysis Year	2050	North/South Street	Conklin Avenue									
Time Analyzed	PM Peak Hour - No Build	Peak Hour Factor	0.92									
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25									
Project Description	I-229/10th Street IMJR											
Lanes												



Vehicle Volumes and Adjustments

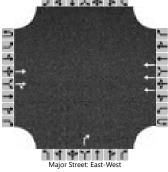
venicle volumes and Adj	ustine															
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	3	0	0	0	3	0		0	0	1		0	0	1
Configuration			Т	TR			Т	TR				R				R
Volume (veh/h)			2340	25			1780	20				90				25
Percent Heavy Vehicles (%)												2				2
Proportion Time Blocked																
Percent Grade (%)										(C			(0	
Right Turn Channelized										Ν	lo			Ν	lo	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)												7.1				7.1
Critical Headway (sec)												7.14				7.14
Base Follow-Up Headway (sec)												3.9				3.9
Follow-Up Headway (sec)												3.92				3.92
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)	Τ											98				27
Capacity, c (veh/h)												133				214
v/c Ratio												0.73				0.13
95% Queue Length, Q ₉₅ (veh)												4.2				0.4
Control Delay (s/veh)												83.9				24.2
Level of Service (LOS)												F				С
Approach Delay (s/veh)										83	3.9			24	1.2	
Approach LOS											F			(С	

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		HCS	7 Sig	nalize	d In	terse	ctio	n R	esu	lts Su	mmar	у				
														-		
General Inforn		-								Intersec	tion Inf	ormatic	on		4,2,441	e u
Agency		HRG								Duration	, h	0.250		-		
Analyst		RL		Analys	is Da	ite Jul 2	9, 20)20		Area Typ	be	Other		<u>^</u>		- <u>1</u>
Jurisdiction		SIOUX FALLS		Time F	Period	I PM	Peak	Hou		PHF		0.92				
Urban Street		10TH STREET		Analys	is Ye	ar 2050)			Analysis	Period	1> 7:0	00			
Intersection		I-229		File Na	ame	2050) PMp	peak	.xus						htr	
Project Descrip	tion	I-229/10TH ST IMJ	R											1		20
Domond Inform	notion				гс	י ז			\^/[<u>ר</u>				,	<u> </u>	
					EE		+			R	<u> </u>	NB T	R		SB T	R
· · ·				320	124		_	730	98		535		1005	595	0	280
	CH/H			520	124	10 00	5	750	50	5 425	000	0	1005	000	0	200
Signal Informa	tion				-		<u>8</u>	5	1.	4.12		1				1
Cycle, s	150.0	Reference Phase	2	1	2	5	2	32		1.2		×		4		4
Offset, s	148	Reference Point	Begin	Green	21.6	6 11.2		1 3.9	41.	7 0.0	0.0		1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6		+3.9 3.6	3.6		0.0		x 1	\rightarrow		512
Force Mode	a, s150.0Reference Phaset, s148Reference PointordinatedNoSimult. Gap E/Wa ModeFixedSimult. Gap N/Sa ResultsImage: Simult Si				4.5	4.5		4.5	3.7	0.0	0.0		5	6	7	Ť
									,							
Timer Results				EBL 5	-	EBT		WBL	-	WBT	NB	L	NBT	SBL	-	SBT
Assigned Phase	gned Phase e Number se Duration, s nge Period, (<i>Y+R c</i>), s					2		1		6			8			4
Case Number	gned Phase e Number se Duration, s nge Period, (Y+R c), s Allow Headway (<i>MAH</i>), s ue Clearance Time (g s), s					3.0		1.1		3.0			5.0			5.0
Phase Duration	se Duration, s nge Period, (Y+ <i>R c</i>), s Allow Headway (<i>MAH</i>), s				'	52.0		49.0		71.3			49.0			49.0
	nge Period,(Y+ <i>R</i> c), s (Allow Headway(<i>MAH</i>), s				\rightarrow	8.1	-	8.1		8.1			7.3			7.3
	Allow Headway (<i>MAH</i>), s			4.2		0.0	_	4.2		0.0		_	5.3			5.3
	ue Clearance Time (g s), s			21.3	3			42.9				-	43.7			43.7
	en Extension Time (g e), s			0.3		0.0		0.0		0.0		_	0.0			0.0
				1.00	_			1.00					1.00			1.00
Max Out Proba	bility			1.00)			1.00					1.00			1.00
Movement Gro	oup Res	ults			EB	;	T	_	WB	_		NB			SB	
	-			L	Т	R		L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	1	6	16	3	8	18	7	4	14
Adjusted Flow I	Rate (v), veh/h		324	1260	0 876	58	585	790	341	582	0	1092	647	0	304
Adjusted Satura	ation Flo	w Rate (<i>s</i>), veh/h/l	In	1688	1790	0	16	674	1690		1701	1669		1674	1643	
Queue Service	Time (g	g s), s		19.3	43.9	9	40	0.9	26.5		41.7	0.0		41.7	0.0	
Cycle Queue C	learance	e Time (<i>g c</i>), s		19.3	43.9)	40	0.9	26.5	1	41.7	0.0		41.7	0.0	
Green Ratio (g	/C)			0.44	0.29	9	0.	.58	0.42		0.28	0.28		0.28	0.28	
Capacity (c), v	/eh/h			450	1048	8	50	504	1424		521	464		513	457	
Volume-to-Cap	acity Ra	itio(X)		0.720	1.20	3	1.1	160	0.555	5	1.116	0.000		1.260	0.000	
Back of Queue	(Q), ft/	/In (95 th percentile))	258.7	988.	8	53	32.5	322.9)	1086. 7	0		1430.4	0	
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	10.2	38.9	9	20	0.8	12.6		43.1	0.0		55.9	0.0	
Queue Storage	Ratio (RQ) (95 th percent	tile)	0.00	0.00)	0.	.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay	(d 1), s/	/veh		33.1	43.2	2	25	5.5	32.8		56.1	0.0		56.1	0.0	
Incremental De				0.5	92.2			4.4	0.1		75.4	0.0		131.9	0.0	
	ial Queue Delay (<i>d</i> ₃), s/veh				0.0			0.0	0.0		0.0	0.0		0.0	0.0	
	ntrol Delay (d), s/veh				135.	4 0.0		9.9	33.0	0.0	131.5	0.0	0.0	188.0	0.0	0.0
	vel of Service (LOS)				F	A		F	С	A	F		A	F		A
	pproach Delay, s/veh / LOS				3	E		49.2		D	45.7	7	D	127.	9	F
Intersection De	ersection Delay, s/veh / LOS						68.2							E		
Multiment															0.5	
Multimodal Re		/1.02		0.40	EB		-	0.40	WB	P	0.44	NB	В	0.40	SB	
				2.13 2.67		B		2.12		B	2.46		В	2.46		B
	lestrian LOS Score / LOS /cle LOS Score / LOS					С		2.41		В	3.25)	С	2.06		В

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	HCS7 Two-Way Stop	o-Control Report	
	, , , , , , , , , , , , , , , , , , ,		
General Information		Site Information	
Analyst	HR Green	Intersection	10th St & Blaine Ave
Agency/Co.		Jurisdiction	
Date Performed	10/2/2020	East/West Street	10th Street
Analysis Year	2050	North/South Street	Blaine Avenue
Time Analyzed	PM Peak Hour - No Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	I-229/10th Street IMJR		
Lanes			
	JA LAA	S & U	



Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	3	0		0	0	1		0	0	0
Configuration			Т	TR			Т					R				
Volume (veh/h)			2760	85			2140					15				
Percent Heavy Vehicles (%)												2				
Proportion Time Blocked																
Percent Grade (%)										. ())					
Right Turn Channelized										N	lo					
Median Type Storage				Undi	vided											
Critical and Follow-up He	eadwa	ys														
Base Critical Headway (sec)												6.9				
Critical Headway (sec)												6.94				
Base Follow-Up Headway (sec)												3.3				
Follow-Up Headway (sec)												3.32				
Delay, Queue Length, and	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)												16				
Capacity, c (veh/h)												103				
v/c Ratio												0.16				
95% Queue Length, Q ₉₅ (veh)												0.5				
Control Delay (s/veh)												46.3				
Level of Service (LOS)												E				
Approach Delay (s/veh)										46	5.3					-
Approach LOS											E					

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		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts Sur	nmar	у				
_															
General Inforn		-							Intersec	tion Inf	-	-			3.0
Agency		HRG							Duration	, h	0.250		-		and the second second
Analyst		RL		Analys	sis Dat	e Jul 29	, 2020		Area Typ	e	Other		<u>*</u> _*		A 10
Jurisdiction		SIOUX FALLS		Time F	Period	PM P	eak Hou	ır	PHF		0.92			1	
Urban Street		10TH STREET		Analys	sis Yea	r 2050			Analysis	Period	1> 7:(00			
Intersection		CLEVELAND AVEN	NUE	File Na	ame	2050	PMpeak	(.xus						18	
Project Descrip	tion	I-229/10TH ST IMJ	R										1	1 1 40 Y	e a
Demand Inform	nation		_		EB	_		W	В	1	NB	_		SB	_
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			340	2045	5 390	40	169	90 185	230	300	70	235	345	220
Signal Informa	ation				1.20	1.00	4	12	6 26	2			17	1	1
Cycle, s	150.0	Reference Phase	2		₩.		NR.		5.4	12			4 -	\mathbf{h}	d p
Offset, s	41	Reference Point	Begin	Green	10.0	67.4	11.0	1.0	34.4	0.0	-	1	2	+ 1	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.0	0.0		0.0		×	\rightarrow	LΙ	512
Force Mode					0.0	2.0	0.0	0.0	2.0	0.0		5	6	7	<u> </u>
Timer Deculto				EBI		EBT			WBT	NBI		NDT	SB		SBT
				5	-	2	WB		<u>vvb1</u> 6	3	-	NBT 8	<u>зы</u> 7	-	4
-	e			-		3.0	<u> </u>	\rightarrow		-		-	· · ·	_	-
				1.0		3.0 95.0			6.3	1.1	<u> </u>	4.0	1.1		4.0
				22.0				\rightarrow	73.0	14.0		40.0	15.0		41.0
Max Allow Hea				3.0 4.2		5.6 0.0			5.6 0.0	3.0 4.2		5.6 4.2	3.0 4.2		5.6 4.2
Queue Clearan		,		4.2	,	0.0	<u> </u>	+	0.0	4.2		4.2 36.4	4.2		4.2 37.4
Green Extensio		1 = 7		0.0		0.0			0.0	0.0		0.0	0.0		0.0
Phase Call Pro		(ge), s		1.00		0.0			0.0	1.00		1.00	1.00		1.00
Max Out Proba				1.00						1.00		1.00	1.00		1.00
Mourant Cr					ED									0.0	
Movement Gro	-	suits			EB	R	L	WB T	R	L	NB T	R		SB T	R
Assigned Move				5	2	12		6	16	3	8	18	7	4	14
Adjusted Flow) voh/h		247	2 1486	-	43	1019		250	402	10	255	614	14
-		ow Rate (s), veh/h/	In	1674	1674		349	1744		1688	1714		1701	1669	
Queue Service		. ,		17.2	38.8	12.1	11.4	67.4		11.0	34.4		12.0	35.4	
Cycle Queue C		- /		17.2	38.8	12.1	29.5	67.4	_	11.0	34.4		12.0	35.4	
Green Ratio (g		o nino (g c), o		0.59	0.60	0.67	0.45	0.45	_	0.30	0.23		0.31	0.24	<u> </u>
Capacity (c), v				260	1995	_	166	784		172	393		184	394	
Volume-to-Cap		itio (X)		0.950			0.262	1.30	_	1.456	1.023		1.388	1.559	
· ·		/In (95 th percentile)	241.5			52.8	2059 3		648.2	720.2			1688.8	
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	9.4	13.9	5.4	2.0	79.8		25.5	28.4		24.8	67.0	
		RQ) (95 th percen	,	1.79	0.00	1.02	0.48	0.00		6.48	0.00		7.81	0.00	
Uniform Delay	(d1), s	/veh		38.5	13.0	10.7	29.7	33.9	33.5	46.3	57.8	i	45.1	57.3	
Incremental De	lay (<i>d</i> 2), s/veh		8.0	0.2	0.1	2.1	140.6	6 161.0	234.3	51.5		204.3	263.8	
Initial Queue D	elay (<i>d</i>	з), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/ve	eh		46.5	13.3	10.8	31.8	174.	5 194.5	280.6	109.3		249.5	321.1	
Level of Service	e (LOS)			D	В	В	С	F	F	F	F		F	F	
Approach Dela	y, s/veh	/ LOS		17.0)	В	181.	3	F	174.	9	F	300.	0	F
Intersection De	lay, s/ve	h / LOS				14	0.0						F		
Multime et al D														00	
Multimodal Re		/1.08		1.00	EB	P	1.01	WB		0.04	NB	P	0.40	SB	P
				1.90	_	B	1.92		B	2.31		B	2.46		B
DICYCIE LOS SC	estrian LOS Score / LOS cle LOS Score / LOS			2.98		С	2.20	J	В	1.56)	В	1.92	2	В

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		HCS	7 Sig	nalize	d Int	ersec	tion F	≀esu	lts Sur	nmar	у				
General Information									Intersec		1		- 19	a state i A L	24.5
Agency		IRG							Duration		0.250		-		
Analyst		RL				e Jul 29			Area Typ)e	Other		100		-
Jurisdiction		SIOUX FALLS		Time F			eak Hou		PHF		0.92				+
Urban Street		0TH STREET		Analys	sis Yea	ır 2050		1	Analysis	Period	1> 7:(00	1		
Intersection	ŀ	HY-VEE DRIVEWA	Y	File Na	ame	2050	PMpeak	<.xus						11	
Project Description	ı l	-229/10TH ST IMJ	R											R Leve	100
Demand Informati	ion				EB			W	В		NB			SB	
Approach Moveme	ent			L	Т	R	L	Т	R	L	Т	R		Т	R
Demand (v), veh/h				185	2080	0 85	25	179	95 80	30	10	20	100	5	90
Signal Information			-				11								Y
	0.0	Reference Phase	2	1.1.2	R.	1 H	5 . T. T.	7				1-	e .	3	a ta
· ·		Reference Point	Begin	Green	5.0	114.3	3 16.5	0.0	0.0	0.0	_		~		4
		Simult. Gap E/W	On	Yellow		3.6	3.6	0.0	0.0	0.0		×			×12
Force Mode Fix	xed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0	0.0	0.0		5	6	7	T
Timer Results	-			EBL		EBT	WB		WBT	NBI		NBT	SBL		SBT
Assigned Phase				5		2			6			8			4
Case Number				1.0		4.0		-	5.3			6.0			6.0
Phase Duration, s				8.0		127.9			119.9			22.1			22.1
Change Period, (Y	(+R _) s		3.0		5.6		+	5.6			5.6		+	5.6
Max Allow Headwar				2.2		0.0			0.0			4.7	<u> </u>		4.7
Queue Clearance T	• •			4.5		0.0		-+-	0.0			4.7			16.4
Green Extension Ti		(=)		4.5		0.0		+	0.0			0.2			0.1
Phase Call Probabi		g e), s		1.00		0.0	 	\rightarrow	0.0			1.00			1.00
Max Out Probability				0.00				\rightarrow				1.00			1.00
	у			0.00				and a				1.00			1.00
Movement Group	Resu	ilts			EB			WB			NB			SB	
Approach Moveme	ent			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movemer	nt			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate		, veh/h		137	807	800	27	1951	l 87	33	33		109	103	
Adjusted Saturation	. ,		In	1661	1744	1719	308	1647	7 1466	1291	1582		1387	1526	
Queue Service Tim		()		2.5	21.4	21.7	4.8	51.9	2.3	3.7	2.8		11.6	9.7	
Cycle Queue Clear		· ·		2.5	21.4	21.7	18.5	51.9		13.4	2.8		14.4	9.7	
Green Ratio (g/C)				0.81	0.82		0.76	0.76		0.11	0.11		0.11	0.11	1
Capacity (c), veh/l				196	1422	-	255	2509		107	174		175	168	
Volume-to-Capacity		o(X)		0.702	0.568	3 0.571	0.107	0.777		0.305	0.187		0.622	0.614	1
Back of Queue (Q	•	· · ·)	164	224.9	_	17.9	640.7		58.6	53.1		199	185.1	
Back of Queue (Q	,	, , ,		6.4	8.7	8.7	0.7	24.6		2.3	2.1		7.9	7.3	
Queue Storage Rat	,	· · ·		1.64	0.00	0.00	0.20	0.00	_	1.17	0.00		2.34	0.00	
Uniform Delay (<i>d</i> 1			,	28.4	4.0	4.0	8.9	10.4		70.1	60.6		67.2	63.7	
Incremental Delay				0.7	0.7	0.7	0.8	2.4		1.6	0.5		6.5	6.3	
Initial Queue Delay	<u>, ,</u>			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d),				29.1	4.7	4.7	9.8	12.9		71.7	61.1		73.7	70.0	
Level of Service (L				C	A	A	A	н <u>2.</u> е	A	E	E		E	E	
Approach Delay, s/		LOS		6.6	<u> </u>	A	12.5	<u> </u>	B	66.4	<u> </u>	E	71.9		E
Intersection Delay,				5.0			3.9		_				B		_
interession Bolay,	0,1011														
Multimodal Result	ts				EB			WB			NB			SB	
	edestrian LOS Score / LOS			1.0/	1	В	1.86	a	В	2.47	7	В	2.32	,	В
Pedestrian LOS Sc	core /	LOS		1.84	+		1.00			2.71	<u></u>		2.52		

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Assigned Phase 2 1 6 8 Image: Case Number Case Number 8.3 1.0 4.0 11.0 10.0 11.0 Phase Duration, s 27.0 20.0 47.0 23.0 Image: Case Number Image: Case Number 23.0 Image: Case Number 23.0 Image: Case Number 24.0 Image: Case Number Imag			HCS	67 Sig	nalize	d Int	ersec	tion F	Resu	lts \$	Sum	mar	y										
Construction HRG Duration, h 0.250 Analyst RL Analysis Date Jul 29, 2020 Area Type Other Jurisdiction SIOUX FALLS Time Period Alva Type Other 0.92 Urban Street 260 H STREET Analysis Year 2050 Analysis Period 12 7:00 Image: Construction 12 29(10 H ST IMJR SB File Name 2050 AMpeak xus NB SB SB Project Description I-229(10 H ST IMJR L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R	0															-							
AnalysisLAnalysis Time PecidAnalysis AM Peak HourPrefOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOtherOther		nation										-			- 1		1.12						
Jurisdiction SIOUX FALLS Time Period AM Peak Nour PHF 0.52 0.5 Intersection 1-220 MB File Name 2050 Analysis Period 1>7.0 Imalysis Period 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 <td></td>																							
Urban Streat 26TH STREET Analysis Year 2050 Analysis Period 1>7.00 Intersection 1-229 NB File Name 2050 AMpeak.xus 1>7.00 Image and the stream of the	-											;					=						
Intersection I=229 NB File Name 2050 AMpeak.xue Project Description I=229/10TH ST IMJR I T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td><td>eak Hou</td><td></td><td>-</td><td></td><td></td><td>_</td><td></td><td>~</td><td></td><td>12</td></th<>							_	eak Hou		-			_		~		12						
Project Description 1-229/10TH ST IMJR INT IMJR Demand Information L T R L T R L T R L T R L T Signal Information Cycle, s 70.0 Reference Phase 6 Offset, s 180 O 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0					<u> </u>					Anal	ysis F	Period	1> 7:(00									
Demand Information EB WB NB L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R					File Na	ame	2050	AMpeak	.xus							+1							
Approach Movement L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R R L T R L T R L T R L T R L T R L T R L T	Project Descrip	tion	I-229/10TH ST IMJ	R	_	_	_	_				_	_	_	5		1911						
Demand (v), veh/h 510 115 315 1580 190 0 515 Signal Information Cycle, s 70.0 Reference Phase 6 6 6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0<	Demand Inform	nation		_		EB	_		W	В			NB	_		SB							
Signal Information Cycle, s TO.0 Reference Phase 6 Offset, s 48 Reference Phase 6 Offset, s 15.4 21.5 18.1 0.0 0.0 0.0 Duccordinated No Simult. Gap E/W On Red 1.3 0.0 0.0 0.0 0.0 Timer Results Fixed Simult. Gap I/W On Red 1.3 0.0 0.0 0.0 Timer Results EBL EBL Z 1 6 8 Change Pation, s SBL	Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R						
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Offset, s	26	Reference Point	Begin	Green	24.5	20.5	9.1	0.0		.0	0.0		1	2	* 1 *	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.6	0.0		.0	0.0	-		7		5.2
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.9	1.9	1.3	0.0	0	.0	0.0		5	6	7	L Y
	InformationHRGionRLionSIOUX FALLStreet26TH STREETtionI-229 SBDescriptonI-229/10TH ST IMJd InformationI-229/10TH ST IMJd InformationSimult Gap E/WodeFixedSimult. Gap E/WodeFixedodeFixedSimult. Gap N/Sesultsd Phaseunation, sPeriod, (Y+R c), sw Headway (MAH), sClearance Time (g c), scall Probabilityt Probabilityt Probabilityt Probabilityent Group Resultsth Movementd Movementd Information Flow Rate (x), veh/hd Saturation Flow Rate (s), veh/hd Saturation Flow Rate (s), scatioi (g/C)r(c), veh/hto-Capacity Ratio (X)Queue (Q), ft/In (95 th percentile)Queue (Q), thin (95 th percentile)Queue (Q), veh/ln (95 th percentile)Delay (d 1), s/vehntal Delay (d 2), s/vehDelay (d 1), s/vehbalay, s/veh / LOS				1		14/2									
Timer Results				EBL	-	EBT	WB		WBT	-	NBL		NBT	SBL		SBT
Assigned Phase)			<u> </u>	_	2	1	\rightarrow	6	_		_	8		\rightarrow	
Case Number						7.3	1.0		4.0	_			9.0		+	
Phase Duration						26.0	30.0		56.0	4			14.0		\rightarrow	
-	· ·	,				5.5	5.5		5.5	4			4.9	<u> </u>	\rightarrow	
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Movement Gro	Clearance Time (<i>g</i> _s), s Extension Time (<i>g</i> _e), s Call Probability It Probability eent Group Results				EB	_		WB	_	т	_	NB			SB	
Approach Move	-			L	Т	R	L	Т	R		L	Т	R	L	Т	R
Assigned Move					2	12	1	6		-	3		18			
), veh/h			438	90	978	945	-	T	168	_	228			
		,	In		1608	1415	1639	1645	_	1	1626					1
-					7.4	2.4	10.0	11.4	-	Т	3.3					+
					7.4	2.4	10.0	11.4		+	3.3					1
Green Ratio (g					0.29	0.42	0.67	0.72	-	Т	0.13					1
Capacity (c), v					942	598	1710	2374		1	423	_				
		atio (X)			0.465	0.150	0.572	0.39	-		0.399					1
· ·		. ,)		122.6	35	123	145.8	_		58					1
		· · ·			4.8	1.4	4.8	5.7			2.3					1
		<u>, ,</u>	,		0.00	0.35	0.61	0.00		1	0.39	_				
Uniform Delay (d 1), s	/veh			18.4	10.8	7.7	6.8			27.9					
Incremental De	lay (<i>d</i> 2), s/veh			1.6	0.5	0.1	0.2			0.2					
Initial Queue De	elay (<i>d</i>	з), s/veh			0.0	0.0	0.0	0.0			0.0					
Control Delay (d), s/ve	eh			19.9	11.3	7.9	7.1			28.2		0.0			
Level of Service	. ,				В	В	Α	Α			С		Α			
	proach Delay, s/veh / LOS			18.5	5	В	7.5		Α		12.0		В	0.0		
Intersection Del	ersection Delay, s/veh / LOS					1().1							В		
								14/5				NIE			05	
Multimodal Re		11.02		0.07	EB		0.0	WB		-	0.40	NB	D	0.01	SB	
Pedestrian LOS				2.27		B	0.64		A		2.46		В	2.31	\rightarrow	В
Bicycle LOS Sc	ore / LC	15		0.94	•	А	2.07		В				F			

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		HCS	7 Sig	nalize	d In	tersec	tion R	Resi	ults Su	nmar	у				
									L.				_		
	nation								Intersec		1		- 11	4.	200
Agency				1					Duration		0.250		-	2472	- 10 m
Analyst		<u> </u>		-		te Jul 29			Area Typ	e	Other				الله الم
Jurisdiction				Time F			eak Hou	ır	PHF		0.92		100		*
Urban Street		<u> </u>		Analys					Analysis	Period	1> 7:0	00	7		1
Intersection				File Na	ame	2050	AMpeak	.xus						11	
Project Descrip	tion	I-229/10TH ST IMJ	R	_		_	_		_	_	_	_	1	14 1 497	100
Demand Inform	nation		_		EE	3		V	VB		NB	_		SB	
Approach Move	ement			L	Т	R	L	T	T R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			40	21	0 250	60	9	55 220	300	355	155	170	40	375
	tion				1	- 111	101				1.00				
	_	Defense Dhara	6			5 - Als	21%	2							4
Cycle, s			6 Decim		2	- 1 A	51	21				1	2	3	4
Offset, s	-	<u></u>	Begin	Green			46.0	0.		0.0			<u>~</u>		•
L	-		On On	Yellow Red		4.0	4.0	0.		0.0	_	-	Y		Ψ.
Force Mode	rstRLdictionSIOUX FALLSn StreetRICE STREETsectionI-229 NBct DescriptionI-229/10TH ST IM.and Informationpach Movementand (v), veh/hand Informationand Informationand Informationand (v), veh/hand Informationand (v), veh/hand Informationand Informationand (v), veh/hand Informationand (v), veh/hand Informationand Informationand Informationand Informationand (v), veh/hand Informationand (v), veh/hand Informationand Informationand Informationand Informationand Reference Phasethis informationSimult. Gap R/We ModeFixed Simult. Gap N/SInformationsimult. Gap R/WNumbere Duration, sge Period, (Y+R c), sAllow Headway (MAH), se Clearance Time ($g \circ$), sn Extension Time ($g \circ$), se Call ProbabilityDut Probability<				2.0	0.0	2.0	0.	0 0.0	0.0	_	5	6	1	
Timer Results	lystRLsdictionSIOUX FALLSan StreetRICE STREETresectionI-229 NBect DescriptionI-229/10TH ST IMJRnand Informationroach Movementnand (v), veh/hreference Phasee, s120.0Reference PointRet, s0Reference PointRcordinatedNoSimult. Gap E/Wse ModeFixedsimult. Gap N/Ser Resultsgned Phasee Numberse Duration, snge Period, ($Y+R c$), sAllow Headway (MAH), sue Clearance Time ($g e$), sse Call ProbabilityOut ProbabilityOut ProbabilityOut Probabilityorach Movementsted Flow Rate (v), veh/hsted Saturation Flow Rate (s), veh/h/lnue Service Time ($g s$), se Queue Clearance Time ($g c$), sen Ratio (g/C)acity (c), veh/hme-to-Capacity Ratio (X)< of Queue (Q), ft/ln (95 th percentile)< of Queue (Q), veh/ln (95 th percentile)				-	EBT	WB	L	WBT	NB		NBT	SB		SBT
Assigned Phase	e					2			6			8	7		4
Case Number					-	7.0			8.0			6.3	1.0		4.0
Phase Duration	nge Period,(Y+R c), s					60.0			60.0			52.0	8.0		60.0
	nge Period,(Y+ <i>R</i> c), s Allow Headway(<i>MAH</i>), s				+	6.0			6.0			6.0	4.0		6.0
-	Allow Headway (<i>MAH</i>), s					0.0			0.0			5.9	6.0		5.9
Queue Clearan	ce Time	e (gs), s										48.0	6.0		32.0
		1 = 7				0.0			0.0			0.0	0.0		11.2
												1.00	1.00)	1.00
Max Out Proba	bility											1.00	1.00)	0.44
Movement Gro	oup Res	ults			EB	;		W	В		NB			SB	ĺ
				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I	Rate (v), veh/h			272	272	632		710	326	554		185	451	
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In		330	1406	1255		1453	917	1673		1594	1444	
Queue Service	Time (g	g s), S			0.1	12.8	0.0		53.9	24.0	36.7		4.0	30.0	
Cycle Queue C	learance	e Time (<i>g c</i>), s			54.0) 12.8	54.0		53.9	46.0	36.7		4.0	30.0	
Green Ratio (g	ı/C)				0.45	5 0.45	0.45		0.45	0.38	0.38		0.43	0.45	
Capacity (c), v	/eh/h				183	633	598		654	244	641		176	650	
	•	. ,			1.48	4 0.430	1.057		1.086	1.339	0.864		1.050	0.694	
Back of Queue	(Q), ft/	In (95 th percentile)		744.	3 187.9	887.3		1009. 2	815.3	614.6		324.4	415.9	
Back of Queue	(Q), ve	eh/In (95 th percent	ile)		28.2	2 7.1	35.5		40.4	31.4	23.6		12.1	15.5	
Queue Storage	Ratio (RQ) (95 th percen	tile)		0.00	0.00	0.00		0.00	3.47	0.00		1.62	0.00	
Uniform Delay	(d1), s/	/veh			49.3	3 16.2	32.4		33.0	51.0	34.1		43.2	26.4	
Incremental De	lay (<i>d</i> 2), s/veh			242.	9 2.0	52.9		60.8	177.6	12.6		81.8	3.2	
Initial Queue De	elay (<i>d</i>	з), s/veh			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/ve	eh			292.	1 18.2	85.3		93.8	228.5	46.8		125.1	29.6	
Level of Service	e (LOS)				F	В	F		F	F	D		F	С	
Approach Dela	y, s/veh	/LOS		155.	2	F	89.8	3	F	114.	1	F	57.3	3	E
Intersection De	lay, s/ve	eh / LOS				10	0.5						F		
Multimodal Re					EB			W			NB	_		SB	_
Pedestrian LOS				1.91	_	B	1.91		B	1.92		В	2.10		В
Bicycle LOS So	core / LC	05		1.38	5	A	1.60	J	В	1.94	ł	В	1.54	+	В

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LICC7 Circulized Intersection Desults Current

		HCS	7 Sig	nalize	d Int	ersec	tion R	Resu	lts Su	nmar	У				
-															
General Inform	nation								Intersec	tion Inf	ormatio	on	2	el stade	1.101
Agency		HRG							Duration	, h	0.250)	-		
Analyst		RL		Analys	is Date	e Jul 29	, 2020		Area Typ	e	Other	~	-		
Jurisdiction		SIOUX FALLS		Time F	Period	AM P	eak Hou	ır	PHF		0.92		*	÷	÷.
Urban Street		RICE STREET		Analys	is Yea	r 2050			Analysis	Period	1> 7:(00	1		
Intersection		I-229 SB		File Na	ame	2050	AMpeak	.xus							
Project Descrip	tion	I-229/10TH ST IMJ	R											4.144	992
Demand Inform	nation		_		EB	_	_	W	B		NB	_	1	SE	5
				L	Т	R		ТТ			T	R	L L	T	R
· · ·				170	345		<u> </u>	10		<u> </u>	<u> </u>		155	<u> </u>	95
Bolliaria (17); 1	011/11			110	010			10					100		00
Signal Informa	tion				1.00								1		1
Cycle, s	al InformationyHRGyRLctionSIOUX FALLSStreetRICE STREETactionI-229 SBt DescriptionI-229/10TH ST IMJand Informationach Movementach Movementgeneration, se Period, (Y+R c), sIlow Headway (MAH), se Clearance Time (g s), sCall Probabilityuut Probabilityuut Probabilityuut Probabilityach Movemented Flow Rate (v), veh/hed Saturation Flow Rate (s), veh/h/ledSaturation Flow Rate (s), veh/h/ledSaturation Flow Rate (s), veh/h/ledSaturation Flow Rate (s), veh/h/ledSaturation Flow Rate (s), sRatio (g/C)ity (c), veh/hed Clearance Time (g c), sRatio (g/C)ity (c), veh/hed Flow Rate (v), veh/hed Flow Rate (v), veh/hed Flow R				i≦ _	- 						1	4		23
Offset, s	40	Reference Point	Begin	Green	6.2	81.5	14.3	0.0	0.0	0.0	_	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		5.0	4.0	0.0		0.0		7	\leftarrow		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0		0.0		5	6	7	8
Timer Results				EBL		EBT	WB		WBT	NBI		NBT	SBL		SBT
Assigned Phase	e			5	-	2			6		-			-	4
Case Number				1.0		4.0		-	8.3	<u> </u>					9.0
				11.2		99.7			88.5		-			-	20.3
		a) s		5.0	-	7.0		-	7.0	<u> </u>					6.0
	· ·	•		4.1		0.0		-	0.0		_			-	4.2
		,		5.8		0.0		-	0.0					-+-	4.2
		, <u> </u>		0.4		0.0			0.0					-	0.2
		(ge), s		1.00		0.0		-	0.0		-			-+-	1.00
	-			0.03				-						-	1.00
Max Out 1 100a	nd (v), veh/h I Information s 120.0 Reference Phase , s 40 Reference Point ordinated No Simult. Gap E/W Mode Fixed Simult. Gap N/S Results ned Phase Number a Duration, s ge Period, ($Y+R c$), s Illow Headway (MAH), s a Clearance Time ($g c$), s a Extension Time ($g c$), s a Extension Time ($g c$), s a Extension Time ($g c$), s a Call Probability Dut Probability Dut Probability Dut Probability ment Group Results ach Movement ted Flow Rate (v), veh/h ted Saturation Flow Rate (s), veh/h/I a Service Time ($g c$), s Queue Clearance Time ($g c$), s a Ratio (g/C) city (c), veh/h te-to-Capacity Ratio (X) of Queue (Q), ft/ln (95 th percentile) of Queue (RQ), veh/ln (95 th percentile)				·										1.00
Movement Gro	, s120.0Reference Phaset, s40Reference PointordinatedNoSimult. Gap E/WordinatedFixedSimult. Gap N/SModeFixedSimult. Gap N/Sr Resultsned PhaseNumbere Duration, sge Period, ($Y+Rc$), sAllow Headway (MAH), se Clearance Time (gs), sn Extension Time (ge), se Call ProbabilityDut Probabilitycach Movementned Movementted Flow Rate (v), veh/hted Saturation Flow Rate (s), sQueue Clearance Time (gs), sQueue Clearance Time (gc), s				EB			WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2			6	16			1	7		14
Adjusted Flow I	Rate (v), veh/h		185	375			830	774				168		103
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In	1647	1584			181	9 1602				1634		1380
Queue Service	Time (g	g s), S		3.8	3.7			54.0) 38.0				12.1		8.5
Cycle Queue C	learanc	e Time (<i>g c</i>), s		3.8	3.7			54.0) 38.0				12.1		8.5
Green Ratio (g	/C)			0.75	0.77			0.68	3 0.68				0.12		0.12
Capacity (c), v	/eh/h			216	2446			123	5 1088				195		165
Volume-to-Cap	acity Ra	atio(X)		0.857	0.153			0.67	2 0.712				0.863		0.626
Back of Queue	(Q), ft	/In (95 th percentile)	206.5	46.7			376.	9 364.1				274.8		150
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	7.9	1.8			14.3	3 14.6				10.5		5.7
Queue Storage	Ratio (RQ) (95 th percen	tile)	2.06	0.00			0.00	0.00				0.86		0.00
Uniform Delay ((d 1), s	/veh		28.1	3.5			12.3	3 13.5				51.9		50.3
Incremental De	lay (<i>d</i> 2), s/veh		12.7	0.1			0.3	0.4				26.3		5.5
Initial Queue De	elay (<i>d</i>	з), s/veh		0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (d), s/ve	eh		40.8	3.7			12.5	5 13.9				78.2		55.8
Level of Service	e (LOS)			D	А			В	В				E		E
Approach Delay	y, s/veh	/ LOS		15.9		В	13.2	2	В	0.0			69.7		E
Intersection De	lay, s/ve	h / LOS				20).1						С		
Multimodal Re	sulte				EB			WE	3		NB			SB	
Pedestrian LOS		/108		0.65	-	A	1.87		, B	2.16	1	В	2.33		B
Bicycle LOS Sc				0.05		A	1.95		B	2.10		5	2.00		F
				0.00			1.30								

		HCS	67 Sig	nalize	d Int	ersec	tion F	Resu	lts	Sum	nmar	у				
Concerct Inform									lute		an Inf				4.3.4	
General Inform	nation											ormatio		- 11		1.11.2
Agency		HRG								ation,		0.250				
Analyst		RL		Analys			, 2020		-	а Туре -	;	Other				
Jurisdiction		SIOUX FALLS		Time F			eak Hou		PHF			0.92			1	
Urban Street		26TH STREET		Analys				1	Ana	Iysis F	Period	1> 7:(00	- The second		
Intersection		I-229 NB		File Na	ame	2050	PMpeak	(.xus							+	
Project Descrip	tion	I-229/10TH ST IMJ	R		-			-	-	-	-	-			1.1.40	91 94 JU
Demand Inform	nation				EB			W	3	_		NB			SE	3
Approach Move	ement			L	Т	R	L	Т	Т	R	L	Т	R	L	Т	F
Demand (v), v	/eh/h				1090) 105	100	117	′5		85	0	1000			
Signal Informa	ation			<u> </u>	T T		-	_	1	1	-				-	
Cycle, s	60.4	Reference Phase	2		**	≓L å							_	.		
Offset, s	41	Reference Point	 Begin		1	a 🔁								2		3
Uncoordinated		Simult. Gap E/W	On	Green		20.4	14.0	0.0		0.0	0.0					
Force Mode	Fixed	Simult. Gap E/W	On	Yellow Red	3.6	3.6 1.9	3.6	0.0		0.0 0.0	0.0		5			_
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.9	1.3	0.0		0.0	0.0		5	6		
Timer Results				EBL	-	EBT	WB	L	WE	3T	NBI	-	NBT	SBL	-	SBT
Assigned Phase	е					2	1		6				8			
Case Number						8.3	1.0		4.(0			11.0			
Phase Duration	1, S					25.9	15.6	3	41.	.5			18.9			
Change Period	, (Y+ R	c), S				5.5	4.6		5.5	5			4.9			
Max Allow Head	· ·	•				3.1	2.2		3.1	1			2.4			
Queue Clearan	2 1	· ·				15.3	2.9		17.	.1			16.0		-	
Green Extensio		, <u> </u>				2.6	0.1		5.6	6			0.0			
Phase Call Pro						1.00	1.00)	1.0				1.00	SBL SE I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I		
Max Out Proba						0.78	0.00)	0.0)9			1.00			
Mayamant Cre				_	EB			WB	-	-		NB			0	
Movement Gro	-	Suits			Т	R	L	T	-	R			R		_	, F
Assigned Move				<u> </u>	2	12	1	6	+		3	8	18			
Adjusted Flow F) veb/b			467	226	109	1277	,	-	5	92	870			+
-		ow Rate (<i>s</i>), veh/h/	In		1686	1607	1652	1670	_	-+		92 1714	1527			+-
Queue Service					13.3	6.5	0.9	15.1	_	-		2.6	14.0			+
Cycle Queue C		- ,			_	6.5		15.1		-			14.0			+
Green Ratio (g		e fille (<i>g</i> c), s			13.3 0.34	0.34	0.9 0.55	0.60	_	-		2.6 0.23	0.41			+
	,					-		L	_	-						+
Capacity (c), v		atio (X)			1139	543	1018	1991	_	-		397	616			
Volume-to-Capa Rock of Quoue		· · · ·)		0.410	_	0.107	0.64	_	\rightarrow		0.233	1.411			
	<u>, , , , , , , , , , , , , , , , , , , </u>	/In (95 th percentile			75.4	72.3	11.7	164.2	<u> </u>	-		44.4	1511.6			
		eh/In (95 th percent			3.0	2.9	0.5 0.03	6.5 0.00		\rightarrow		1.8 0.00	60.5 0.00			
		RQ) (95 th percen	uie)		0.00	_				-						+-
Uniform Delay (, ,				15.4	15.4	8.3	8.0	+	-		18.8	17.5			+
Incremental De	2 1	,			0.0	0.0	0.0	0.3	-	_		0.1	194.7			
Initial Queue De		·			0.0	0.0	0.0	0.0	-	\rightarrow		0.0	0.0			_
Control Delay (15.4	15.4	8.3	8.3	-	_		18.9	212.2			
Level of Service	· /				В	B	A	A		_		B	F			
Approach Delay				15.4		B	8.3		A	·	193.	6	F	0.0		
Intersection De	lay, s/ve	en / LOS				68	8.5							E		
Multimedal D	aulte				FD										05	
Multimodal Re		// 02		0.00	EB		4.0	WB		-	0.00	NB	_	0.00	SE	
Pedestrian LOS				2.38		B	1.34				2.60		C	2.30	,	В
Bicycle LOS Sc	ore / LC	79		1.20		Α	1.63	5	В		2.07		В			

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UCS7 Signalized Interpretion Paculto Summary

