# Project Narrative for McHugh Lane Development

## Project Overview

The McHugh Lane Development Project is a long-term initiative encompassing a total of 40 acres, with Smith Holdings owning 30 acres and Steed Companies owning 10 acres. Phase 1 will focus on 20 acres, combining Steed's 10 acres with 10 acres from Smith. This project aims to enhance the local community by providing additional housing options and expanding commercial infrastructure to support economic growth in Helena.

## Objectives

The project is designed with two primary objectives:

1. **For Smith Holdings**: To increase housing options and create more buildable lots in close proximity to the town center. This initiative will address the growing demand for residential properties, accommodating diverse needs within the community.
2. **For Steed Companies**: To secure city services for existing buildings and facilitate the construction of a new flagship office. This development aims to generate additional employment opportunities in Helena, positioning Steed Companies as a vital contributor to the local economy.

## Phase 1: Annexation and Development

**Annexation**: The first phase involves the annexation of both 10-acre parcels into the city limits. This step is crucial for enabling access to city services, which will benefit both residential and commercial developments.

**Development Plans**:

- **Residential Development**: Smith Holdings plans to create a variety of housing options, including single-family homes and multi-family units. This approach will foster a diverse community and cater to various demographics, including families, young professionals, and retirees.
- **Commercial Development**: Steed Companies will develop a new office complex designed to accommodate their growing business needs. This facility is envisioned as a state-of-the-art workspace that not only enhances operational efficiency but also serves as a hub for innovation and collaboration among Steed's various companies.

## Economic and Community Impact

The McHugh Lane Development Project is poised to make significant contributions to the Helena community:

- **Job Creation**: The new office complex will create numerous job opportunities, attracting talent and stimulating the local economy.
- **Increased Housing Supply**: By adding more housing options, the project will alleviate pressure on the local real estate market, making it easier for residents to find suitable accommodations.
- **Enhanced City Services**: Annexation will ensure that both new and existing developments benefit from essential city services, improving overall quality of life for residents.

**Conclusion**

The McHugh Lane Development Project represents a strategic investment in the future of Helena, aligning with the city's goals for sustainable growth and community development. By focusing on both housing and commercial opportunities, this project aims to create a vibrant and thriving environment that meets the needs of its residents and businesses alike. Through collaboration and careful planning, the stakeholders are committed to ensuring that this development is beneficial for the entire community.

FAW ROAD

MYLES SUBDIVISION NO.2

LOT 15

LOT 10

LOT 11

LOT 12

20' UTILITY EASEMENT
PER COS #486919

FAW ALLEY

FAW ROAD

TRACT B

LOT 1-A

YUHAS AVENUE
55' PUBLIC ACCESS
EASEMENT

LOT 42

LOT 1A

LOT 1B

LOT 20A

LOT 20B

LOT 21A

LOT 21B

GOLDEN ESTATES III COS#3137736

TRACT 5-A-1-A
COS# (PENDING)

TRACT A-1-A-2
COS #3370303
10.91 Ac. (R)

TRACT B-1-A
COS #3370303
10.48 Ac. (R)

TRACT 7-A-1-A
COS #(PENDING)

SANITARY SEWER MANHOLE
RIM = 3820.71'
8" INVERT WEST = 3804.36'
8" INVERT EAST = 3804.07'

60' PUBLIC ACCESS & UTILITY EASEMENT
PER COS #3370303

30'X40' SEWER & WATER EASEMENT
PER COS #3370303

WOLF ROAD (64' PUBLIC R/W)

LOT 68B

LOT 68A

LOT 67B

LOT 67A

LOT G2
COS #3132177
0.647 Ac. (R)
*(UTILITY SITE)*

10' UTILITY EASEMENT
PER COS #3284465

40' GAS LINE EASEMENT
PER COS #3132177

MCHUGH DRIVE (100' PUBLIC R/W)

10' UTILITY EASEMENT
PER COS #3284465

LOT 66

LOT 65

50' PUBLIC R/W
DEDICATED AS TRACT R-2
PER COS #3151528

38' PUBLIC ACCESS EASEMENT
PER COS #3132177

LOT G1-A-2
COS #3284465
20.285 Ac. (R)

LOT 104

TRACT J-1
COS#3151528

LOT G1-A-1
MIXING ZONE EASEMENT
PER COS #3284465

20' UTILITY EASEMENT
PER COS #3284465

30' FIRE PROTECTION AND UTILITY EASEMENT
PER COS #3284465

LOT 17
DETENTION BASIN

LOT 8A

LOT 8

LOT 7A

LOT 7

LOT 6A

LOT 6

LOT 5A

LOT 5

LOT 4A

LOT 4

LOT 3A

LOT 3

LOT 2A

LOT 2

LOT 1A

LOT 1

WILLOWS TOWNHOUSES COS#3151083

LOT G1-A-1-A
COS #3313228
18.303 Ac. (R)
*NPTS*

TRACT A
COS#446711

COONEY DRIVE - 50' PUBLIC R/W
DEDICATED COS #3313228

50' ACCESS EASEMENT
PER COS #446711

ROAD RUNNER STREET - 60' PUBLIC R/W
DEDICATED COS #3313228

LEGEND

- CONTOURS (1 FOOT INTERVAL)
- CONTOUR DEPRESSION
- EXISTING BUILDING
- SUBJECT PARCEL BOUNDARY
- EXISTING EASEMENT, AS NOTED
- FOUND SURVEY MONUMENT
- EXISTING CURB
- EXISTING FENCE
- EXISTING CENTERLINE OF ROAD
- SD — EXISTING STORM DRAIN
- W — EXISTING WATER MAIN
- S — EXISTING SANITARY SEWER
- BP — EXISTING BURIED POWER
- NG — EXISTING NATURAL GAS
- BT — EXISTING BURIED COMMUNICATION
- (D) EXISTING MANHOLE - STORM SEWER
- (S) EXISTING MANHOLE - SANITARY SEWER
- EXISTING WATER VALVE
- EXISTING CLEANOUT
- EXISTING STORM INLET
- EXISTING FIRE HYDRANT
- EXISTING IRRIGATION CONTROL VALVE
- EXISTING DELINEATOR POST
- EXISTING POWER POLE
- EXISTING GUY ANCHOR
- EXISTING TELEPHONE PEDESTAL
- EXISTING SIGN POST
- EXISTING DECIDUOUS TREE
- EXISTING LIGHT POLE
- NPTS — NOT PART OF THIS SURVEY

DATE OF SURVEY: DECEMBER 2024 – FEBRUARY 2025

SURVEY AREA: TRACTS A–1–A–2 & B–1–A OF COS#3370303 AND LOT G1–A–2 OF COS#3284465

OWNERS OF RECORD & SURVEY COMMISSIONED BY: JOSH STEED – STEED RENTALS, LLC, AND KIM SMITH – KIM SMITH PROPERTIES, LLC

PURPOSE OF SURVEY: ENGINEERING DESIGN SURVEY

SURVEY METHODS: THE SURVEY AREA WAS FLOWN WITH UAV FOR ORTHOPHOTOS AND CONTOUR DATA. DESIGN CRITICAL FEATURES SUCH AS ROADWAYS AND UTILITIES WERE SURVEYED WITH CONVENTIONAL GROUND WORKFLOWS.

UTILITIES: INFORMATION OBTAINED FROM CITY OF HELENA GIS AND LEWIS & CLARK COUNTY SEPTIC PERMIT EQ 21–1840 HAS BEEN COMBINED WITH OBSERVED EVIDENCE AND MARKS PROVIDED BY MT ONE CALL TO DEVELOP A VIEW OF UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND UTILITIES CANNOT BE ACCURATELY, COMPLETELY, OR RELIABLY DEPICTED. WHERE ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, THE CLIENT IS ADVISED THAT EXCAVATION MAY BE NECESSARY.

BOUNDARY & EASEMENTS: BOUNDARIES OF PROPERTIES IN THE SURVEY AREA SHOWN ARE ESTABLISHED FROM FIELD–LOCATED MONUMENTS OF RECORD. ADJACENT PROPERTIES MAY BE SHOWN BASED CALCULATIONS FROM RECORD DIMENSIONS. A TITLE COMMITMENT WAS NOT PROVIDED FOR THUS SURVEY, AND THUS NOT ALL EASEMENTS OR OTHER ENCUMBRANCES ON TITLE MAY BE SHOWN.

SURVEY NOTES: CONTOUR INFORMATION SHOWN REFLECTS GROUND CONDITIONS ON THE DATE OF UAV FLIGHT ON DECEMBER 6, 2024. ACTIVE EARTHWORK ASSOCIATED WITH A GRAVEL PIT OPERATION WAS OBSERVED ON THE PROPERTY DURING THE TIME OF SURVEY. GROUND CONDITIONS ARE SUBJECT TO VERIFICATION.

**BASIS OF BEARINGS**

CITY OF HELENA LDP
GEODETIC NORTH OBTAINED BY GPS OBSERVATION
DATUM: NAD83(2011)(EPOCH 2010.00)
PROJECTION: TRANSVERSE MERCATOR
CENTRAL MERIDIAN: W 111°57'00" (–111.95°)
PROJECT ORIGIN LATTITUDE: N 46°30'00" (46.5°)
SCALE FACTOR AT CENTRAL MERIDIAN: 1.000191
FALSE NORTHING: 1000,000.00 ift (30,480m)
FALSE EASTING: 200,000.00 ift (60,960m)

80 40 0 80 160
SCALE IN FEET

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| 1/4 SEC. | SECTION | TOWNSHIP | RANGE |
|---|---|---|---|
| | | | |

PRINCIPAL MERIDIAN, MONTANA
LEWIS & CLARK COUNTY, MONTANA

FIELD WORK: gpq, jjd, ncf
DRAWN BY: ncf
CHECKED BY: gbg

DATE: 3/7/2025
SCALE: 1"=80"
PROJ. #: 10723.001

PLOTTED DATE: Jul/22/2025 PLOTTED BY: cooper krause
CLIENT: McHugh Development SHEET 1 OF 1

DRAWING NAME: R:\10723_Smith\001-McHugh Design Survey\ACAD\Exhibits\10723001-Exhibit.dwg

PROPOSED POND
PRELIMINARY FOOTPRINT: ~28,500 SF
3-FT DEEP WITH 1-FT MIN. FREEBOARD
BOTTOM ELEVATION = ±3805
4:1 SIDE SLOPES
REQUIRED STORAGE (NO INFILTRATION) = ~140,000 CF
REQUIRED STORAGE (W/ INFILTRATION - ASSUMED 2.4 IN/HR) = ~65,000 CF

PROPOSED STORM DRAIN EASEMENT

CONCEPTUAL FUTURE PHASE

EXISTING BUILDING (TYP.)

LANDER ROAD (60-FT ROW)

WOLF ROAD (60-FT ROW)

FUTURE ROAD #4 (60-FT ROW)

FUTURE ROAD #3 (60-FT ROW)

FUTURE ROAD #5 (60-FT ROW)

MCHUGH DRIVE

YUHAS AVE

PROPOSED WATER MAIN (TYP.)

PROPOSED SEWER MAIN (TYP.)

40.00' UTILITY EASEMENT

PROPOSED SUBDIVISION BOUNDARY (TYP.)

1.65 AC
0.50 AC
2.72 AC
0.71 AC
0.44 AC
0.49 AC
0.37 AC
0.34 AC
0.33 AC
0.41 AC
0.41 AC
0.49 AC
0.65 AC
0.86 AC
0.96 AC
0.27 AC
0.32 AC
0.32 AC
0.22 AC
0.27 AC
0.32 AC
0.32 AC
0.22 AC
0.27 AC
0.32 AC
0.32 AC
0.22 AC
0.27 AC
0.22 AC
0.25 AC
0.25 AC
0.25 AC
0.25 AC
0.25 AC
0.25 AC
0.25 AC

LEGEND

COMMERCIAL/ MIXED USE

RESIDENTIAL

| AREA | ACRES |
|---|---|
| Commercial | 9.9 |
| Residential | 7.7 |
| Public ROW | 4.3 |
| **Total Area** | **21.9** |

60 30 0 60 120
SCALE IN FEET


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DSGN. BY: JAZ
APPR. BY: CPK
DATE: 07/23/25

MCHUGH SUBDIVISION
HELENA MONTANA

PROJECT NO. 10723.003

PH 1 PRE APPLICATION

FIGURE NUMBER EX-1

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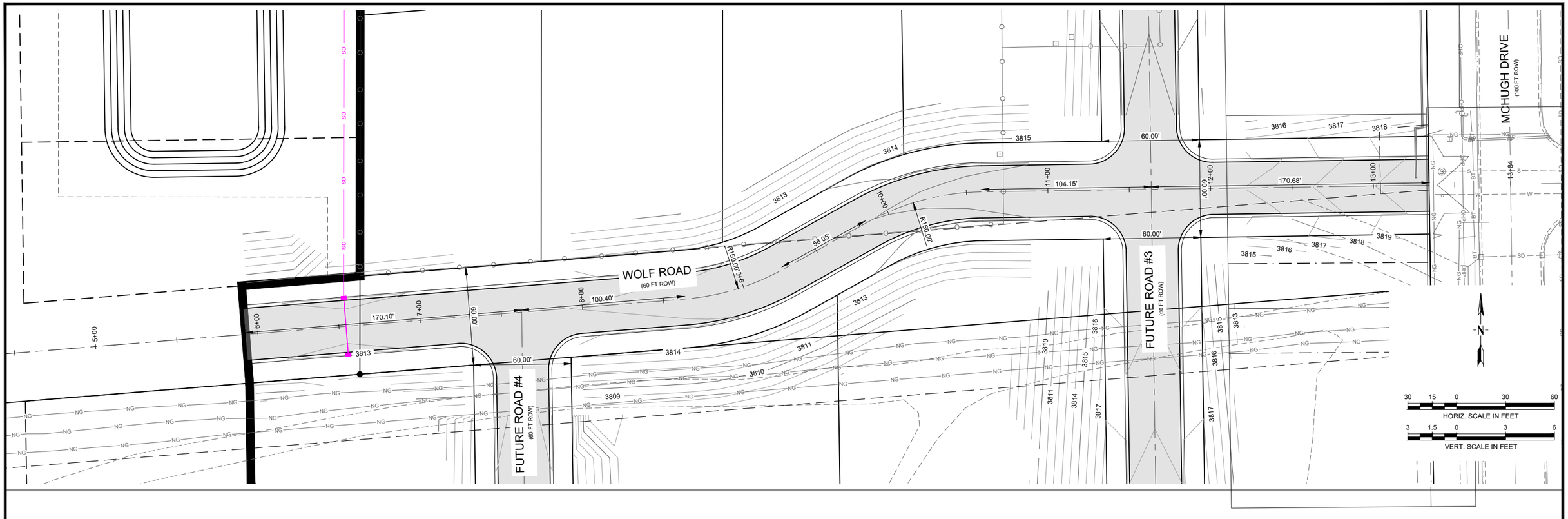
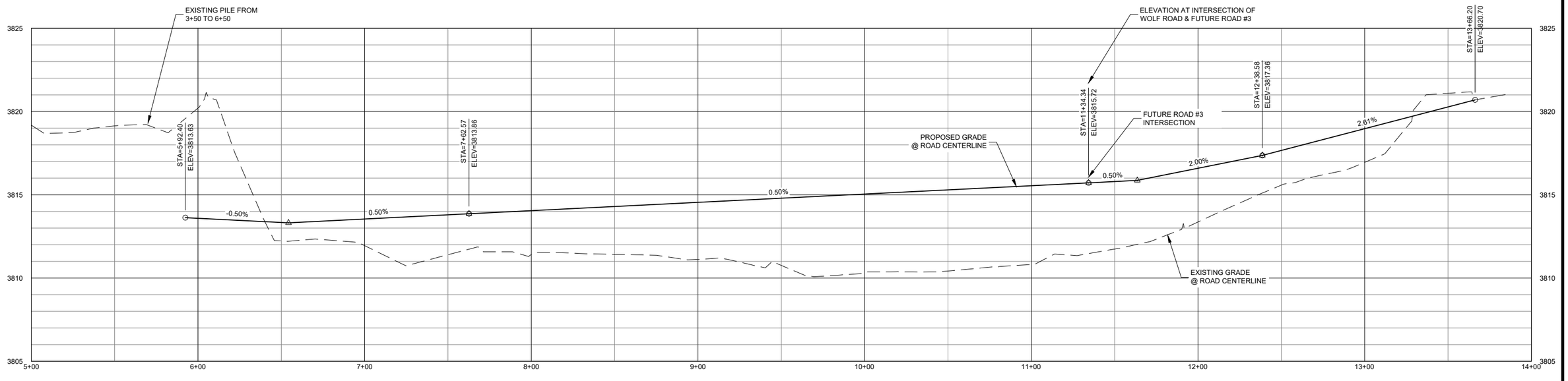
Plotted by cooper krause on Aug/5/2025

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VERIFY SCALE!

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PLOTTED BY:COOPER KRAUSE ON Aug/01/2025

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APPR. BY: CPK
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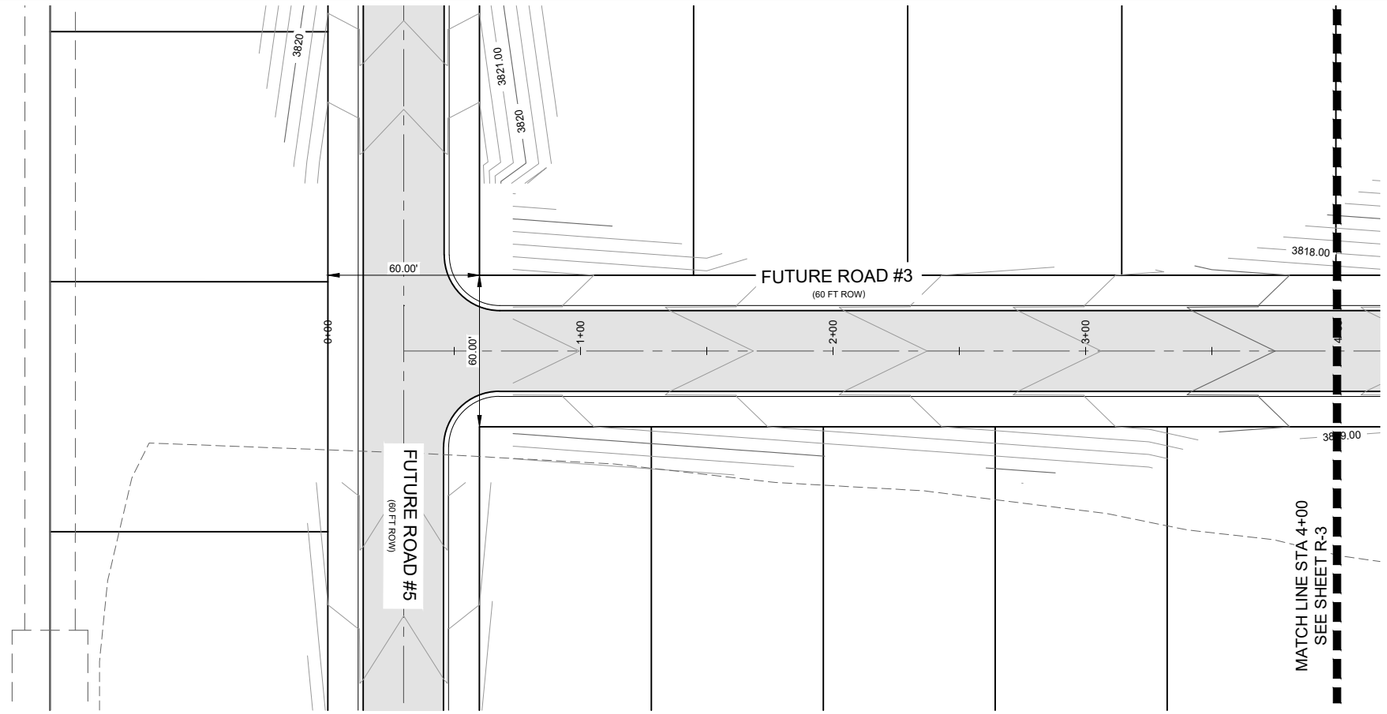
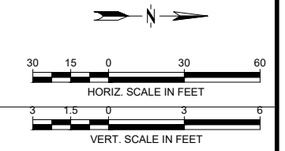
BY: ____
DATE: ____

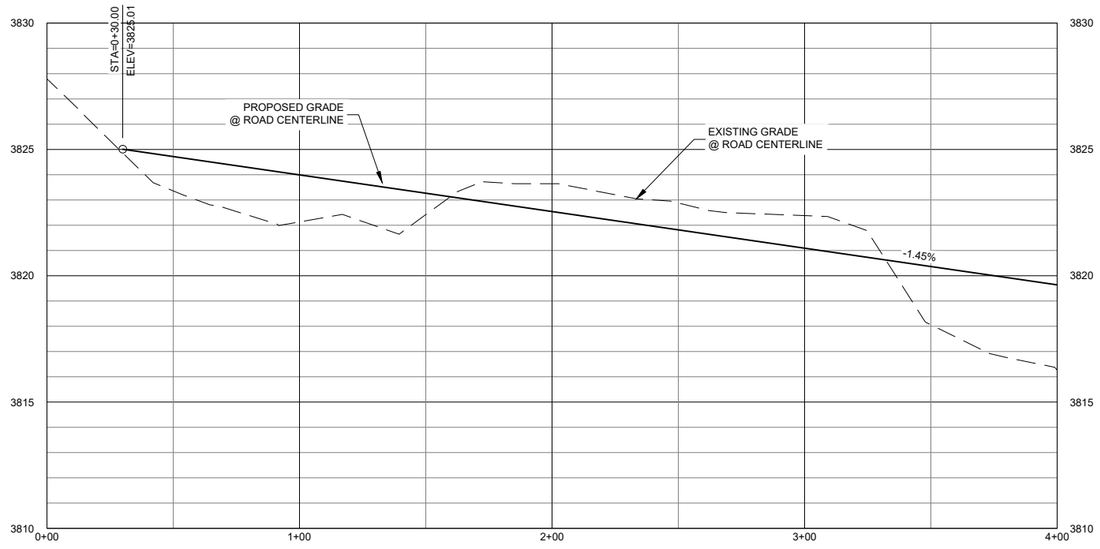
HELENA — MCHUGH DRIVE SUBDIVISION — MONTANA

WOLF ROAD PLAN & PROFILE - STA 0+00 - 9+00

PROJECT NUMBER 10723.003
SHEET NUMBER 4
DRAWING NUMBER R-1

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BY: _____
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MCHUGH DRIVE SUBDIVISION

HELENA MONTANA

FUTURE ROAD #3 PLAN & PROFILE - STA 0+00 - 4+00

PROJECT NUMBER
10723.003

SHEET NUMBER
5

DRAWING NUMBER
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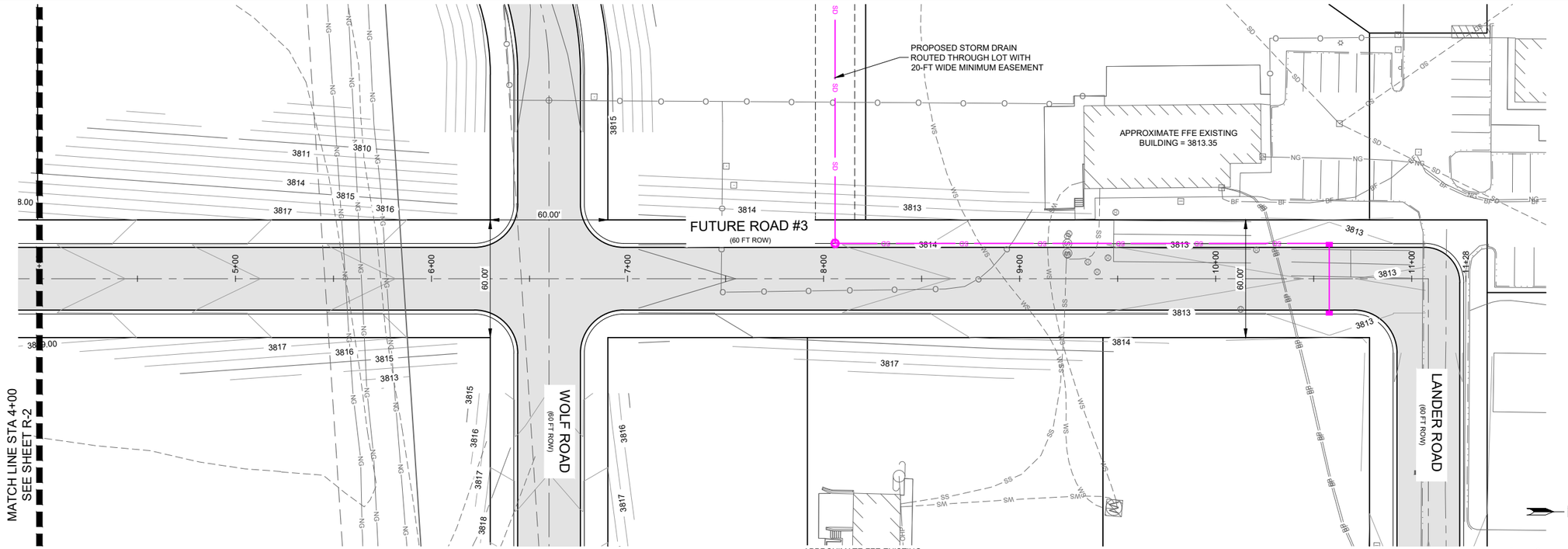


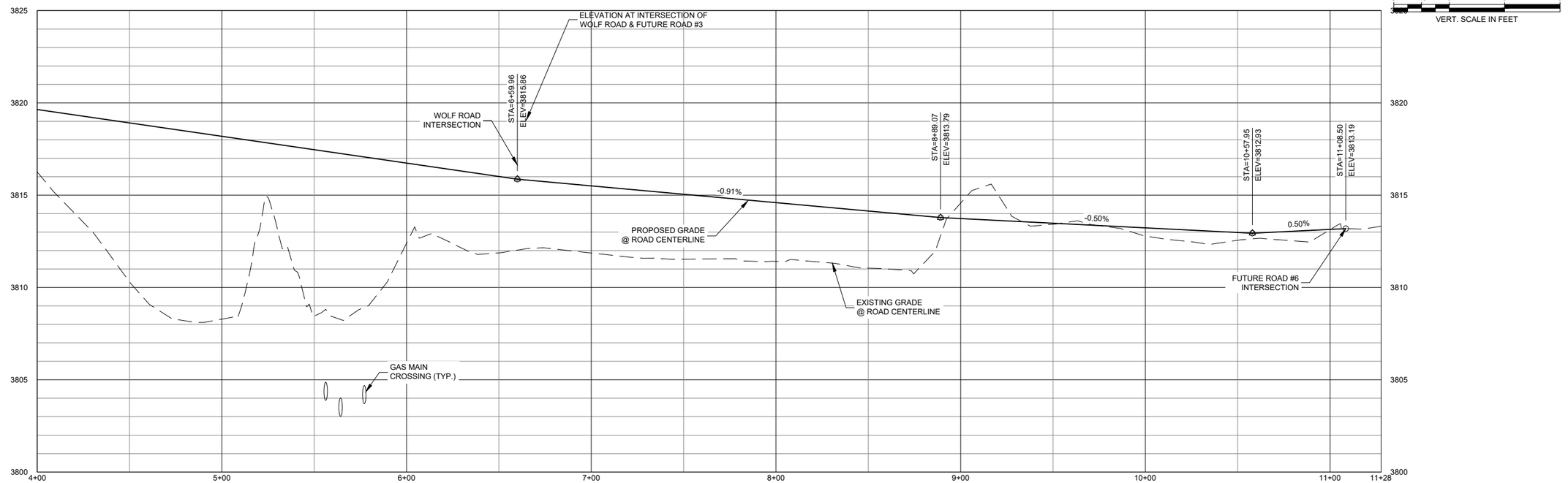


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HELENA MONTANA

FUTURE ROAD #3 PLAN & PROFILE - STA 4+00 - 11+28

PROJECT NUMBER 10723.003

SHEET NUMBER 6

DRAWING NUMBER R-3

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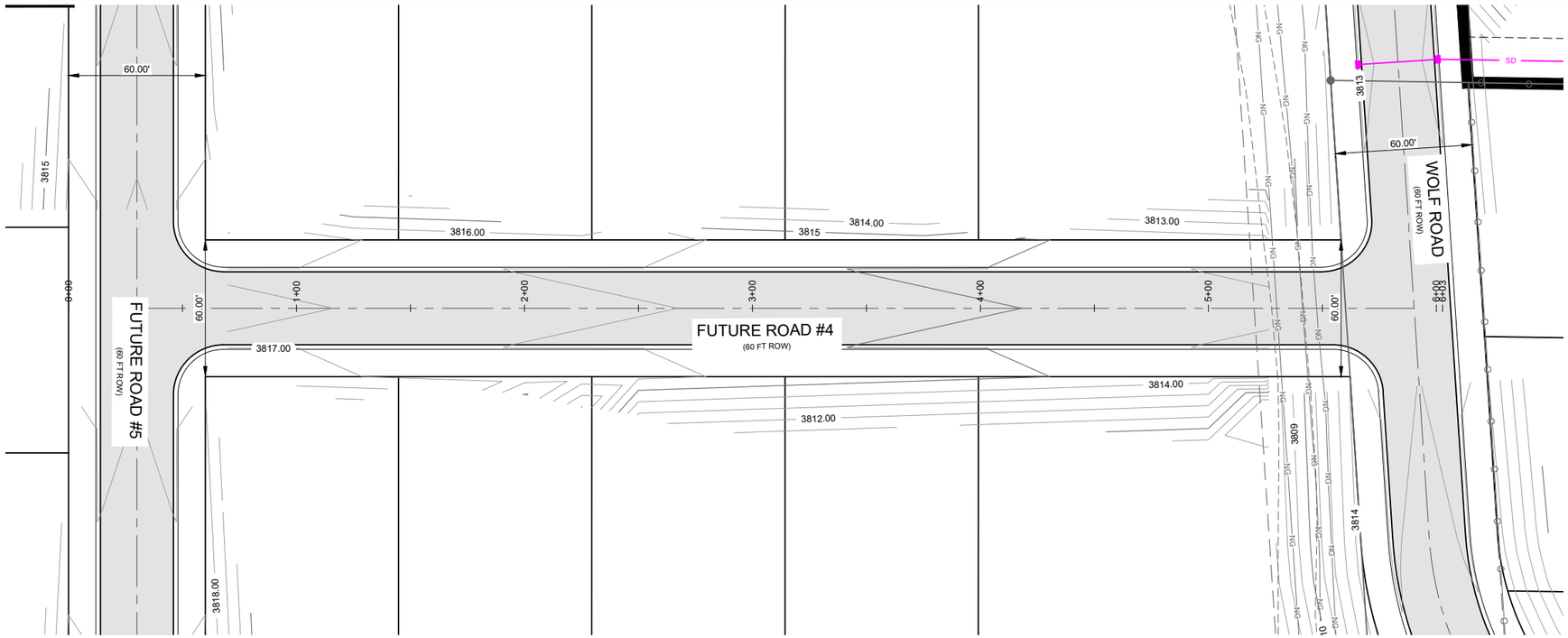


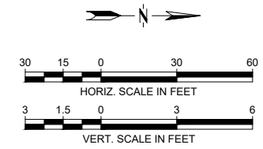


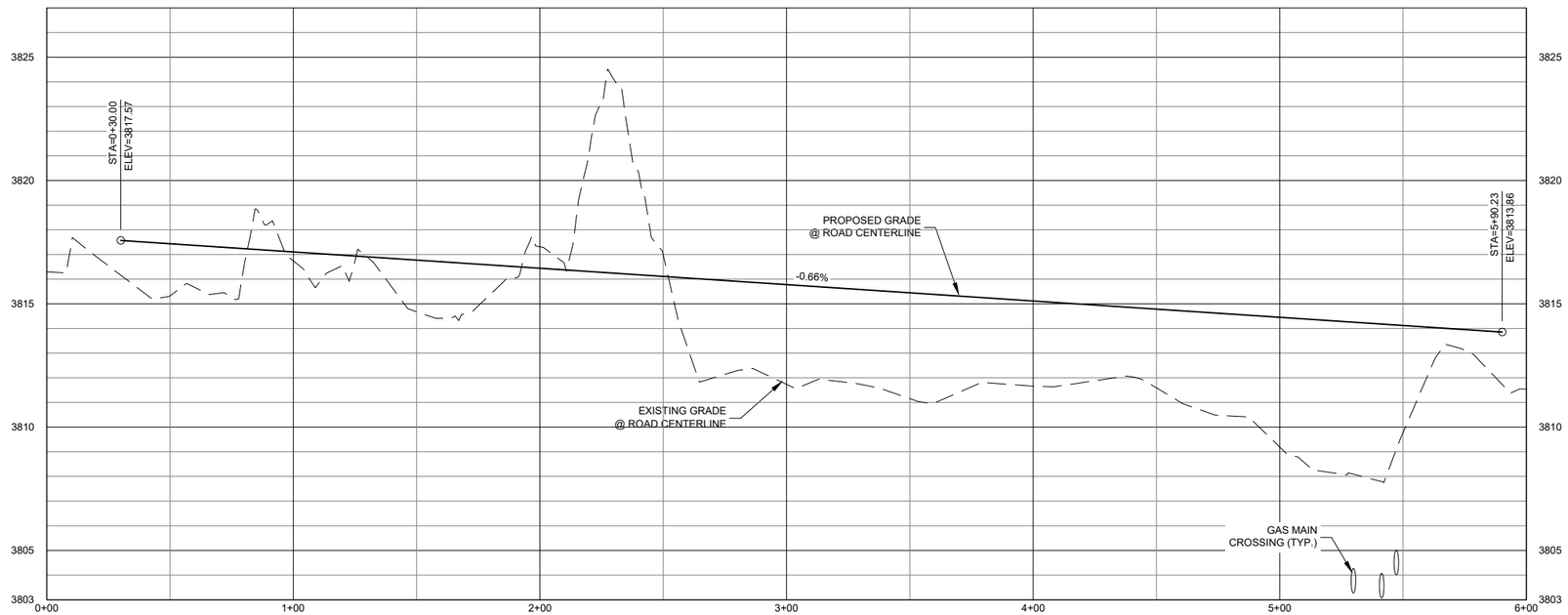


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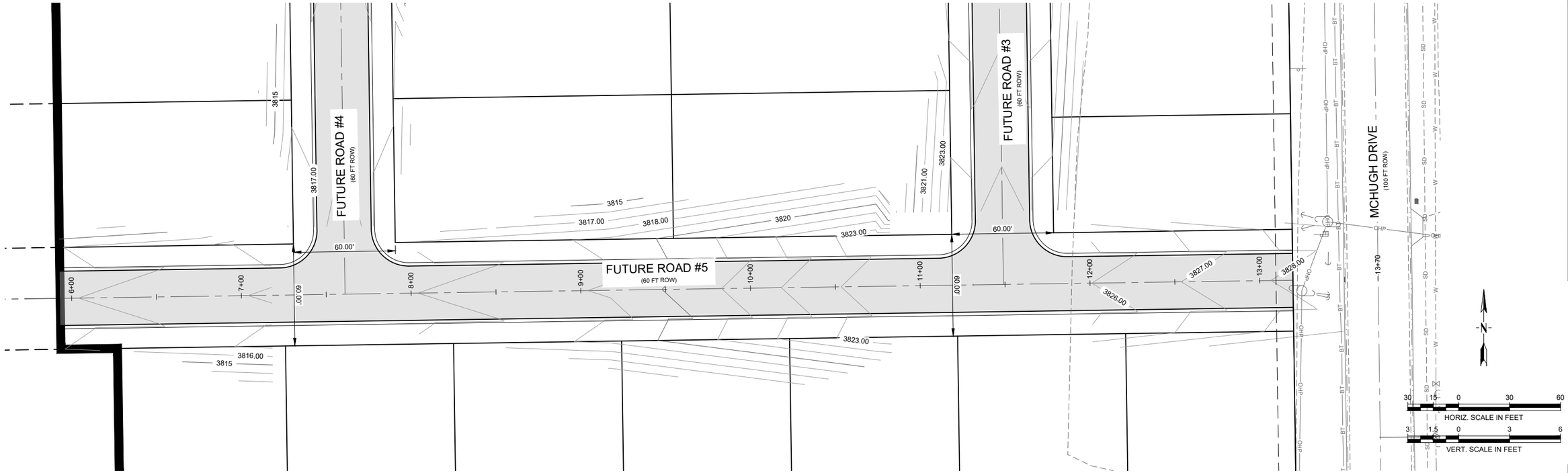
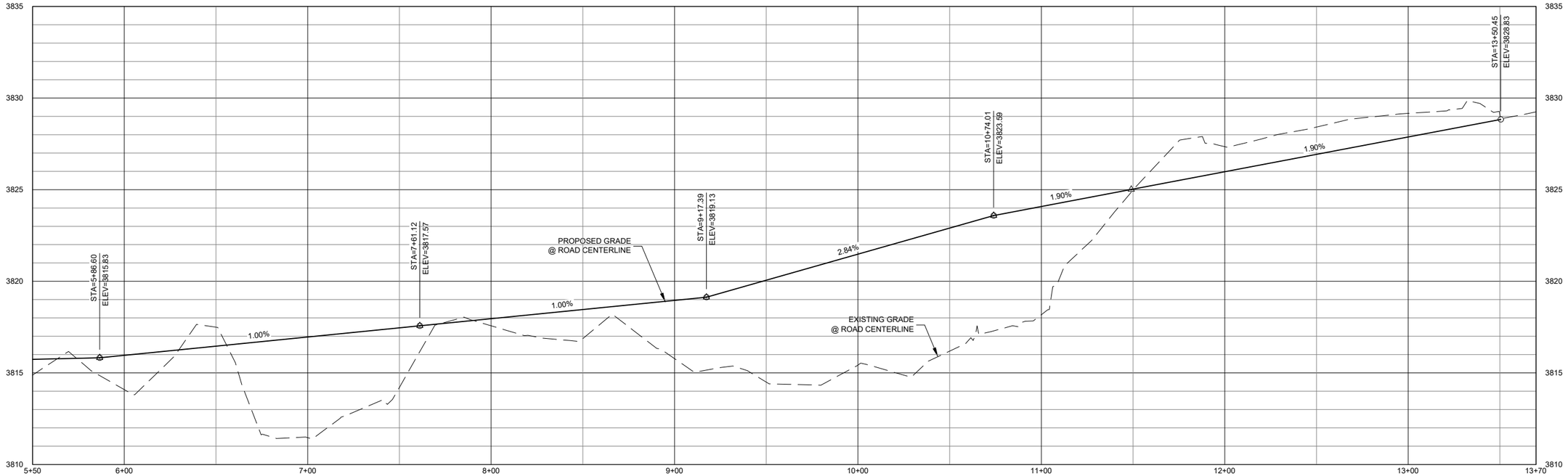
FUTURE ROAD #4 PLAN & PROFILE - STA 0+00 - 6+00

PROJECT NUMBER
10723.003

SHEET NUMBER
7

DRAWING NUMBER
R-4

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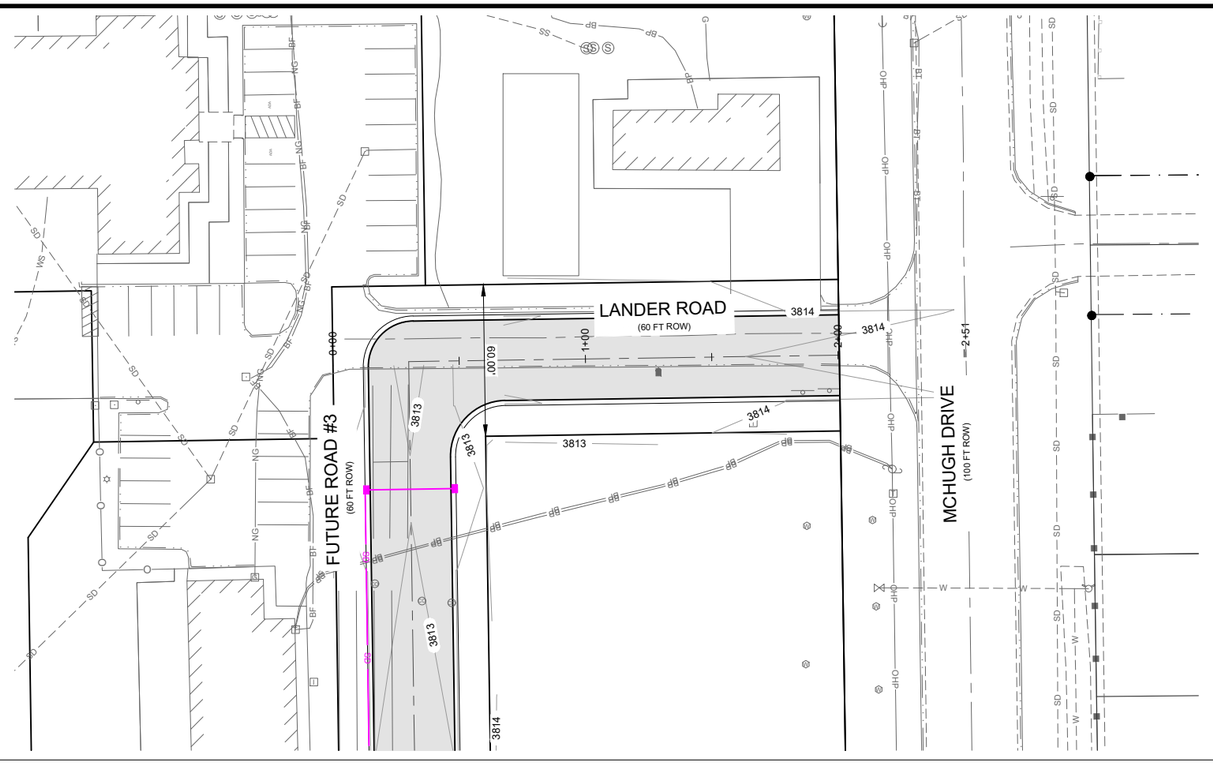
FUTURE ROAD #5 PLAN & PROFILE - STA 0+00 - 7+76

PROJECT NUMBER
10723.003

SHEET NUMBER
8

DRAWING NUMBER
R-5

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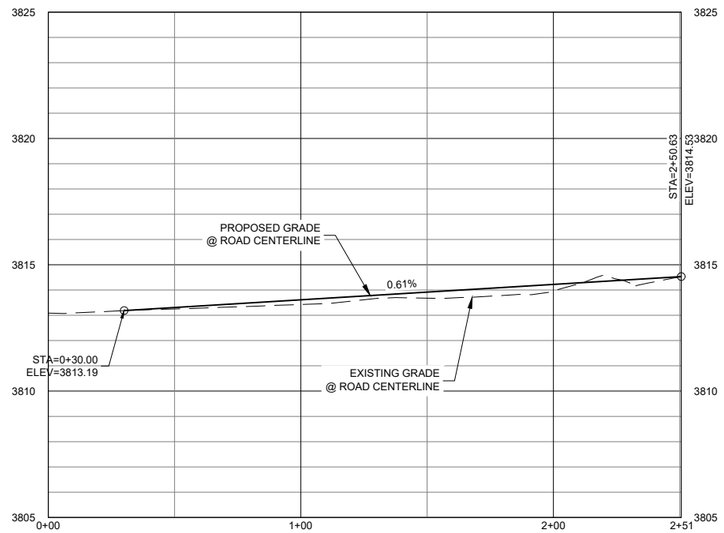
VERT. SCALE IN FEET: 3 1.5 0 3 6

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DATE: _____

MCHUGH DRIVE SUBDIVISION

HELENA MONTANA

LANDER ROAD PLAN & PROFILE - STA 0+00 - 2+51

PROJECT NUMBER 10723.003

SHEET NUMBER 9

DRAWING NUMBER R-6

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## Traffic Impact Study

# McHugh Development

### 3736 McHugh Ln

*Helena, Montana*

*February 2025*

MMI Project No. 10723.002

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# Executive Summary

This report presents an in-depth traffic impact analysis of the McHugh Development and its effects on the surrounding transportation network in Helena, Montana. The study evaluates traffic volumes, intersection delays, and traffic flow characteristics, and provides recommendations for any necessary infrastructure improvements.

