Introduction
This technical memorandum documents the findings of a traffic analysis for proposed improvements for the 85th Street corridor between Sundowner Avenue and Louise Avenue. As part of the proposed action, 85th Street will be extended across I-29 and the roadway widened to a four lane arterial with left-turn lanes.

This traffic analysis report documents the evaluation of existing traffic conditions and the no build and build future year (2038) traffic conditions. The future year was set as 2038 based on proposed 85th Street construction in 2018. The objective of the no build alternative analysis is to define the expected traffic operational characteristics of the current arterial roadway system within the project study area. The build alternative analysis documents the traffic operations with the expansion and extension of 85th Street. The analysis consists of a traffic operations analysis of the arterial intersections within the project study area. The remainder of this document contains a discussion of the following:

- Study Area Roadways
- Planned Roadway Improvements
- Traffic Operations Analyses Methodologies
- Existing and Future Year Condition Traffic Volumes
- Findings of the Existing (2013) Conditions Traffic Analyses
- Findings of the Future Year (2038) No Build and Build Conditions Traffic Analyses

Study Area Roadways
A description of the key arterial roadways within the study is provided below:

- Solberg Avenue is currently a four-lane divided arterial roadway between 57th and approximately 72nd Street. Traffic signal control is provided for the intersections with
57th and 69th Street.

- Louise Avenue is currently a four- or five-lane divided arterial roadway between 57th and 85th Street. Louise Avenue has two lanes between 85th Street and CR 106. Traffic signal control is provided for the Louise Avenue intersections with 57th Street, 59th Street, I-229 southbound ramp, I-229 northbound ramp, 69th Street, 77th Street and 85th Street.

- Tallgrass Avenue is currently a two-lane dirt/gravel roadway between 72nd Street and CR 106. North of 72nd Street the cross section is a four-lane paved arterial roadway.

- Sundowner Avenue is currently a two-lane dirt/gravel roadway between 67th Street and CR 106. Between 57th Street and 67th Street it is a two-lane paved roadway with additional width utilized for on-street parking.

- 57th Street is currently a four-lane divided arterial roadway between Marion Road and Louise Avenue. West of Marion Road, 57th Street has two-lanes plus a continuous two-way left-turn lane.

- 69th Street currently has a variety of cross sections and surface conditions. East of Louise Avenue, it is currently a four-lane divided arterial roadway. Between Louise Avenue and Connie Avenue (one block segment), a four-lane divided roadway is provided. Between Connie Avenue to just west of Sharon Avenue, 69th Street has two-lanes plus a continuous two-way left-turn lane. Between Sharon Avenue and Medical Court West (western access point to Avera Health Center), 69th Street is currently a two-lane undivided roadway. Between Medical Court West and Solberg Avenue / Tallgrass Avenue, 69th Street is currently a four lane divided roadway. All intersections along 69th Street between Louise Avenue and Tallgrass Avenue utilize stop sign control with 69th Street as the free-flow movement.

- 85th Street is currently a two-lane gravel roadway between Sundowner Avenue and I-29 (2,375’) and between I-29 and Townsley Street (2,550’). Between Townsley Street and Louise Avenue (3,950’), 85th Street is two-lane paved roadway. The gap at I-29 where 85th Street does not exist is approximately 1,320’ in length. All intersections along 85th Street utilize stop sign control with 85th Street as the free-flow movement, except for the intersections of Tallgrass and Sundowner Avenue where the north/south traffic movements are free-flowing.

The roadway and intersection geometrics were primarily derived from aerial photography and GIS data provided by the City of Sioux Falls and supplemented through fieldwork. Traffic signal timings were also obtained from the City of Sioux Falls.

**Planned Future Roadway Improvements**

In the vicinity of this study area and southwest Sioux Falls, there are a number of additional transportation improvement projects. These projects are listed below and were identified in the following documents:
Each project listing also includes a project number, reference number, or planning horizon year, shown in parenthesis, as listed in these planning documents.

SDDOT Statewide Transportation Improvement Program (STIP) 2017-2020
- 85th Street: Sundowner Avenue to Tallgrass Avenue (P 1360(01))

Sioux Falls MPO 2017-2020 Transportation Improvement Program
- 85th Street: Sundowner Avenue to Tallgrass Avenue (P 1360(01))
- 85th Street / I-29 Grade Separation (11017)
- 85th Street: Louise Avenue to Sundowner Avenue (11006)
- Tallgrass Avenue: 69th Street to 85th Street (11006)
- Sundowner Avenue: 69th Street to 85th Street (11006)