		HCS	S7 Sig	nalize	d Int	ersec	tion F	Resu	lts :	Sun	nmary	/				
-																
General Inform	nation								Inter	rsect	ion Info	ormatic	on		d John	i de la
Agency		HRG							Dura	ation,	h	0.250		-		
Analyst		RL		Analys	sis Date	Jul 29	, 2020		Area	а Тур	е	Other		-5-		
Jurisdiction		SIOUX FALLS		Time F	Period	PM P	eak Hou	ır	PHF	-		0.92			- +	
Urban Street		26TH STREET		Analys	sis Year	2050			Anal	lysis l	Period	1> 7:(00			
Intersection		I-229 SB		File Na	ame	2050	PMpeak	.xus							33	-
Project Descrip	tion	I-229/10TH ST IMJ	IR											1	15383555	
Demand Inform	nation			_	EB			W	P			NB			SB	
Approach Move					T	R	L	T		R	L		R		<u>ЗБ</u>	R
					615	95	640	62	_	N	150	+ -	580		+	
Demand (v), v	en/n	_	-		015	95	640	02	:0	-	150		000			
Signal Informa	tion				6			Т					_		_	
Cycle, s	120.0	Reference Phase	2		Z		20	2					_		1	
Offset, s	115	Reference Point	Begin	Green	55 5	37.5	11.1	0.0	<u>,</u>	0.0	0.0		1	2	+ 1 *	4
Uncoordinated	115 Reference Point No Simult. Gap E/W Fixed Simult. Gap N/S sse Simult. Gap N/S	On	Yellow		37.5	3.6	0.0		0.0	0.0			7		K J	
Force Mode			On	Red	1.9	1.9	1.3	0.0		0.0	0.0		5	6	7	Ý
-				EDI	_					· -		_	NET	0.01	_	0.0.7
Timer Results				EBL		EBT	WB		WB	_	NBL	-	NBT	SBL		SBT
Assigned Phase	e				_	2	1	\rightarrow	6	_		_	8	<u> </u>	_	
Case Number						7.3	1.0		4.0				9.0		_	
Phase Duration						43.0	61.0	_	104				16.0			
		,				5.5	5.5		5.5	_			4.9			
						0.0	2.2		0.0	0			2.4			
Queue Clearan		(=)					8.7			_		_	13.1			
Green Extensio		(ge), s				0.0	0.8		0.0	0			0.0	L		
Phase Call Prol							1.00			_			1.00			
Max Out Proba	bility		_			_	0.00)	-	_			1.00			
Movement Gro	oup Res	sults			EB			WE	3			NB			SB	
Approach Move	-			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move					2	12	1	6			3		18			1
Adjusted Flow I), veh/h			555	86	696	674		_	163		630			<u> </u>
-		ow Rate (s), veh/h/	/In		1646	1422	1639	166	_		1626					+
Queue Service		. ,			16.8	4.6	6.7	5.5	_		5.7					1
Cycle Queue C		- ,			16.8	4.6	6.7	5.5			5.7					+
Green Ratio (g		- · · · · · · (3 -), -			0.31	0.41	0.79	0.82	_	_	0.09	_				+
Capacity (c), v	,				1029	576	1931	272	_		301				-	1
Volume-to-Cap		atio (X)			0.540	0.149	0.360	0.24	_		0.542					1
· ·		/In (95 th percentile	e)		279.5	74.1	80.8	62.3	_		110.3					1
	. ,	eh/In (95 th percent	,		11.0	2.9	3.2	2.5	_		4.3	_				1
		RQ) (95 th percen			0.00	0.74	0.40	0.00	_		0.74					1
Uniform Delay (,		34.1	22.6	5.8	2.4	_		52.0					1
Incremental De	· ,				1.8	0.5	0.0	0.2			1.1					1
Initial Queue De		·			0.0	0.0	0.0	0.2	_		0.0					+
Control Delay (·			35.9	23.1	5.8	2.6	_		53.1		0.0			+
Level of Service					D	23.1 C	3.8 A	2.0 A	-		D		0.0 A			+
	. ,			34.2		C	4.2		A		10.9		B	0.0		
	oproach Delay, s/veh / LOS tersection Delay, s/veh / LOS				-		4.2 3.0			_	10.9			0.0 B		
	ersection Delay, s/ven / LOS													_		
Multimodal Re	sults				EB			WE	3			NB			SB	
Pedestrian LOS		/LOS		2.29		В	0.63		A		2.48	-	В	2.32		В
Bicycle LOS Sc				1.12		A	1.62		В				F			

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		HCS	7 Sig	nalize	d In	tersec	tion R	Resi	ults Su	mmar	у					
									F							
General Inforn	nation							Intersed	ction Inf		ALC: N	a lu				
Agency HRG									Duratior	ո, h	0.250		-			
Analyst RL					Analysis Date Nov 30				Area Ty	ре	Other				24. 2-	
Jurisdiction SIOUX FALLS			Time Period PM Pe			eak Hou	eak Hour PHF			0.92			1	÷.		
Urban Street RICE STREET			Analys	sis Yea	ar 2050			Analysis	Period	1> 7:0	00			¥		
Intersection	ection I-229 NB			File Na	ame	2050	PMpeak	.xus						11		
Project Descrip	tion	I-229/10TH ST IMJ	R										1	R Dent	21	
	notion.)		10					0.0			
Demand Inform					EB	R		_	VB T R	<u> </u>	NB T	R	L	SB T	R	
• •	Approach Movement Demand (v), veh/h			105	690	_	105		75 150	250	150	100			205	
Demand (V), v	en/n	_	-	105	090	0 780	105	0	75 150	250	150	100	025	625 55 20		
Signal Informa	tion						20.	Г			. 100				1	
Cycle, s	90.0	Reference Phase	2		4	2	2.4	34					4		4	
Offset, s	0	Reference Point	Begin			14.0	11.0	4	0 0 0			1	2	3	4	
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow) 14.0	14.0 4.0	0.					\rightarrow		x † x	
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	0.		0.0		5	6	7	Y	
Timer Results				EBL	-	EBT	WB	L	WBT	NB	L	NBT	SBI		SBT	
Assigned Phase	e					2			6			8	7		4	
Case Number						7.0			8.0			6.3	1.0		4.0	
Phase Duration						52.0			52.0			20.0	18.0		38.0	
Change Period, (Y+R c), s						6.0			6.0			6.0			6.0	
Max Allow Hea	dway(A	<i>MAH</i>), s				0.0			0.0			5.8	6.0		5.8	
Queue Clearance Time (g_s), s												16.0	16.0)	16.5	
Green Extension Time (g_e), s						0.0			0.0			0.0	0.0		5.4	
Phase Call Probability										1.00		1.00		1.00		
Max Out Proba	bility					_						1.00	1.00)	0.31	
Movement Gro	oup Res	sults			EB			W	B		NB			SB	Í	
Approach Move	-			L	T	R	L	Т	1	L	Т	R		T	R	
Assigned Move				5	2	12	1	6		3	8	18	7	4	14	
Adjusted Flow I), veh/h			864	848	334		677	272	272		679	283		
		ow Rate (s), veh/h/l	In		392	_	807		1428	1070	1556		1594	1415		
Queue Service		. ,			6.5	46.0	0.0		39.5	14.0	14.0		14.0	14.5		
Cycle Queue C		- ,			46.0		28.8		39.5	14.0	14.0		14.0	14.5		
Green Ratio (g					0.51	I 0.51	0.51		0.51	0.16	0.16		0.33	0.36		
Capacity (c), v	/eh/h				246	762	467		730	247	242		328	503		
Volume-to-Cap	acity Ra	ntio(X)			3.51	5 1.112	0.715		0.927	1.102	1.123		2.071	0.562	1	
Back of Queue	(Q), ft/	/In (95 th percentile))		3669 6). 1104. 6	251.9		554.1	461.5	470.5		2094.1	218.5		
Back of Queue	(Q), ve	eh/In (95 th percent	ile)		139.	0 41.8	10.1		22.2	17.8	18.1		78.1	8.2		
Queue Storage	Ratio (RQ) (95 th percen	tile)		0.00	0.00	0.00		0.00	1.96	0.00		10.47	0.00		
Uniform Delay	(d 1), s	/veh			25.6	6 26.9	16.6		20.6	40.3	38.0		27.6	23.4		
Incremental De	lay (<i>d</i> 2	lay (<i>d</i> ₂), s/veh			1137.	.6 61.4	9.0		19.6	87.5	94.8		492.5	1.4		
Initial Queue D	tial Queue Delay (d ȝ), s/veh				0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0		
Control Delay (d), s/ve	eh			1163.	.1 88.4	25.7		40.3	127.7	132.8		520.2	24.8		
Level of Service	, ,				F	F	С	С		F	F			С		
Approach Dela				630.	9	F	35.4	1	D	130.	3	F	374.	6	F	
Intersection De	lay, s/ve	eh / LOS				36	5.9						F			
Multimodal Re		11.00			EB			W			NB	_		SB		
Pedestrian LOS				1.89		B	1.89		B	1.94		B	2.11		B	
Bicycle LOS So	ore / LC	79		3.31		С	1.32	<u> </u>	A	1.38	5	A	2.07		В	

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		HCS	7 Sig	nalize	d Int	ersec	tion F	lesu	lts Sur	nmary	У					
_																
General Inform	nation								Intersect	ion Infe	_ • • • ×	14 244 5 8 5				
Agency		HRG							Duration,	h	0.250			- 1	1	
Analyst						e Nov 3			Area Typ	е	Other		-14		1.2	
Jurisdiction SIOUX FALLS					Time Period PM Pea				PHF		0.92				÷.	
Urban Street RICE STREET					is Yea	r 2050			Analysis	Period	1> 7:(00			a de la companya de la	
Intersection	Intersection I-229 SB					2050	PMpeak	.xus								
Project Descript	tion	I-229/10TH ST IMJ	R										1	4144	19.00	
Demand Inform	nation				EB			W	2		NB			90		
Approach Movement					T	R	L	Т	1	L		R	L	L T		
Demand (v), veh/h			L 200	1130			74			+		445		R 95		
Demand (V), V				200	1130	·		14	5 505				445		95	
Signal Informa	tion				1.20		LU.				- 100				1	
Cycle, s	90.0	Reference Phase	2		i ⇒							-	4		5	
Offset, s	15	Reference Point	Begin	Green	07	35.3	28.0	0.0	0.0	0.0	_	1	2	3	4	
Uncoordinated	No	Simult. Gap E/W	On	Yellow		5.0	4.0	0.0		0.0		7	4			
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0		0.0		5	6	7	8	
T D						FRE			MOT			NET			SBT	
Timer Results				EBL		EBT	WB		WBT	NBL	-	NBT	SBL	SBL		
Assigned Phase	e			5	_	2			6							
Case Number	-					4.0			8.3				·		9.0	
Phase Duration		\ -		13.7 5.0	\rightarrow	56.0		-	42.3					-	34.0 6.0	
Change Period, (Y+R c), s					+	7.0			7.0				<u> </u>	4		
Max Allow Headway (<i>MAH</i>), s					\rightarrow	0.0		+	0.0				<u> </u>			
Queue Clearance Time (g_s), s						0.0		-	0.0					-	28.1	
Green Extension Time ($g e$), s						0.0		-	0.0		_			-	0.0	
Phase Call Prob				1.00				-						-	1.00	
Max Out Proba	DIIILY			1.00		-			_			-			1.00	
Movement Gro	oup Res	sults			EB	_		WB			NB	_		SB		
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R	
Assigned Move	ment			5	2			6	16				7		14	
Adjusted Flow F	Rate (<i>v</i>	′), veh/h		217	1228			527	466				484		103	
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In	1647	1654			1692	2 1485				1634		1375	
Queue Service	Time (g	g s), s		6.7	24.2			32.4	22.9				26.1		5.0	
Cycle Queue C	learanc	e Time (<i>g c</i>), s		6.7	24.2			32.4	22.9				26.1		5.0	
Green Ratio (g	/C)			0.51	0.54			0.39	0.39				0.31		0.31	
Capacity(c), v	/eh/h			257	1801			664	583				508		428	
Volume-to-Capa	acity Ra	atio(X)		0.846	0.682			0.79	4 0.800				0.951		0.241	
Back of Queue	(Q), ft	/In (95 th percentile)	178	348.5			339.	1 236.1				516.4		75.9	
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	6.8	13.4			12.8	9.4				19.7		2.9	
Queue Storage	Ratio (RQ) (95 th percen	tile)	1.78	0.00			0.00	0.00				1.61		0.00	
Uniform Delay ((d1), s	/veh		20.0	14.9			22.8	17.8				30.3		23.1	
Incremental De	lay (<i>d</i> 2	2), s/veh		21.5	2.1			4.2	4.9				28.1		0.3	
Initial Queue De	elay(d	з), s/veh		0.0	0.0			0.0	0.0				0.0		0.0	
Control Delay (d), s/ve	eh		41.5	17.0			27.0	22.7				58.4		23.4	
Level of Service (LOS)				D	В			С	С				E		C	
Approach Delay, s/veh / LOS				20.7		С	25.0)	С	0.0			52.2		D	
Intersection Del	lay, s/ve	eh / LOS				28	3.2						С			
Maria:								14/5						SB		
Multimodal Re		11.00		0.00	EB	^	4.01	WB		0.45	NB		0.00			
Pedestrian LOS				0.69		A	1.91		B	2.15	<u>}</u>	В	2.32		В	
Bicycle LOS Score / LOS						В	1.50	,	В						F	

		HCS	57 Sig	nalize	d Int	ersec	tion F	Resu	lts S	Sum	mar	y					
	<i>c</i>																
General Inform	nation										on Infe	242043340					
Agency		HRG		Analysis Date Jul 29, 2020					Durat			0.250		-			
Analyst		RL		, 2020		Area	Туре		Other				=				
Jurisdiction SIOUX FALLS						eak Hou		PHF			0.92		~		12		
Urban Street 26TH STREET Intersection I-229 NB				Analys				1	Analy	/sis F	Period	1> 7:0	00				
Intersection	File Na	ame	2050	AMpeak	.xus							+1					
Project Descrip	tion	I-229/10TH ST IMJ	R	-	-	-	-	-			-	-	-		at tab	6.1K.6	
Demand Inform		EB	_		W	3	_		NB	_	SB						
Approach Movement					Т	R	L	Т		R	L	Т	R	L	Т	R	
Demand (v), v	eh/h				510	115	315	158	80		190	0	515				
O'mu al lufamu	4!			I	1			-				_			-		
Signal Informa						- · · •							_				
Cycle, s	70.0	Reference Phase	6		2	; ; ; *	51	7						2	3	4	
Offset, s	48	Reference Point	Begin	Green		21.5	18.1	0.0		0.0	0.0		-	_			
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.6	0.0		0.0	0.0					$ \Psi$	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.9	1.3	0.0	(0.0	0.0		5	6	7		
Timer Results				EBL		EBT	WB	L	WB	гΙ	NBL	_	NBT	SBL	_	SBT	
Assigned Phase	e					2	1		6				8				
Case Number	-					8.3	1.0		4.0	-			11.0		-		
Phase Duration	. S					27.0	20.0	_	47.0				23.0				
Change Period		c). S				5.5	4.6		5.5			4.9			-		
Max Allow Head	· ·	•				0.0	2.2		0.0			2.4					
Queue Clearance Time (g_s), s						0.0	5.6		0.0	-			17.8		-		
Green Extension Time ($g e$), s						0.0	0.3	_	0.0	-1			0.0				
Phase Call Probability							1.00						1.00		-		
Max Out Proba							0.00					1.00					
Movement Gro	-	sults		EB				WB		\rightarrow			NB T R		SB	Ĩ.	
Approach Move				L	Т	R	L	Т		२	L	-	R	L	Т	R	
Assigned Move		·) · · · - l- /l-			2	12	1	6		-+	3	8	18				
Adjusted Flow F		· ·	lue		430	201	342	1717	_	-+		207	448				
		ow Rate (<i>s</i>), veh/h/	in		1688	1527	1652	1719 28.4		-+		1714	1484				
Queue Service		- ,			7.2	6.7	3.6		_	-+		7.1	15.8				
Cycle Queue C		e fille (<i>g</i> c), s			7.2	6.7	3.6 0.56	28.4 0.59	_	\rightarrow		7.1	15.8				
Green Ratio (<i>g</i> Capacity (<i>c</i>), v	,				0.31	0.31	1259	2039	_	\rightarrow		0.26 443	0.48 706			-	
Volume-to-Capa		atio (X)			1037	469 0.428	0.272	0.842	-	-		443 0.466	0.635				
· ·	· ·	/In (95 th percentile)		0.415		49.7	298.6	-	\rightarrow		123.2	214				
	. ,	eh/In (95 th percentile			5.2	4.2	2.0	11.8	_	+		4.9	8.6				
		RQ) (95 th percent			0.00	0.00	0.12	0.00	_	\rightarrow		0.00	0.00				
Uniform Delay (,, ,			20.9	16.8	8.5	11.6	_			21.9	13.6				
Incremental De	. ,				0.8	1.8	0.0	1.5		\rightarrow		0.3	1.4				
Initial Queue De	2 1	,			0.0	0.0	0.0	0.0	-			0.0	0.0				
Control Delay (·			21.7	18.6	8.5	13.1	-			22.2	15.1			-	
Level of Service					C	B	A	B	1			C	B				
Approach Delay	· /			20.7		C	12.3		B		17.3		В	0.0			
Intersection De				20.1			1.9							B			
	,, <u>∍</u> , .e									اي							
Multimodal Re	sults				EB			WB				NB		SB			
Pedestrian LOS	Score	/LOS		2.25		В	1.35	5	Α		2.60)	С	2.31	2.31 B		
Bicycle LOS Sc	ore / LC	DS		0.86		А	2.19)	В		1.57	,	В				

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		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts S	Sum	nmary	/					
• • •																	
General Inform	nation	1									on Info	7424124					
Agency		HRG							Durat			0.250		-			
Analyst		RL		Analysis Date Jul 29, 2020					Area	Туре	;	Other		-			
Jurisdiction SIOUX FALLS			Time F		_	eak Hou		PHF			0.92				1		
Urban Street 26TH STREET			Analys File Na		2050		1	Analy	sis F	Period	1> 7:0	00	14				
Intersection						2050	AMpeak	.xus							11	•	
Project Descript	tion	I-229/10TH ST IMJ	R					_	_	_				1	AL 1994	191	
Demand Inform	nation		_		EB	_		W	3	-		NB	_	_	SB		
Approach Movement				L	Т	R	L	Т		R	L	T	R				
Demand (v), veh/h			<u> </u>	415	85	900	87	_		155		210		<u>+</u>			
Demand (V), V	CH/H				410	00	300	01	0		100		210				
Signal Informa	tion				4								_		_		
Cycle, s	70.0	Reference Phase	6		Ù		20	7						+ -	n.		
Offset, s	26	Reference Point	Begin	Green	24.5	20.5	9.1	0.0		0.0	0.0		1	2	* 1 *	4	
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.6	0.0).0	0.0			7		5.2	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.9	1.9	1.3	0.0		0.0	0.0		5	6	7	<u> </u>	
Timer Description				EDI		EDT				-	NDI		NDT			ODT	
Timer Results				EBL		EBT	WB		WBT		NBL		NBT	SBL		SBT	
Assigned Phase	3				_	2	1	\rightarrow	6	-		_	8		\rightarrow		
Case Number						7.3	1.0		4.0	-+		_	9.0	<u> </u>	\rightarrow		
Phase Duration		```				26.0	30.0		56.0				14.0		\rightarrow		
Change Period,		,			_	5.5	5.5		5.5		4.9		<u> </u>	\rightarrow			
Max Allow Head		·				0.0	2.2		0.0			_	2.3	<u> </u>	\rightarrow		
Queue Clearan		(_)		<u> </u>		0.0	12.0)	0.0				11.1	<u> </u>	\rightarrow		
Green Extension Time (g e), s						0.0	1.1		0.0	-			0.0		\rightarrow		
Phase Call Prob							1.00					1.00			\rightarrow		
Max Out Probal	Jiiity					-	0.00	,	-		-		1.00				
Movement Gro	up Res	sults			EB			WB	_	Т	_	NB			SB		
Approach Move	ment			L	Т	R	L	Т	R	2	L	Т	R	L	Т	R	
Assigned Move	ment				2	12	1	6			3		18				
Adjusted Flow F	Rate (v), veh/h			438	90	978	945			168	_	228				
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In		1608	1415	1639	1645	5		1626					1	
Queue Service	Time (g	g s), s			7.4	2.4	10.0	11.4			3.3	_					
Cycle Queue C	learanc	e Time (<i>g c</i>), s			7.4	2.4	10.0	11.4			3.3					1	
Green Ratio (g	/C)				0.29	0.42	0.67	0.72			0.13						
Capacity (c), v	eh/h				942	598	1710	2374	1		423						
Volume-to-Capa	acity Ra	atio(X)			0.465	0.150	0.572	0.39	3		0.399						
Back of Queue	(Q), ft	/In (95 th percentile)		122.6	35	123	145.8	3		58						
Back of Queue	(Q), ve	eh/In (95 th percent	ile)		4.8	1.4	4.8	5.7			2.3						
Queue Storage	Ratio (RQ) (95 th percen	tile)		0.00	0.35	0.61	0.00			0.39						
Uniform Delay (d 1), s	/veh			18.4	10.8	7.7	6.8			27.9						
Incremental De	<u> </u>	,			1.6	0.5	0.1	0.2			0.2						
Initial Queue De	elay(d	з), s/veh			0.0	0.0	0.0	0.0			0.0						
Control Delay (19.9	11.3	7.9	7.1			28.2		0.0				
Level of Service					В	В	Α	A			С		Α				
Approach Delay				18.5		В	7.5		Α		12.0		В	0.0			
Intersection Del	ay, s/ve	eh / LOS				1().1							В			
Multimodel De	oulte				FP							ND			00		
Multimodal Re		/1.08		EB			0.01	WB		-	0.40	NB	D	0.04	SB		
Pedestrian LOS				2.27		B	0.64		A	\rightarrow	2.46		В	2.31	_	В	
Bicycle LOS Sc	ore / LC	55		0.94		А	2.07		В				F				

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		HCS	7 Sig	nalize	ed In	iterse	ect	tion R	lesi	ults Su	Im	mary	y				
										T.							
General Inforn							Interse			- 11	41	21.2					
Agency HRG										Duratio	· ·		0.250		-	24	1 - Carrow
Analyst RL				Analysis Date Jul 29						/pe	·			-		الم ا	
Jurisdiction SIOUX FALLS		Time Period			AM Peak Hour			PHF			0.92		100		*		
Urban Street RICE STREET			Analys						Analysi	s Pe	eriod	1> 7:0	00			1 1 1	
Intersection					ame	205	50 A	AMpeak	.xus							11	
Project Descrip	tion	I-229/10TH ST IMJ	R	_		_	_	_		_			_	_	1	14 1 49	1949
Demand Inform	nation		_	EB		3		W		VB		_	NB	NB		SB	
Approach Move	ement			L	Т	F	र	L		T R		L	Т	R	L	Т	R
Demand (v), v	/eh/h			40	21	0 25	50	60	9	55 22	0	300	355	155	170	40	375
	tion			-	-	- 11	1	101	-	<u> </u>		-	1.00				
Signal Informa	_	Defense Dhara	6			, 실신	5	212									4
Cycle, s	120.0	Reference Phase	6 Decim	- 10.34	2			21	7					1	4 2	3	4
Offset, s	0	Reference Point	Begin	Green				46.0	0.			0.0			<u>~</u>		
Uncoordinated	No	Simult. Gap E/W	On	Yellow		4.0		4.0	0.			0.0	_		Y	`	Ψ
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0)	2.0	0.	.0 0.0)	0.0		5	6	1	
Timer Results				EBI	_	EBT		WBI	_	WBT	Т	NBL	_	NBT	SB	BL SBT	
Assigned Phase	е					2				6	T			8	7		4
Case Number						7.0				8.0	$^{+}$			6.3	1.0		4.0
Phase Duration	ı, s					60.0				60.0				52.0	8.0		60.0
Change Period, (Y+R c), s					6.0				6.0	$^{+}$			6.0	4.0		6.0	
Max Allow Headway (<i>MAH</i>), s						0.0				0.0				5.9	6.0		5.9
Queue Clearance Time (g s), s											Т			48.0	6.0		32.0
Green Extension Time ($g \in $), s					0.0				0.0	Т			0.0	0.0		11.2	
Phase Call Pro											Т		1.00		1.00		1.00
Max Out Proba	bility										I			1.00	1.00)	0.44
Movement Gro	oup Res	ults			EB	3	٦		W	В	Т	-	NB			SB	
Approach Move				LT		R		LT		T R		L	Т	T R		LT	
Assigned Move	ment			5	2	12	2	1	6	16	T	3	8	18	7	4	14
Adjusted Flow I	Rate (v), veh/h			272	2 272	2	632		710		326	554		185	451	
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In		330) 140	6	1255	_	1453	3	917	1673		1594	1444	
Queue Service	Time (g	g s), S			0.1	12.	8	0.0		53.9		24.0	36.7		4.0	30.0	
Cycle Queue C	learance	e Time (<i>g c</i>), s			54.0) 12.	8	54.0		53.9	4	46.0	36.7		4.0	30.0	
Green Ratio (g	ı/C)				0.45	5 0.4	5	0.45		0.45		0.38	0.38		0.43	0.45	
Capacity (c), v	/eh/h				183	3 633	3	598		654		244	641		176	650	
Volume-to-Cap	•	. ,			1.48	4 0.43	30	1.057		1.08	3 1	.339	0.864		1.050	0.694	r
Back of Queue	(Q), ft/	In (95 th percentile)		744.	3 187	.9	887.3		1009	. 8	315.3	614.6		324.4	415.9	
Back of Queue	(Q), ve	eh/In (95 th percent	ile)		28.2	2 7.1	1	35.5		40.4		31.4	23.6		12.1	15.5	
Queue Storage	Ratio (RQ) (95 th percen	tile)		0.00	0.0	0	0.00		0.00		3.47	0.00		1.62	0.00	
Uniform Delay	(d1), s/	/veh			49.3	3 16.	2	32.4		33.0		51.0	34.1		43.2	26.4	
Incremental De	ncremental Delay (<i>d</i> ₂), s/veh				242.	.9 2.0)	52.9		60.8	1	77.6	12.6		81.8	3.2	
Initial Queue De	Initial Queue Delay (<i>d</i> 3), s/veh				0.0	0.0)	0.0		0.0		0.0	0.0		0.0	0.0	
Control Delay (rol Delay (<i>d</i>), s/veh				292.	1 18.	2	85.3		93.8	2	228.5	46.8		125.1	29.6	
Level of Service (LOS)				F	В		F		F		F	D		F	С		
Approach Delay, s/veh / LOS			155.	2	F		89.8 F				114.1	1	F	57.3	3	E	
Intersection De	lay, s/ve	eh / LOS					10	0.5			Ι				F		
Multimodal Re					EB				W				NB	_		SB	
Pedestrian LOS				1.91		B		1.91		B	╞	1.92		В	2.10		В
Bicycle LOS So	core / LC	05		1.38	5	Α		1.60		В		1.94		В	1.54	ł	В

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LICC7 Circulized Intersection Desults Current

		HCS	7 Sig	nalize	d Int	ersec	tion R	lesu	lts Su	nmar	У				
-															
General Inform	nation								Intersec	tion Inf	ormatio	on	2	el stade	1.101
Agency		HRG							Duration	, h	0.250)	-		
Analyst		RL		Analys	is Date	e Jul 29	, 2020		Area Typ	e	Other	~	-		
Jurisdiction		SIOUX FALLS		Time F	Period	AM P	eak Hou	ır	PHF		0.92		*	÷	÷.
Urban Street		RICE STREET		Analys	is Yea	r 2050			Analysis	Period	1> 7:(00	1		
Intersection		I-229 SB		File Na	ame	2050	AMpeak	.xus							
Project Descrip	tion	I-229/10TH ST IMJ	R											4.144	992
Demand Inform	nation		_		EB	_	_	W	B		NB	_	1	SE	5
Approach Move				L	Т	R		ТТ			T	R	L L	T	R
Demand (v), v				170	345		<u> </u>	10		<u> </u>	<u> </u>		155	<u> </u>	95
Bolliaria (17); 1	011/11			110	010			10					100		00
Signal Informa	tion				- 6.1								1		1
Cycle, s	120.0	Reference Phase	6		i≦ _	- 						1	4		23
Offset, s	40	Reference Point	Begin	Green	6.2	81.5	14.3	0.0	0.0	0.0	_	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		5.0	4.0	0.0		0.0		7	\leftarrow		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0		0.0		5	6	7	8
Timer Results				EBL		EBT	WB		WBT	NBI		NBT	SBL		SBT
Assigned Phase	e			5	-	2			6		-			-	4
Case Number				1.0		4.0		-	8.3	<u> </u>					9.0
Phase Duration				11.2		99.7		-	88.5		-			-	20.3
Change Period		a) s		5.0	-	7.0		-	7.0	<u> </u>					6.0
Max Allow Head	· ·	•		4.1		0.0		-	0.0		_			-	4.2
Queue Clearan		,		5.8		0.0		-	0.0					-+-	4.2
Green Extensio		, <u> </u>		0.4		0.0			0.0					-	0.2
Phase Call Pro		(ge), s		1.00		0.0		-	0.0		-			-+-	1.00
Max Out Proba	-			0.03				-						-	1.00
Max Out 1 100a	onity			0.00	·										1.00
Movement Gro	oup Res	sults			EB			WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2			6	16			1	7		14
Adjusted Flow I	Rate (v), veh/h		185	375			830	774				168		103
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In	1647	1584			181	9 1602				1634		1380
Queue Service	Time (g	g s), S		3.8	3.7			54.0) 38.0				12.1		8.5
Cycle Queue C	learanc	e Time (<i>g c</i>), s		3.8	3.7			54.0) 38.0				12.1		8.5
Green Ratio (g	/C)			0.75	0.77			0.68	3 0.68				0.12		0.12
Capacity (c), v	/eh/h			216	2446			123	5 1088				195		165
Volume-to-Capa	acity Ra	atio(X)		0.857	0.153			0.67	2 0.712				0.863		0.626
Back of Queue	(Q), ft	/In (95 th percentile)	206.5	46.7			376.	9 364.1				274.8		150
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	7.9	1.8			14.3	3 14.6				10.5		5.7
Queue Storage	Ratio (RQ) (95 th percen	tile)	2.06	0.00			0.00	0.00				0.86		0.00
Uniform Delay ((d 1), s	/veh		28.1	3.5			12.3	3 13.5				51.9		50.3
Incremental De	lay (<i>d</i> 2), s/veh		12.7	0.1			0.3	0.4				26.3		5.5
Initial Queue De	elay (<i>d</i>	з), s/veh		0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (d), s/ve	eh		40.8	3.7			12.5	5 13.9				78.2		55.8
Level of Service	e (LOS)			D	А			В	В				E		E
Approach Delay	y, s/veh	/ LOS		15.9		В	13.2	2	В	0.0			69.7		E
Intersection De	lay, s/ve	h / LOS				20).1						С		
Multimodal Re	sulte				EB			WE	3		NB			SB	
Pedestrian LOS		/108		0.65	-	A	1.87		, B	2.16	1	В	2.33		B
Bicycle LOS Sc				0.05		A	1.95		B	2.10		5	2.00		F
				0.00		~	1.30								

		HCS	67 Sig	nalize	d Int	ersec	tion F	Resu	lts	Sum	nmar	у				
Concerct Inform									lute		an Inf				4.3.4	
General Inform	nation											ormatio		- 11		1.11.2
Agency		HRG								ation,		0.250		-		
Analyst		RL		Analys			, 2020		-	а Туре -	;	Other				
Jurisdiction		SIOUX FALLS		Time F			eak Hou		PHF			0.92			1	
Urban Street		26TH STREET		Analys				1	Ana	Iysis F	Period	1> 7:(00			
Intersection		I-229 NB		File Na	ame	2050	PMpeak	(.xus							+	
Project Descrip	tion	I-229/10TH ST IMJ	R		-	-		-	-	-	-	-			1	91 94 JU
Demand Inform	nation				EB			W	3	_		NB			SE	3
Approach Move	ement			L	Т	R	L	Т	Т	R	L	Т	R	L	Т	F
Demand (v), v	/eh/h				1090) 105	100	117	′5		85	0	1000			
Signal Informa	ation			<u> </u>	T T		-	_	1	1	-				-	
Cycle, s	60.4	Reference Phase	2		**	≓L å							_	.		
Offset, s	41	Reference Point	 Begin		1	a 🔁								2		3
Uncoordinated		Simult. Gap E/W	On	Green		20.4	14.0	0.0		0.0	0.0					
Force Mode	Fixed	Simult. Gap E/W	On	Yellow Red	3.6	3.6 1.9	3.6	0.0		0.0 0.0	0.0		5			_
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.9	1.3	0.0		0.0	0.0		5	6		
Timer Results				EBL	-	EBT	WB	L	WE	3T	NBI	-	NBT	SBL	-	SBT
Assigned Phase	е					2	1		6				8			
Case Number						8.3	1.0		4.(0			11.0			
Phase Duration	1, S					25.9	15.6	3	41.	.5			18.9			
Change Period	, (Y+ R	c), S				5.5	4.6		5.5	5			4.9			
	ax Allow Headway (<i>MAH</i>), s					3.1	2.2		3.1	1			2.4			
	ueue Clearance Time ($g s$), s					15.3	2.9		17.	.1			16.0		-	
Green Extensio		, <u> </u>				2.6	0.1		5.6	6			0.0			
Phase Call Pro						1.00	1.00)	1.0				1.00			
Max Out Proba						0.78	0.00)	0.0)9			1.00			
Mayamant Cre				_	EB			WB	-	-		NB			0	
Movement Gro	-	Suits			Т	R	L	T	-	R			R		SE T	, F
Assigned Move				<u> </u>	2	12	1	6	+		3	8	18			
Adjusted Flow F) veb/b			467	226	109	1277	,	-	5	92	870			+
-		ow Rate (<i>s</i>), veh/h/	In		1686	1607	1652	1670	_	-+		92 1714	1527			+-
Queue Service					13.3	6.5	0.9	15.1	_	-		2.6	14.0			+
Cycle Queue C		- ,			_	6.5		15.1		-			14.0			+
Green Ratio (g		e fille (<i>g</i> c), s			13.3 0.34	0.34	0.9 0.55	0.60	_	-		2.6 0.23	0.41			+
	,					-		L	_	-						+
Capacity (c), v		atio (X)			1139	543	1018	1991	_	-		397	616			
Volume-to-Capa Rock of Quoue		· · · ·)		0.410	_	0.107	0.64	_	\rightarrow		0.233	1.411			
	<u>, , , , , , , , , , , , , , , , , , , </u>	/In (95 th percentile			75.4	72.3	11.7	164.2	<u> </u>	-		44.4	1511.6			
		eh/In (95 th percent			3.0	2.9	0.5 0.03	6.5 0.00		\rightarrow		1.8 0.00	60.5 0.00			
		RQ) (95 th percen	uie)		0.00	_				-						+-
Uniform Delay (, ,				15.4	15.4	8.3	8.0	+	-		18.8	17.5			+
Incremental De	2 1	,			0.0	0.0	0.0	0.3	-	_		0.1	194.7			
Initial Queue De		·			0.0	0.0	0.0	0.0	-	\rightarrow		0.0	0.0			_
Control Delay (15.4	15.4	8.3	8.3	-	_		18.9	212.2			
Level of Service	· /				В	B	A	A		_		В	F			
Approach Delay				15.4		B	8.3		A	·	193.	6	F	0.0		
Intersection De	lay, s/ve	en / LOS				68	8.5							E		
Multimedal D	aulte				FD										05	
Multimodal Re		// 02		0.00	EB		4.0	WB		-	0.00	NB	_	0.00	SE	
Pedestrian LOS				2.38		B	1.34				2.60		C	2.30	,	В
Bicycle LOS Sc	ore / LC	79		1.20		Α	1.63	5	В		2.07		В			

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UCS7 Signalized Interpretion Paculto Summary

		HCS	S7 Sig	nalize	d Int	ersec	tion F	Resu	lts :	Sun	nmary	/				
-																
General Inform	nation								Inter	rsect	ion Info	ormatic	on		d John	i de la
Agency		HRG							Dura	ation,	h	0.250		-		
Analyst		RL		Analys	sis Date	Jul 29	, 2020		Area	а Тур	е	Other		-5-		
Jurisdiction		SIOUX FALLS		Time F	Period	PM P	eak Hou	ır	PHF	-		0.92			- +	
Urban Street		26TH STREET		Analys	sis Year	2050			Anal	lysis l	Period	1> 7:(00			
Intersection		I-229 SB		File Na	ame	2050	PMpeak	.xus							33	-
Project Descrip	tion	I-229/10TH ST IMJ	IR											1	15383555	
Demand Inform	nation			_	EB			W	P			NB			SB	
Approach Move					T	R	L	T		R	L		R		<u>ЗБ</u>	R
					615	95	640	62	_	N	150	+ -	580		+	
Demand (v), v	en/n	_	-		015	95	640	02	:0	-	150		000			
Signal Informa	tion				6			Т					_		_	
Cycle, s	120.0	Reference Phase	2		Z		20	2					_		1	
Offset, s	115	Reference Point	Begin	Green	55 5	37.5	11.1	0.0	<u>,</u>	0.0	0.0		1	2	+ 1 *	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		37.5	3.6	0.0		0.0	0.0			7		K J
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.9	1.9	1.3	0.0		0.0	0.0		5	6	7	Ý
-				EDI	_					· -		_	NET	0.51	_	0.0.7
Timer Results				EBL		EBT	WB		WB	_	NBL	-	NBT	SBL		SBT
Assigned Phase	e				_	2	1	\rightarrow	6	_		_	8	<u> </u>	_	
Case Number						7.3	1.0		4.0				9.0		_	
Phase Duration						43.0	61.0	_	104				16.0			
	ange Period, (Y+R c), s x Allow Headway (MAH), s					5.5	5.5		5.5	_			4.9			
	Allow Headway (<i>MAH</i>), s					0.0	2.2		0.0	0			2.4			
Queue Clearan		(=)					8.7			_		_	13.1			
Green Extensio		(ge), s				0.0	0.8		0.0	0			0.0	L		
Phase Call Prol							1.00			_			1.00			
Max Out Proba	bility		_			_	0.00)	-	_			1.00			
Movement Gro	oup Res	sults			EB			WE	3			NB			SB	
Approach Move	-			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move					2	12	1	6			3		18			1
Adjusted Flow I), veh/h			555	86	696	674		_	163		630			1
-		ow Rate (s), veh/h/	/In		1646	1422	1639	166	_		1626					+
Queue Service					16.8	4.6	6.7	5.5	_		5.7					1
Cycle Queue C		- ,			16.8	4.6	6.7	5.5			5.7					+
Green Ratio (g		- · · · · · · (3 -), -			0.31	0.41	0.79	0.82	_	_	0.09	_				+
Capacity (c), v	,				1029	576	1931	272	_		301				-	1
Volume-to-Cap		atio (X)			0.540	0.149	0.360	0.24	_		0.542					1
· ·		/In (95 th percentile	e)		279.5	74.1	80.8	62.3	_		110.3					
	. ,	eh/In (95 th percent	,		11.0	2.9	3.2	2.5	_		4.3	_				1
		RQ) (95 th percen			0.00	0.74	0.40	0.00	_		0.74					1
Uniform Delay (34.1	22.6	5.8	2.4	_		52.0					1
Incremental De	· ,				1.8	0.5	0.0	0.2			1.1					1
Initial Queue De		·			0.0	0.0	0.0	0.2	_		0.0					+
Control Delay (·			35.9	23.1	5.8	2.6	_		53.1		0.0			+
Level of Service					D	23.1 C	3.8 A	2.0 A	-		D		0.0 A			+
	. ,			34.2		C	4.2		A		10.9		B	0.0		
Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS				04.2	-		4.2 3.0			_	10.9			0.0 B		
	ay, 3/ve													_		
Multimodal Re	sults				EB			WE	3			NB			SB	
Pedestrian LOS		/LOS		2.29		В	0.63		A		2.48	-	В	2.32		В
Bicycle LOS Sc				1.12		A	1.62		В				F			