## Development Overview

The McHugh Development is proposed to be a mixed-use development set to include 21 single-family homes, 254 low-rise multifamily housing units, 66,470sf of commercial business park space, and three industrial park lots projected to employ 100 workers. Given the preliminary stage of the proposed development site plan, measures were taken to ensure a conservative estimate throughout the analysis process. The development site is located along McHugh Drive between Road Runner Drive and Faw Road, with full buildout expected by 2035.

## Analysis and Key Findings

The analysis examined 13 intersections to assess current and future traffic conditions under both no-build (baseline growth) and full buildout scenarios. Utilizing the Highway Capacity Software (HCS), the study assessed Level of Service (LOS) for each intersection. Additionally, an in-depth analysis of Montana Department of Transportation (MDT) provided Crash Data for a 10-year period was conducted to assess crash trends and potential areas of concern.

## Recommendations

Based on the findings, the following recommendations are proposed:

- The addition of pedestrian crossing facilities along McHugh Drive would improve safety and accessibility for non-motorized users. It is recommended that pedestrian facilities such as signage, pavement markings, and lighting be considered on the south leg of the intersection of McHugh Drive and Road Runner Drive or another location identified by the City of Helena.
- The intersection of Custer Avenue & McHugh Drive is forecasted to have substandard LOS during PM peak hours, regardless of development. The study recommends adding exclusive right-turn lanes on Custer Avenue during planned roadway reconstruction efforts outlined in the Greater Helena Area Long Range Transportation Plan (GHALRTP).
- The intersection of North Montana Avenue and Road Runner Drive is forecasted to have substandard LOS in the westbound direction, regardless of development. This intersection also has a high frequency of right-angle crashes. Limiting movements on the east and/or west leg of this approch could improve both LOS and crash trends, but may be unfavorable to existing landowners.

- The intersection of North Montana Avenue and Custer Avenue is forecasted to have susbstandard LOS in the projected future conditions, regardless of development. No intersection improvements are recommended at this time but should be considered wih the planned roadway reconstruction efforts outlined in the GHALRTP.

While the McHugh Development will contribute to increased traffic volumes, the study concludes that most intersections will remain within acceptable operating thresholds, with only minimal improvements required in select locations. This report provides a framework for future transportation planning efforts to ensure smooth integration of the development within Helena's roadway network.

# Introduction

## Purpose of Report & Study Objectives

This report analyzes the traffic impacts of the McHugh Development on the surrounding transportation network. Traffic volumes, intersection delay, and other traffic characteristics are inspected, and recommendations of any warranted improvements are discussed.

## Proposed Development/Study Area

At full buildout, the McHugh Development is proposed to include 21 single family homes, 254 units in low-rise multifamily housing, 66,470sf of commercial business park use, and 3 lots of industrial park with a proposed use by 100 employees. As the development is in the early stages, building envelopes have yet to be determined and commercial business park square footage required estimation (see appendix A for the preliminary site plan). This was done through identifying similar businesses and lots within the study area, and conservatively estimating percent of each lot occupied by commercial buildings. This was then compared to the proposed lot sizes within McHugh Development to determine an estimated total of 66,470 sf of commercial business park land use.

McHugh Development is located in Helena, Montana bordering the city limits on the West side of McHugh Drive, between Road Runner Drive and Faw Road. Full buildout of this development is expected to require ten years, thus the design year for this traffic analysis is 2035.

Currently, the development site consists of three parcels. Two of the parcels are undeveloped and the northeastern parcel is operating as the headquarters of Steed Industries LLC. Bordering this proposed development to the south is an empty commercial lot under B-2 General Commercial District zoning, to the west are mostly undeveloped lots, to the east is McHugh Drive and single family housing, and to the north are residential lots with single family housing.

Proposed access to this development is provided through three approaches located on McHugh Drive. The northern access is an existing short road segment of Lander Road, which currently provides access to Steed Rentals LLC. The middle access is proposed as an extension of Wolf Road, which would eliminate the existing, nearby approach to the southernmost parcel. The southern access is a proposed local road, currently named Smith Avenue, that will create a new, 3-way intersection with McHugh Drive. At the time of report conclusion, there is no available data on exact locations and dimensions of the two proposed accesses. Figure 1, below, provides context regarding the location of the proposed development and accesses, the study area, and the locations of the intersections to be analyzed for existing and future conditions.

Through consultation with the City of Helena Engineering Department, the following intersections were identified for detailed traffic analysis:

1. McHugh Drive & Mill Road
2. McHugh Drive & Lander Road/Yuhas Ave
3. McHugh Drive & Wolf Road
4. McHugh Drive & Smith Ave (2035 Full-Build case only)
5. McHugh Drive & Road Runner Drive
6. McHugh Drive & Benchmark Drive/Barney Street
7. W Custer Avenue & McHugh Drive
8. N Montana Avenue & Wolf Road
9. N Montana Avenue & Partridge Place
10. Road Runner Drive & Ptarmigan Lane
11. Road Runner Drive & Dredge Drive
12. N Montana Avenue & Road Runner Drive
13. W Custer Avenue & N Montana Avenue

Figure 1: Site Location & Study Area

# Study Area Traffic Characteristics

## Existing Conditions

To determine current vehicle, pedestrian, and bicycle volumes within the study area, data collection via CountCam video systems provided counts during the typical AM and PM peak periods, with additional consideration for a potential, school-induced afternoon peak hour from 2-4 PM, for the following locations and dates:

- Tuesday, January 7, 2025: 7-9AM, 2-6PM
    - McHugh Drive & Benchmark Drive/Barney Street
    - McHugh Drive & Road Runner Drive
    - McHugh Drive & Wolf Road
    - McHugh Drive & Lander Road/Yuhas Ave
    - McHugh Drive & Mill Road
- Wednesday, January 8, 2025: 7-9AM, 2-6PM
    - N Montana Avenue & Road Runner Drive
    - N Montana Avenue & Partridge Place
    - N Montana Avenue & Wolf Road
    - Ptarmigan Lane & Road Runner Drive
- Thursday, January 9, 2025: 7-9AM, 2-6PM
    - W Custer Avenue & N Montana Avenue
    - W Custer Avenue & McHugh Drive
    - Road Runner Drive & Dredge Drive

Figures 2a & 2b display the vehicular volume data collected for all intersections within the study area. The vehicular volumes collected across the study area reflected the need for further analysis only at the intersection of Custer Avenue and McHugh Drive, as all other intersections did not possess any single-hour volumes greater than, or comparable to single-hour volumes within the 4-6 PM period. Afternoon peak hour volumes are not shown in the intersection volume figures, but were utilized when performing capacity analysis for the intersection of Custer Avenue and McHugh Drive.

Figure 2a: Study Area Existing Volumes

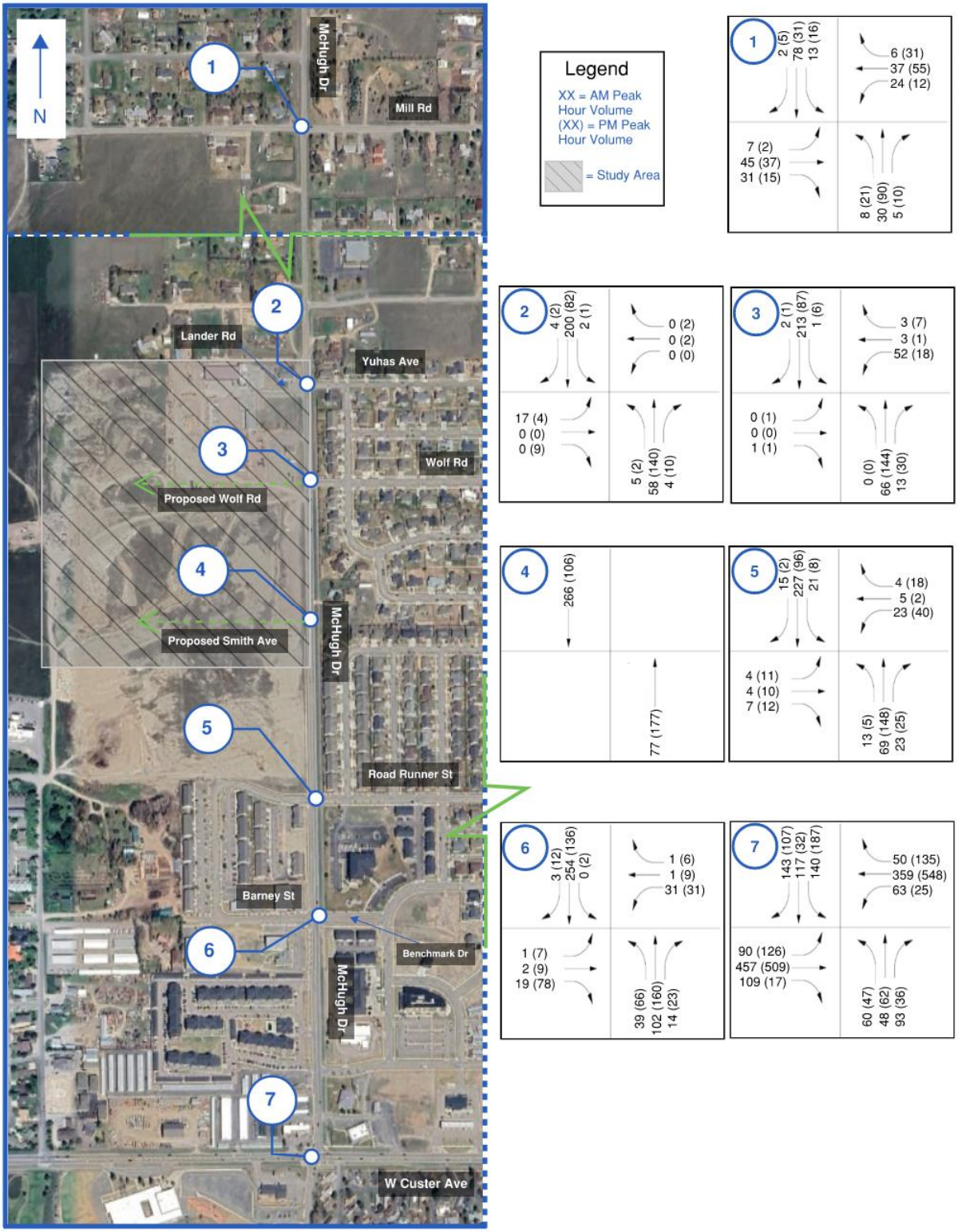
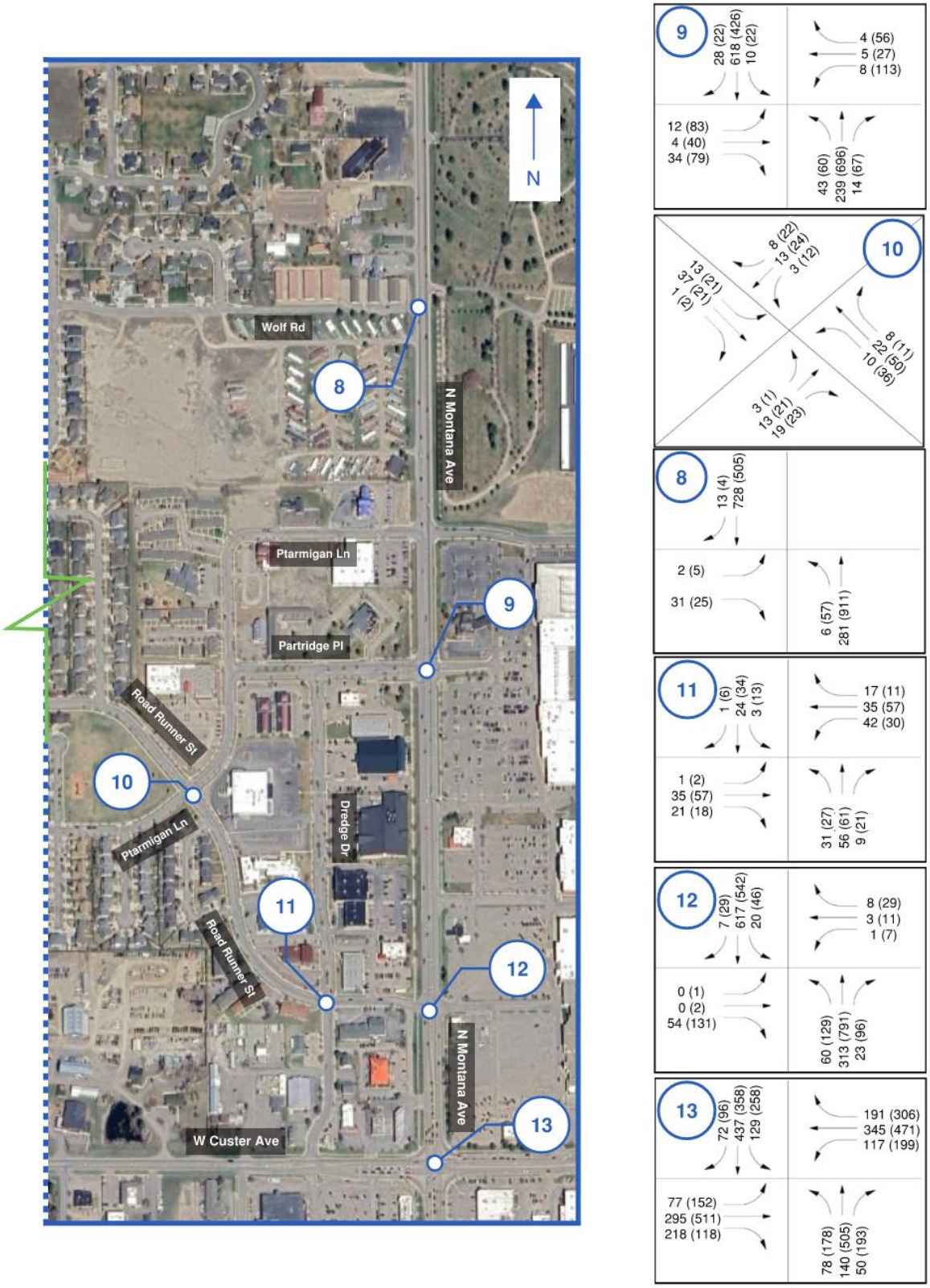


Figure 2b: Study Area Existing Volumes



# Development-Induced Traffic Characteristics

## Trip Generation

Trip generation is a forecast of the number of trips that will be generated by the proposed development. The traffic generated is a function of the quantity and type of proposed land use. This study utilizes trip generation rates found in the Trip Generation Manual, (11th Edition) published by the Institute of Transportation Engineers (ITE). The total estimated trip generation for the site is provided in Table 1, below. Note the following values do consider the industrial park as fully new construction and do not account for the removal of any existing buildings.

Table 1: Estimated Site Trip Generation

| Land Use | Units | Average Weekday Trips | | | Average Weekday, AM Peak Hour Trips | | | Average Weekday, PM Peak Hour Trips | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Enter | Exit | Total | Enter | Exit | Total | Enter | Exit | Total |
| ***Estimated Total Site Generated Trips (Units = 1 Dwelling Unit, 1,000 sq. ft. GFA, or 1 Employee)*** | | | | | | | | | | |
| Single-Family Detached Housing (210) | 21 DU | 120 | 120 | 240 | 5 | 13 | 18 | 14 | 9 | 23 |
| Multifamily Housing (Low-Rise) (220) | 254 DU | 856 | 856 | 1712 | 24 | 78 | 102 | 82 | 48 | 130 |
| Industrial Park (130) | 100 Employees | 323 | 323 | 646 | 55 | 9 | 64 | 15 | 62 | 77 |
| Business Park (770) | 66,470 ft$^2$ | 711 | 711 | 1422 | 79 | 14 | 93 | 26 | 76 | 102 |
| Total | - | 2010 | 2010 | 4020 | 163 | 114 | 277 | 137 | 195 | 332 |

## Trip Distribution

The existing peak hour turning movements at the study intersections, along with Average Annual Daily Traffic (AADT) values pulled from MDT's Traffic AADT Maps for each major corridor was analyzed to determine trip directionality through the study area. Trip distribution at the site access points was estimated based on the distribution of development within the site relative to the three access locations. Figures 3 & 4 below display a visual reference for the estimated trip approach/departure distribution for the McHugh Development.

The vehicle trips generated from the McHugh Development were distributed throughout the study intersections in accordance with the estimated trip distribution for both AM and PM peak hours. These vehicle trips are new to the roadway network after the full buildout of the proposed development. See Figures 5a & 5b below.

Figure 3: Arrival Trip Distribution

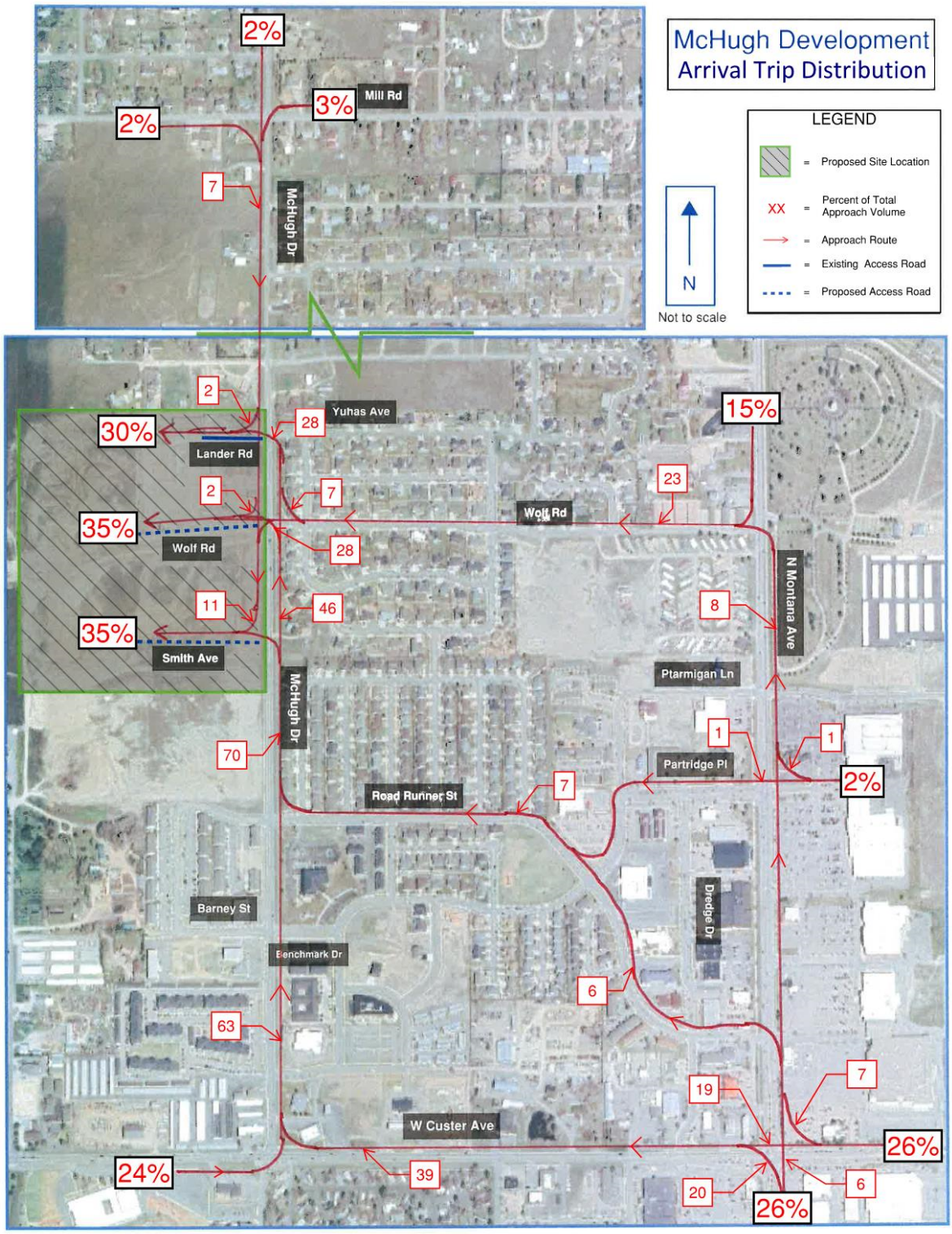


Figure 4: Departure Trip Distribution

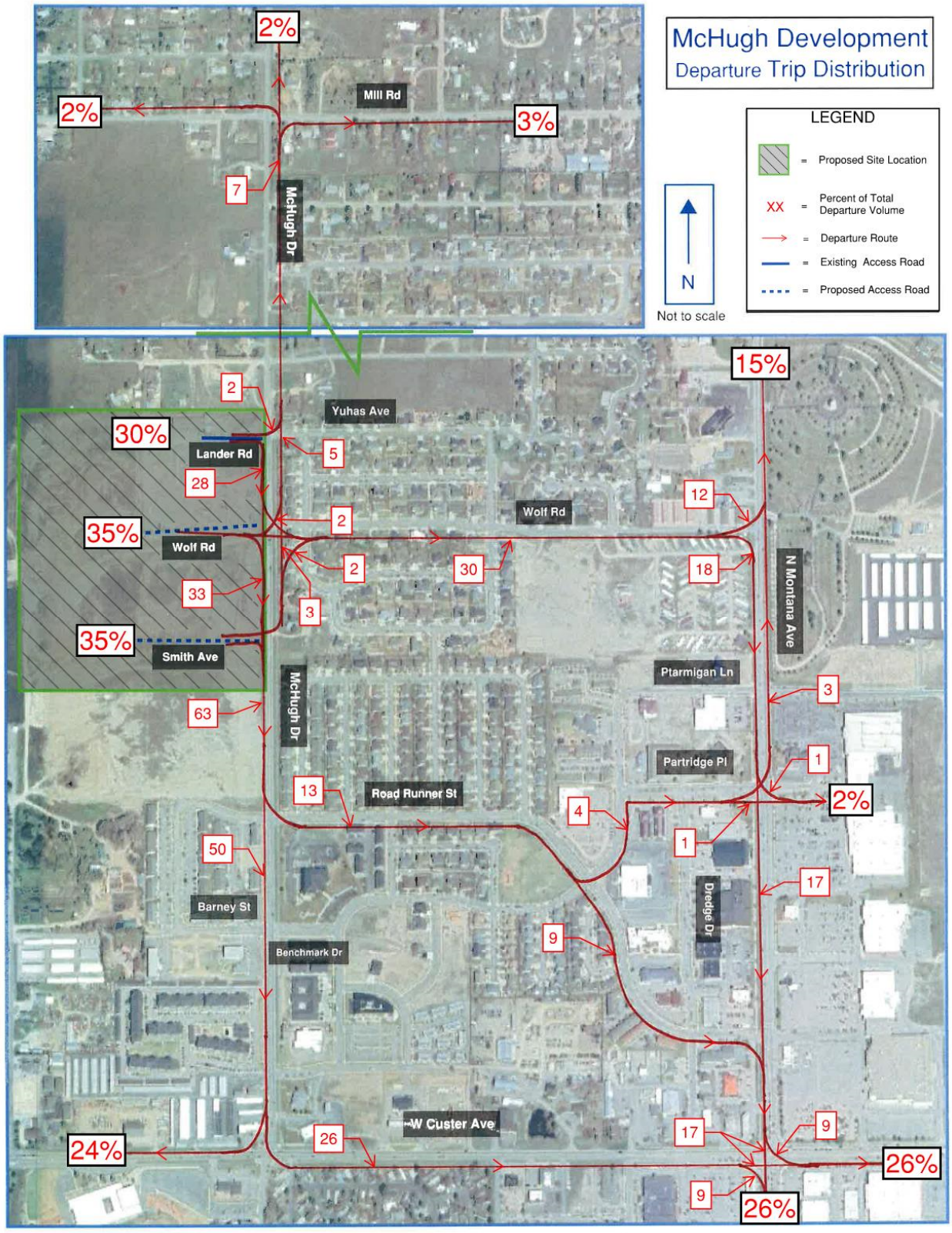


Figure 5a: Site Generated Trips

Figure 5b: Site Generated Trips

# Forecast Traffic Volumes

## Without Proposed Development (2035 No-build)

To understand the future implications of the proposed development, it is necessary to first forecast the traffic volumes of the study area without the generation of traffic from the new development. To do this, the three corridors with available MDT Traffic Data were utilized for average growth calculations, resulting in a growth factor of +1.00%. Figures 6a & 6b, on the following pages, display the forecast traffic volumes for the transportation network within the study area.

## With Full Buildout of Proposed Development (2035 Full Buildout)

Given full buildout of the proposed development by year 2035, the values estimated from the Trip Generation analysis are then added to the forecast traffic volumes from the previous analysis (shown above in Figures 5a & 5b) utilizing the expected traffic patterns from the trip distribution analysis. Figures 7a & 7b display the total forecasted traffic volumes upon full buildout of the proposed development.

Figure 6a: 2035 Traffic Volumes, No-Build

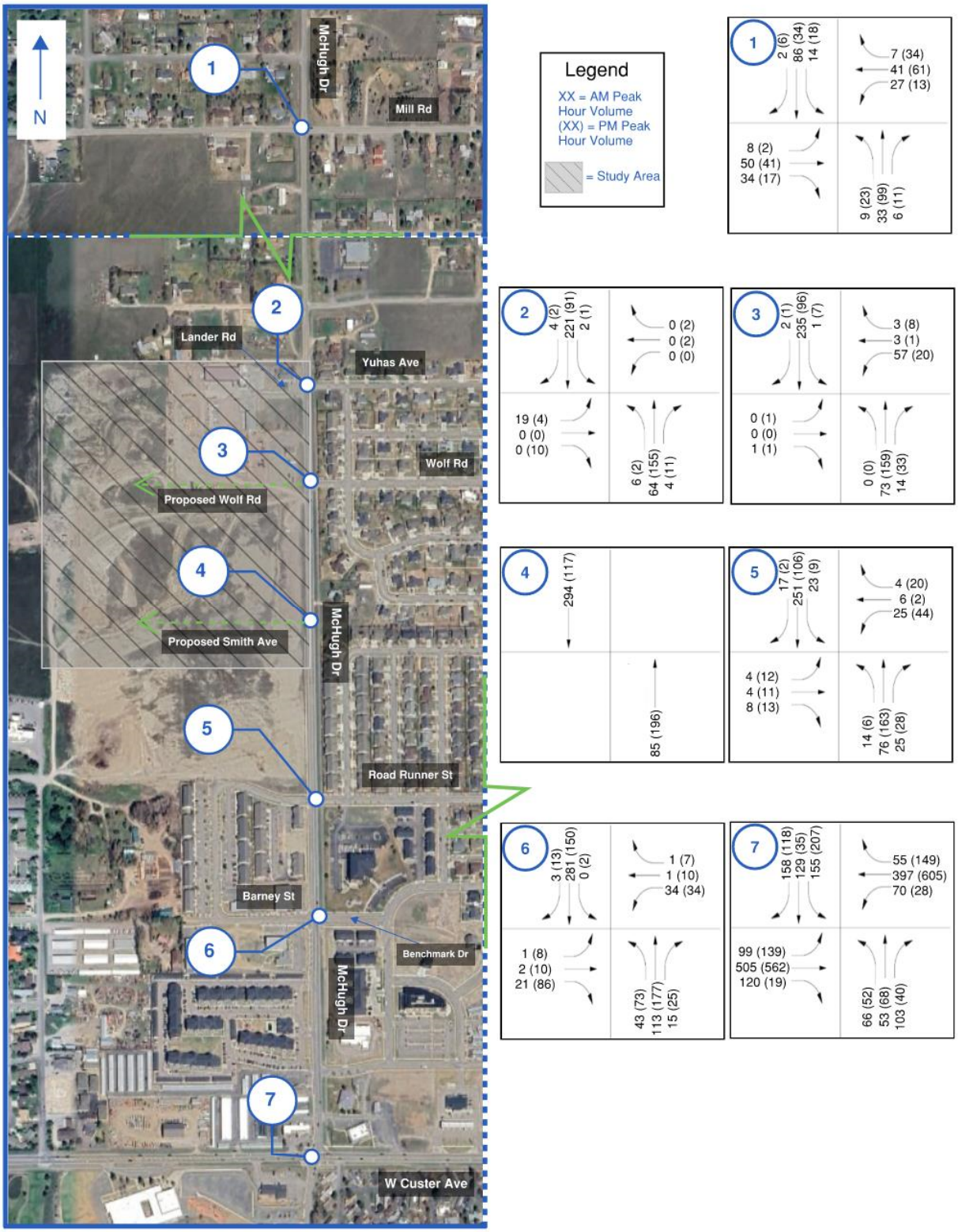


Figure 6b: 2035 Traffic Volumes, No-Build

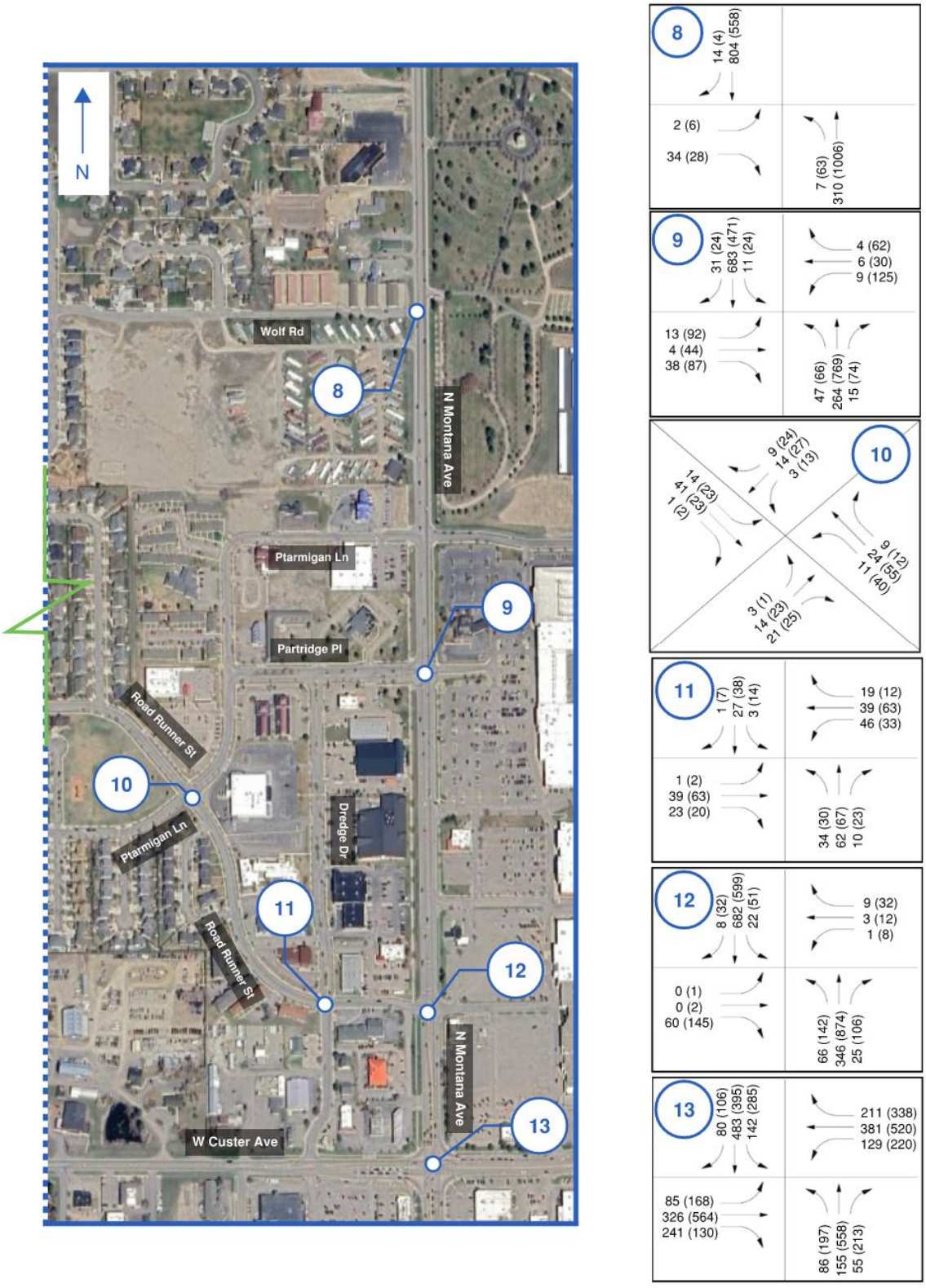


Figure 7a: 2035 Traffic Volumes, Full Buildout of Proposed Development

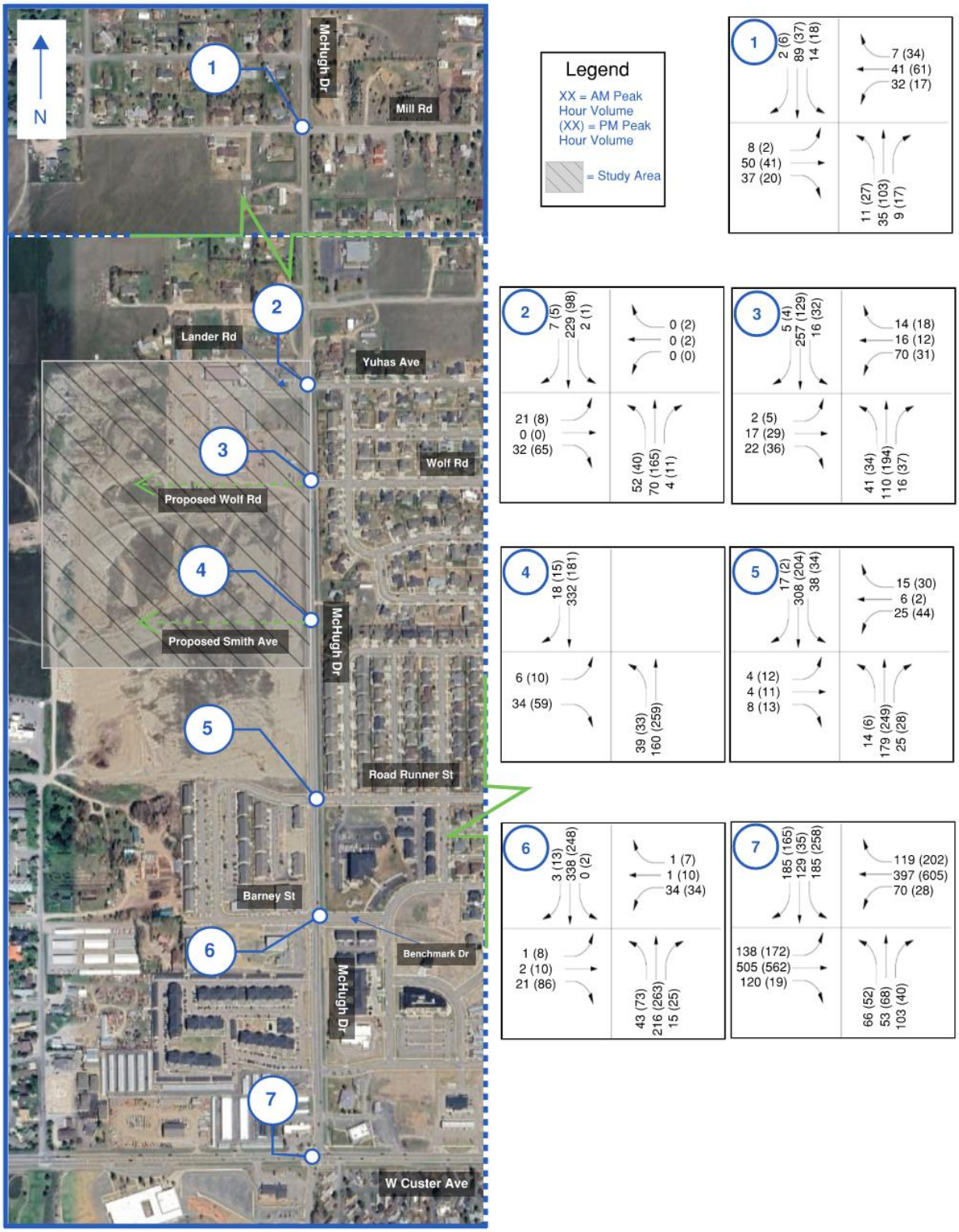
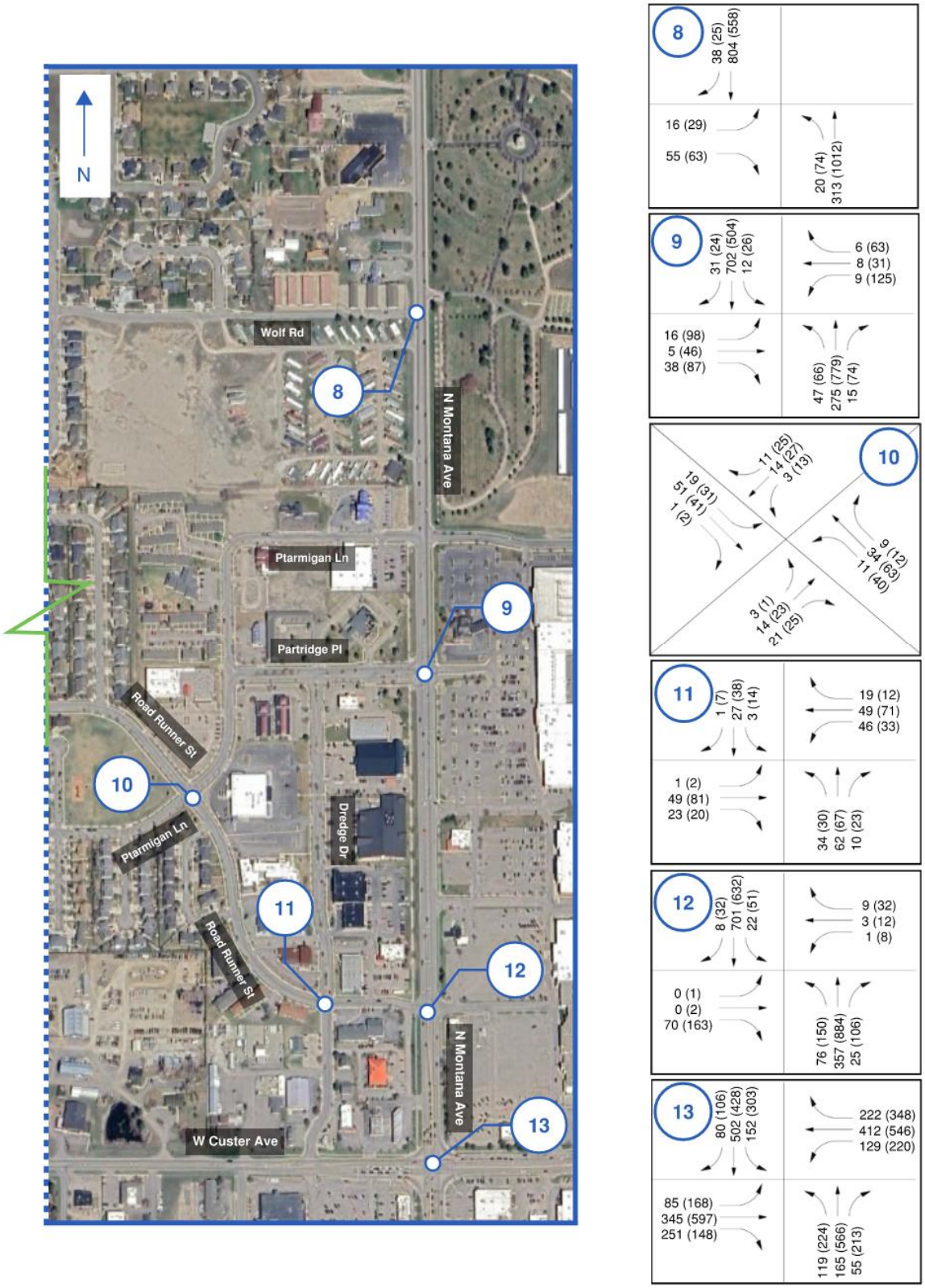


Figure 7b: 2035 Traffic Volumes, Full Buildout of Proposed Development



# Traffic Flow Characteristics

To provide analysis-based recommendations, analyses of the transportation network with future conditions provide objective metrics to compare to the City of Helena standards and insight into the future operations of the surrounding transportation network. The future conditions analyzed are 2035 No-Build and 2035 Full Buildout. The no-build condition considers the traffic volumes forecast with 1.0% growth over 10 years, presented in Figures 6a & 6b above. The full buildout condition considers the same forecast traffic volumes with the addition of site-generated traffic from the construction of the McHugh Development, presented in Figures 7a & 7b above.

## Average Vehicle Delay & Level of Service (LOS)

The analysis of intersection performance within the study area is conducted using McTrans Highway Capacity Software (HCS), which applies concepts from the Highway Capacity Manual (HCM) to evaluate traffic conditions. This software is utilized to assess key metrics such as Level of Service (LOS), which quantifies average vehicle delay, and Volume to Capacity (V/C) ratios, which indicate the degree of congestion at each intersection. By utilizing HCS, the study provides a standardized and reliable evaluation and comparison of future traffic operations, ensuring that projected traffic conditions are accurately represented and appropriate mitigation measures are identified if necessary.

## 1 McHugh Drive & Mill Road

### Existing Conditions

McHugh Drive is a north/south major collector with one travel lane in each direction. Mill Road is a east/west major collector with one travel lane in each direction. Mill Road intersects McHugh Drive at a full movement, 4-way intersection with no turn lanes present and 2-way stop control on Mill Road. At this intersection, the speed limits for McHugh Drive and Mill Road are 45 mph and 35 mph, respectively.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Two-way Stop Control Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 2.

Table 2: McHugh Drive & Mill Road – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound - Through | 10.5 | B | 10.6 | B | 10.7 | B | 10.8 | B |
| Westbound - Through | 11.1 | B | 11.3 | B | 11.3 | B | 11.6 | B |
| Northbound – Left | 7.4 | A | 7.5 | A | 7.4 | A | 7.4 | A |
| Southbound – Left | 7.3 | A | 7.3 | A | 7.5 | A | 7.5 | A |

The analysis summarized above shows that site-generated traffic will have no appreciable impact on delay or operations at this intersection. No intersection improvements are required.