Sioux Falls 2017-2021 Capital Programs
- 85th Street: Louise Avenue to Sundowner Avenue (11006)
- Tallgrass Avenue: 69th Street to 85th Street (11006)
- 85th Street / I-29 Grade Separation (11017)
- Sundowner Avenue: 67th Street to 85th Street (11006)
- 69th Street: Tallgrass Avenue to Louise Avenue (11006)

Go Sioux Falls 2040, Sioux Falls MPO Long-Range Transportation Plan
- 85th Street: Louise Avenue to Sundowner Avenue (Funded / Committed)
- 85th Street / I-29 Grade Separation (Funded / Committed)
- Sundowner Avenue: 67th Street to 85th Street (Funded / Committed)
- Tallgrass Avenue: 69th Street to 85th Street (Funded / Committed)
- 271st Street: Heritage Avenue to 0.2 Miles East of Sundowner Avenue (Funded / Committed)
- 85th Street: Ellis Road to Sundowner Avenue (2021-2025)
- 69th Street: Sundowner Avenue to Solberg Avenue – I-29 Grade Separation Structure (2021-2025)
- Sundowner Avenue: 85th Street to 271st Street (2021-2025)
- 85th Street: Louise Avenue to Audie Avenue (2026-2030)
Traffic Operations Analyses Methodologies

The evaluation of existing and future traffic conditions for the study area roadways consisted of traffic operations analyses for the arterial street system. A brief summary of the analysis methodologies is provided below.

Traffic capacity and level of service determinations for study area intersections were also made based on the theory and methodologies contained in the HCM. These procedures and methodologies were facilitated using the Synchro traffic analysis program. For the purposes of this study, a deficiency is defined as LOS E or worse.

At signalized intersections, level of service is based on the weighted average of all approach delays. For unsignalized intersections, the LOS is based on the worst minor street movement delay (usually the left turn movements on the cross street). Table 1 provides the LOS criteria for signalized and unsignalized intersections.

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Signalized</th>
<th>Unsignalized</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>≤10</td>
<td>≤10</td>
<td>Free flow, minimal delays</td>
</tr>
<tr>
<td>B</td>
<td>&gt;10 and ≤20</td>
<td>&gt;10 and ≤15</td>
<td>Stable flow, occasional delays</td>
</tr>
<tr>
<td>C</td>
<td>&gt;20 and ≤35</td>
<td>&gt;15 and ≤25</td>
<td>Stable flow, periodic delays</td>
</tr>
<tr>
<td>D</td>
<td>&gt;35 and ≤55</td>
<td>&gt;25 and ≤35</td>
<td>Restricted flow, regular delays</td>
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<tr>
<td>E</td>
<td>&gt;55 and ≤80</td>
<td>&gt;35 and ≤50</td>
<td>Maximum capacity, extended delays</td>
</tr>
<tr>
<td>F</td>
<td>&gt;80</td>
<td>&gt;50</td>
<td>Forced flow, excessive delays</td>
</tr>
</tbody>
</table>

Source: 2010 Highway Capacity Manual, Transportation Research Board

Signalized LOS Criteria taken from HCM Chapter 18; Unsignalized LOS Criteria taken from HCM Chapter 19

Existing and Future Year Condition Traffic Volumes

Existing and future year condition traffic volumes for the AM and PM peak hours are provided in Figure 1. The future year (2038) figure includes traffic volumes for both the no-build and
build conditions. These traffic volumes were derived from the following data sources:

- Intersection turn movement counts were provided by the City of Sioux Falls.
- Freeway ramp counts that included hourly and daily volumes were conducted by the SDDOT for the I-29 / I-229 interchange.
- 2035 Sioux Falls MPO Regional Travel Model, base calibrated model.
- Average daily traffic (ADT) was obtained from three sources listed below:
  - Traffic Volumes Counts for the City of Sioux Falls
  - South Dakota Traffic Flow Map produced by the SDDOT
  - A spreadsheet of roadway link volumes provided by the SDDOT

The intersection turn movement counts were collected over a number of years and at different times of the year. These factors result in traffic volume differences that were adjusted during a “smoothing” process in order to develop more consistent turn movement volumes between up and downstream intersections. The intersection turn movement counts at interchange ramp terminal intersections were also used to determine the interchange ramp volumes.

The SDDOT ramp counts for the interchange of I-29 / I-229 provided the peak hour volumes for I-229 between the I-29 and Louise Avenue interchanges. Development of other peak hour freeway volumes required a conversion from daily traffic volumes. In urban areas, the percentage of daily traffic volume that occurs during a peak hour typically ranges from 8.0 to 10.0% on freeways. For a freeway like I-229 the peak hour percentage may be a little higher because there are less through vehicles using this facility as opposed to I-90 and I-29. All of these factors were used to develop “smoothed” traffic volumes for the freeway facilities.

