Appendix A

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Memo

To:	City of Rapid City, South Dakota Department of Transportation		
From:	Mark Tuch, EI; Courtney Sokol, PE	Project:	Sheridan Lake Road- Jackson Boulevard to Deadwood Avenue
CC:			
Date:	April 6th, 2007	Job No:	54618

RE: Existing Conditions Capacity Analysis

Introduction

This memo summarizes the traffic analysis performed for the Sheridan Lake Road proposed extension to Deadwood Avenue in Rapid City, South Dakota. Both the peak season and the off-peak season existing conditions were analyzed during the AM and PM peak hour for 14 study area intersections.

Methodology

Existing 2007 AM and PM peak hour volumes for the 14 intersections were counted by HDR during the month of February. The AM peak hour was determined to be 7:30-8:30 while the PM peak hour was determined to be 3:45-4:45. These counts were balanced between intersections as necessary using engineering judgment. The balanced counts were then adjusted using 2006 seasonal factors obtained from the South Dakota Department of Transportation (SDDOT) to get the peak-season and off-season AM and PM peak hour volumes. Table 1 shows the seasonal factors used. June was used for the peak-season because it is the most peaked month of the year.

Table 1. 2006 Seasonal Factors

Month	Urban Arterials	Urban Collectors
February	0.98	0.98
June	0.86	0.89

The off-season and peak-season volumes were analyzed using the software package Synchro. Existing signal timings were obtained from the City of Rapid City and were input into Synchro. Synchro replicates the analysis procedures defined in the *2000 Highway Capacity Manual*. Level of service (LOS) 'C' has generally been established as the standard for the planning of transportation for peak hour traffic conditions. For this study, intersections with LOS 'D' or lower were considered deficient.

Existing Conditions Analysis Results

Off-Season

The existing conditions were evaluated for the off-season. LOS and delays were obtained from Synchro and are shown in Table 2 and Figure 1. For the off-season analysis, all signalized intersections operate at LOS 'C' or better. For the stop control intersections, several approaches operate below LOS 'C':

- W. Chicago Street / St. Onge
  - NB Approach operates at LOS 'D' in AM
  - SB Approach operates at LOS 'D' in PM
- W. Main Street / Sheffer Road
  - SB Approach operates at LOS 'E' in PM

Table 2. Off-Season LOS and Delay

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Ave. Delay (sec)	LOS	Ave. Delay (sec)
W. Chicago Street/Sturgis Road	C	20.4	C	21.7
W. Main Street/Sturgis Road	A	9.9	B	14.3
Sheridan Lake Road/W. Main Street	B	19.7	B	17.5
Sheridan Lake Road/Canyon Lake Road	B	17.0	B	18.2
Sheridan Lake Road/Jackson Boulevard	C	24.1	C	23.9
W. Chicago Street/Deadwood Avenue	B	12.3	B	16.2
Mountain View Road/W. Chicago Street	B	18.1	B	18.3
Mountain View Road/W. Main Street	C	28.7	C	28.8
Mountain View Road/Canyon Lake Road	C	21.8	B	17.1
Mountain View Road/Jackson Boulevard	A	8.5	C	20.1
W. Main Street/Jackson Boulevard	C	25.2	C	20.6