## 2 McHugh Drive & Yuhas Avenue/Lander Road

### Existing Conditions

McHugh Drive is a north/south major collector with one travel lane in each direction. Yuhas Avenue (East leg of intersection) is a local road with one travel lane in each direction and Lander Road (West leg of intersection) is a local road with one travel lane in each direction, both of which provide east/west movements. Yuhas Avenue and Lander Road intersect McHugh Drive at a full movement, 4-way intersection with no turn lanes present and 2-way stop control on the east/west movements. At this intersection, the speed limit for McHugh Drive is 45 mph and the speed limits for Yuhas Avenue and Lander Road are unposted, thus assumed 25 mph.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Two-way Stop Control Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 3.

Table 3: McHugh Drive & Yuhas Avenue/Lander Road – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound – Through | 11.1 | B | 11.3 | B | 9.4 | A | 9.6 | A |
| Westbound – Through | No traffic volumes observed during data collection | | | | 10.0 | B | 10.6 | B |
| Northbound – Left | 7.8 | A | 7.9 | A | 7.4 | A | 7.5 | A |
| Southbound – Left | 7.4 | A | 7.4 | A | 7.6 | A | 7.6 | A |

The analysis summarized above shows that site-generated traffic will have no appreciable impact on delay or operations at this intersection. No intersection improvements are required.

## 3 McHugh Drive & Wolf Road

### Existing Conditions

McHugh Drive is a north/south major collector with one travel lane in each direction. Wolf Road is an east/west local road with one travel lane in each direction. Currently, Wolf Road and a local access, which is present with a slightly southern offset, intersect McHugh Drive at a full movement, 4-way intersection with no turn lanes present and stop control on Wolf Road and the local access. Upon the proposed full buildout of the McHugh Development, the local access will be a properly aligned extension of Wolf Road and the intersection of McHugh Drive and Wolf Road will be a 4-way, full movement intersection with 2-way stop control on Wolf Road. At this intersection, the speed limits for McHugh Drive and Wolf Road are 45 mph and 25 mph, respectively.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the proposed intersection layout. The HCS Two-way Stop Control Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 4.

Table 4: McHugh Drive & Wolf Road – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound – Through | 9.6 | A | 12.1 | B | 9.9 | A | 12.5 | B |
| Westbound – Through | 11.6 | B | 16.2 | C | 10.7 | B | 14.9 | B |
| Northbound – Left | 7.8 | A | 7.9 | A | 7.4 | A | 7.6 | A |
| Southbound – Left | 7.4 | A | 7.5 | A | 7.7 | A | 7.9 | A |

The analysis summarized above shows that site-generated traffic will have some impact on delay or operations at this intersection, but will maintain operations above a LOS C or better. No intersection improvements are required.

## 4 McHugh Drive & Proposed Smith Avenue

### Conditions

McHugh Drive is a north/south major collector with one travel lane in each direction. At full buildout, the proposed Smith Avenue (West leg of intersection) is to be an east/west local road with one travel lane in each direction and will intersect McHugh Drive at a full movement, 3-way "T" intersection with no turn lanes present and stop control on Smith Avenue. At this intersection, the speed limit for McHugh Drive is 35 mph and the speed limit for Smith Avenue is to be 25 mph.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Two-way Stop Control Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 5.

Table 5: McHugh Drive & Smith Avenue – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound – Through | No intersection present under future, no-build conditions | | 13.1 | B | No intersection present under future, no-build conditions | | 14.0 | B |
| Northbound – Left | | | 8.0 | A | | | 7.7 | A |

The analysis summarized above shows that the proposed intersection will operate at a good LOS. No intersection improvements are required.

## 5 McHugh Drive & Road Runner Drive

### Existing Conditions

McHugh Drive is a north/south major collector with one travel lane in each direction. Road Runner Drive is a east/west local road with one travel lane in each direction. Road Runner Drive intersects McHugh Drive at a full movement, 4-way intersection with no turn lanes present and 2-way stop control on Road Runner Drive. At this intersection, the speed limits for McHugh Drive and Road Runner Drive are 35 mph and 25 mph, respectively.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Two-way Stop Control Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 6.

Table 6: McHugh Drive & Road Runner Drive – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound – Through | 11.3 | B | 13.1 | B | 11.0 | B | 14.0 | B |
| Westbound – Through | 12.6 | B | 14.5 | B | 11.7 | B | 15.3 | C |
| Northbound – Left | 7.9 | A | 8.0 | A | 7.5 | A | 7.7 | A |
| Southbound – Left | 7.5 | A | 7.8 | A | 7.7 | A | 8.0 | A |

The analysis summarized above shows that site-generated traffic will have some impact on delay or operations at this intersection, but will maintain operations at a LOS C or better. No intersection improvements are required.

## 6 McHugh Drive & Benchmark Drive/Barney Street

### Existing Conditions

McHugh Drive is a north/south major collector with one travel lane in each direction. Benchmark Drive (East leg of intersection) and Barney Street (West leg of intersection) are local roads with one travel lane in each direction, both of which provide east/west movements. Benchmark Drive and Barney Street intersect McHugh Drive at a full movement, 4-way intersection with no turn lanes present and 2-way stop control on the east/west movements. At this intersection, the speed limits are 35 mph for McHugh Drive, 25 mph for Benchmark Drive, and unposted on Barney Street, thus assumed as 25 mph.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Two-way Stop Control Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 7.

Table 7: McHugh Drive & Benchmark Drive/Barney Street – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound – Through | 10.5 | B | 11.2 | B | 11.2 | B | 12.9 | B |
| Westbound – Through | 14.3 | B | 17.6 | C | 17.1 | C | 23.7 | C |
| Northbound – Left | 8.0 | A | 8.2 | A | 7.8 | A | 8.1 | A |
| Southbound – Left | 7.5 | A | 7.7 | A | 7.7 | A | 8.0 | A |

The analysis summarized above shows that site-generated traffic will have minor impact on delay or operations at this intersection and will maintain operations at a LOS C or better. No intersection improvements are required.

## 7 Custer Avenue & McHugh Drive

### Existing Conditions

Custer Avenue is an east/west minor arterial with an exclusive left-turn lane and a through/right lane in each direction at the intersection with McHugh Drive. McHugh Drive is a north/south major collector with an exclusive left-turn lane and a through/right lane in each direction at this intersection. McHugh Drive intersects Custer Avenue at a full movement, 4-way intersection with uncoordinated traffic signal control. At this intersection, the speed limits for Custer Avenue and McHugh Drive are 35 mph and 25 mph, respectively. With the presence of an elementary school within close proximity to this intersection, consideration for a peak hour occurring outside of the typical AM/PM hours was given and an afternoon near-peak hour volume was found in the hours of 3:15-4:15 PM.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Streets Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 8.

Table 8: Custer Avenue & McHugh Drive – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | Afternoon Peak Hour | | | | Afternoon Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay | | LOS | |
| Eastbound LT | 13.4 | B | 16.6 | B | 18.1 | B | 24.1 | C | 22.0 | C | 25.2 | C |
| Eastbound Thru | 31.9 | C | 33.2 | C | 52.5 | D | 58.5 | F | 21.2 | C | 28.5 | C |
| Westbound LT | 17.7 | B | 18.9 | B | 20.6 | C | 22.0 | C | 14.1 | B | 17.2 | B |
| Westbound Thru | 21.3 | C | 28.0 | C | 33.0 | C | 55.6 | E | 69.0 | F | 129.2 | F |
| Northbound LT | 27.5 | C | 29.2 | C | 24.9 | C | 26.2 | C | 29.8 | C | 31.7 | C |
| Northbound Thru | 32.2 | C | 33.8 | C | 31.0 | C | 33.0 | C | 36.8 | D | 38.7 | D |
| Southbound LT | 23.6 | C | 24.5 | C | 23.9 | C | 24.0 | C | 26.1 | C | 29.0 | C |
| Southbound Thru | 37.5 | D | 42.9 | D | 27.9 | C | 27.6 | C | 29.3 | C | 30.4 | C |
| Overall Intersection Delay | 28.0 | C | 30.9 | C | 37.3 | D | 46.2 | D | 41.2 | D | 65.7 | E |

The analysis summarized above shows that the future conditions of this intersection will have substandard LOS during PM peak hour operations regardless of development construction for the westbound through movement operating at a LOS F. An analysis with exclusive right-turn lanes on Custer Avenue in the eastbound and westbound directions yielded good LOS for each movement. It is recommended adding exclusive right turn lanes on Custer Avenue at this intersection during the GHALRTP recommended reconstruction of this roadway, further discussed in the Adopted Transportation Plans section of this report. No additional intersection improvements are recommended at this time.

## 8 North Montana Avenue & Wolf Road

### Existing Conditions

North Montana Avenue is a north/south minor arterial with one travel lane in each direction and a two-way left-turn lane. Wolf Road is an east/west local road with one travel lane in each direction. Wolf Road intersects North Montana Avenue at a full movement, 3-way "T" intersection with stop control on Wolf Road. At this intersection, the speed limits for North Montana Avenue and Wolf Road are 50 mph and 25 mph, respectively. On Wolf Road, approximately 640' west of this intersection, there exists a short section of road that narrows significantly to a roadway surface that measures approximately 15' in width. This narrow segment of Wolf Road provides for substandard traffic operations along the corridor.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Two-way Stop Control Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 9.

Table 9: North Montana Avenue & Wolf Road – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound – Right/Left | 17.3 | C | 19.9 | C | 14.6 | B | 19.6 | C |
| Northbound – Left | 9.9 | A | 10.1 | B | 8.9 | A | 9.0 | A |

The analysis summarized above shows that site-generated traffic will have minor impact on delay or operations at this intersection and will maintain operations at a LOS C or better. No intersection improvements are required.

## 9 North Montana Avenue & Partridge Place

### Existing Conditions

North Montana Avenue is a north/south minor arterial with an exclusive left-turn lane, a through lane, and an exclusive right-turn lane in the northbound direction and an exclusive left-turn lane, a through lane, and a through/right lane in the southbound direction at the intersection with Partridge Place. Partridge Place is an east/west local road with an exclusive left-turn lane, a through lane, and an exclusive right-turn lane in the eastbound direction and an exclusive left-turn lane and a through/right lane in the westbound direction at this intersection. Partridge Place intersects North Montana Avenue at a full movement, 4-way intersection with uncoordinated traffic signal control. At this intersection, the speed limit on North Montana Avenue is 35 mph and is unposted on Partridge Place, thus assumed as 25 mph.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Streets Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 10.

Table 10: North Montana Avenue & Partridge Place – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound LT | 19.5 | B | 19.6 | B | 20.7 | C | 21.2 | C |
| Eastbound Thru | 19.1 | B | 19.1 | B | 17.2 | B | 17.5 | B |
| Eastbound RT | 21.4 | C | 21.1 | C | 18.2 | B | 18.5 | B |
| Westbound LT | 19.3 | B | 19.2 | B | 19.9 | B | 20.2 | C |
| Westbound Thru | 19.4 | B | 19.5 | B | 18.2 | B | 18.5 | B |
| Northbound LT | 5.9 | A | 6.1 | A | 8.0 | A | 8.4 | A |
| Northbound Thru | 4.1 | A | 4.2 | A | 11.1 | B | 11.5 | B |
| Northbound RT | 3.4 | A | 3.5 | A | 5.8 | A | 5.8 | A |
| Southbound LT | 4.8 | A | 4.9 | A | 16.9 | B | 17.6 | B |
| Southbound Thru | 4.4 | A | 4.5 | A | 6.4 | A | 6.6 | A |
| Southbound RT | 4.4 | A | 4.6 | A | 6.5 | A | 6.6 | A |
| Overall Int. Delay | 5.5 | A | 5.6 | A | 11.5 | B | 11.8 | B |

The analysis summarized above shows that site-generated traffic will have minor impact on delay or operations at this intersection. No intersection improvements are required.

## 10 Road Runner Drive & Ptarmigan Lane

### Existing Conditions

At this intersection, Road Runner Drive is a northwest/southeast-running local road with one travel lane in each direction. Ptarmigan Lane is a northeast/southwest-running local road with one travel lane in each direction. Ptarmigan Lane intersects Road Runner Drive at a full movement, 4-way intersection with no turn lanes present and 2-way stop control on Ptarmigan Lane. The speed limits of Road Runner Drive and Ptarmigan Lane are 25 mph.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Two-way Stop Control Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 11.

Table 11: Road Runner Drive & Ptarmigan Lane – Average Vehicle Delay & LOS

| Direction – Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound – Left | 7.3 | A | 7.4 | A | 7.4 | A | 7.5 | A |
| Westbound – Left | 7.3 | A | 7.4 | A | 7.4 | A | 7.4 | A |
| Northbound – Through | 9.4 | A | 9.6 | A | 10.0 | A | 10.3 | B |
| Southbound – Through | 9.6 | A | 9.8 | A | 10.6 | B | 11.0 | B |

The analysis summarized above shows that site-generated traffic will have minor impact on delay or operations at this intersection. No intersection improvements are required.

## 11 Road Runner Drive & Dredge Drive

### Existing Conditions

At this intersection, Road Runner Drive is a east/west local road with one travel lane in each direction. Dredge Drive is a north/south local road with one travel lane in each direction. The north leg of Dredge Drive contains a median island that divides the opposing travel lanes while the south leg of Dredge Drive does not have any median. Dredge Drive intersects Road Runner Drive at a full movement, 4-way intersection with no turn lanes present and 2-way stop control on Dredge Drive. The speed limits of Road Runner Drive and Dredge Drive are 25 mph.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Two-way Stop Control Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 12.

Table 12: Road Runner Drive & Dredge Drive – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound | 7.4 | A | 7.4 | A | 7.4 | A | 7.4 | A |
| Westbound | 7.5 | A | 7.5 | A | 7.5 | A | 7.5 | A |
| Northbound | 12.4 | B | 12.8 | B | 12.0 | B | 12.4 | B |
| Southbound | 11.4 | B | 11.6 | B | 11.6 | B | 11.9 | B |

The analysis summarized above shows that site-generated traffic will have minor impact on delay or operations at this intersection. No intersection improvements are required.

## (12) North Montana Avenue & Road Runner Drive

### Existing Conditions

North Montana Avenue is a four lane north/south minor arterial with alternative left turn bays. At the intersection with Road Runner Drive, North Montana Avenue has a left turn lane, a through lane, and a through/right lane in both the northbound and southbound directions. Road Runner Drive is an east/west local road with one travel lane in each direction and no turn lanes present at this intersection. Road Runner Drive intersects North Montana Avenue at a 4-way intersection with stop control on Road Runner Drive. At this intersection, the speed limits for North Montana Avenue and Road Runner Drive are 35 mph and 25 mph, respectively.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Two-way Stop Control Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 13.

Table 13: North Montana Avenue & Road Runner Drive – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound – Through | 11.8 | B | 12.1 | B | 15.1 | C | 16.1 | C |
| Westbound – Through | 17.7 | C | 18.9 | C | 97.1 | F | 112.7 | F |
| Northbound – Left | 9.9 | A | 10.1 | B | 9.7 | A | 9.9 | A |
| Southbound – Left | 8.3 | A | 8.3 | A | 10.8 | B | 10.9 | B |

The analysis summarized above shows that the future conditions of this intersection will have substandard LOS during PM peak hour operations, regardless of development construction in the westbound direction with a projected LOS F. Further analysis demonstrated that a restricted right turn only approach for the westbound leg would provide a good LOS and could reduce the potential for vehicle collisions at this intersection. However, it is unlikely the public and current stakeholders at this location would view this change positively. No intersection improvements are recommended at this time.

## 13 Custer Avenue & North Montana Avenue

### Existing Conditions

Custer Avenue is an east/west minor arterial with a left-turn lane, two through lanes, and a right-turn lane in the eastbound direction and two left-turn lanes, a through lane, and a right-turn lane in the westbound direction at the intersection with North Montana Avenue. North Montana Avenue is a north/south minor arterial with a left-turn lane, two through lanes, and a right-turn lane in the northbound direction and a left-turn lane, a through lane, and a through/right lane in the southbound direction at this intersection. North Montana Avenue intersects Custer Avenue at a full movement, 4-way intersection with uncoordinated traffic signal control. At this intersection, the speed limits for Custer Avenue and North Montana Avenue are 40 mph and 35 mph, respectively. The intersection layout and signal timing was recently updated with construction completed summer of 2024.

### Capacity Analysis

Capacity of this intersection was conducted using the 2035 no-build and full buildout traffic volumes derived earlier within this report and the aforementioned intersection layout. The HCS Streets Analysis tool was utilized to provide an objective comparison of the future conditions. The results of this analysis are summarized in Table 14.

Table 14: Custer Avenue & North Montana Avenue – Average Vehicle Delay & LOS

| Direction - Movement | AM Peak Hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|
| | No-Build | | Full Buildout | | No-Build | | Full Buildout | |
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Eastbound LT | 44.7 | D | 48.7 | D | 78.3 | E | 80.3 | F |
| Eastbound Thru | 27.9 | C | 30.9 | C | 54.5 | D | 55.6 | E |
| Eastbound RT | 7.0 | A | 6.4 | A | 3.4 | A | 3.4 | A |
| Westbound LT | 30.5 | C | 32.5 | C | 43.1 | D | 45.6 | D |
| Westbound Thru | 29.6 | C | 33.3 | C | 83.8 | F | 105.0 | F |
| Westbound RT | 18.2 | B | 19.2 | B | 26.0 | C | 26.5 | C |
| Northbound LT | 25.2 | C | 26.7 | C | 36.8 | D | 39.2 | D |
| Northbound Thru | 27.2 | C | 28.7 | C | 53.4 | D | 54.7 | D |
| Northbound RT | 16.5 | B | 15.0 | B | 11.4 | B | 11.2 | B |
| Southbound LT | 22.3 | C | 23.4 | C | 46.7 | D | 50.5 | D |
| Southbound Thru | 31.0 | C | 34.3 | C | 43.8 | D | 46.1 | D |
| Southbound RT | 31.2 | C | 34.5 | C | 44.1 | D | 46.4 | D |
| Overall Int. Delay | 26.0 | C | 28.2 | C | 49.0 | D | 53.3 | D |

The analysis summarized above shows that the future conditions of this intersection will have substandard LOS during PM peak hour operations regardless of development construction in the eastbound and wesbound movements. While the additional trips generated from the McHugh development does increase the delay at this intersection, it is a minor increase in delay. No intersection improvements are recommended.

# MDT Crash Data Analysis

The MDT Traffic and Safety Bureau provided crash data along McHugh Drive, Custer Avenue, and North Montana Avenue for the years of 2014-2023. The data review was limited to the summary data provided by MDT, as police reports were not reviewed. Analysis of the crash data was completed to identify areas of safety concern. The following discussion includes the analysis for each major corridor and intersection within the study area.

## Corridors

### Custer Avenue

Along the corridor of Custer Avenue, from North Montana Avenue to McHugh Drive, 337 collsions occurred over the 10-year period analyzed. There were 2 suspected serious injury crashes, 71 suspected/possible minor injury crashes, 258 property damage only crashes, and 6 crashes of unknown severity. Of the 337 reported crashes, 208 occurred at intersection-related locations, 124 occurred at non-junction locations, and 5 occurred at driveway or alley related locations. 274 crashes occurred during daylight hours while 63 occurred at night. The most prevalent crash type for this corridor was rear-end collisions with 229 crashes, and the second most prevalent was sideswipe colisions with 28 crashes.

### N Montana Avenue

Along the corridor of North Montana Avenue, from Custer Avenue to Wolf Road, 109 collisions occurred over the 10-year period analyzed. There were 4 suspected serious injury crashes, 29 suspected/possible minor injury crashes, 71 property damage only crashes, and 5 crashes of unknown severity. Of the 109 reported crashes, 60 occurred at intersection-related locations, 47 occurred at non-junction locations, and 2 occurred at driveway or alley related locations. 92 crashes occurred during daylight hours while 17 occurred at night. The most prevalent crash type for this corridor was rear-end collisions with 57 crashes, and the second most prevalent wassideswipe colisions with 17 crashes.

### McHugh Drive

Along the corridor of North Montana Avenue, from Custer Avenue to Wolf Road, 25 collissions occurred over the 10-year period analyzed. There were 2 suspected serious injury crashes, 6 suspected/possible minor injury crashes, and 17 property damage only crashes. Of the 25 reported crashes, 9 occurred at intersection-related locations, 15 occurred at non-junction locations, and 1 occurred at driveway or alley related locations. 18 crashes occurred during daylight hours while 7 occurred at night. The most prevalent crash type for this corridor was fixed object collisions with 9 crashes, and the second most prevalent was rear-end collisions with 3 crashes.

# Intersections

## 1 McHugh Drive & Mill Road

The intersection of McHugh Drive and Mill Road has been the location of 13 crashes over the 10 years of data analyzed. There were 7 possible/suspected minor injury crashes and 6 property damage only crashes. Eleven (11) of the total 13 crashes were right angle crashes. Six (6) of these right angle crashes had possible or suspected minor injuries. One (1) crash was a fixed object, property damage only crash and 1 was a bicyclist-involved collision with a suspected minor injury. All but the fixed object crash happened during daylight hours.

## 2 McHugh Drive & Yuhas Avenue/Lander Road

The intersection of McHugh Drive with Yuhas Avenue and Lander Road has been the site of 1 vehicle crash over the 10-year period analyzed. The collision was a left turn-opposite direction crash with a possible injury and it occurred during daylight hours on dry roads.

## 3 McHugh Drive & Wolf Road

There were no recorded collisions at the intersection of McHugh Drive and Wolf Road within the 10-year period analyzed.

## 5 McHugh Drive & Road Runner Drive

The intersection of McHugh Drive and Road Runner Drive has been the site of 4 crashes within the 10 years of data analyzed. One (1) incident was a motorcycle overturn/rollover crash with a suspected minor injury, 1 was a pedestrian involved fatality, and 2 crashes were property damage only (1 fixed object and 1 right angle). From the available data, it can be derived the pedestrian fatality occurred on a Friday evening on dry roads where a vehicle performing a northbound through movement collided with a pedestrian crossing McHugh Drive. There were no pedestrian crossing facilities (signage or markings) on McHugh Drive when the fatality occurred, nor are there any in place at time of writing. There is exisitng street lighting along Road Runner Drive, but none along McHugh Drive.

## 6 McHugh Drive & Benchmark Drive/Barney Street

The intersection of McHugh Drive with Benchmark Drive and Barney Street has been the location of 5 vehicle crashes over the 10-year period analyzed. Of the 5 crashes, 2 had possible injuries and 3 were property damage only. The 2 injury-related crashes were a rear-end crash and a sideswipe-same direction crash, both of which occurred in morning daylight hours.

## 7 Custer Avenue & McHugh Drive

75 collsisions were recorded at the intersection of West Custer Avenue and McHugh Drive. Of the 75 crashes, 14 were possible or suspected injury crashes, and the remaining 61 were property damage only or unknown.There were 53 rear-end crashes, 7 sideswipe crashes (5 same direction, 2 opposite direction), 3 left turn-opposite direction crashes, and the remaining 12 were right angle, right turn, fixed

and non-fixed object, head on, bicycle-related, and animal involved crashes. Of the 14 possible injury-related crashes, 10 were rear-end collisions during the afternoon and evening hours with only 2 occurring with wet or snowy road surface conditions.

### 8 North Montana Avenue & Wolf Road

The intersection of North Montana Avenue and Wolf Road has been the location of 3 crashes over the 10-year period analyzed in this study. Of the 3 crashes, 1 had a suspected major injury and 2 had suspected minor injuries. Each incident occurred on dry road conditions and no presence of driver impairment was recorded.

### 9 North Montana Avenue & Partridge Place

The intersection of North Montana Avenue and Partridge Place has been the location of 36 crashes over the 10 years of data analyzed. There were 19 rear-end collisions, 5 left turn-opposite direction collisions, 5 right angle collisions, 4 fixed object collisions, 1 right turn-opposite direction collision, 1 sideswipe-same direction collision, and 1 bicycle involved collision. Of the 36 total crashes, 2 were suspected serious injury crashes, 8 had suspected/possible minor injuries, and 26 were property damage only crashes. Of the possible injury-related collisions, 4 were rear-end crashes, 2 were right-angle collisions, and 2 were left turn-opposite direction collisions.

### 10 Road Runner Drive & Ptarmigan Lane

The intersection of Road Runner Drive and Ptarmigan Lane has been the location of 2 vehicular crashes in the 10-year analysis period, both of which were property damage only crashes. One (1) rear-end collision occurred during an active snow event on slippery road conditions. The other collision was a left turn-opposite direction crash involving a southbound left-turning vehicle.

### 11 Road Runner Drive & Dredge Drive

The intersection of Road Runner Drive and Dredge Drive has been the location of 9 crashes in the 10-year period analyzed, of which only 1 crash had a suspected minor injury and the remaining 8 were property damage only crashes. The most common collision type was sideswipe-same direction, with 3 of the 9 total crashes. 2 of the 3 sideswipe collisions were eastbound movements and collisions with a parked vehicle. The single, possible injury-related incident was a rollover incident that involved an impaired driver on a motorcycle.

### 12 North Montana Avenue & Road Runner Drive

The intersection of North Montana Avenue & Road Runner Drive has been the location of 79 crashes over the 10 years of data analyzed. Of the 79 collisions, 34 were right angle, 18 were rear-end, 18 were sideswipe crashes, 3 head on crashes, 2 fixed object collisions, 2 left turn collisions, and 2 were recorded as unknown. There was 1 suspected serious injury crash and 14 suspected minor injury crashes, of which 12 were categorized as right-angle collisions. The remaining 63 incidents were property damage only

crashes. The relative high frequency of right angle collisions is indicative of hazardous traffic operations at this intersection. It may be possible to mitigate this crash trend by restricting movements along the eastbound and westbound legs of this intersection. This is discussed further in the Average Vehicle Delay & Level of Service (LOS) section of this report.

### 13 Custer Avenue & N Montana Avenue

196 crashes occurred at the intersection of Custer Avenue and North Montana Avenue over the 10-year period analyzed. There was 1 suspected serious injury crash, 40 possible/suspected minor injury crashes, 148 property damage only crashes, and the remaining 7 were of unknown severity. There were 126 rear-end crashes, 24 sideswipe crashes, 16 right angle crashes, 12 conflicting left turn crashes, 4 bicycle-involved crashes, 3 pedestrian-involved crashes, 3 right turn crashes, 1 fixed object collision, 1 head on crash, and 6 unknown collision type crashes. Road conditions were dry for 142 crashes, snow-covered for 20 crashes, ice or frost-covered for 19 crashes, and wet for 15 crashes.

## Crash Data Conclusion

- **McHugh Drive & Road Runner Drive**
  The data indicates that while the overall crash frequency at this intersection is low, the pedestrian-involved fatality highlights a critical safety concern. The absence of pedestrian crossing facilities and roadway lighting along McHugh Drive may have contributed to the severity of the incident. To enhance pedestrian safety in this corridor, it is recommended that a marked pedestrain crossing be provided along McHugh as development continues to the west of McHugh Drive. This crossing should include, but not be limited to marked crosswalks, pedestrian crossing signage, and roadway lighting.

- **North Montana Avenue & Road Runner Drive**
  The relatively high frequency of right-angle collisions, especially those resulting in injuries, suggests that vehicles on Road Runner Drive may be experiencing difficulty identifying safe gaps in traffic when crossing or turning onto North Montana Avenue. As this intersection is two-way stop controlled in close proximity to the signalized intersection of Custer Avenue and North Montana Avenue possible safety enhancements could be explored such as restricting intersection movements to right-out only approaches in the eastbound and/or westbound directions.

# Adopted Transportation Plans

There are a few adopted transportation plans which apply to the McHugh Development study area. The Greater Helena Area Long Range Transportation Plan – 2014 Update (GHALRTP) Section 8.1.1 recommends the improvement of Custer Avenue (refered to within GHALRTP as MSN-1) to a five-lane urban arterial standard and Section 8.2 recommends the reconstruction of Mill Road from Green Meadow Drive to Montana Avenue for the purpose of reducing maintenance needs and to accommodate traffic increases (refered to within GHALRTP as CRN-11). There are no proposed completion dates for these recommended improvements within the plan. Currently, Lewis and Clark County is in the early stages of producing an updated long range transportation plan; however, at the time of TIS completion, there were no committed or recommended projects that would impact the study area. Additionally, the Greater Helena Area Community Transportation Safety Plan (GHACTSP) discusses major contributing factors to crashes and strategies to implement for the goal of reducing annual average crashes by 25% over a five-year period. No specific implementation of the GHACTSP is applicable to the study area discussed in this report.

# Multimodal Transportation

Multimodal transportation is an important consideration for the sustainable development of residential and commercial land. Along McHugh Drive there exists a concrete sidewalk from Custer Avenue up to the south extent of the McHugh Development and an asphalt, 10’ wide shared-use path beginning at Custer Avenue that ends just south of Yuhas Avenue and changes to a worn gravel path. Transit options in this area are limited, with Capital Transit being a one-way demand response service. The proposed development will incorporate pedestrian infrastructure for pedestrians and bicyclists designed and constructed to the City of Helena’s standards to the extent of the parcels within the development. Providing safe crossing locations across Mc Hugh Drive with features such as advanced warning signs and crosswalk pavement markings, would greatly reduce the risk involved with pedestrian crossing movements near this proposed development. The unmarked crosswalk on the south side of the intersection of McHugh Drive and Road Runner Drive could be a suitable location for pedestrian crossing facilities.

# Conclusions and Recommendations

Analyses of trip generation, trip distribution, and traffic operations reveal that the construction of McHugh Development will have minimal impact on the area transportation network. Considering the completed analyses, the adopted transportation plans, and the applicable corridor studies, the following are recommended as appropriate:

**McHugh Drive & Road Runner Drive:** Given the lack of pedestrian signage and the occurance of a pedestrian fatality in the last 10 years, adding pedestrian facilities, such as signage, pavement markings, and lighting, to the south side of the intersecftion of McHugh Drive and Road Runner Drive - where ADA compliant pedestrian ramps are currently in place - or at another location identified by the City of Helena, may reduce the risks involved with pedestrian crossings and provide a safer crossing for pedestrains on McHugh Drive.

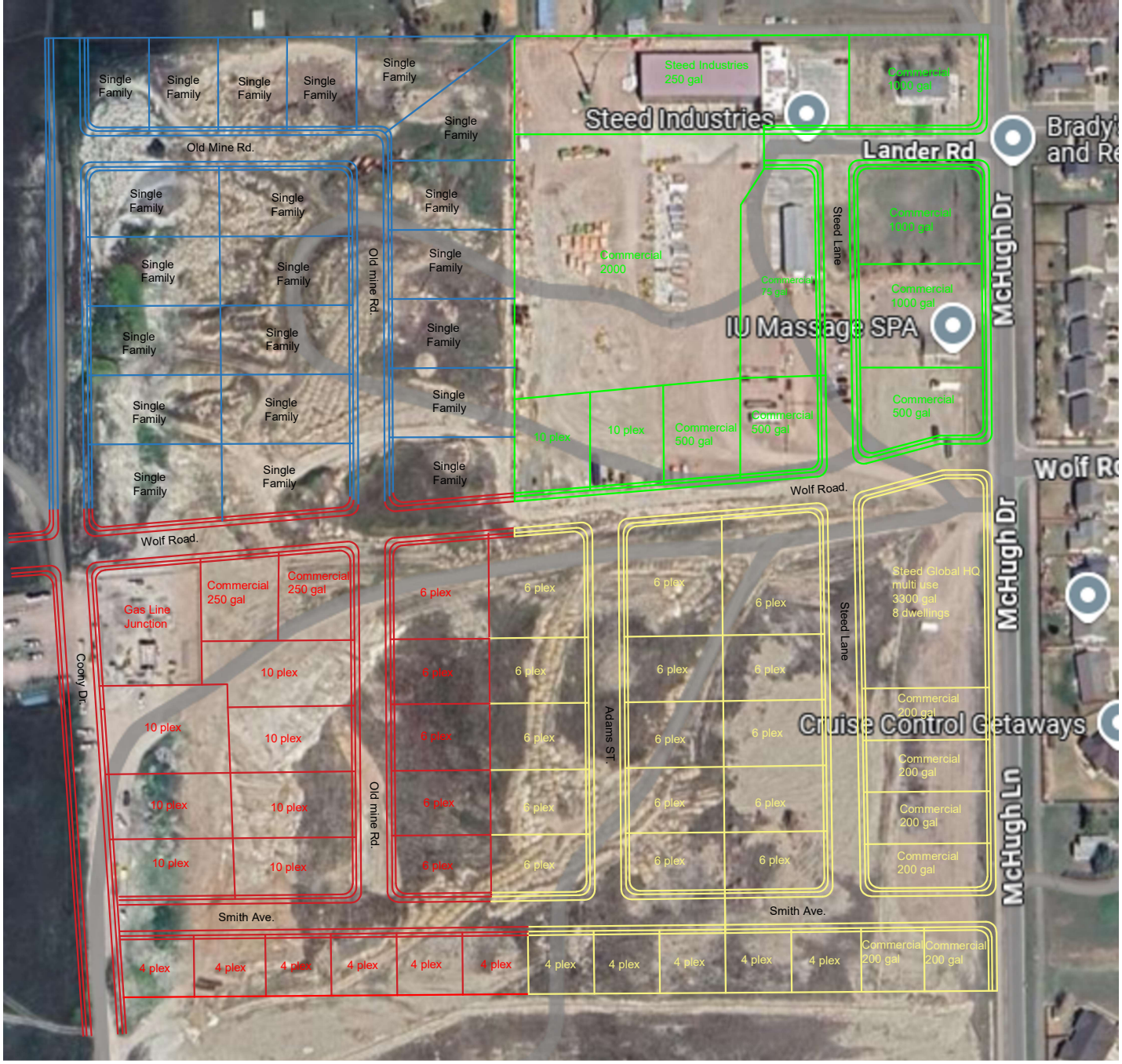
**Custer Avenue & McHugh Drive**: It is recommended to add exclusive right turn lanes on Custer Avenue in both the westbound and eastbound directions when reconstructing Custer Avenue per recommendations in the GHALRTP.

**North Montana Avenue & Road Runner Drive:** The intersection of North Montana Avenue and Road Runner Drive experiences a high frequency of right-angle crashes and is projected to operate at LOS F for westbound movements. This can be attributed to high traffic volumes creating conflicts for eastbound and westbound through and left-turn movements and its close proximity to the signalized intersection at North Montana Avenue and Custer Avenue. Mitigation of LOS deterioration at this intersection is possible through restricting movements for the east and/or west legs of the intersection. This solution may be unfavorable for the adjacent existing landowners and would require further study.

**North Montana Avenue & Custer Avenue:** The intersection of North Montana Avenue & Custer Avenue is projected to have substandard LOS in the projected future conditions due to typical traffic. While this intrection was recently improved, the intersection has a failing LOS in the 2035 no-build condition, without the additional volumes from this development. No intersection improvements are recommended at this time, but should be considered with the proposed reconstruction of Custer Avenue, as recommended in the GHALRTP.

# Appendix A
## Development Site Plan

Traffic Impact Study for
McHugh Development


Steed Industries
Steed Industries 250 gal
Commercial 1000 gal
Lander Rd
Old Mine Rd.
Old mine Rd.
Steed Lane
McHugh Dr
Commercial 2000
Commercial 75 gal
Commercial 1000 gal
IU Massage SPA
Commercial 1000 gal
Commercial 500 gal
10 plex
10 plex
Commercial 500 gal
Commercial 500 gal
Wolf Road.
Wolf Road.
Gas Line Junction
Commercial 250 gal
Commercial 250 gal
10 plex
Coony Dr.
Adams ST.
6 plex
Steed Global HQ multi use 3300 gal 8 dwellings
Commercial 200 gal
Cruise Control Getaways
Commercial 200 gal
Commercial 200 gal
Commercial 200 gal
McHugh Ln
Smith Ave.
Smith Ave.
4 plex
Commercial 200 gal
Commercial 200 gal
Single Family

# Appendix B
## On-site Count Data

Traffic Impact Study for
McHugh Development

**Turn Movement Counts**
W Custer Ave & McHugh Dr
Helena, MT
Thursday, January 9, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 22 | 1 | 34 | 5 | 74 | 5 | 3 | 1 | 3 | 13 | 58 | 1 | 220 | | |
| 7:15 AM | 7:30 AM | 28 | 8 | 40 | 0 | 81 | 13 | 5 | 2 | 4 | 15 | 112 | 8 | 316 | | |
| 7:30 AM | 7:45 AM | 41 | 15 | 47 | 10 | 61 | 9 | 8 | 3 | 6 | 14 | 109 | 6 | 329 | | |
| 7:45 AM | 8:00 AM | 41 | 23 | 44 | 16 | 110 | 8 | 9 | 3 | 19 | 29 | 139 | 28 | 469 | 1334 | |
| 8:00 AM | 8:15 AM | 40 | 39 | 35 | 21 | 101 | 15 | 22 | 22 | 38 | 23 | 93 | 27 | 476 | 1590 | |
| 8:15 AM | 8:30 AM | 18 | 40 | 17 | 16 | 87 | 18 | 21 | 20 | 30 | 24 | 116 | 48 | 455 | 1729 | |
| 8:30 AM | 8:45 AM | 41 | 9 | 18 | 6 | 75 | 20 | 25 | 17 | 25 | 16 | 82 | 12 | 346 | 1746 | <-- Peak Hour |
| 8:45 AM | 9:00 AM | 27 | 5 | 16 | 5 | 83 | 19 | 9 | 1 | 8 | 20 | 113 | 5 | 311 | 1588 | |
| | Peak Hour Volume | 140 | 117 | 143 | 63 | 359 | 50 | 60 | 48 | 93 | 90 | 457 | 109 | | | |

**PHF =** **0.92**

**Peak PM/Peak Afternoon Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 19 | 3 | 21 | 8 | 107 | 14 | 4 | 4 | 8 | 16 | 119 | 3 | 326 | | |
| 2:15 PM | 2:30 PM | 32 | 5 | 12 | 7 | 116 | 24 | 6 | 7 | 12 | 27 | 141 | 10 | 399 | | |
| 2:30 PM | 2:45 PM | 37 | 8 | 14 | 15 | 131 | 15 | 6 | 8 | 9 | 28 | 144 | 7 | 422 | | |
| 2:45 PM | 3:00 PM | 29 | 8 | 23 | 21 | 126 | 23 | 6 | 7 | 9 | 16 | 133 | 14 | 415 | 1562 | |
| 3:00 PM | 3:15 PM | 32 | 25 | 30 | 33 | 137 | 14 | 8 | 11 | 8 | 28 | 113 | 25 | 464 | 1700 | |
| 3:15 PM | 3:30 PM | 21 | 6 | 11 | 10 | 121 | 23 | 25 | 25 | 19 | 37 | 130 | 12 | 440 | 1741 | |
| 3:30 PM | 3:45 PM | 38 | 8 | 16 | 9 | 106 | 14 | 27 | 18 | 32 | 26 | 173 | 3 | 470 | 1789 | |
| 3:45 PM | 4:00 PM | 26 | 4 | 20 | 7 | 116 | 38 | 12 | 14 | 18 | 23 | 145 | 2 | 425 | 1799 | |
| 4:00 PM | 4:15 PM | 32 | 8 | 28 | 6 | 125 | 23 | 7 | 25 | 8 | 24 | 179 | 2 | 467 | 1802 | <-- Afternoon PH |
| 4:15 PM | 4:30 PM | 23 | 5 | 20 | 10 | 122 | 29 | 6 | 12 | 9 | 23 | 147 | 5 | 411 | 1773 | |
| 4:30 PM | 4:45 PM | 48 | 10 | 21 | 4 | 116 | 23 | 12 | 14 | 8 | 33 | 120 | 7 | 416 | 1719 | |
| 4:45 PM | 5:00 PM | 36 | 5 | 21 | 8 | 137 | 46 | 7 | 11 | 9 | 26 | 130 | 3 | 439 | 1733 | |
| 5:00 PM | 5:15 PM | 59 | 11 | 40 | 7 | 146 | 33 | 16 | 17 | 11 | 31 | 133 | 4 | 508 | 1774 | |
| 5:15 PM | 5:30 PM | 44 | 6 | 25 | 6 | 149 | 33 | 12 | 20 | 8 | 36 | 126 | 3 | 468 | 1831 | <-- Peak Hour |
| 5:30 PM | 5:45 PM | 41 | 5 | 18 | 4 | 135 | 27 | 9 | 9 | 4 | 36 | 119 | 6 | 413 | 1828 | |
| 5:45 PM | 6:00 PM | 33 | 5 | 6 | 7 | 130 | 20 | 7 | 9 | 7 | 22 | 111 | 4 | 361 | 1750 | |
| | Peak Hour Volume | 187 | 32 | 107 | 25 | 548 | 135 | 47 | 62 | 36 | 126 | 509 | 17 | | | |

**PHF =** **0.9**

**Turn Movement Counts**
W Custer Ave & N Montana Ave
Helena, MT
Thursday, January 9, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 22 | 49 | 12 | 11 | 53 | 35 | 7 | 14 | 5 | 6 | 35 | 26 | 275 | | |
| 7:15 AM | 7:30 AM | 0 | 109 | 7 | 1 | 89 | 34 | 12 | 10 | 5 | 9 | 0 | 90 | 366 | | |
| 7:30 AM | 7:45 AM | 1 | 138 | 12 | 5 | 63 | 38 | 14 | 4 | 7 | 20 | 0 | 109 | 411 | | |
| 7:45 AM | 8:00 AM | 45 | 143 | 19 | 34 | 88 | 77 | 24 | 35 | 13 | 16 | 87 | 57 | 638 | 1690 | |
| 8:00 AM | 8:15 AM | 37 | 81 | 22 | 35 | 95 | 38 | 21 | 51 | 13 | 21 | 102 | 26 | 542 | 1957 | |
| 8:15 AM | 8:30 AM | 46 | 75 | 19 | 43 | 99 | 38 | 19 | 50 | 17 | 20 | 106 | 26 | 558 | 2149 | |
| 8:30 AM | 8:45 AM | 47 | 110 | 15 | 35 | 71 | 39 | 16 | 45 | 18 | 23 | 85 | 22 | 526 | 2264 | <-- Peak Hour |
| 8:45 AM | 9:00 AM | 54 | 66 | 12 | 32 | 76 | 34 | 28 | 58 | 22 | 16 | 92 | 36 | 526 | 2152 | |
| | Peak Hour Volume | 129 | 437 | 72 | 117 | 345 | 191 | 78 | 140 | 50 | 77 | 295 | 218 | | | |