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		HCS	7 Sig	nalize	d In	tersec	tion R	lesi	ults Su	mmar	у				
F	y HRG														
General Informati	-								Intersec	tion Inf	ormatic	on		11,000	210
Agency		HRG							Duration	i, h	0.250		-		
Analyst				Analys	is Da	te Nov 3	0, 2020		Area Ty	be	Other				10 A
Jurisdiction		SIOUX FALLS		Time F	Period	PM P	eak Hou	r	PHF		0.92			11	÷.
Urban Street		RICE STREET		Analys	sis Yea	ar 2050			Analysis	Period	1> 7:0	00			1 1 1
Intersection		I-229 NB		File Na	ame	2050	PMpeak	.xus						11	
Project Description	ו	I-229/10TH ST IMJI	R										1	1.1.402	10
					= =		-		<u></u>						
Demand Informat					EB		<u> </u>	_	/B	<u> </u>	NB		<u> </u>	SB	
Approach Moveme					T	R	L		T R	L	T	R	L	T	R
Demand (v), veh/	'n			105	690) 780	105	6	75 150	250	150	100	625	55	205
Signal Information	n			-			24.			_					
	e, s 90.0 Reference Phase et, s 0 Reference Point Be oordinated No Simult. Gap E/W 0 e Mode Fixed Simult. Gap N/S 0 er Results gned Phase e Number se Duration, s				4	ter and the second	10.40.50					1.00	A		4
-	e, s 90.0 Reference Phase et, s 0 Reference Point Be oordinated No Simult. Gap E/W 0 ee Mode Fixed Simult. Gap N/S 0 er Results gned Phase e Number se Duration, s nge Period, (Y+R c), s Allow Headway (MAH), s					110						1	2	3	4
· · · · · · · · · · · · · · · · · · ·	No	Simult. Gap E/W	On	Green Yellow		4.0	14.0 4.0	0. 0.		0.0	_	1.1	\rightarrow	ιI	r †3
			On	Red	2.0	0.0	2.0	0.		0.0	_	5	6	7	Ŷ
				17											
Timer Results				EBL	-	EBT	WBI		WBT	NB	L	NBT	SBI	_	SBT
Assigned Phase						2			6			8	7		4
Case Number						7.0			8.0			6.3	1.0		4.0
Phase Duration, s						52.0			52.0		:	20.0	18.0)	38.0
Change Period, ()	Y+R c), s				6.0			6.0			6.0	4.0		6.0
Max Allow Headwa	ay (<i>N</i>	1AH), s				0.0			0.0			5.8	6.0		5.8
Queue Clearance	ueue Clearance Time (g_s), s											16.0	16.0)	16.5
Green Extension T	reen Extension Time ($g \in $), s					0.0			0.0			0.0	0.0		5.4
Phase Call Probab	oility											1.00	1.00)	1.00
Max Out Probabilit	ty											1.00	1.00)	0.31
Movement Group	Res	ults			EB	_		W	B		NB			SB	
Approach Moveme					T	R	L	Т	R	L	Т	R	1	Т	R
Assigned Moveme				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate), veh/h		-	864		334	-	677	272	272		679	283	<u> </u>
-	. ,	w Rate (<i>s</i>), veh/h/l	n		392	_	807		1428	1070	1556		1594	1415	
Queue Service Tim		. ,			6.5	46.0	0.0		39.5	14.0	14.0		14.0	14.5	
Cycle Queue Clear		,			46.0		28.8		39.5	14.0	14.0		14.0	14.5	<u> </u>
Green Ratio (g/C)					0.51	_	0.51		0.51	0.16	0.16		0.33	0.36	1
Capacity (c), veh/					246		467		730	247	242		328	503	<u> </u>
Volume-to-Capacit		tio (X)			3.51	_	0.715		0.927	1.102	1.123		2.071	0.562	1
· · · · ·	-	n (95 th percentile))		3669 6		251.9		554.1	461.5			2094.1		
Back of Queue (Q), ve	h/In (95 th percenti	ile)		139.0	_	10.1		22.2	17.8	18.1		78.1	8.2	
· · ·		RQ) (95 th percent			0.00	_	0.00		0.00	1.96	0.00		10.47	0.00	
Uniform Delay (d a			,		25.6		16.6	_	20.6	40.3	38.0		27.6	23.4	1
Incremental Delay					1137.	_	9.0		19.6	87.5	94.8		492.5	1.4	
Initial Queue Delay	•	, ·			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	1
Control Delay (d),		·			1163.	_	25.7		40.3	127.7	132.8		520.2	24.8	
Level of Service (L					F	F	С		D	F	F		F	С	
· · ·	Approach Delay, s/veh / LOS			630.	9	F	35.4		D	130.		F	374.		F
	ntersection Delay, s/veh / LOS					36	5.9						F		
Multimodal Resul	lts				EB			W	В		NB			SB	
Pedestrian LOS So	core /	LOS		1.89)	В	1.89)	В	1.94	1	В	2.11	1	В
Bicycle LOS Score	e / LO	S		3.31		С	1.32	2	А	1.38	3	А	2.07	7	В

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		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts Sur	nmary	У				
-								10							
General Inform	nation								Intersect	ion Infe	ormatio	on		d shelt	1.84
Agency		HRG							Duration,	h	0.250				1. A.
Analyst		RL		Analys	is Date	e Nov 3			Area Typ	е	Other	-	4		
Jurisdiction		SIOUX FALLS		Time F	Period	PM P	eak Hou	ır	PHF		0.92				÷.
Urban Street		RICE STREET		Analys	is Yea	r 2050			Analysis	Period	1> 7:(00			
Intersection		I-229 SB		File Na	ame	2050	PMpeak	.xus							
Project Descript	tion	I-229/10TH ST IMJ	R										1	11.44	457
Demand Inform	nation				EB			W	2		NB			SE	2
Approach Move				L	T	R		Т	1	L		R	L		
Demand (v), v				200	1130	_		74			+		445	<u> '</u>	95
Demand (V), V	en/n			200	1130			14	5 505				445		90
Signal Informa	tion				1.20		JU				- 100	1.1			11
Cycle, s	90.0	Reference Phase	2		≓ \$		-					1	4		2
Offset, s	15	Reference Point	Begin	Green	07	35.3	28.0	0.0	0.0	0.0	_	1	2	:	3 4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		5.0	4.0	0.0		0.0		7	4		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0		0.0		5	6		7 8
			_		-	_									
Timer Results				EBL	-	EBT	WB		WBT	NBL	-	NBT	SBL	-	SBT
Assigned Phase	e			5		2			6						4
Case Number				1.0		4.0		\rightarrow	8.3					\rightarrow	9.0
Phase Duration				13.7		56.0		\rightarrow	42.3				<u> </u>	\rightarrow	34.0
-	nge Period, (Y+R c), s			5.0		7.0			7.0				<u> </u>	_	6.0
	Allow Headway (<i>MAH</i>), s			4.1	\rightarrow	0.0		\rightarrow	0.0				<u> </u>	\rightarrow	4.2
Queue Clearan		(=)		8.7									<u> </u>		28.1
Green Extensio		(ge), s		0.0	\rightarrow	0.0		\rightarrow	0.0				<u> </u>	\rightarrow	0.0
Phase Call Prob				1.00									<u> </u>		1.00
Max Out Proba	bility			1.00)				_						1.00
Movement Gro	up Res	sults			EB	_		WB			NB	_		SE	}
Approach Move	-			L	Т	R	L	Т	R	L	Т	R		Т	R
Assigned Move				5	2			6	16				7		14
Adjusted Flow F), veh/h		217	1228			527	466				484		103
-		ow Rate (s), veh/h/	In	1647	1654			1692					1634		1375
Queue Service		().		6.7	24.2			32.4	_				26.1		5.0
Cycle Queue C		- ,		6.7	24.2			32.4					26.1		5.0
Green Ratio (g				0.51	0.54			0.39					0.31		0.31
Capacity (c), v	,			257	1801			664	583				508		428
Volume-to-Capa		atio (X)		0.846	0.682			0.794	4 0.800				0.951		0.241
· ·		/In (95 th percentile)	178	348.5			339.	_				516.4		75.9
	. ,	eh/In (95 th percent		6.8	13.4			12.8	_				19.7		2.9
	<u> </u>	RQ) (95 th percen	,	1.78	0.00			0.00					1.61		0.00
Uniform Delay (20.0	14.9			22.8	17.8				30.3		23.1
Incremental De				21.5	2.1			4.2	4.9				28.1		0.3
Initial Queue De		•		0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (• •	·		41.5	17.0			27.0	22.7				58.4		23.4
Level of Service	e (LOS)			D	В			С	С				E		С
Approach Delay	, s/veh	/ LOS		20.7	·	С	25.0)	С	0.0		-	52.2		D
Intersection Del						28	8.2						С		
Multimodal Re					EB			WB			NB			SE	
Pedestrian LOS				0.69		Α	1.91		В	2.15	5	В	2.32		В
Bicycle LOS Sc	ore / LC	DS		1.68	6	В	1.50)	В						F

		HUS	s Sigr	alize	a inte	ersect	ION R	esui	ts Sun	nmary	/	_	_	_	
Conorol Inform									Interes	tion Inf				4.244	
General Inform	nation								Intersec				100	41	
Agency		HRG			·		4 0000		Duration		0.250				
Analyst		MJV				e Dec 2			Area Typ)e	Other	-			~
Jurisdiction		SIOUX FALLS		Time F		_	eak Hou		PHF		0.92		-	-16	
Urban Street		10TH STREET				r 2050			Analysis		1> 7:(00	-		, in the second s
Intersection		CLEVELAND AVEN		File Na	ame	2050	AMpeak	Build	IMJR-2	EB Clev	v.xus			17	
Project Descrip	otion	I-229/10TH ST IMJ	R	_		_	_		_	_	_	_	1	1 1 de 1	N IT
Demand Infor	mation				EB			W	В		NB			SB	
Approach Move				L	Т	R	L	Т		L	Т	R	L	Т	R
Demand (v), v				235	1050) 140	35	185	50 115	295	315	_	90	180	340
Signal Informa	ation				1.20	1000	44		20	19				-	1
Cycle, s	130.0	Reference Phase	6		₩.		- N.	5	10 5				4		the
Offset, s	83	Reference Point	Begin	Green	10.0	62.4	5.0	5.0		1.1.	-	1	* 2	-	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.0	3.0		0.0		7	\rightarrow		sta
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	0.0	0.0		0.0		5	6	7	<u> </u>
Timer Results				EBI	-	EBT	WB	L	WBT	NB	L	NBT	SBI	-	SBT
Assigned Phas	e			5		2			6	3		8	7		4
Case Number				1.0		4.0			6.3	1.1		4.0	1.1		4.0
Phase Duration				13.0		81.0			68.0	16.0		41.0	8.0		33.0
Change Period	· ·	,		3.0	_	5.6			5.6	3.0		5.6	3.0	_	5.6
	ax Allow Headway (<i>MAH</i>), s			4.2		0.0			0.0	4.2		4.2	4.2		4.2
	ueue Clearance Time (g s), s			12.0						15.0		27.9	7.0		29.4
Green Extensio		(ge), s		0.0		0.0		\rightarrow	0.0	0.0		2.6	0.0		0.0
Phase Call Pro				1.00						1.00		1.00	0.97		1.00
Max Out Proba	bility		_	1.00)	_			_	1.00)	0.54	1.00)	1.00
Movement Gro	oup Res	ults	_		EB	_		WB			NB	_		SB	
Approach Move	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow). veh/h		246	846	397	38	1068		321	375		98	565	<u> </u>
-		ow Rate (<i>s</i>), veh/h/l	n	1674	1758	1649	440	1744		1688	1745		1701	1598	
Queue Service				10.0	13.6	11.0	5.8	62.4	-	13.0	25.9		5.0	27.4	
Cycle Queue C		- ,		10.0	13.6	11.0	6.4	62.4	_	13.0	25.9		5.0	27.4	
Green Ratio (g				0.57	0.58	0.58	0.48	0.48		0.33	0.27		0.25	0.21	
Capacity (c),				184	2039	956	265	837		224	475		179	337	
Volume-to-Cap		itio(X)		1.334			0.144	1.276	_	1.431	0.789		0.545	1.678	
Back of Queue	(Q), ft	t/In (95 th percentile	e)												
	. ,	eh/In (95 th percenti		22.3	8.2	6.4	1.1	75.4	78.3	29.7	18.1		1.7	63.3	
Queue Storage	e Ratio (RQ) (95 th percent	tile)	4.23	0.00	0.00	0.27	0.00	0.00	7.55	0.00		0.53	0.00	
Jniform Delay (d_1), s/veh				35.0	10.6	7.9	17.3	31.0	30.9	38.0	43.8		43.3	51.3	
ncremental Delay (d 2), s/veh				178.7	0.5	1.2	0.6	128.8	3 140.7	217.5	8.7		3.4	317.9	
Initial Queue D		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0			
Control Delay (d), s/ve	eh		213.7	11.2	9.0	17.8	159.8	3 171.5	255.5	52.6		46.7	369.2	
Level of Servic	e (LOS)			F	В	Α	В	F	F	F	D		D	F	
Approach Dela	y, s/veh	/ LOS		44.0)	D	163.	1	F	146.	1	F	321.	6	F
Intersection De	lay, s/ve	eh / LOS				14	6.3						F		
					EB										
	Multimodal Results							WB			NB			SB	
Pedestrian LOS				1.90		B	1.91	_	В	2.45		В	2.46		В
Bicycle LOS So	core / LC	DS		1.34		Α	2.28	3	В	1.64	1	В	1.58	3	В

	_	HCS	s Sigr	alize	d Int	ersect	ion R	esul	ts Sun	nmary	/	_	_		
														4.2.4.1	
General Inform	nation								Intersec				-	44	Print Print
Agency		HRG							Duration		0.250				
Analyst		MJV		-		e Dec 2			Area Typ	be	Other	-		*	A-1
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF		0.92				
Urban Street		10TH STREET		-		r 2050			Analysis		1> 7:(00			1
Intersection		CLEVELAND AVEN		File Na	ame	2050	PMpeak	Build	I IMJR- 2	EB Cle	v.xus			11	
Project Descrip	tion	I-229/10TH ST IMJ	R						_				1	11000	10.10
Demand Inform	mation				EB			W	В		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v				340	204	_	40	169	_	230	300	_	235	345	220
												_			
Signal Informa	ation				1.000			11	54.0						1
Cycle, s	150.0	Reference Phase	2	1	li ≦	-	1		542			-	4	5	Φ
Offset, s	82	Reference Point	Begin	Green	10.0	66.4	12.0	35	111	0.0	-	1	2	-1-	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.0	35		0.0	_	7	\rightarrow		5 12
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	0.0	2.0		0.0		5	6	7	Y
									14-5-5						057
Timer Results				EBI	-	EBT	WB	L	WBT	NB	L	NBT	SBI		SBT
Assigned Phas	e			5		2			6	3		8	7	\rightarrow	4
Case Number				1.0		4.0		\rightarrow	6.3	1.1		4.0	1.1		4.0
Phase Duration	•			22.0		94.0		\rightarrow	72.0	15.0		41.0	15.0		41.0
Change Period	<u>.</u>	,		3.0		5.6			5.6	3.0		5.6	3.0		5.6
	lax Allow Headway (<i>MAH</i>), s			4.2		0.0			0.0	4.2	<u> </u>	4.2	4.2		4.2
Queue Clearan	ueue Clearance Time (g s), s			21.0)					14.0	<u> </u>	37.1	14.0)	37.4
Green Extensio	on Time	(g _e), s		0.0		0.0			0.0	0.0		0.0	0.0		0.0
Phase Call Pro	bability			1.00)					1.00	D	1.00	1.00)	1.00
Max Out Proba	bility			1.00)					1.00	2	1.00	1.00)	1.00
Movement Gro	oup Res	sults			EB	_		WE	2		NB			SB	
Approach Move	-			L	T	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow) veh/h		361	 1745		43	1019		250	402	10	255	614	· · ·
		ow Rate (<i>s</i>), veh/h/l	n	1674	1758	+	118	1744	_	1688	1714		1701	1669	
Queue Service				19.0	56.6	67.6	20.8	66.4		12.0	35.1		12.0	35.4	
Cycle Queue C		- ,		19.0	56.6	67.6	66.4	66.4	_	12.0	35.1		12.0	35.4	
Green Ratio (g		c mile (<i>g t</i>), 3		0.58	0.59	0.59	0.44	0.44		0.32	0.24		0.32	0.24	
Capacity (c), v	· ·			260	2072	-	64	772		183	404		184	394	
Volume-to-Cap		tio (X)		1.390	0.842		0.675	1.32	_	1.366			1.388	1.559	++
· · · ·	-	t/In(95 th percentile	•)	1.530	0.042	0.000	0.075	1.52	0 1.307	1.500	0.394		1.000	1.559	
	, ,	eh/In (95 th percentie		30.7	25.5	30.9	3.8	80.6	85.0	23.9	27.4		24.7	67.0	
				5.83	0.00	0.00	0.89	0.00	_	6.07	0.00		7.78	0.00	
-	Queue Storage Ratio(<i>R</i> Q)(95 th percentile) Uniform Delay(d 1), s/veh				19.7	27.2	59.8	32.4	_	44.5	57.2		44.4	57.3	
Incremental De		47.5 181.8	1.2	3.7	26.2	149.	_	195.6	43.2		204.3	263.8			
Initial Queue D		0.0	0.0	0.0	0.0	0.0		0.0	43.2		0.0	0.0	++		
Control Delay (229.3	21.0	30.9	86.0	181.	_	240.1	100.4		248.7	321.1			
Level of Service				229.3 F	21.0 C	C	60.0 F	F	4 201.7 F	240.1 F	F		240.7 F	521.1 F	
Approach Dela		F 49.3			г 189.		F	г 154.		F	г 299.		F		
Intersection Dela		49.3	,			4	Г	194.	U		299. F	U	Г		
mersection De	iay, s/ve					13	7.5								
Multimodal Re	Multimodal Results							WE	3		NB			SB	
Pedestrian LOS		/LOS		1.90	EB	В	1.92		B	2.46		В	2.46		В
				2.15		B	2.20		B	1.56		B	1.92		B
	Bicycle LOS Score / LOS														

		Н	CS Sigr	nalize	d Inte	ersect	ion R	esul	ts Sun	nmary	/				
_								ļ							
General Inform	nation								Intersec					i staate ti J	2.5
Agency		HRG							Duration	, h	0.250				
Analyst		MJV		Analys	is Dat	e Dec 2			Area Typ)e	Other		*		-
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF		0.92			-1-	
Urban Street		10TH STREET		Analys	is Yea	r 2050			Analysis	Period	1> 7:0	00			
Intersection		HY-VEE DRIVEV	VAY	File Na	ame	2050	AMpeak	Build	IMJR.xu	is				12	
Project Descrip	otion	I-229/10TH ST IN	<i>I</i> JR											151115000	100
Demand Infor	mation		_		EB	_		W	B		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			100	1045	5 25	20	192	25 90	10	5	5	30	5	65
					_			کچند		<u>مبغ</u>			<u>den se s</u>		
Signal Informa	ation				1		121						_		*
Cycle, s	130.0	Reference Phase	e 6		R.		1.1	2				1	e .	3	* † *
Offset, s	29	Reference Point	Begin	Green	4.9	101.0) 9.9	0.0	0.0	0.0				5	~
Uncoordinated	No	Simult. Gap E/W	/ On	Yellow		3.6	3.6	0.0		0.0		×	₩		- st 2
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0	0.0	0.0		5	6	7	<u> </u>
Timer Results				EBL		EBT	WB		WBT	NB		NBT	SBI		SBT
Assigned Phas				5	-	2			6			8			4
Case Number	c			1.0		4.0		\rightarrow	5.3	<u> </u>		6.0	<u> </u>		6.0
Phase Duration				7.9		114.5		\rightarrow	106.6			15.5	<u> </u>		15.5
				3.0		5.6	<u> </u>	\rightarrow	5.6	┣───	\rightarrow	5.6	<u> </u>	\rightarrow	5.6
-	ange Period, (Y+ <i>R c</i>), s x Allow Headway (<i>MAH</i>), s			2.2			<u> </u>	\rightarrow	0.0					\rightarrow	
	ax Allow Headway (<i>MAH</i>), s leue Clearance Time (<i>g</i> s), s			3.5		0.0	<u> </u>	\rightarrow	0.0	<u> </u>	\rightarrow	4.7 9.3	<u> </u>	+	4.7
		1 = 7				0.0		\rightarrow	0.0		\rightarrow			_	8.3
Green Extensio		(ge), s		0.0		0.0	<u> </u>	\rightarrow	0.0	<u> </u>		0.0	┣───	\rightarrow	0.1
Phase Call Pro	-			0.98				\rightarrow				0.99			0.99
Max Out Proba	DIIILY	_		0.00		_			_	lesson and the second s		1.00			1.00
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow	Rate(<i>v</i>), veh/h		105	564	559	22	2092	2 98	11	11		33	76	
Adjusted Satur	ation Flo	ow Rate (<i>s</i>), veh/	'n/ln	1661	1744	1729	490	1647	7 1466	1323	1626		1415	1530	1
Queue Service	Time (g	g s), S		1.5	10.5	10.5	1.5	50.5	2.1	1.0	0.8		2.9	6.3	
Cycle Queue C	learanc	e Time (<i>g c</i>), s		1.5	10.5	10.5	4.1	50.5	2.1	7.3	0.8		3.7	6.3	
Green Ratio (g	ŋ/C)			0.83	0.84	0.84	0.78	0.78	0.78	0.08	0.08		0.08	0.08	1
Capacity (c), v	/eh/h			193	1461	1448	426	2559	1139	92	124		154	117	
Volume-to-Cap	acity Ra	itio (X)		0.544	0.386	0.386	0.051	0.818	8 0.086	0.118	0.088		0.211	0.652	
Back of Queue	(Q), f	t/In (95 th percent	tile)												
Back of Queue	(Q), ve	eh/In (95 th perce	ntile)	4.8	5.3	5.3	0.3	22.4	1.1	0.7	0.6		1.9	5.1	
		RQ) (95 th perce		1.25	0.00	0.00	0.08	0.00	0.22	0.34	0.00		0.57	0.00	
Uniform Delay	(d1), s	/veh		24.4	2.7	2.7	4.0	8.9	3.5	61.9	55.8		57.5	58.4	1
Incremental De	<u> </u>			0.8	0.7	0.7	0.2	3.0	0.1	0.6	0.3		0.8	12.8	
Initial Queue D		,		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (25.3	3.4	3.4	4.3	11.9	_	62.5	56.1		58.4	71.1	1
Level of Servic				С	Α	Α	Α	В	Α	E	E		E	E	
Approach Dela				5.3		A	11.5		В	59.3		E	67.3		E
Intersection De							1.3			1			B		
Multimodal Re	sults				EB			WB			NB			SB	
	edestrian LOS Score / LOS					-	1.0		P	0.4			0.00		
Pedestrian LOS	S Score	/LOS		1.82	2	В	1.84	4	В	2.47	1	В	2.32	2	В

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		HCS	S Sign	alizeo	d Inte	ersect	ion R	esul	ts Sun	nmary	/				
														4.2.4.1	- 1-
General Informatio		100							Intersec					46	
Agency		HRG							Duration		0.250				
Analyst		MJV					1, 2022		Area Typ	e	Other				·
Jurisdiction		SIOUX FALLS		Time F			eak Hou		PHF		0.92			212	
Urban Street		10TH STREET				2050		I	Analysis		1> 7:(00	-		
Intersection		HY-VEE DRIVEWA		File Na	ame	2050	PMpeak	Build	IMJR.xu	s				11	
Project Description	I	-229/10TH ST IMJ	R		-			-					1		
Demand Information	ion				EB	_		W	В		NB	_		SB	_
Approach Movemer	nt			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (<i>v</i>), veh/h	h			185	2080	85	25	179	95 80	30	10	20	100	5	90
Signal Information	n		-	-	Γ						1.00				
	1	Reference Phase	2		1	1.2 3	- 24%					1			4
Cycle, s 150 Offset, s 52		Reference Point			-5	2 - 2 - 2	100	7				1	2	3	4
Uncoordinated N		Simult. Gap E/W	Begin	Green		111.7	16.5	0.0		0.0		_	<u>A</u>		
Force Mode Fix		•	On On	Yellow Red	3.0 0.0	3.6 2.0	3.6 2.0	0.0		0.0		5	Y	7	Ψ
		Simult. Gap N/S	On	Reu	0.0	2.0	2.0	0.0	0.0	0.0		5	6	/	
Timer Results				EBL	-	EBT	WB	L	WBT	NB	L	NBT	SBI	-	SBT
Assigned Phase				5		2			6			8			4
Case Number				1.0		4.0			5.3			6.0			6.0
Phase Duration, s				10.6		127.9			117.3			22.1			22.1
Change Period, (Y	/+ <i>R</i> c), s		3.0		5.6			5.6			5.6			5.6
Max Allow Headway	ax Allow Headway (<i>MAH</i>), s			2.2		0.0			0.0			4.7			4.7
-	ueue Clearance Time ($g s$), s			7.5								15.4			16.4
	ueue Clearance Time (g s), s reen Extension Time (g e), s			0.1		0.0			0.0			0.2			0.1
Phase Call Probabi		. ,,		1.00								1.00			1.00
Max Out Probability	y			0.00								1.00			1.00
Movement Group	Peer	ulto			EB			WB			NB			SB	
Approach Movemen					T	R	L	T	R	L		R	L	Т	R
Assigned Movemen				5	2	12		6	16	3	8	18	7	4	14
Adjusted Flow Rate		woh/h		- 5 - 191	2 1501	739	27	195 ²		33	33	10	109	103	14
Adjusted Saturation			n	1661	1744	1707	166	1647	_	1291	1582		1387	1526	
Queue Service Time				5.5	17.5	17.7	8.9	55.8		3.7	2.8		11.6	9.7	
Cycle Queue Cleara		,		5.5	17.5	17.7	15.9	55.8	_	13.4	2.0	<u> </u>	14.4	9.7	
Green Ratio (g/C)		nine (g c), s		0.81	0.82	0.82	0.74	0.74		0.11	0.11		0.11	9.7	
Capacity (c), veh/h					2843	1392	164	245 ²		107	174	<u> </u>	175	168	
Volume-to-Capacity		ic (X)		215	2843 0.528	0.531	0.166	245 0.79		0.305			0.622	0.614	
	,	<u> </u>	•)	0.890	0.526	0.551	0.100	0.79	5 0.060	0.305	0.167		0.022	0.014	
	ack of Queue (Q), ft/ln (95 th percentile) ack of Queue (Q), veh/ln (95 th percentile)				6.9	7.0	0.7	26.8	1.4	2.3	2.1		7.9	7.3	
	ack of Queue(Q), veh/In(95 th percentile) Queue Storage Ratio(RQ)(95 th percentile)				0.00	0.00	0.22	0.00		1.17	0.00		2.34	0.00	
Uniform Delay (<i>d</i> 1	,	2.84 40.0	3.4	3.4	8.2	12.0	_	70.1	60.6		67.2	63.7			
Incremental Delay (6.1	0.3	0.6	2.2	2.8	0.1	1.6	0.5		6.5	6.3			
	nitial Queue Delay (d ȝ), s/veh					0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d),				0.0 46.1	0.0	4.0	10.4	14.8	_	71.7	61.1		73.7	70.0	
Level of Service (LC				D	A	A	B	B	A	E	E		E	E	
Approach Delay, s/v		7.1		A	14.4		B	66.4		E	71.9	<u> </u>	E		
Intersection Delay, s					3.9						B				
	Aultimodal Results							WB			NB			SB	_
Pedestrian LOS Sco				1.84		B	1.86		B	2.6	_	C	2.47		В
Bicycle LOS Score	/ LOS	5		1.89		В	2.19	9	В	0.60)	A	0.84		A

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		HCS	S Sigr	nalize	d Int	ersect	tion R	esul	ts Sun	nmary	/				
General Inform	nation								Intersec					el state ti 1111	N.C.
Agency		HRG							Duration	, h	0.250		0		and the second
Analyst		MJV		Analys	sis Dat	e Dec 2			Area Typ	be	Other	-	<u>*</u> _*		~
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF		0.92		+	-	
Urban Street		10TH STREET		Analys	sis Yea	ır 2050			Analysis	Period	1> 7:(00			
Intersection		I-229		File Na	ame	2050	AMpeak	k Build	IMJR.xu	S				1110	
Project Descrip	otion	I-229/10TH ST IMJ	R		_			_					1	4 1 4 Y	10.1
Demand Infor	mation		_		EB	_		W	В		NB	_		SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			155	660	535	695	103	30 760	620	0	580	225	0	335
Signal Informa	ation				1	1	ý.			_	100				
Cycle, s	130.0	Reference Phase	6		2.	a 3	7.4	1 × 4	Skill,				A		4
Offset, s	40	Reference Point	Begin			0	e 🐴	5	11				2	3	4
Uncoordinated		Simult. Gap E/W	On	Green		13.4	49.5	26.		0.0			A		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow Red	4.5	3.6 4.5	3.6 4.5	3.6		0.0		5	¥ 6	7	Ψ
	Tixed	olinal. Oup N/O	OII	Itteu	14.0	1.0	14.0	0.1	0.0	0.0		-	-		
Timer Results				EBL	-	EBT	WB	L	WBT	NB	L	NBT	SBI	-	SBT
Assigned Phas	е			5		2	1		6			8			4
Case Number				1.1		3.0	1.1		3.0			5.0			5.0
Phase Duration	า, s			16.9)	57.6	38.4	4	79.1			34.0			34.0
Change Period	, (Y+ R	c), S		8.1		8.1	8.1		8.1			7.3			7.3
Max Allow Hea	ax Allow Headway (MAH), s			4.2		0.0	4.2	2	0.0			5.3			5.3
Queue Clearar	Leue Clearance Time ($g s$), s			8.7			27.9	9				27.5			28.7
Green Extensio	on Time	(ge),s		0.1		0.0	2.4		0.0			0.0			0.0
Phase Call Pro	bability			0.99)		1.00)				1.00			1.00
Max Out Proba	bility			1.00)		0.0	0				1.00			1.00
Movement Gro	oup Res	sults			EB	_		WB			NB			SB	
Approach Move	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow), veh/h		144	614	498	561	831	613	674	0	630	245	0	364
	· ·	ow Rate (s), veh/h/l	In	1688	1660		1674	1678	_	1652	1669	1320	1626	1643	1481
Queue Service		· · · · ·		6.7	20.7	_	25.9	24.5		25.5	0.0	22.9	8.1	0.0	26.7
		e Time (<i>g c</i>), s		6.7	20.7	_	25.9	24.5		25.5	0.0	22.9	8.1	0.0	26.7
Green Ratio (g		- · · · · · (3 ·), -		0.45	0.38		0.63	0.55	_	0.21	0.21	0.44	0.21	0.21	0.27
Capacity (c),				395	1265	-	623	1834		789	343	1173	779	337	401
Volume-to-Cap		ntio (X)		0.365	0.485	_	0.900	0.45		0.854	0.000	0.537	0.314	0.000	0.909
•		t/ln (95 th percentile	e)												
	. ,	eh/In (95 th percent	,	5.0	13.8		9.9	12.1		17.5	0.0	11.7	6.2	0.0	20.1
		RQ) (95 th percen	,	0.37	0.00	_	0.80	0.00		1.77	0.00	0.69	0.88	0.00	0.40
Uniform Delay		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	21.9	38.4	_	17.3	26.6	_	51.2	0.0	27.0	44.3	0.0	45.6
Incremental De				0.5	1.2		1.0	0.1		9.3	0.0	0.6	0.3	0.0	24.5
Initial Queue D		,		0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (•		22.4	39.6	0.0	18.3	26.7	0.0	60.5	0.0	27.6	44.6	0.0	70.1
Level of Servic				C	D	A	В	C	A	E		C	D		E
Approach Dela	<u>, </u>			21.9		C	16.2		B	44.6	3	D	59.9		E
Intersection De							9.9						C		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS	S Score	/LOS		2.44	L	В	2.2	6	В	2.46	3	В	2.46	6	В
Bicycle LOS So	core / LC	DS		1.70)	В	2.7		С	2.64		С	1.49)	А

		HCS	S Sigr	nalize	d Inte	ersect	tion R	esu	lts Sur	nmary	/				
-									-						
General Inforn	nation								Intersed					JIU	
Agency		HRG							Duration	n, h	0.250)	- 1	6.4.33	
Analyst		MJV		Analys	is Date	e Dec 2	21, 2022		Area Ty	pe	Other	-			-
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF		0.92				
Urban Street		10TH STREET		Analys	is Yea	r 2050			Analysis	Period	1> 7:	00			
Intersection		I-229		File Na	ame	2050	PMpeak	k Build	l IMJR.xu	ls				1110	
Project Descrip	tion	I-229/10TH ST IMJ	R	_		_	_		_	_	_	_	1	4.1.444	917
Demand Inform	nation				EB	_		W	В		NB	_		SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			320	1245	5 865	730	98	35 425	5 535	0	1005	595	0	280
Signal Informa	ation	_	-	F	2	T a			\$		100		12		1
Cycle, s	150.0	Reference Phase	2		2.	- 3			Asi		4	-	2		4
Offset, s	31	Reference Point	∠ Begin		1		- 5-		117				2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green		19.4	55.0	24					<u>A</u>		•
Force Mode	Fixed	Simult. Gap E/W	On	Yellow Red	3.6 4.5	3.6 4.5	3.6 4.5	3.6				5	Y	7	Ψ.
Force Mode	Fixed	Simult. Gap N/S		Reu	4.5	4.5	4.5	3.1	0.0	0.0		5	8	1	
Timer Results				EBL	-	EBT	WB	L	WBT	NB	L	NBT	SBI	-	SBT
Assigned Phas	е			5		2	1		6			8			4
Case Number				1.1		3.0	1.1		3.0			5.0			5.0
Phase Duration	i, s			27.4	-	63.1	54.9	9	90.6			32.0			32.0
Change Period	, (Y+R)	c), S		8.1		8.1	8.1		8.1			7.3			7.3
Max Allow Hea	ax Allow Headway (<i>MAH</i>), s			4.2		0.0	4.2	2	0.0			5.3			5.3
Queue Clearan	$\begin{array}{c} \text{Headway} (matri), s\\ \text{Headway} (g_s), s \end{array}$			18.3	;		45.8	В 🛛				26.7			26.7
Green Extensio	n Time	(g _e), s		1.0		0.0	1.0		0.0			0.0			0.0
Phase Call Pro	bability			1.00	,		1.00	D C				1.00			1.00
Max Out Proba	bility			0.00			1.00	2				1.00			1.00
Movement Gro	un Res	aults			EB	_		WE	3		NB			SB	
Approach Move	-				Т	R	L	T	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow) veh/h		314	1223	849	582	786	_	582	0	1092	647	0	304
	· ·	ow Rate (s), veh/h/	In	1688	1783	0.0	1674	169		1652	1669	1396	1626	1643	1477
Queue Service		().		16.3	47.9	-	43.8	17.9		24.7	0.0	24.7	24.7	0.0	24.7
Cycle Queue C		- /		16.3	47.9		43.8	17.9	_	24.7	0.0	24.7	24.7	0.0	24.7
Green Ratio (g				0.50	0.37		0.69	0.55		0.16	0.16	0.48	0.16	0.16	0.29
Capacity (c), v	· ·			517	1306		592	185		640	275	1307	631	271	439
Volume-to-Cap		itio (X)		0.608	0.936		0.983	0.42		0.909	0.000	0.836	1.024	0.000	0.693
· ·		t/In (95 th percentile	e)												
	. ,	eh/In (95 th percent		8.9	20.9		14.3	8.0		18.6	0.0	25.0	22.8	0.0	16.2
		RQ) (95 th percen		0.66	0.00		1.14	0.00)	1.87	0.00	1.46	2.33	0.00	0.32
Uniform Delay	niform Delay (d_1), s/veh						18.4	16.2	2	63.1	0.0	33.9	64.2	0.0	47.1
	ncremental Delay (d 2), s/veh						7.2	0.1		17.2	0.0	5.1	42.1	0.0	5.1
	nitial Queue Delay (d ȝ), s/veh						0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/ve	eh		26.4	34.6	0.0	25.6	16.2	2 0.0	80.3	0.0	38.9	106.4	0.0	52.3
Level of Service				С	С	Α	С	В	A	F		D	F		D
Approach Dela		21.2	2	С	16.2	2	В	53.3	3	D	89.0)	F		
Intersection De				3	7.5						D				
Multimerica	a				EB			14/5)		ND			00	
	Aultimodal Results Pedestrian LOS Score / LOS					P	0.0	WE		0.4	NB	D	0.4	SB	D
				2.45 2.67		B C	2.2 2.4		B	2.4		B C	2.47		B
	ycle LOS Score / LOS					U	2.4		D	3.23		U	2.00	,	D

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		HC	S Sigr	nalized	d Inte	ersect	ion R	esul	ts Su	immary	y				
								ļ					ļ		
General Inform	nation								-	ection Inf	formatio	on		1.000	
Agency		HRG							Duratio	on, h	0.250)			
Analyst		MJV		Analys	is Dat	e Dec 2	1, 2022		Area T	уре	Other	r	<u>.</u>		←
Jurisdiction		SIOUX FALLS		Time P	'eriod	AM P	eak Hou	ır	PHF		0.92				
Urban Street		10TH STREET		Analys	is Yea	r 2050			Analys	is Period	1> 7:	00			
Intersection		JESSICA AVENUE		File Na	ame	2050	AMpeak	Build	IMJR.)	kus				11	
Project Descrip	otion	I-229/10TH ST IMJ	IR										1	14 1 46	1917
Demand Infor	mation		_		EB	_		WE	В		NB	_		SB	
Approach Move	ement			L	Т	R	L	Т	F	λ L	Т	R	L	Т	R
Demand (v), v	/eh/h				985	60	30	190)5	155	;	50			
Cinnel Inform															
Signal Informa	1	Deferre Dheese		4		-									
Cycle, s	130.0	Reference Phase	6		R .	151	2					1	1 2	3	4
Offset, s	124	Reference Point	Begin	Green			0.0	0.0							
Uncoordinated	<u> </u>	Simult. Gap E/W	On	Yellow		3.6	0.0	0.0							
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0 0.0		5	6	7	
Timer Results			_	EBL	_	EBT	WB	L	WBT	NB	L	NBT	SBL	_	SBT
Assigned Phas	е					2			6			8			
Case Number						8.0			6.0			9.0			
Phase Duratior	1, S					109.1			109.1			20.9			
Change Period	, (Y+R	c), S				5.6			5.6			5.6			
	ax Allow Headway (<i>MAH</i>), s					0.0			0.0			5.3			
	ueue Clearance Time (g_s), s									1		14.7			
Green Extensio		, ,				0.0			0.0			0.6			
Phase Call Pro		(3,)										1.00			
Max Out Proba										1		0.51			
Movement Gro		vulto			EB			WB			NB			SB	
Approach Move	-	Suits		L	Т	R	L	T	R	L		R		T	R
Assigned Move					2	12	1	6		3	┢───	18		<u> </u>	
Adjusted Flow) vob/b			574	562	28	1796		168		54			+
	· ·	ow Rate (<i>s</i>), veh/h/	//n		1758		492	1674		1688		1502			+
Queue Service			111		15.8	12.9	492 0.7	10/4		12.7	──	4.3			+
		e Time (g c), s			15.8	12.9	17.4	10.4		12.7		4.3		<u> </u>	
Green Ratio (e fille (<i>g</i> c), s			0.80	0.80	0.80	0.80		0.12	┼───	0.12		┝───	+
Capacity (c), v	· ,				1399	-	387	2664	_	199		177		┝───	+
,		tic (X)					0.073	0.674	_	0.847		0.307			+
Volume-to-Cap		t/In(95 th percentile	.		0.410	0.410	0.073	0.072	+	0.047		0.307			+
	. ,	eh/In (95 th percentile			7.5	7.4	0.2	2.9	+	10.6		3.1			+
	, ,	RQ) (95 th percen			0.00	0.00	0.06	0.00		2.24	<u> </u>	0.00			
Uniform Delay					4.0	4.0	2.8	1.0	+	56.2	+	52.5		<u> </u>	
Incremental De	<u> </u>				0.9	0.9	0.3	1.0		18.1		1.4			
Initial Queue D		,			0.0	0.0	0.0	0.0	+	0.0	<u> </u>	0.0		<u> </u>	+
Control Delay (,			4.9	4.9	3.1	2.0	+	74.3		53.9			
Level of Servic					4.9 A	4.9 A	3.1 A	2.0 A	+	E		D			
	· /			4.9		A	2.0		A	<u> </u>	3	E	0.0	<u> </u>	
Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS				7.3			2.0 .7			09.	<u> </u>		A 0.0		
	Intersection Delay, s/veh / LOS					, 	. 1			سيراو					
Multimodal Re	sults				EB			WB			NB			SB	
		/LOS		1.84		В	0.64		A	2.3		В	2.16	1	В
	estrian LOS Score / LOS rcle LOS Score / LOS								B			F			