Peak-Season

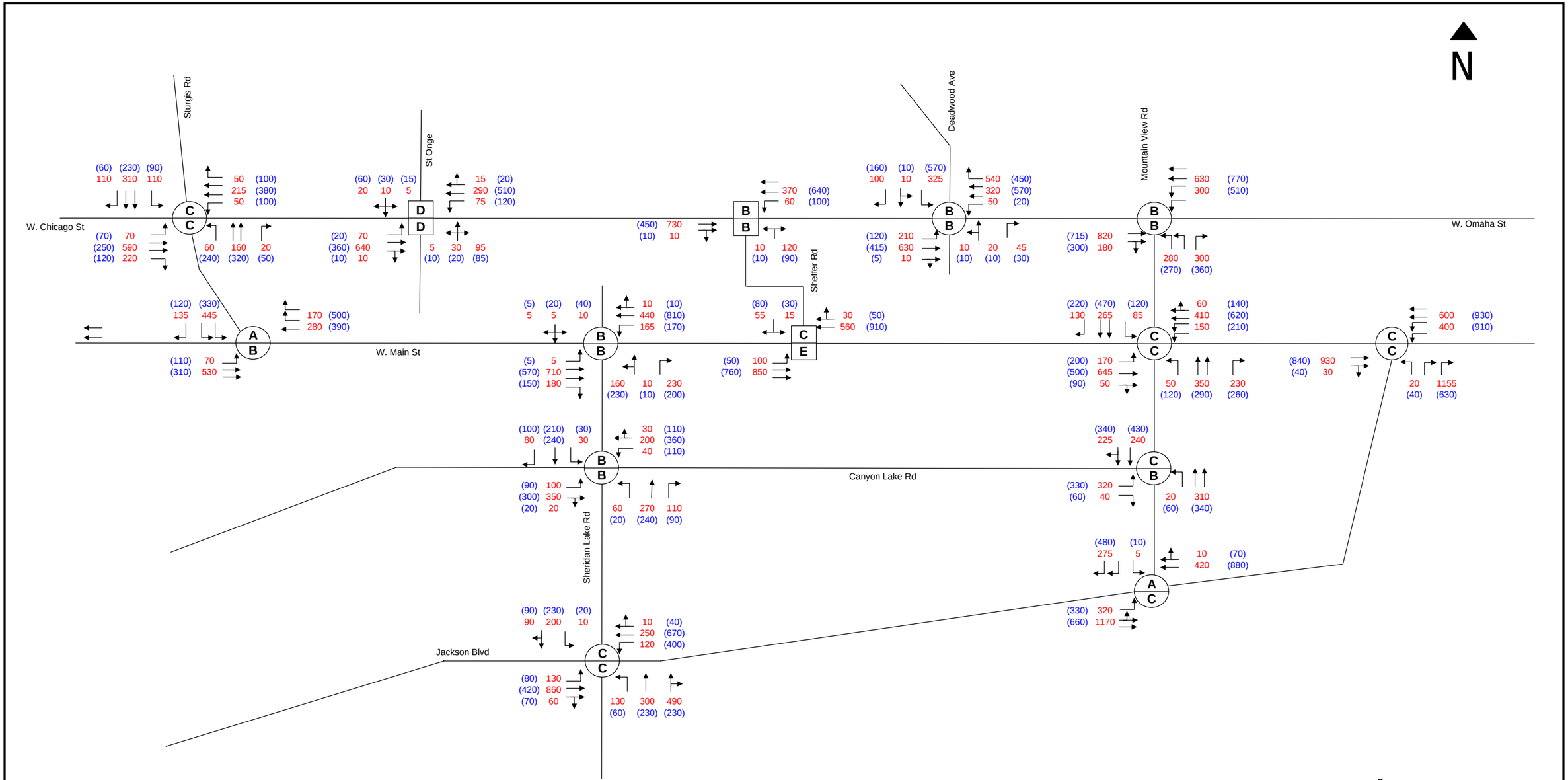
The existing conditions were also evaluated during the peak-season. LOS and delays from Synchro are shown in Table 3 and Figure 2. All signalized intersections operate at a LOS 'C' or better.
For the stop control intersections, a several approaches operate below LOS 'C', including:

- W. Chicago Street / St. Onge
  - NB Approach operates at LOS 'F' in AM and LOS 'D' in PM
  - SB Approach operates at LOS 'F' in both AM & PM
- W. Main Street / Sheffer Road
  - SB approach operates at LOS 'D' in AM and LOS 'F' in PM

The main cause of delays on these approaches is from left-turn and through movements. These movements are conflicting with the high volumes in the eastbound and westbound direction, and cause significant delays.

Table 3. Peak-Season LOS and delays

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Ave. Delay (sec)	LOS	Ave. Delay (sec)
W. Chicago Street/Sturgis Road	C	21.7	C	23.8
W. Main Street/Sturgis Road	B	10.7	B	16.0
Sheridan Lake Road/W. Main Street	C	22.1	B	19.6
Sheridan Lake Road/Canyon Lake Road	B	19.7	C	23.6
Sheridan Lake Road/Jackson Boulevard	C	29.4	C	33.5
W. Chicago Street/Deadwood Avenue	B	13.1	B	18.7
Mountain View Road/W. Chicago Street	C	20.7	C	21.8
Mountain View Road/W. Main Street	C	29.6	C	30.7
Mountain View Road/Canyon Lake Road	C	22.3	B	18.4
Mountain View Road/Jackson Boulevard	A	8.5	C	21.1
W. Main Street/Jackson Boulevard	C	33.0	C	23.9



Sources:
1. 2007 Turning Movement Volumes by HDR, February 2007
2. 2006 Seasonal Factors, SDDOT, February 2007