**PHF =** **0.89**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 59 | 80 | 23 | 48 | 83 | 38 | 30 | 87 | 43 | 34 | 108 | 31 | 664 | | |
| 2:15 PM | 2:30 PM | 65 | 88 | 26 | 60 | 93 | 49 | 38 | 107 | 49 | 44 | 95 | 31 | 745 | | |
| 2:30 PM | 2:45 PM | 59 | 103 | 29 | 59 | 95 | 46 | 31 | 96 | 48 | 32 | 115 | 26 | 739 | | |
| 2:45 PM | 3:00 PM | 66 | 78 | 28 | 64 | 98 | 38 | 47 | 121 | 50 | 39 | 111 | 35 | 775 | 2923 | |
| 3:00 PM | 3:15 PM | 66 | 81 | 25 | 69 | 113 | 52 | 33 | 99 | 53 | 26 | 116 | 21 | 754 | 3013 | |
| 3:15 PM | 3:30 PM | 53 | 78 | 26 | 37 | 103 | 61 | 29 | 114 | 56 | 29 | 107 | 21 | 714 | 2982 | |
| 3:30 PM | 3:45 PM | 52 | 77 | 17 | 55 | 95 | 68 | 37 | 114 | 54 | 41 | 139 | 45 | 794 | 3037 | |
| 3:45 PM | 4:00 PM | 69 | 100 | 12 | 49 | 108 | 58 | 45 | 114 | 33 | 38 | 144 | 35 | 805 | 3067 | |
| 4:00 PM | 4:15 PM | 59 | 100 | 25 | 53 | 101 | 70 | 36 | 133 | 50 | 47 | 155 | 28 | 857 | 3170 | |
| 4:15 PM | 4:30 PM | 62 | 89 | 16 | 46 | 112 | 52 | 42 | 133 | 57 | 45 | 114 | 23 | 791 | 3247 | |
| 4:30 PM | 4:45 PM | 70 | 95 | 27 | 51 | 102 | 64 | 38 | 104 | 67 | 38 | 120 | 29 | 805 | 3258 | |
| 4:45 PM | 5:00 PM | 60 | 73 | 22 | 43 | 121 | 79 | 61 | 132 | 40 | 33 | 109 | 34 | 807 | 3260 | |
| 5:00 PM | 5:15 PM | 65 | 107 | 25 | 53 | 125 | 88 | 50 | 128 | 36 | 42 | 154 | 35 | 908 | 3311 | |
| 5:15 PM | 5:30 PM | 63 | 83 | 22 | 52 | 123 | 75 | 29 | 141 | 50 | 39 | 128 | 20 | 825 | 3345 | <-- Peak Hour |
| 5:30 PM | 5:45 PM | 69 | 102 | 26 | 43 | 106 | 57 | 36 | 133 | 49 | 43 | 109 | 25 | 798 | 3338 | |
| 5:45 PM | 6:00 PM | 61 | 71 | 20 | 41 | 96 | 54 | 23 | 95 | 38 | 34 | 110 | 21 | 664 | 3195 | |
| | Peak Hour Volume | 258 | 358 | 96 | 199 | 471 | 306 | 178 | 505 | 193 | 152 | 511 | 118 | | | |

**PHF =** **0.92**

**Turn Movement Counts**
McHugh Dr & Benchmark Dr/Barney St
Helena, MT
Tuesday, January 7, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 1 | 47 | 0 | 5 | 0 | 0 | 2 | 12 | 1 | 1 | 0 | 8 | 77 | | |
| 7:15 AM | 7:30 AM | 0 | 55 | 1 | 6 | 0 | 0 | 2 | 20 | 1 | 1 | 1 | 3 | 90 | | |
| 7:30 AM | 7:45 AM | 0 | 68 | 0 | 8 | 0 | 1 | 5 | 23 | 2 | 0 | 0 | 9 | 116 | | |
| 7:45 AM | 8:00 AM | 0 | 73 | 1 | 8 | 0 | 0 | 8 | 20 | 4 | 0 | 0 | 2 | 116 | 399 | |
| 8:00 AM | 8:15 AM | 0 | 67 | 0 | 8 | 0 | 0 | 10 | 30 | 5 | 1 | 1 | 3 | 125 | 447 | |
| 8:15 AM | 8:30 AM | 0 | 46 | 2 | 7 | 1 | 0 | 16 | 29 | 3 | 0 | 1 | 5 | 110 | 467 | <-- Peak Hour |
| 8:30 AM | 8:45 AM | 0 | 30 | 0 | 2 | 1 | 0 | 10 | 43 | 5 | 0 | 0 | 12 | 103 | 454 | |
| 8:45 AM | 9:00 AM | 0 | 25 | 3 | 1 | 2 | 0 | 9 | 21 | 5 | 0 | 0 | 6 | 72 | 410 | |
| | Peak Hour Volume | 0 | 254 | 3 | 31 | 1 | 1 | 39 | 102 | 14 | 1 | 2 | 19 | | | |

**PHF =** **0.93**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 1 | 33 | 1 | 2 | 0 | 0 | 7 | 21 | 1 | 0 | 0 | 4 | 70 | | |
| 2:15 PM | 2:30 PM | 1 | 25 | 0 | 6 | 0 | 0 | 4 | 18 | 9 | 0 | 1 | 2 | 66 | | |
| 2:30 PM | 2:45 PM | 1 | 28 | 0 | 5 | 0 | 1 | 4 | 33 | 3 | 2 | 0 | 1 | 78 | | |
| 2:45 PM | 3:00 PM | 0 | 24 | 4 | 13 | 3 | 1 | 6 | 21 | 2 | 0 | 1 | 7 | 82 | 296 | |
| 3:00 PM | 3:15 PM | 0 | 41 | 1 | 8 | 2 | 2 | 4 | 39 | 3 | 3 | 1 | 5 | 109 | 335 | |
| 3:15 PM | 3:30 PM | 1 | 25 | 0 | 3 | 0 | 2 | 3 | 45 | 7 | 2 | 0 | 7 | 95 | 364 | |
| 3:30 PM | 3:45 PM | 0 | 29 | 3 | 13 | 1 | 0 | 12 | 46 | 12 | 2 | 1 | 5 | 124 | 410 | |
| 3:45 PM | 4:00 PM | 0 | 28 | 6 | 6 | 3 | 1 | 35 | 35 | 3 | 2 | 1 | 17 | 137 | 465 | |
| 4:00 PM | 4:15 PM | 1 | 23 | 0 | 12 | 4 | 3 | 8 | 40 | 6 | 2 | 4 | 15 | 118 | 474 | |
| 4:15 PM | 4:30 PM | 0 | 20 | 1 | 4 | 2 | 0 | 19 | 44 | 1 | 1 | 1 | 6 | 99 | 478 | |
| 4:30 PM | 4:45 PM | 1 | 36 | 2 | 7 | 3 | 1 | 15 | 42 | 6 | 1 | 0 | 13 | 127 | 481 | |
| 4:45 PM | 5:00 PM | 0 | 36 | 6 | 8 | 2 | 1 | 23 | 26 | 5 | 3 | 3 | 18 | 131 | 475 | |
| 5:00 PM | 5:15 PM | 0 | 37 | 2 | 11 | 0 | 2 | 13 | 49 | 5 | 1 | 3 | 33 | 156 | 513 | |
| 5:15 PM | 5:30 PM | 1 | 27 | 2 | 5 | 4 | 2 | 15 | 43 | 7 | 2 | 3 | 14 | 125 | 539 | <-- Peak Hour |
| 5:30 PM | 5:45 PM | 0 | 14 | 3 | 7 | 5 | 0 | 22 | 36 | 0 | 4 | 0 | 14 | 105 | 517 | |
| 5:45 PM | 6:00 PM | 0 | 21 | 9 | 5 | 4 | 1 | 18 | 31 | 6 | 8 | 4 | 21 | 128 | 514 | |
| | Peak Hour Volume | 2 | 136 | 12 | 31 | 9 | 6 | 66 | 160 | 23 | 7 | 9 | 78 | | | |

**PHF =** **0.86**

**Turn Movement Counts**
McHugh Dr & Road Runner St
Helena, MT
Tuesday, January 7, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 2 | 43 | 2 | 6 | 0 | 0 | 2 | 7 | 3 | 1 | 0 | 0 | 66 | | |
| 7:15 AM | 7:30 AM | 2 | 46 | 1 | 9 | 0 | 0 | 3 | 17 | 2 | 0 | 0 | 1 | 81 | | |
| 7:30 AM | 7:45 AM | 1 | 61 | 0 | 7 | 2 | 1 | 6 | 15 | 2 | 0 | 0 | 1 | 96 | | |
| 7:45 AM | 8:00 AM | 8 | 68 | 2 | 5 | 0 | 1 | 2 | 14 | 3 | 1 | 2 | 2 | 108 | 351 | |
| 8:00 AM | 8:15 AM | 3 | 55 | 5 | 8 | 1 | 1 | 0 | 19 | 14 | 2 | 1 | 2 | 111 | 396 | |
| 8:15 AM | 8:30 AM | 9 | 43 | 8 | 3 | 2 | 1 | 5 | 21 | 4 | 1 | 1 | 2 | 100 | 415 | <-- Peak Hour |
| 8:30 AM | 8:45 AM | 3 | 24 | 2 | 4 | 2 | 1 | 8 | 29 | 4 | 1 | 1 | 2 | 81 | 400 | |
| 8:45 AM | 9:00 AM | 3 | 27 | 6 | 0 | 0 | 2 | 7 | 15 | 1 | 0 | 1 | 2 | 64 | 356 | |
| | Peak Hour Volume | 21 | 227 | 15 | 23 | 5 | 4 | 13 | 69 | 23 | 4 | 4 | 7 | | | |

**PHF =** **0.93**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 1 | 22 | 1 | 6 | 0 | 2 | 4 | 15 | 2 | 1 | 0 | 6 | 60 | | |
| 2:15 PM | 2:30 PM | 4 | 21 | 1 | 3 | 0 | 3 | 1 | 12 | 3 | 0 | 0 | 2 | 50 | | |
| 2:30 PM | 2:45 PM | 0 | 22 | 0 | 4 | 0 | 3 | 3 | 28 | 7 | 0 | 0 | 3 | 70 | | |
| 2:45 PM | 3:00 PM | 0 | 21 | 2 | 3 | 0 | 3 | 2 | 18 | 2 | 3 | 0 | 4 | 58 | 238 | |
| 3:00 PM | 3:15 PM | 2 | 33 | 0 | 7 | 1 | 4 | 4 | 35 | 8 | 1 | 3 | 4 | 102 | 280 | |
| 3:15 PM | 3:30 PM | 0 | 19 | 1 | 4 | 0 | 1 | 3 | 38 | 8 | 0 | 0 | 2 | 76 | 306 | |
| 3:30 PM | 3:45 PM | 1 | 23 | 0 | 4 | 2 | 1 | 2 | 40 | 8 | 1 | 0 | 4 | 86 | 322 | |
| 3:45 PM | 4:00 PM | 3 | 29 | 1 | 3 | 0 | 2 | 2 | 30 | 6 | 2 | 1 | 1 | 80 | 344 | |
| 4:00 PM | 4:15 PM | 2 | 16 | 2 | 7 | 1 | 7 | 3 | 37 | 6 | 2 | 1 | 1 | 85 | 327 | |
| 4:15 PM | 4:30 PM | 5 | 14 | 5 | 4 | 3 | 4 | 0 | 39 | 5 | 0 | 1 | 3 | 83 | 334 | |
| 4:30 PM | 4:45 PM | 2 | 23 | 1 | 10 | 0 | 2 | 2 | 35 | 9 | 4 | 1 | 5 | 94 | 342 | |
| 4:45 PM | 5:00 PM | 0 | 30 | 0 | 11 | 0 | 4 | 0 | 23 | 6 | 1 | 2 | 1 | 78 | 340 | |
| 5:00 PM | 5:15 PM | 3 | 19 | 0 | 15 | 1 | 6 | 2 | 48 | 5 | 3 | 4 | 4 | 110 | 365 | |
| 5:15 PM | 5:30 PM | 3 | 24 | 1 | 4 | 1 | 6 | 1 | 42 | 5 | 3 | 3 | 2 | 95 | 377 | <-- Peak Hour |
| 5:30 PM | 5:45 PM | 2 | 12 | 1 | 5 | 2 | 6 | 1 | 32 | 5 | 3 | 3 | 2 | 74 | 357 | |
| 5:45 PM | 6:00 PM | 2 | 18 | 0 | 7 | 0 | 3 | 0 | 34 | 8 | 1 | 2 | 3 | 78 | 357 | |
| | Peak Hour Volume | 8 | 96 | 2 | 40 | 2 | 18 | 5 | 148 | 25 | 11 | 10 | 12 | | | |

**PHF =** **0.86**

**Turn Movement Counts**
McHugh Dr & Wolf Rd
Helena, MT
Tuesday, January 7, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 1 | 24 | 0 | 20 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 50 | | |
| 7:15 AM | 7:30 AM | 0 | 36 | 0 | 12 | 0 | 0 | 0 | 15 | 3 | 0 | 1 | 0 | 67 | | |
| 7:30 AM | 7:45 AM | 0 | 56 | 1 | 8 | 0 | 1 | 0 | 16 | 3 | 0 | 0 | 0 | 85 | | |
| 7:45 AM | 8:00 AM | 0 | 64 | 0 | 15 | 0 | 1 | 0 | 15 | 1 | 0 | 0 | 0 | 96 | 298 | |
| 8:00 AM | 8:15 AM | 1 | 45 | 0 | 18 | 2 | 0 | 0 | 18 | 4 | 0 | 0 | 0 | 88 | 336 | |
| 8:15 AM | 8:30 AM | 0 | 48 | 1 | 11 | 1 | 1 | 0 | 17 | 5 | 0 | 0 | 1 | 85 | 354 | <-- Peak Hour |
| 8:30 AM | 8:45 AM | 1 | 28 | 0 | 5 | 0 | 0 | 0 | 25 | 7 | 0 | 1 | 0 | 67 | 336 | |
| 8:45 AM | 9:00 AM | 0 | 28 | 0 | 3 | 0 | 1 | 0 | 14 | 3 | 0 | 0 | 0 | 49 | 289 | |
| | Peak Hour Volume | 1 | 213 | 2 | 52 | 3 | 3 | 0 | 66 | 13 | 0 | 0 | 1 | | | |

**PHF =** **0.92**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 0 | 22 | 0 | 2 | 0 | 2 | 0 | 15 | 4 | 0 | 0 | 0 | 45 | | |
| 2:15 PM | 2:30 PM | 0 | 22 | 0 | 3 | 0 | 1 | 0 | 12 | 3 | 0 | 0 | 0 | 41 | | |
| 2:30 PM | 2:45 PM | 2 | 20 | 0 | 4 | 0 | 0 | 0 | 21 | 10 | 1 | 0 | 0 | 58 | | |
| 2:45 PM | 3:00 PM | 0 | 17 | 0 | 7 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 46 | 190 | |
| 3:00 PM | 3:15 PM | 2 | 24 | 0 | 10 | 0 | 4 | 0 | 32 | 7 | 0 | 0 | 0 | 79 | 224 | |
| 3:15 PM | 3:30 PM | 1 | 7 | 0 | 7 | 0 | 1 | 0 | 29 | 10 | 0 | 0 | 0 | 55 | 238 | |
| 3:30 PM | 3:45 PM | 0 | 25 | 0 | 7 | 0 | 1 | 0 | 31 | 10 | 0 | 0 | 0 | 74 | 254 | |
| 3:45 PM | 4:00 PM | 1 | 23 | 0 | 5 | 0 | 3 | 1 | 30 | 3 | 0 | 0 | 1 | 67 | 275 | |
| 4:00 PM | 4:15 PM | 0 | 17 | 0 | 3 | 0 | 2 | 2 | 40 | 6 | 1 | 0 | 0 | 71 | 267 | |
| 4:15 PM | 4:30 PM | 2 | 21 | 0 | 3 | 0 | 3 | 0 | 39 | 5 | 0 | 1 | 1 | 75 | 287 | |
| 4:30 PM | 4:45 PM | 0 | 23 | 0 | 1 | 0 | 2 | 0 | 36 | 3 | 0 | 0 | 0 | 65 | 278 | |
| 4:45 PM | 5:00 PM | 0 | 27 | 0 | 4 | 1 | 0 | 0 | 25 | 5 | 0 | 0 | 1 | 63 | 274 | |
| 5:00 PM | 5:15 PM | 4 | 17 | 0 | 5 | 0 | 3 | 0 | 44 | 11 | 1 | 0 | 0 | 85 | 288 | |
| 5:15 PM | 5:30 PM | 2 | 20 | 1 | 8 | 0 | 2 | 0 | 39 | 11 | 0 | 0 | 0 | 83 | 296 | <-- Peak Hour |
| 5:30 PM | 5:45 PM | 1 | 18 | 0 | 1 | 0 | 1 | 0 | 32 | 9 | 0 | 0 | 0 | 62 | 293 | |
| 5:45 PM | 6:00 PM | 1 | 17 | 0 | 4 | 0 | 1 | 0 | 29 | 7 | 0 | 0 | 0 | 59 | 289 | |
| | Peak Hour Volume | 6 | 87 | 1 | 18 | 1 | 7 | 0 | 144 | 30 | 1 | 0 | 1 | | | |

**PHF =** **0.87**

**Turn Movement Counts**
McHugh Dr & Lander Rd/Yuhas Ave
Helena, MT
Tuesday, January 7, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 0 | 27 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 3 | 0 | 0 | 35 | | |
| 7:15 AM | 7:30 AM | 0 | 31 | 1 | 0 | 0 | 0 | 1 | 11 | 3 | 3 | 0 | 1 | 51 | | |
| 7:30 AM | 7:45 AM | 1 | 50 | 1 | 0 | 0 | 0 | 3 | 10 | 1 | 8 | 0 | 0 | 74 | | |
| 7:45 AM | 8:00 AM | 1 | 59 | 3 | 0 | 0 | 0 | 1 | 13 | 1 | 3 | 0 | 0 | 81 | 241 | |
| 8:00 AM | 8:15 AM | 0 | 43 | 0 | 0 | 0 | 0 | 1 | 17 | 1 | 5 | 0 | 0 | 67 | 273 | |
| 8:15 AM | 8:30 AM | 0 | 48 | 0 | 0 | 0 | 0 | 0 | 18 | 1 | 1 | 0 | 0 | 68 | 290 | <-- Peak Hour |
| 8:30 AM | 8:45 AM | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 24 | 1 | 3 | 0 | 0 | 54 | 270 | |
| 8:45 AM | 9:00 AM | 0 | 26 | 0 | 0 | 0 | 0 | 2 | 11 | 1 | 2 | 0 | 1 | 43 | 232 | |
| | Peak Hour Volume | 2 | 200 | 4 | 0 | 0 | 0 | 5 | 58 | 4 | 17 | 0 | 0 | | | |

**PHF =** **0.9**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 0 | 23 | 0 | 0 | 0 | 0 | 2 | 13 | 0 | 0 | 0 | 0 | 38 | | |
| 2:15 PM | 2:30 PM | 1 | 20 | 0 | 1 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 1 | 35 | | |
| 2:30 PM | 2:45 PM | 1 | 19 | 0 | 1 | 0 | 0 | 0 | 20 | 1 | 0 | 0 | 1 | 43 | | |
| 2:45 PM | 3:00 PM | 0 | 16 | 0 | 1 | 0 | 0 | 0 | 22 | 2 | 0 | 0 | 1 | 42 | 158 | |
| 3:00 PM | 3:15 PM | 0 | 19 | 1 | 5 | 0 | 0 | 1 | 31 | 4 | 0 | 0 | 2 | 63 | 183 | |
| 3:15 PM | 3:30 PM | 0 | 12 | 0 | 1 | 0 | 0 | 0 | 26 | 7 | 0 | 0 | 0 | 46 | 194 | |
| 3:30 PM | 3:45 PM | 0 | 24 | 0 | 1 | 0 | 0 | 0 | 29 | 1 | 0 | 0 | 0 | 55 | 206 | |
| 3:45 PM | 4:00 PM | 0 | 21 | 0 | 2 | 0 | 0 | 0 | 30 | 2 | 1 | 0 | 1 | 57 | 221 | |
| 4:00 PM | 4:15 PM | 0 | 15 | 1 | 1 | 0 | 0 | 2 | 41 | 0 | 0 | 0 | 1 | 61 | 219 | |
| 4:15 PM | 4:30 PM | 1 | 21 | 0 | 1 | 0 | 0 | 0 | 39 | 2 | 0 | 0 | 0 | 64 | 237 | |
| 4:30 PM | 4:45 PM | 0 | 21 | 0 | 1 | 0 | 2 | 1 | 35 | 3 | 1 | 0 | 3 | 67 | 249 | |
| 4:45 PM | 5:00 PM | 1 | 26 | 0 | 2 | 0 | 0 | 0 | 24 | 1 | 0 | 0 | 0 | 54 | 246 | |
| 5:00 PM | 5:15 PM | 0 | 15 | 1 | 1 | 0 | 0 | 1 | 44 | 4 | 2 | 0 | 3 | 71 | 256 | |
| 5:15 PM | 5:30 PM | 0 | 20 | 1 | 0 | 0 | 0 | 0 | 37 | 2 | 1 | 0 | 3 | 64 | 256 | <-- Peak Hour |
| 5:30 PM | 5:45 PM | 0 | 15 | 0 | 3 | 0 | 1 | 0 | 35 | 2 | 1 | 0 | 0 | 57 | 246 | |
| 5:45 PM | 6:00 PM | 0 | 16 | 0 | 2 | 0 | 1 | 0 | 27 | 4 | 2 | 0 | 0 | 52 | 244 | |
| | Peak Hour Volume | 1 | 82 | 2 | 4 | 0 | 2 | 2 | 140 | 10 | 4 | 0 | 9 | | | |

**PHF =** **0.9**

**Turn Movement Counts**
McHugh Dr & Mill Rd
Helena, MT
Tuesday, January 7, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 4 | 12 | 0 | 0 | 7 | 0 | 5 | 3 | 0 | 0 | 4 | 4 | 39 | | |
| 7:15 AM | 7:30 AM | 1 | 9 | 0 | 3 | 10 | 1 | 0 | 6 | 3 | 0 | 8 | 5 | 46 | | |
| 7:30 AM | 7:45 AM | 5 | 23 | 0 | 4 | 10 | 2 | 2 | 5 | 2 | 2 | 15 | 8 | 78 | | |
| 7:45 AM | 8:00 AM | 3 | 19 | 0 | 9 | 8 | 2 | 3 | 9 | 2 | 2 | 13 | 12 | 82 | 245 | |
| 8:00 AM | 8:15 AM | 1 | 13 | 1 | 6 | 11 | 2 | 3 | 8 | 1 | 3 | 8 | 7 | 64 | 270 | |
| 8:15 AM | 8:30 AM | 4 | 23 | 1 | 5 | 8 | 0 | 0 | 8 | 0 | 0 | 9 | 4 | 62 | 286 | <-- Peak Hour |
| 8:30 AM | 8:45 AM | 3 | 6 | 0 | 4 | 9 | 1 | 1 | 12 | 3 | 0 | 7 | 7 | 53 | 261 | |
| 8:45 AM | 9:00 AM | 2 | 13 | 2 | 0 | 4 | 3 | 5 | 5 | 1 | 1 | 8 | 7 | 51 | 230 | |
| | Peak Hour Volume | 13 | 78 | 2 | 24 | 37 | 6 | 8 | 30 | 5 | 7 | 45 | 31 | | | |

**PHF =** **0.87**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 1 | 12 | 0 | 0 | 4 | 4 | 4 | 2 | 3 | 0 | 8 | 2 | 40 | | |
| 2:15 PM | 2:30 PM | 5 | 6 | 0 | 3 | 14 | 2 | 3 | 12 | 1 | 0 | 5 | 5 | 56 | | |
| 2:30 PM | 2:45 PM | 1 | 9 | 1 | 0 | 6 | 3 | 2 | 9 | 1 | 0 | 12 | 4 | 48 | | |
| 2:45 PM | 3:00 PM | 2 | 6 | 0 | 2 | 6 | 0 | 3 | 15 | 0 | 0 | 4 | 1 | 39 | 183 | |
| 3:00 PM | 3:15 PM | 1 | 8 | 1 | 1 | 9 | 3 | 4 | 17 | 2 | 0 | 4 | 4 | 54 | 197 | |
| 3:15 PM | 3:30 PM | 1 | 5 | 2 | 2 | 17 | 3 | 4 | 13 | 3 | 0 | 17 | 4 | 71 | 212 | |
| 3:30 PM | 3:45 PM | 2 | 17 | 0 | 1 | 9 | 6 | 1 | 15 | 3 | 0 | 17 | 6 | 77 | 241 | |
| 3:45 PM | 4:00 PM | 3 | 7 | 2 | 2 | 8 | 8 | 4 | 19 | 2 | 0 | 10 | 3 | 68 | 270 | |
| 4:00 PM | 4:15 PM | 3 | 7 | 1 | 2 | 9 | 6 | 2 | 20 | 2 | 2 | 8 | 3 | 65 | 281 | |
| 4:15 PM | 4:30 PM | 3 | 9 | 1 | 3 | 5 | 10 | 6 | 17 | 4 | 0 | 8 | 4 | 70 | 280 | |
| 4:30 PM | 4:45 PM | 7 | 7 | 0 | 3 | 10 | 9 | 5 | 20 | 5 | 0 | 11 | 3 | 80 | 283 | |
| 4:45 PM | 5:00 PM | 4 | 9 | 1 | 4 | 17 | 10 | 5 | 26 | 0 | 0 | 11 | 3 | 90 | 305 | |
| 5:00 PM | 5:15 PM | 3 | 7 | 2 | 1 | 15 | 4 | 6 | 22 | 1 | 2 | 8 | 4 | 75 | 315 | |
| 5:15 PM | 5:30 PM | 2 | 8 | 2 | 4 | 13 | 8 | 5 | 22 | 4 | 0 | 7 | 5 | 80 | 325 | <-- Peak Hour |
| 5:30 PM | 5:45 PM | 1 | 6 | 0 | 1 | 17 | 9 | 7 | 22 | 1 | 0 | 8 | 3 | 75 | 320 | |
| 5:45 PM | 6:00 PM | 2 | 9 | 0 | 2 | 9 | 2 | 5 | 15 | 1 | 0 | 7 | 3 | 55 | 285 | |
| | Peak Hour Volume | 16 | 31 | 5 | 12 | 55 | 31 | 21 | 90 | 10 | 2 | 37 | 15 | | | |

**PHF =** **0.9**

**Turn Movement Counts**
N Montana Ave & Wolf Rd
Helena, MT
Wednesday, January 8, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 0 | 115 | 2 | 0 | 0 | 0 | 1 | 34 | 0 | 0 | 0 | 7 | 159 | | |
| 7:15 AM | 7:30 AM | 0 | 117 | 5 | 0 | 0 | 0 | 3 | 53 | 0 | 0 | 0 | 12 | 190 | | |
| 7:30 AM | 7:45 AM | 0 | 225 | 2 | 0 | 0 | 0 | 1 | 51 | 0 | 0 | 0 | 8 | 287 | | |
| 7:45 AM | 8:00 AM | 0 | 201 | 2 | 0 | 0 | 0 | 0 | 82 | 0 | 1 | 0 | 9 | 295 | 931 | |
| 8:00 AM | 8:15 AM | 0 | 155 | 5 | 0 | 0 | 0 | 0 | 90 | 0 | 1 | 0 | 6 | 257 | 1029 | |
| 8:15 AM | 8:30 AM | 0 | 147 | 4 | 0 | 0 | 0 | 5 | 58 | 0 | 0 | 0 | 8 | 222 | 1061 | <-- Peak Hour |
| 8:30 AM | 8:45 AM | 0 | 140 | 3 | 0 | 0 | 0 | 2 | 87 | 0 | 2 | 0 | 7 | 241 | 1015 | |
| 8:45 AM | 9:00 AM | 0 | 137 | 0 | 0 | 0 | 0 | 0 | 63 | 0 | 2 | 0 | 5 | 207 | 927 | |
| | Peak Hour Volume | 0 | 728 | 13 | 0 | 0 | 0 | 6 | 281 | 0 | 2 | 0 | 31 | | | |

**PHF =** **0.9**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 0 | 125 | 0 | 0 | 0 | 0 | 7 | 134 | 0 | 0 | 0 | 4 | 270 | | |
| 2:15 PM | 2:30 PM | 0 | 113 | 1 | 0 | 0 | 0 | 4 | 146 | 0 | 1 | 0 | 5 | 270 | | |
| 2:30 PM | 2:45 PM | 0 | 119 | 1 | 0 | 0 | 0 | 3 | 150 | 0 | 1 | 0 | 7 | 281 | | |
| 2:45 PM | 3:00 PM | 0 | 124 | 2 | 0 | 0 | 0 | 8 | 136 | 0 | 0 | 0 | 8 | 278 | 1099 | |
| 3:00 PM | 3:15 PM | 0 | 121 | 1 | 0 | 0 | 0 | 9 | 169 | 0 | 1 | 0 | 3 | 304 | 1133 | |
| 3:15 PM | 3:30 PM | 0 | 99 | 1 | 0 | 0 | 0 | 11 | 175 | 0 | 0 | 0 | 4 | 290 | 1153 | |
| 3:30 PM | 3:45 PM | 0 | 121 | 3 | 0 | 0 | 0 | 11 | 178 | 0 | 4 | 0 | 9 | 326 | 1198 | |
| 3:45 PM | 4:00 PM | 0 | 132 | 2 | 0 | 0 | 0 | 11 | 185 | 0 | 3 | 0 | 11 | 344 | 1264 | |
| 4:00 PM | 4:15 PM | 0 | 121 | 0 | 0 | 0 | 0 | 17 | 193 | 0 | 3 | 0 | 5 | 339 | 1299 | |
| 4:15 PM | 4:30 PM | 0 | 127 | 1 | 0 | 0 | 0 | 8 | 219 | 0 | 1 | 0 | 7 | 363 | 1372 | |
| 4:30 PM | 4:45 PM | 0 | 142 | 1 | 0 | 0 | 0 | 12 | 210 | 0 | 2 | 0 | 6 | 373 | 1419 | |
| 4:45 PM | 5:00 PM | 0 | 133 | 1 | 0 | 0 | 0 | 12 | 225 | 0 | 0 | 0 | 11 | 382 | 1457 | |
| 5:00 PM | 5:15 PM | 0 | 119 | 0 | 0 | 0 | 0 | 17 | 244 | 0 | 2 | 0 | 3 | 385 | 1503 | |
| 5:15 PM | 5:30 PM | 0 | 111 | 2 | 0 | 0 | 0 | 16 | 232 | 0 | 1 | 0 | 5 | 367 | 1507 | <-- Peak Hour |
| 5:30 PM | 5:45 PM | 0 | 112 | 1 | 0 | 0 | 0 | 14 | 209 | 0 | 2 | 0 | 9 | 347 | 1481 | |
| 5:45 PM | 6:00 PM | 0 | 101 | 3 | 0 | 0 | 0 | 19 | 165 | 0 | 2 | 0 | 15 | 305 | 1404 | |
| | Peak Hour Volume | 0 | 505 | 4 | 0 | 0 | 0 | 57 | 911 | 0 | 5 | 0 | 25 | | | |

**PHF =** **0.98**

**Turn Movement Counts**
N Montana Ave & Partridge Pl
Helena, MT
Wednesday, January 8, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 0 | 105 | 2 | 0 | 0 | 0 | 5 | 31 | 0 | 0 | 1 | 2 | 146 | | |
| 7:15 AM | 7:30 AM | 0 | 114 | 1 | 0 | 0 | 0 | 12 | 53 | 0 | 0 | 0 | 4 | 184 | | |
| 7:30 AM | 7:45 AM | 1 | 181 | 5 | 0 | 1 | 0 | 7 | 43 | 1 | 2 | 1 | 8 | 250 | | |
| 7:45 AM | 8:00 AM | 1 | 177 | 3 | 2 | 2 | 0 | 11 | 74 | 2 | 2 | 1 | 6 | 281 | 861 | |
| 8:00 AM | 8:15 AM | 4 | 138 | 10 | 1 | 0 | 0 | 9 | 75 | 7 | 5 | 1 | 10 | 260 | 975 | |
| 8:15 AM | 8:30 AM | 4 | 122 | 10 | 5 | 2 | 4 | 16 | 47 | 4 | 3 | 1 | 10 | 228 | 1019 | <-- Peak Hour |
| 8:30 AM | 8:45 AM | 4 | 104 | 6 | 10 | 3 | 1 | 10 | 67 | 5 | 5 | 3 | 9 | 227 | 996 | |
| 8:45 AM | 9:00 AM | 1 | 115 | 10 | 4 | 1 | 2 | 14 | 53 | 9 | 4 | 3 | 12 | 228 | 943 | |
| | Peak Hour Volume | 10 | 618 | 28 | 8 | 5 | 4 | 43 | 239 | 14 | 12 | 4 | 34 | | | |

**PHF =** **0.91**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 5 | 97 | 6 | 22 | 8 | 9 | 21 | 95 | 17 | 10 | 8 | 21 | 319 | | |
| 2:15 PM | 2:30 PM | 4 | 106 | 9 | 33 | 4 | 10 | 34 | 100 | 25 | 10 | 5 | 20 | 360 | | |
| 2:30 PM | 2:45 PM | 4 | 103 | 7 | 28 | 4 | 11 | 15 | 120 | 23 | 13 | 12 | 26 | 366 | | |
| 2:45 PM | 3:00 PM | 3 | 101 | 8 | 33 | 4 | 6 | 25 | 100 | 19 | 15 | 3 | 12 | 329 | 1374 | |
| 3:00 PM | 3:15 PM | 5 | 107 | 10 | 28 | 5 | 10 | 24 | 124 | 23 | 16 | 5 | 20 | 377 | 1432 | |
| 3:15 PM | 3:30 PM | 8 | 82 | 7 | 28 | 1 | 10 | 12 | 143 | 19 | 18 | 6 | 21 | 355 | 1427 | |
| 3:30 PM | 3:45 PM | 3 | 98 | 5 | 26 | 5 | 12 | 17 | 148 | 17 | 12 | 3 | 23 | 369 | 1430 | |
| 3:45 PM | 4:00 PM | 9 | 108 | 11 | 23 | 6 | 7 | 15 | 155 | 21 | 8 | 7 | 27 | 397 | 1498 | |
| 4:00 PM | 4:15 PM | 12 | 109 | 12 | 25 | 12 | 12 | 10 | 160 | 31 | 21 | 7 | 22 | 433 | 1554 | |
| 4:15 PM | 4:30 PM | 7 | 111 | 7 | 34 | 8 | 14 | 14 | 162 | 18 | 20 | 8 | 17 | 420 | 1619 | |
| 4:30 PM | 4:45 PM | 5 | 110 | 8 | 36 | 7 | 17 | 18 | 164 | 18 | 14 | 12 | 16 | 425 | 1675 | |
| 4:45 PM | 5:00 PM | 7 | 115 | 6 | 24 | 4 | 10 | 14 | 169 | 21 | 23 | 10 | 20 | 423 | 1701 | <-- Peak Hour |
| 5:00 PM | 5:15 PM | 4 | 97 | 3 | 35 | 11 | 15 | 16 | 185 | 11 | 25 | 5 | 24 | 431 | 1699 | |
| 5:15 PM | 5:30 PM | 6 | 104 | 5 | 18 | 5 | 14 | 12 | 178 | 17 | 21 | 13 | 19 | 412 | 1691 | |
| 5:30 PM | 5:45 PM | 12 | 93 | 4 | 23 | 5 | 9 | 14 | 165 | 19 | 18 | 3 | 18 | 383 | 1649 | |
| 5:45 PM | 6:00 PM | 2 | 93 | 5 | 31 | 2 | 13 | 6 | 125 | 19 | 16 | 4 | 13 | 329 | 1555 | |
| | Peak Hour Volume | 22 | 426 | 22 | 113 | 27 | 56 | 60 | 696 | 67 | 83 | 40 | 79 | | | |

**PHF =** **0.98**

**Turn Movement Counts**
N Montana Ave & Road Runner St
Helena, MT
Wednesday, January 8, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 1 | 106 | 0 | 2 | 0 | 1 | 4 | 35 | 1 | 1 | 0 | 10 | 161 | | |
| 7:15 AM | 7:30 AM | 2 | 109 | 1 | 1 | 0 | 0 | 9 | 63 | 1 | 0 | 0 | 11 | 197 | | |
| 7:30 AM | 7:45 AM | 5 | 173 | 1 | 0 | 0 | 1 | 7 | 51 | 9 | 0 | 0 | 16 | 263 | | |
| 7:45 AM | 8:00 AM | 1 | 180 | 1 | 1 | 0 | 1 | 19 | 100 | 4 | 0 | 0 | 13 | 320 | 941 | |
| 8:00 AM | 8:15 AM | 10 | 139 | 3 | 0 | 3 | 3 | 17 | 91 | 5 | 0 | 0 | 18 | 289 | 1069 | |
| 8:15 AM | 8:30 AM | 4 | 125 | 2 | 0 | 0 | 3 | 17 | 71 | 5 | 0 | 0 | 7 | 234 | 1106 | <-- Peak Hour |
| 8:30 AM | 8:45 AM | 4 | 120 | 1 | 0 | 0 | 3 | 14 | 73 | 5 | 0 | 0 | 7 | 227 | 1070 | |
| 8:45 AM | 9:00 AM | 2 | 125 | 3 | 1 | 0 | 3 | 25 | 75 | 7 | 0 | 0 | 12 | 253 | 1003 | |
| | Peak Hour Volume | 20 | 617 | 7 | 1 | 3 | 8 | 60 | 313 | 23 | 0 | 0 | 54 | | | |

**PHF =** **0.86**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 5 | 134 | 3 | 7 | 1 | 11 | 17 | 123 | 19 | 1 | 0 | 31 | 352 | | |
| 2:15 PM | 2:30 PM | 5 | 144 | 1 | 1 | 0 | 6 | 31 | 160 | 12 | 0 | 1 | 15 | 376 | | |
| 2:30 PM | 2:45 PM | 12 | 147 | 4 | 6 | 0 | 4 | 26 | 152 | 26 | 0 | 3 | 26 | 406 | | |
| 2:45 PM | 3:00 PM | 2 | 141 | 4 | 2 | 2 | 6 | 17 | 156 | 14 | 0 | 0 | 22 | 366 | 1500 | |
| 3:00 PM | 3:15 PM | 4 | 147 | 2 | 3 | 2 | 2 | 20 | 155 | 24 | 0 | 0 | 17 | 376 | 1524 | |
| 3:15 PM | 3:30 PM | 3 | 124 | 2 | 2 | 2 | 2 | 23 | 169 | 20 | 0 | 1 | 26 | 374 | 1522 | |
| 3:30 PM | 3:45 PM | 6 | 140 | 1 | 1 | 0 | 7 | 15 | 183 | 33 | 0 | 1 | 34 | 421 | 1537 | |
| 3:45 PM | 4:00 PM | 10 | 142 | 4 | 3 | 0 | 10 | 31 | 184 | 16 | 0 | 1 | 36 | 437 | 1608 | |
| 4:00 PM | 4:15 PM | 10 | 149 | 2 | 1 | 0 | 11 | 24 | 197 | 20 | 0 | 1 | 30 | 445 | 1677 | |
| 4:15 PM | 4:30 PM | 9 | 154 | 3 | 4 | 1 | 8 | 25 | 196 | 25 | 1 | 0 | 24 | 450 | 1753 | |
| 4:30 PM | 4:45 PM | 10 | 143 | 7 | 1 | 3 | 8 | 34 | 186 | 29 | 0 | 0 | 27 | 448 | 1780 | |
| 4:45 PM | 5:00 PM | 16 | 135 | 7 | 3 | 2 | 3 | 37 | 199 | 24 | 0 | 0 | 23 | 449 | 1792 | |
| 5:00 PM | 5:15 PM | 8 | 142 | 6 | 3 | 3 | 11 | 27 | 216 | 16 | 1 | 1 | 37 | 471 | 1818 | <-- Peak Hour |
| 5:15 PM | 5:30 PM | 12 | 122 | 9 | 0 | 3 | 7 | 31 | 190 | 27 | 0 | 1 | 44 | 446 | 1814 | |
| 5:30 PM | 5:45 PM | 12 | 120 | 2 | 3 | 1 | 9 | 34 | 177 | 24 | 0 | 0 | 25 | 407 | 1773 | |
| 5:45 PM | 6:00 PM | 6 | 123 | 7 | 4 | 0 | 9 | 37 | 134 | 18 | 6 | 1 | 22 | 367 | 1691 | |
| | Peak Hour Volume | 46 | 542 | 29 | 7 | 11 | 29 | 129 | 791 | 96 | 1 | 2 | 131 | | | |

**PHF =** **0.96**

**Turn Movement Counts**
Road Runner Dr & Dredge Dr
Helena, MT
Thursday, January 9, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 0 | 2 | 0 | 18 | 8 | 0 | 2 | 3 | 2 | 0 | 9 | 2 | 46 | | |
| 7:15 AM | 7:30 AM | 0 | 2 | 0 | 8 | 10 | 2 | 4 | 9 | 4 | 0 | 6 | 3 | 48 | | |
| 7:30 AM | 7:45 AM | 1 | 3 | 0 | 13 | 3 | 1 | 9 | 28 | 3 | 1 | 11 | 4 | 77 | | |
| 7:45 AM | 8:00 AM | 1 | 12 | 1 | 23 | 12 | 6 | 9 | 9 | 1 | 0 | 12 | 7 | 93 | 264 | |
| 8:00 AM | 8:15 AM | 1 | 5 | 0 | 3 | 15 | 3 | 5 | 9 | 2 | 0 | 4 | 3 | 50 | 268 | |
| 8:15 AM | 8:30 AM | 0 | 4 | 0 | 3 | 5 | 7 | 8 | 10 | 3 | 0 | 8 | 7 | 55 | 275 | <-- Peak Hour |
| 8:30 AM | 8:45 AM | 1 | 2 | 1 | 2 | 11 | 3 | 6 | 13 | 4 | 0 | 10 | 10 | 63 | 261 | |
| 8:45 AM | 9:00 AM | 3 | 1 | 0 | 0 | 9 | 5 | 4 | 10 | 2 | 1 | 11 | 3 | 49 | 217 | |
| | Peak Hour Volume | 3 | 24 | 1 | 42 | 35 | 17 | 31 | 56 | 9 | 1 | 35 | 21 | | | |