		HC	S Sigr	nalize	d Inte	ersect	ion R	esult	s Sun	nmary	1				
													-		
General Inform	nation									tion Infe			×	4.3.4-1	24
Agency		HRG							Duration	, h	0.250				
Analyst		MJV		Analys	is Date	e Dec 2			Area Typ	be	Other				←
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır I	PHF		0.92				
Urban Street		10TH STREET		Analys	is Yea	r 2050			Analysis	Period	1> 7:(00	14		
Intersection		JESSICA AVENUE		File Na	ame	2050	PMpeak	k Build	IMJR.xu	IS				10	
Project Descrip	otion	I-229/10TH ST IMJ	IR										N N	4.1.449	10
Demand Infor	mation		_		EB	_		WE	3		NB	_	T	SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v					2060) 105	65	146		65		70		<u> </u>	+
2									-						
Signal Informa	ation						Т								
Cycle, s	150.0	Reference Phase	2	1	-	5	2						-+		
Offset, s	10	Reference Point	Begin	Croon	130.4	1 8.4	0.0	0.0	0.0	0.0	_	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		3.6	0.0	0.0	0.0	0.0					КЭ
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	Ŷ
Timer Results				EBL		EBT	WB		WBT	NBI	_	NBT	SBL		SBT
				EDL		2			6	INDI		8	SBL	·	301
Assigned Phas	e						<u> </u>		-	<u> </u>		-	<u> </u>	_	
Case Number						8.0			6.0	<u> </u>	_	9.0		_	
Phase Duration		`			+	136.0		-+	136.0	<u> </u>		14.0		_	
Change Period	· ·	•				5.6	<u> </u>	_	5.6	<u> </u>		5.6	<u> </u>		
Max Allow Hea	2 (· ·		<u> </u>	\rightarrow	0.0	<u> </u>		0.0	<u> </u>	_	5.3	<u> </u>		
Queue Clearar		, ,					<u> </u>			<u> </u>		9.6	<u> </u>		
Green Extensio		(ge), s			_	0.0	<u> </u>		0.0	<u> </u>		0.0			
Phase Call Pro	-											1.00			
Max Out Proba	bility					_			_			1.00			_
Movement Gro	oup Res	sults			EB	_		WB	_		NB			SB	
Approach Move	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move					2	12	1	6	1	3		18			+
Adjusted Flow), veh/h			1177	1177	61	1380	<u> </u>	71		76			<u> </u>
	· ·	ow Rate (s), veh/h/	/In		1758	1728	151	1674	-	1688		1502			+
Queue Service					40.7	41.8	0.4	0.7	-	6.2		7.6			<u> </u>
		e Time (<i>g</i> c), s			40.7	41.8	78.8	0.7		6.2		7.6			+
Green Ratio (g		cc (g c), c			0.87	0.87	0.87	0.87	1	0.06		0.06			1
Capacity (c),					1528	1502	137	2910	-	95		84			+
Volume-to-Cap		atio (X)			0.770		0.448	0.474		0.748		0.905			
· ·		t/In (95 th percentile	e)		0.110	0.100	0.110			0.1 10		0.000		_	1
	. ,	eh/In (95 th percent	,		16.1	16.6	2.5	0.4		6.2		8.0			1
	· /	RQ) (95 th percent			0.00	0.00	0.65	0.00		1.32		0.00			+
Uniform Delay		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			3.9	4.0	12.7	0.00		69.8		70.4			1
Incremental De	· ,				3.8	4.2	6.3	0.1		29.2		68.2			+
Initial Queue D	• •	,			0.0	0.0	0.0	0.0		0.0		0.0		_	+
Control Delay (·			7.7	8.2	19.0	0.0		99.0		138.6			+
Level of Servic					A	0.2 A	B	0.4 A		99.0 F		F			
Approach Dela	<u>, ,</u>			7.9		A	1.2		A	119.	5	F	0.0		1
Intersection Dela	•			1.9			.6		А	119.3	~		0.0 A		
ILICI SECUOII DE	nay, 3/ve	/ii/ LOO				9							· · ·		
	sults				FB	_		WB			NB			SB	
Multimodal Re Pedestrian LOS		/108		1.81	EB	В	0.61	WB	A	2.33	NB	В	2.16	SB	В

		HC	S Sigr	nalize	d Inte	ersect	ion R	esu	lts S	Sum	mary	1				
0															4.2.4-1	1.11
General Inform	nation	LUDO							<u> </u>			ormatic			4	
Agency		HRG								ation,		0.250				
Analyst		MJV				e Dec 2				а Туре –	;	Other				*
Jurisdiction		SIOUX FALLS		Time F		_	eak Hou	ır	PHF			0.92			10	- #*
Urban Street		10TH STREET				r 2050			1	alysis I		1> 7:(00			La construction de la constructi
Intersection		LOWELL AVENUE		File Na	ame	2050	AMpeak	c Build	d IMJ	JR.xus					+	
Project Descrip	otion	I-229/10TH ST IMJ	R					-	-						1.000	1916
Demand Inform	mation				EB			W	/B			NB			SB	
Approach Move	ement			L	Т	R	L		Г	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			15	1045	5 10	55	18	80	50	15	15	55	90	20	35
Signal Informa	ation		_					Т		Γ	T					
Cycle, s	130.0	Reference Phase	6		1	7	- 24 S	2						<u>a</u>	1	4
Offset, s	99	Reference Point	Begin	·	-			ή.				1 100	1	2	3	4
Uncoordinated		Simult. Gap E/W	On	Green Yellow		95.1 3.6	17.3 3.6	0.0		0.0	0.0	_		-€		-+-
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0		0.0	0.0		5	6	7	Y
							_	ļ						1		
Timer Results				EBI		EBT	WB	L	WE		NBL	-	NBT	SBI	-	SBT
Assigned Phas	e					2	1		6				8			4
Case Number						6.3	1.0	_	4.(8.0			8.0
Phase Duration						100.7	6.4		107	_			22.9			22.9
Change Period		,				5.6	3.0		5.0	_			5.6			5.6
Max Allow Hea	2 1	·				0.0	4.2		0.0	0			4.3			4.3
Queue Clearan		(_)					2.9	_		_			9.0			16.8
Green Extensio		(ge), s			-	0.0	0.1	_	0.0	0			0.8			0.5
Phase Call Pro							0.8	_		_			1.00			1.00
Max Out Proba	bility	_	_			-	0.0)	-		-		0.00			0.26
Movement Gro	oup Res	sults			EB			WE	3			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ement			5	2	12	1	6		16	3	8	18	7	4	14
Adjusted Flow	Rate(<i>v</i>	′), veh/h		16	556	554	52	910) 9	908		92			158	
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In	255	1758	1752	1688	177	2 1	756		1606			1367	
Queue Service	Time (g	g s), s		4.7	18.6	18.6	0.9	29.	1 3	30.2		0.0			7.8	
Cycle Queue C	learanc	e Time (<i>g c</i>), s		28.1	18.6	18.6	0.9	29.	1 3	30.2		7.0			14.8	
Green Ratio (g	g/C)			0.73	0.73	0.73	0.77	0.7	8 0	0.78		0.13			0.13	
Capacity (c), v	veh/h			195	1286	1282	398	138	4 1	371		246			227	
Volume-to-Cap	acity Ra	atio (X)		0.081	0.432	0.432	0.130	0.65	57 0.	.662		0.375			0.696	
	. ,	t/In (95 th percentile														
		eh/In (95 th percent		0.5	11.6	11.6	0.5	13.	_	14.1		5.1			9.2	
-		RQ) (95 th percen	tile)	0.11	0.00	0.00	0.23	0.0	_	0.00		0.00			0.00	
Uniform Delay	. ,			16.7	8.6	8.6	5.3	6.0		6.3		51.9			55.4	
Incremental De		·		0.7	1.0	1.0	0.1	1.6	_	1.7		0.9			4.8	
Initial Queue D				0.0	0.0	0.0	0.0	0.0		0.0		0.0			0.0	
Control Delay (17.5	9.5	9.6	5.4	7.7		8.0		52.8			60.2	
Level of Servic	· /			B	A	A	A	A		A		D	Ļ		E	
Approach Dela				9.7		A	7.8		A	\	52.8	3	D	60.2	2	E
Intersection De	elay, s/ve	en / LOS				1:	2.3							В		
Multimodal Re	sults				EB			WE	3			NB			SB	
Pedestrian LOS	S Score	/LOS		1.63	3	В	1.6	2	В	3	2.31		В	2.31		В
Bicycle LOS So	core / LC	DS		1.45	5	А	2.2	7	В	3	0.64		А	0.75	5	А

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		HC	S Sigr	nalize	d Inte	ersect	ion R	esu	lts S	Sum	mary	1				
_														1		
General Inform	nation								Inte	ersecti	on Inf	ormatic	n			de la
Agency		HRG							Dura	ation,	h	0.250				
Analyst		MJV		Analys	is Date	e Dec 2	1, 2022		Area	а Туре	;	Other				<u>م</u>
Jurisdiction		SIOUX FALLS		Time F	Period	PM P	eak Hou	ır	PHF	=		0.92				
Urban Street		10TH STREET		Analys	is Yea	r 2050			Ana	alysis F	Period	1> 7:0)0			
Intersection		LOWELL AVENUE		File Na	ame	2050	PMpeal	c Build	d IMJ	JR.xus					*	
Project Descrip	tion	I-229/10TH ST IMJ	IR												1.1.902	24
Demand Inform	nation		-	_	EB	-	_	W	/D	-	1	NB	-		SB	-
Approach Move				L	T	R	1 .	<u>۷۷</u>		R			R	L	T	R
· ·					L	_	L							_		
Demand (v), v	en/n	_	_	30	2115	5 20	180	15	25	100	10	30	70	180	55	20
Signal Informa	tion				5		L JIL				T			14		1
Cycle, s	150.0	Reference Phase	2	1	2			21						4		A
Offset, s	145	Reference Point	Begin	Croon	0.6	01.4	22.5		<u></u>		0.0	_	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		91.4 3.5	32.5 3.5	0.0		0.0	0.0			\rightarrow		6 13
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0		0.0	0.0		5	6	7	Ŷ
								. 1							. 1	
Timer Results				EBL	-	EBT	WB		WE		NBI	-	NBT	SB	-	SBT
Assigned Phase	e				\rightarrow	2	1	\rightarrow	6	_			8	<u> </u>	_	4
Case Number						6.3	1.0	_	4.(_			8.0			8.0
Phase Duration	Duration, s					96.9	15.1	_	112				38.0			38.0
Change Period,					5.5	5.5	_	5.5				5.5			5.5	
Max Allow Head		· ·				0.0	4.2		0.0	0			4.3			4.3
Queue Clearan		, = ,			_		11.7			_		_	11.6			34.5
Green Extensio		(ge), s		<u> </u>		0.0	0.0		0.0	0			1.4	<u> </u>		0.0
Phase Call Prol				<u> </u>			1.00			-			1.00	<u> </u>		1.00
Max Out Proba	bility	_				-	1.00)	-		-		0.01			1.00
Movement Gro	oup Res	sults			EB	_		WE	3		_	NB	_		SB	_
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6		16	3	8	18	7	4	14
Adjusted Flow F	Rate (v), veh/h		32	1142	1142	167	758	3 7	747		120			277	
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	′ln	346	1758	1752	1688	177	2 1	733		1650			1229	
Queue Service				10.3	91.3	91.3	9.7	47.1	1 4	16.3		0.0			22.8	
Cycle Queue C		- ,		41.4	91.3	91.3	9.7	47.1	1 4	16.3		9.6			32.5	1
Green Ratio (g				0.61	0.61	0.61	0.69	0.7	1 0).71		0.22			0.22	1
Capacity (c), v	· ·			185	1070	+	157	125	_	231		383			307	
Volume-to-Capa		atio (X)		0.173	1.066		1.061	0.60	_	.607		0.312			0.903	
· ·	· ·	t/ln (95 th percentile	e)													
		eh/In (95 th percent		1.6	61.9	62.3	14.4	28.2	2 2	27.0		7.0			19.0	
		RQ) (95 th percen		0.31	0.00	0.00	6.10	0.00	_	0.00		0.00			0.00	
Uniform Delay (32.9	32.1	32.1	57.4	23.7	_	22.4		49.8			60.8	
Incremental De	· ,			1.1	40.5	41.8	78.0	1.6	_	1.6		0.5			28.1	
Initial Queue De		,		0.0	0.0	0.0	0.0	0.0	_	0.0		0.0			0.0	
Control Delay (·		34.0	72.6	74.0	135.4	25.2	_	24.0		50.2			88.9	
Level of Service				С	F	F	F	С	_	С		D			F	
Approach Delay	. ,			72.8		E	35.7		D		50.2		D	88.9	9	F
Intersection Del							9.0							E		
Multimodal Re	sults				EB			WE	3			NB			SB	
Pedestrian LOS	Score	/LOS		1.67	'	В	1.6	5	В	3	2.31		В	2.3	1	В
Bicycle LOS Sc	ore / LC	DS		2.43	;	В	2.1′	1	В	3	0.68	3	А	0.94	1	А

		HCS	57 Sig	nalize	d Int	ersec	tion F	Resu	lts	Sum	mary	y				
															4.2.4.1	
General Inform	nation										-	ormatic	-	- Ľ		10.0
Agency		HRG		1						ation, I		0.250		-		
Analyst		RL				Jul 29			_	а Туре -		Other				=
Jurisdiction		SIOUX FALLS		Time F		_	eak Hou		PHF			0.92				12
Urban Street		26TH STREET				⁻ 2027			Ana	lysis F	Period	1> 7:0	00	7		
Intersection		I-229 NB		File Na	ame	2027	AMpeak	.xus							**	
Project Descrip	tion	I-229/10TH ST IMJ	R						_					1	4 T 44Y	1947
Demand Inform	nation				EB			W	R			NB			SB	
Approach Move				L	Т	R	L	Т		R	L	T	R	L	Т	R
Demand (v), v				<u> </u>	480	115	315	14:	_		150	0	415	<u> </u>	<u> </u>	
	CH/H				+00	115	010	14	55		150	0	+15			
Signal Informa	tion										Τ		_			
Cycle, s	50.0	Reference Phase	6		2		12	2						+		
Offset, s	4	Reference Point	Begin	Green	10.4	12.5	12.1	0.0		0.0	0.0		1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.6	0.0		0.0	0.0					5 12
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.9	1.3	0.0		0.0	0.0		5	6	7	Ť
							T									
Timer Results				EBL		EBT	WB		WE		NBL	-	NBT	SBL	-	SBT
Assigned Phase	9				_	2	1	_	6	_			8		-	
Case Number						8.3	1.0		4.0				11.0			
Phase Duration					-	18.0	15.0	_	33.				17.0		-	
Change Period,	· ·					5.5	4.6	_	5.5	_			4.9			
Max Allow Head		,			_	0.0	2.2		0.0	5		_	2.4			
Queue Clearan		1 = 7					4.9	_		_		_	10.3			
Green Extensio		(ge), s			_	0.0	0.2		0.0	5		_	0.1			
Phase Call Prol					_		1.00	_		\rightarrow			1.00			
Max Out Proba	bility	_	_			_	0.01		-		_		1.00			_
Movement Gro	oup Res	sults			EB	_		WB	;	_	_	NB			SB	
Approach Move	-			L	Т	R	L	Т	Т	R	L	Т	R	L	Т	R
Assigned Move					2	12	1	6			3	8	18			
Adjusted Flow F). veh/h			342	161	342	1582	2			163	339			
		ow Rate (<i>s</i>), veh/h/	In		1674	1509	1652	1672	_			1714	1457			
Queue Service		. , ,			5.3	4.8	2.9	20.2				4.0	8.3			1
Cycle Queue C					5.3	4.8	2.9	20.2				4.0	8.3			
Green Ratio (g					0.25	0.25	0.50	0.55	_			0.24	0.45			1
Capacity (c), w					837	377	1235	1840	_			415	653			
Volume-to-Capa		itio (X)			0.409	0.427	0.277	0.86	_			0.393	0.519			1
· ·		/In (95 th percentile)		82.6	75.8	35.5	205.	_			62.9	96.9			1
	. ,	eh/In (95 th percent			3.3	3.0	1.4	8.1				2.5	3.9			
	. ,	RQ) (95 th percen	,		0.00	0.00	0.09	0.00	_			0.00	0.00			
Uniform Delay (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			19.2	17.8	7.7	9.6				15.9	9.9			1
Incremental De	. ,				0.6	1.4	0.0	2.4	_	\neg		0.2	0.3			1
Initial Queue De					0.0	0.0	0.0	0.0				0.0	0.0			
Control Delay (• •	•			19.8	19.2	7.7	12.0	_			16.1	10.2			
Level of Service					В	В	А	В				В	В			1
Approach Delay	. ,			19.6		В	11.2	2	В		12.1		В	0.0		
Intersection De						12	2.8							B		
Multimodal Re					EB			WB				NB			SB	
Pedestrian LOS				2.24		В	1.35		A		2.59		С	2.29		В
Bicycle LOS Sc	ore / LC	DS		0.84		А	2.07	7	В		1.32	2	A			

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		HCS	67 Sig	nalize	d Int	ersec	tion F	Resu	Its S	Sun	nmary	/				
General Inform	nation	1									ion Info		-	- 01	4	3.2415
Agency		HRG				1			Durat			0.250		-		
Analyst		RL				e Jul 29			Area	Туре	9	Other	•			÷
Jurisdiction		SIOUX FALLS		Time F		_	eak Hou	ır	PHF			0.92				1
Urban Street		26TH STREET		<u> </u>		⁻ 2027			Analy	/sis F	Period	1> 7:(00	N COL		
Intersection		I-229 SB		File Na	ame	2027	AMpeak	.xus							11	r [
Project Descript	tion	I-229/10TH ST IMJ	R					_	_	_					1.1.44	19 H H
Demand Inform	nation				EB			W	B	-		NB			SE	3
Approach Move				L	Т	R	L	Т		R	L L	Т	R	L	Т	
Demand (v), v					385	85	900	70	_		155	<u> </u>	210		<u> </u>	-
20110110 (17), 1											100		1.0		in 1	
Signal Informa	tion				- ÷								_		-	
Cycle, s	50.0	Reference Phase	6		é	-⊨ •	20	2						+ -	1	
Offset, s	36	Reference Point	Begin	Green	16.5	12.5	5.1	0.0) (0.0	0.0		-		*	
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.6	3.6	0.0		0.0 0.0	0.0			7		
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.9	1.9	1.3	0.0) (0.0	0.0		5	6		7 T
Timer Results			_	EBL		EBT	WB		WB	г	NBL		NBT	SBL	_	SBT
	ed Phase					2	1		6	-	INDL		8		+-	301
-	umber					_	· · ·		-	-			-	<u> </u>	\rightarrow	
Case Number	Jumber Duration, s					7.3	1.0		4.0	_		_	9.0		\rightarrow	
						18.0	22.0	_	40.0	-		_	10.0		\rightarrow	
-	e Period, (Y+R c), s low Headway (<i>MAH</i>), s				_	5.5	5.5		5.5	_		_	4.9		\rightarrow	
		,			_	0.0	2.2		0.0	-		_	2.3	<u> </u>	\rightarrow	
Queue Clearan		(=)			_	0.0	9.7	_	0.0	-		_	7.1	<u> </u>	\rightarrow	
Green Extensio		(ge), s			_	0.0	0.9		0.0	-			0.0	<u> </u>	\rightarrow	
Phase Call Pro					_		1.00			_			1.00		\rightarrow	
Max Out Proba	bility	_				-	0.04	1	-				1.00			
Movement Gro	oup Res	sults			EB	_		WE	;			NB	_		SE	3
Approach Move	ment			L	Т	R	L	Т	F	र	L	Т	R	L	Т	R
Assigned Move	ment				2	12	1	6			3		18			
Adjusted Flow F	Rate (v), veh/h			352	78	978	766			168		228			
Adjusted Satura	ation Flo	ow Rate (s), veh/h/	ln		1594	1410	1639	1616	3		1626					
Queue Service					4.6	1.9	7.7	5.8	_		2.5					
Cycle Queue C					4.6	1.9	7.7	5.8			2.5					
Green Ratio (g					0.25	0.35	0.62	0.69	_		0.10					
Capacity (c), v					797	497	1693	2229	_		332					
Volume-to-Capa		atio (X)			0.441	0.156	0.578	0.34			0.508					
· ·		/In (95 th percentile)		76.6	27	52.7	46.5			40.3					
	<u>, ,</u>	eh/In (95 th percent			3.0	1.1	2.1	1.8	_		1.6					
		RQ) (95 th percen			0.00	0.27	0.26	0.00	_		0.27					
Uniform Delay (,		15.8	11.1	4.4	4.1	_		21.3					
Incremental De	. ,				1.7	0.7	0.2	0.2			0.5	_				
Initial Queue De	• •	,			0.0	0.0	0.0	0.0	_		0.0					
Control Delay (• •	·			17.5	11.8	4.5	4.3	_		21.8	_	0.0			
Level of Service					В	B	A	A			С		A			
Approach Delay	. ,			16.5		B	4.4		A		9.3		A	0.0		
Intersection Del							.2							A		
	-				_											
Multimodal Re					EB			WE				NB			SE	
Pedestrian LOS				2.26		В	0.63	_	A		2.45		В	2.29	,	В
Bicycle LOS Sc	ore / LC	DS		0.91		А	1.93	3	В				F			

	_	HCS	57 Sig	nalize	d Int	ersec	tion R	lesi	ults Su	mmar	у	_	_	_	
									[.						
General Inform	nation								Intersec		1		- 11	42.49 B 4 L	N N
Agency		HRG							Duration		0.250			20122	
Analyst		RL		L		e Jul 29			Area Typ	be	Other		-		ام الحد
Jurisdiction		SIOUX FALLS		Time F		_	eak Hou	Ir	PHF		0.92				*
Urban Street		RICE STREET				⁻ 2027			Analysis	Period	1> 7:0	00	12		9 2
Intersection		I-229 NB		File Na	ame	2027	AMpeak	.xus						11	
Project Descrip	otion	I-229/10TH ST IMJ	R										1	1414	6-17 -
Demand Inform	mation				EB			V	/B		NB			SB	
Approach Move				L	Т	R	ΠL.		T R	ΤL.	T	R	L.	T	R
Demand (v), v				25	160	185	35	_	70 200	185	225	35	90	20	200
														-	
Signal Informa	ation					山	20.								1
Cycle, s	65.0	Reference Phase	6				*1	7					4		t
Offset, s	64	Reference Point	Begin	Green	29.7	4.0	15.3	0.	0 0.0	0.0		1		3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0			\rightarrow		512
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	0.		0.0		5	6	7	T.
						EDT									0.5.7
Timer Results				EBL		EBT	WB		WBT	NB		NBT	SBI		SBT
Assigned Phas	e				_	2		\rightarrow	6	<u> </u>	_	8	7	_	4
Case Number	se Duration, s					7.0 35.7		-	8.0 35.7			6.3	1.0		4.0 29.3
	ange Period, (Y+R c), s					35.7 6.0	<u> </u>	\rightarrow	6.0		-	21.3 6.0	8.0 4.0		29.3 6.0
-	2 · · · ·					0.0		-	0.0		_	5.7	6.0	_	5.7
	x Allow Headway (<i>MAH</i>), s eue Clearance Time ($g s$), s					0.0		\rightarrow	0.0			13.9	4.9		10.8
Green Extensio						0.0			0.0			1.4	0.0	_	4.3
Phase Call Pro		(90),0				0.0			0.0			1.00	0.83		1.00
Max Out Proba												1.00	1.00		0.28
Movement Gro	-	sults			EB			W	- i		NB			SB	
Approach Move				L	Т	R	L	Т	_	L	Т	R	L_L_	Т	R
Assigned Move				5	2	12	1	6		3	8	18	7	4	14
Adjusted Flow					201	201	530		453	201	283		98	239	
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	ln		1135	1370	1569		1315	1114	1616		1594	1371	
Queue Service	Time (g	g s), S			2.3	4.5	0.0		18.6	11.1	10.5		2.9	8.8	
Cycle Queue C	learanc	e Time (<i>g c</i>), s			20.7	4.5	17.7		18.6	11.9	10.5		2.9	8.8	
Green Ratio (g	g/C)				0.46	0.46	0.46		0.46	0.24	0.24		0.33	0.36	
Capacity (c), v					581	625	775		600	360	382		286	493	
Volume-to-Cap		· · /			0.346	0.322	0.684		0.756	0.558			0.342	0.485	<u> </u>
		In (95 th percentile			49.8	60.7	262.5		253.2	141.9			48.8	117.1	
	· · ·	eh/In (95 th percent	,		1.9	2.3	10.5		10.1	5.5	8.1		1.8	4.4	
		RQ) (95 th percen	tile)		0.00	0.00	0.00		0.00	0.60	0.00		0.24	0.00	
Uniform Delay	<u> </u>				6.6	7.6	14.4		14.4	23.9	23.0		16.9	16.2	
Incremental De		· ·			1.5 0.0	1.3	4.9		8.6	3.0	8.1		1.5	0.7	
	tial Queue Delay (d ȝ), s/veh					0.0	0.0		0.0	0.0	0.0		0.0	0.0	
, ,	ontrol Delay (<i>d</i>), s/veh					8.9	19.2		23.1	26.9	31.1		18.5 B	16.9	
Level of Service				9.6	A	A	B		C	C	C	C		B	P
Approach Dela				8.5		A 20	21.0	J	С	29.3		С	17.4 P	+	В
Intersection De	ay, s/ve					20	0.0						В		
Multimodal Re	sults				EB			W	B		NB			SB	
Pedestrian LOS		/ LOS		1.89	1	В	1.89		B	1.92		В	2.09		В
Bicycle LOS So				1.15		A	1.30		A	1.29	_	A	1.04	_	A
,															

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General Information Intersection Information Agency HRG Duration, h 0.250 Analysit RL Analysis Date Jul 29, 2020 Area Type Other Jurisdiction SICUX FALLS Time Period AM Peak NUP PHF 0.92 Urban Street RICE STREET Analysis Var 2027 Analysis Period 1>7.00 Intersection I-229 SB File Name 2027 AMpeak xus Project Description I>29/10TH ST IMJR Demand Information L T R L T R L T Queles 660 Reference Phase 6 Green 3.5 36.7 7.8 0.0 0.0 0.0 Force Mode Fixed Simult. Gap EW On Red 2.0 2.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	
Agency HRG Duration Duration Not occurs	
AnalysisRLAnalysisDateJul 29, 2020AreaTypeOtherOtherJul 24Jul 24	1 2 4
Jurisdiction SIOUX FALLS Time Period MPeak Hour PHF 0.92 Unarticle intersection I2027 Marking Period I207 Marking Period Marking Period <t< td=""><td>1. Starten,</td></t<>	1. Starten,
Intersection I-229 SB File Name 2027 AMpeak.xus NB NB S Approach Movement I_229/10TH ST IMJR L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T <td< td=""><td>÷</td></td<>	÷
Project Description I=22/10TH ST IMJR EB WB NB S Approach Movement L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	
Approach Movement L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R R L T R L T R L T R L T R L T R L T R L T	492
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	3
Signal Information Cycle, s 65.0 Reference Phase 6 Offset, s 12 Reference Point Begin Green 3.5 35.7 7.8 0.0 0.0 0.0 Force Mode Fixed Simult. Gap E/W On Red 2.0 2.0 0.0 0.0 0.0 0.0 Timer Results EBL EBL EBL EBT WBL WBT NBL NBT SBL Assigned Phase 5 2 6 MBT SBL SBL Case Number 1.0 4.0 8.3 <t< td=""><td>R</td></t<>	R
Cycle, s 65.0 Reference Point Begin Green Green 3.5 35.7 7.8 0.0 0.0 0.0 Uncoordinated No Simuit. Gap E/W On No Simuit. Gap E/W On No No No Simuit. Gap N/S On No	80
Cycle, s 65.0 Reference Pnint Begin Green 3.5 35.7 7.8 0.0 0.0 0.0 Uncoordinated No Simuit. Gap E/W On No Simuit. Gap E/W On No No Simuit. Gap N/S On No No No Simuit. Gap N/S No No <td></td>	
	L
	3
Timer Results EBL EBT WBL WBL NBL NBT SBL Assigned Phase 5 2 6 6 \sim <td></td>	
Assigned Phase 5 2 $\begin{tabular}{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c $	7 8
Assigned Phase 5 2 $\begin{tabular}{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c }{ c $	SBT
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	4
	9.0
Change Period, (Y+R c), s5.07.0I7.0IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII <th< td=""><td>13.8</td></th<>	13.8
Max Allow Headway (MAH), s 4.1 0.0 0.0 Image: Second Seco	6.0
Queue Clearance Time ($g \circ$), s 3.9 I <td>4.2</td>	4.2
Green Extension Time (g e), s0.10.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.00.0 <th< td=""><td>7.6</td></th<>	7.6
Phase Call Probability0.88Image Call Probability0.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.880.88	0.3
Max Out Probability 1.00 Image: Constraint of the sector of the se	0.99
Movement Group Results EB WB B <td>1.00</td>	1.00
Approach MovementLTRLTRLTRLTRLTRLTRLTRLTRLTRLTRLTRLTRLTRLTRLTRLTRALTRALTRALTRALTRALTRALTRALTRAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA </th <th></th>	
Assigned Movement5261677Adjusted Flow Rate (v), veh/h120255650050066147147Adjusted Saturation Flow Rate (s), veh/h/ln164715556166814676616316341634Queue Service Time (g_s), s1.91.91.917.516.0661616316341634Cycle Queue Clearance Time (g_c), s1.91.91.917.516.0661616356.616Green Ratio (g/C)0.630.68616915805660.1216196196196196196Volume-to-Capacity Ratio (X)0.3460.12160.6170.62166161414.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914.914	T.
Adjusted Flow Rate (v), veh/h120255 m m 565 500 m m m 147 Adjusted Saturation Flow Rate (s), veh/h/ln16471555 m 16681467 m	R
Adjusted Saturation Flow Rate (s), veh/h/ln16471555Image: flow flow flow flow flow flow flow flow	14
Queue Service Time $(g \circ)$, s1.91.91.91.7.516.01.01.05.6Cycle Queue Clearance Time $(g \circ)$, s1.91.91.917.516.01.05.65.65.6Green Ratio (g/C) 0.630.680.680.550.550.550.60.120.12Capacity (c) , veh/h34521161.09158051.01.01.96Volume-to-Capacity Ratio (X) 0.3460.1211.00.6170.6211.00.7500.55Back of Queue (Q) , ft/ln (95 th percentile)23.518.91.0116.7138.51.0114.9114.9Back of Queue (Q) , veh/ln (95 th percentile)0.90.71.04.45.51.01.014.4Queue Storage Ratio (RQ) (95 th percentile)0.240.001.00.000.001.01.027.71.0Incremental Delay $(d 1)$, s/veh8.53.60.11.00.00.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.01.0 <td>87</td>	87
Cycle Queue Clearance Time (gc), s1.91.91.91.7.516.01.01.05.6Green Ratio (g/C)0.630.680.680.550.550.550.50.120.12Capacity (c), veh/h345211609158050.51.0196196Volume-to-Capacity Ratio (X)0.3460.1210.120.6170.6210.60.00.7500.750Back of Queue (Q), th/ln (95 th percentile)23.518.90.6116.7138.50.60.1114.9Back of Queue (Q), veh/ln (95 th percentile)0.90.70.64.45.50.60.6114.9Queue Storage Ratio (RQ) (95 th percentile)0.240.000.00.000.000.000.000.30.36Uniform Delay (d_1), s/veh8.53.60.10.30.30.30.30.00.00.00.0Intial Queue Delay (d_3), s/veh0.00.00.00.00.00.00.00.00.00.00.00.0Control Delay (d_1), s/veh9.13.70.70.88.611.60.00.00.00.00.00.0	1369
Green Ratio (g/C) 0.63 0.68 0 0.55 0.55 0 0 0.12 Capacity (c), veh/h 345 2116 0 915 805 0 0 196 Volume-to-Capacity Ratio (X) 0.346 0.121 0 0.617 0.621 0 0 0.750 Back of Queue (Q), tr/ln (95 th percentile) 23.5 18.9 0 116.7 138.5 0 0 114.9 Back of Queue (Q), veh/ln (95 th percentile) 0.9 0.7 0 4.4 5.5 0 0 4.4 14.9 Queue Storage Ratio (RQ) (95 th percentile) 0.24 0.00 0 0.00 0.00 0.00 0 0 27.7 Incremental Delay (d 1), s/veh 8.5 3.6 0 0.3 0.3 0.3 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 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 <	3.9
Capacity (c), veh/h 345 2116 Image: Married Marrie	3.9
Volume-to-Capacity Ratio (X) 0.346 0.121 0 0.617 0.621 0 0 0.750 Back of Queue (Q), ft/ln (95 th percentile) 23.5 18.9 0 116.7 138.5 0 0 114.9 Back of Queue (Q), veh/ln (95 th percentile) 0.9 0.7 0 4.4 5.5 0 0 4.4 10.0 Queue Storage Ratio (RQ) (95 th percentile) 0.24 0.00 0 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.12
Back of Queue (Q), ft/ln (95 th percentile) 23.5 18.9 Image: Married Marri	164
Back of Queue (Q), veh/ln (95 th percentile) 0.9 0.7 Image: Constraint of the percentile of the percentite of the percentite of the percentite of the percentite of the pe	0.531
Queue Storage Ratio (RQ) (95 th percentile) 0.24 0.00 Image: Constraint of the constraint of th	2.4
Uniform Delay (d 1), s/veh 8.5 3.6 8.3 11.2 1000000000000000000000000000000000000	0.00
Incremental Delay (d 2), s/veh 0.6 0.1 0 0.3 0.3 0.3 6.9 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0<	26.9
Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	26.9
Control Delay (d), s/veh 9.1 3.7 8.6 11.6 34.5	0.0
	29.5
Level of Service (LOS) A A A B C	29.5 C
Approach Delay, s/veh / LOS 5.4 A 10.0 A 0.0 32.7	C
Intersection Delay, s/veh / LOS 12.1 B	
Multimodal Results EB WB NB SI	3
Pedestrian LOS Score / LOS 0.65 A 1.87 B 2.13 B 2.30	В
Bicycle LOS Score / LOS 0.80 A 1.43 A	F

		HCS	67 Sig	nalize	d Int	ersec	tion F	lesu	lts	Sum	ımar	У				
General Informa		-										ormatic	on		1.2.4	
Agency		HRG							Dura	ation, l	h	0.250		-		
Analyst		RL		Analys	is Date	ə Jul 29	, 2020		Area	а Туре	<u>}</u>	Other		-A-		-
Jurisdiction		SIOUX FALLS		Time P	'eriod	PM Pe	eak Hou	ır	PHF	:		0.92		÷		
Urban Street		26TH STREET		Analys	is Year	r 2027			Ana	lysis F	Period	1> 7:0	00			
Intersection		I-229 NB		File Na	ame	2027	PMpeak	(.xus							+1	
Project Description	on	I-229/10TH ST IMJ	IR												4 1 447	2.92
Demand Informa	ation		_		EB			W	B			NB	_	1	SB	
Approach Movem	nent			L	Т	R	L	Т	·T	R	L	Т	R	L	Т	R
Demand (v), veh	h/h				1065	5 105	100	105	55		65	0	805		1	
						<u>i</u>		كبنا							in a state	
Signal Information	1	F	1	L	e	- +										
	50.4	Reference Phase	2		2	. R≓ ″	- 51)	2				×			3	
Offset, s	48	Reference Point	Begin	Green	9.0	17.4	9.0	0.0)	0.0	0.0			_		
	Yes	Simult. Gap E/W	On	Yellow	0	3.6	3.6	0.0		0.0	0.0			Y		· 🔨
Force Mode F	Fixed	Simult. Gap N/S	On	Red	1.0	1.9	1.3	0.0)	0.0	0.0		5	6	7	
Timer Results			_	EBL		EBT	WB	L	WE	3T	NBL		NBT	SBL		SBT
Assigned Phase	ed Phase					2	1		6			-	8		-	
Case Number	Number				+	8.3	1.0		4.0	_			11.0		+	
Phase Duration, s	Duration, s					22.9	13.6	_	36.	_		_	13.9			
	e Period, (Y+R c), s				+	5.5	4.6		5.5				4.9		\rightarrow	
2 ,	e Period, (Y+R c), s low Headway (<i>MAH</i>), s					3.1	2.2		3.1				2.4			
Queue Clearance		·			-	13.0	2.7		12.				11.0	<u> </u>	\rightarrow	
Green Extension						1.8	0.0		5.3				0.0			
Phase Call Proba		(90),0			-	1.00	1.00		1.0				1.00		+	
Max Out Probabil						1.00	0.00		0.0				1.00		+	
								<u>ni</u>		an)						
Movement Grou	-	ults			EB			WB	-	_		NB			SB	1
Approach Movem					Т	R	L	T	+	R		T	R	L	Т	R
Assigned Movem					2	12	1	6	+	\rightarrow	3	8	18		<u> </u>	
Adjusted Flow Ra		,			538	259	109	1147		_		71	658		<u> </u>	
		w Rate (s), veh/h/	'ln		1685	1604	1652	1649		\rightarrow		1714	1488		<u> </u>	
Queue Service Ti					11.0	6.3	0.7	10.3		_		1.8	9.0			
Cycle Queue Cle		e Time (<i>g c</i>), s			11.0	6.3	0.7	10.3	_			1.8	9.0			
Green Ratio (g/C	· ·				0.35	0.35	0.56	0.62	_	\rightarrow		0.18	0.36		 	
Capacity (c), vel					1163	554	1050	2029	_	\rightarrow		306	522			
Volume-to-Capac	-	. ,	,		0.462		0.103	0.56		\rightarrow		0.231	1.260		 	
	,	In (95 th percentile	,		69	65.7	8.2	102.	_	\rightarrow		29.1	895.6		<u> </u>	
	· ·	h/ln (95 th percent			2.7	2.6	0.3	4.1		\rightarrow		1.2	35.8		 	+
-		RQ) (95 th percen	ule)		0.00	0.00	0.02	0.00	_	\rightarrow		0.00	0.00		<u> </u>	
Uniform Delay (a	· · ·				12.9	12.9	6.8	5.7		\rightarrow		17.7	16.1			-
Incremental Delay	• •	,			0.0	0.0	0.0	0.2	_	\rightarrow		0.1	131.9		<u> </u>	+
Initial Queue Dela		•			0.0	0.0	0.0	0.0	_	\rightarrow		0.0	0.0			
Control Delay (d		n			12.9	12.9	6.8	5.9	+	\rightarrow		17.9	148.0 F		<u> </u>	+
Level of Service (. ,	/1.08		12.0	В	B	A	A		\rightarrow	125	B		0.0	L	
Approach Delay,				12.9		B	6.0		A	\rightarrow	135.4	+	F	0.0		
Intersection Delay	y, s/ve	II / LUS				41	1.8							D		
Multimodal Resu	ults				EB			WB	\$			NB			SB	
				2.37		В	1.33	3	A		2.59		С	2.29		В
Pedestrian LOS S	Score	/LOS		2.57		i		- 1			2.00	·	0	2.20	·	

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		HCS	67 Sig	nalize	d Int	ersec	tion F	Resu	lts S	Sun	nmary	/				
Concret Inform	otion								Intor		ion Info	, www.otio		Γp	4.3.44	
General Inforn	nation												on	- 01		
Agency		HRG					0000		Dura			0.250		-		
Analyst		RL		<u> </u>		Jul 29			Area	• •	9	Other				=
Jurisdiction		SIOUX FALLS		Time F		_	eak Hou		PHF			0.92		-		12
Urban Street		26TH STREET		<u> </u>		2027			Anal	ysis l	Period	1> 7:0)0			
Intersection		I-229 SB	_	File Na	ame	2027	PMpeak	(.xus						_	11	·
Project Descrip	tion	I-229/10TH ST IMJ	R	-	-	-	-	-	-	-	-	-	-		HE THEFT	<u>1910</u>
Demand Inform	nation				EB			W	В			NB			SB	
Approach Move	ement			L	Т	R	L	т		R	L	Т	R	L	Т	R
Demand (v), v	eh/h				590	95	640	48	0		150		580			
Signal Informa	tion				Γ	1	Г			_						
Cycle, s	100.0	Reference Phase	2	-	2										~	
Offset, s	97	Reference Point	Begin				26	2					1	2	11	4
Uncoordinated	No	Simult. Gap E/W	On	Green		28.5	10.1	0.0		0.0	0.0	_		~ 		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow Red	3.6	3.6	3.6 1.3	0.0		0.0 0.0	0.0	_	5	¥ 6	7	I Y
	TIXOU	official cup 14/0	on	Tiou	1.0	1.0	1.0	0.0		0.0	0.0					
Timer Results				EBL	-	EBT	WB	L	WB	Т	NBL		NBT	SBL		SBT
Assigned Phase	e					2	1		6				8			
Case Number						7.3	1.0		4.0)			9.0			
Phase Duration	i, S					34.0	51.0)	85.0	0			15.0			
Change Period	, (Y+R	c), S				5.5	5.5		5.5	5			4.9			
Max Allow Head	dway(<i>I</i>	<i>MAH</i>), s				0.0	2.2		0.0)			2.4			
Queue Clearan	ce Time	e (g s), s					8.5						12.1			
Green Extensio	n Time	(ge), s				0.0	0.8		0.0)			0.0			
Phase Call Pro	bability						1.00)					1.00			
Max Out Proba	bility						0.00)	_				1.00			
Movement Gro	oup Res	sults			EB			WB		-		NB			SB	
Approach Move					Т	R	L	Т	-	R	L	Т	R	L	Т	R
Assigned Move				_	2	12	1	6	<u> </u>		3	· ·	18	_	<u> </u>	
Adjusted Flow I) veh/h			646	104	696	522	-	_	163		630			
-	· ·	ow Rate (<i>s</i>), veh/h/	In		1643	1422	1639	1630	_	_	1626		000			
Queue Service		· · · · · ·			17.5	4.8	6.5	3.9	_	_	4.7				<u> </u>	
		e Time (<i>g</i> _c), s			17.5	4.8	6.5	3.9		_	4.7					
Green Ratio (g		o milo (g o), o			0.28	0.39	0.76	0.80	_	_	0.10					
Capacity (c), v	,				937	549	1808	2592	_		328					
Volume-to-Cap		atio (X)			0.690	0.189	0.385	0.20			0.497					
•	· ·	/In (95 th percentile)		282.5	76.7	76	42.1			88.1					
	. ,	eh/In (95 th percent			11.1	3.0	3.0	1.7	_		3.4					
		RQ) (95 th percen			0.00	0.77	0.38	0.00			0.59					
Uniform Delay					31.8	20.3	6.9	2.5	_		42.5					
Incremental De	. ,				3.2	0.6	0.0	0.1			0.4					
Initial Queue De	2 1	,			0.0	0.0	0.0	0.0	+		0.0	_				
Control Delay (·			35.0	20.9	7.0	2.6			43.0		0.0			
Level of Service					D	C	A	A			D		A			
Approach Dela	. ,			33.1		C	5.1		A		8.8		A	0.0		
Intersection De				00.1			3.8				0.0			B		
														_		
Multimodal Re	sults				EB			WB				NB			SB	
Pedestrian LOS	S Score	/ LOS		2.29		В	0.63	3	Α		2.47		В	2.32	2	В
Bicycle LOS Sc	ore / LC	DS		1.10		А	1.49	2	А				F			