LEGEND

- X / X — AM Signalized Intersection Level of Service / PM Signalized Intersection Level of Service
- X / X — AM Unsignalized Intersection Worst Case Stop Controlled Approach Level of Service / PM Unsignalized Intersection Worst Case Stop Controlled Approach Level of Service
- ← Existing Geometrics
- XXX 2007 AM Peak Hour Volume
- (XXX) 2007 PM Peak Hour Volume

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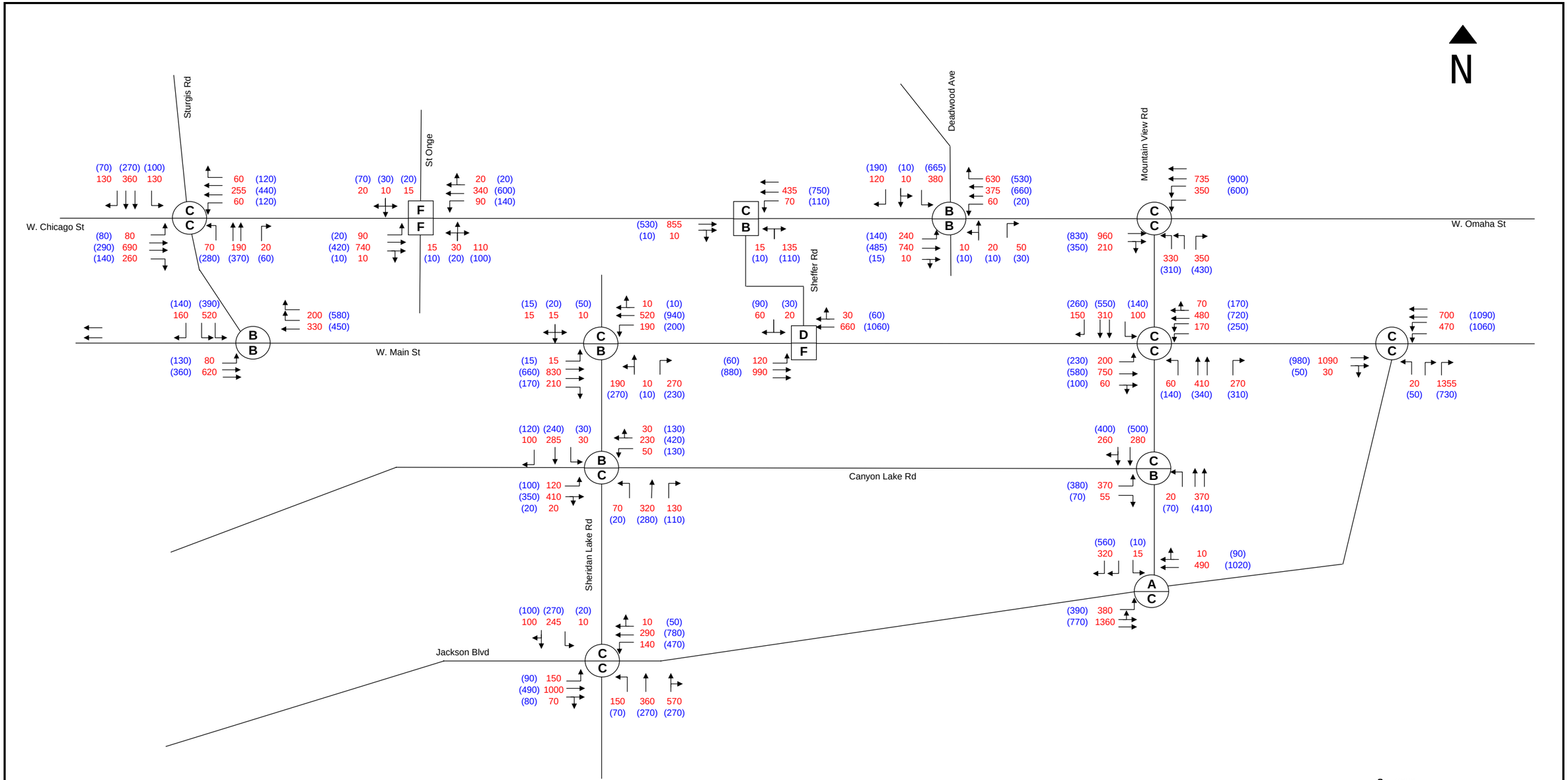
2007 Balanced Off-Season Peak Hour Volumes, Intersection Geometrics

Sheridan Lake Road, Rapid City SD

Date
March 2007

Figure
1



LEGEND

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2007 Balanced Peak-Season Peak Hour Volumes, Intersection Geometrics

Sheridan Lake Road, Rapid City SD

Date
March 2007

Figure
2