**PHF =** **0.74**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 1 | 10 | 0 | 2 | 9 | 2 | 4 | 13 | 8 | 0 | 5 | 7 | 61 | | |
| 2:15 PM | 2:30 PM | 6 | 10 | 0 | 4 | 8 | 5 | 8 | 20 | 3 | 0 | 8 | 4 | 76 | | |
| 2:30 PM | 2:45 PM | 3 | 8 | 1 | 4 | 4 | 3 | 10 | 12 | 3 | 0 | 6 | 5 | 59 | | |
| 2:45 PM | 3:00 PM | 7 | 10 | 0 | 4 | 10 | 2 | 8 | 14 | 3 | 1 | 11 | 2 | 72 | 268 | |
| 3:00 PM | 3:15 PM | 4 | 12 | 1 | 1 | 5 | 4 | 6 | 13 | 1 | 0 | 6 | 4 | 57 | 264 | |
| 3:15 PM | 3:30 PM | 4 | 14 | 1 | 4 | 14 | 7 | 4 | 10 | 6 | 0 | 5 | 3 | 72 | 260 | |
| 3:30 PM | 3:45 PM | 7 | 10 | 0 | 4 | 11 | 9 | 12 | 18 | 1 | 0 | 11 | 7 | 90 | 291 | |
| 3:45 PM | 4:00 PM | 11 | 9 | 1 | 3 | 5 | 7 | 6 | 18 | 4 | 0 | 8 | 5 | 77 | 296 | |
| 4:00 PM | 4:15 PM | 7 | 12 | 1 | 4 | 15 | 2 | 8 | 10 | 3 | 0 | 7 | 0 | 69 | 308 | |
| 4:15 PM | 4:30 PM | 7 | 7 | 0 | 2 | 11 | 3 | 6 | 20 | 6 | 0 | 9 | 3 | 74 | 310 | |
| 4:30 PM | 4:45 PM | 2 | 4 | 0 | 4 | 11 | 2 | 8 | 12 | 3 | 0 | 15 | 4 | 65 | 285 | |
| 4:45 PM | 5:00 PM | 4 | 12 | 0 | 7 | 15 | 4 | 6 | 17 | 4 | 2 | 12 | 6 | 89 | 297 | |
| 5:00 PM | 5:15 PM | 4 | 14 | 5 | 10 | 20 | 1 | 7 | 13 | 8 | 0 | 18 | 5 | 105 | 333 | |
| 5:15 PM | 5:30 PM | 3 | 4 | 1 | 9 | 11 | 4 | 6 | 19 | 6 | 0 | 12 | 3 | 78 | 337 | |
| 5:30 PM | 5:45 PM | 3 | 6 | 0 | 1 | 13 | 3 | 4 | 18 | 7 | 0 | 10 | 6 | 71 | 343 | <-- Peak Hour |
| 5:45 PM | 6:00 PM | 3 | 5 | 1 | 5 | 15 | 4 | 8 | 8 | 12 | 1 | 9 | 2 | 73 | 327 | |
| | Peak Hour Volume | 13 | 34 | 6 | 30 | 57 | 11 | 27 | 61 | 21 | 2 | 57 | 18 | | | |

**PHF =** **0.82**

**Turn Movement Counts**
Ptarmigan Ln & Road Runner Dr
Helena, MT
Wednesday, January 8, 2025

$$PHF = \frac{V}{V_{15} * 4}$$

**Peak AM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 7:00 AM | 7:15 AM | 0 | 1 | 0 | 3 | 5 | 1 | 0 | 3 | 3 | 1 | 6 | 1 | 24 | | |
| 7:15 AM | 7:30 AM | 1 | 2 | 0 | 2 | 10 | 1 | 0 | 1 | 7 | 1 | 7 | 1 | 33 | | |
| 7:30 AM | 7:45 AM | 1 | 3 | 2 | 0 | 2 | 1 | 0 | 2 | 6 | 1 | 16 | 1 | 35 | | |
| 7:45 AM | 8:00 AM | 1 | 3 | 1 | 1 | 4 | 2 | 2 | 7 | 5 | 5 | 10 | 0 | 41 | 133 | |
| 8:00 AM | 8:15 AM | 0 | 5 | 2 | 3 | 10 | 4 | 1 | 2 | 6 | 3 | 9 | 0 | 45 | 154 | <-- Peak Hour |
| 8:15 AM | 8:30 AM | 1 | 2 | 3 | 6 | 6 | 1 | 0 | 2 | 2 | 4 | 2 | 0 | 29 | 150 | |
| 8:30 AM | 8:45 AM | 1 | 6 | 1 | 4 | 4 | 7 | 0 | 2 | 6 | 1 | 1 | 0 | 33 | 148 | |
| 8:45 AM | 9:00 AM | 3 | 2 | 2 | 3 | 9 | 3 | 1 | 4 | 0 | 3 | 5 | 0 | 35 | 142 | |
| | Peak Hour Volume | 3 | 13 | 8 | 10 | 22 | 8 | 3 | 13 | 19 | 13 | 37 | 1 | | | |

**PHF =** **0.79**

**Peak PM Period**

| | | Southbound | | | Westbound | | | Northbound | | | Eastbound | | | Interval | Hourly | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Total | Total | |
| 2:00 PM | 2:15 PM | 3 | 3 | 5 | 1 | 8 | 2 | 0 | 4 | 1 | 3 | 4 | 0 | 34 | | |
| 2:15 PM | 2:30 PM | 6 | 8 | 3 | 7 | 6 | 3 | 1 | 1 | 2 | 2 | 4 | 0 | 43 | | |
| 2:30 PM | 2:45 PM | 6 | 5 | 2 | 8 | 8 | 5 | 0 | 3 | 6 | 6 | 1 | 1 | 51 | | |
| 2:45 PM | 3:00 PM | 4 | 7 | 4 | 7 | 11 | 1 | 2 | 6 | 8 | 2 | 5 | 1 | 58 | 186 | |
| 3:00 PM | 3:15 PM | 9 | 12 | 6 | 3 | 6 | 3 | 2 | 4 | 1 | 3 | 4 | 1 | 54 | 206 | |
| 3:15 PM | 3:30 PM | 2 | 7 | 3 | 4 | 10 | 1 | 1 | 7 | 4 | 8 | 3 | 1 | 51 | 214 | |
| 3:30 PM | 3:45 PM | 10 | 5 | 1 | 4 | 11 | 3 | 0 | 8 | 6 | 4 | 11 | 2 | 65 | 228 | |
| 3:45 PM | 4:00 PM | 4 | 10 | 5 | 3 | 7 | 3 | 0 | 4 | 6 | 6 | 5 | 1 | 54 | 224 | |
| 4:00 PM | 4:15 PM | 8 | 6 | 5 | 7 | 12 | 0 | 0 | 11 | 3 | 4 | 7 | 0 | 63 | 233 | |
| 4:15 PM | 4:30 PM | 2 | 7 | 5 | 5 | 6 | 1 | 0 | 4 | 4 | 6 | 5 | 0 | 45 | 227 | |
| 4:30 PM | 4:45 PM | 4 | 10 | 7 | 5 | 9 | 2 | 0 | 3 | 1 | 2 | 6 | 0 | 49 | 211 | |
| 4:45 PM | 5:00 PM | 2 | 4 | 1 | 13 | 14 | 4 | 1 | 5 | 11 | 6 | 2 | 1 | 64 | 221 | |
| 5:00 PM | 5:15 PM | 3 | 4 | 7 | 12 | 13 | 4 | 0 | 7 | 4 | 8 | 10 | 1 | 73 | 231 | |
| 5:15 PM | 5:30 PM | 3 | 6 | 7 | 6 | 14 | 1 | 0 | 6 | 7 | 5 | 3 | 0 | 58 | 244 | |
| 5:30 PM | 5:45 PM | 5 | 8 | 3 | 5 | 9 | 1 | 1 | 6 | 6 | 5 | 6 | 0 | 55 | 250 | <-- Peak Hour |
| 5:45 PM | 6:00 PM | 1 | 5 | 2 | 7 | 8 | 0 | 1 | 2 | 1 | 2 | 5 | 1 | 35 | 221 | |
| | Peak Hour Volume | 12 | 24 | 22 | 36 | 50 | 11 | 1 | 21 | 23 | 21 | 21 | 2 | | | |

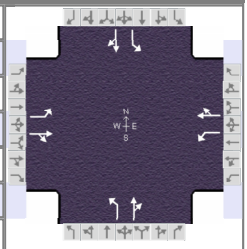
**PHF =** **0.86**

# Appendix C
## HCS Analysis Reports

Traffic Impact Study for
McHugh Development

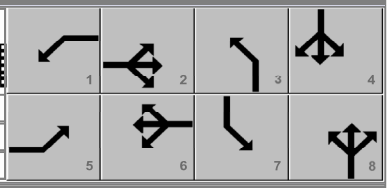
# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 6, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | AM No-Build | PHF | 0.92 |
| Urban Street | W Custer Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | W Custer Ave & McHug… | File Name | AAMN.xus | | |
| Project Description | AM No-Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 99 | 505 | 120 | 70 | 397 | 55 | 66 | 53 | 103 | 155 | 129 | 158 |

| Signal Information | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cycle, s | 80.4 | Reference Phase | 2 | | | | | | | | | |
| Offset, s | 0 | Reference Point | End | Green | 4.1 | 0.5 | 35.0 | 4.0 | 0.1 | 13.8 | | |
| Uncoordinated | Yes | Simult. Gap E/W | On | Yellow | 3.0 | 0.0 | 4.0 | 3.0 | 3.0 | 3.0 | | |
| Force Mode | Fixed | Simult. Gap N/S | On | Red | 1.0 | 0.0 | 2.0 | 1.0 | 1.0 | 2.0 | | |



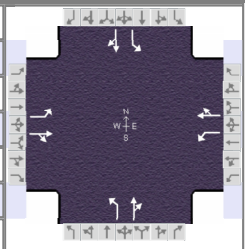

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | 5 | 2 | 1 | 6 | 3 | 8 | 7 | 4 |
| Case Number | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 |
| Phase Duration, s | 8.5 | 41.5 | 8.1 | 41.0 | 8.0 | 18.8 | 12.1 | 22.9 |
| Change Period, ( $Y+R_c$ ), s | 4.0 | 6.0 | 4.0 | 6.0 | 4.0 | 5.0 | 4.0 | 5.0 |
| Max Allow Headway ( *MAH* ), s | 4.1 | 4.1 | 4.1 | 4.1 | 4.3 | 3.9 | 4.3 | 3.9 |
| Queue Clearance Time ( $g_s$ ), s | 4.6 | 29.4 | 3.9 | 18.9 | 4.6 | 9.6 | 8.0 | 16.3 |
| Green Extension Time ( $g_e$ ), s | 0.2 | 2.5 | 0.1 | 4.6 | 0.1 | 1.4 | 0.3 | 1.1 |
| Phase Call Probability | 0.91 | 1.00 | 0.82 | 1.00 | 0.80 | 1.00 | 0.98 | 1.00 |
| Max Out Probability | 0.00 | 0.80 | 0.00 | 0.16 | 0.00 | 0.01 | 0.13 | 0.12 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | 108 | 679 | | 76 | 491 | | 72 | 170 | | 168 | 312 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1767 | 1793 | | 1767 | 1813 | | 1767 | 1658 | | 1767 | 1672 | |
| Queue Service Time ( $g_s$ ), s | 2.6 | 27.4 | | 1.9 | 16.9 | | 2.6 | 7.6 | | 6.0 | 14.3 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | 2.6 | 27.4 | | 1.9 | 16.9 | | 2.6 | 7.6 | | 6.0 | 14.3 | |
| Green Ratio ( *g/C* ) | 0.49 | 0.44 | | 0.49 | 0.44 | | 0.22 | 0.17 | | 0.30 | 0.22 | |
| Capacity ( *c* ), veh/h | 392 | 791 | | 236 | 789 | | 197 | 284 | | 360 | 371 | |
| Volume-to-Capacity Ratio ( *X* ) | 0.275 | 0.859 | | 0.323 | 0.622 | | 0.363 | 0.596 | | 0.468 | 0.840 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 45 | 479 | | 33 | 297 | | 54 | 144 | | 116 | 271 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 1.8 | 18.7 | | 1.3 | 11.6 | | 2.1 | 5.6 | | 4.5 | 10.6 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.21 | 2.18 | | 0.33 | 2.97 | | 0.67 | 1.79 | | 0.64 | 1.50 | |
| Uniform Delay ( $d_1$ ), s/veh | 13.1 | 20.2 | | 16.9 | 17.6 | | 26.4 | 30.7 | | 22.6 | 29.9 | |
| Incremental Delay ( $d_2$ ), s/veh | 0.4 | 11.7 | | 0.8 | 3.7 | | 1.1 | 1.5 | | 0.9 | 7.5 | |
| Initial Queue Delay ( $d_3$ ), s/veh | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | 13.4 | 31.9 | | 17.7 | 21.3 | | 27.5 | 32.2 | | 23.6 | 37.5 | |
| Level of Service (LOS) | B | C | | B | C | | C | C | | C | D | |
| Approach Delay, s/veh / LOS | 29.4 | C | | 20.8 | C | | 30.8 | C | | 32.6 | C | |
| Intersection Delay, s/veh / LOS | 28.0 | | | | | | C | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.90 | B | 1.90 | B | 1.93 | B | 1.93 | B |
| Bicycle LOS Score / LOS | 1.79 | B | 1.42 | A | 0.89 | A | 1.28 | A |

# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 6, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | AM Full Build | PHF | 0.92 |
| Urban Street | W Custer Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | W Custer Ave & McHug… | File Name | AAMB.xus | | |
| Project Description | AM Full Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 138 | 505 | 120 | 70 | 397 | 119 | 66 | 53 | 103 | 185 | 129 | 185 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 84.0 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Green | 4.2 | 1.9 | 35.0 | 4.1 | 1.6 | 14.2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Yellow | 3.0 | 0.0 | 4.0 | 3.0 | 3.0 | 3.0 | | | | | | | | |
| Red | 1.0 | 0.0 | 2.0 | 1.0 | 1.0 | 2.0 | | | | | | | | |

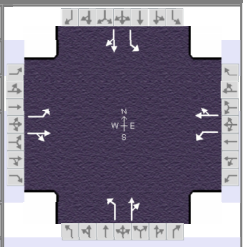
| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | 5 | 2 | 1 | 6 | 3 | 8 | 7 | 4 |
| Case Number | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 |
| Phase Duration, s | 10.1 | 42.9 | 8.2 | 41.0 | 8.1 | 19.2 | 13.7 | 24.8 |
| Change Period, ( $Y+R_c$ ), s | 4.0 | 6.0 | 4.0 | 6.0 | 4.0 | 5.0 | 4.0 | 5.0 |
| Max Allow Headway ( *MAH* ), s | 4.1 | 4.1 | 4.1 | 4.1 | 4.3 | 3.9 | 4.3 | 3.9 |
| Queue Clearance Time ( $g_s$ ), s | 6.0 | 30.7 | 4.0 | 24.6 | 4.8 | 9.9 | 9.5 | 18.6 |
| Green Extension Time ( $g_e$ ), s | 0.3 | 2.2 | 0.1 | 4.0 | 0.1 | 1.5 | 0.3 | 1.0 |
| Phase Call Probability | 0.97 | 1.00 | 0.83 | 1.00 | 0.81 | 1.00 | 0.99 | 1.00 |
| Max Out Probability | 0.02 | 0.98 | 0.00 | 0.42 | 0.00 | 0.01 | 0.42 | 0.34 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | 150 | 679 | | 76 | 561 | | 72 | 170 | | 201 | 341 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1767 | 1793 | | 1767 | 1777 | | 1767 | 1658 | | 1767 | 1662 | |
| Queue Service Time ( $g_s$ ), s | 4.0 | 28.7 | | 2.0 | 22.6 | | 2.8 | 7.9 | | 7.5 | 16.6 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | 4.0 | 28.7 | | 2.0 | 22.6 | | 2.8 | 7.9 | | 7.5 | 16.6 | |
| Green Ratio ( *g/C* ) | 0.49 | 0.44 | | 0.47 | 0.42 | | 0.22 | 0.17 | | 0.31 | 0.24 | |
| Capacity ( *c* ), veh/h | 338 | 788 | | 229 | 740 | | 187 | 281 | | 380 | 393 | |
| Volume-to-Capacity Ratio ( *X* ) | 0.444 | 0.862 | | 0.333 | 0.758 | | 0.384 | 0.604 | | 0.529 | 0.869 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 70 | 501 | | 37 | 391 | | 57 | 151 | | 146 | 318 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 2.7 | 19.6 | | 1.4 | 15.3 | | 2.2 | 5.9 | | 5.7 | 12.4 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.32 | 2.28 | | 0.37 | 3.91 | | 0.71 | 1.89 | | 0.81 | 1.77 | |
| Uniform Delay ( $d_1$ ), s/veh | 15.7 | 21.2 | | 18.0 | 20.9 | | 27.9 | 32.3 | | 23.4 | 30.8 | |
| Incremental Delay ( $d_2$ ), s/veh | 0.9 | 12.0 | | 0.8 | 7.1 | | 1.3 | 1.6 | | 1.1 | 12.1 | |
| Initial Queue Delay ( $d_3$ ), s/veh | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | 16.6 | 33.2 | | 18.9 | 28.0 | | 29.2 | 33.8 | | 24.5 | 42.9 | |
| Level of Service (LOS) | B | C | | B | C | | C | C | | C | D | |
| Approach Delay, s/veh / LOS | 30.2 | C | | 26.9 | C | | 32.4 | C | | 36.1 | D | |
| Intersection Delay, s/veh / LOS | 30.9 | | | | | | C | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.90 | B | 1.90 | B | 1.93 | B | 1.93 | B |
| Bicycle LOS Score / LOS | 1.86 | B | 1.54 | B | 0.89 | A | 1.38 | A |

# HCS Signalized Intersection Results Summary

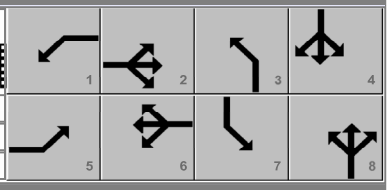
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 6, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | Afternoon 15:15-16:15 No-Build | PHF | 0.96 |
| Urban Street | W Custer Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | W Custer Ave & McHug… | File Name | AAFN.xus | | |
| Project Description | Afternoon No-Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 122 | 693 | 21 | 35 | 517 | 108 | 78 | 91 | 85 | 129 | 29 | 130 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 82.4 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Green | 2.8 | 2.4 | | 35.0 | 4.3 | 2.4 | 16.5 | | | | | |
| Yellow | 3.0 | 0.0 | | 4.0 | 3.0 | 0.0 | 3.0 | | | | | |
| Red | 1.0 | 0.0 | | 2.0 | 1.0 | 0.0 | 2.0 | | | | | |



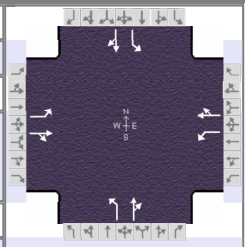

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | 5 | 2 | 1 | 6 | 3 | 8 | 7 | 4 |
| Case Number | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 |
| Phase Duration, s | 9.2 | 43.4 | 6.8 | 41.0 | 8.3 | 21.5 | 10.7 | 23.9 |
| Change Period, ( $Y+R_c$ ), s | 4.0 | 6.0 | 4.0 | 6.0 | 4.0 | 5.0 | 4.0 | 5.0 |
| Max Allow Headway ( *MAH* ), s | 4.1 | 4.1 | 4.1 | 4.1 | 4.3 | 4.0 | 4.3 | 4.0 |
| Queue Clearance Time ( $g_s$ ), s | 5.2 | 38.6 | 2.9 | 28.9 | 5.0 | 10.6 | 6.8 | 9.2 |
| Green Extension Time ( $g_e$ ), s | 0.2 | 0.0 | 0.0 | 3.2 | 0.1 | 1.0 | 0.2 | 1.0 |
| Phase Call Probability | 0.95 | 1.00 | 0.57 | 1.00 | 0.84 | 1.00 | 0.95 | 1.00 |
| Max Out Probability | 0.01 | 1.00 | 0.00 | 0.80 | 0.00 | 0.00 | 0.04 | 0.00 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | 127 | 744 | | 36 | 651 | | 81 | 183 | | 134 | 166 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1767 | 1659 | | 1767 | 1797 | | 1767 | 1593 | | 1767 | 1617 | |
| Queue Service Time ( $g_s$ ), s | 3.2 | 36.6 | | 0.9 | 26.9 | | 3.0 | 8.6 | | 4.8 | 7.2 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | 3.2 | 36.6 | | 0.9 | 26.9 | | 3.0 | 8.6 | | 4.8 | 7.2 | |
| Green Ratio ( *g/C* ) | 0.49 | 0.45 | | 0.46 | 0.42 | | 0.25 | 0.20 | | 0.29 | 0.23 | |
| Capacity ( *c* ), veh/h | 274 | 752 | | 148 | 763 | | 322 | 318 | | 346 | 371 | |
| Volume-to-Capacity Ratio ( *X* ) | 0.464 | 0.989 | | 0.246 | 0.853 | | 0.253 | 0.576 | | 0.388 | 0.446 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 58 | 669 | | 17 | 475 | | 58 | 154 | | 94 | 130 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 2.3 | 26.2 | | 0.7 | 18.6 | | 2.3 | 6.0 | | 3.7 | 5.1 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.26 | 3.04 | | 0.17 | 4.75 | | 0.73 | 1.93 | | 0.52 | 0.72 | |
| Uniform Delay ( $d_1$ ), s/veh | 16.9 | 22.3 | | 19.7 | 21.4 | | 24.5 | 29.8 | | 23.2 | 27.3 | |
| Incremental Delay ( $d_2$ ), s/veh | 1.2 | 30.2 | | 0.9 | 11.6 | | 0.4 | 1.2 | | 0.7 | 0.6 | |
| Initial Queue Delay ( $d_3$ ), s/veh | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | 18.1 | 52.5 | | 20.6 | 33.0 | | 24.9 | 31.0 | | 23.9 | 27.9 | |
| Level of Service (LOS) | B | D | | C | C | | C | C | | C | C | |
| Approach Delay, s/veh / LOS | 47.5 | D | | 32.4 | C | | 29.1 | C | | 26.1 | C | |
| Intersection Delay, s/veh / LOS | 37.3 | | | | | | D | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.90 | B | 1.90 | B | 1.93 | B | 1.93 | B |
| Bicycle LOS Score / LOS | 1.92 | B | 1.62 | B | 0.92 | A | 0.98 | A |

# HCS Signalized Intersection Results Summary

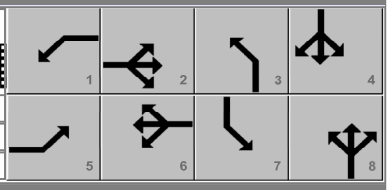
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 6, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | Afternoon 15:15-16:15 Full Build | PHF | 0.96 |
| Urban Street | W Custer Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | W Custer Ave & McHug… | File Name | AAFB.xus | | |
| Project Description | Afternoon Full Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 155 | 693 | 21 | 35 | 517 | 161 | 78 | 91 | 85 | 180 | 29 | 130 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 86.6 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 2.9 | 3.6 | 35.0 | 4.5 | 0.6 | 16.9 | |
| Yellow | 3.0 | 0.0 | 4.0 | 3.0 | 3.0 | 3.0 | |
| Red | 1.0 | 0.0 | 2.0 | 1.0 | 1.0 | 2.0 | |



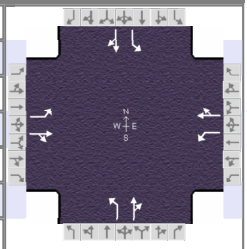

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | 5 | 2 | 1 | 6 | 3 | 8 | 7 | 4 |
| Case Number | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 |
| Phase Duration, s | 10.5 | 44.6 | 6.9 | 41.0 | 8.5 | 21.9 | 13.2 | 26.5 |
| Change Period, ( $Y+R_c$ ), s | 4.0 | 6.0 | 4.0 | 6.0 | 4.0 | 5.0 | 4.0 | 5.0 |
| Max Allow Headway ( *MAH* ), s | 4.1 | 4.1 | 4.1 | 4.1 | 4.3 | 4.0 | 4.3 | 4.0 |
| Queue Clearance Time ( $g_s$ ), s | 6.4 | 40.6 | 3.0 | 36.1 | 5.1 | 11.1 | 8.9 | 9.2 |
| Green Extension Time ( $g_e$ ), s | 0.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.9 | 0.3 | 1.0 |
| Phase Call Probability | 0.98 | 1.00 | 0.58 | 1.00 | 0.86 | 1.00 | 0.99 | 1.00 |
| Max Out Probability | 0.03 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.29 | 0.00 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | 161 | 744 | | 36 | 706 | | 81 | 183 | | 188 | 166 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1767 | 1659 | | 1767 | 1775 | | 1767 | 1590 | | 1767 | 1656 | |
| Queue Service Time ( $g_s$ ), s | 4.4 | 38.6 | | 1.0 | 34.1 | | 3.1 | 9.1 | | 6.9 | 7.2 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | 4.4 | 38.6 | | 1.0 | 34.1 | | 3.1 | 9.1 | | 6.9 | 7.2 | |
| Green Ratio ( *g/C* ) | 0.50 | 0.45 | | 0.44 | 0.40 | | 0.25 | 0.20 | | 0.32 | 0.25 | |
| Capacity ( *c* ), veh/h | 224 | 740 | | 143 | 717 | | 348 | 311 | | 378 | 412 | |
| Volume-to-Capacity Ratio ( *X* ) | 0.721 | 1.006 | | 0.255 | 0.984 | | 0.234 | 0.590 | | 0.496 | 0.402 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 85 | 725 | | 19 | 674 | | 62 | 165 | | 136 | 130 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 3.3 | 28.3 | | 0.8 | 26.3 | | 2.4 | 6.4 | | 5.3 | 5.2 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.39 | 3.29 | | 0.19 | 6.74 | | 0.77 | 2.06 | | 0.75 | 0.72 | |
| Uniform Delay ( $d_1$ ), s/veh | 19.7 | 24.0 | | 21.0 | 25.5 | | 25.8 | 31.7 | | 23.0 | 27.2 | |
| Incremental Delay ( $d_2$ ), s/veh | 4.3 | 34.5 | | 0.9 | 30.0 | | 0.3 | 1.3 | | 1.0 | 0.5 | |
| Initial Queue Delay ( $d_3$ ), s/veh | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | 24.1 | 58.5 | | 22.0 | 55.6 | | 26.2 | 33.0 | | 24.0 | 27.6 | |
| Level of Service (LOS) | C | F | | C | E | | C | C | | C | C | |
| Approach Delay, s/veh / LOS | 52.3 | D | | 53.9 | D | | 30.9 | C | | 25.7 | C | |
| Intersection Delay, s/veh / LOS | 46.2 | | | | | | D | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.90 | B | 1.91 | B | 1.93 | B | 1.93 | B |
| Bicycle LOS Score / LOS | 1.98 | B | 1.71 | B | 0.92 | A | 1.07 | A |

# HCS Signalized Intersection Results Summary

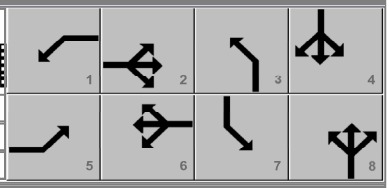
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 6, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | PM No-Build | PHF | 0.90 |
| Urban Street | W Custer Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | W Custer Ave & McHug… | File Name | APMN.xus | | |
| Project Description | PM No-Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 139 | 562 | 19 | 28 | 605 | 149 | 52 | 68 | 40 | 207 | 35 | 118 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 78.9 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 2.5 | 3.2 | 35.0 | 3.6 | 3.3 | 8.3 | |
| Yellow | 3.0 | 0.0 | 4.0 | 3.0 | 3.0 | 3.0 | |
| Red | 1.0 | 0.0 | 2.0 | 1.0 | 1.0 | 2.0 | |



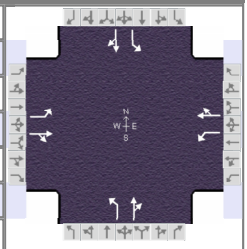

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | 5 | 2 | 1 | 6 | 3 | 8 | 7 | 4 |
| Case Number | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 |
| Phase Duration, s | 9.7 | 44.2 | 6.5 | 41.0 | 7.6 | 13.3 | 14.9 | 20.6 |
| Change Period, ( $Y+R_c$ ), s | 4.0 | 6.0 | 4.0 | 6.0 | 4.0 | 5.0 | 4.0 | 5.0 |
| Max Allow Headway ( *MAH* ), s | 4.1 | 4.1 | 4.1 | 4.1 | 4.3 | 3.9 | 4.3 | 3.9 |
| Queue Clearance Time ( $g_s$ ), s | 5.5 | 23.9 | 2.7 | 37.0 | 4.3 | 7.2 | 10.6 | 9.4 |
| Green Extension Time ( $g_e$ ), s | 0.3 | 5.1 | 0.0 | 0.0 | 0.1 | 0.8 | 0.3 | 0.8 |
| Phase Call Probability | 0.97 | 1.00 | 0.49 | 1.00 | 0.72 | 1.00 | 0.99 | 1.00 |
| Max Out Probability | 0.01 | 0.50 | 0.00 | 1.00 | 0.00 | 0.00 | 0.93 | 0.00 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | 154 | 646 | | 31 | 838 | | 58 | 120 | | 230 | 170 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1767 | 1845 | | 1767 | 1791 | | 1767 | 1740 | | 1767 | 1623 | |
| Queue Service Time ( $g_s$ ), s | 3.5 | 21.9 | | 0.7 | 35.0 | | 2.3 | 5.2 | | 8.6 | 7.4 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | 3.5 | 21.9 | | 0.7 | 35.0 | | 2.3 | 5.2 | | 8.6 | 7.4 | |
| Green Ratio ( *g/C* ) | 0.53 | 0.48 | | 0.48 | 0.44 | | 0.15 | 0.11 | | 0.27 | 0.20 | |
| Capacity ( *c* ), veh/h | 218 | 893 | | 287 | 795 | | 267 | 184 | | 385 | 322 | |
| Volume-to-Capacity Ratio ( *X* ) | 0.708 | 0.723 | | 0.108 | 1.054 | | 0.216 | 0.652 | | 0.597 | 0.529 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 68 | 369 | | 13 | 833 | | 45 | 107 | | 170 | 134 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 2.6 | 14.4 | | 0.5 | 32.5 | | 1.8 | 4.2 | | 6.6 | 5.3 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.31 | 1.68 | | 0.13 | 8.33 | | 0.56 | 1.34 | | 0.94 | 0.75 | |
| Uniform Delay ( $d_1$ ), s/veh | 17.8 | 16.2 | | 13.9 | 21.9 | | 29.4 | 33.9 | | 24.6 | 28.3 | |
| Incremental Delay ( $d_2$ ), s/veh | 4.2 | 5.1 | | 0.2 | 47.1 | | 0.4 | 2.9 | | 1.5 | 1.0 | |
| Initial Queue Delay ( $d_3$ ), s/veh | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | 22.0 | 21.2 | | 14.1 | 69.0 | | 29.8 | 36.8 | | 26.1 | 29.3 | |
| Level of Service (LOS) | C | C | | B | F | | C | D | | C | C | |
| Approach Delay, s/veh / LOS | 21.4 | C | | 67.1 | E | | 34.5 | C | | 27.5 | C | |
| Intersection Delay, s/veh / LOS | 41.2 | | | | | | D | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.89 | B | 1.90 | B | 1.94 | B | 1.93 | B |
| Bicycle LOS Score / LOS | 1.81 | B | 1.92 | B | 0.78 | A | 1.15 | A |

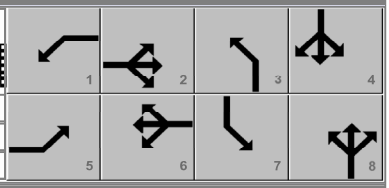
# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 6, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | PM Full Build | PHF | 0.90 |
| Urban Street | W Custer Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | W Custer Ave & McHug… | File Name | APMB.xus | | |
| Project Description | PM Full Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 172 | 562 | 19 | 28 | 605 | 202 | 52 | 68 | 40 | 258 | 35 | 165 |

| Signal Information | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cycle, s | 83.5 | Reference Phase | 2 | | | | | | | | | |
| Offset, s | 0 | Reference Point | End | | | | | | | | | |
| Uncoordinated | Yes | Simult. Gap E/W | On | Green | 2.6 | 0.5 | 35.0 | 3.7 | 5.9 | 8.8 | | |
| Force Mode | Fixed | Simult. Gap N/S | On | Yellow | 3.0 | 3.0 | 4.0 | 3.0 | 3.0 | 3.0 | | |
| | | | | Red | 1.0 | 1.0 | 2.0 | 1.0 | 1.0 | 2.0 | | |



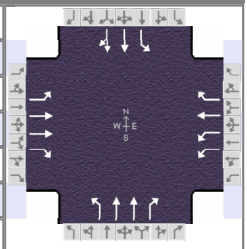

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | 5 | 2 | 1 | 6 | 3 | 8 | 7 | 4 |
| Case Number | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 | 1.1 | 4.0 |
| Phase Duration, s | 11.1 | 45.5 | 6.6 | 41.0 | 7.7 | 13.8 | 17.6 | 23.7 |
| Change Period, ( $Y+R_c$ ), s | 4.0 | 6.0 | 4.0 | 6.0 | 4.0 | 5.0 | 4.0 | 5.0 |
| Max Allow Headway ( *MAH* ), s | 4.1 | 4.1 | 4.1 | 4.1 | 4.3 | 3.9 | 4.3 | 3.9 |
| Queue Clearance Time ( $g_s$ ), s | 6.8 | 30.0 | 2.8 | 37.0 | 4.4 | 7.5 | 13.4 | 12.4 |
| Green Extension Time ( $g_e$ ), s | 0.4 | 3.1 | 0.0 | 0.0 | 0.1 | 1.0 | 0.2 | 0.9 |
| Phase Call Probability | 0.99 | 1.00 | 0.51 | 1.00 | 0.74 | 1.00 | 1.00 | 1.00 |
| Max Out Probability | 0.05 | 0.92 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.01 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | 191 | 646 | | 31 | 897 | | 58 | 120 | | 287 | 222 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1767 | 1660 | | 1767 | 1775 | | 1767 | 1740 | | 1767 | 1610 | |
| Queue Service Time ( $g_s$ ), s | 4.8 | 28.0 | | 0.8 | 35.0 | | 2.4 | 5.5 | | 11.4 | 10.4 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | 4.8 | 28.0 | | 0.8 | 35.0 | | 2.4 | 5.5 | | 11.4 | 10.4 | |
| Green Ratio ( *g/C* ) | 0.53 | 0.47 | | 0.45 | 0.42 | | 0.15 | 0.11 | | 0.29 | 0.22 | |
| Capacity ( *c* ), veh/h | 236 | 785 | | 229 | 744 | | 252 | 184 | | 424 | 361 | |
| Volume-to-Capacity Ratio ( *X* ) | 0.810 | 0.822 | | 0.136 | 1.205 | | 0.229 | 0.652 | | 0.676 | 0.615 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 97 | 444 | | 15 | 1297 | | 48 | 114 | | 226 | 188 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 3.8 | 17.3 | | 0.6 | 50.6 | | 1.9 | 4.5 | | 8.8 | 7.3 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.44 | 2.02 | | 0.15 | 12.97 | | 0.60 | 1.43 | | 1.26 | 1.04 | |
| Uniform Delay ( $d_1$ ), s/veh | 18.6 | 19.0 | | 16.9 | 24.3 | | 31.2 | 35.9 | | 25.4 | 29.1 | |
| Incremental Delay ( $d_2$ ), s/veh | 6.5 | 9.5 | | 0.3 | 105.0 | | 0.5 | 2.9 | | 3.7 | 1.3 | |
| Initial Queue Delay ( $d_3$ ), s/veh | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | 25.2 | 28.5 | | 17.2 | 129.2 | | 31.7 | 38.7 | | 29.0 | 30.4 | |
| Level of Service (LOS) | C | C | | B | F | | C | D | | C | C | |
| Approach Delay, s/veh / LOS | 27.7 | C | | 125.5 | F | | 36.4 | D | | 29.6 | C | |
| Intersection Delay, s/veh / LOS | 65.7 | | | | | | E | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.90 | B | 1.90 | B | 1.94 | B | 1.93 | B |
| Bicycle LOS Score / LOS | 1.87 | B | 2.02 | B | 0.78 | A | 1.33 | A |

# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 18, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | AM No-Build | PHF | 0.89 |
| Urban Street | Custer Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | Custer Avenue & North… | File Name | BAMN.xus | | |
| Project Description | AM No-Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 85 | 326 | 241 | 129 | 381 | 211 | 86 | 155 | 55 | 142 | 483 | 80 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 78.7 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| Green | 5.6 | 3.9 | 11.3 | 4.9 | 2.8 | 15.2 | 5 | 6 | 7 | 8 |
| Yellow | 4.0 | 4.0 | 4.0 | 4.0 | 0.0 | 4.0 | | | | |
| Red | 3.0 | 3.0 | 3.0 | 3.0 | 0.0 | 3.0 | | | | |

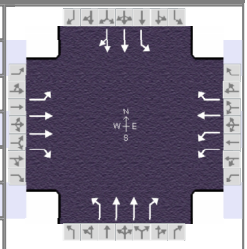
| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | 1 | 6 | 5 | 2 | 7 | 4 | 3 | 8 |
| Case Number | 2.0 | 3.0 | 2.0 | 3.0 | 1.1 | 3.0 | 1.1 | 4.0 |
| Phase Duration, s | 12.6 | 23.5 | 18.3 | 29.2 | 11.9 | 22.2 | 14.7 | 25.0 |
| Change Period, ( $Y+R_c$ ), s | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Max Allow Headway ( *MAH* ), s | 4.1 | 4.2 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| Queue Clearance Time ( $g_s$ ), s | 6.2 | 13.8 | 5.0 | 19.0 | 5.3 | 5.2 | 7.5 | 14.7 |
| Green Extension Time ( $g_e$ ), s | 0.2 | 2.7 | 2.9 | 3.2 | 0.2 | 3.4 | 0.4 | 3.2 |
| Phase Call Probability | 0.88 | 1.00 | 0.96 | 1.00 | 0.88 | 1.00 | 0.97 | 1.00 |
| Max Out Probability | 0.00 | 0.00 | 0.07 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 1 | 6 | 16 | 5 | 2 | 12 | 7 | 4 | 14 | 3 | 8 | 18 |
| Adjusted Flow Rate ( *v* ), veh/h | 96 | 366 | 271 | 145 | 428 | 237 | 97 | 174 | 62 | 160 | 323 | 309 |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1767 | 1795 | 1588 | 1716 | 1856 | 1583 | 1795 | 1795 | 1560 | 1795 | 1885 | 1790 |
| Queue Service Time ( $g_s$ ), s | 4.2 | 7.1 | 11.8 | 3.0 | 17.0 | 8.6 | 3.3 | 3.2 | 2.2 | 5.5 | 12.6 | 12.7 |
| Cycle Queue Clearance Time ( $g_c$ ), s | 4.2 | 7.1 | 11.8 | 3.0 | 17.0 | 8.6 | 3.3 | 3.2 | 2.2 | 5.5 | 12.6 | 12.7 |
| Green Ratio ( *g/C* ) | 0.07 | 0.21 | 0.27 | 0.14 | 0.28 | 0.38 | 0.26 | 0.19 | 0.34 | 0.29 | 0.23 | 0.23 |
| Capacity ( *c* ), veh/h | 126 | 754 | 433 | 494 | 524 | 602 | 237 | 694 | 526 | 454 | 431 | 410 |
| Volume-to-Capacity Ratio ( *X* ) | 0.755 | 0.486 | 0.625 | 0.294 | 0.817 | 0.394 | 0.407 | 0.251 | 0.117 | 0.352 | 0.750 | 0.755 |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 94 | 134 | 81 | 56 | 307 | 137 | 64 | 61 | 14 | 101 | 242 | 246 |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 3.7 | 5.3 | 3.2 | 2.2 | 12.0 | 5.4 | 2.5 | 2.4 | 0.5 | 4.0 | 9.6 | 9.3 |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.45 | 0.64 | 0.39 | 0.23 | 1.28 | 0.57 | 0.31 | 0.29 | 0.07 | 0.44 | 1.05 | 1.02 |
| Uniform Delay ( $d_1$ ), s/veh | 35.9 | 27.4 | 5.6 | 30.2 | 26.4 | 17.8 | 24.1 | 27.0 | 16.5 | 21.8 | 28.3 | 28.4 |
| Incremental Delay ( $d_2$ ), s/veh | 8.8 | 0.5 | 1.5 | 0.3 | 3.2 | 0.4 | 1.1 | 0.2 | 0.1 | 0.5 | 2.6 | 2.8 |
| 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 |
| Control Delay ( *d* ), s/veh | 44.7 | 27.9 | 7.0 | 30.5 | 29.6 | 18.2 | 25.2 | 27.2 | 16.5 | 22.3 | 31.0 | 31.2 |
| Level of Service (LOS) | D | C | A | C | C | B | C | C | B | C | C | C |
| Approach Delay, s/veh / LOS | 22.4 | C | | 26.4 | C | | 24.6 | C | | 29.3 | C | |
| Intersection Delay, s/veh / LOS | 26.0 | | | | | | C | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 2.45 | B | 2.28 | B | 2.44 | B | 2.28 | B |
| Bicycle LOS Score / LOS | 1.09 | A | 1.82 | B | 0.76 | A | 1.14 | A |

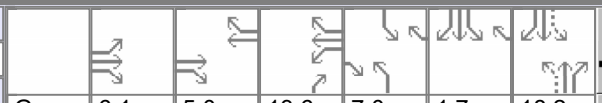
# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 18, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | AMFull Build | PHF | 0.89 |
| Urban Street | Custer Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | Custer Avenue & North… | File Name | BAMB.xus | | |
| Project Description | AM Full Build | | | | |

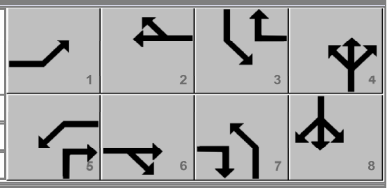


| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 85 | 345 | 251 | 129 | 412 | 222 | 119 | 165 | 55 | 152 | 502 | 80 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 86.7 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |



| | | | | | | |
|---|---|---|---|---|---|---|
| Green | 6.1 | 5.0 | 13.6 | 7.0 | 1.7 | 18.2 |
| Yellow | 4.0 | 4.0 | 4.0 | 4.0 | 0.0 | 4.0 |
| Red | 3.0 | 3.0 | 3.0 | 3.0 | 0.0 | 3.0 |