**Findings of the Existing Conditions Traffic Analyses**

The results of the traffic operation analyses for existing (year 2013) conditions are shown on Figure 2 and the figure displays results for the arterial intersections within the project area. For current conditions there are a few of arterial intersections within the study area that exceed acceptable levels (minimum acceptable traffic operating conditions are LOS D). These intersections include:

- 57th Street / Sundowner Avenue (ante meridiem [AM] / post meridiem [PM] peaks)
- Louise Avenue / I-229 Southbound (AM / PM peaks)
- Highway 106 / Sundowner Avenue (AM / PM peaks)
Findings of the Future Year (2038) No Build and Build Conditions Traffic Analyses

The traffic operations picture is anticipated to change considerably between the current conditions and the 2038 horizon year as traffic volumes in the 85th Street corridor are projected to grow considerably and the resulting volumes along 85th Street will range from 14,000 to 21,000 per day for the Build condition. Substantial traffic growth for 85th Street is also projected under the No-Build condition. The other arterial roadways in southwest Sioux Falls are also projected to see marked increases in traffic volumes between current conditions and the 2038 horizon year. For the Interstate system, the forecasted 2038 traffic in the I-29 and I-229 corridors are projected to be approximately double current volumes. Without capacity enhancing improvements, congestion in the morning and afternoon peak hours is expected to increase substantially from current conditions for most of the arterial roadways within southwest Sioux Falls. Figures 3 and 4 displays the 2038 no-build and build arterial intersection operations, respectively, within the study area in southwest Sioux Falls.

For the purposes of this analysis, a deficiency is defined as LOS E or worse. Applying the LOS D minimum operations threshold, a number of arterial intersections within the study area and southwest Sioux Falls do not meet acceptable congestion levels under the future year no-build conditions, see Figure 3. These intersections include:

- 57th Street / Sundowner Avenue (AM / PM peaks)
- 57th Street / Marion Road (AM / PM peaks)
- 57th Street / Solberg Avenue (AM / PM peaks)
- 57th Street / Louise Avenue (AM / PM peaks)
- Louise Avenue / I-229 Southbound (AM / PM peaks)
- 69th Street / Louise Avenue (AM / PM peaks)
- 85th Street / Sundowner Avenue (AM / PM peaks)
- Highway 106 / Sundowner Avenue (AM / PM peaks)
- Highway 106 / I-29 (AM / PM peaks)
- Highway 106 / Tallgrass Avenue (AM / PM peaks)
- Highway 106 / Louise Avenue (AM / PM peaks)

The findings of the future year (2038) no-build conditions traffic analyses show that a large portion of the arterial roadway intersections within the project area are projected to experience capacity deficiencies. Many of the signalized intersections with poor levels of service (LOS F) for are projected to significantly exceed the 80 second threshold established for LOS F operations. The 85th Street and Sundowner Avenue intersection is projected to be LOS E/F under no-build conditions in part because the traffic control will be two-way stop-sign control under this scenario.
The future year (2038) build conditions are shown on Figure 4 and once again a number of
intersections are projected to not meet the acceptable LOS threshold. Those intersections
include:

- 57th Street / Sundowner Avenue (AM / PM peaks)
- 57th Street / Marion Road (AM / PM peaks)
- 57th Street / Solberg Avenue (AM / PM peaks)
- 57th Street / Louise Avenue (AM / PM peaks)
- Louise Avenue / I-229 Southbound (AM / PM peaks)
- 69th Street / Louise Avenue (AM / PM peaks)
- Highway 106 / Sundowner Avenue (AM / PM peaks)
- Highway 106 / I-29 (AM / PM peaks)
- Highway 106 / Tallgrass Avenue (AM / PM peaks)
- Highway 106 / Louise Avenue (AM / PM peaks)

Under the future year build conditions there a number of intersections whose LOS do not
appeared to be improved compared to the no-build conditions, however, many of these
intersections do experience a reduction in traffic delay. This is especially true for the 57th Street
intersections.
Figure 1. Existing (2013) and Future Year (2038) Traffic Volumes

<table>
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<th>2013 Daily Traffic</th>
<th>2038 No Build Daily Traffic</th>
<th>2038 Build Daily Traffic</th>
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**LEGEND**

- **3,900** - 2013 Daily Traffic
- **26,800** - 2038 No Build Daily Traffic
- **26,800** - 2038 Build Daily Traffic

Figure I. Existing (2013) and Future Year (2038) Traffic Volumes
Figure 2. Existing (2013) Intersection Traffic Operations Summary

**LEGEND**

- LOS A/B
- LOS C
- LOS D
- LOS E/F
- AM/PM Junction LOS
Figure 3. Future (2038) No-Build Scenario Traffic Operations Summary - Intersections
Figure 4. Future (2038) Build Scenario Traffic Operations Summary - Intersections