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		_						_	nmar	,	_	_	_	_
General Information								Intersec		-				an la
Agency	HRG							Duration	, h	0.250		-		
Analyst	RL		L		Nov 3			Area Typ	e	Other				
Jurisdiction	SIOUX FALLS		Time F		_	eak Hou	r	PHF		0.92		4	1	*
Urban Street	RICE STREET		Analys	is Year	· 2027			Analysis	Period	1> 7:0	00	1		
Intersection	I-229 NB		File Na	ame	2027	PMpeak	.xus						11	
Project Description	I-229/10TH ST IMJ	IR										1	1.444	10
Demand Information	_			EB			W	B		NB			SB	
Approach Movement			L	T	R	L	T	1	L	T	R	L	T	R
Demand (v), veh/h			75	515	585	60	35		145	115	40	335	30	110
			10	010	000	00	00		110	no	10	000	00	110
Signal Information				- 5	八	21.								1
Cycle, s 75.0	Reference Phase	2				20	2					4		str.
Offset, s 72	Reference Point	Begin	Green	38.0	10.0	11.0	0.0	0.0	0.0	_	1	1 2	3	4
Uncoordinated No	Simult. Gap E/W	On	Yellow		4.0	4.0	0.0		0.0			\rightarrow	V	512
Force Mode Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	0.0	0.0	0.0		5	6	7	<u> </u>
Timer Dessilte			EDI		EDT			MDT	ND	_	NDT		_	ODT
Timer Results Assigned Phase			EBL	-	EBT 2	WBI	-	WBT 6	NBI	-	NBT 8	SBI 7	·	SBT 4
<u> </u>							\rightarrow	-			-	· · ·		
Case Number	se Duration, s				7.0		\rightarrow	8.0			6.3	1.0		4.0
	ase Duration, s ange Period, (Y+ <i>R</i> c), s				44.0		\rightarrow	44.0			17.0	14.0		31.0
	ange Period, (Y+R c), s x Allow Headway (<i>MAH</i>), s				6.0		\rightarrow	6.0			6.0	4.0	_	6.0
	x Allow Headway (<i>MAH</i>), s				0.0		\rightarrow	0.0			5.7	6.0		5.7
Queue Clearance Time	, _ ,				0.0		\rightarrow	0.0			11.6	12.0	,	8.1
Green Extension Time Phase Call Probability	(g e), s		<u> </u>	_	0.0	<u> </u>	\rightarrow	0.0	<u> </u>		0.0	0.0		3.0 1.00
Max Out Probability											1.00	1.00		0.07
Max Out 1 Tobability											1.00	1.00	,	0.07
Movement Group Res	sults			EB			WE	3		NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v	′), veh/h			641	636	256		310	158	168		364	152	
Adjusted Saturation Flo	ow Rate (<i>s</i>), veh/h/	′ln		1464	1434	1072		1329	1206	1570		1594	1390	İ –
Queue Service Time (g s), s			16.4	29.2	0.0		11.2	9.6	7.7		10.0	6.1	
Cycle Queue Clearanc	æ Time (<i>g c</i>), s			28.5	29.2	8.8		11.2	9.6	7.7		10.0	6.1	İ –
Green Ratio (g/C)				0.51	0.51	0.51		0.51	0.15	0.15		0.31	0.33	1
Capacity (c), veh/h				796	727	604		673	273	230		359	463	
Volume-to-Capacity Ra	atio(X)			0.806	0.875	0.423		0.460	0.578	0.732		1.014	0.328	
Back of Queue (Q), ft	/In (95 th percentile)		299.5	377.8	114.7		149.1	143.5	172.2		301	87.4	
Back of Queue (Q), v	· · ·			11.3	14.3	4.6		6.0	5.5	6.6		11.2	3.3	
Queue Storage Ratio (,, .	itile)		0.00	0.00	0.00		0.00	0.61	0.00		1.50	0.00	
Uniform Delay (<i>d</i> 1), s				12.3	15.7	11.0		11.8	31.4	30.6		26.6	18.7	
Incremental Delay (d z	2), s/veh			6.5	10.8	2.2		2.3	4.8	13.6		51.0	0.4	
Initial Queue Delay (d	,			0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/v					26.4	13.2		14.0	36.2	44.2		77.6	19.1	
					C C	В		В	D	D		F	В	
Level of Service (LOS)	vel of Service (LOS) proach Delay, s/veh / LOS					13.6	6	В	40.4		D	60.4		E
Approach Delay, s/veh					30).1						С		
,														
Approach Delay, s/veh Intersection Delay, s/ve				EP			\\/□	2					CD	
Approach Delay, s/veh	eh / LOS		1.89	EB	B	1.89	WE	B	1.93	NB	B	2.10	SB	В

UCS7 Signalized Interpretion Paculto Summary

UncoordinatedNoSimult. Gap E/WOForce ModeFixedSimult. Gap N/SOForce ModeFixedSimult. Gap N/SOTimer ResultsAssigned PhaseCase NumberPhase Duration, sChange Period, $(Y+R c)$, sMax Allow Headway (MAH), sQueue Clearance Time ($g s$), sGreen Extension Time ($g e$), sPhase Call ProbabilityMax Out ProbabilityMax Out ProbabilityMax Out ProbabilityApproach MovementAssigned MovementAdjusted Saturation Flow Rate (s), veh/hAdjusted Flow Rate (v), veh/hAdjusted Saturation Flow Rate (s), sCycle Queue Clearance Time ($g c$), sGreen Ratio (g/C)Capacity (c), veh/hVolume-to-Capacity Ratio (X)Back of Queue (Q), tr/ln (95 th percentile)Back of Queue (Q), veh/ln (95 th percentile)Queue Storage Ratio (RQ) (95 th percentile)Uniform Delay ($d t$), s/veh	2 egin On	Analysi Time P Analysi File Na L 190	eriod s Year	2027	0, 2020 eak Hou PMpeak	r 1	I ntersect i Duration, Area Type PHF Analysis F	h ;	0.250 Other 0.92	'n		JL	25
AgencyHRGAnalystRLJurisdictionSIOUX FALLSUrban StreetICE STREETIntersectionI-229 SBProject DescriptionI-229/10TH ST IMJEDemand InformationApproach MovementDemand InformationApproach MovementDemand (v), veh/hSignal InformationCycle, s75.0Reference PhaseOffset, s11Reference PhaseSignal InformationCase NumberChange Period, (Y+R c), sMax Allow Headway (MAH), sQueue Clearance Time (g s), sGreen Extension Time (g s), sGreen Extension Time (g s), sCycle Queue Clearance Time (g s), sApproach MovementAdjusted Saturation Flow Rate (s	2 egin On	Time P Analysi File Na L	eriod s Year me EB	PM Pe 2027	eak Hou	r 1	Duration, Area Type PHF	h ;	0.250 Other	on 	- 2	JL	
AnalystRLJurisdictionSIOUX FALLSUrban StreetRICE STREETIntersectionI-229 SBProject DescriptorI-229/10TH ST IMJRDemand InformationApproach MovementDemand (v), veh/hSignal InformationApproach MovementDemand (v), veh/hSignal InformationApproach MovementOffset, s11Reference PhaseOffset, s11Reference PointBimult. Gap N/SOffset, s11Reference PointBimult. Gap N/SOffset, s11Reference PointBimult. Gap N/SOffset, s11Reference PointBimult. Gap N/SImmer ResultsAssigned PhaseCase NumberCase NumberPhase Duration, sChange Period, (Y+R c), sMax Allow Headway (MAH), sQueue Clearance Time (g c), sPhase Call ProbabilityMay Out ProbabilityMovement Group Rate (v), veh/hAdjusted Saturation Flow Rate (v), veh/hAdjusted Satura	2 egin On	Time P Analysi File Na L	eriod s Year me EB	PM Pe 2027	eak Hou	r l	Area Type PHF	;	Other			1	
SIOUX FALLSJurisdictionSIOUX FALLSUrban StreetRICE STREETIntersectionI-229 SBProject DescriptionI-229/10TH ST IMJRDemand InformationApproach MovementDemand (v), veh/hDemand (v), veh/hSignal InformationCycle, s75.0Reference PhaseOffset, s11Reference PointBiIncoordinatedNoSimult. Gap E/WIncoordinatedNoSimult. Gap N/SCycle, s75.0Force ModeFixedSigned PhaseCase NumberPhase Duration, sChange Period, ($Y+R c$), sMax Allow Headway (MAH), sQueue Clearance Time ($g c$), sPhase Call ProbabilityMax Out ProbabilityMax Out ProbabilityMax Out ProbabilityMax Out ProbabilityMax Out ProbabilityMay Out ProbabilityMay Out ProbabilityApproach MovementAssigned MovementAdjusted Flow Rate (v), veh/hAdjusted Flow Rate (v), veh/hAdjusted Saturation Flow Rate (s), veh/h/lnQueue Service Time ($g c$), sGreen Ratio (g/C)Capacity (c), veh/hVolume-to-Capacity Ratio (X)Back of Queue (Q , ft/ln (95 th percentile)Back of Queue (Q), veh/ln (95 th percentile)Queue Storage Ratio (RQ) (95 th percentile)Queue Storage Ratio (RQ) (95 th percentile)Queue Storage Ratio (RQ) (95 th percentile) </td <td>2 egin On</td> <td>Time P Analysi File Na L</td> <td>eriod s Year me EB</td> <td>PM Pe 2027</td> <td>eak Hou</td> <td>r I</td> <td>PHF</td> <td></td> <td></td> <td></td> <td>1.1.</td> <td></td> <td></td>	2 egin On	Time P Analysi File Na L	eriod s Year me EB	PM Pe 2027	eak Hou	r I	PHF				1.1.		
Urban StreetRICE STREETIntersectionI-229 SBProject DescriptionI-229/10TH ST IMJRDemand InformationApproach MovementDemand (v), veh/hDemand (v), veh/hSignal InformationCycle, s75.0Reference PhaseOffset, s11Reference PointBiIncoordinatedNoSignal ResultsSimult. Gap E/W0Force ModeFixedSimult. Gap N/SForce ModeFixedSimult. Gap N/SGase NumberSCase NumberPhase Duration, sChange Period, ($Y+R c$), sMax Allow Headway (MAH), sQueue Clearance Time ($g c$), sGreen Extension Time ($g c$), sSPhase Call ProbabilityMax Out ProbabilityMax Out ProbabilityMax Out ProbabilityMax Out ProbabilityAdjusted Flow Rate (v), veh/hAdjusted Flow Rate (v), veh/hAdjusted Saturation Flow Rate (s), veh/h/InQueue Service Time ($g c$), sGreen Ratio (g/C)Capacity (c), veh/hVolume-to-Capacity Ratio (X)Back of Queue (Q), tr/ln (95 th percentile)Back of Queue (Q), te/ln (95 th percentile)Queue Storage Ratio (RQ) (95 th percentile)Queue Storage Ratio (RQ) (95 th percentile)	2 egin 0n	Analysi File Na L	s Year me EB	2027				Period	0.92				
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Assigned Phase Case Number Phase Duration, s Change Period, ($Y+R c$), s Max Allow Headway (MAH), s Queue Clearance Time ($g s$), s Green Extension Time ($g e$), s Phase Call Probability Max Out Probability Max Out Probability Movement Group Results Approach Movement Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time ($g s$), s Cycle Queue Clearance Time ($g c$), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile)		Red	2.0	2.0	2.0	0.0	0.0	0.0		5	6	7	8
Assigned Phase Case Number Phase Duration, s Change Period, ($Y+R c$), s Max Allow Headway (MAH), s Queue Clearance Time ($g s$), s Green Extension Time ($g e$), s Phase Call Probability Max Out Probability Max Out Probability Movement Group Results Approach Movement Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time ($g s$), s Cycle Queue Clearance Time ($g c$), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile)													
Case Number Phase Duration, s Change Period, $(Y+R c)$, s Max Allow Headway (<i>MAH</i>), s Queue Clearance Time ($g s$), s Green Extension Time ($g e$), s Phase Call Probability Max Out Probability Movement Group Results Approach Movement Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time ($g s$), s Cycle Queue Clearance Time ($g c$), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile)	\rightarrow	EBL	_	EBT	WBI	-	WBT	NBL		NBT	SBL		SBT
Phase Duration, s Change Period, ($Y+R c$), s Max Allow Headway (MAH), s Queue Clearance Time ($g s$), s Green Extension Time ($g e$), s Phase Call Probability Max Out Probability Max Out Probability Movement Group Results Approach Movement Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time ($g s$), s Cycle Queue Clearance Time ($g c$), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile)	\rightarrow	5		2			6					\rightarrow	4
Change Period, ($Y+R c$), s Max Allow Headway (MAH), s Queue Clearance Time ($g s$), s Green Extension Time ($g e$), s Phase Call Probability Max Out Probability Max Out Probability Movement Group Results Approach Movement Adjusted Flow Rate (v), veh/h Adjusted Flow Rate (v), veh/h Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time ($g s$), s Cycle Queue Clearance Time ($g c$), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile)		1.0		4.0			8.3						9.0
Max Allow Headway (<i>MAH</i>), s Queue Clearance Time ($g s$), s Green Extension Time ($g e$), s Phase Call Probability Max Out Probability Movement Group Results Approach Movement Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time ($g s$), s Cycle Queue Clearance Time ($g c$), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile)	\rightarrow	12.7		47.5			34.8						27.5
Queue Clearance Time $(g \circ)$, s Green Extension Time $(g \circ)$, s Phase Call Probability Max Out Probability Movement Group Results Approach Movement Assigned Movement Adjusted Flow Rate (v) , veh/h Adjusted Saturation Flow Rate (s) , veh/h/ln Queue Service Time $(g \circ)$, s Cycle Queue Clearance Time $(g \circ)$, s Green Ratio (g/C) Capacity (c) , veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q) , ft/ln $(95$ th percentile) Back of Queue (Q) , veh/ln $(95$ th percentile) Queue Storage Ratio (RQ) $(95$ th percentile)		5.0		7.0			7.0						6.0
Green Extension Time ($g e$), s Phase Call Probability Max Out Probability Movement Group Results Approach Movement Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time ($g s$), s Cycle Queue Clearance Time ($g c$), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile)		4.1		0.0			0.0						4.2
Phase Call Probability Max Out Probability Movement Group Results Approach Movement Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time (g_s), s Cycle Queue Clearance Time (g_c), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile)		7.4											20.4
Max Out Probability Movement Group Results Approach Movement Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time (g_s), s Cycle Queue Clearance Time (g_c), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile)		0.4		0.0			0.0						1.1
Movement Group ResultsApproach MovementAssigned MovementAdjusted Flow Rate (v), veh/hAdjusted Saturation Flow Rate (s), veh/h/lnQueue Service Time (gs), sCycle Queue Clearance Time (gc), sGreen Ratio (g/C)Capacity (c), veh/hVolume-to-Capacity Ratio (X)Back of Queue (Q), ft/ln (95 th percentile)Back of Queue (Q), veh/ln (95 th percentile)Queue Storage Ratio (RQ) (95 th percentile)Uniform Delay (dt), s/veh		0.99											1.00
Approach Movement Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time (g_s), s Cycle Queue Clearance Time (g_c), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay (d_1), s/veh		0.07											0.40
Approach Movement Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time (g_s), s Cycle Queue Clearance Time (g_c), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay (d_1), s/veh	_	_	EB			WB	_	_	NB			SB	
Assigned Movement Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time (g_s), s Cycle Queue Clearance Time (g_c), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay (d_1), s/veh		1	T	R	L	Т	R	L	Т	R		T	R
Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time (g_s), s Cycle Queue Clearance Time (g_c), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay (d_1), s/veh	\rightarrow	5	2		_	6	16	_			7		14
Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time (g_s), s Cycle Queue Clearance Time (g_c), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay (d_1), s/veh		207	859		_	519	464				418		87
Queue Service Time ($g s$), s Cycle Queue Clearance Time ($g c$), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay ($d t$), s/veh		1647	1604			1673					1634	-	1370
Cycle Queue Clearance Time ($g c$), s Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay ($d t$), s/veh		5.4	12.6			13.8	21.0				18.4	_	3.6
Green Ratio (g/C) Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay (d_1), s/veh		5.4	12.6			13.8	21.0				18.4		3.6
Capacity (c), veh/h Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay (d_1), s/veh		0.50	0.54			0.37	0.37				0.29		0.29
Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay (d_1), s/veh		315	1730			619	550				470		394
Back of Queue (Q), ft/ln (95 th percentile) Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay (d_1), s/veh	(0.496			0.839					0.891		0.221
Back of Queue (Q), veh/ln (95 th percentile) Queue Storage Ratio (RQ) (95 th percentile Uniform Delay (d_1), s/veh			189.5			197	189.2				343.3		52.7
Queue Storage Ratio (<i>RQ</i>) (95 th percentile Uniform Delay (<i>d</i> 1), s/veh		3.5	7.3			7.5	7.6				13.1		2.0
Uniform Delay (d 1), s/veh		0.90	0.00			0.00	0.00				1.07		0.00
		15.8	10.9			17.7	19.6				25.6		20.3
Incremental Delay (d ₂), s/veh		2.3	1.0			1.3	1.5				13.5		0.3
Initial Queue Delay (<i>d</i> ₂), s/veh		0.0	0.0			0.0	0.0				0.0	-	0.0
Control Delay (<i>d</i>), s/veh	\rightarrow	18.1	11.9			19.1	21.2				39.1		20.6
Level of Service (LOS)		B	B			B	C				D	-	C
Approach Delay, s/veh / LOS		13.1	_	В	20.1		C	0.0			35.9		D
Intersection Delay, s/veh / LOS	\rightarrow			20			-	0.0			C		_
	#										-		
Multimodal Results	1		EB			WB			NB			SB	
Pedestrian LOS Score / LOS		0.68		А	1.91		В	2.14		В	2.31	T	В
Bicycle LOS Score / LOS		1.37		A	1.03		A					+	F

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														1241	1.11
General Inforn	nation								Intersec				-	41	2015
Agency		HRG		1					Duration		0.250				
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Urban Street		10TH STREET				r 2027			Analysis		1> 7:(00			1. 1.
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Project Descrip	tion	I-229/10TH ST IMJ	R										1	14.1444	10.1
Demand Inform	nation		_		EB	_		W	В		NB	_	T	SB	
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			160	690	95	20	118	85 60	205	220	20	55	110	210
					1	1									
Signal Informa							4		20	4.9			-		
Cycle, s	80.0	Reference Phase	6		R	1	5		812 5	12		1-4	e,	1	4
Offset, s	9	Reference Point	Begin	Green	5.0	36.2	3.7	0.3		6 0.0			~	1	
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.0	3.6	3.0	3.0) 3.6	0.0		×	7		<u>st</u> z
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	0.0	0.0) 2.0	0.0		5	6	7	1
Time: Drest						ГРТ				ND		NDT	0.51		ODT
Timer Results				EBI 5	-	EBT	WB		WBT 6	NB 2	-	NBT °	SBI	-	SBT
Assigned Phase Case Number	C .					2 4.0			-	3		8	7		4
				1.0 8.0		4.0		-	6.3 41.8	1.1 10.0		4.0 23.5	1.1 6.7		4.0 20.2
	ase Duration, s ange Period. (Y+R c), s					5.6	<u> </u>	-	5.6	3.0		23.5 5.6	3.0		5.6
-	ange Period, (Y+R c), s < Allow Headway (MAH), s					0.0		-	0.0	4.2		4.2	4.2		4.2
Queue Clearan		,		4.2 6.4		0.0		+	0.0	9.0		12.9	4.2		16.6
Green Extensio		1 - 7		0.0		0.0			0.0	0.0		1.2	0.0		0.0
Phase Call Pro		(3)		0.97						0.99		1.00	0.74		1.00
Max Out Proba	bility			1.00)					1.00)	0.78	1.00)	1.00
Movement Gro	un Res	sults		_	EB			WE	3		NB			SB	
Approach Move	-	Juito		1	Т	R	L	T	, R	L	Т	R		Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I) veh/h		163	542	257	22	692		223	261		60	348	
		ow Rate (<i>s</i>), veh/h/l	In	1674	1758		670	174	_	1688	1746		1701	1597	
Queue Service				4.4	2.6	2.2	0.8	24.7		7.0	10.9		2.2	14.6	
Cycle Queue C		_ , _ ,		4.4	2.6	2.2	0.8	24.7		7.0	10.9		2.2	14.6	++
Green Ratio (g		· · · · · · (y •), •		0.54	0.55	0.55	0.45	0.45	_	0.29	0.22		0.23	0.18	
Capacity (c), v	· ·			250	1942		393	789	_	238	391		239	292	
Volume-to-Cap		itio(X)		0.650	0.279	0.283	0.056	0.87	7 0.880	0.938	0.667		0.250	1.193	
Back of Queue	(Q), ft	t/In (95 th percentile	e)		_									_	
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	2.6	1.5	1.3	0.2	10.6	6 10.5	10.0	8.5		1.6	22.9	
Queue Storage	Ratio (RQ) (95 th percent	tile)	0.50	0.00	0.00	0.05	0.00	0.00	2.55	0.00		0.52	0.00	
Uniform Delay	· ,			13.9	3.1	2.5	6.2	10.3	_	26.7	28.3		25.3	32.7	
Incremental De	2 1			5.2	0.3	0.7	0.2	10.5	_	41.5	4.3		0.5	115.6	
Initial Queue De		•		0.0	0.0	0.0	0.0	0.0	_	0.0	0.0		0.0	0.0	
Control Delay (19.1	3.5	3.2	6.4	20.8		68.1	32.6		25.8	148.3	
Level of Service				B	A	A	A	C	C	E	С		C	F	
Approach Dela	-			6.0		Α	20.7	7	С	49.0)	D	130.	3	F
Intersection De	lay, s/ve	eh / LOS				34	4.3						С		
Multimedal De	oulto				EB			\\\/)		ND			C D	
Multimodal Re Pedestrian LOS		/1.05		1.88	EB	В	1.90	WE	B	2.44	NB 1	В	2.44	SB	В
Bicycle LOS Sc				1.05		A	1.62		B	1.29		A	1.16		A
210,010 200 00				1.00			1.02			1.20			1.10		

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	_	HC	s sigr	alize	a int	ersect	ION R	esui	ts Sun	nmary	/	_	_		
											1		L B	4.2.4.1	
General Inform									Intersec					41	
Agency		HRG							Duration		0.250		1		
Analyst		MJV				e Dec 2	-		Area Typ	e	Other				A
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF		0.92		X .		- 24 <u>1</u>
Urban Street		10TH STREET				r 2027			Analysis		1> 7:(00			1
Intersection		CLEVELAND AVEN		File Na	ame	2027	PMpeak	Build	I IMJR - 2	EB Cle	v.xus			11	
Project Descrip	tion	I-229/10TH ST IMJ	R					_						4.1.444	何時
Demand Inform	nation				EB			W	B		NB			SB	
Approach Move				L	T	R	L	Т	-		T	R	L	T	R
Demand (v), v				235	132		20	95		175	210	50	145	210	160
	011/11			200	1020		20		00	110	210	00	110	210	100
Signal Informa	ation				1				20,	1.1			13		1
Cycle, s	100.0	Reference Phase	2				-	8	10.00	1.51			4	5	P
Offset, s	9	Reference Point	Begin	Green	10.0	39.5	5.0	1.0			-	1	2	-1-1	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		39.5	3.0	3.0		0.0		7	\rightarrow		sta.
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	0.0	0.0		0.0		5	6	7	Y
Timer Results				EBI	-	EBT	WB	L	WBT	NB	-	NBT	SBL	-	SBT
Assigned Phas						2			6	3		8	7		4
Case Number						4.0			6.3	1.1		4.0	1.1		4.0
Phase Duration	Duration, s					59.0			45.1	12.0)	33.0	8.0		29.0
Change Period	, (Y+ R (c), S		3.0		5.6			5.6	3.0		5.6	3.0		5.6
Max Allow Hea	dway(<i>N</i>	<i>MAH</i>), s		4.2		0.0			0.0	4.2		4.2	4.2		4.2
Queue Clearan	ce Time	e (g s), s		10.8	3					10.3	3	16.3	7.0		25.4
Green Extensio	on Time	(ge),s		0.1		0.0			0.0	0.0		2.2	0.0		0.0
Phase Call Pro	bability			1.00)					0.99)	1.00	0.99	,	1.00
Max Out Proba	bility			1.00)					1.00)	0.15	1.00)	1.00
Movement Gro		sulte		_	EB			WE	2		NB			SB	
Approach Move	-	Suits		1	Т	R	L	T	R	L	T	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow) veh/h		265	1260		22	579		190	283	10	158	402	14
		ow Rate (s), veh/h/l	In	1674	1758		250	1744		1688	1713		1701	1657	
Queue Service		(),·		8.8	24.0	28.5	5.4	28.3	_	8.3	14.3		5.0	23.4	
Cycle Queue C		- ,		8.8	24.0	28.5	21.0	28.3		8.3	14.3		5.0	23.4	
Green Ratio (g		e fille (<i>g c</i>), s		0.52	0.53	0.53	0.39	0.39		0.34	0.27		0.28	0.23	
Capacity (c), v				309	1877	_	134	689	_	224	469		279	388	
Volume-to-Cap		tio (X)		0.857			0.163	0.84	_	0.850	0.602		0.564	1.037	
	•	t/In (95 th percentile	e)	0.001	0.071	0.010	0.100	0.04	. 0.042	0.000	0.002		0.00-	1.007	
		eh/In (95 th percent		6.1	11.5	14.3	0.8	17.1	16.6	8.5	10.2		2.6	22.2	
	· ,	RQ) (95 th percen		1.16	0.00	0.00	0.18	0.00		2.15	0.00		0.83	0.00	
Uniform Delay		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	21.7	14.1	20.6	23.1	21.2	_	27.5	31.6		32.6	38.3	
	. ,			8.2	0.7	1.7	2.3	10.7		25.3	2.2		2.6	55.7	
	Incremental Delay (<i>d</i> ₂), s/veh Initial Queue Delay (<i>d</i> ₃), s/veh					0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (•		0.0 29.9	0.0	22.3	25.4	31.9		52.8	33.7		35.2	94.0	
,	Level of Service (LOS)					C	C	C	C	D	C		D	54.0 F	
	Approach Delay, s/veh / LOS					B	31.8		C	41.4		D	77.4		E
Intersection De	-			18.8			2.4		-				C		
													-		
Multimodal Re	Multimodal Results							WE	3		NB			SB	
Pedestrian LOS	Pedestrian LOS Score / LOS)	В	1.91	1	В	2.44	1	В	2.45	;	В
Bicycle LOS So	ore / LC	DS		1.60)	В	1.44	1	А	1.27	7	А	1.41		A

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		HCS	S Sigr	nalize	d Inte	ersect	ion R	esul	ts Sun	nmary	1				
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General Inform	nation								Intersec		ormatio	on		i si si si si si Li Li	1910
Agency		HRG							Duration	, h	0.250)			
Analyst		MJV		Analys	sis Date	e Dec 2	1, 2022		Area Typ	e	Other	-	÷		
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF		0.92			1	
Urban Street		10TH STREET		Analys	sis Yea	r 2027			Analysis	Period	1> 7:(00	1		
Intersection		HY-VEE DRIVEWA	٩Y	File Na	ame	2027	AMpeak	k Build	IMJR.xu	s				11	
Project Descrip	tion	I-229/10TH ST IMJ	R										1	1 T 49Y	1917
Demand Inform	nation				EB			W	В		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			90	660	15	10	12	10 70	10	5	5	30	5	65
Signal Informa	tion		-	I	r -		115			_	1.00				
Cycle, s	80.0	Reference Phase	6		1	1.2 3	24°4						2		4
Offset, s	68	Reference Point	Begin		-5	19 - 20 -		7				1	2	3	4
Uncoordinated			<u> </u>	Green		52.0	9.4	0.0		0.0	_	_	<u>A</u>		
Force Mode	No Fixed	Simult. Gap E/W Simult. Gap N/S	On On	Yellow Red	3.0 0.0	3.6 2.0	3.6 2.0	0.0		0.0		5		7	Ŷ
Force Mode	Fixed	Simult. Gap N/S	On	Rea	0.0	2.0	2.0	10.0	0.0	0.0		5	6	/	
Timer Results						EBT	WB	L	WBT	NB	_	NBT	SBI	-	SBT
Assigned Phase	e			5		2			6			8			4
Case Number				1.0		4.0			5.3			6.0			6.0
Phase Duration	, s			7.4		65.0			57.6			15.0			15.0
Change Period,	, (Y+R	c), S		3.0		5.6			5.6			5.6			5.6
Max Allow Head		•		2.2		0.0			0.0			4.7			4.7
Queue Clearan		· ·		3.3				+				6.3			5.7
Green Extensio				0.0		0.0			0.0			0.2			0.2
Phase Call Prol				0.87	,							0.94			0.94
Max Out Proba				0.05	;							1.00			1.00
Movement Gro	-	sults			EB			WE			NB			SB	
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow F				92	347	344	11	131		11	11		33	76	\square
		ow Rate (<i>s</i>), veh/h/	In	1661	1744	1730	734	1647	_	1323	1626		1415	1530	
Queue Service		- ,		1.3	7.0	7.0	0.4	18.6	_	0.6	0.5		1.7	3.7	
Cycle Queue C		e Time (<i>g c</i>), s		1.3	7.0	7.0	0.4	18.6		4.3	0.5		2.2	3.7	
Green Ratio (g				0.73	0.74	0.74	0.65	0.65	_	0.12	0.12		0.12	0.12	
Capacity (c), v				352	1294	1283	567	214 ⁻	_	185	192		249	181	
Volume-to-Capa		· · ·		0.262	0.268	0.268	0.019	0.61	4 0.080	0.059	0.057		0.131	0.421	
	. ,	t/In (95 th percentile		0.0	0.5	0.0		0.5					1.0		
	· /	eh/In (95 th percent		0.6	3.8	3.8	0.1	9.7	0.8	0.4	0.3		1.0	2.6	-
-		RQ) (95 th percen	tile)	0.16	0.00	0.00	0.03	0.00		0.18	0.00		0.31	0.00	
Uniform Delay (· ,			6.4	5.0	5.0	5.0	8.2		34.7	31.3		32.3	32.7	
Incremental De		,		0.1	0.5	0.5	0.1	1.3	0.2	0.1	0.1		0.3	1.9	
Initial Queue De		•		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	_
Control Delay (6.5 A	5.5 A	5.5	5.0	9.5	5.3	34.9	31.4		32.6	34.6	
	evel of Service (LOS)					Α	Α	A	A	С	С		С	C	
	pproach Delay, s/veh / LOS					А	9.2		A	33.2	2	С	34.0)	С
Intersection De	lay, s/ve	eh / LOS				9	.4						A		
Multiment	a													0.5	
Multimodal Re		/1.02		4.04	EB		4.04	WE		0.47	NB		0.07	SB	
Pedestrian LOS				1.84		B	1.86	_	B	2.45		B	2.30		B
Bicycle LOS Sc	ore / LC	15		1.17		А	1.64	1	В	0.52		A	0.67		A

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		HC	S Sigr	nalize	d Inte	ersect	ion R	esul	ts Sun	nmary	/				
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General Inform	nation								Intersec		1			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2.0
Agency		HRG							Duration	, h	0.250)			
Analyst		MJV		Analys	is Dat	e Dec 2			Area Typ	e	Other	-	±		~ <mark>-</mark>
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF		0.92			1 (A)	
Urban Street		10TH STREET		Analys	sis Yea	r 2027			Analysis	Period	1> 7:0	00	1		
Intersection		HY-VEE DRIVEWA	٩Y	File Na	ame	2027	PMpeal	c Build	IMJR.xu	s				12	
Project Descrip	otion	I-229/10TH ST IMJ	R										1	1.1.1.1.1.1	1 A
Demand Inform	mation				EB			W	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			160	1335	5 45	15	95	0 65	30	10	20	100	5	90
Signal Informa	ation		_	1							. 100		- 1		1
Cycle, s	100.0	Reference Phase	2	6	1	44	10 Y 10					1.4	4		4
Offset, s	11	Reference Point	Begin				10.0				_	1	2	3	4
Uncoordinated		Simult. Gap E/W	On	Green Yellow		68.6 3.6	12.2 3.6	0.0		0.0		X	\rightarrow		-+-
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0		0.0		5	6	7	Ŷ
Timer Results				EBL		FDT						NDT	CDI		ODT
						EBT 2	WB		WBT 6	NB		NBT 8	SBI	-	SBT 4
	Assigned Phase					_	<u> </u>		-			-			-
Case Number				1.0		4.0			5.3		_	6.0			6.0
Phase Duration		\		8.0	\rightarrow	82.2	<u> </u>	_	74.2			17.8		-+	17.8
Change Period	· ·			3.0	-+	5.6		-	5.6	<u> </u>	_	5.6		_	5.6
Max Allow Hea	2 1	,		2.2		0.0	<u> </u>		0.0	<u> </u>	_	4.7	<u> </u>		4.7
Queue Clearan				4.8			<u> </u>	_		<u> </u>	_	10.8	<u> </u>		11.4
Green Extensio		(ge), S		0.1		0.0	<u> </u>		0.0	<u> </u>		0.8	<u> </u>		0.7
Phase Call Pro				0.99			<u> </u>	_				1.00	<u> </u>	_	1.00
Max Out Proba	bility			0.00)							0.15			0.20
Movement Gro	oup Res	ults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow	Rate(<i>v</i>), veh/h		177	767	761	16	1033	3 71	33	33		109	103	
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In	1661	1744	1724	332	1647	7 1466	1291	1582		1387	1526	
Queue Service	Time (g	g s), S		2.8	9.9	9.8	1.7	14.3	1.6	2.4	1.8		7.6	6.4	
Cycle Queue C	learanc	e Time (<i>g c</i>), s		2.8	9.9	9.8	3.7	14.3	1.6	8.8	1.8		9.4	6.4	
Green Ratio (g	ŋ/C)			0.76	0.77	0.77	0.69	0.69	0.69	0.12	0.12		0.12	0.12	
Capacity(c), v	/eh/h			446	1336	1320	293	2260	1006	148	193		216	186	
Volume-to-Cap	acity Ra	itio (X)		0.397	0.575	0.577	0.056	0.45	7 0.070	0.221	0.169		0.503	0.554	
Back of Queue	(Q), f	t/In (95 th percentile	e)												
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	1.5	3.6	3.5	0.2	8.1	0.8	1.5	1.3		4.9	4.6	
		RQ) (95 th percen		0.38	0.00	0.00	0.07	0.00	0.18	0.74	0.00		1.46	0.00	
Uniform Delay	(d1), s	/veh		5.6	1.8	1.8	5.8	7.2	5.2	45.5	39.3		43.6	41.3	
Incremental De	ay (d 2), s/veh		0.1	0.9	0.9	0.4	0.7	0.1	0.7	0.4		2.2	3.1	Ĩ
Initial Queue D				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (d), s/ve	eh		5.7	2.7	2.7	6.2	7.8	5.3	46.2	39.8		45.7	44.4	
Level of Servic				А	Α	Α	А	Α	A	D	D		D	D	
	pproach Delay, s/veh / LOS					A	7.7		A	43.0)	D	45.1		D
Intersection De				3.0			.4						A		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS	S Score	/LOS		1.84	-	В	1.86	3	В	2.46	6	В	2.30)	В
Bicycle LOS So	core / LC	DS		1.87	/	В	1.4	1	А	0.60)	А	0.84	1	А

		HCS	S Sigr	alize	d Int	ersect	tion R	esul	ts Sun	nmary	1				
_															
General Inform	nation								Intersec					JIU	
Agency		HRG							Duration		0.250				
Analyst		MJV		-		e Dec 2			Area Typ	be	Other	-			~_ <mark></mark> &
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF		0.92		-		
Urban Street		10TH STREET		Analys	sis Yea	ar 2027			Analysis	Period	1> 7:(00	-		
Intersection		1-229		File Na	ame	2027	AMpeak	k Build	IMJR.xu	s				1110	
Project Descrip	tion	I-229/10TH ST IMJ	R	_		_	_		_	_	_	_	1	4.1.444	10
Demand Inform	nation				EB			W	B		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v				115	490	_	350	75		320	0	305	180	0	270
														-	
Signal Informa	tion					7	-	41			1 100				1
Cycle, s	80.0	Reference Phase	6		P	C 3		e .	10				4		\$
Offset, s	58	Reference Point	Begin	Green	16	1.5	26.6	15	7 0.0	0.0		1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.6	3.6		0.0		7	\rightarrow		51 2
Force Mode	Fixed	Simult. Gap N/S	On	Red	4.5	4.5	4.5	3.7		0.0		5	6	7	Y
Timer Results		_	_	EBL	-	грт	WB	1	WBT	NB		NDT	SBI	_	SBT
				5		EBT 2	1 1		<u>vvы</u> 6	IND	-	NBT 8	301		4
Assigned Phase	e						· · ·		-	<u> </u>		-	<u> </u>		
Case Number				1.1	,	3.0	1.1	_	3.0	<u> </u>		5.0			5.0
Phase Duration		\ -		12.7	+	34.7	22.3		44.3	L		23.0			23.0
Change Period,	· ·			8.1		8.1	8.1		8.1			7.3	-	_	7.3
Max Allow Head	- ,	,		4.2	_	0.0	4.2		0.0	<u> </u>	_	5.3		_	5.3
Queue Clearan Green Extensio		1 = 7		5.1 0.0	-	0.0	13.0 0.6		0.0			11.6 2.6			17.7 0.0
Phase Call Prol		(<i>g</i> e), s		0.0		0.0	1.00	_	0.0			1.00			1.00
Max Out Proba				1.00			0.96					1.00	-		1.00
	biiity			1.00	,		0.30	<u> </u>				1.00			1.00
Movement Gro	oup Res	sults			EB			WE	;		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow F	Rate (v), veh/h		102	435	275	377	813	533	348	0	332	196	0	293
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	In	1688	1612	2	1674	163 ⁻	1	1652	1669	1273	1626	1643	1435
Queue Service	Time (g	g s), S		3.1	8.4		11.6	15.8	;	7.3	0.0	9.6	4.0	0.0	15.7
Cycle Queue C		- ,		3.1	8.4		11.6	15.8	;	7.3	0.0	9.6	4.0	0.0	15.7
Green Ratio (g	/C)			0.39	0.33		0.54	0.45	;	0.20	0.20	0.20	0.20	0.20	0.20
Capacity (c), v	/eh/h			342	1071		602	147	5	828	328	500	818	322	282
Volume-to-Capa	acity Ra	itio (X)		0.298	0.406	6	0.626	0.55	1	0.420	0.000	0.663	0.239	0.000	1.042
Back of Queue	(Q), f	t/In (95 th percentile	e)												
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	2.1	5.8		4.3	8.1		5.3	0.0	5.6	2.8	0.0	15.9
		RQ) (95 th percen		0.16	0.00		0.35	0.00		0.54	0.00	0.33	0.40	0.00	0.32
Uniform Delay ((d1), s	/veh		15.8	21.0		10.3	18.8	;	28.8	0.0	29.7	27.4	0.0	32.2
Incremental De	lay (<i>d</i> 2), s/veh		0.5	1.1		0.4	0.4		0.5	0.0	3.7	0.2	0.0	65.1
Initial Queue De		•		0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/ve	eh		16.3	22.1	0.0	10.6	19.2	0.0	29.3	0.0	33.4	27.7	0.0	97.2
Level of Service	evel of Service (LOS)					Α	В	В	Α	С		С	С		F
Approach Delay	Approach Delay, s/veh / LOS					В	11.4	1	В	31.3	3	С	69.4	1	E
Intersection Del	lay, s/ve	eh / LOS				2	3.2						С		
Multimodal Re					EB			WE			NB			SB	
Pedestrian LOS				2.43		В	2.26		В	2.44		В	2.44		В
Bicycle LOS Sc	ore / LC	DS		1.31		Α	1.92	2	В	1.6′		В	1.29)	A