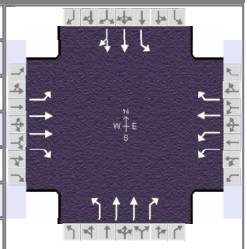

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | 1 | 6 | 5 | 2 | 7 | 4 | 3 | 8 |
| Case Number | 2.0 | 3.0 | 2.0 | 3.0 | 1.1 | 3.0 | 1.1 | 4.0 |
| Phase Duration, s | 13.1 | 25.2 | 20.6 | 32.6 | 14.0 | 25.2 | 15.7 | 26.9 |
| Change Period, ( $Y+R_c$ ), s | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Max Allow Headway ( *MAH* ), s | 4.1 | 4.2 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| Queue Clearance Time ( $g_s$ ), s | 6.6 | 15.3 | 5.2 | 22.3 | 7.0 | 5.7 | 8.3 | 16.5 |
| Green Extension Time ( $g_e$ ), s | 0.2 | 2.8 | 3.1 | 3.2 | 0.3 | 3.6 | 0.5 | 3.3 |
| Phase Call Probability | 0.90 | 1.00 | 0.97 | 1.00 | 0.96 | 1.00 | 0.98 | 1.00 |
| Max Out Probability | 0.00 | 0.00 | 0.08 | 0.04 | 0.00 | 0.00 | 0.00 | 0.04 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 1 | 6 | 16 | 5 | 2 | 12 | 7 | 4 | 14 | 3 | 8 | 18 |
| Adjusted Flow Rate ( *v* ), veh/h | 96 | 388 | 282 | 145 | 463 | 249 | 134 | 185 | 62 | 171 | 334 | 320 |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1767 | 1795 | 1588 | 1716 | 1856 | 1583 | 1795 | 1795 | 1560 | 1795 | 1885 | 1793 |
| Queue Service Time ( $g_s$ ), s | 4.6 | 8.3 | 13.3 | 3.2 | 20.3 | 9.8 | 5.0 | 3.7 | 2.3 | 6.3 | 14.4 | 14.5 |
| Cycle Queue Clearance Time ( $g_c$ ), s | 4.6 | 8.3 | 13.3 | 3.2 | 20.3 | 9.8 | 5.0 | 3.7 | 2.3 | 6.3 | 14.4 | 14.5 |
| Green Ratio ( *g/C* ) | 0.07 | 0.21 | 0.29 | 0.16 | 0.30 | 0.40 | 0.29 | 0.21 | 0.37 | 0.31 | 0.23 | 0.23 |
| Capacity ( *c* ), veh/h | 126 | 753 | 462 | 540 | 550 | 627 | 259 | 755 | 574 | 466 | 433 | 412 |
| Volume-to-Capacity Ratio ( *X* ) | 0.760 | 0.515 | 0.610 | 0.268 | 0.842 | 0.398 | 0.516 | 0.245 | 0.108 | 0.367 | 0.772 | 0.776 |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 104 | 160 | 90 | 61 | 365 | 158 | 97 | 72 | 15 | 118 | 274 | 278 |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 4.1 | 6.3 | 3.6 | 2.4 | 14.3 | 6.2 | 3.8 | 2.8 | 0.6 | 4.7 | 10.9 | 10.5 |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.50 | 0.76 | 0.43 | 0.25 | 1.52 | 0.66 | 0.46 | 0.34 | 0.07 | 0.51 | 1.19 | 1.15 |
| Uniform Delay ( $d_1$ ), s/veh | 39.6 | 30.4 | 5.1 | 32.2 | 28.7 | 18.8 | 25.1 | 28.5 | 14.9 | 22.9 | 31.3 | 31.4 |
| Incremental Delay ( $d_2$ ), s/veh | 9.1 | 0.5 | 1.3 | 0.3 | 4.6 | 0.4 | 1.6 | 0.2 | 0.1 | 0.5 | 3.0 | 3.2 |
| 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 |
| Control Delay ( *d* ), s/veh | 48.7 | 30.9 | 6.4 | 32.5 | 33.3 | 19.2 | 26.7 | 28.7 | 15.0 | 23.4 | 34.3 | 34.5 |
| Level of Service (LOS) | D | C | A | C | C | B | C | C | B | C | C | C |
| Approach Delay, s/veh / LOS | 24.1 | C | | 29.1 | C | | 25.8 | C | | 32.1 | C | |
| Intersection Delay, s/veh / LOS | 28.2 | | | | | | C | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 2.45 | B | 2.28 | B | 2.44 | B | 2.29 | B |
| Bicycle LOS Score / LOS | 1.12 | A | 1.90 | B | 0.80 | A | 1.17 | A |

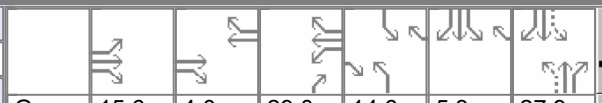
# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 18, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | PM No-Build | PHF | 0.92 |
| Urban Street | Custer Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | Custer Avenue & North… | File Name | BPMN.xus | | |
| Project Description | PM No-Build | | | | |

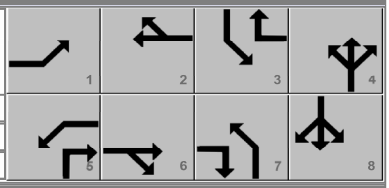


| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 168 | 564 | 130 | 220 | 520 | 338 | 197 | 558 | 213 | 285 | 395 | 80 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 131.4 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |



| | | | | | | |
|---|---|---|---|---|---|---|
| Green | 15.6 | 4.0 | 29.0 | 14.6 | 5.3 | 27.9 |
| Yellow | 4.0 | 4.0 | 4.0 | 4.0 | 0.0 | 4.0 |
| Red | 3.0 | 3.0 | 3.0 | 3.0 | 0.0 | 3.0 |



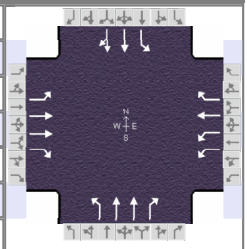
| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | 1 | 6 | 5 | 2 | 7 | 4 | 3 | 8 |
| Case Number | 2.0 | 3.0 | 2.0 | 3.0 | 1.1 | 3.0 | 1.1 | 4.0 |
| Phase Duration, s | 22.6 | 33.6 | 36.0 | 47.0 | 21.6 | 34.9 | 26.9 | 40.3 |
| Change Period, ( *Y+R c* ), s | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Max Allow Headway ( *MAH* ), s | 4.1 | 4.1 | 4.2 | 4.2 | 4.1 | 4.1 | 4.1 | 4.1 |
| Queue Clearance Time ( *g s* ), s | 15.4 | 23.6 | 9.5 | 42.0 | 14.3 | 23.4 | 19.4 | 18.3 |
| Green Extension Time ( *g e* ), s | 0.2 | 2.9 | 3.8 | 0.0 | 0.3 | 4.5 | 0.6 | 5.3 |
| Phase Call Probability | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Max Out Probability | 0.68 | 0.03 | 0.37 | 1.00 | 0.34 | 0.35 | 0.44 | 0.17 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 1 | 6 | 16 | 5 | 2 | 12 | 7 | 4 | 14 | 3 | 8 | 18 |
| Adjusted Flow Rate ( *v* ), veh/h | 183 | 613 | 141 | 239 | 565 | 367 | 214 | 607 | 232 | 310 | 265 | 252 |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1767 | 1795 | 1570 | 1743 | 1856 | 1571 | 1767 | 1766 | 1586 | 1795 | 1885 | 1768 |
| Queue Service Time ( *g s* ), s | 13.4 | 21.6 | 8.9 | 7.5 | 40.0 | 21.8 | 12.3 | 21.4 | 12.7 | 17.4 | 16.0 | 16.3 |
| Cycle Queue Clearance Time ( *g c* ), s | 13.4 | 21.6 | 8.9 | 7.5 | 40.0 | 21.8 | 12.3 | 21.4 | 12.7 | 17.4 | 16.0 | 16.3 |
| Green Ratio ( *g/C* ) | 0.12 | 0.20 | 0.31 | 0.22 | 0.30 | 0.46 | 0.32 | 0.21 | 0.43 | 0.37 | 0.25 | 0.25 |
| Capacity ( *c* ), veh/h | 209 | 725 | 492 | 770 | 565 | 716 | 351 | 751 | 690 | 367 | 477 | 448 |
| Volume-to-Capacity Ratio ( *X* ) | 0.873 | 0.845 | 0.287 | 0.311 | 1.001 | 0.513 | 0.610 | 0.807 | 0.336 | 0.843 | 0.555 | 0.562 |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 296 | 383 | 96 | 149 | 823 | 329 | 236 | 383 | 123 | 342 | 305 | 308 |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 11.5 | 15.2 | 3.8 | 5.9 | 32.1 | 12.8 | 9.2 | 15.0 | 4.9 | 13.6 | 12.1 | 11.7 |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 1.41 | 1.82 | 0.46 | 0.62 | 3.43 | 1.37 | 1.13 | 1.82 | 0.59 | 1.49 | 1.33 | 1.28 |
| Uniform Delay ( *d 1* ), s/veh | 57.0 | 50.5 | 3.0 | 42.8 | 45.7 | 25.4 | 35.0 | 49.2 | 11.1 | 34.5 | 42.6 | 42.7 |
| Incremental Delay ( *d 2* ), s/veh | 21.3 | 4.0 | 0.3 | 0.2 | 38.1 | 0.6 | 1.8 | 4.2 | 0.3 | 12.2 | 1.2 | 1.4 |
| 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 |
| Control Delay ( *d* ), s/veh | 78.3 | 54.5 | 3.4 | 43.1 | 83.8 | 26.0 | 36.8 | 53.4 | 11.4 | 46.7 | 43.8 | 44.1 |
| Level of Service (LOS) | E | D | A | D | F | C | D | D | B | D | D | D |
| Approach Delay, s/veh / LOS | 51.4 | D | | 57.4 | E | | 40.8 | D | | 45.0 | D | |
| Intersection Delay, s/veh / LOS | 49.0 | | | | | | D | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 2.46 | B | 2.30 | B | 2.46 | B | 2.30 | B |
| Bicycle LOS Score / LOS | 1.26 | A | 2.42 | B | 1.36 | A | 1.17 | A |

# HCS Signalized Intersection Results Summary

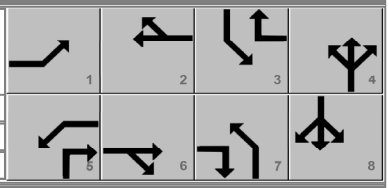
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 18, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | PM No-Build | PHF | 0.92 |
| Urban Street | Custer Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | Custer Avenue & North… | File Name | BPMB.xus | | |
| Project Description | PM Full Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 168 | 597 | 148 | 220 | 546 | 348 | 224 | 566 | 213 | 303 | 428 | 80 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 133.7 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | |
|---|---|---|---|---|---|---|
| Green | 15.8 | 5.5 | 27.5 | 16.5 | 4.8 | 28.6 |
| Yellow | 4.0 | 4.0 | 4.0 | 4.0 | 0.0 | 4.0 |
| Red | 3.0 | 3.0 | 3.0 | 3.0 | 0.0 | 3.0 |




| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | 1 | 6 | 5 | 2 | 7 | 4 | 3 | 8 |
| Case Number | 2.0 | 3.0 | 2.0 | 3.0 | 1.1 | 3.0 | 1.1 | 4.0 |
| Phase Duration, s | 22.8 | 35.3 | 34.5 | 47.0 | 23.5 | 35.6 | 28.3 | 40.5 |
| Change Period, ( $Y+R_c$ ), s | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Max Allow Headway ( *MAH* ), s | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| Queue Clearance Time ( $g_s$ ), s | 15.6 | 25.3 | 9.8 | 42.0 | 16.2 | 24.2 | 20.8 | 19.9 |
| Green Extension Time ( $g_e$ ), s | 0.2 | 3.1 | 3.9 | 0.0 | 0.3 | 4.5 | 0.5 | 5.3 |
| Phase Call Probability | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Max Out Probability | 0.81 | 0.06 | 0.41 | 1.00 | 1.00 | 0.41 | 0.97 | 0.23 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 1 | 6 | 16 | 5 | 2 | 12 | 7 | 4 | 14 | 3 | 8 | 18 |
| Adjusted Flow Rate ( *v* ), veh/h | 183 | 649 | 161 | 239 | 593 | 378 | 243 | 615 | 232 | 329 | 283 | 269 |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1767 | 1795 | 1570 | 1743 | 1856 | 1571 | 1767 | 1766 | 1586 | 1795 | 1885 | 1775 |
| Queue Service Time ( $g_s$ ), s | 13.6 | 23.3 | 10.2 | 7.8 | 40.0 | 23.0 | 14.2 | 22.2 | 13.3 | 18.8 | 17.7 | 17.9 |
| Cycle Queue Clearance Time ( $g_c$ ), s | 13.6 | 23.3 | 10.2 | 7.8 | 40.0 | 23.0 | 14.2 | 22.2 | 13.3 | 18.8 | 17.7 | 17.9 |
| Green Ratio ( *g/C* ) | 0.12 | 0.21 | 0.34 | 0.21 | 0.30 | 0.46 | 0.34 | 0.21 | 0.42 | 0.37 | 0.25 | 0.25 |
| Capacity ( *c* ), veh/h | 209 | 761 | 526 | 716 | 555 | 720 | 357 | 757 | 668 | 379 | 472 | 445 |
| Volume-to-Capacity Ratio ( *X* ) | 0.875 | 0.853 | 0.306 | 0.334 | 1.069 | 0.525 | 0.681 | 0.813 | 0.347 | 0.868 | 0.599 | 0.606 |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 301 | 411 | 106 | 155 | 954 | 344 | 272 | 396 | 133 | 375 | 334 | 338 |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 11.8 | 16.3 | 4.2 | 6.2 | 37.3 | 13.4 | 10.6 | 15.5 | 5.3 | 14.9 | 13.3 | 12.8 |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 1.44 | 1.96 | 0.51 | 0.65 | 3.97 | 1.43 | 1.29 | 1.88 | 0.63 | 1.63 | 1.45 | 1.40 |
| Uniform Delay ( $d_1$ ), s/veh | 58.0 | 50.7 | 3.0 | 45.4 | 46.9 | 25.8 | 35.3 | 50.0 | 10.9 | 34.8 | 44.2 | 44.3 |
| Incremental Delay ( $d_2$ ), s/veh | 22.3 | 4.9 | 0.3 | 0.3 | 58.1 | 0.7 | 3.9 | 4.7 | 0.3 | 15.7 | 1.9 | 2.1 |
| 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 |
| Control Delay ( *d* ), s/veh | 80.3 | 55.6 | 3.4 | 45.6 | 105.0 | 26.5 | 39.2 | 54.7 | 11.2 | 50.5 | 46.1 | 46.4 |
| Level of Service (LOS) | F | E | A | D | F | C | D | D | B | D | D | D |
| Approach Delay, s/veh / LOS | 51.6 | D | | 68.8 | E | | 42.0 | D | | 47.8 | D | |
| Intersection Delay, s/veh / LOS | 53.3 | | | | | | D | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 2.46 | B | 2.30 | B | 2.46 | B | 2.30 | B |
| Bicycle LOS Score / LOS | 1.31 | A | 2.49 | B | 1.39 | A | 1.21 | A |

# HCS Two-Way Stop-Control Report

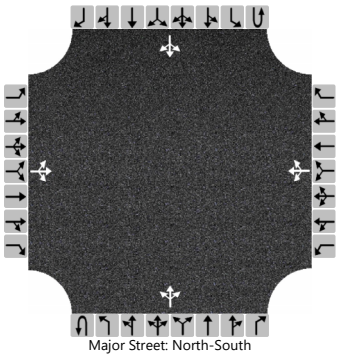
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison Maierle |
| Date Performed | 2/4/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM No-build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Benchmark/Barney |
| Jurisdiction | City of Helena |
| East/West Street | Benchmark Dr/Barney St |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.93 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 1 | 2 | 21 | | 34 | 1 | 1 | | 43 | 113 | 15 | | 0 | 281 | 3 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 26 | | | | 39 | | | 46 | | | | 0 | | |
| Capacity, c (veh/h) | | | 676 | | | | 426 | | | 1250 | | | | 1440 | | |
| v/c Ratio | | | 0.04 | | | | 0.09 | | | 0.04 | | | | 0.00 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.1 | | | | 0.3 | | | 0.1 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 2.6 | | | | 7.7 | | | | | | | | | |
| Control Delay (s/veh) | | | 10.5 | | | | 14.3 | | | 8.0 | 0.3 | 0.3 | | 7.5 | 0.0 | 0.0 |
| Level of Service (LOS) | | | B | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 10.5 | | | | 14.3 | | | | 2.2 | | | | 0.0 | | | |
| Approach LOS | B | | | | B | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

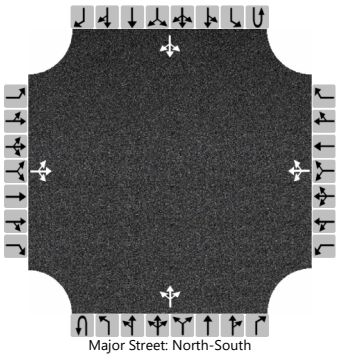
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison Maierle |
| Date Performed | 2/4/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Benchmark/Barney |
| Jurisdiction | City of Helena |
| East/West Street | Benchmark Dr/Barney St |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.93 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes



Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 1 | 2 | 21 | | 34 | 1 | 1 | | 43 | 216 | 15 | | 0 | 338 | 3 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | 0 | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 26 | | | | 39 | | | 46 | | | | 0 | | |
| Capacity, c (veh/h) | | | 603 | | | | 324 | | | 1186 | | | | 1311 | | |
| v/c Ratio | | | 0.04 | | | | 0.12 | | | 0.04 | | | | 0.00 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.1 | | | | 0.4 | | | 0.1 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 2.6 | | | | 10.2 | | | | | | | | | |
| Control Delay (s/veh) | | | 11.2 | | | | 17.6 | | | 8.2 | 0.4 | 0.4 | | 7.7 | 0.0 | 0.0 |
| Level of Service (LOS) | | | B | | | | C | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | | 11.2 | | | | 17.6 | | | | 1.6 | | | | 0.0 | | |
| Approach LOS | | B | | | | C | | | | A | | | | A | | |

# HCS Two-Way Stop-Control Report

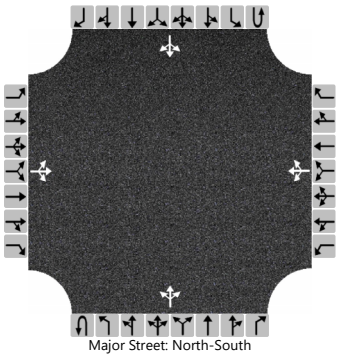
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison Maierle |
| Date Performed | 2/4/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM No-build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Benchmark/Barney |
| Jurisdiction | City of Helena |
| East/West Street | Benchmark Dr/Barney St |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.86 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 8 | 10 | 86 | | 34 | 10 | 7 | | 73 | 177 | 25 | | 2 | 150 | 13 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 121 | | | | 59 | | | 85 | | | | 2 | | |
| Capacity, c (veh/h) | | | 706 | | | | 356 | | | 1378 | | | | 1327 | | |
| v/c Ratio | | | 0.17 | | | | 0.17 | | | 0.06 | | | | 0.00 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.6 | | | | 0.6 | | | 0.2 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 15.4 | | | | 15.4 | | | | | | | | | |
| Control Delay (s/veh) | | | 11.2 | | | | 17.1 | | | 7.8 | 0.6 | 0.6 | | 7.7 | 0.0 | 0.0 |
| Level of Service (LOS) | | | B | | | | C | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 11.2 | | | | 17.1 | | | | 2.5 | | | | 0.1 | | | |
| Approach LOS | B | | | | C | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

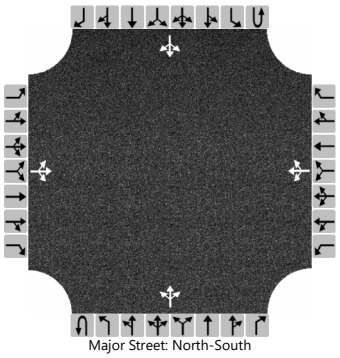
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison Maierle |
| Date Performed | 2/4/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Benchmark/Barney |
| Jurisdiction | City of Helena |
| East/West Street | Benchmark Dr/Barney St |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.86 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes



Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 8 | 10 | 86 | | 34 | 10 | 7 | | 73 | 263 | 25 | | 2 | 248 | 13 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 121 | | | | 59 | | | 85 | | | | 2 | | |
| Capacity, c (veh/h) | | | 574 | | | | 251 | | | 1252 | | | | 1219 | | |
| v/c Ratio | | | 0.21 | | | | 0.24 | | | 0.07 | | | | 0.00 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.8 | | | | 0.9 | | | 0.2 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 20.5 | | | | 23.0 | | | | | | | | | |
| Control Delay (s/veh) | | | 12.9 | | | | 23.7 | | | 8.1 | 0.7 | 0.7 | | 8.0 | 0.0 | 0.0 |
| Level of Service (LOS) | | | B | | | | C | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 12.9 | | | | 23.7 | | | | 2.2 | | | | 0.1 | | | |
| Approach LOS | B | | | | C | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

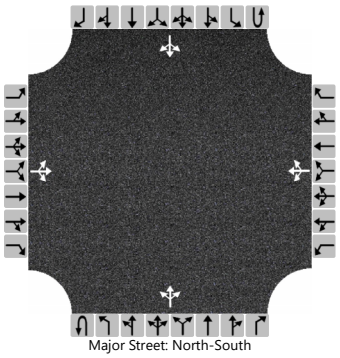
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/4/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Road Runner St |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.93 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 4 | 4 | 8 | | 25 | 6 | 4 | | 14 | 76 | 25 | | 23 | 251 | 17 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 17 | | | | 38 | | | 15 | | | | 25 | | |
| Capacity, c (veh/h) | | | 588 | | | | 511 | | | 1268 | | | | 1476 | | |
| v/c Ratio | | | 0.03 | | | | 0.07 | | | 0.01 | | | | 0.02 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.1 | | | | 0.2 | | | 0.0 | | | | 0.1 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 2.6 | | | | 5.1 | | | | | | | | | |
| Control Delay (s/veh) | | | 11.3 | | | | 12.6 | | | 7.9 | 0.1 | 0.1 | | 7.5 | 0.1 | 0.1 |
| Level of Service (LOS) | | | B | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 11.3 | | | | 12.6 | | | | 1.0 | | | | 0.7 | | | |
| Approach LOS | B | | | | B | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

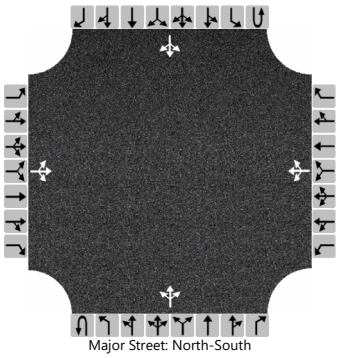
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/4/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Road Runner St |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.93 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 4 | 4 | 8 | | 25 | 6 | 15 | | 14 | 179 | 25 | | 38 | 308 | 17 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | 0 | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 17 | | | | 49 | | | 15 | | | | 41 | | |
| Capacity, c (veh/h) | | | 464 | | | | 429 | | | 1204 | | | | 1344 | | |
| v/c Ratio | | | 0.04 | | | | 0.12 | | | 0.01 | | | | 0.03 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.1 | | | | 0.4 | | | 0.0 | | | | 0.1 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 2.6 | | | | 10.2 | | | | | | | | | |
| Control Delay (s/veh) | | | 13.1 | | | | 14.5 | | | 8.0 | 0.1 | 0.1 | | 7.8 | 0.3 | 0.3 |
| Level of Service (LOS) | | | B | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | | 13.1 | | | | 14.5 | | | | 0.6 | | | | 1.1 | | |
| Approach LOS | | B | | | | B | | | | A | | | | A | | |

# HCS Two-Way Stop-Control Report

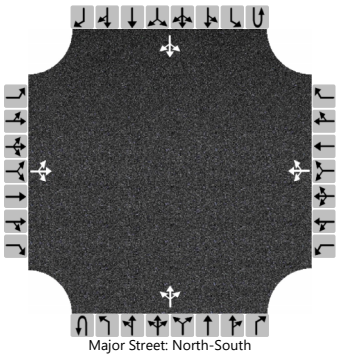
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/4/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Road Runner St |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.86 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 12 | 11 | 13 | | 44 | 2 | 20 | | 6 | 163 | 28 | | 9 | 106 | 2 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 42 | | | | 77 | | | 7 | | | | 10 | | |
| Capacity, c (veh/h) | | | 641 | | | | 610 | | | 1455 | | | | 1341 | | |
| v/c Ratio | | | 0.07 | | | | 0.13 | | | 0.00 | | | | 0.01 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.2 | | | | 0.4 | | | 0.0 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 5.1 | | | | 10.2 | | | | | | | | | |
| Control Delay (s/veh) | | | 11.0 | | | | 11.7 | | | 7.5 | 0.0 | 0.0 | | 7.7 | 0.1 | 0.1 |
| Level of Service (LOS) | | | B | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 11.0 | | | | 11.7 | | | | 0.3 | | | | 0.7 | | | |
| Approach LOS | B | | | | B | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

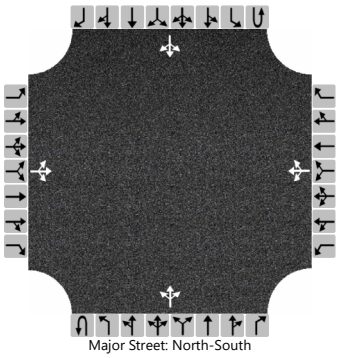
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/4/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Road Runner St |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.86 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 12 | 11 | 13 | | 44 | 2 | 30 | | 6 | 249 | 28 | | 34 | 204 | 2 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 42 | | | | 88 | | | 7 | | | | 40 | | |
| Capacity, c (veh/h) | | | 443 | | | | 437 | | | 1321 | | | | 1232 | | |
| v/c Ratio | | | 0.09 | | | | 0.20 | | | 0.01 | | | | 0.03 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.3 | | | | 0.7 | | | 0.0 | | | | 0.1 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 7.7 | | | | 17.9 | | | | | | | | | |
| Control Delay (s/veh) | | | 14.0 | | | | 15.3 | | | 7.7 | 0.0 | 0.0 | | 8.0 | 0.3 | 0.3 |
| Level of Service (LOS) | | | B | | | | C | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 14.0 | | | | 15.3 | | | | 0.2 | | | | 1.4 | | | |
| Approach LOS | B | | | | C | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

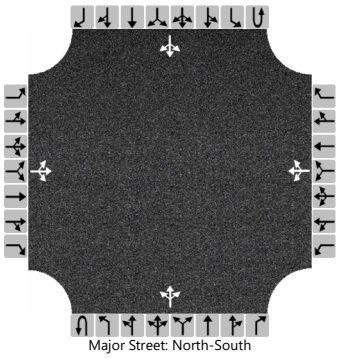
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Wolf Rd |
| Jurisdiction | City of Helena |
| East/West Street | Wolf Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.92 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 0 | 0 | 1 | | 57 | 3 | 3 | | 0 | 73 | 14 | | 1 | 235 | 2 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | 0 | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 1 | | | | 68 | | | 0 | | | | 1 | | |
| Capacity, c (veh/h) | | | 780 | | | | 614 | | | 1301 | | | | 1493 | | |
| v/c Ratio | | | 0.00 | | | | 0.11 | | | 0.00 | | | | 0.00 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.0 | | | | 0.4 | | | 0.0 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 0.0 | | | | 10.2 | | | | | | | | | |
| Control Delay (s/veh) | | | 9.6 | | | | 11.6 | | | 7.8 | 0.0 | 0.0 | | 7.4 | 0.0 | 0.0 |
| Level of Service (LOS) | | | A | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | | 9.6 | | | | 11.6 | | | | 0.0 | | | | 0.0 | | |
| Approach LOS | | A | | | | B | | | | A | | | | A | | |

# HCS Two-Way Stop-Control Report

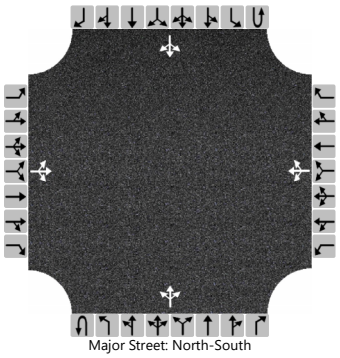
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Wolf Rd |
| Jurisdiction | City of Helena |
| East/West Street | Wolf Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.92 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 2 | 17 | 22 | | 70 | 16 | 14 | | 41 | 110 | 16 | | 16 | 257 | 5 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | 0 | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 45 | | | | 109 | | | 45 | | | | 17 | | |
| Capacity, c (veh/h) | | | 551 | | | | 428 | | | 1272 | | | | 1441 | | |
| v/c Ratio | | | 0.08 | | | | 0.25 | | | 0.04 | | | | 0.01 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.3 | | | | 1.0 | | | 0.1 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 7.7 | | | | 25.6 | | | | | | | | | |
| Control Delay (s/veh) | | | 12.1 | | | | 16.2 | | | 7.9 | 0.3 | 0.3 | | 7.5 | 0.1 | 0.1 |
| Level of Service (LOS) | | | B | | | | C | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | | 12.1 | | | | 16.2 | | | | 2.2 | | | | 0.5 | | |
| Approach LOS | | B | | | | C | | | | A | | | | A | | |

# HCS Two-Way Stop-Control Report

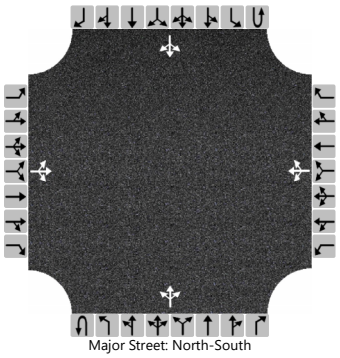
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Wolf Rd |
| Jurisdiction | City of Helena |
| East/West Street | Wolf Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.87 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 1 | 0 | 1 | | 20 | 1 | 8 | | 0 | 159 | 33 | | 7 | 96 | 1 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 2 | | | | 33 | | | 0 | | | | 8 | | |
| Capacity, c (veh/h) | | | 737 | | | | 664 | | | 1472 | | | | 1343 | | |
| v/c Ratio | | | 0.00 | | | | 0.05 | | | 0.00 | | | | 0.01 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.0 | | | | 0.2 | | | 0.0 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 0.0 | | | | 5.1 | | | | | | | | | |
| Control Delay (s/veh) | | | 9.9 | | | | 10.7 | | | 7.4 | 0.0 | 0.0 | | 7.7 | 0.0 | 0.0 |
| Level of Service (LOS) | | | A | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 9.9 | | | | 10.7 | | | | 0.0 | | | | 0.6 | | | |
| Approach LOS | A | | | | B | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

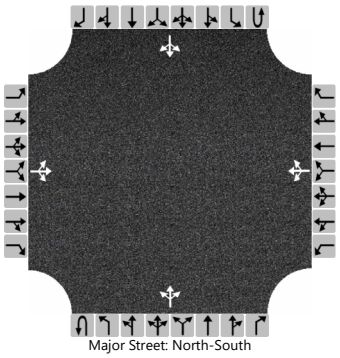
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Wolf Rd |
| Jurisdiction | City of Helena |
| East/West Street | Wolf Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.87 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 5 | 29 | 36 | | 31 | 12 | 18 | | 34 | 194 | 37 | | 32 | 129 | 4 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 80 | | | | 70 | | | 39 | | | | 37 | | |
| Capacity, c (veh/h) | | | 560 | | | | 433 | | | 1422 | | | | 1293 | | |
| v/c Ratio | | | 0.14 | | | | 0.16 | | | 0.03 | | | | 0.03 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.5 | | | | 0.6 | | | 0.1 | | | | 0.1 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 12.8 | | | | 15.4 | | | | | | | | | |
| Control Delay (s/veh) | | | 12.5 | | | | 14.9 | | | 7.6 | 0.2 | 0.2 | | 7.9 | 0.2 | 0.2 |
| Level of Service (LOS) | | | B | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 12.5 | | | | 14.9 | | | | 1.2 | | | | 1.7 | | | |
| Approach LOS | B | | | | B | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

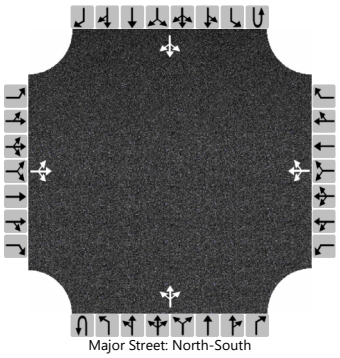
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Yuhas Ave/Lander Rd |
| Jurisdiction | City of Helena |
| East/West Street | Yuhas Ave/Lander Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.90 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 19 | 0 | 0 | | 0 | 0 | 0 | | 6 | 64 | 4 | | 2 | 221 | 4 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | 0 | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 21 | | | | 0 | | | 7 | | | | 2 | | |
| Capacity, c (veh/h) | | | 609 | | | | 0 | | | 1310 | | | | 1517 | | |
| v/c Ratio | | | 0.03 | | | | | | | 0.01 | | | | 0.00 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.1 | | | | | | | 0.0 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 2.6 | | | | | | | | | | | | | |
| Control Delay (s/veh) | | | 11.1 | | | | | | | 7.8 | 0.0 | 0.0 | | 7.4 | 0.0 | 0.0 |
| Level of Service (LOS) | | | B | | | | | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | | 11.1 | | | | | | | | 0.7 | | | | 0.1 | | |
| Approach LOS | | B | | | | | | | | A | | | | A | | |

# HCS Two-Way Stop-Control Report

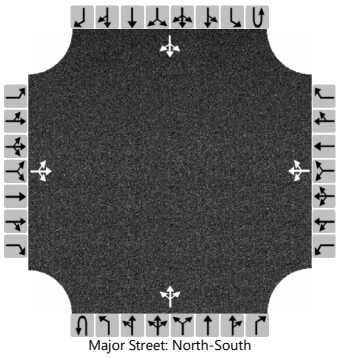
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Yuhas Ave/Lander Rd |
| Jurisdiction | City of Helena |
| East/West Street | Yuhas Ave/Lander Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.90 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 21 | 0 | 32 | | 0 | 0 | 0 | | 52 | 70 | 4 | | 2 | 229 | 7 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | 0 | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 59 | | | | 0 | | | 58 | | | | 2 | | |
| Capacity, c (veh/h) | | | 629 | | | | 0 | | | 1296 | | | | 1509 | | |
| v/c Ratio | | | 0.09 | | | | | | | 0.04 | | | | 0.00 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.3 | | | | | | | 0.1 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 7.7 | | | | | | | | | | | | | |
| Control Delay (s/veh) | | | 11.3 | | | | | | | 7.9 | 0.4 | 0.4 | | 7.4 | 0.0 | 0.0 |
| Level of Service (LOS) | | | B | | | | | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | | 11.3 | | | | | | | | 3.5 | | | | 0.1 | | |
| Approach LOS | | B | | | | | | | | A | | | | A | | |

# HCS Two-Way Stop-Control Report

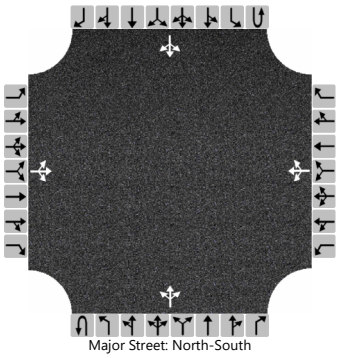
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Yuhas Ave/Lander Rd |
| Jurisdiction | City of Helena |
| East/West Street | Yuhas Ave/Lander Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.90 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 4 | 0 | 10 | | 0 | 2 | 2 | | 2 | 155 | 11 | | 1 | 91 | 2 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 16 | | | | 4 | | | 2 | | | | 1 | | |
| Capacity, c (veh/h) | | | 842 | | | | 720 | | | 1482 | | | | 1384 | | |
| v/c Ratio | | | 0.02 | | | | 0.01 | | | 0.00 | | | | 0.00 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.1 | | | | 0.0 | | | 0.0 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 2.6 | | | | 0.0 | | | | | | | | | |
| Control Delay (s/veh) | | | 9.4 | | | | 10.0 | | | 7.4 | 0.0 | 0.0 | | 7.6 | 0.0 | 0.0 |
| Level of Service (LOS) | | | A | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 9.4 | | | | 10.0 | | | | 0.1 | | | | 0.1 | | | |
| Approach LOS | A | | | | B | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

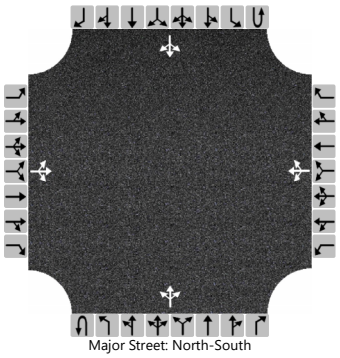
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Yuhas Ave/Lander Rd |
| Jurisdiction | City of Helena |
| East/West Street | Yuhas Ave/Lander Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.90 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 8 | 0 | 65 | | 0 | 2 | 2 | | 40 | 165 | 11 | | 1 | 98 | 5 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 81 | | | | 4 | | | 44 | | | | 1 | | |
| Capacity, c (veh/h) | | | 868 | | | | 646 | | | 1468 | | | | 1371 | | |
| v/c Ratio | | | 0.09 | | | | 0.01 | | | 0.03 | | | | 0.00 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.3 | | | | 0.0 | | | 0.1 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 7.7 | | | | 0.0 | | | | | | | | | |
| Control Delay (s/veh) | | | 9.6 | | | | 10.6 | | | 7.5 | 0.3 | 0.3 | | 7.6 | 0.0 | 0.0 |
| Level of Service (LOS) | | | A | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 9.6 | | | | 10.6 | | | | 1.6 | | | | 0.1 | | | |
| Approach LOS | A | | | | B | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

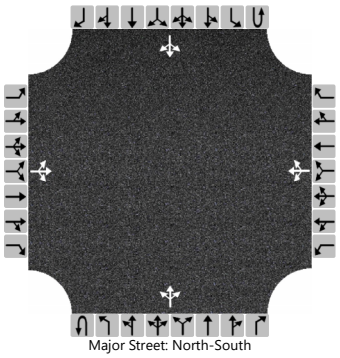
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Mill Rd |
| Jurisdiction | City of Helena |
| East/West Street | Mill Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.87 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 8 | 50 | 34 | | 27 | 41 | 7 | | 9 | 33 | 6 | | 14 | 86 | 2 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | 0 | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 106 | | | | 86 | | | 10 | | | | 16 | | |
| Capacity, c (veh/h) | | | 761 | | | | 678 | | | 1485 | | | | 1557 | | |
| v/c Ratio | | | 0.14 | | | | 0.13 | | | 0.01 | | | | 0.01 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.5 | | | | 0.4 | | | 0.0 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 12.8 | | | | 10.2 | | | | | | | | | |
| Control Delay (s/veh) | | | 10.5 | | | | 11.1 | | | 7.4 | 0.1 | 0.1 | | 7.3 | 0.1 | 0.1 |
| Level of Service (LOS) | | | B | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | | 10.5 | | | | 11.1 | | | | 1.4 | | | | 1.1 | | |
| Approach LOS | | B | | | | B | | | | A | | | | A | | |

# HCS Two-Way Stop-Control Report

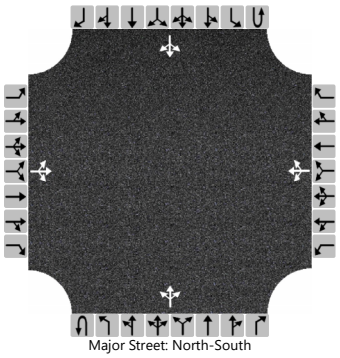
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Mill Rd |
| Jurisdiction | City of Helena |
| East/West Street | Mill Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.87 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes



Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 8 | 50 | 37 | | 32 | 41 | 7 | | 11 | 35 | 9 | | 14 | 89 | 2 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 109 | | | | 92 | | | 13 | | | | 16 | | |
| Capacity, c (veh/h) | | | 755 | | | | 659 | | | 1481 | | | | 1549 | | |
| v/c Ratio | | | 0.14 | | | | 0.14 | | | 0.01 | | | | 0.01 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.5 | | | | 0.5 | | | 0.0 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 12.8 | | | | 12.8 | | | | | | | | | |
| Control Delay (s/veh) | | | 10.6 | | | | 11.3 | | | 7.5 | 0.1 | 0.1 | | 7.3 | 0.1 | 0.1 |
| Level of Service (LOS) | | | B | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | 10.6 | | | | 11.3 | | | | 1.5 | | | | 1.0 | | | |
| Approach LOS | B | | | | B | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

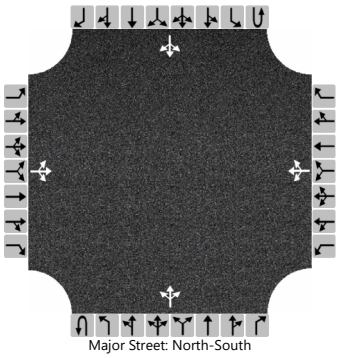
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Mill Rd |
| Jurisdiction | City of Helena |
| East/West Street | Mill Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.90 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 2 | 41 | 17 | | 13 | 61 | 34 | | 23 | 99 | 11 | | 18 | 34 | 6 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | 0 | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 67 | | | | 120 | | | 26 | | | | 20 | | |
| Capacity, c (veh/h) | | | 701 | | | | 695 | | | 1557 | | | | 1459 | | |
| v/c Ratio | | | 0.10 | | | | 0.17 | | | 0.02 | | | | 0.01 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.3 | | | | 0.6 | | | 0.1 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 7.7 | | | | 15.4 | | | | | | | | | |
| Control Delay (s/veh) | | | 10.7 | | | | 11.3 | | | 7.4 | 0.1 | 0.1 | | 7.5 | 0.1 | 0.1 |
| Level of Service (LOS) | | | B | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | | 10.7 | | | | 11.3 | | | | 1.4 | | | | 2.4 | | |
| Approach LOS | | B | | | | B | | | | A | | | | A | | |

# HCS Two-Way Stop-Control Report

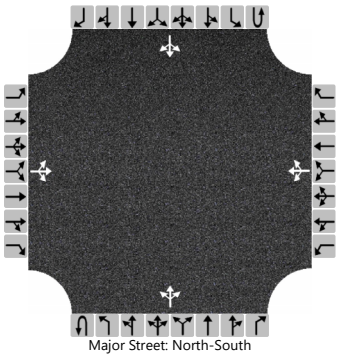
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Mill Rd |
| Jurisdiction | City of Helena |
| East/West Street | Mill Rd |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.90 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 2 | 41 | 20 | | 17 | 61 | 34 | | 27 | 103 | 17 | | 18 | 37 | 6 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | | | | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | 0 | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 | | 4.13 | | | | 4.13 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 70 | | | | 124 | | | 30 | | | | 20 | | |
| Capacity, c (veh/h) | | | 692 | | | | 673 | | | 1553 | | | | 1445 | | |
| v/c Ratio | | | 0.10 | | | | 0.19 | | | 0.02 | | | | 0.01 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.3 | | | | 0.7 | | | 0.1 | | | | 0.0 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 7.7 | | | | 17.9 | | | | | | | | | |
| Control Delay (s/veh) | | | 10.8 | | | | 11.6 | | | 7.4 | 0.2 | 0.2 | | 7.5 | 0.1 | 0.1 |
| Level of Service (LOS) | | | B | | | | B | | | A | A | A | | A | A | A |
| Approach Delay (s/veh) | | 10.8 | | | | 11.6 | | | | 1.5 | | | | 2.3 | | |
| Approach LOS | | B | | | | B | | | | A | | | | A | | |

# HCS Two-Way Stop-Control Report

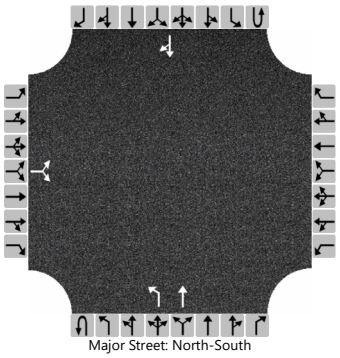
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | N Montana Ave & Wolf Rd |
| Jurisdiction | City of Helena |
| East/West Street | Wolf Rd |
| North/South Street | N Montana Ave |
| Peak Hour Factor | 0.90 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LR | | | | | | | L | T | | | | | TR |
| Volume (veh/h) | | 2 | | 34 | | | | | | 7 | 310 | | | | 804 | 14 |
| Percent Heavy Vehicles (%) | | 3 | | 3 | | | | | | 3 | | | | | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Left Only | | | | | | | | 1 | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | | 6.2 | | | | | | 4.1 | | | | | | |
| Critical Headway (sec) | | 6.43 | | 6.23 | | | | | | 4.13 | | | | | | |
| Base Follow-Up Headway (sec) | | 3.5 | | 3.3 | | | | | | 2.2 | | | | | | |
| Follow-Up Headway (sec) | | 3.53 | | 3.33 | | | | | | 2.23 | | | | | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 40 | | | | | | | 8 | | | | | | |
| Capacity, c (veh/h) | | | 333 | | | | | | | 745 | | | | | | |
| v/c Ratio | | | 0.12 | | | | | | | 0.01 | | | | | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.4 | | | | | | | 0.0 | | | | | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 10.2 | | | | | | | 0.0 | | | | | | |
| Control Delay (s/veh) | | | 17.3 | | | | | | | 9.9 | | | | | | |
| Level of Service (LOS) | | | C | | | | | | | A | | | | | | |
| Approach Delay (s/veh) | | 17.3 | | | | | | | | 0.2 | | | | | | |
| Approach LOS | | C | | | | | | | | A | | | | | | |

# HCS Two-Way Stop-Control Report

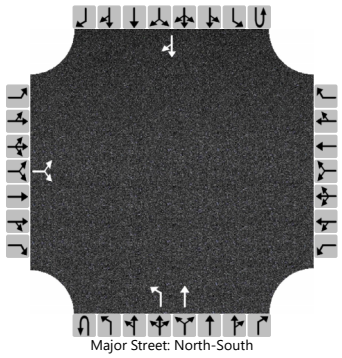
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | N Montana Ave & Wolf Rd |
| Jurisdiction | City of Helena |
| East/West Street | Wolf Rd |
| North/South Street | N Montana Ave |
| Peak Hour Factor | 0.90 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LR | | | | | | | L | T | | | | | TR |
| Volume (veh/h) | | 16 | | 55 | | | | | | 20 | 313 | | | | 804 | 38 |
| Percent Heavy Vehicles (%) | | 3 | | 3 | | | | | | 3 | | | | | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Left Only | | | | | | | | 1 | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | | 6.2 | | | | | | 4.1 | | | | | | |
| Critical Headway (sec) | | 6.43 | | 6.23 | | | | | | 4.13 | | | | | | |
| Base Follow-Up Headway (sec) | | 3.5 | | 3.3 | | | | | | 2.2 | | | | | | |
| Follow-Up Headway (sec) | | 3.53 | | 3.33 | | | | | | 2.23 | | | | | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 79 | | | | | | | 22 | | | | | | |
| Capacity, c (veh/h) | | | 320 | | | | | | | 728 | | | | | | |
| v/c Ratio | | | 0.25 | | | | | | | 0.03 | | | | | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.9 | | | | | | | 0.1 | | | | | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 23.0 | | | | | | | 2.6 | | | | | | |
| Control Delay (s/veh) | | | 19.9 | | | | | | | 10.1 | | | | | | |
| Level of Service (LOS) | | | C | | | | | | | B | | | | | | |
| Approach Delay (s/veh) | | 19.9 | | | | | | | | 0.6 | | | | | | |
| Approach LOS | | C | | | | | | | | A | | | | | | |

# HCS Two-Way Stop-Control Report

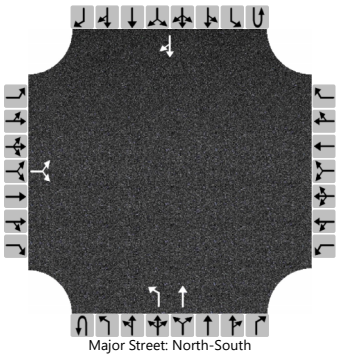
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | N Montana Ave & Wolf Rd |
| Jurisdiction | City of Helena |
| East/West Street | Wolf Rd |
| North/South Street | N Montana Ave |
| Peak Hour Factor | 0.98 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes




## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LR | | | | | | | L | T | | | | | TR |
| Volume (veh/h) | | 6 | | 28 | | | | | | 63 | 1006 | | | | 558 | 4 |
| Percent Heavy Vehicles (%) | | 3 | | 3 | | | | | | 3 | | | | | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Left Only | | | | | | | | 1 | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | | 6.2 | | | | | | 4.1 | | | | | | |
| Critical Headway (sec) | | 6.43 | | 6.23 | | | | | | 4.13 | | | | | | |
| Base Follow-Up Headway (sec) | | 3.5 | | 3.3 | | | | | | 2.2 | | | | | | |
| Follow-Up Headway (sec) | | 3.53 | | 3.33 | | | | | | 2.23 | | | | | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 35 | | | | | | | 64 | | | | | | |
| Capacity, c (veh/h) | | | 409 | | | | | | | 995 | | | | | | |
| v/c Ratio | | | 0.08 | | | | | | | 0.06 | | | | | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.3 | | | | | | | 0.2 | | | | | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 7.7 | | | | | | | 5.1 | | | | | | |
| Control Delay (s/veh) | | | 14.6 | | | | | | | 8.9 | | | | | | |
| Level of Service (LOS) | | | B | | | | | | | A | | | | | | |
| Approach Delay (s/veh) | | 14.6 | | | | | | | | 0.5 | | | | | | |
| Approach LOS | | B | | | | | | | | A | | | | | | |

# HCS Two-Way Stop-Control Report

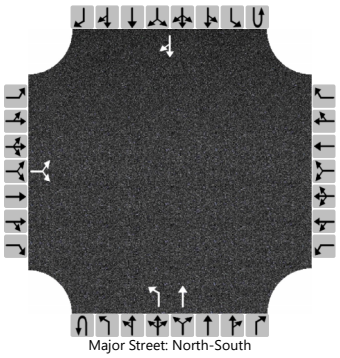
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | N Montana Ave & Wolf Rd |
| Jurisdiction | City of Helena |
| East/West Street | Wolf Rd |
| North/South Street | N Montana Ave |
| Peak Hour Factor | 0.98 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LR | | | | | | | L | T | | | | | TR |
| Volume (veh/h) | | 29 | | 63 | | | | | | 74 | 1012 | | | | 558 | 25 |
| Percent Heavy Vehicles (%) | | 3 | | 3 | | | | | | 3 | | | | | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Left Only | | | | | | | | 1 | | | | | | |

## Critical and Follow-up Headways

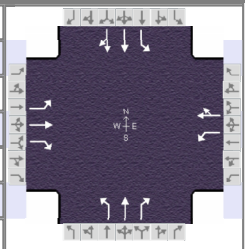
| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | | 6.2 | | | | | | 4.1 | | | | | | |
| Critical Headway (sec) | | 6.43 | | 6.23 | | | | | | 4.13 | | | | | | |
| Base Follow-Up Headway (sec) | | 3.5 | | 3.3 | | | | | | 2.2 | | | | | | |
| Follow-Up Headway (sec) | | 3.53 | | 3.33 | | | | | | 2.23 | | | | | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 94 | | | | | | | 76 | | | | | | |
| Capacity, c (veh/h) | | | 340 | | | | | | | 976 | | | | | | |
| v/c Ratio | | | 0.28 | | | | | | | 0.08 | | | | | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 1.1 | | | | | | | 0.3 | | | | | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 28.2 | | | | | | | 7.7 | | | | | | |
| Control Delay (s/veh) | | | 19.6 | | | | | | | 9.0 | | | | | | |
| Level of Service (LOS) | | | C | | | | | | | A | | | | | | |
| Approach Delay (s/veh) | | 19.6 | | | | | | | | 0.6 | | | | | | |
| Approach LOS | | C | | | | | | | | A | | | | | | |

# HCS Signalized Intersection Results Summary

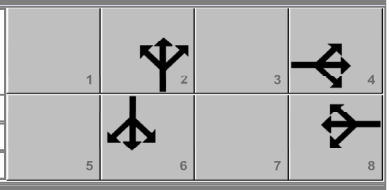
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 7, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | AM No-Build | PHF | 0.91 |
| Urban Street | N Montana Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | N Montana Ave & Partri… | File Name | IAMN.xus | | |
| Project Description | AM No-Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 13 | 4 | 38 | 9 | 6 | 4 | 47 | 264 | 15 | 11 | 683 | 31 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 44.2 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 27.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Yellow | 5.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Red | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | |



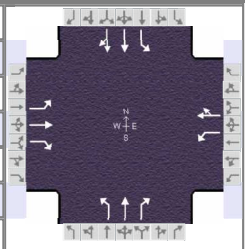

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 4 | | 8 | | 2 | | 6 |
| Case Number | | 5.0 | | 6.0 | | 5.0 | | 6.0 |
| Phase Duration, s | | 9.2 | | 9.2 | | 35.0 | | 35.0 |
| Change Period, ( $Y+R_c$ ), s | | 6.0 | | 6.0 | | 8.0 | | 8.0 |
| Max Allow Headway ( *MAH* ), s | | 4.2 | | 4.2 | | 4.2 | | 4.2 |
| Queue Clearance Time ( $g_s$ ), s | | 3.1 | | 2.4 | | 8.4 | | 6.6 |
| Green Extension Time ( $g_e$ ), s | | 0.2 | | 0.2 | | 5.0 | | 5.0 |
| Phase Call Probability | | 0.63 | | 0.63 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.00 | | 0.00 | | 0.01 | | 0.01 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Adjusted Flow Rate ( *v* ), veh/h | 14 | 4 | 42 | 10 | 11 | | 52 | 290 | 16 | 12 | 395 | 389 |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1383 | 1856 | 1572 | 1401 | 1728 | | 684 | 1870 | 1571 | 1080 | 1885 | 1856 |
| Queue Service Time ( $g_s$ ), s | 0.4 | 0.1 | 1.1 | 0.3 | 0.3 | | 1.8 | 3.2 | 0.2 | 0.2 | 4.6 | 4.6 |
| Cycle Queue Clearance Time ( $g_c$ ), s | 0.7 | 0.1 | 1.1 | 0.4 | 0.3 | | 6.4 | 3.2 | 0.2 | 3.4 | 4.6 | 4.6 |
| Green Ratio ( *g/C* ) | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | | 0.61 | 0.61 | 0.61 | 0.61 | 0.61 | 0.61 |
| Capacity ( *c* ), veh/h | 256 | 136 | 115 | 263 | 127 | | 509 | 1141 | 959 | 744 | 1150 | 1133 |
| Volume-to-Capacity Ratio ( *X* ) | 0.056 | 0.032 | 0.362 | 0.038 | 0.087 | | 0.101 | 0.254 | 0.017 | 0.016 | 0.344 | 0.344 |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 6 | 2 | 19 | 4 | 5 | | 8 | 28 | 1 | 2 | 41 | 40 |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 0.2 | 0.1 | 0.8 | 0.2 | 0.2 | | 0.3 | 1.1 | 0.1 | 0.1 | 1.6 | 1.6 |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.13 | 0.04 | 0.43 | 0.07 | 0.08 | | 0.03 | 0.09 | 0.00 | 0.01 | 0.24 | 0.24 |
| Uniform Delay ( $d_1$ ), s/veh | 19.4 | 19.0 | 19.5 | 19.2 | 19.1 | | 5.8 | 4.0 | 3.4 | 4.8 | 4.3 | 4.3 |
| Incremental Delay ( $d_2$ ), s/veh | 0.1 | 0.1 | 1.9 | 0.1 | 0.3 | | 0.1 | 0.1 | 0.0 | 0.0 | 0.2 | 0.2 |
| 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 |
| Control Delay ( *d* ), s/veh | 19.5 | 19.1 | 21.4 | 19.3 | 19.4 | | 5.9 | 4.1 | 3.4 | 4.8 | 4.4 | 4.4 |
| Level of Service (LOS) | B | B | C | B | B | | A | A | A | A | A | A |
| Approach Delay, s/veh / LOS | 20.8 | C | | 19.3 | B | | 4.3 | A | | 4.4 | A | |
| Intersection Delay, s/veh / LOS | 5.5 | | | | | | A | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 2.28 | B | 2.11 | B | 1.85 | B | 2.04 | B |
| Bicycle LOS Score / LOS | 0.59 | A | 0.52 | A | 1.08 | A | 1.14 | A |

# HCS Signalized Intersection Results Summary

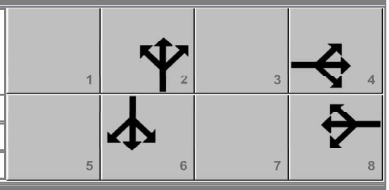
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 7, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | AM Full Build | PHF | 0.91 |
| Urban Street | N Montana Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | N Montana Ave & Partri… | File Name | IAMB.xus | | |
| Project Description | AM Full Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 16 | 5 | 38 | 9 | 8 | 6 | 47 | 275 | 15 | 12 | 702 | 31 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 44.4 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 27.0 | 3.4 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Yellow | 5.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Red | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | |



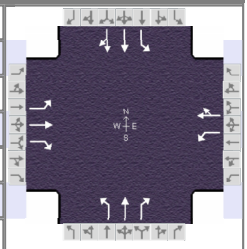

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 4 | | 8 | | 2 | | 6 |
| Case Number | | 5.0 | | 6.0 | | 5.0 | | 6.0 |
| Phase Duration, s | | 9.4 | | 9.4 | | 35.0 | | 35.0 |
| Change Period, ( $Y+R_c$ ), s | | 6.0 | | 6.0 | | 8.0 | | 8.0 |
| Max Allow Headway ( *MAH* ), s | | 4.2 | | 4.2 | | 4.2 | | 4.2 |
| Queue Clearance Time ( $g_s$ ), s | | 3.1 | | 2.4 | | 8.6 | | 6.8 |
| Green Extension Time ( $g_e$ ), s | | 0.2 | | 0.3 | | 5.2 | | 5.2 |
| Phase Call Probability | | 0.67 | | 0.67 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.00 | | 0.00 | | 0.02 | | 0.01 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Adjusted Flow Rate ( *v* ), veh/h | 18 | 5 | 42 | 10 | 15 | | 52 | 302 | 16 | 13 | 406 | 400 |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1379 | 1856 | 1572 | 1399 | 1719 | | 671 | 1870 | 1571 | 1068 | 1885 | 1857 |
| Queue Service Time ( $g_s$ ), s | 0.5 | 0.1 | 1.1 | 0.3 | 0.4 | | 1.9 | 3.4 | 0.2 | 0.3 | 4.8 | 4.8 |
| Cycle Queue Clearance Time ( $g_c$ ), s | 0.9 | 0.1 | 1.1 | 0.4 | 0.4 | | 6.6 | 3.4 | 0.2 | 3.6 | 4.8 | 4.8 |
| Green Ratio ( *g/C* ) | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | | 0.61 | 0.61 | 0.61 | 0.61 | 0.61 | 0.61 |
| Capacity ( *c* ), veh/h | 258 | 144 | 122 | 267 | 133 | | 497 | 1136 | 955 | 730 | 1145 | 1128 |
| Volume-to-Capacity Ratio ( *X* ) | 0.068 | 0.038 | 0.343 | 0.037 | 0.115 | | 0.104 | 0.266 | 0.017 | 0.018 | 0.354 | 0.354 |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 7 | 2 | 19 | 4 | 7 | | 8 | 31 | 1 | 2 | 44 | 43 |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 0.3 | 0.1 | 0.7 | 0.2 | 0.3 | | 0.3 | 1.2 | 0.1 | 0.1 | 1.7 | 1.7 |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.16 | 0.05 | 0.42 | 0.07 | 0.11 | | 0.03 | 0.10 | 0.00 | 0.01 | 0.26 | 0.25 |
| Uniform Delay ( $d_1$ ), s/veh | 19.5 | 19.0 | 19.4 | 19.1 | 19.1 | | 6.0 | 4.1 | 3.5 | 4.9 | 4.4 | 4.4 |
| Incremental Delay ( $d_2$ ), s/veh | 0.1 | 0.1 | 1.7 | 0.1 | 0.4 | | 0.1 | 0.1 | 0.0 | 0.0 | 0.2 | 0.2 |
| 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 |
| Control Delay ( *d* ), s/veh | 19.6 | 19.1 | 21.1 | 19.2 | 19.5 | | 6.1 | 4.2 | 3.5 | 4.9 | 4.5 | 4.6 |
| Level of Service (LOS) | B | B | C | B | B | | A | A | A | A | A | A |
| Approach Delay, s/veh / LOS | 20.5 | C | | 19.4 | B | | 4.4 | A | | 4.6 | A | |
| Intersection Delay, s/veh / LOS | 5.6 | | | | | | A | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 2.28 | B | 2.11 | B | 1.85 | B | 2.04 | B |
| Bicycle LOS Score / LOS | 0.59 | A | 0.53 | A | 1.10 | A | 1.16 | A |

# HCS Signalized Intersection Results Summary

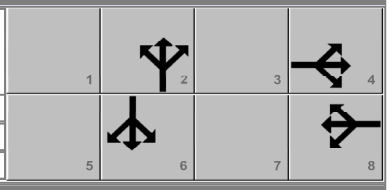
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 7, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | PM No-Build | PHF | 0.98 |
| Urban Street | N Montana Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | N Montana Ave & Partri… | File Name | IPMN.xus | | |
| Project Description | PM No-Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 92 | 44 | 87 | 125 | 30 | 62 | 66 | 769 | 74 | 24 | 471 | 24 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 50.5 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 27.0 | 9.5 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Yellow | 5.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Red | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | |



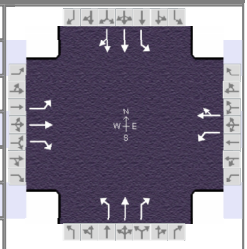

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 4 | | 8 | | 2 | | 6 |
| Case Number | | 5.0 | | 6.0 | | 5.0 | | 6.0 |
| Phase Duration, s | | 15.5 | | 15.5 | | 35.0 | | 35.0 |
| Change Period, ( $Y+R_c$ ), s | | 6.0 | | 6.0 | | 8.0 | | 8.0 |
| Max Allow Headway ( *MAH* ), s | | 4.3 | | 4.3 | | 4.2 | | 4.2 |
| Queue Clearance Time ( $g_s$ ), s | | 7.9 | | 7.4 | | 19.0 | | 20.5 |
| Green Extension Time ( $g_e$ ), s | | 1.5 | | 1.5 | | 6.5 | | 6.4 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.01 | | 0.00 | | 0.17 | | 0.19 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Adjusted Flow Rate ( *v* ), veh/h | 94 | 45 | 89 | 128 | 94 | | 67 | 785 | 76 | 24 | 254 | 251 |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1289 | 1856 | 1572 | 1350 | 1652 | | 887 | 1870 | 1572 | 684 | 1885 | 1853 |
| Queue Service Time ( $g_s$ ), s | 3.4 | 1.0 | 2.5 | 4.4 | 2.5 | | 2.2 | 17.0 | 1.2 | 1.5 | 3.7 | 3.7 |
| Cycle Queue Clearance Time ( $g_c$ ), s | 5.9 | 1.0 | 2.5 | 5.4 | 2.5 | | 5.9 | 17.0 | 1.2 | 18.5 | 3.7 | 3.7 |
| Green Ratio ( *g/C* ) | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 |
| Capacity ( *c* ), veh/h | 322 | 349 | 296 | 369 | 311 | | 553 | 1000 | 841 | 279 | 1008 | 991 |
| Volume-to-Capacity Ratio ( *X* ) | 0.292 | 0.129 | 0.300 | 0.345 | 0.302 | | 0.122 | 0.785 | 0.090 | 0.088 | 0.252 | 0.253 |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 44 | 18 | 38 | 58 | 40 | | 16 | 223 | 13 | 10 | 47 | 46 |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 1.7 | 0.7 | 1.5 | 2.3 | 1.6 | | 0.6 | 8.8 | 0.5 | 0.4 | 1.9 | 1.8 |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.97 | 0.41 | 0.85 | 0.97 | 0.67 | | 0.05 | 0.74 | 0.04 | 0.08 | 0.28 | 0.27 |
| Uniform Delay ( $d_1$ ), s/veh | 20.2 | 17.1 | 17.6 | 19.3 | 17.7 | | 7.9 | 9.4 | 5.7 | 16.8 | 6.3 | 6.3 |
| Incremental Delay ( $d_2$ ), s/veh | 0.5 | 0.2 | 0.6 | 0.6 | 0.5 | | 0.1 | 1.7 | 0.0 | 0.1 | 0.1 | 0.1 |
| 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 |
| Control Delay ( *d* ), s/veh | 20.7 | 17.2 | 18.2 | 19.9 | 18.2 | | 8.0 | 11.1 | 5.8 | 16.9 | 6.4 | 6.5 |
| Level of Service (LOS) | C | B | B | B | B | | A | B | A | B | A | A |
| Approach Delay, s/veh / LOS | 19.0 | B | | 19.2 | B | | 10.5 | B | | 6.9 | A | |
| Intersection Delay, s/veh / LOS | 11.5 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 2.27 | B | 2.10 | B | 1.87 | B | 2.06 | B |
| Bicycle LOS Score / LOS | 0.86 | A | 0.85 | A | 2.02 | B | 0.92 | A |

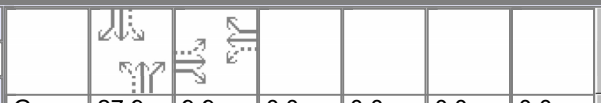
# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | Morrison-Maierle | | | Duration, h | 0.250 |
| Analyst | C. Grant Duininck | Analysis Date | Feb 7, 2025 | Area Type | Other |
| Jurisdiction | City of Helena | Time Period | PM No-Build | PHF | 0.98 |
| Urban Street | N Montana Avenue | Analysis Year | 2035 | Analysis Period | 1> 7:00 |
| Intersection | N Montana Ave & Partri… | File Name | IPMB.xus | | |
| Project Description | PM Full Build | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 98 | 46 | 87 | 125 | 31 | 63 | 66 | 779 | 74 | 26 | 504 | 24 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 51.8 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |



| | | | | | | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| Green | 27.9 | 9.9 | 0.0 | 0.0 | 0.0 | 0.0 | 5 | 6 | 7 | 8 |
| Yellow | 5.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | |
| Red | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | |

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 4 | | 8 | | 2 | | 6 |
| Case Number | | 5.0 | | 6.0 | | 5.0 | | 6.0 |
| Phase Duration, s | | 15.9 | | 15.9 | | 35.9 | | 35.9 |
| Change Period, ( $Y+R_c$ ), s | | 6.0 | | 6.0 | | 8.0 | | 8.0 |
| Max Allow Headway ( *MAH* ), s | | 4.3 | | 4.3 | | 4.2 | | 4.2 |
| Queue Clearance Time ( $g_s$ ), s | | 8.3 | | 7.6 | | 19.7 | | 21.5 |
| Green Extension Time ( $g_e$ ), s | | 1.6 | | 1.6 | | 6.7 | | 6.5 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.01 | | 0.00 | | 0.20 | | 0.24 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Adjusted Flow Rate ( *v* ), veh/h | 100 | 47 | 89 | 128 | 96 | | 67 | 795 | 76 | 27 | 271 | 268 |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 1287 | 1856 | 1572 | 1348 | 1653 | | 859 | 1870 | 1572 | 678 | 1885 | 1854 |
| Queue Service Time ( $g_s$ ), s | 3.7 | 1.1 | 2.5 | 4.5 | 2.6 | | 2.4 | 17.7 | 1.2 | 1.7 | 4.0 | 4.0 |
| Cycle Queue Clearance Time ( $g_c$ ), s | 6.3 | 1.1 | 2.5 | 5.6 | 2.6 | | 6.5 | 17.7 | 1.2 | 19.5 | 4.0 | 4.0 |
| Green Ratio ( *g/C* ) | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 |
| Capacity ( *c* ), veh/h | 322 | 355 | 301 | 369 | 316 | | 533 | 1007 | 846 | 271 | 1015 | 998 |
| Volume-to-Capacity Ratio ( *X* ) | 0.311 | 0.132 | 0.295 | 0.346 | 0.304 | | 0.126 | 0.790 | 0.089 | 0.098 | 0.267 | 0.268 |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 48 | 20 | 39 | 60 | 42 | | 16 | 234 | 13 | 11 | 52 | 51 |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 1.9 | 0.8 | 1.5 | 2.3 | 1.6 | | 0.6 | 9.2 | 0.5 | 0.4 | 2.1 | 2.1 |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 1.07 | 0.44 | 0.87 | 1.00 | 0.70 | | 0.05 | 0.78 | 0.04 | 0.09 | 0.31 | 0.30 |
| Uniform Delay ( $d_1$ ), s/veh | 20.7 | 17.4 | 17.9 | 19.7 | 18.0 | | 8.2 | 9.6 | 5.8 | 17.5 | 6.4 | 6.4 |
| Incremental Delay ( $d_2$ ), s/veh | 0.5 | 0.2 | 0.5 | 0.6 | 0.5 | | 0.1 | 1.9 | 0.0 | 0.2 | 0.1 | 0.1 |
| 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 |
| Control Delay ( *d* ), s/veh | 21.2 | 17.5 | 18.5 | 20.2 | 18.5 | | 8.4 | 11.5 | 5.8 | 17.6 | 6.6 | 6.6 |
| Level of Service (LOS) | C | B | B | C | B | | A | B | A | B | A | A |
| Approach Delay, s/veh / LOS | 19.4 | B | | 19.5 | B | | 10.8 | B | | 7.1 | A | |
| Intersection Delay, s/veh / LOS | 11.8 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 2.27 | B | 2.10 | B | 1.87 | B | 2.06 | B |
| Bicycle LOS Score / LOS | 0.88 | A | 0.86 | A | 2.03 | B | 0.95 | A |

# HCS Two-Way Stop-Control Report

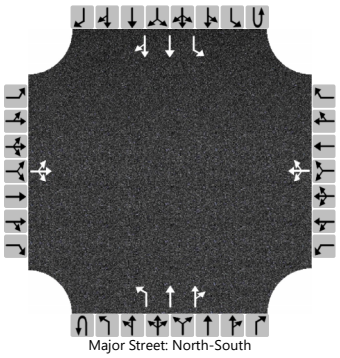
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | N Montana Ave & Road Runner St |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | N Montana Ave |
| Peak Hour Factor | 0.86 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration | | | LTR | | | | LTR | | | L | T | TR | | L | T | TR |
| Volume (veh/h) | | 0 | 0 | 60 | | 1 | 3 | 9 | 0 | 66 | 346 | 25 | 0 | 22 | 682 | 8 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | 3 | 3 | | | 3 | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.5 | 6.5 | 6.9 | | 7.5 | 6.5 | 6.9 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.56 | 6.56 | 6.96 | | 7.56 | 6.56 | 6.96 | | 4.16 | | | | 4.16 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 70 | | | | 15 | | | 77 | | | | 26 | | |
| Capacity, c (veh/h) | | | 596 | | | | 298 | | | 811 | | | | 1117 | | |
| v/c Ratio | | | 0.12 | | | | 0.05 | | | 0.09 | | | | 0.02 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.4 | | | | 0.2 | | | 0.3 | | | | 0.1 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 10.2 | | | | 5.1 | | | 7.7 | | | | 2.6 | | |
| Control Delay (s/veh) | | | 11.8 | | | | 17.7 | | | 9.9 | | | | 8.3 | | |
| Level of Service (LOS) | | | B | | | | C | | | A | | | | A | | |
| Approach Delay (s/veh) | 11.8 | | | | 17.7 | | | | 1.5 | | | | 0.3 | | | |
| Approach LOS | B | | | | C | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

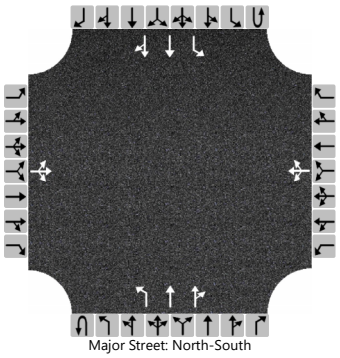
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | N Montana Ave & Road Runner St |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | N Montana Ave |
| Peak Hour Factor | 0.86 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration | | | LTR | | | | LTR | | | L | T | TR | | L | T | TR |
| Volume (veh/h) | | 0 | 0 | 70 | | 1 | 3 | 9 | 0 | 76 | 357 | 25 | 0 | 22 | 701 | 8 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | 3 | 3 | | | 3 | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.5 | 6.5 | 6.9 | | 7.5 | 6.5 | 6.9 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.56 | 6.56 | 6.96 | | 7.56 | 6.56 | 6.96 | | 4.16 | | | | 4.16 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 81 | | | | 15 | | | 88 | | | | 26 | | |
| Capacity, c (veh/h) | | | 586 | | | | 275 | | | 795 | | | | 1105 | | |
| v/c Ratio | | | 0.14 | | | | 0.06 | | | 0.11 | | | | 0.02 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.5 | | | | 0.2 | | | 0.4 | | | | 0.1 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 12.8 | | | | 5.1 | | | 10.2 | | | | 2.6 | | |
| Control Delay (s/veh) | | | 12.1 | | | | 18.9 | | | 10.1 | | | | 8.3 | | |
| Level of Service (LOS) | | | B | | | | C | | | B | | | | A | | |
| Approach Delay (s/veh) | 12.1 | | | | 18.9 | | | | 1.7 | | | | 0.3 | | | |
| Approach LOS | B | | | | C | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

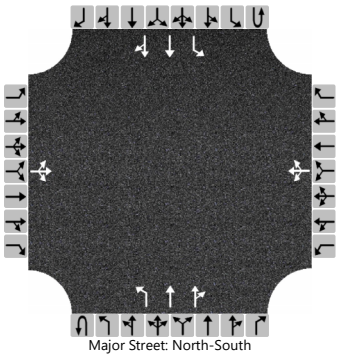
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM No-Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | N Montana Ave & Road Runner St |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | N Montana Ave |
| Peak Hour Factor | 0.96 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration | | | LTR | | | | LTR | | | L | T | TR | | L | T | TR |
| Volume (veh/h) | | 1 | 2 | 145 | | 8 | 12 | 32 | 0 | 142 | 874 | 106 | 0 | 51 | 599 | 32 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | 3 | 3 | | | 3 | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.5 | 6.5 | 6.9 | | 7.5 | 6.5 | 6.9 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.56 | 6.56 | 6.96 | | 7.56 | 6.56 | 6.96 | | 4.16 | | | | 4.16 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 154 | | | | 54 | | | 148 | | | | 53 | | |
| Capacity, c (veh/h) | | | 509 | | | | 91 | | | 920 | | | | 670 | | |
| v/c Ratio | | | 0.30 | | | | 0.60 | | | 0.16 | | | | 0.08 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 1.3 | | | | 2.8 | | | 0.6 | | | | 0.3 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 33.3 | | | | 71.7 | | | 15.4 | | | | 7.7 | | |
| Control Delay (s/veh) | | | 15.1 | | | | 91.7 | | | 9.7 | | | | 10.8 | | |
| Level of Service (LOS) | | | C | | | | F | | | A | | | | B | | |
| Approach Delay (s/veh) | 15.1 | | | | 91.7 | | | | 1.2 | | | | 0.8 | | | |
| Approach LOS | C | | | | F | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

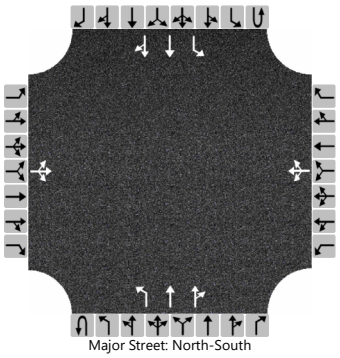
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | N Montana Ave & Road Runner St |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | N Montana Ave |
| Peak Hour Factor | 0.96 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration | | | LTR | | | | LTR | | | L | T | TR | | L | T | TR |
| Volume (veh/h) | | 1 | 2 | 163 | | 8 | 12 | 32 | 0 | 150 | 884 | 106 | 0 | 51 | 632 | 32 |
| Percent Heavy Vehicles (%) | | 3 | 3 | 3 | | 3 | 3 | 3 | 3 | 3 | | | 3 | 3 | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | 0 | | | | 0 | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.5 | 6.5 | 6.9 | | 7.5 | 6.5 | 6.9 | | 4.1 | | | | 4.1 | | |
| Critical Headway (sec) | | 7.56 | 6.56 | 6.96 | | 7.56 | 6.56 | 6.96 | | 4.16 | | | | 4.16 | | |
| Base Follow-Up Headway (sec) | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 | | 2.2 | | | | 2.2 | | |
| Follow-Up Headway (sec) | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 | | 2.23 | | | | 2.23 | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 173 | | | | 54 | | | 156 | | | | 53 | | |
| Capacity, c (veh/h) | | | 497 | | | | 81 | | | 892 | | | | 663 | | |
| v/c Ratio | | | 0.35 | | | | 0.67 | | | 0.18 | | | | 0.08 | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 1.5 | | | | 3.1 | | | 0.6 | | | | 0.3 | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 38.4 | | | | 79.4 | | | 15.4 | | | | 7.7 | | |
| Control Delay (s/veh) | | | 16.1 | | | | 112.7 | | | 9.9 | | | | 10.9 | | |
| Level of Service (LOS) | | | C | | | | F | | | A | | | | B | | |
| Approach Delay (s/veh) | 16.1 | | | | 112.7 | | | | 1.3 | | | | 0.8 | | | |
| Approach LOS | C | | | | F | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

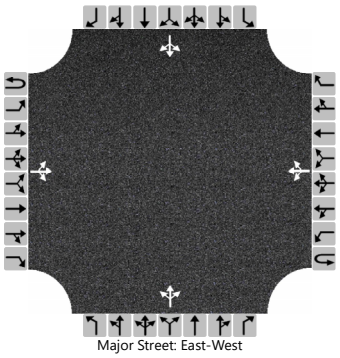
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM No-Build |
| Intersection Orientation | East-West |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | Road Runner St and Dredge Dr |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | Dredge Dr. |
| Peak Hour Factor | 0.74 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes




## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 0 | | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 1 | 39 | 23 | | 46 | 39 | 19 | | 34 | 62 | 10 | | 3 | 27 | 1 |
| Percent Heavy Vehicles (%) | | 3 | | | | 3 | | | | 3 | 3 | 3 | | 3 | 3 | 3 |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | | | | | | | | 0 | | | | 0 | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 4.1 | | | | 4.1 | | | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 |
| Critical Headway (sec) | | 4.13 | | | | 4.13 | | | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 |
| Base Follow-Up Headway (sec) | | 2.2 | | | | 2.2 | | | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 |
| Follow-Up Headway (sec) | | 2.23 | | | | 2.23 | | | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | 1 | | | | 62 | | | | | 143 | | | | 42 | |
| Capacity, c (veh/h) | | 1514 | | | | 1507 | | | | | 627 | | | | 601 | |
| v/c Ratio | | 0.00 | | | | 0.04 | | | | | 0.23 | | | | 0.07 | |
| 95% Queue Length, $Q_{95}$ (veh) | | 0.0 | | | | 0.1 | | | | | 0.9 | | | | 0.2 | |
| 95% Queue Length, $Q_{95}$ (ft) | | | | | | | | | | | 23.0 | | | | 5.1 | |
| Control Delay (s/veh) | | 7.4 | 0.0 | 0.0 | | 7.5 | 0.3 | 0.3 | | | 12.4 | | | | 11.4 | |
| Level of Service (LOS) | | A | A | A | | A | A | A | | | B | | | | B | |
| Approach Delay (s/veh) | 0.1 | | | | 3.5 | | | | 12.4 | | | | 11.4 | | | |
| Approach LOS | A | | | | A | | | | B | | | | B | | | |

# HCS Two-Way Stop-Control Report

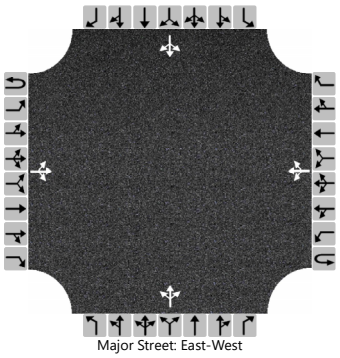
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM Full Build |
| Intersection Orientation | East-West |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | Road Runner St and Dredge Dr |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | Dredge Dr. |
| Peak Hour Factor | 0.74 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes




## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 0 | | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 1 | 49 | 23 | | 46 | 49 | 19 | | 34 | 62 | 10 | | 3 | 27 | 3 |
| Percent Heavy Vehicles (%) | | 3 | | | | 3 | | | | 3 | 3 | 3 | | 3 | 3 | 3 |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | | | | | | | | 0 | | | | 0 | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 4.1 | | | | 4.1 | | | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 |
| Critical Headway (sec) | | 4.13 | | | | 4.13 | | | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 |
| Base Follow-Up Headway (sec) | | 2.2 | | | | 2.2 | | | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 |
| Follow-Up Headway (sec) | | 2.23 | | | | 2.23 | | | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | 1 | | | | 62 | | | | | 143 | | | | 45 | |
| Capacity, c (veh/h) | | 1497 | | | | 1490 | | | | | 603 | | | | 594 | |
| v/c Ratio | | 0.00 | | | | 0.04 | | | | | 0.24 | | | | 0.08 | |
| 95% Queue Length, $Q_{95}$ (veh) | | 0.0 | | | | 0.1 | | | | | 0.9 | | | | 0.2 | |
| 95% Queue Length, $Q_{95}$ (ft) | | | | | | | | | | | 23.0 | | | | 5.1 | |
| Control Delay (s/veh) | | 7.4 | 0.0 | 0.0 | | 7.5 | 0.3 | 0.3 | | | 12.8 | | | | 11.6 | |
| Level of Service (LOS) | | A | A | A | | A | A | A | | | B | | | | B | |
| Approach Delay (s/veh) | 0.1 | | | | 3.2 | | | | 12.8 | | | | 11.6 | | | |
| Approach LOS | A | | | | A | | | | B | | | | B | | | |

# HCS Two-Way Stop-Control Report

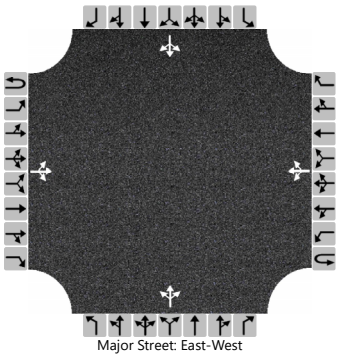
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM No-Build |
| Intersection Orientation | East-West |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | Road Runner St and Dredge Dr |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | Dredge Dr. |
| Peak Hour Factor | 0.82 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: East-West

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 0 | | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 2 | 63 | 20 | | 33 | 63 | 12 | | 30 | 67 | 23 | | 14 | 38 | 7 |
| Percent Heavy Vehicles (%) | | 3 | | | | 3 | | | | 3 | 3 | 3 | | 3 | 3 | 3 |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | | | | | | | | | 0 | | | | 0 | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | | Undivided | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 4.1 | | | | 4.1 | | | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 |
| Critical Headway (sec) | | 4.13 | | | | 4.13 | | | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 |
| Base Follow-Up Headway (sec) | | 2.2 | | | | 2.2 | | | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 |
| Follow-Up Headway (sec) | | 2.23 | | | | 2.23 | | | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | 2 | | | | 40 | | | | | 146 | | | | 72 | |
| Capacity, c (veh/h) | | 1497 | | | | 1485 | | | | | 657 | | | | 616 | |
| v/c Ratio | | 0.00 | | | | 0.03 | | | | | 0.22 | | | | 0.12 | |
| 95% Queue Length, $Q_{95}$ (veh) | | 0.0 | | | | 0.1 | | | | | 0.8 | | | | 0.4 | |
| 95% Queue Length, $Q_{95}$ (ft) | | | | | | | | | | | 20.5 | | | | 10.2 | |
| Control Delay (s/veh) | | 7.4 | 0.0 | 0.0 | | 7.5 | 0.2 | 0.2 | | | 12.0 | | | | 11.6 | |
| Level of Service (LOS) | | A | A | A | | A | A | A | | | B | | | | B | |
| Approach Delay (s/veh) | 0.2 | | | | 2.4 | | | | 12.0 | | | | 11.6 | | | |
| Approach LOS | A | | | | A | | | | B | | | | B | | | |

# HCS Two-Way Stop-Control Report

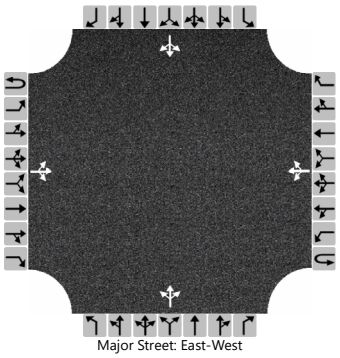
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM Full Build |
| Intersection Orientation | East-West |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | Road Runner St and Dredge Dr |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | Dredge Dr. |
| Peak Hour Factor | 0.82 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: East-West

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 0 | | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 2 | 81 | 20 | | 33 | 71 | 12 | | 30 | 67 | 23 | | 14 | 38 | 7 |
| Percent Heavy Vehicles (%) | | 3 | | | | 3 | | | | 3 | 3 | 3 | | 3 | 3 | 3 |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | | | | | | | | 0 | | | | 0 | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 4.1 | | | | 4.1 | | | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 |
| Critical Headway (sec) | | 4.13 | | | | 4.13 | | | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 |
| Base Follow-Up Headway (sec) | | 2.2 | | | | 2.2 | | | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 |
| Follow-Up Headway (sec) | | 2.23 | | | | 2.23 | | | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | 2 | | | | 40 | | | | | 146 | | | | 72 | |
| Capacity, c (veh/h) | | 1485 | | | | 1458 | | | | | 629 | | | | 590 | |
| v/c Ratio | | 0.00 | | | | 0.03 | | | | | 0.23 | | | | 0.12 | |
| 95% Queue Length, $Q_{95}$ (veh) | | 0.0 | | | | 0.1 | | | | | 0.9 | | | | 0.4 | |
| 95% Queue Length, $Q_{95}$ (ft) | | | | | | | | | | | 23.0 | | | | 10.2 | |
| Control Delay (s/veh) | | 7.4 | 0.0 | 0.0 | | 7.5 | 0.2 | 0.2 | | | 12.4 | | | | 11.9 | |
| Level of Service (LOS) | | A | A | A | | A | A | A | | | B | | | | B | |
| Approach Delay (s/veh) | 0.2 | | | | 2.3 | | | | 12.4 | | | | 11.9 | | | |
| Approach LOS | A | | | | A | | | | B | | | | B | | | |