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Γ

									nmary					
General Informatio	17							Intersec		1				24
Agency	HRG							Duration	, h	0.250		- 1		
Analyst	MJV		Analys	is Date		1, 2022		Area Typ	e	Other				·
Jurisdiction	SIOUX FALLS		Time F			eak Hou	ır	PHF		0.92		-		
Urban Street	10TH STREET		Analys	is Yea	r 2027			Analysis	Period	1> 7:(00			
Intersection	I-229		File Na	ame	2027	PMpeak	k Build	IMJR.xu	s				1110	r 🗖
Project Description	I-229/10TH ST IM	IJR		_			_					1	4.1.444	
Demand Information	on			EB			WE	3		NB			SB	
Approach Movemen	nt		L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), veh/h	I		225	920	485	365	65	5 270	275	0	520	465	0	220
Signal Information		_	<u> </u>	Г										
	1	2		2%	- 3		1 1 1 V	54 F.		4	-		- 1	4
Cycle, s 100 Offset, s 64			-			° ≓ *`*		12			1	2	3	4
		Begin	Green		6.2	40.6	18.		0.0		_	<u> </u>		•
Uncoordinated No	·	On	Yellow		0.0	3.6	3.6		0.0			Y		Ψ
Force Mode Fixe	ed Simult. Gap N/S	On	Red	4.5	0.0	4.5	3.7	0.0	0.0		5	6	7	
Timer Results			EBL	-	EBT	WB	L	WBT	NBI	_	NBT	SBL	-	SBT
Assigned Phase			5		2	1		6			8			4
Case Number			1.1		3.0	1.1		3.0			5.0			5.0
Phase Duration, s			19.1		48.7	25.3	3	54.9			26.0			26.0
Change Period, (Y-	+ <i>R c</i>), s		8.1		8.1	8.1		8.1			7.3			7.3
Max Allow Headway	/(<i>MAH</i>), s		4.2		0.0	4.2		0.0			5.3			5.3
Queue Clearance Ti	, ,		10.7	·		16.4	1				20.7			18.2
Green Extension Tir	, ,		0.3		0.0	0.8		0.0			0.0			0.4
Phase Call Probabil	(=)		1.00	,		1.00)				1.00			1.00
Max Out Probability			1.00			0.56	3				1.00			1.00
Movement Group F	Results			EB	_		WB	_		NB			SB	-
Approach Movemen			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movemen			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate			271	1107	583	396	711	293	299	0	565	505	0	239
,	Flow Rate (s), veh/ł	n/In	1688	1695		1674	1637		1652	1669	1298	1626	1643	1436
Queue Service Time		1/111	8.7	25.5		14.4	12.6	_	7.8	0.0	18.7	14.5	0.0	16.2
Cycle Queue Cleara	, _ ,		8.7	25.5		14.4	12.6		7.8	0.0	18.7	14.5	0.0	16.2
Green Ratio (g/C)			0.52	0.41		0.58	0.47		0.19	0.19	0.19	0.19	0.19	0.19
Capacity (c), veh/h]		496	1377		436	1532	_	762	312	485	752	307	268
Volume-to-Capacity			0.546	0.804		0.909	0.464	_	0.392	0.000	1.164	0.672	0.000	0.891
), ft/ln (95 th percenti	le)	0.010	0.004		0.000	0.70		0.002	0.000		0.012	0.000	0.001
. ,), veh/ln (95 th percer		6.4	11.6		6.8	6.2		5.9	0.0	19.3	10.2	0.0	12.4
	io (<i>RQ</i>) (95 th perce		0.48	0.00		0.55	0.00		0.60	0.00	1.13	1.45	0.00	0.25
Uniform Delay(d 1)	, ,, .	,	16.2	17.5		15.6	13.9	_	36.2	0.0	40.7	38.9	0.0	39.7
Incremental Delay (,		0.5	2.9		8.3	0.4		0.5	0.0	94.5	2.6	0.0	29.1
Initial Queue Delay	,		0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d),	, ,		16.7	20.3	0.0	23.8	14.3	0.0	36.7	0.0	135.1	41.6	0.0	68.8
Level of Service (LC			В	C	A	C	В	A	D		F	D		E
· · ·	Approach Delay, s/veh / LOS					14.0		B	101.	1	F	50.3	3	D
Intersection Delay, s			13.8		B 34	4.5						C		
				EB			WB			NB			CD	
Multimodal Results	S			ED			VVD			IND			SB	
Multimodal Results Pedestrian LOS Sco			2.43		В	2.26		В	2.45	-	В	2.45		В

		HCS	S Sigr	nalize	d Inte	ersect	ion R	esul	ts Sun	nmary	,				
General Inform	nation								Intersec	tion Info	ormatio	on	1	4.2.4-	144
Agency		HRG							Duration		0.250		1.15		
Analyst		MJV		Analys	sis Date	e Dec 2	1, 2022		Area Typ		Other		4		
Jurisdiction		SIOUX FALLS		Time F			eak Hou		PHF		0.92			-1.	=
Urban Street		10TH STREET				2027	bait Hot		Analysis	Period	1> 7:0	00			
Intersection		JESSICA AVENUE		File Na			AMpeak		IMJR.xu		1. 7.				·
Project Descrip	tion	I-229/10TH ST IMJ	R				inpour	Bana						ST 1 557	121
· · • • • • • • • • • • • • • • • •															
Demand Inform	nation				EB		Т	WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h				620	45	20	141	5	115		40			
-					1	1		1-	1-						
Signal Informa	_				•	_									
Cycle, s	80.0	Reference Phase	6		* *	5	2					1		3	4
Offset, s	71	Reference Point	Begin	Green	60.8	8.0	0.0	0.0	0.0	0.0			_		
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	0.0	0.0	0.0	0.0			Y		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	
Timer Deculto			_			грт				NDI	Ĩ	NDT	CDI		ODT
Timer Results				EBL		EBT 2	WB		WBT 6	NBL	-	NBT 8	SBL	·	SBT
Assigned Phase Case Number	e			<u> </u>		8.0			6.0	<u> </u>	_	o 9.0		\rightarrow	
										<u> </u>	_			\rightarrow	
Phase Duration				<u> </u>		66.4			66.4	<u> </u>	_	13.6		\rightarrow	
Change Period					_	5.6		_	5.6	<u> </u>		5.6	<u> </u>	-+-	
Max Allow Head	2 (·		<u> </u>		0.0			0.0	<u> </u>		5.3 7.8		\rightarrow	
Queue Clearan Green Extensio		1 - 7		<u> </u>		0.0	-		0.0		_	7.0 0.4		+	
Phase Call Prol		(<i>g</i> e), s		<u> </u>	+	0.0			0.0	<u> </u>	_	0.4	<u> </u>	\rightarrow	
Max Out Proba												0.98		\rightarrow	
Max Out Floba	Dinty								_			0.47			
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move					2	12	1	6		3		18			
Adjusted Flow I), veh/h			366	357	20	1391		125		43			
Adjusted Satura	ation Flo	w Rate (<i>s</i>), veh/h/l	In		1758	1716	725	1674		1688		1502			
Queue Service		. ,			6.7	5.0	0.6	11.4		5.8		2.1			
Cycle Queue C		- ,			6.7	5.0	7.3	11.4		5.8		2.1			
Green Ratio (g					0.76	0.76	0.76	0.76		0.10		0.10			
Capacity (c), v	,				1336	1304	580	2544		168		150			
Volume-to-Cap		itio(X)			0.274	0.274	0.034	0.547	'	0.742		0.290			
Back of Queue	(Q), ft	t/In (95 th percentile	e)												
Back of Queue	(Q), ve	eh/In (95 th percent	ile)		2.4	2.3	0.1	4.1		4.9		1.5			
Queue Storage	Ratio (RQ) (95 th percen	tile)		0.00	0.00	0.04	0.00		1.04		0.00			
Uniform Delay ((d 1), s	/veh			2.9	2.9	3.5	2.9		35.0		33.4			
Incremental De	lay (<i>d</i> 2), s/veh			0.5	0.5	0.1	0.7		8.8		1.5			
Initial Queue De	elay (<i>d</i>	з), s/veh			0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay (d), s/ve	eh			3.4	3.4	3.6	3.6		43.8		34.9			
Level of Service	e (LOS)				Α	A	А	Α		D		С			
Approach Delay	y, s/veh	/LOS		3.4		A	3.6		A	41.5	5	D	0.0		
Intersection De	lay, s/ve	eh / LOS				6	.3						A		
Multimodal Re					EB			WB			NB			SB	
Pedestrian LOS				1.83		В	0.63		A	2.31		В	2.14		В
Bicycle LOS So	core / LC	DS		1.08	3	А	1.77	7	В			F			

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		HC	S Sigr	nalize	d Inte	ersect	ion R	esult	s Sun	nmary					
General Inform	nation								ntersec					4.2.47	24.54
Agency		HRG							Duration	, h	0.250				
Analyst		MJV		Analys	is Date	e Dec 2			Area Typ	be	Other		- <u>1</u>		←
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır I	PHF		0.92				
Urban Street		10TH STREET		Analys	is Year	2027		/	Analysis	Period	1> 7:0	00			
Intersection		JESSICA AVENUE	E	File Na	ame	2027	PMpeak	Build	IMJR.xu	S				11	
Project Descrip	otion	I-229/10TH ST IM.	JR										N	4.1.67	10.1
Demand Infor	mation		_		EB	_		WE	3		NB	_		SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L L	Т	R
Demand (v), v					1620	80	50	870		45	+	45	-	<u> </u>	+
2														in a state	
Signal Informa	ation				<u> </u>		Т								
Cycle, s	100.0	Reference Phase	2	1	-	5	2					1	+		
Offset, s	4	Reference Point	Begin	Green	02.2	6.5	0.0	0.0	0.0	0.0	_	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	0.0	0.0	0.0	0.0					K I
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0		5	6	7	Y
Timer Deculto				EBI		EDT					_	NDT	CDI		ODT
Timer Results	ssigned Phase					EBT	WB		WBT	NBL		NBT	SBL	·	SBT
	e				-	2		-+	6	<u> </u>	_	8		+	
Case Number					_	8.0	<u> </u>		6.0	<u> </u>		9.0	<u> </u>	+	
Phase Duration		````			_	87.9	<u> </u>		87.9	<u> </u>		12.1	<u> </u>	\rightarrow	
Change Period	· ·				_	5.6	<u> </u>		5.6	<u> </u>		5.6		\rightarrow	
Max Allow Hea	2 (,				0.0	<u> </u>		0.0	<u> </u>		5.3		\rightarrow	
Queue Clearan												5.1		+	
Green Extensio		(ge), s			_	0.0		\rightarrow	0.0			0.1		\rightarrow	
Phase Call Pro	-											0.93			
Max Out Proba	bility					_			_			1.00			
Movement Gro	oup Res	sults			EB	_		WB	_		NB			SB	_
Approach Move	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move					2	12	1	6		3		18			1
Adjusted Flow), veh/h			925	922	57	992		49		49			+
-	· ·	ow Rate (<i>s</i>), veh/h/	/ln		1758	1729	248	1590	1	1688		1502			1
Queue Service		()			21.2	20.3	13.7	9.4		2.8		3.1			+
		e Time (<i>g</i> c), s			21.2	20.3	33.4	9.4	1	2.8		3.1			1
Green Ratio (g					0.82	0.82	0.82	0.82	1	0.07		0.07			1
Capacity (c),					1446	1422	223	2616		110		98			
Volume-to-Cap		atio(X)			0.640	0.649	0.255	0.379		0.443		0.498			1
•		t/In (95 th percentile	e)												
	. ,	eh/In (95 th percen			8.5	8.6	1.4	3.7		2.3		2.4			1
	, ,	RQ) (95 th percer			0.00	0.00	0.37	0.00		0.49		0.00			1
Uniform Delay		,, .	,		3.3	3.4	11.1	2.9		45.0		45.1			
Incremental De	· ,				2.2	2.3	2.5	0.4		3.9		5.5			
Initial Queue D	• •	,			0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay (·			5.5	5.7	13.5	3.2		48.9		50.6			1
Level of Servic					A	A	B	A		D		D			1
Approach Dela	<u>, ,</u>			5.6		A	3.8		A	49.8	3	D	0.0		
Intersection De				5.0			.4						A 0.0		
	,, 0, 00	·													
											NID			0.0	
Multimodal Re	sults				EB			WB			IND			SB	
Multimodal Re Pedestrian LOS		/LOS		1.82		В	0.62		A	2.31	NB	В	2.15	1	В

		HC	S Sigr	nalize	d Inte	ersect	ion R	esul	ts S	Sum	mary	/				
General Inform	nation								Inter	rsecti	ion Infe	ormatio			deneseran A	N.C.
Agency		HRG				17				ation,		0.250				
Analyst		MJV				e Dec 2				а Туре	3	Other				<u>م</u>
Jurisdiction		SIOUX FALLS		Time F			eak Hou	ır	PHF	:		0.92			-1-1	
Urban Street		10TH STREET		Analys	sis Yea	2027			Anal	lysis F	Period	1> 7:0	00	N.		, i i i i i i i i i i i i i i i i i i i
Intersection		LOWELL AVENUE		File Na	ame	2027	AMpeak	Build	I IMJ	R.xus					*	
Project Descript	tion	I-229/10TH ST IMJ	IR												4.1.444	10.10
Demand Inform	nation				EB			W	B			NB			SB	
Approach Move				L	T	R	ΙL.	Т		R		Т	R	L	T	R
Demand (v), v				10	695	10	35	128		30	10	10	40	65	15	25
Demand (V), V	CH/H			10	035	10	55	120	55	50	10	10		00	15	23
Signal Informa	tion				8		11.				T					1
Cycle, s	80.0	Reference Phase	2		Ŷ.		- T.T.	7					·	6		str
Offset, s	48	Reference Point	Begin	Green	23	55.1	8.5	0.0		0.0	0.0	_			3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		3.6	3.6	0.0		0.0	0.0			∽		512
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0		0.0	0.0		5	6	7	Y
Timer Results				EBI		EBT	WB		WB	27	NBL		NBT	SB		SBT
Assigned Phase	<u> </u>			EDI	·	2	1	╘─┼╴	6				8	30		4
Case Number	5				-	6.3	1.0		4.0	_			8.0			8.0
Phase Duration						60.7	5.3	_	65.9	_			0.0 14.1	<u> </u>		14.1
Change Period,	· ·	•				5.6	3.0		5.6				5.6			5.6
Max Allow Head		· ·				0.0	4.2		0.0	J			5.3	<u> </u>		5.3
Queue Clearan Green Extensio					-	0.0	2.5 0.1		0.0				5.1 0.8	<u> </u>	+	8.0 0.7
Phase Call Prot		(<i>g</i> e), s			-	0.0	0.1		0.0				0.8	<u> </u>		0.98
Max Out Probal					-		0.00			-			0.01			0.04
max out rood	Sinty						0.00			and the			0.01			0.01
Movement Gro	-	sults			EB			WB	}			NB			SB	
Approach Move				L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6		16	3	8	18	7	4	14
Adjusted Flow F	Rate (<i>v</i>), veh/h		10	355	353	37	705	; 7	700		65			114	
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/	/In	380	1758	1749	1688	1772	2 17	757		1587			1469	
Queue Service		- ,		0.7	5.5	5.5	0.5	7.8	7	7.9		0.0			2.9	
Cycle Queue C		e Time (<i>g c</i>), s		3.4	5.5	5.5	0.5	7.8	_	7.9		3.1			6.0	
Green Ratio (g				0.69	0.69	0.69	0.74	0.75	_).75		0.11			0.11	
Capacity (c), v				339	1210	1204	596	1336		326		220			228	
Volume-to-Capa		. ,		0.030	0.293	0.293	0.063	0.52	7 0.	.528		0.296			0.500	
	<u>, ,</u>	t/In (95 th percentile							+							
		eh/In (95 th percent		0.1	3.1	3.1	0.2	3.0		3.0		2.2			4.1	
	· ·	RQ) (95 th percen	itile)	0.02	0.00	0.00	0.09	0.00	_	0.00		0.00			0.00	
Uniform Delay (. ,			4.3	4.1	4.1	3.2	1.8		1.9		33.4			34.6	<u> </u>
Incremental Del		,		0.2	0.6	0.6	0.0	1.1	_	1.1		1.1			2.4	
Initial Queue De	• •	·		0.0	0.0	0.0	0.0	0.0	_	0.0		0.0			0.0	<u> </u>
Control Delay (4.5	4.7	4.7	3.2	2.9		3.0		34.4			37.0	<u> </u>
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	pproach Delay, s/veh / LOS					A	3.0		Α	4	34.4	+	С	37.0)	D
Intersection Del	ay, s/ve	en / LOS				6	.0			لي				A		
Multimodal Re	sulte				EB			WB	2			NB			SB	
	Pedestrian LOS Score / LOS					В	1.61		B	\rightarrow	2.30		В	2.30		В
. Sassanan LOO	cycle LOS Score / LOS					A	1.70				0.60		-	2.00	·	

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Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.0	0.0) 0	.0		5	6	7	1
Timer Results		_		EBI		EBT	WB	I	WBT	N	IBL	1	NBT	SBI		SBT
Assigned Phase	9					2	1	-	6			-	8			4
Case Number	-					6.3	1.0		4.0	+			8.0			8.0
Phase Duration	s					69.5	8.0		77.5	-	_		22.5			22.5
Change Period,		c) S				5.6	3.0		5.6	-			5.6			5.6
Max Allow Head	· ·	•				0.0	4.2	_	0.0	-			5.3			5.3
Queue Clearan		· ·				0.0	4.8		0.0	-			6.8			16.2
Green Extensio		, = ,				0.0	0.3		0.0	-			1.4			0.7
Phase Call Prot		(90),0				0.0	0.98		0.0				1.00			1.00
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Approach Move				L E	Т	R	L	T	R	L		_	R		T	R
Assigned Move		·) · · · - l- /l-		5	2	12	1	6	16	3	3		18	7	4	14
Adjusted Flow F			//	31	890	889	146	558			8			<u> </u>	207	
		ow Rate(s), veh/h/	in	507	1758 34.4	1751 34.6	1688 2.8	177 8.4	_		16 0.	_		<u> </u>	1413 9.4	
Queue Service		- ,		2.0				<u> </u>	_	_		-		<u> </u>	L	
Cycle Queue C		e Time (<i>g</i> c), s		2.7	34.4	34.6	2.8	8.4			4.				14.2	
Green Ratio (<i>g</i> . Capacity (<i>c</i>), v	,			0.64	0.64	0.64	0.71 235	0.72			0.1				0.17	
Volume-to-Capa		atio (X)		392	1123		235 0.623	0.43	_		0.2	-			0.687	
· ·		t/In(95 th percentile	2)	0.080	0.792	0.794	0.023	0.43	0.43	3	0.2	.19			0.08/	
		eh/In (95 th percent		0.4	16.8	16.9	4.3	4.3	4.4		3.	4		<u> </u>	9.1	
		RQ) (95 th percen		0.08	0.00	0.00	1.80	0.0	_		0.0	_			0.00	
Uniform Delay (,,		5.9	10.8	10.8	18.1	3.1			36				40.4	
Incremental De	. ,			0.3	4.3	4.3	2.3	0.9	_	_	0.				5.1	
Initial Queue De		,		0.0	0.0	0.0	0.0	0.0	_	_	0.	_			0.0	
Control Delay (6.2	15.1	15.2	20.4	4.0	_		37	-			45.5	
Level of Service				Α	В	В	С	Α	Α			_			D	
Approach Delay	pproach Delay, s/veh / LOS					В	6.0		Α	3	7.2		D	45.5	5	D
Intersection Del	ay, s/ve	eh / LOS				14	4.1							В		
					EB											
	Multimodal Results							WE				IB			SB	
Pedestrian LOS				1.65		B	1.63		B		.30		В	2.30		B
Bicycle LOS Sc	ore / LC	72		1.78	5	В	1.52	2	В	0	.63		A	0.83	5	Α

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Appendix G – Concept Evaluation Memo



MEMO

TO:	Steve Gramm South Dakota Department of Transportation
FROM:	Ben White, HR Green, PE Chase Cutler, HR Green, PE, PTOE
DATE:	April 9, 2021
RE:	I-229 Exit 6 (10th Street) Interchange Study – Build Concepts SD DOT Project Number: PL0194(98) P, PCN 07P7

This technical memo serves to document the evaluation and refinement of Build concepts at the I-229 Exit 6 interchange with 10th Street in the City of Sioux Falls, South Dakota. The location of the study intersections and features of the surrounding area can be seen in the following figure.

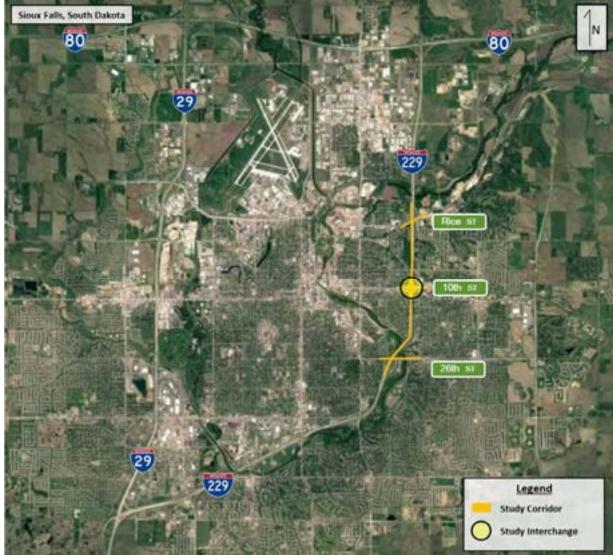


Figure 1: I-229 Exit 6 Study Area



I-229 & 10th Street (Exit 6)

The existing 10th Street corridor is an urban principal arterial with a 4-lane divided roadway within the interchange area. The existing service interchange at I-229 & 10th Street is a Single Point Urban Interchange (SPUI) that operates under traffic signal control. The nearest intersection west of the interchange is approximately 275 feet at Conklin Avenue which is a Right-In/Right Out (RI/RO) access, the nearest full access intersection is approximately 600 feet away at Lowell Avenue (traffic signal control). The nearest intersection east of the interchange is approximately 375 feet at Blaine Avenue which is a RI/RO access, the nearest full access intersection is approximately 375 feet at Blaine Avenue (traffic signal control). The study intersections can be seen in the figure below.



Figure 2: 10th Street Corridor/Interchange

Build Concepts

The two Build Concepts carried forward from the previously completed I-229 Major Improvement Study (MIS) were evaluated and refined to fulfill the SDDOT traffic operations criteria. Build Concepts included a Diverging Diamond Interchange (DDI) and a SPUI. The 2050 future year traffic volumes were applied to these Build Concepts and an iterative process of traffic operations analysis and redesign was performed to adapt the concepts to the traffic needs. This process is described in greater detail in the following section.



Operations Analysis Results

Traffic analyses were conducted for 2050 Future Year conditions under scenarios for No-Build and for each Build Concept. Traffic analysis for the study area intersections was performed using Highway Capacity Software version 7.9 (HCS7) which executes methodology outlined in the 6th edition of the Highway Capacity Manual (HCM6).

The SDDOT has established a minimum LOS C on urban interstate highway corridors. At ramp terminal intersections, the overall intersection must be at a LOS C or better; however, individual movements may operate at a LOS D. At other arterial intersections, the overall intersection must be a LOS D or better; however, individual movements may operate at a LOS E if signalized or LOS F if unsignalized. Signalized intersections that were modified by the project cannot operate with a volume to capacity ratio greater than 1.0 for any movement. If arterial intersections were shown to have any movements with a queue storage ratio greater than 1.0 than that intersection will be reported as LOS F.

No-Build Condition

The No-Build Condition intersection capacity analysis considered forecasted year traffic volumes, and the existing lane configurations and intersection traffic control. The following table shows the intersection LOS, delay, and expected volume to capacity (v/c) for the critical movement at each intersection during the AM and PM peak hours. The v/c ratios are representative of the worst-case turning movement at each approach.

			-			Jonunion	operation					
	Control	Int		ction	EB	Leg	WB Leg		NB	Leg	SB Leg	
Intersection	Туре	Dela	LOS ay (se	ec/veh)	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
10 th Street & Lowell Avenue	Signal	AM PM	B D	16.7 45.5	A D	0.42 1.04	B C	0.63 1.01	E D	0.37 0.32	E F	0.71 <mark>0.93</mark>
10 th Street & Conklin Avenue	TWSC	AM PM	D F	25.8 <mark>83.9</mark>	-	- -	-	-	D F	0.52 0.73	D C	0.06 0.13
10 th Street & I-229	Signal	AM PM	F E	100.6 68.2	FE	1.46 1.20	D D	0.95 1.16	F D	1.23 1.12	D F	0.79 1.26
10 th Street & Blaine Avenue	TWSC	AM PM	C E	16.3 46.3	-	-	-	-	C E		NA NA	
10 th Street & Cleveland Avenue	Signal	AM PM	F F	146.1 140.0	D B	1.24 0.95	FF	1.27 1.35	FF	1.41 1.46	F F	1.64 1.56

Table 1: No-Build Condition Operations

** RED = Inadequate LOS or V/C > 1.0

** ORANGE = V/C over 0.90

The results of the No-Build Condition analysis show that there were undesirable traffic delays expected at all intersections within the study area. The majority of the study intersections operated at a Level of Service E or worse during at least one of the peak hour time periods with all intersections failing due to vehicle delay or v/c ratio criteria. The intersection of 10th Street & I-229 experienced LOS F and LOS E during both the AM and PM peak hours, respectively.

DDI Condition

The DDI Concept Condition intersection capacity analysis considered forecasted future year traffic volumes, and the modified concept condition lane configurations and intersection traffic control. The following table shows the



intersection LOS, delay, and expected volume to capacity (v/c) for the critical movement at each intersection during the AM and PM peak hours. The v/c ratios are representative of the worst-case turning movement at each approach. The intersection approaches with movements that were nearing a v/c ratio of 1.0 (highlighted in orange) indicate that it was near capacity.

	Control	Int		ction	EB	Leg	WB	Leg	NB Leg		SB Leg	
Intersection	Туре	Dela	LOS ay (se	6 / ec/veh)	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
10 th Street & Lowell Avenue	Signal	AM PM	B C	19.2 30.7	B D	0.37 0.89	B B	0.66 0.51	D D	0.21 0.78	D E	0.34 0.48
10 th Street & Conklin Avenue	TWSC	AM PM	-	-	-	-	-	- -	-	-	-	-
10 th Street & SB I-229	SB DDI Signal	AM PM	B B	12.2 18.5	B B	0.64 <mark>0.98</mark>	A B	0.76 0.89	-	-	B B	0.76 0.79
10 th Street & NB I-229	NB DDI Signal	AM PM	B C	17.9 23.6	A C	0.37 <mark>0.90</mark>	C C	0.99 0.98	B B	0.78 0.76	-	-
10 th Street & Blaine Avenue	TWSC	AM PM	-	-	-	-	-	-	-	-	-	-
10 th Street & Cleveland Avenue	Signal	AM PM	D D	42.4 46.2	C C	0.51 0.87	D E	0.93 0.99	E E	0.78 0.81	D E	0.48 0.84

Table 2: DDI Concept Operations

** RED = Inadequate LOS or V/C > 1.0

** ORANGE = V/C over 0.90

The results of the DDI Concept Condition analysis show that acceptable traffic delays at intersections within the study area can be obtained with the DDI Concept. The operational results depicted were the result of multiple iterations of roadway lane assignment and intersection signal timing plan evaluations in an effort to minimize the roadway cross-section needs while fulfilling the capacity demands.

The number of lanes within the DDI that were determined necessary to accommodate the anticipated traffic demand and obtain sufficient traffic operations resulted in 4 eastbound through lanes and 3 westbound through lanes at the west DDI crossover intersection and 4 eastbound through lanes and 4 westbound through lanes at the east DDI crossover intersection. The roadway cross section and intersection turn lanes necessary to provide adequate capacity under the DDI concept can be seen in **Table 3** and depicted graphically in **Appendix A**.

				,		
	Control	Intersection	EB Leg	WB Leg	NB Leg	SB Leg
Intersection	Туре	Movement	Lanes Required	Lanes Required	Lanes Required	Lanes Required
10 th Street & SB I-229	SB DDI Signal	LT TH RT	- 4 1	1 3 -	- - -	2 - 1
10 th Street & NB I-229	NB DDI Signal	LT TH RT	Shared 4 -	- 4 Shared	2 - 2	- - -

Table 3: DDI Concept Design Requirements



SPUI Condition

The SPUI Concept Condition intersection capacity analysis considered forecasted future year traffic volumes, and the modified concept condition lane configurations and intersection traffic control. The following table shows the intersection LOS, delay, and expected volume to capacity (v/c) for the critical movement at each intersection during the AM and PM peak hours. The v/c ratios are representative of the worst-case turning movement at each approach. The intersection approaches with movements that were nearing a v/c ratio of 1.0 (highlighted in orange) indicate that it was near capacity.

			Sucept O									
Intersection	Control	Int	erse LOS	ction	EB	Leg	WB	Leg	NB	Leg	SB	Leg
intersection	Туре	Dela		ec/veh)	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
10 th Street &	0:	АМ	В	10.6	А	0.52	А	0.60	D	0.39	D	0.37
Lowell Avenue	Signal	РМ	В	17.4	В	0.70	В	0.83	D	0.39	D	0.72
10 th Street &		АМ	-	-	-	-	-	-	-	-	-	-
Conklin Avenue	TWSC	РМ	-	-	-	-	-	-	-	-	-	-
10 th Street &	SPUI	АМ	В	18.0	С	0.68	В	0.93	В	0.73	В	0.27
I-229	Signal	РМ	С	22.6	С	0.85	С	0.93	В	0.74	С	0.83
10 th Street &		АМ	-	-	_	_	-	-	-	-	-	-
Blaine Avenue	TWSC	РМ	-	-	-	-	-	-	-	-	-	-
10 th Street &	0	АМ	с	20.7	А	0.57	С	0.85	С	0.52	С	0.62
Cleveland Avenue	Signal	PM	С	21.1	В	0.69	В	0.75	D	0.78	D	0.74

Table 4: SPUI Concept Operations

** RED = Inadequate LOS or V/C > 1.0

** ORANGE = V/C over 0.90

The results of the SPUI Concept Condition analysis show that acceptable traffic delays at intersections within the study area can be obtained with the SPUI Concept. The operational results depicted were the result of multiple iterations of roadway lane assignment and intersection signal timing plan evaluations in an effort to minimize the roadway cross-section needs while fulfilling the capacity demands.

The number of lanes at the SPUI that were necessary to accommodate the anticipated traffic demand and obtain sufficient traffic operations resulted in 3 eastbound through lanes and 3 westbound through lanes with dual left-turn lanes needed. The roadway cross section and intersection turn lanes necessary to provide adequate capacity under the SPUI concept can be seen in **Table 5** and depicted graphically in **Appendix A**.

		able 5. 01 01 0	oncept Besi	gir Kequireine	1113	
	Control	Intersection	EB Leg	WB Leg	NB Leg	SB Leg
Intersection	Туре	Movement	Lanes Required	Lanes Required	Lanes Required	Lanes Required
10 th Street & I-229	SPUI Signal	LT TH RT	2 3 1	2 3 1	2 - 2	2 - 1

Table 5: SPUI Concept Design Requirements



Summary

The traffic operations analysis was used as a tool to assist in the refinement of the DDI and SPUI concepts that were retained from a previous study. The traffic operations analysis provided feedback to the design team informing the number of lanes necessary to provide capacity as well as the number of turn lanes and length of storage required at turn bays.

The traffic operations analysis has shown the expected delays from each of the revised Build Concept conditions. Overall, it can be said that both of the Build Concepts provide reduced delays at intersections within the study area when compared to the No-Build condition.

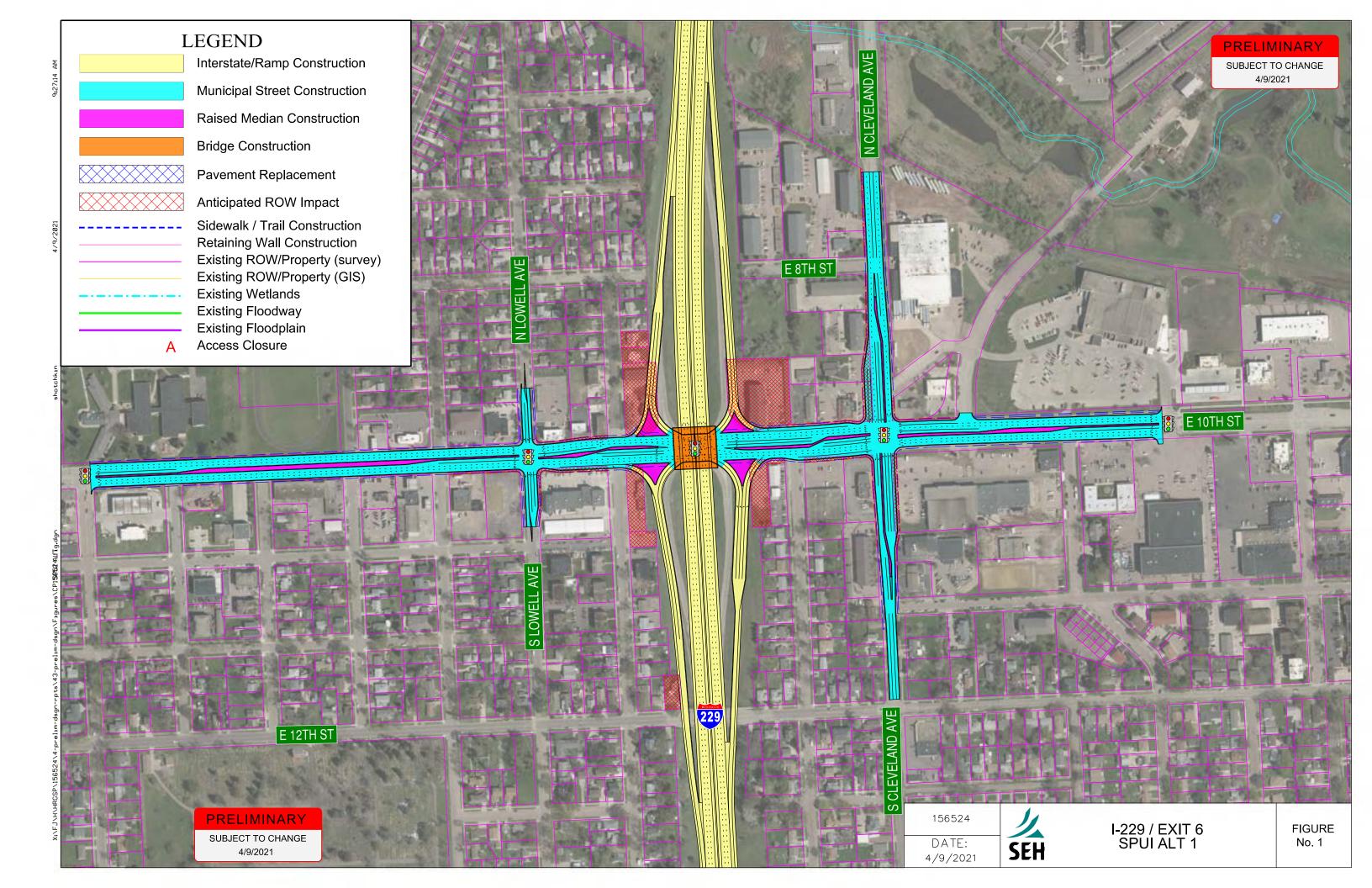
When comparing the two Build Concepts, it can be seen that the SPUI concept was able to provide reduced delays compared to the DDI Concept. The difference in traffic operations between concepts can be attributed to the conflicting traffic volumes at the interchange, the intersection spacing, and the available traffic signal cycle lengths. The DDI concept has a higher conflicting volume of traffic than the SPUI concept, has more closely spaced signalized intersections than the SPUI, and cannot operate under the same cycle length as adjacent intersections. The combination of these elements contributed to the need for additional travel lanes at each of the crossover intersections to accommodate the traffic demand.

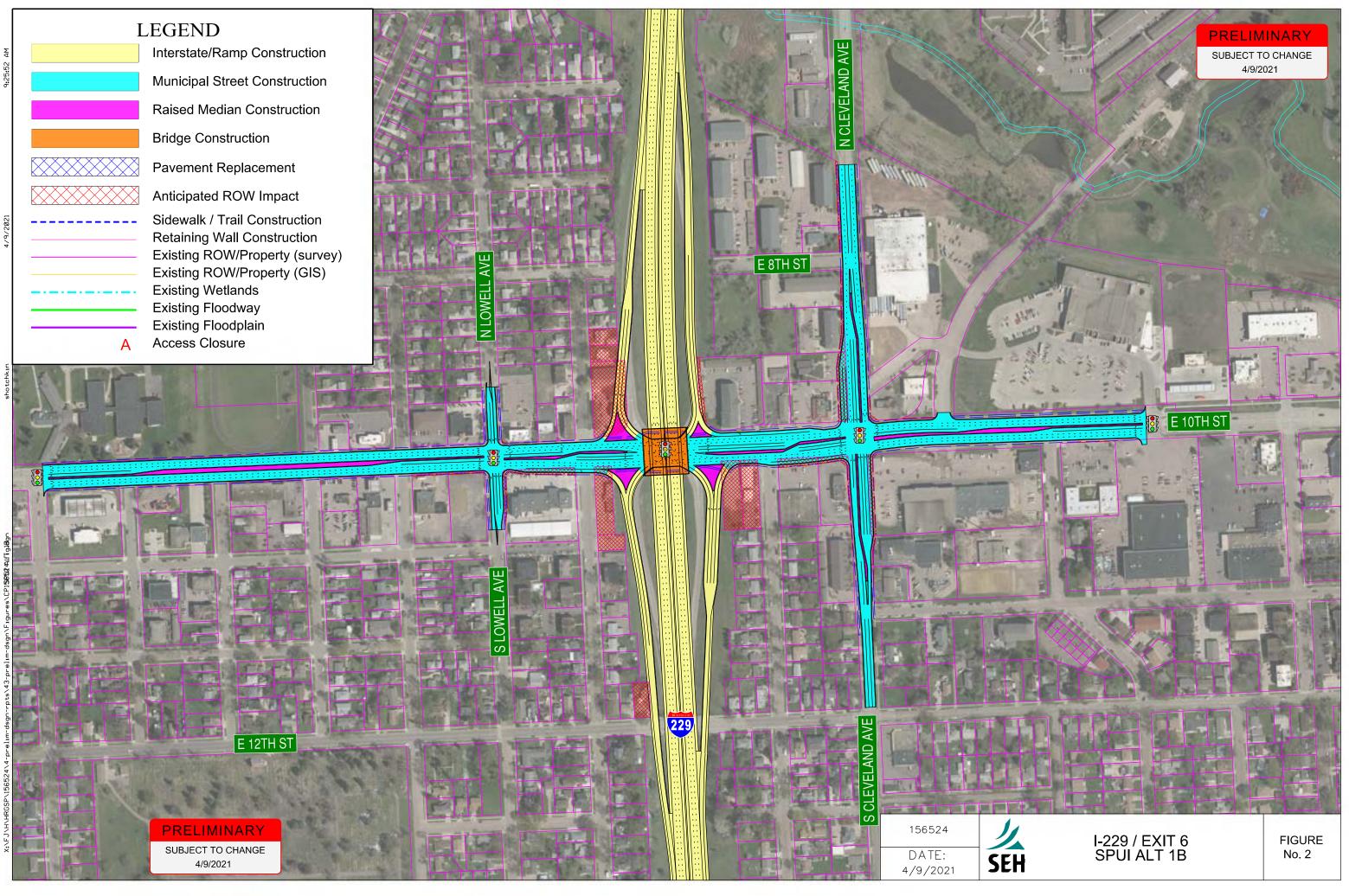
A secondary analysis was conducted to evaluate whether allowing a relaxed interchange ramp delay standard of achieving LOS D or better at the interchange ramp intersections would reduce the number of required travel lanes. It was determined that the controlling traffic operations metric that most influenced design was the v/c ratio and reducing the delay criteria did not provide opportunity to eliminate any travel lanes.

The refined preliminary design for each Build concept can be seen in the **Appendix A**.