# HCS Two-Way Stop-Control Report

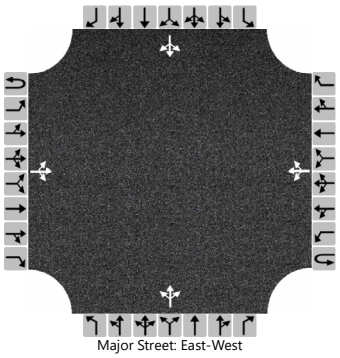
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM No-Build |
| Intersection Orientation | East-West |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | Road Runner St & Ptarmigan Ln |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | Ptarmigan Ln |
| Peak Hour Factor | 0.79 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes




## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 0 | | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 14 | 41 | 1 | | 11 | 24 | 9 | | 3 | 14 | 21 | | 3 | 14 | 9 |
| Percent Heavy Vehicles (%) | | 3 | | | | 3 | | | | 3 | 3 | 3 | | 3 | 3 | 3 |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | | | | | | | | 0 | | | | 0 | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 4.1 | | | | 4.1 | | | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 |
| Critical Headway (sec) | | 4.13 | | | | 4.13 | | | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 |
| Base Follow-Up Headway (sec) | | 2.2 | | | | 2.2 | | | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 |
| Follow-Up Headway (sec) | | 2.23 | | | | 2.23 | | | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | 18 | | | | 14 | | | | | 48 | | | | 33 | |
| Capacity, c (veh/h) | | 1561 | | | | 1546 | | | | | 859 | | | | 808 | |
| v/c Ratio | | 0.01 | | | | 0.01 | | | | | 0.06 | | | | 0.04 | |
| 95% Queue Length, $Q_{95}$ (veh) | | 0.0 | | | | 0.0 | | | | | 0.2 | | | | 0.1 | |
| 95% Queue Length, $Q_{95}$ (ft) | | | | | | | | | | | 5.1 | | | | 2.6 | |
| Control Delay (s/veh) | | 7.3 | 0.1 | 0.1 | | 7.3 | 0.1 | 0.1 | | | 9.4 | | | | 9.6 | |
| Level of Service (LOS) | | A | A | A | | A | A | A | | | A | | | | A | |
| Approach Delay (s/veh) | 1.9 | | | | 1.9 | | | | 9.4 | | | | 9.6 | | | |
| Approach LOS | A | | | | A | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

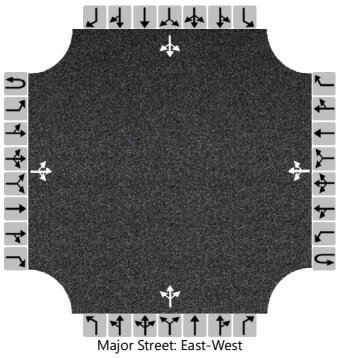
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM Full Build |
| Intersection Orientation | East-West |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | Road Runner St & Ptarmigan Ln |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | Ptarmigan Ln |
| Peak Hour Factor | 0.79 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: East-West

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 0 | | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 19 | 51 | 1 | | 11 | 34 | 9 | | 3 | 14 | 21 | | 3 | 14 | 11 |
| Percent Heavy Vehicles (%) | | 3 | | | | 3 | | | | 3 | 3 | 3 | | 3 | 3 | 3 |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | | | | | | | | 0 | | | | 0 | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 4.1 | | | | 4.1 | | | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 |
| Critical Headway (sec) | | 4.13 | | | | 4.13 | | | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 |
| Base Follow-Up Headway (sec) | | 2.2 | | | | 2.2 | | | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 |
| Follow-Up Headway (sec) | | 2.23 | | | | 2.23 | | | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | 24 | | | | 14 | | | | | 48 | | | | 35 | |
| Capacity, c (veh/h) | | 1544 | | | | 1530 | | | | | 827 | | | | 786 | |
| v/c Ratio | | 0.02 | | | | 0.01 | | | | | 0.06 | | | | 0.05 | |
| 95% Queue Length, $Q_{95}$ (veh) | | 0.0 | | | | 0.0 | | | | | 0.2 | | | | 0.1 | |
| 95% Queue Length, $Q_{95}$ (ft) | | | | | | | | | | | 5.1 | | | | 2.6 | |
| Control Delay (s/veh) | | 7.4 | 0.1 | 0.1 | | 7.4 | 0.1 | 0.1 | | | 9.6 | | | | 9.8 | |
| Level of Service (LOS) | | A | A | A | | A | A | A | | | A | | | | A | |
| Approach Delay (s/veh) | 2.1 | | | | 1.6 | | | | 9.6 | | | | 9.8 | | | |
| Approach LOS | A | | | | A | | | | A | | | | A | | | |

# HCS Two-Way Stop-Control Report

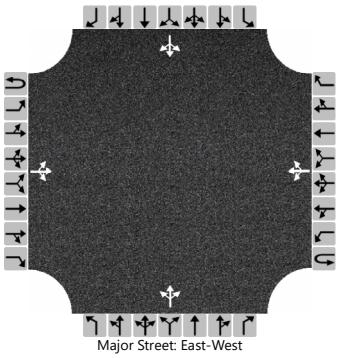
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM No-Build |
| Intersection Orientation | East-West |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | Road Runner St & Ptarmigan Ln |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | Ptarmigan Ln |
| Peak Hour Factor | 0.86 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: East-West

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 0 | | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 23 | 23 | 2 | | 40 | 55 | 12 | | 1 | 23 | 25 | | 13 | 27 | 24 |
| Percent Heavy Vehicles (%) | | 3 | | | | 3 | | | | 3 | 3 | 3 | | 3 | 3 | 3 |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | | | | | | | | 0 | | | | 0 | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 4.1 | | | | 4.1 | | | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 |
| Critical Headway (sec) | | 4.13 | | | | 4.13 | | | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 |
| Base Follow-Up Headway (sec) | | 2.2 | | | | 2.2 | | | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 |
| Follow-Up Headway (sec) | | 2.23 | | | | 2.23 | | | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | 27 | | | | 47 | | | | | 57 | | | | 74 | |
| Capacity, c (veh/h) | | 1514 | | | | 1578 | | | | | 780 | | | | 717 | |
| v/c Ratio | | 0.02 | | | | 0.03 | | | | | 0.07 | | | | 0.10 | |
| 95% Queue Length, $Q_{95}$ (veh) | | 0.1 | | | | 0.1 | | | | | 0.2 | | | | 0.3 | |
| 95% Queue Length, $Q_{95}$ (ft) | | | | | | | | | | | 5.1 | | | | 7.7 | |
| Control Delay (s/veh) | | 7.4 | 0.1 | 0.1 | | 7.4 | 0.2 | 0.2 | | | 10.0 | | | | 10.6 | |
| Level of Service (LOS) | | A | A | A | | A | A | A | | | A | | | | B | |
| Approach Delay (s/veh) | 3.6 | | | | 2.9 | | | | 10.0 | | | | 10.6 | | | |
| Approach LOS | A | | | | A | | | | A | | | | B | | | |

# HCS Two-Way Stop-Control Report

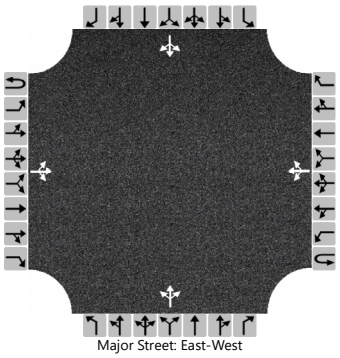
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM Full Build |
| Intersection Orientation | East-West |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | Road Runner St & Ptarmigan Ln |
| Jurisdiction | City of Helena |
| East/West Street | Road Runner St |
| North/South Street | Ptarmigan Ln |
| Peak Hour Factor | 0.86 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes




## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 0 | | 0 | 1 | 0 |
| Configuration | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (veh/h) | | 31 | 41 | 2 | | 40 | 63 | 12 | | 1 | 23 | 25 | | 13 | 27 | 25 |
| Percent Heavy Vehicles (%) | | 3 | | | | 3 | | | | 3 | 3 | 3 | | 3 | 3 | 3 |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | | | | | | | | 0 | | | | 0 | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | Undivided | | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 4.1 | | | | 4.1 | | | | 7.1 | 6.5 | 6.2 | | 7.1 | 6.5 | 6.2 |
| Critical Headway (sec) | | 4.13 | | | | 4.13 | | | | 7.13 | 6.53 | 6.23 | | 7.13 | 6.53 | 6.23 |
| Base Follow-Up Headway (sec) | | 2.2 | | | | 2.2 | | | | 3.5 | 4.0 | 3.3 | | 3.5 | 4.0 | 3.3 |
| Follow-Up Headway (sec) | | 2.23 | | | | 2.23 | | | | 3.53 | 4.03 | 3.33 | | 3.53 | 4.03 | 3.33 |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | 36 | | | | 47 | | | | | 57 | | | | 76 | |
| Capacity, c (veh/h) | | 1502 | | | | 1550 | | | | | 738 | | | | 679 | |
| v/c Ratio | | 0.02 | | | | 0.03 | | | | | 0.08 | | | | 0.11 | |
| 95% Queue Length, $Q_{95}$ (veh) | | 0.1 | | | | 0.1 | | | | | 0.3 | | | | 0.4 | |
| 95% Queue Length, $Q_{95}$ (ft) | | | | | | | | | | | 7.7 | | | | 10.2 | |
| Control Delay (s/veh) | | 7.5 | 0.2 | 0.2 | | 7.4 | 0.2 | 0.2 | | | 10.3 | | | | 11.0 | |
| Level of Service (LOS) | | A | A | A | | A | A | A | | | B | | | | B | |
| Approach Delay (s/veh) | 3.2 | | | | 2.7 | | | | 10.3 | | | | 11.0 | | | |
| Approach LOS | A | | | | A | | | | B | | | | B | | | |

# HCS Two-Way Stop-Control Report

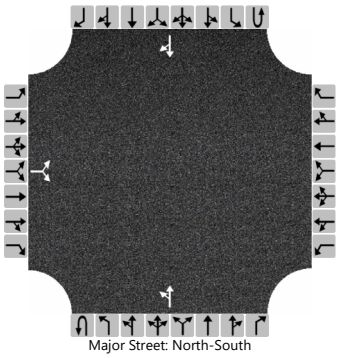
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | AM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Smith Ave |
| Jurisdiction | City of Helena |
| East/West Street | Smith Ave |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.92 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LR | | | | | | | LT | | | | | | TR |
| Volume (veh/h) | | 6 | | 34 | | | | | | 39 | 160 | | | | 332 | 18 |
| Percent Heavy Vehicles (%) | | 3 | | 3 | | | | | | 3 | | | | | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | | 6.2 | | | | | | 4.1 | | | | | | |
| Critical Headway (sec) | | 6.43 | | 6.23 | | | | | | 4.13 | | | | | | |
| Base Follow-Up Headway (sec) | | 3.5 | | 3.3 | | | | | | 2.2 | | | | | | |
| Follow-Up Headway (sec) | | 3.53 | | 3.33 | | | | | | 2.23 | | | | | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 43 | | | | | | | 42 | | | | | | |
| Capacity, c (veh/h) | | | 619 | | | | | | | 1173 | | | | | | |
| v/c Ratio | | | 0.07 | | | | | | | 0.04 | | | | | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.2 | | | | | | | 0.1 | | | | | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 5.1 | | | | | | | 2.6 | | | | | | |
| Control Delay (s/veh) | | | 11.3 | | | | | | | 8.2 | 0.3 | | | | | |
| Level of Service (LOS) | | | B | | | | | | | A | A | | | | | |
| Approach Delay (s/veh) | | 11.3 | | | | | | | | 1.9 | | | | | | |
| Approach LOS | | B | | | | | | | | A | | | | | | |

# HCS Two-Way Stop-Control Report

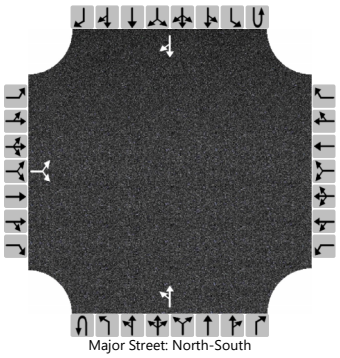
## General Information

| | |
|---|---|
| Analyst | C. Grant Duininck |
| Agency/Co. | Morrison-Maierle |
| Date Performed | 2/5/2025 |
| Analysis Year | 2035 |
| Time Analyzed | PM Full Build |
| Intersection Orientation | North-South |
| Project Description | McHugh Development |

## Site Information

| | |
|---|---|
| Intersection | McHugh Dr & Smith Ave |
| Jurisdiction | City of Helena |
| East/West Street | Smith Ave |
| North/South Street | McHugh Dr |
| Peak Hour Factor | 0.92 |
| Analysis Time Period (hrs) | 0.25 |

## Lanes


Major Street: North-South

## Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Priority | | 10 | 11 | 12 | | 7 | 8 | 9 | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 |
| Number of Lanes | | 0 | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Configuration | | | LR | | | | | | | LT | | | | | | TR |
| Volume (veh/h) | | 10 | | 59 | | | | | | 33 | 259 | | | | 181 | 15 |
| Percent Heavy Vehicles (%) | | 3 | | 3 | | | | | | 3 | | | | | | |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | 0 | | | | | | | | | | | | | | |
| Right Turn Channelized | | | | | | | | | | | | | | | | |
| Median Type \| Storage | | Undivided | | | | | | | | | | | | | | |

## Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Critical Headway (sec) | | 7.1 | | 6.2 | | | | | | 4.1 | | | | | | |
| Critical Headway (sec) | | 6.43 | | 6.23 | | | | | | 4.13 | | | | | | |
| Base Follow-Up Headway (sec) | | 3.5 | | 3.3 | | | | | | 2.2 | | | | | | |
| Follow-Up Headway (sec) | | 3.53 | | 3.33 | | | | | | 2.23 | | | | | | |

## Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow Rate, v (veh/h) | | | 75 | | | | | | | 36 | | | | | | |
| Capacity, c (veh/h) | | | 751 | | | | | | | 1351 | | | | | | |
| v/c Ratio | | | 0.10 | | | | | | | 0.03 | | | | | | |
| 95% Queue Length, $Q_{95}$ (veh) | | | 0.3 | | | | | | | 0.1 | | | | | | |
| 95% Queue Length, $Q_{95}$ (ft) | | | 7.7 | | | | | | | 2.6 | | | | | | |
| Control Delay (s/veh) | | | 10.3 | | | | | | | 7.7 | 0.2 | | | | | |
| Level of Service (LOS) | | | B | | | | | | | A | A | | | | | |
| Approach Delay (s/veh) | | 10.3 | | | | | | | | 1.1 | | | | | | |
| Approach LOS | | B | | | | | | | | A | | | | | | |

# Appendix D
## Level of Service Definitions

Traffic Impact Study for
McHugh Development

## LEVEL OF SERVICE DEFINITION

Level of service (LOS) is determined by the control delay experienced by drivers and is calculated for each movement, each approach, and for the intersection as a whole in signalized conditions. Control delay is defined as the total delay experienced by a driver and include initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

In unsignalized conditions the delay a vehicle experiences is determined by the capacity of the approach, the degree of saturation on the uncontrolled roadway, and the number of acceptable gaps in the passing traffic stream. The delay a vehicle experiences is a function of the capacity of the approach, the volume of traffic, and the signal timing in signalized conditions.

LOS values range from A to F. The delay range for each LOS value under unsignalized and signalized conditions is shown in the following tables.

### UNSIGNALIZED INTERSECTION LEVEL OF SERVICE

| LOS | AVERAGE CONTROL DELAY (SECONDS/VEHICLE) |
|---|---|
| **A** | 0-10 |
| **B** | >10-15 |
| **C** | >15-25 |
| **D** | >25-35 |
| **E** | >35-50 |
| **F** | >50 |

Source: Transportation Research Board, *Highway Capacity Manual, 6th Edition*

### SIGNALIZED INTERSECTION LEVEL OF SERVICE

| LOS | AVERAGE CONTROL DELAY (SECONDS/VEHICLE) |
|---|---|
| **A** | 0-10 |
| **B** | >10-20 |
| **C** | >20-35 |
| **D** | >35-55 |
| **E** | >55-80 |
| **F** | >80 |

Source: Transportation Research Board, *Highway Capacity Manual, 6th Edition*

Morrison Maierle | engineers surveyors planners scientists

# Memo

| | |
|---|---|
| **To:** | City of Helena |
| **From:** | Cooper Krause, P.E. |
| **Date:** | August 5, 2025 |
| **Job No.:** | 10723.003 |
| **RE:** | McHugh Subdivision Pre Application- Preliminary Wastewater Demand |
| **CC:** | |

☐ **Urgent** ☒ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **For Your Use**

The purpose of this memo is to outline preliminary wastewater demands for Phase 1 of the proposed McHugh subdivision in Helena, MT. These estimates are preliminary and should be refined as more development details become available.

Phase 1 of the McHugh Subdivision is a mixed-use development covering approximately 21.9 acres. It includes 7.7 acres of residential land which will feature a variety of multi-family buildings estimated at 138 total dwelling units. These units are distributed across multi-family buildings ranging from four to ten units per building. The development also designates 9.9 acres for commercial/ mixed use, subdivided into 16 lots. While the specific nature of future commercial tenants is currently unknown, the area is expected to accommodate office or retail businesses. The total anticipated wastewater demand is approximately 36,400 gallons per day (gpd). The demand is based on the published values in the Golden Estates Lift Station agreement in which Kim Smith has purchased the capacity for 26,500 gpd. It is understood that additional capacity will need to be purchased for the full build-out of Phase 1.

## Commercial Demand

The commercial portion of the development spans approximately 10 acres and is subdivided into 16 individual lots. Since the specific nature of future commercial tenants is currently unknown, wastewater demand projections are based on typical office and retail usage scenarios. If the lots are developed primarily for office use, and assuming up to 500 employees across all lots, the estimated wastewater demand would be approximately 7,500 gallons per day, based on a rate of 15 gallons per day per employee. Alternatively, if the lots are developed for retail use, with one building per lot, the estimated demand would be around 8,800 gallons per day, using a standard rate of 550 gallons per day per building. These estimates provide a reasonable range for planning purposes until more detailed tenant information becomes available.

## *Residential Demand*

The anticipated residential wastewater demand is based on 200 gpd per each multi-family unit and is summarized in the table below:

| McHugh Subdivision: Phase 1 Residential/Multi-Family Demand | | |
|---|---|---|
| **Building Type** | **Number of Buildings** | **Unit Total** |
| 4-plex | 5 | 20 |
| 6-plex | 15 | 90 |
| 8-Unit Mixed | 1 | 8 |
| 10-plex | 2 | 20 |
| **Total Residential Units** | | **138** |
| **Wastewater Demand (gpd)** | | **27,600** |

## *Conclusion*

In conclusion, the anticipated total wastewater demand for the McHugh Subdivision Phase 1 is estimated to be approximately 36,400 gallons per day. This figure represents a preliminary projection based on the assumed residential and commercial usage scenarios, and it aligns with the rates established under the Golden Estates Lift Station agreement. It is important to note that this estimate may be subject to revision as more detailed information regarding commercial tenants and final development plans becomes available.

Attachments:

Golden Estates Lift Station Agreement

# REBATE AGREEMENT

**THIS AGREEMENT** is made and entered into this 10th day of September, 2007, by and between **YUHAS DEVELOPMENT, INC.**, a Montana corporation, **SPEARHEAD, LLC**, a Montana limited liability company, and **KIM SMITH**, (together, "Owners"), and the **CITY OF HELENA, MONTANA**, a municipal corporation organized and existing under the laws of the State of Montana, 316 North Park Avenue, Helena, Montana 59623 ("City").

## RECITALS

**A.** Owners own the properties designated as the Golden Estates Subdivision, the future Summit Peak Subdivision, and a vacant property west of McHugh Drive owned by Kim Smith. These properties are shown on the attached Exhibit "A."

**B.** In 2007, the Golden Estates lift station was designed and constructed by Owner Yuhas to serve the individual properties as described above. The lift station capacity reserved for the use of the Owners is 117,820 gpd. This capacity will be split among the three parties as they have specified in separate agreements not included herein, and not attached.

**C.** In addition, the new Golden Estates lift station replaces the previously existing Skelton Lift Station. This lift station served several properties, including the entirety of the Skelton Addition, Skelton Second Addition, Anderson Addition, Northgate Center, and Cottonwood West Subdivision. Also served are some individual businesses including but not limited to Ross Stores, Inc., Hastings, Albertsons, Joann's Fabrics, Valley Bank, Road Runner Center, and Pizza Hut. Capacity for all these uses is included in the new lift station. The attached exhibit A identifies the location of the service area boundary for the Skelton Lift station at the effective date of this Rebate Agreement.

**D.** The existing Skelton Lift Station was subject to a rebate for additional capacity for any individuals outside the users listed above. The Cottonwood Business Park Subdivision is also included in the Skelton Lift Station service area. This subdivision is nearly completed and will be subject to a rebate charge.

**E.** The Owners and City desire to enter into this Agreement to define the rights of the Owners in rebates accruing from the construction of the Golden Estates lift station and its superseding of the Skelton lift station.

## AGREEMENT

1. **Skelton Rebate:** The Owners agree that Cottonwood West Business Park is responsible for the rebate rights established for the Skelton lift station and the developer of the Skelton lift station may and shall receive that rebate. The Owners have obtained from the Skelton lift station developer a release on all other rebate rights.

2. **Lift Station Capacity:** The lift station capacity reserved for the use of the Owners, consisting of 117,820 gallons per day (gpd), may be traded or transferred among the Owners at their discretion and mutual agreement. For any property of Owners not currently annexed into the City, that Owner's share of reserved capacity is credited for lift station capacity needs for the property when annexed and developed. No portion of the capacity, however, can be sold or transferred to any other person except when associated with property owned by any of the Owners, and any such attempted transfer in violation hereof shall be void and unenforceable as to the Owners. The right to lift station capacity can be used by any of the Owners on any adjacent land purchased in the future by an Owner.

3. **Future Connections:** The parties agree that any person who desires to connect to the lift station, but is not within the sewer service area boundary shown on Exhibit A, may do so in one of two ways:

   a. build additional capacity into the lift station at the expense of the party desiring the connection; or

   b. purchase through the City-administered rebate from the Owners any available capacity that is either in excess of the 117,820 gpd, has been released by one of the Owners, or is excess to the needs of property after its full development.

4. **Rebate Calculations:** The parties agree that the amount of Owners' rebate will be based on the $750,000 agreed upon cost of the total lift station (including original bid price, change orders #1 and #2, and engineering), as approved by the City, divided by the additional capacity above the amount needed to serve the Skelton Lift Station of 117,820 gpd. This results in a cost of $6.36 per gpd, where a gallon per day is based on the average day's wastewater production.

5. **Right of First Refusal:** As to any excess capacity produced by the Golden Estates lift station, if any, Owner William R. Weaver, or an entity owned in whole or in part by him ("Weaver") approved by the other two Owners, is granted a first right of refusal to acquire the excess capacity, provided that Weaver can show an actual need for use of the additional capacity within the lift station service area or for property owned by Weaver that is adjacent to the lift station service area. Capacity acquired by Weaver cannot be sold or transferred to any other person or entity not approved by the

other two Owners for property not owned in the majority by Weaver or a Weaver affiliate.

**IN WITNESS WHEREOF,** the parties have executed this Agreement the day and year first above written.

**YUHAS DEVELOPMENT, INC.**

By: Ronald L. Yuhas
Its President

**SPEARHEAD, LLC**

By: _____
William R. Weaver, Manager

Kim Smith
**Kim Smith**

**CITY OF HELENA, MONTANA**

By _____
Tim Burton, City Manager

ATTEST:

By _____
Debbie Havens, City Clerk

APPROVED AS TO FORM:

By _____
David L. Nielsen, City Attorney

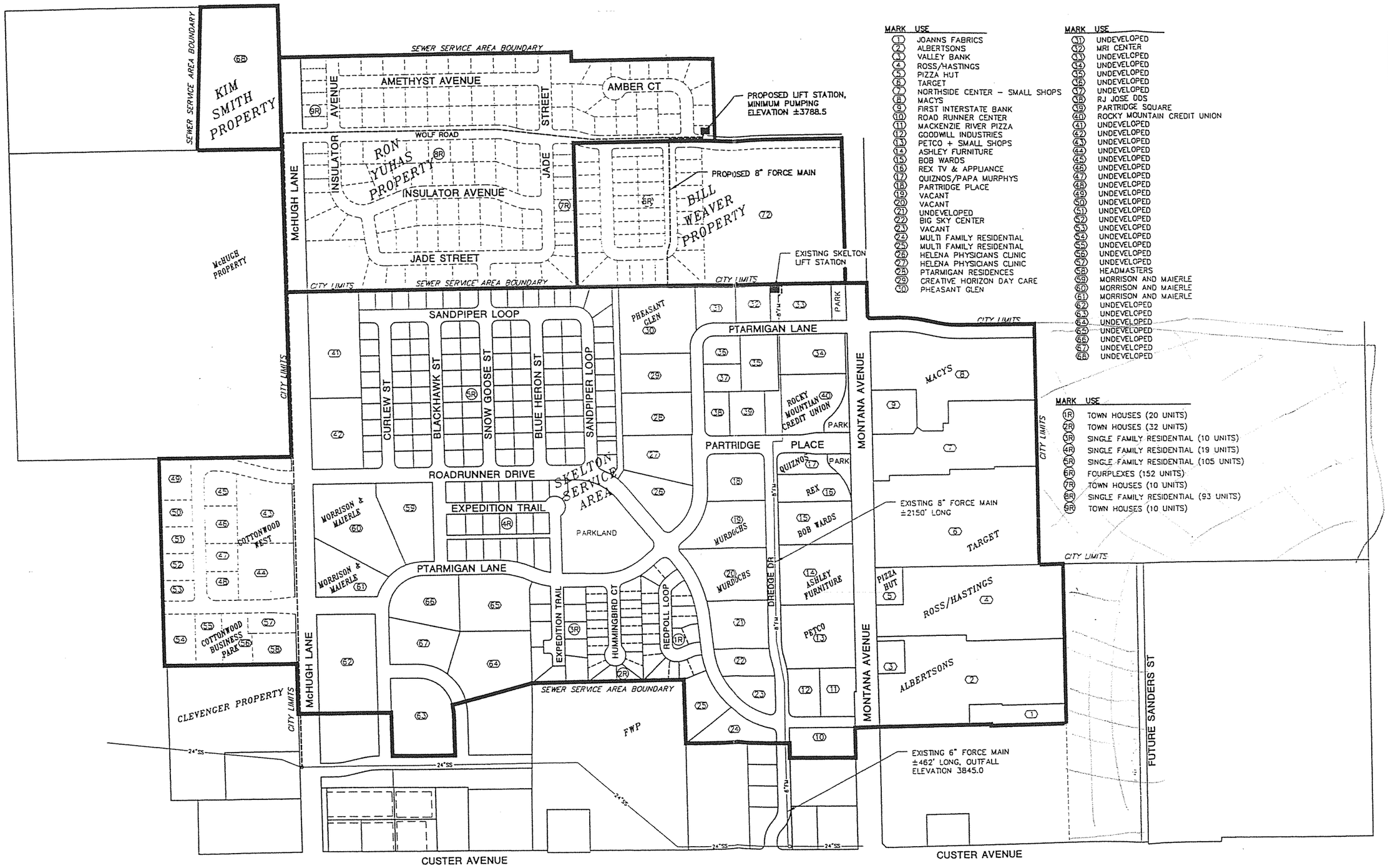
## GOLDEN ESTATES LIFT STATION WASTEWATER GENERATION

4-Oct-07

| MARK # | LOT | OCCUPANCY (existing uses are bold) | Wastewater Generation Numbers Based on Table Below: SHOP CTR | RETAIL | RESTURANT | OFFICE | RESIDENTIAL (Single Family) | RESIDENTIAL (Multifamily) | WASTEWATER FLOWRATE (gpd) |
|---|---|---|---|---|---|---|---|---|---|
| **SHOPKO\DAKOTA SQUARE\NORTHGATE** | | | | | | | | | |
| 2 | DAKOTA SQ MINOR PHS I LT 2, COS #514476 | **JoAnns Fabrics** | | 1 | | | | | 550 |
| 3 | DAKOTA SQUARE MINOR SUBD PH I COS #514476 | **Albertsons** | | 2 | | | | | 1,100 |
| 4 | DAKOTA SQUARE MINOR SUBDIVISION PHASE 1 | **Valley Bank** | | | | 3 | | | 45 |
| 5 | SHOPKO MINOR SUBD LT 1A-2 COS #3042910 | **Ross** | 300 | | | | | | 900 |
| | | **Hastings** | Incl above | | | | | | ~ |
| 6 | SHOPKO MINOR SUBD LT 1A-3 COS #3042910 | **Pizza Hut** | | | 300 | | | | 2,700 |
| 7 | NORTHSIDE CENTER MINOR LT 1 COS #600867 | **Target** | 850 | | | | | | 2,550 |
| 8 | NORTHSIDE CENTER MINOR LT 2 COS #600867 | **Michaels** | Incl above | | | | | | ~ |
| | | **Verizon Wireless** | Incl above | | | | | | ~ |
| | | **Famous Footwear** | Incl above | | | | | | ~ |
| | | **Great Clips** | Incl above | | | | | | ~ |
| | | **Cash Advance** | Incl above | | | | | | ~ |
| | | **Leslie's Hallmark** | Incl above | | | | | | ~ |
| | | **Sallys Beauty Supply** | Incl above | | | | | | ~ |
| 9 | NORTHSIDE CENTER MINOR LT 3 COS #600867 | **Macys** | Incl above | | | | | | ~ |
| 10 | NORTHSIDE CENTER MINOR LT 4 COS #600867 | **First Interstate Bank** | | | | 15 | | | 225 |
| **ORPHANAGE ACRES** | | | | | | | | | 8070 GPD |
| 11 | ORPHANAGE ACRES LT 3A COS 507444/B | **Road Runner Center** | | 4 | | | | | 2,200 |
| **SKELTON ADDITION** | | | | | | | | | |
| 12 | MACKENZIE MINOR SUBD LOT 1A-1 PER COS #587060 | **MacKenzie River Pizza** | | | 400 | | | | 3,600 |
| 13 | MACKENZIE MINOR SUBD LOT 1A-2 PER COS #587060 | **Goodwill Industries** | | 1 | | | | | 550 |
| 14 | SKELTON ADDN PHASE I BLK 1 AMND LT 2A1 PER COS #3072813 | **Petco** | | 1 | | | | | 550 |
| | | **Taco Del Mar** | | | 300 | | | | 2,700 |
| | | Vacant Lease Space | | 1 | | | | | 550 |
| | | Vacant Lease Space | | 1 | | | | | 550 |
| 15 | SKELTON ADDN SUBD PHASE 1 BLK 1 LT 4-A COS #3062269 | **Ashley Furniture** | | 1 | | | | | 550 |
| 16 | SKELTON ADDN SUBD PHASE 1 BLK 1 LT 5 | **Bob Wards** | | 2 | | | | | 1,100 |
| 17 | SKELTON ADDN SUBD PHASE 1 BLK 1 LT 6A | **Rex TV** | | 1 | | | | | 550 |
| 18 | SKELTON ADD PHASE 1 BLK 1 LT 6B | **Quiznos** | | | 300 | | | | 2,700 |
| 19 | PARTRIDGE PLACE RETAIL CENTER CONDOS SKELTON ADDN SUBD PHASE 1 BLK 1 LT 7 COS #569219/E | **Real Estate of Montana** | | | | 5 | | | 75 |
| | | **Black Belt Acadamy** | | 1 | | | | | 550 |
| | | **Memory Trail** | | 1 | | | | | 550 |
| | | Vacant Lease Space | | 3 | | | | | 1,650 |
| 20 & 21 | SKELTON ADDN SUBD PHASE 1 BLK 1 LT 8 & 9 | Vacant | | 3 | | | | | 1,650 |
| 22 | SKELTON ADDN SUBD PH 1 BLK 1 LT 10-A1 COS #3072814 | Future Commercial | | | | 25 | | | 375 |
| 23 | SKELTON ADDN SUBD PHASE 1 BLK 1 AMND LT 11-A, COS #3038640 | **Big Sky Center** | | 3 | | | | | 1,650 |
| 24 | SKELTON ADDN SUBD PHASE 1 BLK 1 AMND LT 11-A, COS #3038640 | Vacant | | 3 | | | | | 1,650 |
| 25 | SKELTON ADDN SUBD PHASE 1 BLK 3 | **Multi Family Housing** | | | | | | 22 | 4,400 |
| 26 | SKELTON ADDN SUBD PHASE 1 BLK 3 LT 2 | **Multi-Family Housing** | | | | | | 16 | 3,200 |
| 27&28 | SKELTON ADDN PHASE 1 BLK 2 LT 10 & 11 COS #569219/E | **Helena Physicians Clinic** | | 2 | | 50 | | | 1,850 |
| 29 | SKELTON ADDN SUBD PHASE 1 BLK 2 LT 9 | **Ptarmigan Residences** | | | | | | 23 | 4,600 |
| 30 | SKELTON ADDN SUBD PHASE 1 BLK 2 LT 8-B COS #613247/AS | **Creative Horizon Day Care** | | | | 35 | | | 525 |
| 31 | SKELTON ADDN PHASE 1 BLK 2 LT 8-A COS #613247/AS | **Pheasant Glen** | | | | | | 32 | 6,400 |
| 32 | SKELTON ADDN PHASE 1 BLK 2 LT 7-E COS #613247/AS | Future Commercial | | 1 | | | | | 550 |
| 33 | SKELTON ADDN PHASE 1 BLK 2 LT 7-A1 COS #615794/AP | **MRI Center** | | | | 2 | | | 30 |
| 34 | SKELTON ADDN PHASE 1 BLK 2 LT 1-A1 COS #615794/AP | Future Commercial | | 1 | | | | | 550 |
| 35 | SKELTON ADDITION PHASE 1, BLK 2, LT 3-A1 | Future Restaurant | | | 300 | | | | 2,700 |
| 36 | SKELTON ADDITION PHASE 1, BLK 2, LT 7-B | Future Restaurant | | | 300 | | | | 2,700 |
| 37 | SKELTON ADDITION PHASE 1, BLK 2, LT 7-C | Future Restaurant | | | 300 | | | | 2,700 |
| 38 | SKELTON ADDITION PHASE 1, BLK 2, LT 7-D | Future Restaurant | | | 300 | | | | 2,700 |
| 39 | SKELTON ADDN SUBD PHASE 1 BLK 2 AMENDED LOT 6 A PER COS #592577 | **R.J. Jose, DDS** | | | | 7 | | | 105 |
| 40 | SKELTON ADDN SUBD PHASE I BLK 2 AMENDED LOT 5-A PER COS # 592577 | **Quality Vision Care** | | | | 7 | | | 105 |
| | | **West Coast Beauty Supply** | | 1 | | | | | 550 |
| | | **American Gen. Finance** | | | | 3 | | | 45 |
| | | **Salon Techniques** | | 1 | | | | | 550 |
| | | **D. Williams CPA** | | | | 2 | | | 30 |
| | | **Knapp Insurance** | | | | 4 | | | 60 |
| | | **Mangis Financial Serv.** | | | | 4 | | | 60 |
| 41 | SKELTON ADDN SUBD PHASE 1 blk 2 AMENDED LOT 4-A2 COS #3004000 | **Rocky Mtn Credit Union** | | | | 20 | | | 300 |
| 42 | SKELTON SECOND ADDITION BLK 9 LT 2 COS #3089412 IN NW4SE4 | The Willows Townhouses (future) | | | | | 32 | | 8,000 |
| 43 | SKELTON SECOND ADDITION BLK 9 LT 1 COS #3089412, IN NW4SE4 | The Willows Townhouses (future) | | | | | | Incl above | ~ |
| 44-54 | COTTONWOOD WEST SUBDIVISION | Future Commercial | | 20 | | | | | 11,000 |
| 55-58 | COTTONWOOD OFFICES SUBDIVISION | Future Offices | | | | 400 | | | 6,000 |
| 59 | FUTURE LOT | **Headmasters** | | | | 15 | | | 225 |
| 1R | QUAIL RUN SUBD | **Quail Run Subdivision** | | | | | 20 | | 5,000 |
| 2R | SKELTON ADDN SUBD PHASE 1 | **Hummingbird Court** | | | | | | 32 | 6,400 |
| 5R | SKELTON ADD PHASE II SEQ I | **Single Family Residential** | | | | | 105 | | 26,250 |
| **ANDERSON ADDITION** | | | | | | | | | |
| 60-62 | ANDERSON BUSINESS PARK SUBD LTS 4-5, COS #3050024, IN W2SE4 | **Morrison & Maierle** | | | | 190 | | | 2,850 |
| 63 | ANDERSON BUSINESS PARK, LT 2 & 3 | Future Commercial | | | | 125 | | | 1,875 |
| 64 | ANDERSON BUSINESS PARK, LT 12 | **Heritage Propane Office** | | | | 220 | | | 3,300 |
| 65 | ANDERSON BUSINESS PARK, LT 10 | Future Commercial | | | | 75 | | | 1,125 |
| 66 | ANDERSON BUSINESS PARK, LT 9 | Future Commercial | | | | 65 | | | 975 |
| 67 | ANDERSON BUSINESS PARK, LT 7 | Future Commercial | | | | 60 | | | 900 |
| 68 | ANDERSON BUSINESS PARK, LT 11 | Future Commercial | | | | 60 | | | 900 |
| 3R | ANDERSON BUSINESS PARK SUBD IN W2SE4 | **Single Family Residential** | | | | | 10 | | 2,500 |
| 4R | ANDERSON BUSINESS PARK SUBD IN W2SE4 | **Single Family Residential** | | | | | 19 | | 4,750 |
| | | | | | | | TOTAL EXISTING LIFT STATION: | | 148,580 |
| **SMITH PROPERTIES** | | | | | | | | | |
| 71 | | Future Commercial & Mixed Residential | | 20 | | | 30 | 40 | 26,500 |
| **PEBBLE GARDENS** | | | | | | | | | |
| 6R | PEBBLE GARDENS MOBILE PARK LT 63 & TR IN S2SEN COS 274489 | Future Multi-family Residential | | | | | | 253 | 50,600 |
| 72 | " | Future Commercial | | 24+ | | | | | 13,470 |
| **GOLDEN ESTATES IV** | | | | | | | | | |
| 7R-9R | GOLDEN ESTATES IV | Mixed Residential | | | | | 93 | 20 | 27,250 |
| | | | | | | | | TOTAL: | 266,400 |

Wastewater Usage Rates

| | |
|---|---|
| Shopping Center | 3 gpd per parking space |
| Retail | 550 gpd per water closet |
| Restaurant | 9 gpd per Customer |
| Office | 15 gpd per Employee |
| Single Family Residential | 250 gpd per residence |
| Multi-family Residential | 200 gpd per residence |




| MARK | USE |
|---|---|
| 1 | JOANNS FABRICS |
| 2 | ALBERTSONS |
| 3 | VALLEY BANK |
| 4 | ROSS/HASTINGS |
| 5 | PIZZA HUT |
| 6 | TARGET |
| 7 | NORTHSIDE CENTER – SMALL SHOPS |
| 8 | MACYS |
| 9 | FIRST INTERSTATE BANK |
| 10 | ROAD RUNNER CENTER |
| 11 | MACKENZIE RIVER PIZZA |
| 12 | GOODWILL INDUSTRIES |
| 13 | PETCO + SMALL SHOPS |
| 14 | ASHLEY FURNITURE |
| 15 | BOB WARDS |
| 16 | REX TV & APPLIANCE |
| 17 | QUIZNOS/PAPA MURPHYS |
| 18 | PARTRIDGE PLACE |
| 19 | VACANT |
| 20 | VACANT |
| 21 | UNDEVELOPED |
| 22 | BIG SKY CENTER |
| 23 | VACANT |
| 24 | MULTI FAMILY RESIDENTIAL |
| 25 | MULTI FAMILY RESIDENTIAL |
| 26 | HELENA PHYSICIANS CLINIC |
| 27 | HELENA PHYSICIANS CLINIC |
| 28 | PTARMIGAN RESIDENCES |
| 29 | CREATIVE HORIZON DAY CARE |
| 30 | PHEASANT GLEN |

| MARK | USE |
|---|---|
| 31 | UNDEVELOPED |
| 32 | MRI CENTER |
| 33 | UNDEVELOPED |
| 34 | UNDEVELOPED |
| 35 | UNDEVELOPED |
| 36 | UNDEVELOPED |
| 37 | UNDEVELOPED |
| 38 | RJ JOSE DDS |
| 39 | PARTRIDGE SQUARE |
| 40 | ROCKY MOUNTAIN CREDIT UNION |
| 41 | UNDEVELOPED |
| 42 | UNDEVELOPED |
| 43 | UNDEVELOPED |
| 44 | UNDEVELOPED |
| 45 | UNDEVELOPED |
| 46 | UNDEVELOPED |
| 47 | UNDEVELOPED |
| 48 | UNDEVELOPED |
| 49 | UNDEVELOPED |
| 50 | UNDEVELOPED |
| 51 | UNDEVELOPED |
| 52 | UNDEVELOPED |
| 53 | UNDEVELOPED |
| 54 | UNDEVELOPED |
| 55 | UNDEVELOPED |
| 56 | UNDEVELOPED |
| 57 | UNDEVELOPED |
| 58 | HEADMASTERS |
| 59 | MORRISON AND MAIERLE |
| 60 | MORRISON AND MAIERLE |
| 61 | MORRISON AND MAIERLE |
| 62 | UNDEVELOPED |
| 63 | UNDEVELOPED |
| 64 | UNDEVELOPED |
| 65 | UNDEVELOPED |
| 66 | UNDEVELOPED |
| 67 | UNDEVELOPED |
| 68 | UNDEVELOPED |

| MARK | USE |
|---|---|
| 1R | TOWN HOUSES (20 UNITS) |
| 2R | TOWN HOUSES (32 UNITS) |
| 3R | SINGLE FAMILY RESIDENTIAL (10 UNITS) |
| 4R | SINGLE FAMILY RESIDENTIAL (19 UNITS) |
| 5R | SINGLE FAMILY RESIDENTIAL (105 UNITS) |
| 6R | FOURPLEXES (152 UNITS) |
| 7R | TOWN HOUSES (10 UNITS) |
| 8R | SINGLE FAMILY RESIDENTIAL (93 UNITS) |
| 9R | TOWN HOUSES (10 UNITS) |

STAHLY ENGINEERING & ASSOCIATES
Professional Engineers
& Surveyors
3530 Centennial Dr.
Helena, MT 59601
Phone:(406)442-4594
Fax:(406)442-8537
E-MAIL: seaengnr@MT.net
7585 Shedhorn Drive
Bozeman, MT 59718
Phone:(406)522-9526
Fax:(406)522-9528
E-MAIL: seaengnr@MT.net

# SEWER SERVICE AREA MAP - FOR REBATE

## GOLDEN ESTATES LIFT STATION

## HELENA, MT

DESIGNED JLL
DRAWN JLL
CHECKED HAW
DATE 6-12-07

PRJ: 0431-00403
DWG: REBATESERVAREA.DWG
VIEW:

SHEET 1

9/11/2007 9:25 AM
N:\0431\00403\dwg\Lift Station\REBATE SERVICE AREA.dwg