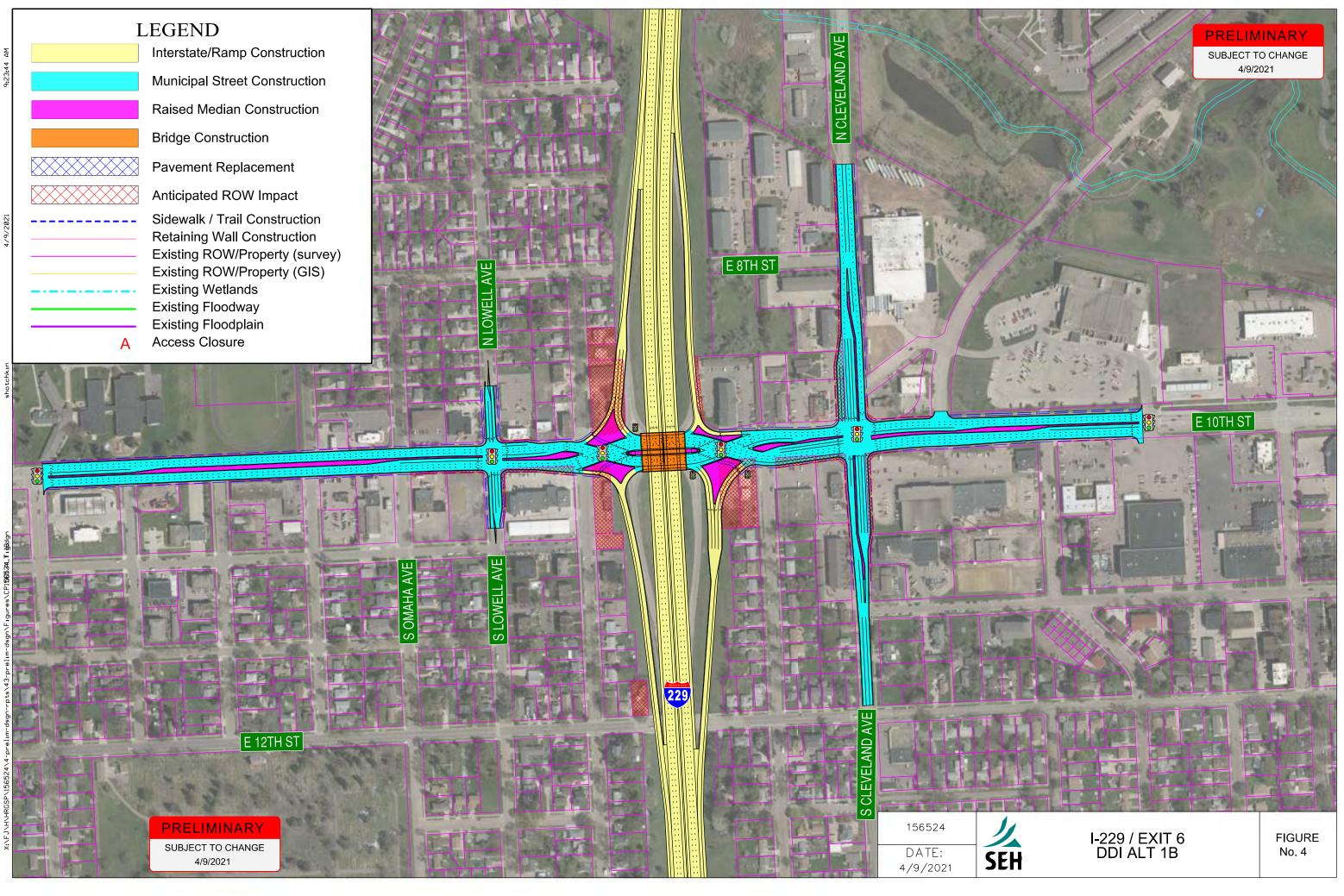


APPENDIX A: Build Concepts









Appendix H – Safety Memo



Building a Better World for All of Us[®]

DRAFT MEMORANDUM

TO:	Steve Gramm South Dakota Department of Transportation
FROM:	Graham Johnson, PE (SD, MN, IA), PTOE Justin Anibas, EIT
DATE:	November 18, 2020
RE:	I-229 Exit 6 (10th Street) Interchange Project - Safety Memo SEH No. HRGSP 156524

This technical memorandum provides the findings related to the analysis of the crash history for the I-229 Exit 6 Interchange project. The project area includes mainline I-229 as well as Rice Street, 6th Street, 10th Street, 12th Street, 18th Street, Southeastern Avenue, and 26th Street in Sioux Falls, South Dakota. This includes I-229 at the Exit 5, Exit 6, and Exit 7 interchange area connections. The purpose is to highlight areas with existing safety concerns in the project area.

Figure 1 shows the project area, which includes Mainline I-229, 10th Street (Exit 6 Interchange), and several other roadways that cross I-229.

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Crash Data	
Mainline I-229	
I-229 Ramps	7
Intersection Crashes	9
Segment Crashes	
Results	

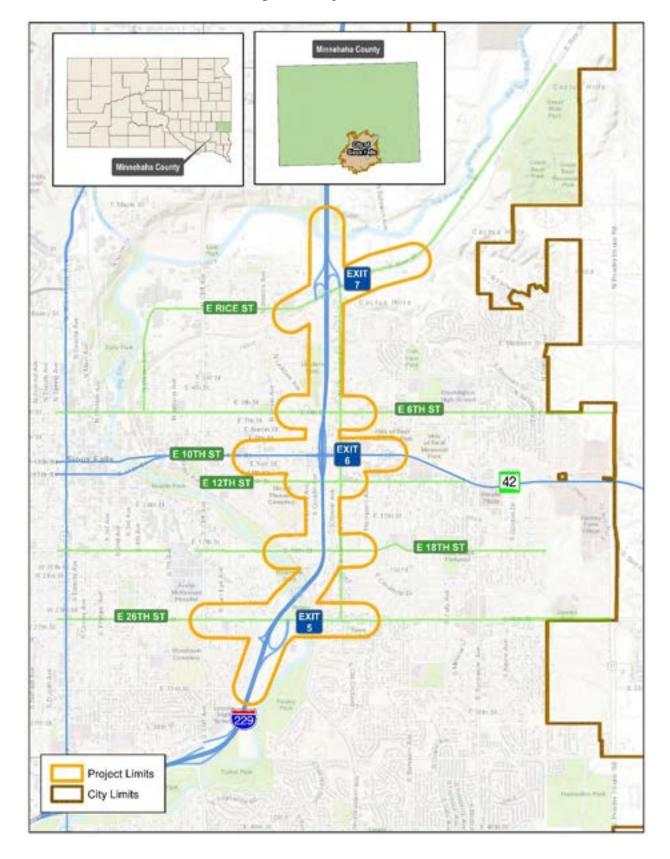


Figure 1 Project Location

CRASH DATA

Crash data from January 1, 2015 through December 31, 2019 was provided by the South Dakota Department of Transportation (SDDOT). The type and severity of crashes were reviewed, and crash rates were calculated for each study intersection. There were a total of 1,632 crashes within the project area that included 353 Mainline I-229, 47 crashes along the freeway ramps, and 1,232 crashes along the project roadways and intersections.

Crash severity is separated into six categories based on injuries sustained during the crash.

- Fatal Crash that results in death.
- Severity A Crash that results in an incapacitating injury.
- Severity B Crash that results in a non-incapacitating injury.
- Severity C Crash that results in possible injury.
- Property Damage Crash that results in property damage only, with no injuries.
- Wild Animal Hit Crash where a wild animal was hit; with no injuries to vehicle drivers/passengers.

The crash rate at each intersection or segment is expressed as a number of crashes per million entering vehicles (MEV). A critical crash rate is a statistical rate that is unique to each intersection or segment and is based on vehicular exposure and the average crash rate for similar facility; the critical crash rate provides a statistical threshold for screening intersections and segment safety concerns.

The critical index is the crash rate divided by the critical crash rate, a ratio of the observed crash rate to the critical crash rate. An intersection or segment with a crash rate higher than the critical rate (critical index > 1) can indicate a safety concern and the site should be further reviewed; a site with a critical index below 1.0 implies that the site does not deviate significantly from the statewide trends.

The following sections provide a summary of the mainline I-229 crashes, I-229 ramp crashes, intersection crashes, and arterial segment crashes.

The attached **Tables A1a through A2b** summarize the crashes along Mainline I-229 and the I-229 ramps by crash severity and general crash diagram. The attached **Tables B1a through B2b** summarize the crashes at each intersection and along each roadway segment by crash severity and general crash diagram.

The attached Figures A1-A3 represents the locations of all the crashes in the project area.

MAINLINE I-229

There were a total of 353 crashes along Mainline I-229 from south of Exit 5 to north of Exit 7 in the 5-year period; directionally it is virtually split with 178 northbound crashes and 175 southbound crashes.

For this analysis, merge/diverge segments were considered to be either the taper area of the exit/entrance ramp or within 750 feet of the ramp gore if the ramp is a lane drop or lane add. The 750 feet assumption was based on the observation that many of the crashes occurred within 750 feet of ramp entrance or exit area. The only exception are the southern ramps of Exit 6 which have approximately 1,400' acceleration and deceleration lanes.

Table 1 summarizes the crashes by severity for each I-229 segment. A brief summary of the crash trends found in the crash information follows. This includes a summary of any mainline I-229 segments with a crash rate that exceeds the calculated critical rate or that had a fatal/severity A crash during the 5-year analysis period.

	Description			Cra	ish Seve	erity			Crash Rate Information			
	Segment	Fatal	A	в	С	PD	Wild Animal	Total	Crash Rate	Critical Rate	Critical Index	
	Between Exits 4 & 5*	0	0	1	0	3	0	4	0.42	1.93	0.22	
	Exit 5 Diverge	0	0	0	1	9	1	11	1.91	2.21	0.87	
	Exit 5 between Ramps	0	0	0	0	5	3	8	0.90	1.97	0.46	
50	Exit 5 Merge	0	0	0	0	5	2	7	1.17	2.18	0.54	
Northbound I-229	Between Exits 5 & 6	1	2	3	2	33	4	45	1.58	1.54	1.03	
pu	Exit 6 Diverge	0	1	1	3	18	1	24	2.63	1.95	1.35	
poq	Exit 6 between Ramps	0	0	0	0	8	0	8	0.83	1.92	0.43	
orth	Exit 6 Merge	0	0	1	1	4	0	6	1.42	2.42	0.59	
ž	Between Exits 6 & 7	0	0	1	3	9	9	22	1.08	1.63	0.66	
	Exit 7 Diverge	0	1	0	0	3	6	10	2.36	2.42	0.98	
	Exit 7 between Ramps	0	0	0	0	3	4	7	1.10	2.15	0.51	
	Exit 7 Merge	0	0	1	0	19	6	26	6.73	2.49	2.70	
	Exit 7 Diverge	0	0	0	1	5	2	8	2.07	2.49	0.83	
	Exit 7 between Ramps	0	0	0	0	4	3	7	1.22	2.21	0.55	
	Exit 7 Merge	0	0	2	1	18	1	22	5.19	2.42	2.15	
29	Between Exits 7 & 6	0	0	1	2	9	13	25	1.33	1.66	0.80	
I-229	Exit 6 Diverge	0	0	1	1	12	1	15	3.54	2.42	1.46	
pur	Exit 6 between Ramps	0	0	2	2	10	1	15	1.77	1.99	0.89	
Southbound	Exit 6 Merge	0	0	0	0	18	0	18	1.53	1.84	0.83	
uth	Between Exits 6 & 5	1	0	2	4	30	0	37	1.36	1.55	0.88	
So	Exit 5 Diverge	0	0	0	0	3	1	4	1.48	2.80	0.53	
	Exit 5 between Ramps	0	0	0	0	2	1	3	0.51	2.20	0.23	
	Exit 5 Merge	0	0	0	0	7	3	10	1.73	2.21	0.78	
	Between Exits 5 & 4*	0	0	1	0	6	4	11	1.21	1.95	0.62	
	TOTAL	2	4	17	21	243	66	353	n/a	n/a	n/a	

Table 1 Mainline I-229 Crashes

- All mainline segments are Urban Interstate with a Statewide Average Crash Rate of 1.03.

- Bold/Shaded indicates a calculated crash rate that is at or exceeding the critical rate.

- * Does not include northbound Merge or southbound Diverge crashes at Exit 4.

Mainline I-229 Crash Trends

- Approximately 64% of the Mainline I-229 crashes were single vehicle (ran off road, spin outs, etc.) or wild animal hit crashes, which means only 36% of crashes along Mainline I-229 involve two vehicles colliding with one another.
- Approximately 63% of the crashes on Mainline I-229 occurred during daylight conditions, with the remaining 37% occurring when it was dark.
- Approximately 54% of the crashes on Mainline I-229 occurred when the roadway surface was dry, with the remaining 46% occurring when the roadway was wet (12%) or snowy/icy (34%).
- Approximately 48% of the crashes on Mainline I-229 occurred during the AM peak period (6-9 AM) and the PM peak period (3-6 PM).
- Approximately 47% of crashes occurred between four months of November through February, during the typical winter months.
- There were a total of 2 fatal and 4 severity A crashes along Mainline I-229 between 2015 through 2019.

Northbound I-229 Crashes

- Northbound I-229 between Exits 5 & 6 Mainline Segment
 - Total Crashes 45
 Crash Rate <u>1.58</u>
 Critical Crash Rate <u>1.54</u>
 Critical Index <u>1.03</u>
 - 45 crashes occurred along this 0.83-mile segment of I-229 over the last 5 years, this segment has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
 - A majority (54%) of the crashes along this segment of I-229 were concentrated at the 2 bridges over the Big Sioux River and Southeastern Avenue as well as the two curves in the roadway.
 - 33 of the 45 crashes were single vehicle crashes (ran off road, spin outs, etc.)
 - 31 of the 45 crashes occurred when the roadway was either wet, snowy, or icy, which indicates weather is likely a significant factor in crashes along this segment of I-229.
 - There was 1 fatal crash along this segment of I-229; this crash involved a vehicle running off the roadway and rolling over when the roadway was icy.
 - There were 3 incapacitating injury (severity A) crashes along this segment of I-229. Weather was a factor
 in all three of the incapacitating injury crashes. One was a single vehicle crash, one was an
 angle/sideswipe crash, and one was a rear end crash.

• Northbound I-229 Exit 6 Diverge – Diverge Segment

Total Crashes – 24Crash Rate – 2.63Critical Crash Rate – 1.95Critical Index – 1.35

- 24 crashes occurred near the exit ramp area along this 1,400-foot segment of I-229 over the last 5 years, this segment has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 10 of the 24 crashes along this segment of I-229 were rear end crashes, likely due to vehicles slowing for congestion either on the mainline or on the exit ramp. Following too closely was the most common contributing factor for these crashes.
- Weather was a factor in 9 of the 24 crashes along this segment of I-229

• Northbound I-229 Exit 7 Diverge – Diverge Segment

 Total Crashes – 10
 Crash Rate – 2.36
 Critical Crash Rate – 2.42
 Critical Index – 0.98

- All 10 of the crashes along this segment were single vehicle (ran off road, spin outs, etc.) or wild animal hit crashes.
- There was 1 incapacitating injury (severity A) crash along this segment of I-229. This crash involved a vehicle running off the roadway and colliding with the guard rail/bridge.

• Northbound I-229 Exit 7 Merge – Merge Segment

 Total Crashes – 26
 Crash Rate – 6.73
 Critical Crash Rate – 2.49
 Critical Index – 2.70

- 26 crashes occurred in the entrance ramp area along this 750-foot segment of I-229 over the last 5 years, this segment has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- A majority (69%) of the crashes along this segment of I-229 were concentrated near the Big Sioux River bridge.
- 15 of the 26 crashes were single vehicle crashes (ran off road, spin outs, etc.)
- 17 of the 26 crashes occurred when the roadway was either snowy or icy, which indicates weather is likely a significant factor in crashes along this segment of I-229.

Southbound I-229 Crashes

• Southbound I-229 Exit 7 Merge – Merge Segment

Total Crashes - 22Crash Rate - 5.19Critical Crash Rate - 2.42Critical Index - 2.15

- 22 crashes occurred in the entrance ramp area along this 750-foot segment of I-229 over the last 5 years, this segment has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 8 of the 22 crashes were sideswipe crashes, likely involving vehicles merging or changing lanes.
- 7 of the 22 crashes were single vehicle crashes (ran off road, spin outs, etc.).
- 10 of the 22 crashes occurred when the roadway was either wet, snowy, or icy. This segment of roadway includes a bridge over Rice Street, which could become slippery during adverse weather conditions.

Southbound I-229 Exit 6 Diverge – Diverge Segment

 Total Crashes – 15
 Crash Rate – <u>3.54</u>
 Critical Crash Rate – <u>2.42</u>
 Critical Index – <u>1.46</u>

- 15 crashes occurred near the exit ramp area along this 750-foot segment of I-229 over the last 5 years, this segment has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 12 of the 15 crashes were single vehicle crashes (ran off road, spin outs, etc.).
- 7 of the 15 crashes occurred when the roadway was either wet, snowy, or icy.

• Southbound I-229 between Exits 6 & 5 – Mainline Segment

Total Crashes – 37Crash Rate – 1.36Critical Crash Rate – 1.55Critical Index – 0.88

- 23 of the 37 crashes were single vehicle crashes (ran off road, spin outs, etc.).
- 11 of the 37 crashes were rear end crashes.
- 19 of the 37 crashes occurred when the roadway was either wet, snowy, or icy.
- There was 1 fatal crash along this segment of I-229. This crash involved a vehicle running off the roadway and hitting a guardrail.

While there are five areas above the critical crash rates, described above, there are also four additional areas that are within 15% of the critical rate. While not over the statistical critical rate, it does relate to additional areas having had safety concerns. These include:

- Northbound I-229 at Exit 5 Diverge
- Northbound I-229 at Exit 7 Diverge
- Southbound I-229 between Exit 6 Entrance and Exit Ramps
- Southbound I-229 between Exit 6 and Exit 5

I-229 RAMPS

There were a total of 47 crashes on the I-229 Exit 5, Exit 6, and Exit 7 ramp connections during the 5-year period. Below is a brief summary of the trends seen in these crashes as well as a summary of any I-229 Ramps with a crash rate that exceeds calculated critical rate or had a severe crash during the 5-year analysis period. Table 2 summarizes the crashes by severity for each ramp along I-229.

For this analysis, ramp crashes did not include crashes that occurred at the intersections of the ramp terminals or along mainline I-229.

	Description			Cra	sh Seve	rity			Rat	te Informat	ion
	Segment	Fatal	A	в	С	PD	Wild Animal	Total	Crash Rate	Critical Rate	Critical Index
S	Exit 5 Off Ramp	0	0	0	0	4	0	4	0.83	2.33	0.36
Ramps	Exit 5 On Ramp	0	0	1	1	11	0	13	7.67	3.33	2.30
R R	Exit 6 Off Ramp	0	0	0	0	2	0	2	0.57	2.57	0.22
I-229	Exit 6 On Ramp	0	0	0	1	2	0	3	1.15	2.84	0.40
NB -	Exit 7 Off Ramp	0	0	0	1	7	0	8	8.09	4.17	1.94
z	Exit 7 On Ramp	0	1	0	0	1	0	2	1.51	3.68	0.41
S	Exit 7 Off Ramp	0	0	0	0	0	0	0	0.00	3.54	0.00
Ramps	Exit 7 On Ramp	0	0	1	0	2	0	3	3.08	4.20	0.73
R R	Exit 6 Off Ramp	0	0	0	0	0	0	0	0.00	2.80	0.00
B I-229	Exit 6 On Ramp	0	0	0	1	8	0	9	4.92	3.24	1.52
- -	Exit 5 Off Ramp	0	0	0	0	1	0	1	1.63	5.19	0.31
S	Exit 5 On Ramp	0	0	0	1	1	0	2	2.10	4.23	0.50
	TOTAL	0	1	2	5	39	0	47			
- All	mainline segments are Urban Interstate w	ith a Stat	tewide Av	verage C	rash Rate	e of 1.03					

Table 2 I-229 Ramp Crashes

- Bold/Shaded indicates a calculated crash rate that is at or exceeding the critical rate.

I-229 Ramp Crash Trends

- Approximately 74% of the I-229 ramp crashes were single vehicle (ran off road, spin outs, etc.), which means only 26% of crashes on the I-229 ramps involve two vehicles colliding with one another.
- Approximately 68% of the crashes on the I-229 ramps occurred during daylight conditions, with the remaining 32% occurring when it was dark.
- Approximately 55% of the crashes on the I-229 ramps occurred when the roadway surface was dry, with the remaining 45% occurring when the roadway was wet (9%) or snowy/icy (36%).
- Approximately 40% of the crashes on the I-229 Ramps occurred during the AM peak period (6-9 AM) and PM • peak period (3-6 PM).
- Approximately 55% of crashes occurred between the four months of November through February, during the typical winter months.
- There was 1 severity A crash on the I-229 Ramps from 2015 through 2019.

Northbound I-229 Ramp Crashes

- Northbound I-229 Exit 5 On Ramp
 - Total Crashes 13Crash Rate 7.67Critical Crash Rate 3.33Critical Index 2.30
 - 13 crashes occurred along this ramp over the last 5 years, this segment has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
 - A majority of the crashes on this ramp occurred on the loop section.
 - 12 of the 13 crashes were single vehicle crashes (ran off road, spin outs, etc.).
 - 7 of the 13 crashes occurred when the roadway was either wet, snowy, or icy.

• Northbound I-229 Exit 7 Off Ramp

- Total Crashes 8
 Crash Rate 8.09
 Critical Crash Rate 4.17
 Critical Index 1.94
- 8 crashes occurred along this ramp over the last 5 years, this segment has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- All 8 of the crashes on this ramp occurred on the loop section and were single vehicle crashes (ran off road, spin outs, etc.).
- 4 of the 8 crashes occurred when the roadway was either snowy or icy.

Northbound I-229 Exit 7 On Ramp

Total Crashes – 2 Crash Rate – 1.51 Critical Crash Rate – 3.68 Critical Index – 0.41

- Both of the crashes on this ramp were single vehicle crashes (ran off road, spin outs, etc.) and occurred when the roadway was dry.
- There was 1 incapacitating injury (severity A) crash on this ramp. This crash involved an intoxicated driver running off the roadway and rolling over.

Southbound I-229 Ramp Crashes

- Southbound I-229 Exit 6 On Ramp
 Total Crashes 9
 Crash Rate <u>4.92</u>
 Critical Crash Rate <u>3.24</u>
 Critical Index <u>1.52</u>
 - 9 crashes occurred along this ramp over the last 5 years, this segment has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
 - 6 of the 9 crashes were rear end crashes, which indicates there may be congestion on this ramp.
 - 3 of the 9 crashes were single vehicle crashes (ran off road, spin outs, etc.).
 - 4 of the 9 crashes occurred when the roadway was either wet, snowy, or icy.

INTERSECTION CRASHES

There were a total of 1,104 crashes at the 27 intersections (23 study intersections, 4 other intersections) analyzed as part of this project between 2015 and 2019. Non-study intersections with approximately 10 crashes in the 5-year history were included in the intersection analysis. **Table 3** summarizes the crashes by severity for each intersection.

				Cra	ish Seve	erity			Rat	te Informat	ion
	Intersection	Fatal	A	В	С	PD	Wild Animal	Total	Crash Rate	Critical Rate	Critical Index
	Rice St at Lowell Ave	0	0	1	1	7	0	9	0.38	0.56	0.67
e St	Rice St at I-229 SB Ramp Terminal**	0	1	1	3	9	0	14	0.51	0.99	0.52
Rice	Rice St at I-229 NB Ramp Terminal**	0	0	2	10	39	0	51	1.53	0.95	1.61
	Rice St at Bahnson Ave	0	0	0	1	1	0	2	0.10	0.60	0.17
	6th St at Lowell Ave	0	0	1	2	5	0	8	0.38	0.59	0.65
St	6th St at Leadale Ave ⁽²⁾	0	0	0	0	8	0	8	0.41	0.60	0.69
6 th	6th St at N Cleveland Ave**	0	0	8	14	66	0	88	2.26	1.35	1.67
	10th St at Jessica Ave**	0	0	0	3	9	0	12	0.28	0.90	0.31
	10th St at St. Paul Ave ⁽²⁾	0	0	4	1	9	0	14	0.32	0.48	0.66
	10th St at Lowell Ave**	0	1	5	12	34	0	52	1.11	0.89	1.25
St	10th St at Conklin Ave	0	0	1	1	4	0	6	0.14	1.41	0.10
10 th 9	10th St at Single Point Terminal**	0	3	3	24	120	0	150	2.47	0.85	2.90
7	10th St at Blaine Ave	0	0	0	0	5	0	5	0.09	1.35	0.07
	10th St at Cleveland Ave**	0	1	14	25	124	0	164	2.56	1.26	2.03
	10th St at Chapel Hill Rd ⁽²⁾	0	0	2	0	7	0	9	0.22	0.49	0.45
	10th St at Hy-Vee Access**	0	0	0	6	19	0	25	0.61	0.91	0.67
2 th	12th St at Lowell Ave	0	0	1	2	4	0	7	1.10	0.88	1.25
1	12th St at Cleveland Ave**	0	0	1	7	26	0	34	1.73	1.05	1.65
St	18th St at Southeastern Ave**	0	0	2	2	28	0	32	1.80	1.07	1.68
8 ₽	18th St at Blaine Ave ⁽²⁾	0	0	1	0	9	0	10	0.84	0.70	1.20
3	18th St at Cleveland Ave**	0	0	1	4	24	0	29	1.51	1.05	1.43
	26th St at Van Eps Ave**	0	0	2	2	12	0	16	0.67	1.02	0.66
	26th St at Yeager Rd**	0	0	4	12	33	0	49	1.16	0.91	1.28
Str	Yeager Rd at SB Ramp Terminal	0	1	0	3	12	0	16	1.01	0.65	1.54
26 th	26th St at NB Ramp Terminal**	0	0	10	17	72	0	99	1.93	0.88	2.20
	26th St at Southeastern Ave**	0	0	4	13	90	0	107	1.58	1.25	1.26
	26th St at Cleveland Ave**	0	1	6	20	61	0	88	1.82	0.89	2.06
	TOTAL	0	8	74	185	837	0	1104	n/a	n/a	n/a

Table 3 Intersection Crashes

- **Signalized Intersection

- Bold/Red Shaded indicates a calculated crash rate that is at or exceeding the critical rate.

- (2) Notes non-study intersections included.

Below is a brief summary of the trends seen in these crashes as well as a summary of all intersections and highlights locations where the crash rate exceeds the calculated critical rate.

Intersection Trends

- Approximately 58% of the intersection crashes (638 out of 1,104) were rear end crashes. 97% of the rear end crashes occurred at the 16 signalized intersections analyzed. These crashes are likely the result of slowing traffic or congestion at the signalized intersections.
- Approximately 68% of all rear end crashes occurred in the eastbound/westbound direction, while the remaining 32% were in the northbound/southbound direction.
- Approximately 30% of the intersection crashes (332 out of 1,148) were right-angle crashes.
- Approximately 73% of the intersection crashes occurred during daylight conditions, with the remaining 27% occurring under dark conditions.
- Approximately 69% of the crashes occurred when the roadway surface was dry, with the remaining 31% occurring when the roadway was wet (16%) or snowy/icy (15%).
- Approximately 46% of the crashes occurred during the AM peak (6-9 AM) and PM peak (3-6 PM) periods with 31% of all crashes occurring during the PM peak period.
- The winter months (November through February) had generally the highest number of crashes, but overall there was not a significant difference in crashes by month.
- There were a total of 8 severity A crashes and no fatal crashes from 2015 through 2019.
- There were a total of 7 crashes involving pedestrian or bicyclists at the 27 intersections analyzed as part of this study.

Rice Street Crashes (4 Intersections)

- Rice Street at Lowell Avenue (Minor Street Stop Control)
 Total Crashes 9
 Crash Rate 0.38
 Critical Crash Rate 0.56
 Critical Index 0.67
 - 6 of the 9 crashes were right-angle crashes. 5 of the right-angle crashes involved northbound left turning vehicles and eastbound through vehicles.

• Rice Street at I-229 Southbound Ramp Terminal (Traffic Signal)

 Total Crashes – 14
 Crash Rate – 0.51
 Critical Crash Rate – 0.99
 Critical Index – 0.52

- 8 of the 14 crashes were rear end crashes, likely the result of backups at the intersection. 4 of the rear
 end crashes were in the eastbound direction and 4 were in the southbound direction.
- There was 1 incapacitating injury (severity A) crash at this intersection. This crash involved an eastbound left turning vehicle failing to yield to a westbound vehicle.
- Rice Street at I-229 Northbound Ramp Terminal/Cleveland Avenue (Traffic Signal)

 Total Crashes – 51
 Crash Rate – <u>1.53</u>
 Critical Crash Rate – <u>0.95</u>
 Critical Index – <u>1.61</u>

- 51 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 24 of the 51 crashes were right-angle crashes. 18 involved vehicles taking a left turn with 8 involving eastbound and westbound vehicles together (no protected left phase).
- 19 of the 51 crashes were rear end crashes, likely the result of backups at the intersection. 11 of the rear end crashes were in the northbound direction and 4 were in the southbound direction (2 eastbound, 2 westbound). This could indicate that backups are worse for northbound vehicles, although the railroad crossing on the south leg could also result in some rear end crashes for vehicles stopping for a train.
- Rice Street at Bahnson Avenue (Minor Street Stop Control)
 Total Crashes 2
 Crash Rate 0.10
 Critical Crash Rate 0.58
 Critical Index 0.09
 With only 2 crashes over the last 5 years at this intersection, no crash trends exist.

6th Street Crashes (3 Intersections)

- 6th Street at Lowell Avenue (Minor Street Stop Control)
 - Total Crashes 8
 Crash Rate 0.38
 Critical Crash Rate 0.59
 Critical Index 0.65
 - 5 of the 8 crashes were right-angle crashes. 4 out of 5 of the right-angle crashes involved a westbound vehicle and a vehicle from one of the minor streets.
- 6th Street at Leadale Avenue (Minor Street Stop Control)
 - Total Crashes 8
 Crash Rate 0.41
 Critical Crash Rate 0.60
 Critical Index 0.69
 - 3 of the 8 crashes were right-angle crashes and 2 were side-swipe crashes. 7 of the 8 crashes involved a westbound vehicle.
- 6th Street at Cleveland Avenue (Traffic Signal)
 - Total Crashes 88 Crash Rate 2.26 Critical Crash Rate 1.35 Critical Index 1.67
 - 88 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
 - 43 of the 88 crashes were rear end crashes, likely the result of backups at the intersection. 18 of the rear end crashes were in the westbound direction and 9 were in the eastbound direction (11 northbound, 5 southbound).
 - 31 of the 88 crashes were right-angle crashes. 14 involved vehicles taking a left turn.
 - There were 2 pedestrian crashes and 1 bicycle crash at this intersection.
 - 1. A northbound bicycle failed to yield to a westbound right turning vehicle (Severity B)
 - 2. A northbound left turning vehicle failed to yield to a pedestrian (Severity B)
 - 3. A pedestrian disregarded the traffic control and was struck by an eastbound vehicle (Severity C).

10th Street Crashes (9 Intersections)

- 10th Street at Jessica Avenue (Traffic Signal) Total Crashes – 12 Crash Rate – 0.28 Critical Crash Rate – 0.90 Critical Index – 0.31
 9 of the 12 crashes were rear end crashes, likely due to backups at the intersection. 7 of the rear end
 - 9 of the 12 crashes were rear end crashes, likely due to backups at the intersection. 7 of the rear end crashes were in the eastbound direction and 2 were in the westbound direction.

• 10th Street at St Paul Avenue (Minor Street Stop Control)

- Total Crashes 14
 Crash Rate 0.32
 Critical Crash Rate 0.48
 Critical Index 0.66
- 11 of the 14 crashes were right-angle crashes, 8 involved a southbound vehicle failing to yield to a westbound vehicle.
- 10th Street at Lowell Avenue (Traffic Signal)

Total Crashes - 52Crash Rate - $\underline{1.11}$ Critical Crash Rate - $\underline{0.89}$ Critical Index - $\underline{1.25}$

- 52 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 36 of the 52 crashes were rear end crashes, likely due to backups at the intersection. 28 of the rear end crashes were in the eastbound direction and 6 were in the westbound direction (2 southbound). This could indicate that backups are much worse for eastbound traffic than westbound traffic.
- 15 of the 52 crashes were right-angle crashes. 9 of the right-angle crashes involved vehicles taking a left turn, all 9 involved an eastbound vehicle.
- There was 1 incapacitating injury (severity A) crash at this intersection. This crash was an eastbound rear end crash.

- 10th Street at Conklin Avenue (Right-In/Right-Out Access)
 - Total Crashes 6 Crash Rate – 0.14 Critical Crash Rate – 1.41 Critical Index - 0.10
 - 2 of the 6 crashes involved vehicles turning right off of Conklin Avenue onto 10th Street.
 - 2 of 6 crashes involved westbound vehicles changing lanes to either turn onto Conklin Avenue or to avoid _ a vehicle that was slowing to do so.
- 10th Street at I-229 Single Point Ramp Terminal (Traffic Signal)

Total Crashes – 150 Crash Rate – 2.47 Critical Crash Rate – 0.85 Critical Index – 2.90

- 150 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern. Considering the crash rate is nearly triple the critical crash rate at this intersection, any design considerations should include improvements to reduce crashes at this intersection.
- 129 of the 150 crashes were rear end crashes, likely the result of backups at the intersection and signal timing issues. 45 of the rear end crashes were in the westbound direction and 26 were in the eastbound direction (43 northbound, 15 southbound).
- There were 3 incapacitating (severity A) crashes at this intersection.
 - 1. A northbound vehicle stuck the bridge rail and a traffic sign
 - 2. Two westbound rear end crashes
- 10th Street at Blaine Avenue (Right-In/Right-Out Access)

Total Crashes – 5

Total Crashes – 9

Critical Crash Rate – 1.35 Critical Index – 0.07 Crash Rate – 0.09 All 5 of these crashes involved vehicles either slowing down to take a right turn or changing lanes to avoid vehicles slowing down to do so.

10th Street at Cleveland Avenue (Traffic Signal)

Total Crashes – 164 Crash Rate – 2.56 Critical Crash Rate – <u>1.26</u> Critical Index – 2.03

- 164 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern. Considering the crash rate is over double the critical crash rate at this intersection, any design considerations should include improvements to reduce crashes at this intersection.
- 94 of the 164 crashes were rear end crashes, likely due to backups at the intersection. 43 of the rear ends were in the westbound direction and 20 were in the eastbound direction (17 northbound, 14 southbound). This could indicate that backups are much worse for westbound traffic than eastbound traffic. 22 of the 43 westbound rear end crashes occurred during the PM peak period (3 to 6 PM).
- 55 of the 164 crashes were right-angle crashes. 28 of the right-angle crashes involved vehicles taking a left turn, with 18 involving eastbound and westbound vehicles together (no westbound protected left phase).
- There was 1 incapacitating injury (severity A) crash at this intersection. This crash was a westbound rear end crash.

Critical Crash Rate – 0.49

10th Street at Chapel Hill Road (Minor Street Stop Control)

- Critical Index 0.49
- 6 of the 9 crashes were right-angle crashes, all involved westbound vehicles.

Crash Rate – 0.22

• 10th Street at Hy-Vee Access (Traffic Signal)

Total Crashes – 25 Crash Rate – 0.61

Critical Crash Rate – 0.91

Critical Index – 0.67

- 17 of the 25 crashes were rear end crashes, likely due to backups at the intersection. 12 of the rear ends were in the westbound direction and 5 were in the eastbound direction.
- There were 1 pedestrian and 1 bicycle crash at this intersection.
 - 1. A bicycle failed to yield to a southbound left turning vehicle (Severity C)
 - 2. A southbound left turning vehicle failed to yield to a pedestrian (Severity C)

12th Street Crashes (2 Intersections)

- 12th Street at Lowell Avenue (Minor Street Stop Control)
 - Total Crashes 7Crash Rate 1.10Critical Crash Rate 0.88Critical Index 1.25-7 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.Critical Crash Rate 0.88Critical Index 1.25
 - 5 of the 7 crashes were right-angle crashes. All 5 crashes involved one vehicle from 12th Street and one from Lowell Avenue. 4 of the 5 crashes involved a northbound vehicle.
- 12th Street at Cleveland Avenue (Traffic Signal)

Total Crashes – 34 Crash Rate – <u>1.73</u> Critical Crash Rate – <u>1.05</u> Critical Index – <u>1.65</u>

- 34 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 22 of the 34 crashes were right-angle crashes. 12 of the right-angle crashes involved vehicles disregarding the traffic signal.
- There was 1 bicycle crash at this intersection. This crash involved a bicyclist failing to yield to a southbound through vehicle.

18th Street Crashes (3 Intersections)

• 18th Street at Southeastern Avenue (Traffic Signal)

Total Crashes – 32 Crash Rate – <u>1.80</u> Critical Crash Rate – <u>1.07</u> Critical Index – <u>1.68</u>

- 32 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 13 of the 32 crashes were rear end crashes, likely due to backups at the intersection. 8 of the rear ends were in the eastbound direction and 2 were in the westbound direction (2 northbound, 1 southbound).
- 11 of the 32 crashes right-angle crashes. 9 of the right-angle crashes involved vehicles taking a left turn.

• 18th Street at Blaine Avenue (Minor Street Stop Control)

- Total Crashes 10Crash Rate 0.84Critical Crash Rate 0.70Critical Index 1.20
- 10 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 5 of the 10 crashes were right-angle crashes. 4 of the 5 crashes involved a northbound and a westbound vehicle.
- 18th Street at Cleveland Avenue (Traffic Signal)
 - Total Crashes 29Crash Rate 1.51Critical Crash Rate 1.05Critical Index 1.43
 - 29 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
 - 15 of the 29 crashes were right-angle crashes.

26th Street Crashes (6 Intersections)

It should be noted that the 26th Street interchange area is currently in the process of being reconstructed and should be completed in the fall of 2020. Therefore, any safety concerns or crash trends may change significantly with a new interchange and roadway design.

- 26th Street at Van Eps Avenue (Traffic Signal)
 Total Crashes 16
 Crash Rate 0.67
 Critical Crash Rate 1.02
 Critical Index 0.66
 All 16 of the crashes were rear end crashes, likely due to backups at the intersection. 9 of the rear ends were in the westbound direction and 6 were in the eastbound direction (1 northbound).
- 26th Street at Yeager Road (Traffic Signal)
 - Total Crashes 49
 Crash Rate <u>1.16</u>
 Critical Crash Rate <u>0.91</u>
 Critical Index <u>1.28</u>
 - Yeager will be realigned and no longer carry I-229 traffic as part of Exit 5 Interchange Project.
 - 49 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
 - 39 of the 49 crashes were rear end crashes, likely due to backups at the intersection. 25 of the rear ends were in the westbound direction and 7 were in the eastbound direction (1 northbound). This could indicate that backups are worse for westbound vehicles.
- Yeager Road at I-229 Southbound Ramp Terminal (Minor Street Stop Control)
 - Total Crashes 16
 Crash Rate 1.01
 Critical Crash Rate 0.65
 Critical Index 1.54

 –
 As part of the reconstruction of the Exit 5, this intersection will be eliminated and the southbound I-229 ramps will have access directly to 26th Street, creating a new intersection with traffic signal control.
 - 16 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
 - 10 of the 16 crashes were right-angle crashes. 7 of the right-angle crashes involved a southbound left turning vehicle failing to yield to a northbound vehicle.
 - There was 1 incapacitating injury (severity A) crash at this intersection. This crash involved a westbound left turning vehicle failing to yield to a northbound vehicle.
- 26th Street at I-229 Northbound Ramp Terminal (Traffic Signal)
 - Total Crashes 99
 Crash Rate <u>1.93</u>
 Critical Crash Rate <u>0.88</u>
 Critical Index <u>2.20</u>
 - 99 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
 - 70 of the 99 crashes were rear end crashes, likely due to backups at the intersection. 31 of the rear ends were in the northbound direction, 15 were in the eastbound direction, and 24 were in the westbound direction.

• 26th Street at Southeastern Avenue (Traffic Signal)

Total Crashes – 107Crash Rate – 1.58Critical Crash Rate – 1.25Critical Index – 1.26

- 107 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 58 of the 107 crashes were rear end crashes, likely due to backups at the intersection. 28 of the rear ends were in the westbound direction and 15 were in the eastbound direction (9 northbound, 6 southbound).
- 38 of the 107 crashes were right-angle crashes. 16 of the right-angle crashes involved left turning vehicles.

• 26th Street at Cleveland Avenue (Traffic Signal)

Total Crashes – 88 Crash Rate – <u>1.82</u> Critical Crash Rate – <u>0.89</u> Critical Index – <u>2.06</u>

- 88 crashes occurred over the last 5 years, this intersection has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 54 of the 88 crashes were rear end crashes, likely due to backups at the intersection. 36 of the rear ends were in the westbound direction and 14 were in the eastbound direction (4 northbound). This could indicate backups are worse for westbound vehicles.
- 24 of the 88 crashes were right-angle crashes. 10 of the right-angle crashes involved left turning vehicles.
- There was 1 incapacitating injury (severity A) crash at this intersection. This crash involved a drunk driver disregarding the traffic control.

SEGMENT CRASHES

There were a total of 128 crashes along the roadway segments analyzed as part of this project between 2015 and 2019. The segments included any crashes between the 27 intersections analyzed that was not assigned as an intersection crash.

Crashes at any business or residential access would be considered segment crashes for the purposes of this analysis. Table 4 summarizes the crashes by severity for each segment.

	Roadway Description			Cra	sh Seve	rity			Rat	e Informat	ion
	From / To	Fatal	A	в	С	PD	Wild Animal	Total	Crash Rate	Critical Rate	Critical Index
St	Lowell Ave / I-229 SB Ramp	0	0	0	0	0	5	5	2.63	7.11	0.37
Rice (I-229 SB Ramp / I-229 NB Ramp	0	0	0	0	0	4	4	0.76	5.47	0.14
Ř	I-229 NB Ramp / Bahnson Ave	0	0	1	0	2	6	9	1.01	7.18	0.14
St	Lowell Ave / Leadale Ave	0	0	1	0	2	0	3	2.36	10.20	0.23
6 th	Leadale Ave / N Cleveland Ave	0	0	0	2	6	0	8	2.36	6.11	0.39
	Jessica Ave / St. Paul Ave	0	0	3	0	6	0	9	1.10	5.01	0.22
	St. Paul Ave / Lowell Ave	0	0	0	1	8	0	9	1.66	5.26	0.32
	Lowell Ave / Conklin Ave	0	0	0	0	0	0	0	0.00	4.72	0.00
st	Conklin Ave / Single Point Ramp	0	0	0	0	0	0	0	0.00	5.00	0.00
10 th	Single Point Ramp / Blaine Ave	0	0	1	0	2	0	3	0.75	4.20	0.18
	Blaine Ave / Cleveland Ave	0	0	0	1	2	0	3	0.81	4.26	0.19
	Cleveland Ave / Chapel Hill Rd	0	0	0	0	0	0	0	0.00	4.93	0.00
	Chapel Hill Rd / Hy-Vee Access	0	0	0	0	4	0	4	0.72	5.42	0.13
12 th	Lowell Ave / Cleveland Ave	0	0	3	6	8	0	17	<u>10.95</u>	3.31	3.31
12	Southeastern Ave / Blaine Ave	0	0	2	2	10	0	14	4.18	7.70	0.54
18 th	Blaine Ave / Cleveland Ave	0	0	2	0	1	0	3	4.78	11.96	0.40
SE	18th St / 26th St (Southeastern Ave)	0	0	0	0	6	1	7	0.81	2.32	0.35
	Van Eps Ave / Yeager Rd	0	0	1	1	9	0	11	1.74	6.96	0.25
st	Yeager Rd / NB Ramp	0	0	1	0	2	0	3	0.36	5.02	0.07
26th 9	I-229 NB Ramp / Southeastern Ave	0	0	2	3	9	2	16	1.27	4.64	0.27
Ñ	Southeastern Ave / Cleveland Ave	0	0	0	0	0	0	0	0.00	5.34	0.00
	26th St / SB Ramp (Yeager Rd)	0	0	0	0	0	0	0	0.00	13.64	0.00
	TOTAL	0	0	17	16	77	18	128	n/a	n/a	n/a
- Bolo	d/Red shaded indicates a calculated crash rate that	is at or ex	xceeding	the critic	al rate.				0.81 4.26 0.00 4.93 0.72 5.42 10.95 3.31 4.18 7.70 4.78 11.96 0.81 2.32 1.74 6.96 0.36 5.02 1.27 4.64 0.00 5.34		

Table 4 Segment Crashes

Below is a brief summary of the trends seen in these crashes as well as a summary of the roadway segment location with a crash rate that exceeds the calculated critical rate.

Segment Trends

- Approximately 38% of the segment crashes (48 out of 128) were single vehicle (ran off road, spin outs, etc.) or wild animal hit crashes.
- Approximately 66% of the segment crashes occurred during daylight conditions, with the remaining 34% occurring when it was dark.
- Approximately 73% of the segment crashes occurred when the roadway surface was dry, with the remaining 27% occurring when the roadway was wet (16%) or snowy/icy (11%).
- Approximately 48% of the segment crashes occurred during the AM peak (6-9 AM) and PM peak (3-6 PM) periods.
- There were 3 crashes involving a pedestrian or bicyclist on the roadway segments between 2015 and 2019.
 - A bicycle crash occurred on 6th Street between Leadale Avenue and Cleveland Avenue and involved a vehicle taking a right turn into the gas station parking lot hitting a bicyclist.
 - A pedestrian crash occurred on 10th Street at Omaha Avenue and involved an eastbound vehicle making a right turn into a pedestrian.
 - A pedestrian crash occurred on 12th Street at Conklin Avenue and involved a pedestrian crossing the roadway, failing to yield.

12th Street

• 12th Street between Lowell Avenue and Cleveland Avenue

Total Crashes – 17 Crash Rate – <u>10.95</u> Critical Crash Rate – <u>3.13</u> Critical Index – <u>3.31</u>

- 17 crashes occurred along this 1,330-foot segment over the last 5 years, this segment has a crash rate that exceeds the calculated critical rate, indicating a safety concern.
- 7 crashes involved single vehicles, including 4 driving while intoxicated.
- There are two intersections, Conklin Avenue and Blaine Avenue, along this segment that each had about 5 crashes.

Other Study Corridors

No segments with crash rates that exceed the critical rate were found along Rice Street, 6th Street, 10th Street, 18th Street, Southeastern Avenue, or 26th Street.

RESULTS

The most recent 5-years of crash data, 2015 through 2019, was reviewed as part of the I-229 Exit 6 Interchange Project. A total of 1,632 crashes occurred within the study area during the 5-year period. Crash rates were calculated for all segments and intersections and compared to the critical crash rates; a crash rate higher than the critical indicates a safety concern.

Mainline I-229 has 6 segment areas that have had crash rates above the critical, these include:

- Northbound I-229 Locations:
 - Mainline segment between Exit 5 and Exit 6.
 - Exit 6 Diverge Area.
 - Exit 7 Merge Area.
- Southbound I-229 Locations:
 - Exit 7 Merge Area.
 - Exit 6 Diverge Area.
 - o Exit 6 Merge Area.

There were 3 ramp connections from I-229 that had crash rates above the critical rate, these include:

- Northbound I-229 Entrance Ramp from 26th Street (Exit 5).
- Northbound I-229 Exit Ramp to Rice Street (Exit 7).
- Southbound I-229 Entrance Ramp from 10th Street (Exit 6).

The study intersections included 23 recommended study locations; 4 additional intersection were included as they had approximately 10 crashes during the 5-year period. A total of 15 intersections have crash rates that exceed the critical rates, these include:

- Rice Street at the I-229 Northbound Ramp Terminal
- 6th Street at Cleveland Avenue
- 10th Street at Lowell Avenue
- 10th Street at I-229 SPUI
- 10th Street at Cleveland Avenue
- 12th Street at Lowell Avenue
- 12th Street at Cleveland Avenue
- 18th Street at Southeastern Avenue
- 18th Street at Blaine Avenue
- 18th Street at Cleveland Avenue
- 26th Street at Yeager Road**
- 26th Street at I-229 Northbound Ramp Terminal**
- 26th Street at Southeastern Avenue**
- 26th Street at Cleveland Avenue**
- Yeager Road at I-229 Southbound Ramp Terminal**
 - **26th Street/Exit 5 is currently under construction and the new design should improve safety on the corridor.

Arterial segments were divided between intersections, a total of 22 segments were evaluated along the 7 roadways. Only 1 segment had a crash rate higher than the critical rate.

• 12th Street: between Lowell Avenue and Cleveland Avenue

Figure 2 highlights the mainline, ramp connection segments, and intersections that have crash rates that are above the critical rate.

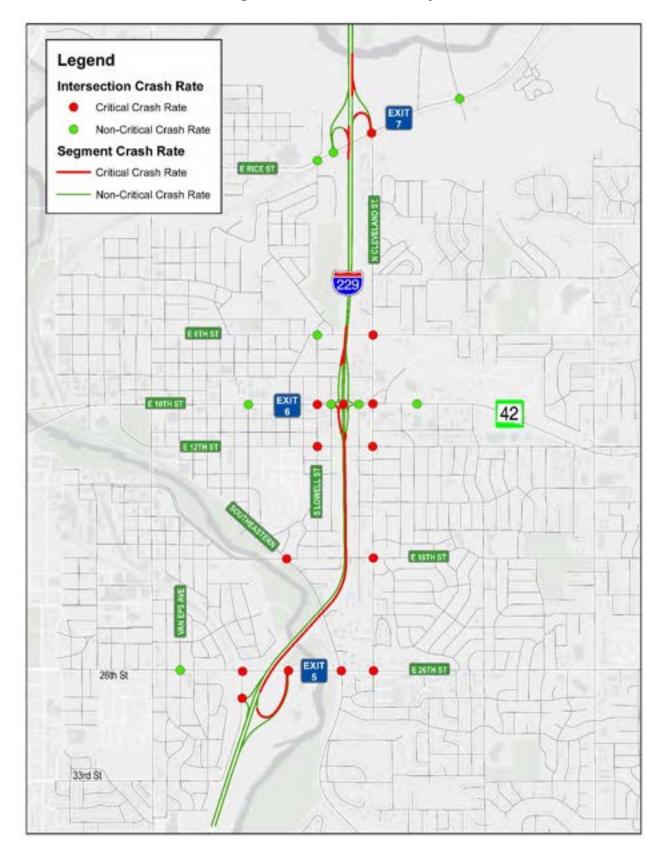


Figure 2 Crash Rate Summary

It should be noted that the current construction project at the I-229 Exit 5 (26th Street) interchange will provide safety improvements to the intersections being reconstructed between Yeager Road and Southeastern Avenue. While the 26th Street at Cleveland intersection is not within the construction limits, over 40% of the existing crashes at that intersection are westbound rear end crashes; therefore, improvements downstream should reduce congestion and improve the safety of this intersection. The crashes on the northbound I-229 entrance ramp from 26th Street may not be improved as part current construction project; the existing crashes mainly occurred on the curved, loop ramp portion of the existing entrance ramp which is not fully part of the ongoing construction project.

This analysis is intended to show existing safety issues within the project area. Design changes for the study interchange, intersections, and surrounding project area should consider safety improvements for the intersections and segments that have a history of an existing safety problem.

To address the existing safety concerns throughout the project area, the following is a partial list of potential safety improvements that could be considered during the overall study recommendations:

- High Friction Surface Treatments (HFST) improved traction for road curves in all weather conditions.
- Intelligent Transportation Systems (ITS) improved warning information for changes in roadway conditions.
- Apply current design standards this applies to both freeway and arterial corridors.
- Added capacity improvements to improve the traffic operations flow and efficiency.
- Signal Timing and Phasing updates –including left turn phases and improved traffic flow.

Attachments:

Tables A1a through A2b – Crash Summary Tables – Mainline I-229 and I-229 Ramps Tables B1a through B2b – Crash Summary Tables – Intersection and Segment Crashes Figures A1 through A3 – Crash Location Figures

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Table A1a I-229 Exit 6 Interchange Project 2015 to 2019 Crash Data SDDOT Crash Geodatabase Data

												SE	ION		
	Mainline Segment	\$	Sea	ment			Cra	sh Seve	eritv			Crash	Critical	Critical	SDDOT
		.										Rate	Rates	Index	Average
	FROM	Road Section	Length (Miles)	Segment ADT	Fatal	А	В	с	Property	Wild Animal Hits	Total	Crash Rate	Crash Rate	Critical Index	Crash Rate
	Between Exits 4 & 5	Urban Interstate	0.24	22,250	0	0	1	0	3	0	4	0.42	1.93	0.22	1.03
	Exit 5 Diverge	Urban Interstate	0.14	22,250	0	0	0	1	9	1	11	1.91	2.21	0.87	1.03
	Exit 5 between Ramps	Urban Interstate	0.30	16,420	0	0	0	0	5	3	8	0.90	1.97	0.46	1.03
റ	Exit 5 Merge	Urban Interstate	0.17	18,855	0	0	0	0	5	2	7	1.17	2.18	0.54	1.03
53	Between Exits 5 & 6	Urban Interstate	0.83	18,855	1	2	3	2	33	4	45	<u>1.58</u>	1.54	1.03	1.03
p	Exit 6 Diverge	Urban Interstate	0.27	18,855	0	1	1	3	18	1	24	<u>2.63</u>	1.95	1.35	1.03
Northbound I-229	Exit 6 between Ramps	Urban Interstate	0.43	12,285	0	0	0	0	8	0	8	0.83	1.92	0.43	1.03
orth	Exit 6 Merge	Urban Interstate	0.14	16,325	0	0	1	1	4	0	6	1.42	2.42	0.59	1.03
z	Between Exits 6 & 7	Urban Interstate	0.69	16,325	0	0	1	3	9	9	22	1.08	1.63	0.66	1.03
	Exit 7 Diverge	Urban Interstate	0.14	16,325	0	1	0	0	3	6	10	2.36	2.42	0.98	1.03
	Exit 7 between Ramps	Urban Interstate	0.26	13,495	0	0	0	0	3	4	7	1.10	2.15	0.51	1.03
	Exit 7 Merge	Urban Interstate	0.14	14,900	0	0	1	0	19	6	26	<u>6.73</u>	2.49	2.70	1.03
	Exit 7 Diverge	Urban Interstate	0.14	14,900	0	0	0	1	5	2	8	2.07	2.49	0.83	1.03
	Exit 7 between Ramps	Urban Interstate	0.25	12,400	0	0	0	0	4	3	7	1.22	2.21	0.55	1.03
	Exit 7 Merge	Urban Interstate	0.14	16,325	0	0	2	1	18	1	22	<u>5.19</u>	2.42	2.15	1.03
ი	Between Exits 7 & 6	Urban Interstate	0.63	16,325	0	0	1	2	9	13	25	1.33	1.66	0.80	1.03
-22	Exit 6 Diverge	Urban Interstate	0.14	16,325	0	0	1	1	12	1	15	<u>3.54</u>	2.42	1.46	1.03
Southbound I-229	Exit 6 between Ramps	Urban Interstate	0.43	10,725	0	0	2	2	10	1	15	1.77	1.99	0.89	1.03
bol	Exit 6 Merge	Urban Interstate	0.34	18,855	0	0	0	0	18	0	18	1.53	1.84	0.83	1.03
outh	Between Exits 6 & 5	Urban Interstate	0.79	18,855	1	0	2	4	30	0	37	1.36	1.55	0.88	1.03
ũ	Exit 5 Diverge	Urban Interstate	0.08	18,855	0	0	0	0	3	1	4	1.48	2.80	0.53	1.03
	Exit 5 between Ramps	Urban Interstate	0.20	16,215	0	0	0	0	2	1	3	0.51	2.20	0.23	1.03
	Exit 5 Merge	Urban Interstate	0.14	22,250	0	0	0	0	7	3	10	1.73	2.21	0.78	1.03
	Between Exits 5 & 4	Urban Interstate	0.22	22,250	0	0	1	0	6	4	11	1.21	1.95	0.62	1.03
	TOTAL				2	4	17	21	243	66	353		•	•	
		·	•		1%	1%	5%	6%	69%	19%		-			

Critical Rate	Critical	Average Rate
Exceeded	Index ≥ 1	Exceeded

Table A1b I-229 Exit 6 Interchange Project 2015 to 2019 Crash Data SDDOT Crash Geodatabase Data

	Mainline Segment	ts			Dia	gram - (Crash T	уре			Light	Condition	Surface Condition			
	FROM	Road Section	Rear End	Right Angle	Side Swipe	Head On	One- Vehicle	Wild Animal	Ped/Bike	Total	Day	Dark	Dry	Wet	Snow/Ice	
	Between Exits 4 & 5	Urban Interstate	1	0	1	0	2	0	0	4	3	1	3	1	0	
	Exit 5 Diverge	Urban Interstate	7	0	2	0	1	1	0	11	5	6	7	2	2	
	Exit 5 between Ramps	Urban Interstate	0	0	1	0	4	3	0	8	4	4	6	0	2	
ი	Exit 5 Merge	Urban Interstate	0	0	1	0	4	2	0	7	3	4	3	1	3	
I-229	Between Exits 5 & 6	Urban Interstate	4	2	3	0	32	4	0	45	28	17	16	1	28	
pu	Exit 6 Diverge	Urban Interstate	11	1	3	0	8	1	0	24	13	11	13	7	4	
Northbound	Exit 6 between Ramps	Urban Interstate	0	1	4	0	3	0	0	8	6	2	5	1	2	
ort	Exit 6 Merge	Urban Interstate	2	0	3	0	1	0	0	6	6	0	6	0	0	
z	Between Exits 6 & 7	Urban Interstate	3	3	1	0	6	9	0	22	11	11	10	4	8	
	Exit 7 Diverge	Urban Interstate	0	0	1	0	3	6	0	10	4	6	8	2	0	
	Exit 7 between Ramps	Urban Interstate	0	1	0	0	2	4	0	7	2	5	4	1	2	
	Exit 7 Merge	Urban Interstate	2	1	2	0	15	6	0	26	20	6	9	0	17	
	Exit 7 Diverge	Urban Interstate	0	0	1	0	5	2	0	8	1	7	5	2	1	
	Exit 7 between Ramps	Urban Interstate	0	0	0	0	4	3	0	7	5	2	2	1	4	
	Exit 7 Merge	Urban Interstate	2	4	8	0	7	1	0	22	16	6	12	4	6	
6	Between Exits 7 & 6	Urban Interstate	4	0	0	0	8	13	0	25	12	13	19	1	5	
I-229	Exit 6 Diverge	Urban Interstate	1	0	1	0	12	1	0	15	11	4	8	4	3	
	Exit 6 between Ramps	Urban Interstate	2	0	2	0	10	1	0	15	11	4	5	3	7	
bol	Exit 6 Merge	Urban Interstate	4	1	7	0	6	0	0	18	14	4	12	3	3	
Southbound	Between Exits 6 & 5	Urban Interstate	9	2	3	0	23	0	0	37	30	7	18	1	18	
S	Exit 5 Diverge	Urban Interstate	1	0	0	0	2	1	0	4	1	3	2	1	1	
	Exit 5 between Ramps	Urban Interstate	1	1	0	0	0	1	0	3	3	0	3	0	0	
	Exit 5 Merge	Urban Interstate	1	1	4	0	1	3	0	10	7	3	9	0	1	
	Between Exits 5 & 4	Urban Interstate	2	2	1	0	2	4	0	11	7	4	6	3	2	
	TOTAL	TOTAL	57	20	49	0	161	66	0	353	223	130	191	43	119	
			16%	6%	14%	0%	46%	19%	0%		63%	37%	54%	12%	34%	

NOTES:

Crash Rates - Number of crashes per million entering vehicles

Exceeding the Calculated Critical Rates indicated a sustained crash problem.

SDDOT Statewide Averages							
Segement Type	Crash Rate						
Urban Interstate	1.03						

Table A2a I-229 Exit 6 Interchange Project 2015 to 2019 Crash Data SDDOT Crash Geodatabase Data

											SEGMENT CRASH RATE INFORMATION			
Ramp Segments	6	Seg	ment		Crash Severity					Crash Rate	Critical Rates	Critical Index	SDDOT Average	
FROM	Road Section	Length (Miles)	Segment ADT	Fatal	Wild Animal						Crash Rate	Crash Rate	Critical Index	Crash Rate
Exit 5 Off Ramp	Urban Interstate	0.45	5,830	0	0	0	0	4	0	4	0.83	2.33	0.36	1.03
Exit 5 On Ramp	Urban Interstate	0.38	2,450	0	0	1	1	11	0	13	7.67	3.33	2.30	1.03
Exit 6 Off Ramp	Urban Interstate	0.29	6,570	0	0	0	0	2	0	2	0.57	2.57	0.22	1.03
Exit 6 On Ramp	Urban Interstate	0.26	5,500	0	0	0	1	2	0	3	1.15	2.84	0.40	1.03
Exit 7 Off Ramp	Urban Interstate	0.19	2,830	0	0	0	1	7	0	8	8.09	4.17	1.94	1.03
Exit 7 On Ramp	Urban Interstate	0.28	2,615	0	1	0	0	1	0	2	1.51	3.68	0.41	1.03
Exit 7 Off Ramp	Urban Interstate	0.32	2,500	0	0	0	0	0	0	0	0.00	3.54	0.00	1.03
Exit 7 On Ramp	Urban Interstate	0.20	2,730	0	0	1	0	2	0	3	3.08	4.20	0.73	1.03
Exit 6 Off Ramp	Urban Interstate	0.27	5,600	0	0	0	0	0	0	0	0.00	2.80	0.00	1.03
Exit 6 On Ramp	Urban Interstate	0.15	6,775	0	0	0	1	8	0	9	4.92	3.24	1.52	1.03
Exit 5 Off Ramp	Urban Interstate	0.13	2,640	0	0	0	0	1	0	1	1.63	5.19	0.31	1.03
Exit 5 On Ramp	Urban Interstate	0.09	5,620	0	0	0	1	1	0	2	2.10	4.23	0.50	1.03
TOTAL				0	1	2	5	39	0	47				
	•	•		0%	2%	4%	11%	83%	0%		-			
												Oritinal Data	Critical	Augusta Data

Critical Rate	Critical	Average Rate
Exceeded	Index ≥ 1	Exceeded

Table A2b I-229 Exit 6 Interchange Project 2015 to 2019 Crash Data SDDOT Crash Geodatabase Data

	Ramp Segment	S			Dia	igram - (Crash T	уре			Light (Condition Surface Condition			ition
	FROM	Road Section	Rear End	Right Angle	Side Swipe	Head On	One- Vehicle	Wild Animal	Ped/Bike	Total	Day	Dark	Dry	Wet	Snow/Ice
ps	Exit 5 Off Ramp	Urban Interstate	0	0	0	0	4	0	0	4	3	1	3	0	1
am	Exit 5 Off Ramp Exit 5 On Ramp	Urban Interstate	1	0	0	0	12	0	0	13	10	3	6	2	5
Б	Exit 6 Off Ramp	Urban Interstate	0	0	0	0	2	0	0	2	0	2	1	0	1
our	Exit 6 On Ramp	Urban Interstate	1	1	0	0	1	0	0	3	1	2	2	0	1
rthb	Exit 7 Off Ramp	Urban Interstate	0	0	0	0	8	0	0	8	7	1	4	0	4
Nor	Exit 7 On Ramp	Urban Interstate	0	0	0	0	2	0	0	2	1	1	2	0	0
sd	Exit 7 Off Ramp	Urban Interstate	0	0	0	0	0	0	0	0	0	0	0	0	0
Ram	Exit 7 On Ramp	Urban Interstate	1	0	0	0	2	0	0	3	3	0	3	0	0
	Exit 6 Off Ramp	Urban Interstate	0	0	0	0	0	0	0	0	0	0	0	0	0
noc	Exit 6 On Ramp	Urban Interstate	6	0	0	0	3	0	0	9	5	4	5	2	2
outhbound	Exit 5 Off Ramp	Urban Interstate	0	0	0	0	1	0	0	1	0	1	0	0	1
So	Exit 5 On Ramp	Urban Interstate	2	0	0	0	0	0	0	2	2	0	0	0	2
	TOTAL	TOTAL	11	1	0	0	35	0	0	47	32	15	26	4	17
			23%	2%	0%	0%	74%	0%	0%		68%	32%	55%	9%	36%

NOTES:

Crash Rates - Number of crashes per million entering vehicles

SDDOT Statewide Averages							
Segement Type	Crash Rate						
Urban Interstate	1.03						

Table B1a I-229 Exit 6 Project 2015 to 2019 Crash Data SDDOT Crash Geodatabase Data

										IN	ITERSECTION CRAS	SH RATE INFORM	ATION
Study Intersections					Cra	sh Seve	erity			Crash Rate	Critical Rates	Critical Index	Sioux Falls Average
Intersection	Control Type	Entering ADT	Fatal	Α	В	с	Property	Wild Animal Hits	Total	Crash Rate	Crash Rate	Critical Index	Crash Rate
Rice St at Lowell Ave	Unsignalized-one road above ADT 4,000	13,100	0	0	1	1	7	0	9	0.38	0.56	0.67	0.27
Rice St at I-229 SB Ramp Terminal**	Signal-one road above ADT 10,000	14,900	0	1	1	3	9	0	14	0.51	0.99	0.52	0.59
Rice St at I-229 NB Ramp Terminal**	Signal-one road above ADT 10,000	18,270	0	0	2	10	39	0	51	<u>1.53</u>	0.95	1.61	0.59
Rice St at Bahnson Ave	Unsignalized-one road above ADT 4,000	10,810	0	0	0	1	1	0	2	0.10	0.60	0.17	0.27
6th St at Lowell Ave	Unsignalized-one road above ADT 4,000	11,530	0	0	1	2	5	0	8	0.38	0.59	0.65	0.27
6th St at Leadale Ave	Unsignalized-one road above ADT 4,000	10,700	0	0	0	0	8	0	8	0.41	0.60	0.69	0.27
6th St at N Cleveland Ave**	Signal-both roads above ADT 10,000	21,350	0	0	8	14	66	0	88	2.26	1.35	1.67	0.94
10th St at Jessica Ave**	Signal-one road above ADT 10,000	23,400	0	0	0	3	9	0	12	0.28	0.90	0.31	0.59
10th St at St. Paul Ave	Unsignalized-one road above ADT 4,000	24,050	0	0	4	1	9	0	14	0.32	0.48	0.66	0.27
10th St at Lowell Ave**	Signal-one road above ADT 10,000	25,550	0	1	5	12	34	0	52	<u>1.11</u>	0.89	1.25	0.59
10th St at Conklin Ave	Other	23,400	0	0	1	1	4	0	6	0.14	1.41	0.10	1.00
10th St at Single Point Ramp Terminal**	Signal-one road above ADT 10,000	33,240	0	3	3	24	120	0	150	2.47	0.85	2.90	0.59
10th St at Blaine Ave	Other	31,900	0	0	0	0	5	0	5	0.09	1.35	0.07	1.00
10th St at Cleveland Ave**	Signal-both roads above ADT 10,000	35,100	0	1	14	25	124	0	164	2.56	1.26	2.03	0.94
10th St at Chapel Hill Rd	Unsignalized-one road above ADT 4,000	22,500	0	0	2	0	7	0	9	0.22	0.49	0.45	0.27
10th St at Hy-Vee Access**	Signal-one road above ADT 10,000	22,500	0	0	0	6	19	0	25	0.61	0.91	0.67	0.59
12th St at Lowell Ave	Unsignalized-one road above ADT 4,000	3,500	0	0	1	2	4	0	7	<u>1.10</u>	0.88	1.25	0.27
12th St at Cleveland Ave**	Signal-both roads under ADT 10,000	10,750	0	0	1	7	26	0	34	<u>1.73</u>	1.05	1.65	0.58
18th St at Southeastern Ave**	Signal-both roads under ADT 10,000	9,750	0	0	2	2	28	0	32	<u>1.80</u>	1.07	1.68	0.58
18th St at Blaine Ave	Unsignalized-one road above ADT 4,000	6,500	0	0	1	0	9	0	10	0.84	0.70	1.20	0.27
18th St at Cleveland Ave**	Signal-both roads under ADT 10,000	10,550	0	0	1	4	24	0	29	<u>1.51</u>	1.05	1.43	0.58
26th St at Van Eps Ave**	Signal-one road above ADT 10,000	13,000	0	0	2	2	12	0	16	0.67	1.02	0.66	0.59
26th St at Yeager Rd**	Signal-one road above ADT 10,000	23,050	0	0	4	12	33	0	49	<u>1.16</u>	0.91	1.28	0.59
Yeager Rd at SB Ramp Terminal	Unsignalized-one road above ADT 1,000	8,670	0	1	0	3	12	0	16	<u>1.01</u>	0.65	1.54	0.28
26th St at NB Ramp Terminal**	Signal-one road above ADT 10,000	28,020	0	0	10	17	72	0	99	<u>1.93</u>	0.88	2.20	0.59
26th St at Southeastern Ave**	Signal-both roads above ADT 10,000	37,050	0	0	4	13	90	0	107	<u>1.58</u>	1.25	1.26	0.94
26th St at Cleveland Ave**	Signal-one road above ADT 10,000	26,450	0	1	6	20	61	0	88	<u>1.82</u>	0.89	2.06	0.59
TOTAL			0	8	74	185	837	0	1,104				
			0%	1%	7%	17%	76%	0%	100%	-			

**Signalized Intersections

Critical Rate Critical Exceeded Index ≥ 1

Average Rate Exceeded

Table B1b I-229 Exits 3 & 4 Project 2013 to 2017 Crash Data SDDOT Crash Geodatabase Data

Study Intersections		Diagram - Crash Type									
Intersection	Control Type	Rear End	Right Angle	Side Swipe	Head On	One- Vehicle	Wild Animal	Pedestrian Crashes	Total		
Rice St at Lowell Ave	Unsignalized-one road above ADT 4,000	2	6	1	0	0	0	0	9		
Rice St at I-229 SB Ramp Terminal**	Signal-one road above ADT 10,000	8	5	1	0	0	0	0	14		
Rice St at I-229 NB Ramp Terminal**	Signal-one road above ADT 10,000	19	24	3	0	5	0	0	51		
Rice St at Bahnson Ave	Unsignalized-one road above ADT 4,000	0	1	0	0	1	0	0	2		
6th St at Lowell Ave	Unsignalized-one road above ADT 4,000	3	5	0	0	0	0	0	8		
6th St at Leadale Ave	Unsignalized-one road above ADT 4,000	1	3	2	0	2	0	0	8		
6th St at N Cleveland Ave**	Signal-both roads above ADT 10,000	43	31	8	2	1	0	3	88		
10th St at Jessica Ave**	Signal-one road above ADT 10,000	9	2	1	0	0	0	0	12		
10th St at St. Paul Ave	Unsignalized-one road above ADT 4,000	2	11	0	1	0	0	0	14		
10th St at Lowell Ave**	Signal-one road above ADT 10,000	36	15	0	0	1	0	0	52		
10th St at Conklin Ave	Other	1	2	2	0	1	0	0	6		
10th St at Single Point Ramp Terminal**	Signal-one road above ADT 10,000	129	11	4	0	6	0	0	150		
10th St at Blaine Ave	Other	0	0	4	0	1	0	0	5		
10th St at Cleveland Ave**	Signal-both roads above ADT 10,000	94	55	9	0	5	0	1	164		
10th St at Chapel Hill Rd	Unsignalized-one road above ADT 4,000	1	6	2	0	0	0	0	9		
10th St at Hy-Vee Access**	Signal-one road above ADT 10,000	17	5	1	0	0	0	2	25		
12th St at Lowell Ave	Unsignalized-one road above ADT 4,000	0	5	0	0	2	0	0	7		
12th St at Cleveland Ave**	Signal-both roads under ADT 10,000	7	22	2	0	2	0	1	34		
18th St at Southeastern Ave**	Signal-both roads under ADT 10,000	13	11	3	0	5	0	0	32		
18th St at Blaine Ave	Unsignalized-one road above ADT 4,000	4	5	1	0	0	0	0	10		
18th St at Cleveland Ave**	Signal-both roads under ADT 10,000	10	15	1	0	3	0	0	29		
26th St at Van Eps Ave**	Signal-one road above ADT 10,000	16	0	0	0	0	0	0	16		
26th St at Yeager Rd**	Signal-one road above ADT 10,000	39	9	0	1	0	0	0	49		
Yeager Rd at SB Ramp Terminal	Unsignalized-one road above ADT 1,000	2	10	1	0	3	0	0	16		
26th St at NB Ramp Terminal**	Signal-one road above ADT 10,000	70	11	13	1	4	0	0	99		
26th St at Southeastern Ave**	Signal-both roads above ADT 10,000	58	38	9	0	2	0	0	107		
26th St at Cleveland Ave**	Signal-one road above ADT 10,000	54	24	2	0	8	0	0	88		
TOTAL		638	332	70	5	52	0	7	1,104		
		58%	30%	6%	0%	5%	0%	1%			

Sioux Falls Average		
Intersection Type	9	Crash Rate
Signal-both roads abo	ve ADT 10,000	0.94
Signal-one road above	ADT 10,000	0.59
Signal-both roads und	er ADT 10,000	0.58
Unsignalized-both road	ds above ADT 4,000	0.28
Unsignalized-one road	above ADT 4,000	0.27
Unsignalized-one road	0.28	
Unsignalized-both road	0.42	
Other		1.00

NOTES:

Crash Rates - Number of crashes per million entering vehicles

Exceeding the Calculated Critical Rates indicated a sustained crash proble

Table B2a
I-229 Exit 6 Project
2015 to 2019 Crash Data
SDDOT Crash Geodatabase Data

													SE	SEGMENT CRASH RATE INFORMATION			
	Roadway Segments			Seg	ment			Cra	sh Seve	erity			Crash Rate	Critical Rates	Critical Index	Sioux Falls	
	FROM	то	Road Section	Length (Miles)	Segment ADT	Fatal	A	в	с	Property	Wild Animal Hits	Total	Crash Rate	Crash Rate	Critical Index	Crash Rate	
	Lowell Ave	I-229 SB Ramp Terminal	4-Lane - Turn Lanes (TWLTL)	0.09	12,200	0	0	0	0	0	5	5	2.63	7.11	0.37	3.40	
Rice St	I-229 SB Ramp Terminal	I-229 NB Ramp Terminal	4-Lane - No Turn Lanes	0.19	15,100	0	0	0	0	0	4	4	0.76	5.47	0.14	3.33	
	I-229 NB Ramp Terminal	Bahnson Ave	2-Lane - Turn Lanes (TWLTL)	0.43	11,500	0	0	1	0	2	6	9	1.01	7.18	0.14	5.17	
6th St	Lowell Ave	Leadale Ave	2-Lane - Turn Lanes (TWLTL)	0.07	10,200	0	0	1	0	2	0	3	2.36	10.20	0.23	4.79	
001 31	Leadale Ave	N Cleveland Ave	4-Lane - Turn Lanes (TWLTL)	0.18	10,200	0	0	0	2	6	0	8	2.36	6.11	0.39	3.38	
	Jessica Ave	St. Paul Ave	4-Lane - Turn Lanes (TWLTL)	0.19	23,800	0	0	3	0	6	0	9	1.10	5.01	0.22	3.31	
	St. Paul Ave	Lowell Ave	4-Lane - Turn Lanes (TWLTL)	0.13	23,800	0	0	0	1	8	0	9	1.66	5.26	0.32	3.19	
	Lowell Ave	Conklin Ave	4-Lane - Median	0.06	22,900	0	0	0	0	0	0	0	0.00	4.72	0.00	2.18	
10th St	Conklin Ave	Single Point Ramp Terminal	4-Lane - Median	0.05	22,900	0	0	0	0	0	0	0	0.00	5.00	0.00	2.22	
1011 51	Single Point Ramp Terminal	Blaine Ave	4-Lane - Median	0.07	31,400	0	0	1	0	2	0	3	0.75	4.20	0.18	2.18	
	Blaine Ave	Cleveland Ave	4-Lane - Median	0.06	31,400	0	0	0	1	2	0	3	0.81	4.26	0.19	2.16	
	Cleveland Ave	Chapel Hill Rd	4-Lane - Median	0.06	21,500	0	0	0	0	0	0	0	0.00	4.93	0.00	2.20	
	Chapel Hill Rd	Hy-Vee Access	4-Lane - Turn Lanes (TWLTL)	0.14	21,500	0	0	0	0	4	0	4	0.72	5.42	0.13	3.34	
12th St	Lowell Ave	Cleveland Ave	2-Lane - No Turn Lanes	0.25	3,400	0	0	3	6	8	0	17	<u>10.95</u>	3.31	3.31	0.96	
18th St	Southeastern Ave	Blaine Ave	2-Lane - Turn Lanes (TWLTL)	0.33	5,500	0	0	2	2	10	0	14	4.18	7.70	0.54	4.54	
18th St	Blaine Ave	Cleveland Ave	2-Lane - Turn Lanes (TWLTL)	0.06	5,500	0	0	2	0	1	0	3	4.78	11.96	0.40	4.37	
Southeastern	18th St	26th St	2-Lane - No Turn Lanes	0.56	8,500	0	0	0	0	6	1	7	0.81	2.32	0.35	1.28	
	Van Eps Ave	Yeager Rd	2-Lane - Turn Lanes (TWLTL)	0.28	12,400	0	0	1	1	9	0	11	1.74	6.96	0.25	4.66	
	Yeager Rd	NB Ramp Terminal	4-Lane - No Turn Lanes	0.21	21,700	0	0	1	0	2	0	3	0.36	5.02	0.07	3.33	
26th St	NB Ramp Terminal	Southeastern Ave	4-Lane - No Turn Lanes	0.24	28,500	0	0	2	3	9	2	16	1.27	4.64	0.27	3.28	
	Southeastern Ave	Cleveland Ave	4-Lane - Turn Lanes (TWLTL)	0.15	24,400	0	0	0	0	0	0	0	0.00	5.34	0.00	3.40	
Yeager St	26th St	SB Ramp Terminal	2-Lane - Turn Lanes (TWLTL)	0.13	2,640	0	0	0	0	0	0	0	0.00	13.64	0.00	5.26	
	TOTAL					0	0	17	16	77	18	128		•	•		
		•		•		0%	0%	13%	13%	60%	14%		-			Í	

Critical Rate	Critical	Average Rate
Exceeded	Index ≥ 1	Exceeded

Table B2b I-229 Exits 3 & 4 Project 2013 to 2017 Crash Data SDDOT Crash Geodatabase Data

	Roadway Segments	3				Dia	gram - (Crash T	уре		
	FROM	то	Road Section	Rear End	Right Angle	Side Swipe	Head On	One- Vehicle	Wild Animal	Pedestrian Crashes	Total
	Lowell Ave	I-229 SB Ramp Terminal	4-Lane - Turn Lanes (TWLTL)	0	0	0	0	0	5	0	5
Rice St	I-229 SB Ramp Terminal	I-229 NB Ramp Terminal	4-Lane - No Turn Lanes	0	0	0	0	0	4	0	4
	I-229 NB Ramp Terminal	Bahnson Ave	2-Lane - Turn Lanes (TWLTL)	2	0	0	0	1	6	0	9
6th St	Lowell Ave	Leadale Ave	2-Lane - Turn Lanes (TWLTL)	1	1	0	0	1	0	0	3
othist	Leadale Ave	N Cleveland Ave	4-Lane - Turn Lanes (TWLTL)	1	3	2	0	1	0	1	8
	Jessica Ave	St. Paul Ave	4-Lane - Turn Lanes (TWLTL)	5	2	2	0	0	0	0	9
	St. Paul Ave	Lowell Ave	4-Lane - Turn Lanes (TWLTL)	1	6	1	0	0	0	1	9
	Lowell Ave	Conklin Ave	4-Lane - Median	0	0	0	0	0	0	0	0
10th St	Conklin Ave	Single Point Ramp Terminal	4-Lane - Median	0	0	0	0	0	0	0	0
10th St	Single Point Ramp Terminal	Blaine Ave	4-Lane - Median	0	3	0	0	0	0	0	3
	Blaine Ave	Cleveland Ave	4-Lane - Median	1	1	0	0	1	0	0	3
	Cleveland Ave	Chapel Hill Rd	4-Lane - Median	0	0	0	0	0	0	0	0
	Chapel Hill Rd	Hy-Vee Access	4-Lane - Turn Lanes (TWLTL)	2	1	0	0	1	0	0	4
12th St	Lowell Ave	Cleveland Ave	2-Lane - No Turn Lanes	2	8	0	0	6	0	1	17
18th St	Southeastern Ave	Blaine Ave	2-Lane - Turn Lanes (TWLTL)	3	0	2	0	9	0	0	14
1801 50	Blaine Ave	Cleveland Ave	2-Lane - Turn Lanes (TWLTL)	0	1	0	0	2	0	0	3
Southeastern	18th St	26th St	2-Lane - No Turn Lanes	2	1	0	0	3	1	0	7
	Van Eps Ave	Yeager Rd	2-Lane - Turn Lanes (TWLTL)	6	4	0	0	1	0	0	11
26th St	Yeager Rd	NB Ramp Terminal	4-Lane - No Turn Lanes	0	0	1	0	2	0	0	3
200151	NB Ramp Terminal	Southeastern Ave	4-Lane - No Turn Lanes	5	6	1	0	2	2	0	16
	Southeastern Ave	Cleveland Ave	4-Lane - Turn Lanes (TWLTL)	0	0	0	0	0	0	0	0
Yeager St	26th St	SB Ramp Terminal	2-Lane - Turn Lanes (TWLTL)	0	0	0	0	0	0	0	0
	TOTAL			31	37	9	0	30	18	3	128
				25%	30%	7%	0%	24%	14%		

SDDOT Statewide Averages	Crash Rate					
Segment Type	(x = Accesses/Mile)					
2-Lane - No Turn Lanes	CR = -0.0065x+1.4033					
2-Lane - Turn Lanes (TWLTL)	CR = -0.008x+5.2641					
4-Lane - No Turn Lanes	CR = -0.0026x+3.3277					
4-Lane - Turn Lanes (TWLTL)	CR = -0.0029x+3.4004					
6-Lane - Turn Lanes (TWLTL)	CR = -0.0216x+12.142					
4-Lane - Median	CR = -0.0013x+2.2188					
6-Lane - Median	CR = -0.0046x+3.6133					

NOTES:

Crash Rates - Number of crashes per million entering vehicles

Exceeding the Calculated Critical Rates indicated a sustained crash problem.